



WaveStar[®] BandWidth Manager, Release 4.1

User Operations Guide

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Issue 7
October 2001

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About this Information Product

Purpose This User Operations Guide (UOG) provides the following information about the WaveStar BandWidth Manager, Release 4.1:

- Detailed descriptive information to the circuit pack level
- Operation and provisioning tasks
- WaveStar craft interface terminal (WaveStar CIT) usage

Reason for reissue Major changes to this book since the Release 4.0 version (Issue 5) June, 2001 include adding material to cover new features, adding new tasks, and modifying tasks.

New Features

The following features are new to Release 4.1:

- Sub-Network Connection Protection (SNCP) in its general form (no physical ring required – any two network paths can be used)
- FTAM-FTP gateway function
- FTP directly through TCP/IP
- Duplicated RS-232 serial interface

New Tasks

The following tasks have been added:

- *T249: Download Software*
- *T250: Access and Provision RS-232 Ports*
- *T251: Creating/Modifying/Deleting a Download Profile*
- *T349: Provision Traffic on a Single BLSR/MS-SPRing*

- *T350: Provision Traffic on Multiple BLSRs/MS-SPRings*
- *T351: Provision Traffic on a BLSR/MS-SPRing with Time Slot Interchange*
- *T352: Turn Up a UPSR or SNCP Ring*
- *T353: Provision Traffic on a UPSR or SNCP*
- *T354: Move Eligible Pre-Release 4.0 Cross-Connections On-Shelf*
- *Appendix D: Power Down/Power Up an Optical Network Element*

Modified Tasks

The following tasks have been modified:

- *Task 244: Configure TCP/IP Parameters for a Network Element* changed to *Task 244: Configure TCP/IP Parameters for a Network Element (including FTAM-FTP Gateway)*, because the FTAM-FTP gateway is enabled on the TCP/IP screen
- *Task 304: Modify/Delete/Roll Cross-Connection* changed to *Task 304: Modify/Delete/Roll/Convert Cross-Connection* because converting to/from path-protected is now one of the options in the Cross Connection Wizard

Safety labels The following safety labels are used throughout this document:



DANGER

Indicates the presence of a hazard that will cause death or severe personal injury if the hazard is not avoided.



WARNING

Indicates the presence of a hazard that can cause death or severe personal injury if the hazard is not avoided.



CAUTION

Indicates the presence of a hazard that will or can cause minor personal injury or property damage if the hazard is not avoided. Caution is also used for property-damage-only accidents, including equipment damage, loss of software, or service interruption.

Intended audience

The WaveStar BandWidth Manager User Operations Guide is written primarily for technicians in the field of telecommunications and communications network providers.

Descriptive material in this document may be used by anyone desiring specific information or knowledge on the operational functions and features of the WaveStar BandWidth Manager.

Procedural material (tasks) in this document is written primarily for maintenance, operation, and provisioning personnel responsible for the operation and maintenance of the WaveStar BandWidth Manager.

Conventions used

Each group of tasks is numbered. A task number does not represent a task's priority, the level of privilege required for the task, or the sequence in which tasks should be performed.

The task numbering conventions for the respective task groups are as follows:

- Acceptance (100-199)
- Operation (200-299)
- Circuit Order/Provisioning (300-399)
- Trouble-Clearing (500-599)— these only exist in the AMTCG
- Supporting (700-799)

For example, a task numbered 303 is a circuit order/provisioning task. A task numbered 206 is an operations task.

Related documentation

The following table lists the documents included in the WaveStar BandWidth Manager documentation set.

Table 1. WaveStar BandWidth Manager Documentation Set

Comcode	Document Number	Title
NA	365-370-100	<i>WaveStar BandWidth Manager Installation Manual</i>
109 128 090	365-370-101 R4.1	<i>WaveStar BandWidth Manager Applications and Planning Guide</i>
109 142 315	365-370-133	<i>WaveStar BandWidth Manager TL-1 Message Details (formerly the Operations System Engineering Guide)</i>
109 128 108	365-370-109 R4.1	<i>WaveStar BandWidth Manager User Operations Guide</i>
109 128 116	365-370-110 R4.1	<i>WaveStar BandWidth Manager Alarm Messages and Troubleclearing Guide</i>
109 153 866	CD-ROM	<i>WaveStar BandWidth Manager Release 4.1 Documents</i>

Laser Safety Information

Lightwave/lightguide systems, their associated test sets, and similar operating systems use semiconductor laser transmitters that emit infrared (IR) light at wavelengths between approximately 800 nanometers (nm) and 1600 nm. The emitted light is above the red end of the visible spectrum, which is normally not visible to the human eye. Although radiant energy at near-IR wavelengths is officially designated invisible, some people can see the shorter wavelength energy even at power levels several orders of magnitude below any that have been shown to cause injury to the eye.

Conventional lasers can produce an intense beam of monochromatic light. The term monochromatic light means a single wavelength output of pure color that may be visible or invisible to the eye. A conventional laser produces a small-size beam of light, and because the beam size is small the power density (also called irradiance) is very high.

Consequently, lasers and laser products are subject to federal and applicable state regulations as well as international standards for their safe operation.

A conventional laser beam expands very little over distance or is said to be very well collimated. Thus, conventional laser irradiance remains relatively constant over distance. However, lasers used in lightwave systems have a large beam divergence, typically 10 to 20 degrees. Here, irradiance obeys the inverse square law (doubling the distance reduces the irradiance by a factor of 4) and rapidly decreases over distance.

Lasers and eye damage

The optical energy emitted by laser and high-radiance LEDs in the 400-1400 nm range may cause eye damage if absorbed by the retina. When a beam of light enters the eye, the eye magnifies and focuses the energy on the retina magnifying the irradiance. The irradiance of the energy that reaches the retina is approximately 10⁵ or 100,000 times more than at the cornea and, if sufficiently intense, may cause a retinal burn.

The damage mechanism at the wavelengths used in telecommunications is thermal in origin, for example, damage caused by heating. Therefore, a specific amount of energy is required for a definite time to heat an area of retinal tissue. Damage to the retina occurs only when one looks at the light sufficiently long that the product of the retinal irradiance and the viewing time exceeds the damage threshold. Optical energies above 1400 nm cause surface and skin burns and do not affect the retina. The thresholds for injury at wavelengths greater than 1400 nm are significantly higher than for wavelengths in the retinal hazard region.

Classification of lasers

Manufacturers of lasers and laser products in the United States are regulated by the Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) under 21 CFR 1040. These regulations require manufacturers to certify each laser or laser product as belonging to one of four major Classes: I, II, IIa, IIIa, IIIb, or IV. The International Electro-technical Commission (IEC) is an international standards body that writes laser safety standards. Classification schemes are similar with Classes divided into Classes 1, 2, 3A, 3B, and 4. Lasers are classified according to the accessible emission limits and

their potential for causing injury. Lightwave systems are generally classified as Class I/1, because, under normal operating conditions, all energized laser transmitting circuit packs are terminated on optical fibers which enclose the laser energy with the fiber sheath forming a protective housing. Also, covers are in place over the circuit pack shelves. The circuit packs themselves, however, may be FDA/CDRH Class I or IIb or IEC Class 1, 3A, or 3B.

Lightwave safety precautions

In its normal operating mode, a lightwave system is totally enclosed and presents no risk of eye injury. It is a Class I/1 system under the FDA/CDRH and IEC classifications.

The lightguide cables that interconnect various components of a lightwave system can disconnect or break, and may expose people to lightwave emission. Also, certain measures and maintenance procedures may expose the technician to emission from the semiconductor laser during installation and servicing. Unlike more familiar laser devices, such as solid-state and gas lasers, the emission pattern of a semiconductor laser results in a highly divergent beam. In a divergent beam, the irradiance (power density) decreases rapidly with distance. The greater the distance, the less energy will enter the eye and the less potential risk for eye injury. Inadvertently viewing an unterminated fiber or damaged fiber with the unaided eye at distances greater than 5 to 6 inches normally will not cause eye injury provided the power in the fiber is less than a few milliwatts at the shorter wavelengths and a few tens of milliwatts at the longer wavelengths. However, damage may occur if an optical instrument such as a microscope, magnifying glass, or eye loupe is used to stare at the energized fiber end.

Use of controls, adjustments and procedures other than those specified herein may result in hazardous laser radiation exposure.

Safety precautions for enclosed systems

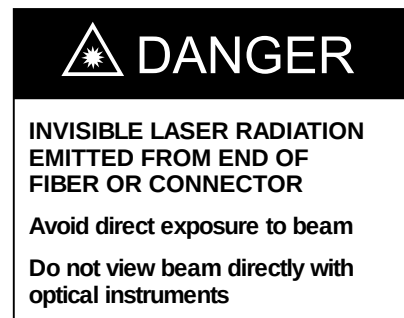
Under normal operating conditions, lightwave transmission systems are completely enclosed; nonetheless, the following precautions should be observed:

- Because of the potential for eye damage, technicians should not stare into optical connectors or broken fibers.
- Under no circumstance should lightwave/lightguide operations be performed by a technician before satisfactorily completing an approved training course.

- Since viewing lightwave emission directly in excess of Class I/1 limits with an optical instrument such as an eye loupe greatly increases the risk of eye damage, an appropriate label(s) must appear in plain view, in close proximity to the optical port, on the terminal equipment.

Figure 1-1 illustrates the FDA Class IIb non-interlocked protective housing label.

Figure 1-1 Protective Housing Label



NC-USM-111

Safety precautions for unenclosed systems

During service, maintenance, or restoration, a lightwave transmission system is considered unenclosed. Under these conditions, follow these practices:

- Only authorized, trained personnel shall be permitted to do service, maintenance, and restoration. Avoid exposing the eye to emissions from unterminated, energized optical connectors at close distances. Laser modules associated with the optical ports of laser circuit packs are typically recessed, which limits the exposure distance. Optical port shutters and automatic power reduction (APR) are engineering controls that are also used to limit the emissions. However, technicians removing or replacing laser circuit packs should not stare or look directly into the optical port with optical instruments or magnifying lenses. (Normal eye wear or indirect viewing instruments, such as a Find-R-Scope, are not considered magnifying lenses or optical instruments.)
- Only authorized, trained personnel should use the lightwave test equipment during installation or servicing since this equipment contains semiconductor lasers. [Some examples of lightguide test equipment are Optical Time Domain Reflectometers (OTDRs), Hand-Held Loss Test Sets, and Feature Finders.]

- Under no circumstances shall any personnel scan a fiber with an optical test set without verifying that all lightwave sources on the fiber are turned off.
- All unauthorized personnel shall be excluded from the immediate area of lightwave transmission systems during installation and service.

Consult *ANSI Z136.1*, American National Standard for Safe Use of Lasers in the United States or outside the United States, IEC-60825, Part 2 for guidance on the safe use of optical fiber optic communication systems in the workplace.

Electrostatic Discharge (ESD) Considerations

This section describes the precautions required because of ESD.

Circuit pack/port unit handling precautions

Industry experience has shown that all integrated circuit packs can be damaged by static electricity that builds up on work surfaces and personnel. The static charges are produced by various charging effects of movement and contact with other objects. Dry air allows greater static charges to accumulate. Higher potentials are measured in areas with low relative humidity, but potentials high enough to cause damage can occur anywhere.

Observe the following precautions when handling circuit packs/units to prevent damage by electrostatic discharge:

- Assume all circuit packs contain solid-state electronic components that can be damaged by ESD.
- When handling circuit packs/units (storing, installing, removing, etc.) or when working on the backplane, always wear a grounded wrist strap or wear a heel strap and stand on a grounded, static-dissipating floor mat.
- Handle all circuit packs/units by the faceplate or latch and by the top and bottom outermost edges. Never touch the components, conductors, or connector pins.
- Observe all warning labels on bags and cartons. Whenever possible, do not remove circuit packs/units from antistatic packaging until ready to insert them into slots.
- If possible, open all circuit packs/units at a static-safe work position, using properly grounded wrist straps and static-dissipating table mats.
- Always store and transport circuit packs/units in static-safe packaging. Shielding is not required unless specified.

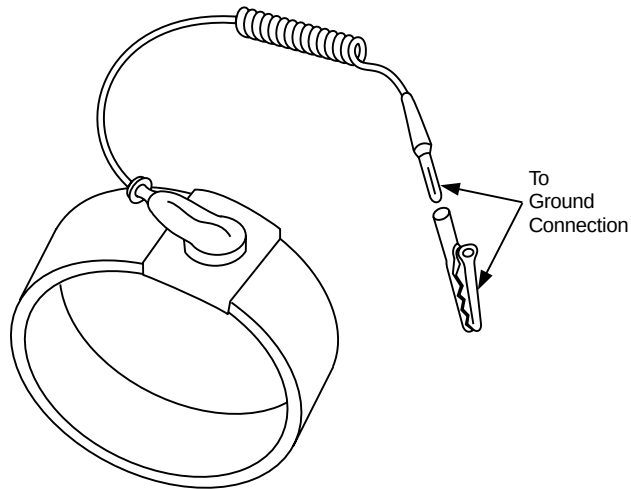
- Keep all static-generating materials such as food wrappers, plastics, and *Styrofoam*® containers away from all circuit packs/units. When removing circuit packs/units from a cabinet, immediately place the circuit packs/units in static-safe packages.
- Whenever possible, maintain relative humidity above 20 percent.
- Always keep the electromagnetic interference (EMI)/ESD protective front covers on the shelves except during an upgrade or maintenance procedure. Once a circuit pack/unit is replaced in the shelf, immediately close the front cover.

Important! Any connectors on the shelf interconnection panel that are not cabled should be fitted with a plastic dust cap to provide ESD protection.

Static control wrist straps

To reduce the possibility of ESD damage, shelves are equipped with grounding jacks to enable personnel to ground themselves using wrist straps (Figure 1-2), while handling circuit packs/units or working on a shelf. The wrist straps should be checked periodically with a wrist strap tester to ensure that they are working properly.

Figure 1-2 Static Control Wrist Strap



NC-USM-110

Important! The grounding jacks for connection of wrist straps are located on each user panel and the rear of the equipment bay. These jacks are labeled.

Important safety instructions

READ AND UNDERSTAND ALL INSTRUCTIONS.

When using this telecommunication equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons, including the following:

1. Follow all warnings and instructions marked on the product.
2. Slots and openings in this product at the back or bottom are provided for ventilation. To protect it from overheating, these openings must not be blocked or covered.
3. Opening or removing rear covers or sheet-metal parts may present exposure to high current or electrical energy levels, or to other risks.
4. Never push objects of any kind into this product through slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock. Never spill liquid of any kind on the product.
5. Refer servicing to qualified service personnel.
6. Use caution when installing and modifying telecommunications lines.
7. Never install telecommunication wiring during a lightning storm.
8. Never install telecommunication jacks in wet locations unless the jack is specifically designed for wet locations.
9. Never touch uninsulated telecommunication wires or terminals unless the telecommunication line has been disconnected at the network interface.
10. Installation must include an independent frame ground conductor to building ground. Grounding/bonding circuit continuity is vital for safe operation of this equipment. Never operate with grounding/bonding conductor disconnected.
11. This product has two -48 V DC input power feeders. Disconnecting one power feeder will not de-energize the product. To reduce the risk of injury, disconnect both power supply cables when removing power from the system.
12. Metallic telecommunication interfaces should not leave the building premises unless connected to telecommunication devices providing primary and secondary protection, as applicable.
13. For continued protection against risk of fire, replace only with same type and rating of fuse.

14. Use only Lucent Technologies manufactured, recognized circuit packs/units/modules.
15. This equipment is intended for installation in Restricted Access Locations where access is controlled or where access can only be gained by service personnel with a key or tool. Access to this equipment is restricted to qualified service personnel only.
16. Power the unit only from -48 V DC sources providing Safety Extra Low Voltage (SELV) outputs.
17. This equipment must be provided with a readily accessible input power disconnect device as part of the building installation (such as a main power disconnect switch or external circuit breaker).

SAVE THESE INSTRUCTIONS.

**Description of
documentation set**

This section briefly describes the documents that are included in the WaveStar BandWidth Manager documentation set.

Installation Manual

The *WaveStar BandWidth Manager Installation Manual* is a step-by-step guide to system installation and setup. It also includes information needed for pre-installation site planning and post-installation acceptance testing.

Applications and Planning Guide

The *WaveStar BandWidth Manager Applications and Planning Guide* (APG) is for use by network planners, analysts and managers. It is also for use by the Lucent Account Team. It presents a detailed overview of the system, describes its applications, gives planning requirements, engineering rules, ordering information, and technical specifications.

User Operations Guide

The *WaveStar BandWidth Manager User Operations Guide* provides step-by-step information for use in daily system operations. The manual demonstrates how to perform system provisioning, operations, and administrative tasks.

Alarm Messages and Trouble Clearing Guide

The *WaveStar BandWidth Manager Alarm Messages and Trouble Clearing Guide* provides detailed information on maintenance and trouble clearing, a list of the systems's alarm messages, and procedures for routine maintenance, troubleshooting, diagnostics, and component replacement.

TL-1 Messaging Guide

The *WaveStar BandWidth Manager TL-1 Messaging Guide* provides detailed information on TL1 commands, messages, and error codes.

Document assumptions	This document assumes that its readers have an understanding of the following: • Basic principles of telecommunication transmission • Common telecommunication and system terminology (a glossary is provided in this manual to assist you) • Test sets and tools used in the telecommunication industry • Local operations and functional procedures of your company • Personal computer (PC) operation, common PC terminology, and navigational procedures in a windows-style user interface
User interface to system	Users interact with the WaveStar BandWidth Manager system using a PC and a windows-like graphical user interface (GUI). The GUI is called the WaveStar Craft Interface Terminal (WaveStar CIT), which permits you to perform system operations such as administration, provisioning, fault management, and more.
Using the WaveStar CIT	Procedures or tasks presented in this document expect users to be familiar with operating the WaveStar CIT and navigating through the screens of information relating to a particular operation. The screens are designed to be straightforward and to contain all information relating to a particular operation. The tasks presented in this document rely heavily on the information provided in the screen displays. Therefore, it is imperative that a user read all the information provided in a particular screen before continuing an operational function. Appendix A in this manual provides with a WaveStar CIT tutorial, which guides you through basic operation of the GUI.
Training	Prerequisite training that will allow you to become proficient in understanding and operating the WaveStar BandWidth Manager is described later in this preface under the heading “Training.” This document expects a user to be familiar with the basic functions of the system before performing tasks that could damage the system, affect system operations, or impede communication traffic within the system. Understanding the descriptive material provided in this manual and attending the suggested training courses should allow you to perform the tasks necessary to operate and maintain the WaveStar BandWidth Manager system.

Chapter descriptions Table 2. highlights the type of information found in each chapter.

Table 2. Chapter Descriptions

Chapter	Title	Description
Preface	About This Document	Describes the book's purpose, intended audience, and organization. References related documentation and explains how to comment on this document.
1	System Introduction	Provides presents network application solutions, provides a high-level product overview, describes the product family, lists product features by release, and describes the WaveStar CIT.
2	Network Topologies	Describes the SONET and SDH applications possible with WaveStar BandWidth Manager.
3	Platform Descriptions	Describes the hardware and configurations available for WaveStar BandWidth Manager.
4	Operations Interfaces	Describes the operations interfaces that provide voice, data, alarm, and status information on service and equipment.
5	Circuit Pack/Port Unit Descriptions	Describes the purpose and functions for each circuit pack and port unit.
6	Control, Transmission, and Synchronization Interfaces	Discusses system control architecture, signal transmission, and synchronization. Introduces the synchronization tasks and provides supporting (noncritical) synchronization information.
7	Provisioning, Security, and Administration	Describes the administration and provisioning features of the WaveStar BandWidth Manager. Introduces the provisioning tasks and provides supporting (noncritical) provisioning information.
8	Performance Monitoring	Defines a series of reports that a user can initiate to determine network traffic concentrations and available network elements (NE) resources.
	Acceptance Tasks	Provides procedures that are used for accepting the system.
	Operation Tasks	Defines how to perform various routine activities to administer user accessibility and promote optimum functionality.
	Circuit Order/Provisioning Tasks	Provides procedures that are used when adding or deleting work order items.
	Supporting Tasks	Provides procedures for all supporting tasks you may perform using the WaveStar BandWidth Manager.
Appendix A	WaveStar CIT Tutorial	Introduces the WaveStar CIT software and provides information about common WaveStar CIT usage scenarios.
Appendix B	Technical Specifications	Provides SONET and SDH technical specifications for the system.

Chapter	Title	Description
Appendix C	Task Lists	Provides lists of tasks, one alphabetical and one by task number.
	Abbreviations and Acronyms	Explains common telecommunication abbreviations and acronyms.
	Glossary	Defines telecommunication terms.
	Index	Lists specific subjects and their corresponding page numbers.

The WaveStar CIT Tutorial in Appendix A will familiarize you with the interactions of the WaveStar CIT and the network element.

Important! Use the tutorial only with a WaveStar network element that is out of service.

Using the tasks

To find instructions for performing specific tasks, first determine what category--acceptance task, operations task, circuit order/provisioning task--the task you wish to perform would be found in. After determining the task category, go to the individual section labeled with that task category and search the section's Task Index for the type of task you're looking for.

For example, if you've been asked to create a new cross-connection:

1. Go to the "Circuit Order/Provisioning" task section of this manual.
2. Find the Circuit Order/Provisioning Task Index in front of the section.
3. Find the task element "Cross Connections — Create New... T 303."

Important! T 303 is the numerical reference for the task you want to perform.

Using task elements

Main tasks contained in the Acceptance, Operations, or Circuit Order/Provisioning task sections of this manual are classified as "task elements." Task elements are main tasks containing step-by-step instructions to accomplish a distinct user task.

All task elements in each task category are numbered and are listed in numerical order. However, you should never perform any of the tasks in numerical order unless directed by the main task you are performing.

Important! Perform all steps in a task in numeric order unless a step sends you to another task element, a supporting element (SE), or supporting task.

Unless otherwise instructed, if one task element sends you to another task element or supporting task, you must return to the first task element after you complete the second. After you have completed the first main task element, you have finished the task.

Using supporting elements

Supporting elements (SEs) contain details necessary to complete the step that referenced the SE in the main task. SEs allow new or infrequent users access to detailed information that may not be needed by experienced users. Supporting elements are used only within the main task that referenced the SE. Therefore, an SE is an integral part of the main task and has a similar numerical reference.

For example, in task T 303 there is a supporting element referenced from one of the steps. The supporting element is SE 303-1: View Equipment Details for Provisioned Status.

Important! When you complete a supporting element, you **MUST** return to the step in the task element that referenced the supporting element.

Using supporting tasks

Supporting tasks are not main task elements. Supporting tasks may be referenced from multiple main task elements to support a job function you are performing.

Go to a supporting task only when it is referred to by a main task element. Supporting tasks are not to be accessed directly except by very experienced personnel.

Important! Perform all steps in a supporting task in numeric order unless a step sends you to another task element, a supporting element (SE), or supporting task.

Unless otherwise instructed, if one task element sends you to another task element or supporting task, you must return to the first task element after you complete the second. After you have completed the first main task element, you have finished the task.

If/Then statements in a task or supporting element

If .../Then ... columns in a task element contain only one condition that is true in a table cell under the If ... column. You perform the action in the related table cell under the Then ... column. You then continue to the next sequential step or as directed by the action under the Then ... column.

Verifying actions

Sometimes you will be asked to verify that actions have occurred. This may take the form of a formal statement of the expected response. At other times, the instructions will merely state verify that... If the expected response is not observed and a specific trouble-clearing reference is not made, you should reference the “Trouble-Clearing Task Index” in the WaveStar BandWidth Manager Alarm Message and Troubleclearing Guide, 365-370-110 R4.1 to start trouble clearing.

Screen display and equipment designation fonts

The tasks in this manual use a MONOSPACE font to identify text on a screen or a response displayed from the network. A BOLD font identifies the lettering designations on panels, shelves, and circuit packs.

Documentation Ordering Information

This section describes how to order

- Additional copies of this document
- Electronic documentation (CD-ROMs)
- Product drawings

RBOC/BOC Customers

RBOC/BOC customers should process orders through your Company Documentation Coordinator.

Commercial Customers

Table 3, “Placing an Order” provides the information necessary for commercial customers to order standard documentation or request placement on the standing order list (for reissues of any document) by mail, internet, email, telephone, or fax.

Table 3. Placing an Order

Mailing, Internet and email Addresses	Telephone Numbers	Fax Numbers
Mailing address: Lucent Technologies Attention: Order Entry 2855 N. Franklin Road P.O. Box 19901 Indianapolis, IN 46219 Internet address: www.lucentdocs.com or www.lucent8.com email address for international orders: intlorders@lucent.com	From USA: 1-888-LUCENT8 (1-888-582-3688)	1-800-566-9568
	From Canada, North American Region (NAR): 1-317-322-6615	1-317-322-6699
	From Europe, the Middle East, Africa (EMEA Region); Asia/Pacific Region and China; and Caribbean/Latin America Region (CALA): 1-317-322-6416	1-317-322-6699

Ordering CD-ROMs

Documentation for WaveStar BandWidth Manager is available on CD-ROM. The following table lists the contacts for specific information about CD-ROM documentation.

Table 4. Ordering CD-ROM Documentation

IF you wish to...	THEN contact...
order an annual subscription	Your Account Executive. Lucent Technologies Customer Information Center. Contact information is provided in previous table.
obtain pricing information	
obtain a list of documents available on CD-ROM	

Ordering Drawings

To order any of the drawings listed in the following table, contact the Lucent Technologies Customer Information Center.

Available Drawings

The following table lists the available drawings. These drawings provide valuable product information.

Table 5. Product Drawings

Drawing Number	NEBS/ ETSI	Description	Note
Using ED9C280-28 with original cables			DA: Effective 6/01/02 Replaced by: ED9C280-12
801-802-001-2	NEBS	NEBS Original Footprint 3-Aisle Floor Plan Data Sheet (3-Bay Control/Switch Complex)	DA: Effective 4/01/02
801-802-001-3	NEBS	NEBS Original Footprint 4-Aisle Floor Plan Data Sheet (3-Bay Control/Switch Complex)	DA: Effective 4/01/02
801-802-001-4	ETSI	ETSI Original Footprint 3-Aisle Floor Plan Data Sheet (3-Bay Control/Switch Complex)	DA: Effective 4/01/02
801-802-001-5	ETSI	ETSI Original Footprint 4-Aisle Floor Plan Data Sheet (3-Bay Control/Switch Complex)	DA: Effective 4/01/02
801-802-001-10	NEBS	NEBS Original Footprint 3-Aisle Floor Plan Data Sheet (2-Bay Control/Switch Complex)	DA: Effective 6/01/02 Replaced by: 801-802-001-30
801-802-001-11	NEBS	NEBS Original Footprint 4-Aisle Floor Plan Data Sheet (2-Bay Control/Switch Complex)	DA: Effective 6/01/02 Replaced by: 801-802-001-31
801-802-001-12	ETSI	ETSI Original Footprint 3-Aisle Floor Plan Data Sheet (2-Bay Control/Switch Complex)	DA: Effective 6/01/02 Replaced by: 801-802-001-32
801-802-001-13	ETSI	ETSI Original Footprint 4-Aisle Floor Plan Data Sheet (2-Bay Control/Switch Complex)	DA: Effective 6/01/02 Replaced by: 801-802-001-33
Using ED9C280-11 for reduced footprints with reduced cables or ED9C280-13 for reduced footprints with reduced cables with the cable racking greater than 11.5 ft/3.5 m above the floor or for raised-floor platforms with cable-rack depths of greater than 1 ft/305 mm			Available 7/01/01
801-802-001-15	NEBS	NEBS Reduced Footprint 4-Aisle Floor Plan Data Sheet (2-Bay Control/Switch Complex)	Available 7/01/01

Drawing Number	NEBS/ ETSI	Description	Note
801-802-001-17	NEBS	NEBS Reduced Footprint 3-Aisle Floor Plan Data Sheet (2-Bay Control/Switch Complex)	Available 7/01/01
801-802-001-19	ETSI	ETSI Reduced Footprint 4-Aisle Floor Plan Data Sheet (2-Bay Control/Switch Complex)	Available 7/01/01
801-802-001-21	ETSI	ETSI Reduced Footprint 3-Aisle Floor Plan Data Sheet (2-Bay Control/Switch Complex)	Available 7/01/01
Using ED9C280-12 for standard footprints with reduced cables			Available 7/01/01
801-802-001-22	NEBS	NEBS Standard Footprint 3-Aisle Floor Plan Data Sheet (3-Bay Control/Switch Complex)	DA: Effective 4/01/02
801-802-001-23	NEBS	NEBS Standard Footprint 4-Aisle Floor Plan Data Sheet (3-Bay Control/Switch Complex)	DA: Effective 4/01/02
801-802-001-24	ETSI	ETSI Standard Footprint 3-Aisle Floor Plan Data Sheet (3-Bay Control/Switch Complex)	DA: Effective 4/01/02
801-802-001-25	ETSI	ETSI Standard Footprint 4-Aisle Floor Plan Data Sheet (3-Bay Control/Switch Complex)	DA: Effective 4/01/02
801-802-001-30	NEBS	NEBS Standard Footprint 3-Aisle Floor Plan Data Sheet (2-Bay Control/Switch Complex)	Available 7/01/01
801-802-001-31	NEBS	NEBS Standard Footprint 4-Aisle Floor Plan Data Sheet (2-Bay Control/Switch Complex)	Available 7/01/01
801-802-001-32	ETSI	ETSI Standard Footprint 3-Aisle Floor Plan Data Sheet (2-Bay Control/Switch Complex)	Available 7/01/01
801-802-001-33	ETSI	ETSI Standard Footprint 4-Aisle Floor Plan Data Sheet (2-Bay Control/Switch Complex)	Available 7/01/01
Control/Switch Complexes and Bays for Standard Footprint			

Drawing Number	NEBS/ ETSI	Description	Note
ED9C280-30	NEBS/ETSI	Control/Switch Complex: Three Bays	DA: Effective 4/01/02
ED9C280-60	NEBS/ETSI	Control/Switch Complex: Two Bays	
ED9C280-31	NEBS/ETSI	Universal I/O Bay	
ED9C280-39	NEBS/ETSI	10G I/O Bay	
ED9C280-39	NEBS/ETSI	10G/Universal I/O Bay	
ED9C280-65	NEBS/ETSI	SDH I/O Bay	
ED9C280-65	NEBS/ETSI	10G/SDH I/O Bay	
Control/Switch Complexes and Bays for Reduced Footprint			Available 7/01/01
ED9C280-60	NEBS/ETSI	Control/Switch Complex: Two Bays	Available 7/01/01
ED9C280-31	NEBS/ETSI	Universal I/O Bay	Available 7/01/01
ED9C280-39	NEBS/ETSI	10G I/O Bay	Available 7/01/01
ED9C280-39	NEBS/ETSI	10G/Universal I/O Bay	Available 7/01/01
ED9C280-65	NEBS/ETSI	SDH I/O Bay	Available 7/01/01
ED9C280-65	NEBS/ETSI	10G/SDH I/O Bay	Available 7/01/01
ED9C280-42	ETSI	ETSI Cable Management Bays	Available 7/01/01
Software			
ED9C280-40	NEBS/ETSI	WaveStar BandWidth Manager Software	

Methods of Payment

For commercial customers, use one of the following methods of payment:

- Credit card is required for orders totaling \$1000 or less. Visa, MasterCard, and American Express are accepted. Prepayment by check is also accepted.
- Orders totaling over \$1000 may be paid by credit card, check, or invoice upon receipt of a purchase order. Purchase orders may be faxed or mailed using the information in Table 3 - Placing an Order.

Orders placed by Lucent associates are billed to a cost center.

Training Information

To review the available courses or to enroll in a training course at one of Lucent's corporate training centers,

- Within the United States,
 - Visit <https://www.lucent-product-training.com>
 - Call **1-888-LUCENT8** (1-888-582-3688): *Prompt 2*.
- Outside the continental United States,
 - Visit <https://www.lucent-product-training.com>
 - Contact your in-country training representative
 - Call: **+1-407-767-2798**
 - Fax: **+1-407-767-2677**

To arrange for a suitcase session at your facility,

- Within the United States, call **1-888-LUCENT8** (1-888-582-3688): *Prompt 2*.
- Outside the continental United States,
 - Contact your in-country training representative
 - Call: **+1-407-767-2798**
 - Fax: **+1-407-767-2677**

Overview Course

This section describes TR3800 and TR3802.

Content

The WaveStar BandWidth Manager Overview Course (TR3800, SONET edition and TR3802, SDH edition) provides a detailed introduction to WaveStar BandWidth Manager, covering the features and benefits of the network solutions, equipment functions and requirements, and network planning.

Audience

Lucent marketing/sales personnel, customer network planners and engineers, product managers, technical consultants, and account representatives.

Course length

3 days

Operations and Maintenance Course

This section describes TR3801 and TR3803.

Content

The WaveStar BandWidth Manager Operations and Maintenance Course (TR3801, SONET and TR3803, SDH edition) includes detailed descriptions of initial turn-up and day-to-day operations and maintenance tasks, as well as emphasis on developing skills using the WaveStar BandWidth Manager User Operations Guide, 365-370-109 R4.1 and the WaveStar BandWidth Manager Alarm Messages and Troubleclearing Guide, 365-370-110 R4.1. The course covers the physical equipment and using the new GUI-based WaveStar CIT to provision equipment, enter cross-connections, perform administrative functions, run diagnostic tests, and perform manual protection switching.

Audience

Technicians, installers, maintenance engineers, technical support personnel, product evaluators, and anyone desiring operations and maintenance information for WaveStar BandWidth Manager.

Course length

5 days

Lucent Worldwide Services

Lucent Worldwide Services provides a full life-cycle of services and solutions to help you plan, design, implement, and operate your network in today's rapidly changing and complex environment.

Technical Support

Lucent Technologies provides the following Technical Support Services:

- Remote Technical Support (RTS) - remote technical support to troubleshoot and resolve system problems.
- On-site Technical Support (OTS) - on-site assistance with operational issues and remedial maintenance.
- Repair and Replacement (R&R) - technical support services for device repair/return or parts replacement.
- Lucent OnLine Customer Support - online access to information and services that can help resolve technical support requests.

Important! Technical Support Services are available 24 hours a day, 7 days a week.

Customers inside the United States and Canada

Technical Support Services can be reached at **+1-866-LUCENT8 (866-582-3688)**: *Prompt 1.*

Customers outside the United States

Technical Support Services can be reached at **+1-630-224-4672**:
Prompt 2.

Worldwide Services Web-Site

For additional information regarding Worldwide Services, refer to the Lucent Technologies' web-site at **<http://www.lucent.com/products>**

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1 System Introduction

Overview

Purpose This chapter provides detailed descriptions and illustrations of the WaveStar BandWidth Manager equipment.

Contents The following topics are discussed in this chapter:

Overview of WaveStar BandWidth Manager, Release 4.1	1 - 2
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Overview of WaveStar BandWidth Manager, Release 4.1

Overview WaveStar BandWidth Manager provides customers with creative and flexible solutions to network problems.

WaveStar BandWidth Manager WaveStar BandWidth Manager is a platform for bandwidth management and integrated 2-fiber and 4-fiber Bidirectional Line-Switch Ring (BLSR)/Multiple Section - Shared Protection Ring (MS-SPRing) applications, as well as Unidirectional Path-Switch Ring (UPSR) and Sub-Network Connection Protection (SNCP) ring applications. WaveStar BandWidth Manager is a modular networking system capable of integrating multiple interoffice transport and broadband digital cross-connect facilities into a single network element.

WaveStar BandWidth Manager is available in a 4608/1536 platform which provides a switch fabric capable of cross-connecting 4608 STS-1/1536 STM-1 equivalents.

Customer needs The major customer need addressed by the WaveStar BandWidth Manager is the need to provide a cost-effective, flexible, and upgradeable system. Other customer needs met by WaveStar BandWidth Manager include

- Reduced cost
- Greater add/drop termination capacity
- Efficient bandwidth management
- Relief of fiber exhaust on BLSRs/MS-SPRings
- Preservation of embedded fiber base
- Reduction in network costs

Central office consolidation

By using WaveStar BandWidth Manager, customers can

- Terminate multiple 2-fiber and 4-fiber BLSR/MS-SPRing lightwave facilities on a single WaveStar BandWidth Manager
- Conserve office space and minimize equipment expenses by using a next generation technology lightwave facility and a cross-connect consolidation design
- Increase network reliability by eliminating port units, cables, fibers and cross-connect bays normally required to move traffic between multiple stand-alone lightwave terminating facilities
- Simplify network management through centralized control of bandwidth management and lightwave provisioning within a single equipment platform

Multiple BLSR/MS-SPRing terminations

When WaveStar BandWidth Manager is integrated into a central office, the need for numerous stand-alone ADMs is eliminated. A single WaveStar BandWidth Manager is capable of performing cross-connects between rings and terminating multiple 2-fiber and 4-fiber BLSRs/MS-SPRings with the following benefits:

- Multiple nodes on independent
 - 2-fiber OC-192 BLSRs/STM-64 MS-SPRings
 - 4-fiber OC-192 BLSRs/STM-64 MS-SPRings
 - 2-fiber OC-48 BLSRs/STM-16 MS-SPRings
 - 4-fiber OC-48 BLSRs/STM-16 MS-SPRings
- Lower rate tributary port units may be connected to the OC-192/STM-64 and OC-48/STM-16 facilities through the either the main or shelf-based cross-connect fabric
- BLSR/MS-SPRing through-connections are handled in the shelf-based switch fabrics and do not consume capacity of the main switch fabric
- Modular I/O (shelf and port unit) growth

Flexible bandwidth management

WaveStar BandWidth Manager provides flexible bandwidth management by using

- Integrated broadband cross-connect fabric that allows efficient movement and re-routing of traffic among OC-192/STM-64, OC-48/STM-16, OC-12/STM-4, OC-3/STM-1, DS3/EC-1, and STM-1e facilities on different shelves
- A 4608/1536 capacity cross-connect fabric with highly reliable electronic (rather than manual) cross-connections and OAM&P functions
- Provisionable DS3, STS-1/VC-3, STS-3c/VC-4, STS-12c/VC-4-4c, and STS-48c/VC-4-16c cross-connect capabilities

Product interworking (transmission and communication)

WaveStar BandWidth Manager supports transmission and communication (via DCC) interworking between

- WaveStar BandWidth Managers over
 - 2-fiber OC-48 BLSRs/STM-16 MS-SPRings
 - 2-fiber OC-192 BLSRs/STM-64 MS-SPRings
 - 4-fiber OC-48 BLSRs/STM-16 MS-SPRings
 - 4-fiber OC-192 BLSRs/STM-64 MS-SPRings
 - 4-fiber STM-16 MS-SPRings with transoceanic protocol
 - 4-fiber STM-64 MS-SPRings with transoceanic protocol
 - OC-48 UPSRs
 - OC-192/STM-64 (1+1 protected interfaces)
 - OC-48/STM-16 (1+1 protected interfaces)
 - OC-12/STM-4 (1+1 protected interfaces)
 - OC-3/STM-1 (1+1 protected interfaces)
- WaveStar BandWidth Manager and WaveStar TDM 2.5G/10G (2-Fiber), Release 5.0 over 2-fiber OC-192 BLSRs, 2-fiber OC-48 BLSRs, as well as OC-3 and OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive), and OC-48 interfaces: 1+1 protected (unidirectional, non-revertive)
- WaveStar BandWidth Manager and FT-2000 OC-48 Add/Drop Rings Terminal, Release 9.1 over 2-fiber OC-48 BLSRs, as well as OC-3 and OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)

- WaveStar BandWidth Manager and Fujitsu FLM 150 ADM, Release 15 over OC-3 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
- WaveStar BandWidth Manager and Fujitsu FLM 2400 ADM, Release 14.2 and 15 over 2-fiber OC-48 BLSRs and OC-48 UPSRs
- WaveStar BandWidth Manager and DDM-2000 OC-3 Multiplexer, Release 13 over OC-12 UPSRs, as well as OC-3 and OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
- WaveStar BandWidth Manager and DDM-2000 OC-12 Multiplexer, Release 7 over OC-12 UPSRs, as well as OC-3 and OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
- WaveStar BandWidth Manager and Metropolis™ DMX Access Multiplexer, Release 1.1 over OC-48 UPSRs
- WaveStar BandWidth Manager and WaveStar TDM 10G (STM-64), Release 3.0 over 2-fiber STM-16 and STM-64 MS-SPRings, as well as STM-1 and STM-4 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive) and STM-16 interfaces: 1+1 protected (unidirectional, non-revertive)
- WaveStar BandWidth Manager and WaveStar ADM 16/1 (Ruby II Release) over 2-fiber STM-16 MS-SPRings and STM-4 and STM-16 SNCs, as well as STM-1 and STM-4 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive and bidirectional, non-revertive) and STM-16 interfaces: 1+1 protected (unidirectional, non-revertive and bidirectional, non-revertive)
- WaveStar BandWidth Manager and Nortel Networks TransportNode TN-4T STM-4 Terminal Multiplexer, H1.00, over STM-4 SNCs, as well as STM-1 and STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
- WaveStar BandWidth Manager and Nortel Networks TransportNode TN-16X, Release H2.00, over STM-4 and STM-16 SNCs, as well as STM-1, STM-4, and STM-16 interfaces; 1+1 protected (bidirectional, non-revertive)
- WaveStar BandWidth Manager and Marconi SMA 16/4, Series 3, over STM-4 and STM-16 SNCs, as well as STM-1, STM-4, and STM-16 interfaces: 1+1 protected (bidirectional, non-revertive)

Transmission interfacing

WaveStar BandWidth Manager supports optical transmission interfacing between

- WaveStar BandWidth Manager and WaveStar Optical Line System (OLS) 40G/80G over OC-48/STM-16 optics via the OC48/STM16/DWDM01-16 port units
- WaveStar BandWidth Manager and WaveStar Optical Line System (OLS) 400G, Release 3 over OC-192/STM-64 optics via the OC192/STM64/WDM port units (40 wavelengths) and OC-48/STM-16 optics via the OC48/STM16/WDM port units (80 wavelengths)
- WaveStar BandWidth Manager and Lucent (Ascend) GX 550 Multiservice WAN, Release Jade M2 (2.2.1.2) Switch over OC-48/STM-16 and OC-12/STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
- WaveStar BandWidth Manager and Lucent (Ascend) CBX 500 Multiservice WAN, Release Jade M2 (4.2) Switch over OC-12/STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
- WaveStar BandWidth Manager supports optical transmission interfacing between Cisco ONS 15454 system and WaveStar BandWidth Manager over OC-48 UPSRs, as well as OC-3 and OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
- WaveStar BandWidth Manager and Marconi MSH 84/86, Series 3, over STM-1, STM-4, and STM-16 interfaces: 1+1 protected (bidirectional, non-revertive)

Reference

For more information about WaveStar BandWidth Manager network application solutions, refer to Chapter 2, “Network Topologies.”



The WaveStar Product Family

Overview The WaveStar product family is designed to offer telecommunications service providers advanced services and revenue-generating capabilities.

Lucent products Lucent Technologies offers the industry's widest range of high-quality transport systems designed to provide total network solutions.

Family members The WaveStar product family offers a series of products designed to enhance customers' networks. The product family includes

- WaveStar® BandWidth Manager (SONET/SDH)
- WaveStar® TDM 2.5G/10G (2-Fiber) (SONET)
- WaveStar® TDM 10G (STM-64) (SDH)
- WaveStar® Optical Line System (OLS) 40G (SONET)
- WaveStar® Optical Line System (OLS) 80G (SDH)
- WaveStar® Optical Line System (OLS) 1.6T (400/800G) (SONET/SDH)
- WaveStar® OptiGate™ Subsystem (SONET/SDH)
- WaveStar® LambdaRouter (256/1024)
- WaveStar® LambdaUnite
- WaveStar® LambdaXtreme
- WaveStar® AM 1 (SDH)
- WaveStar® TM 1 (SDH)
- WaveStar® Add/Drop Multiplexer 16/1 (SDH)
- WaveStar® Add/Drop Multiplexer 4/1 (SDH)
- WaveStar® DACS 4/4/1 (SDH)
- WaveStar® Digital Video Systems (SONET/SDH)
- WaveStar® ITM-SC (SONET/SDH)
- WaveStar® Network Management System (SONET/SDH)
- WaveStar® SNMS (SONET/SDH)
- WaveStar® TransLAN™ Card (SONET/SDH)

Family features

The WaveStar product family offers customers

- SONET-based and SDH-based services
- Scalable cross-connect, multiplex, and transport services
- Network consolidation and reliability
- Interoperability with other vendors' products
- Coordination of network element and element management services



4608/1536 Platform

Overview This section briefly introduces the 4608/1536 platform available in WaveStar BandWidth Manager.

4608/1536 platform description With the WaveStar BandWidth Manager 4608/1536 platform, Lucent enables customers to add capacity to their network as needed without wasting equipment and incurring unnecessary costs. (4608/1536 represents the size of the platform's switch, 4608 STS-1/1536 STM-1 equivalents.)

Because the different I/O Bays house different types of shelves (which may include one to four SWIF pairs), the number of equipped I/O Bays in a 4608/1536 local I/O Complex may vary. The 4608/1536 platform can support a maximum of 48 SWIF pairs. In R4.1, the 4608/1536 platform can support a maximum of 36 I/O Shelves with a maximum of 48 SWIF pairs.

The WaveStar BandWidth Manager 4608/1536 platform includes either a 2-bay or 3-bay Control/Switch Complex, an I/O Complex (maximum of 36 I/O Shelves), and the required cable management bays.

Control/Switch Complex A 2-bay or 3-bay Control/Switch Complex provides fully-duplicated main control, memory, and timing for the platform and a fully-duplicated, single-stage, N^2 , 4608x4608/1536x1536 cross-connect switch fabric.

Important! The reduced footprint floor plans with the reduced cabling for 2-bay Control/Switch Complexes (Figure 1-1 [NEBs] and Figure 1-2 [ETSI]) are available as of July 1, 2001.

Effective June 1, 2002, the standard footprint (Figure 1-3 and Figure 1-5 [NEBs] and Figure 1-4 and Figure 1-6 [ETSI]) will be Discontinued Availability (DA).

Contact your Account Executive for more information.

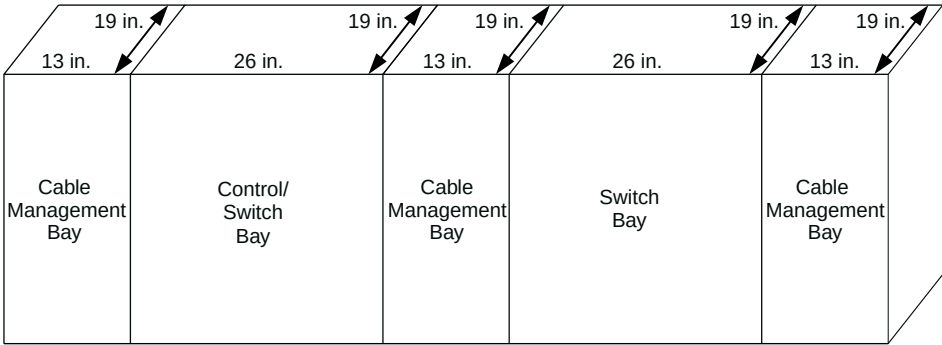
2-bay Control/Switch Complex

A 2-bay Control/Switch Complex comprises one Control/Switch Bay, one Switch Bay, and three required cable management bays.

Figure 1-1 (NEBs) and Figure 1-2 (ETSI) illustrate the 2-bay Control/Switch Complexes for the reduced footprints.

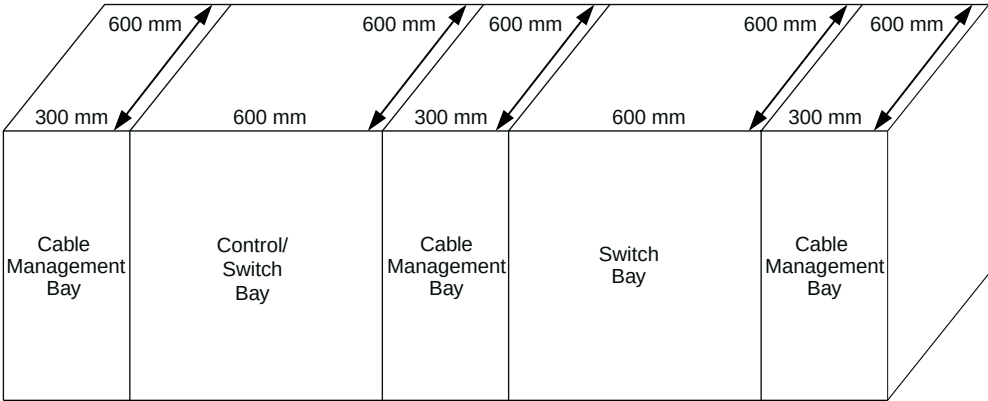
Important! Because the 3-bay Control/Switch Complexes will be DA effective April 1, 2002, the reduced footprint floor plans will only be available with 2-bay Control/Switch Complexes. Please contact you account executive for more information.

Figure 1-1 NEBS 2-Bay Control/Switch Complex - Reduced Footprints



wbwm04257

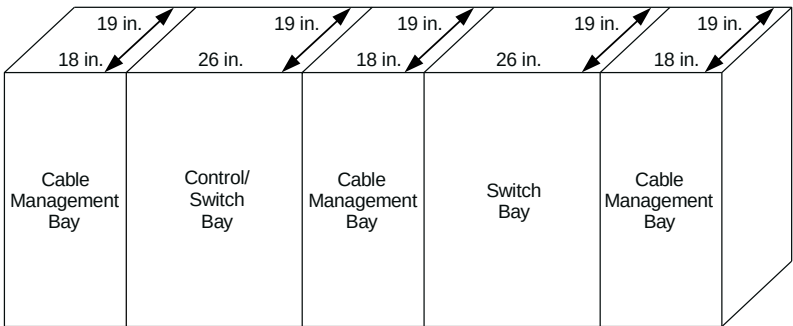
Figure 1-2 ETSI 2-Bay Control Switch Complex - Reduced Footprints



wbwm04258

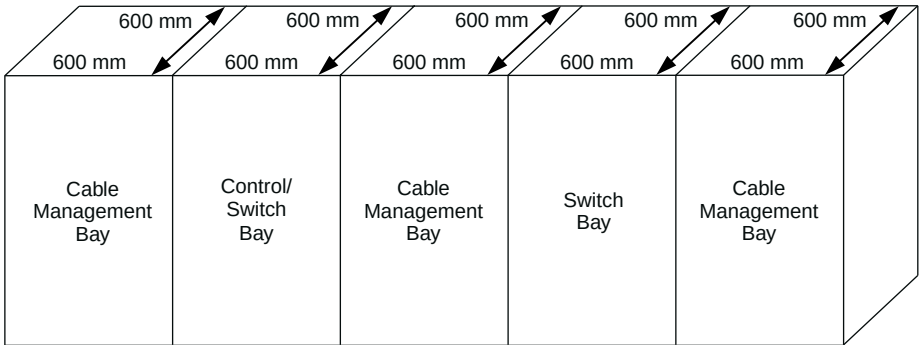
Figure 1-3 (NEBs) and Figure 1-4 (ETSI) illustrate the 2-bay Control/Switch Complexes for the standard footprints.

Figure 1-3 NEBS 2-Bay Control/Switch Complex -Standard Footprints



wbwm04057

Figure 1-4 ETSI 2-Bay Control Switch Complex - Standard Footprints



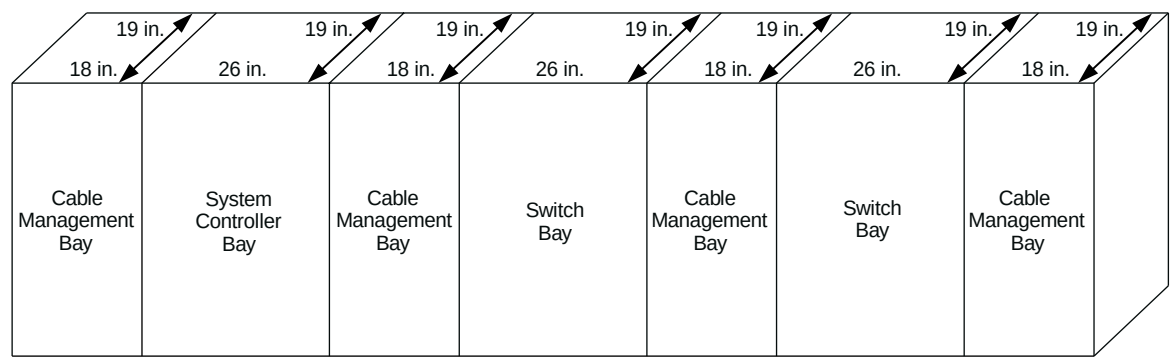
wbwm04158

3-bay Control/Switch Complex

A 3-bay Control/Switch Complex comprises one System Controller Bay, two Switch Bays, and four required cable management bays.

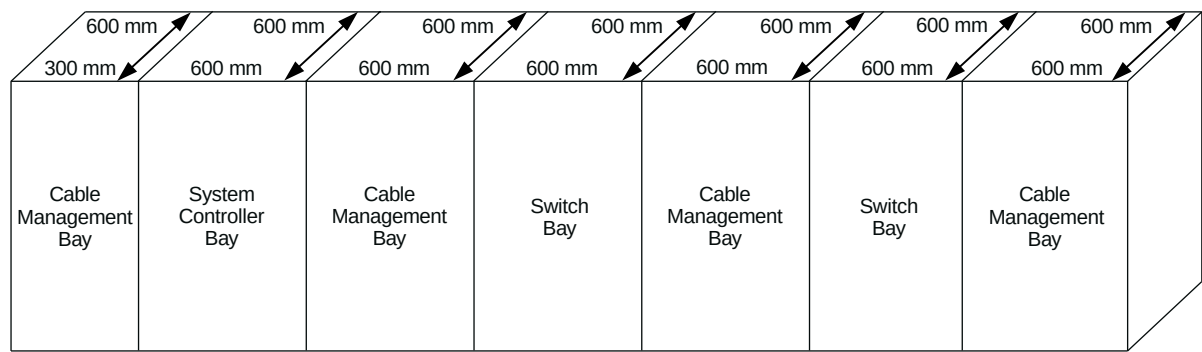
Figure 1-5 (NEBs) and Figure 1-6 (ETSI) illustrate the 3-bay Control/Switch Complexes for the standard footprints.

Figure 1-5 NEBS 3-Bay Control/Switch Complex - Standard Footprints



wbwm04053

Figure 1-6 ETSI 3-Bay Control/Switch Complex - Standard Footprints



wbwm04152

I/O Complex

An I/O Complex provides electrical and optical transmission interfaces that are housed in Universal I/O Shelves, STM1e Universal I/O Shelves, and/or 10G I/O Shelves.

All transmission port units (hardware) are capable of transmitting and receiving SDH-rate and SONET-rate signals. The WaveStar BandWidth Manager software allows you to provision the port unit to accept the appropriate type of signal.

Universal I/O Shelves

The Universal I/O Shelves are capable of terminating

- 2-fiber OC-48 BLSRs/STM-16 MS-SPRings via OC48/STM16 port units
- 4-fiber OC-48 BLSRs/STM-16 MS-SPRings (open and closed) via OC48/STM16 port units
- 4-fiber STM-16 MS-SPRings with transoceanic protocol/shortened loop via the OC48/STM16 port units
- OC-48 and OC-12 Unidirectional Path-Switch Rings (UPSRs)
- STM-N Sub-Network Connection Protection (SNCP) rings
- Long reach OC-48/STM-16 signals via OC48/STM16 port units
- Short and long reach OC-12/STM-4 signals via OC12/STM4 port units
- Short and long reach OC-3/STM-1 signals via OC3/STM1 port units
- DS3 and EC-1 signals via DS3EC1/8 port units

SDH Universal I/O Shelves

The SDH Universal I/O Shelves are capable of terminating

- 2-fiber OC-48 BLSRs/STM-16 MS-SPRings via OC48/STM16 port units
- 4-fiber OC-48 BLSRs/STM-16 MS-SPRings (open and closed) via OC48/STM16 port units
- 4-fiber STM-16 MS-SPRings with transoceanic protocol (open and closed) via OC48/STM16 port units
- OC-48 and OC-12 unidirectional path-switch rings (UPSRs)
- STM-N Sub-Network Connection Protection (SNCP) rings
- Long reach OC-48/STM-16 signals via OC48/STM16 port units
- Short and long reach OC-12/STM-4 signals via OC12/STM4 port units
- Short and long reach OC-3/STM-1 signals via OC3/STM1 port units
- STM-1e signals via STM1E/4 port units

10G I/O Shelves

The 10G I/O Shelves are capable of terminating

- 2-fiber OC-192 BLSRs/STM-64 MS-SPRings via OC192/STM64 port units
- 4-fiber OC-192 BLSRs/STM-64 MS-SPRings (open and closed) via OC192/STM64 port units
- 4-fiber STM-64 MS-SPRings with transoceanic protocol (open and closed) via OC192/STM64 port units
- Intermediate and extended intermediate reach OC-192/STM-64 signals via OC192/STM64 port units

Spacers between I/O Bays

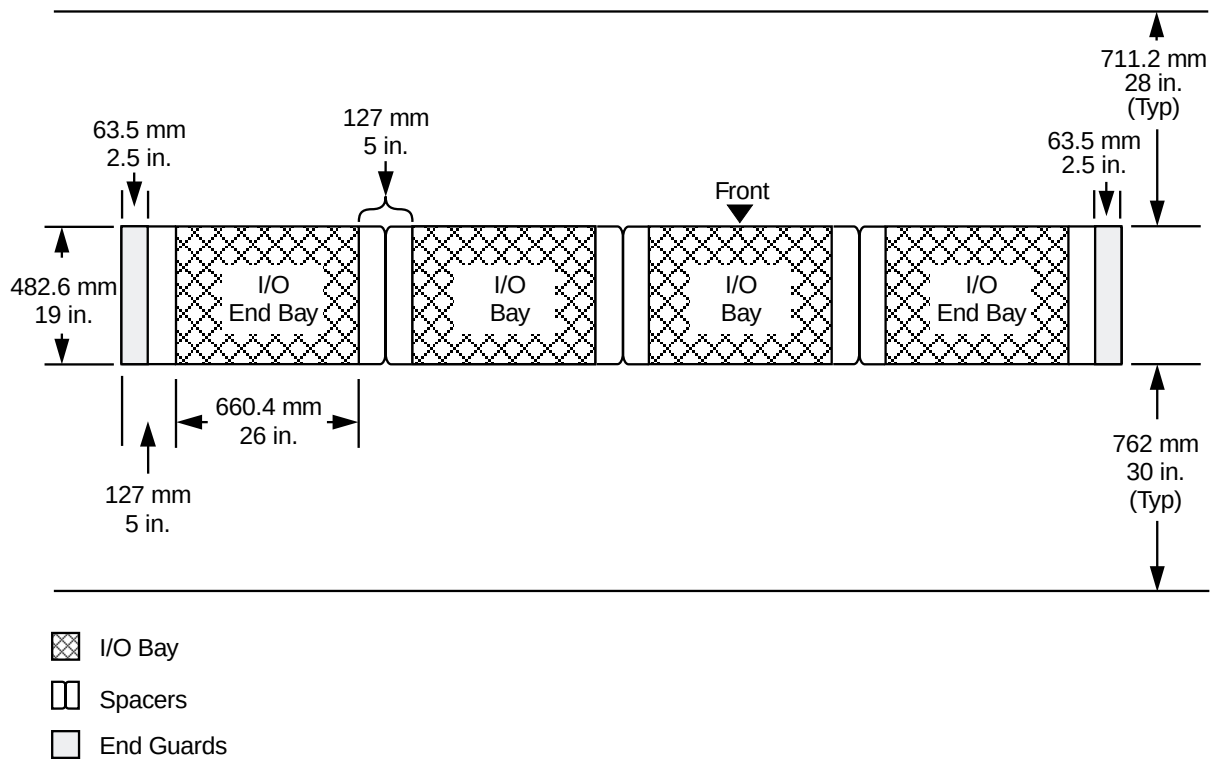
The NEBS I/O Complexes require spacers between the I/O Bays. The ETSI I/O Complexes require cable management bays between the I/O Bays.

NEBS I/O Complexes

Figure 1-7 (NEBS) illustrates the spacers required between I/O Bays in NEBS I/O Complexes.

Important! The NEBS I/O Complex is physical the same in the standard and reduced footprints.

Figure 1-7 NEBS I/O Complex



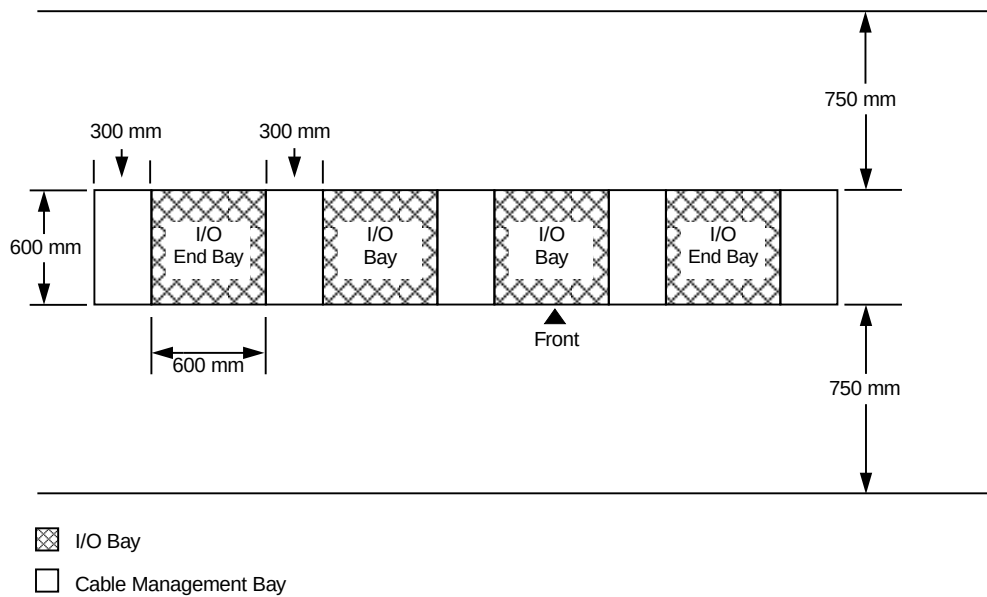
wbwm06002

ETSI I/O Complexes

Figure 1-8 (standard footprints) and Figure 1-9 (reduced footprints) illustrate the cable management bays required between I/O Bays in ETSI I/O Complexes.

Important! The cable management bays in ETSI I/O Complexes (reduced footprints) vary in size depending on the type of connector panels on the I/O Shelves in the adjacent I/O Bays.

Figure 1-8 ETSI I/O Complex (Standard Footprints)

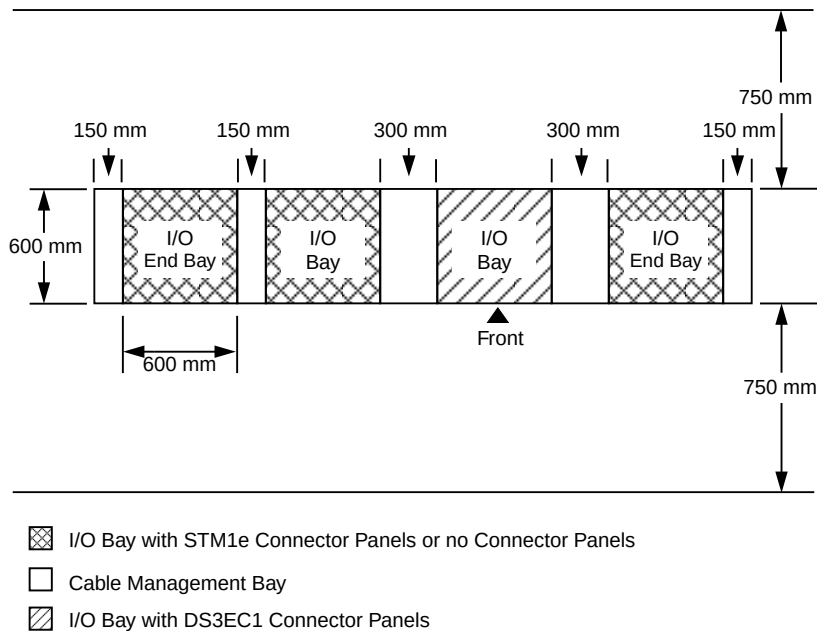


wbwm06112

Figure 1-8 and illustrates the cable management bays required between I/O Bays in ETSI platforms (reduced footprints).

Important! The cable management bays between or adjacent to I/O Bays with STM1e Connector Panels or no connector panels are 150 mm wide. The cable management bays between or adjacent to I/O Bays with DS3EC1 Connector Panels are 300 mm wide. For example, a single 300 mm cable management bay between an I/O bay with DS3EC1 Connector Panels and an I/O Bay with no connector panels is sufficient. For example, an I/O Bay with a single DS3EC1 Connector Panel on the right side of the bay only requires one 300 mm wide cable management bay on the right side of the bay. The cable management on the left side of the bay should be 150 mm wide.

Figure 1-9 ETSI I/O Complexes (Reduced Footprints)



wbwm06212

Transmission Interfaces

Introduction WaveStar BandWidth Manager provides electrical and optical transmission interfaces that are housed in the Universal I/O Shelves, SDH Universal I/O Shelves, and 10G I/O Shelves.

Optical interfaces WaveStar BandWidth Manager provides a variety of optical port units. All transmission port units (hardware) are capable of transmitting and receiving SDH-rate and SONET-rate signals. The software allows you to provision the port unit to accept the appropriate type of signal.

OC192/STM64 port units

The OC192/STM64 port units each contain one bidirectional port (transmit and receive).

Four port units are necessary to terminate one 4-fiber BLSR/MS-SPRing (closed). Two port units are necessary to terminate one 2-fiber BLSR/MS-SPRing or 4-fiber BLSR/MS-SPRing (open) in an end terminal.

WaveStar BandWidth Manager provides the following OC192/STM64 port units:

- OC192/STM64/1.5IR1 port units capable of transmitting and receiving one extended intermediate reach OC-192/STM-64 signal with strong forward error correction (SFEC) in the 1.5 μm range (up to 60 km).
- OC192/STM64/1.5IRS1 port units capable of transmitting and receiving one extended intermediate reach OC-192/STM-64 signal with SFEC in the 1.5 μm range (up to 30 km).
- OC192/STM64/POU passive optic port units, compatible with 16 wavelengths of the ITU standard for dense wavelength division multiplexing (DWDM), capable of transmitting and receiving one long reach OC-192/STM-64 signal in the 1.5 μm range (up to 40 km with the Passive Optics Boxes).
- OC192/STM64/WDM port units, compatible with 40 wavelengths of the ITU standard for dense wavelength division multiplexing (DWDM), capable of transmitting and receiving one long reach OC-192/STM-64 signal in the 1.5 μm range. Because the OC192/STM64/WDM port units are designed to work with the WaveStar OLS 400G systems without OTUs, the maximum transmission distance is dependant upon the OLS system (up to 25 km with Lucent's WaveStar OLS 400G).

OC48/STM16 port units

The OC48/STM16 port units each contain one bidirectional port (transmit and receive).

Four port units are necessary to terminate one 4-fiber BLSR/MS-SPRing (closed). Two port units are necessary to terminate one 2-fiber BLSR/MS-SPRing or 4-fiber BLSR/MS-SPRing (open) in an end terminal.

WaveStar BandWidth Manager provides the following OC48/STM64 port units:

- OC48/STM16/1.3LR1 port units capable of transmitting and receiving one long reach OC-48/STM-16 signal in the 1.3 μm range (up to 51 km).
- OC48/STM16/1.5LR1 port units capable of transmitting and receiving one long reach OC-48/STM-16 signal in the 1.5 μm range (up to 80 km).
- OC48/STM16/DWDM01-16 port units, compatible with 16 wavelengths of the ITU standard for dense wavelength division multiplexing (DWDM), capable of transmitting and receiving one long reach OC-48/STM-16 signal in the 1.5 μm range. Because the OC48/STM16/DWDM01-16 port units are designed to work with the WaveStar OLS 40G/80G systems without OTUs, the maximum transmission distance is dependant upon the OLS system (up to 25 km with Lucent's WaveStar OLS 40G/80G).
- OC48/STM16/POU passive optic port units, compatible with 16 wavelengths of the ITU standard for dense wavelength division multiplexing (DWDM), capable of transmitting and receiving one long reach OC-48/STM-16 signal in the 1.5 μm range (up to 55 km with the Passive Optics Boxes).
- OC48/STM16/WDM port units, compatible with 80 wavelengths of the ITU standard for dense wavelength division multiplexing (DWDM), capable of transmitting and receiving one long reach OC-48/STM-16 signal in the 1.5 μm range. Because the OC48/STM16/WDM port units are designed to work with the WaveStar OLS 400G systems without OTUs, the maximum transmission distance is dependant upon the OLS system (up to 25 km with Lucent's WaveStar OLS 400G).

OC12/STM4 port units

Each OC12/STM4 port unit contains two independent bidirectional ports (transmit and receive).

WaveStar BandWidth Manager provides the following OC12/STM4 port units:

- OC12/STM4/1.3SR2 port units capable of transmitting and receiving two short or intermediate reach OC-12/STM-4 signals in the 1.3 μm range (up to 15 km).
- OC12/STM4/1.3LR2 port units capable of transmitting and receiving two long reach OC-12/STM-4 signals in the 1.3 μm range (up to 51 km).

OC3/STM1 port units

Each OC3/STM1 port unit contains four independent bidirectional ports (transmit and receive).

WaveStar BandWidth Manager provides the following OC3/STM1 port units:

- OC3/STM1/1.3SR4 port units capable of transmitting and receiving four short or intermediate reach OC-3/STM-1 signals in the 1.3 μm range (up to 15 km).
- OC3/STM1/1.3LR4 port units capable of transmitting and receiving four long reach OC-3/STM-1 signals in the 1.3 μm range (up to 51 km).

Electrical interfaces

WaveStar BandWidth Manager provides two electrical port units.

DS3EC1/8 port units

The DS3EC1/8 port units are capable of transmitting and receiving signals at either the DS3-rate or EC-1-rate (user-provisionable). Each port unit contains eight independent bidirectional ports (transmit and receive).

STM1E/4 port units

The STM1E/4 port units are capable of transmitting and receiving signals at the STM-1e-rate (SDH). Each port unit contains four independent bidirectional ports (transmit and receive).



System Growth

Overview WaveStar BandWidth Manager can be grown modularly by increasing the size of the main and shelf-based switch fabrics and/or adding additional I/O Shelves as additional transmission capacity is required.

Switch capacity The switch fabric provided by two fully-equipped Switch Shelves in the 4608/1536 platform is able to cross-connect up to 4608 STS-1/1536 STM-1 equivalents of capacity.

Important! The two Switch Shelves may be housed in two Switch Bays (3-bay Control/Switch Complex) or in a Control/Switch Bay and a Switch Bay (2-bay Control/Switch Complex).

Modular growth System transmission capacity can be increased modularly by adding additional I/O Shelves (either Universal I/O Shelves, STM1e Universal I/O Shelves, or 10G I/O Shelves).

Important! The amount of main switch fabric capacity consumed by each I/O Bay depends on how the shelves in the bay are equipped (namely, the number of SWIF pairs used). Each Universal I/O Shelf or STM1e Universal I/O Shelf may consume either 96 or 192 STS-1/32 or 64 STM-1 equivalents of the available switch fabric. Each 10G I/O Shelf may consumes either 96, 192, 288, or 384 STS-1/32, 64, 96, or 128 STM-1 equivalents of the available switch fabric.

4608/1536 platform

As greater transmission capacity is needed for the 4608/1536 platform, additional I/O Shelves may be added to the I/O Complex.

Because the different I/O Bays house different types of shelves (which may include one to four SWIF pairs), the number of equipped I/O Bays in an 4608/1536 local I/O Complex may vary. In R4.1, the 4608/1536 platform can support a maximum of 36 I/O Shelves with a maximum of 48 SWIF pairs for the platform.

References For additional information about the equipment available in WaveStar BandWidth Manager, refer to Chapter 3, "Platform Description."



WaveStar CIT

Introduction The WaveStar craft interface terminal (CIT) is a personal computer (PC) equipped with the Windows[®] NT operating system and loaded with WaveStar CIT software. The WaveStar CIT software includes a graphical user interface (GUI) that can be used to access local and remote network elements via an intraoffice LAN. OS-based software (for example, subnetwork management system [SNMS]) provides an alternate method of remote maintenance from an external center.

Capabilities The WaveStar CIT allows a user to perform the following tasks:

- Establish and/or remove networks and network components
- Maintain cross-connections
- Generate network reports
- Perform provisioning
- Clear network troubles
- Monitor and report network alarms/performance
- Add to and/or drop from both optical and electrical interfaces
- Create non-blocking cross-connections between facilities

Reference For more information about the WaveStar CIT, refer to Appendix A, “WaveStar Craft Interface Terminal Tutorial.”



Key Features

Overview This section lists the key features available in WaveStar BandWidth Manager, R1.3, R2.0, R2.1, R3.0, R3.1, R4.0, and R4.1.

Major R1.3 features WaveStar BandWidth Manager provides the following major features in Release 1.3:

- 4608/1536 platform with a 4608 STS-1/1536 STM-1 equivalent cross-connect and a 3-bay Control/Switch Complex
- Errorless, N^2 , non-blocking 4608/1536 switch fabric architecture
- Fully-duplicated 4608/1536 switch fabric
- Modular I/O growth with the 4608/1536 platform
- Duplicated system and shelf controllers and Stratum 3 synchronization
- Non-revertive 1+1 timing protection
- STS-1/STM-1 I/O capabilities
- STS-1 and STS-3c cross-connect capabilities
- VC-3 and VC-4 cross-connect capabilities
- DS3/STS-1, DS3/VC-3, STS-1/VC-3, and STS-3c/VC-4 interworking
- Long reach OC-48/STM-16 (1.3 μm and 1.5 μm)
- Four-fiber OC-48 BLSR interface
- Four-fiber STM-16 MS-SPRing (closed) interface
- Four-fiber STM-16 MS-SPRing with transoceanic protocol (open and closed) interface
- Long reach STM-16 optics (1+1 protected)
- Short and long reach OC-12/STM-4 optics (0x1 and 1+1 protected)
- Short and long reach OC-3/STM-1 optics (0x1 and 1+1 protected)
- DS3 (0x1, 1xN protected) electrical interfaces (EC-1 ready)
- DCC on OC-48/STM-16 interfaces
- STS-N preemptible protection access on 4-fiber OC-48 BLSRs
- VC-N preemptible protection access on 4-fiber STM-16 MS-SPRing
- Flexible interface mixing using universal interface slots

- External timing from an office BITS clock
- Limited OC-48/STM-16 line timing
- Free-running, holdover, and locked (external) synchronization modes
- DS1 timing inputs
- Cross-connect loopback
- STS-1 granularity, non-blocking TSA
- VC-3 and VC-4 granularity, non-blocking TSA
- Bridging and rolling cross-connections
- Standard SONET transmission maintenance signals
- Standard DS3 transmission maintenance signals
- DS3 performance monitoring
- Standard SDH transmission maintenance signals
- Limited SDH regenerator section, multiplex section, and high order intermediate path performance monitoring
- DS3/VC-3 path trace (for DS3/VC-3 gateways)
- STS-1 path trace (for DS3/STS-1 gateways)
- Limited test access on DS3 and EC-1 ports
- Configuration management and equipment inventory
- Security features
- WaveStar Sub-Network Management System (WaveStar SNMS) support
- AT&T NEDS compliance: AT&T Practice 801-900-160, AT&T Network Equipment Design Standards and Requirements for Physical and Electrical design
- NEBS compliance: Telcordia Technologies' GR-63-CORE and GR-1089-CORE Network Building Systems Generic Requirements for NEBS Level II and NEBS Level III
- Zone 4 earthquake compliance
- ITU and ETSI compliance
- CE marking
- ETSI ETS 300 019 earthquake compliance
- External LAN interface on I/O Shelves
- WaveStar CIT GUI on Windows® NT
- NCC R3.0 or later support

- Software download/backup and restore using OSI
- Operations interworking (transmission and communication) between
 - WaveStar BandWidth Managers over 4-fiber OC-48 BLSRs, 4-fiber STM-16 MS-SPRings, and 4-fiber STM-16 MS-SPRings with transoceanic protocol
 - WaveStar BandWidth Manager and WaveStar ADM 16/1, (Platinum II) over STM-1 interfaces

Major R2.0 features

WaveStar BandWidth Manager provides the following major features in Release 2.0:

- 4608/1536 platform with a 4608 STS-1/1536 STM-1 equivalent cross-connect and a 2-bay Control/Switch Complex
- Modular I/O growth with the 4608/1536 platform
- 10G I/O Shelf electrically connected (OC-192/STM-64 interfaces)
- Intermediate reach OC-192/STM-64 optics (0x1 protected)
- Four-fiber OC-192 BLSR/STM-64 MS-SPRings interfaces (open and closed)
- Two-fiber OC-48 BLSR interfaces
- OC-48 1+1 protected interfaces
- Two-fiber STM-64 MS-SPRing interfaces
- Four-fiber STM-16 MS-SPRing (open) interfaces
- Four-fiber STM-64 MS-SPRing with transoceanic protocol
- STS-N preemptible protection access on 2-fiber OC-48 BLSRs and 4-fiber OC-192 BLSRs
- VC-N preemptible protection access on 2-fiber and 4-fiber STM-64 MS-SPRings
- SONET section and line performance monitoring
- SDH regenerator section, multiplex section, and high order intermediate path performance monitoring
- NEBS compliance: Telcordia Technologies' GR-63-CORE and GR-1089-CORE Network Building Systems Generic Requirements NEBS Level III, including requirements for EMI and ESD with open door, Zone 4 earthquake compliance
- Limited DS1 timing outputs
- STS-12c/VC-4-4c cross-connect capabilities
- STS-12c/VC-4-4c interworking

- EC-1 (1xN protected) electrical interfaces
- DCC on OC-192/STM-64, OC-12/STM-4, and OC-3/STM-1 interfaces
- Operations interworking (transmission and communication) between
 - WaveStar BandWidth Managers over 4-fiber OC-192 BLSRs, 2-fiber OC-48 BLSRs, and OC-48, OC-12, and OC-3 interfaces: 1+1 protected
 - WaveStar BandWidth Manager and WaveStar TDM 2.5G/10G (2-Fiber), Release 4 over 2-fiber OC-48 BLSRs, as well as OC-3 and OC-12 (0x1 protected) interfaces
 - WaveStar BandWidth Manager and FT-2000 OC-48 Add/Drop Rings Terminal, Release 9.1 over 2-fiber OC-48 BLSRs, as well as OC-3 and OC-12 (0x1 protected) interfaces
 - WaveStar BandWidth Manager and DDM-2000 OC-3 Multiplexer, Release 13 over OC-3 and OC-12 (0x1 protected) interfaces
 - WaveStar BandWidth Manager and DDM-2000 OC-12 Multiplexer, Release 7 over OC-3 and OC-12 (0x1 protected) interfaces

Major R2.1 features

WaveStar BandWidth Manager provides the following major features in Release 2.1:

- OC-48/STM-16 (1.5 μ m) DWDM optics (16 wavelengths)
- Operations interworking (transmission and communication) between
 - WaveStar BandWidth Managers over 2-fiber STM-64 MS-SPRings
 - WaveStar BandWidth Manager and WaveStar TDM 10G (STM-64), Release 1.1 over 2-fiber STM-64 MS-SPRings
 - WaveStar BandWidth Manager and WaveStar ADM 16/1 (Sapphire III) over 2-fiber STM-16 MS-SPRings
- Transmission interfacing between WaveStar BandWidth Manager and WaveStar Optical Line System 40G/80G (WaveStar OLS 40G/80G) over OC-48/STM-16 optics via the OC48/STM16/DWDM01-16 port units
- EC-1 (0x1 protected) electrical interfaces

Major R3.0 features

WaveStar BandWidth Manager provides the following major features in Release 3.0:

- Two-fiber OC-192 BLSR interfaces
- Two-fiber STM-16 MS-SPRing interfaces
- Extended intermediate reach OC-192/STM-64 1.5 μ m optical interface with strong forward error correction (SFEC)
- OC-192/STM-64 (1.5 μ m) passive optics (16 wavelengths)
- OC-192/STM-64 (1.5 μ m) WDM optics (40 wavelengths, compatible with WaveStar OLS 400G)
- OC-48/STM-16 (1.5 μ m) passive optics (16 wavelengths)
- Full 1+1 protection on OC-48/STM-16 interfaces
- STS-N preemptible protection access on 2-fiber OC-192 BLSRs
- VC-N preemptible protection access on 2-fiber STM-16 MS-SPRings
- STS-48c/VC-4-16c cross-connect capabilities
- STS-48c/VC-4-16c interworking
- SONET intermediate and terminated path performance monitoring
- Inactivity logout
- Password aging
- Operations interworking (transmission and communication) between
 - WaveStar BandWidth Managers over 2-fiber OC-192 BLSRs and 2-fiber STM-16 MS-SPRings and STM-16 interfaces: 1+1 protected
 - WaveStar BandWidth Manager and WaveStar TDM 2.5G/10G (2-Fiber), Release 4 over 2-fiber OC-192 BLSRs
 - WaveStar BandWidth Manager and Fujitsu FLM 150 ADM over OC-3 (0x1 protected) interfaces
- Transmission interfacing between WaveStar BandWidth Manager and WaveStar Optical Line System 400G, Release 2.0 over OC-192/STM-64 optics via the new OC192/STM64/WDM port units (40 wavelengths)

Major R3.1 features

WaveStar BandWidth Manager provides the following major features in Release 3.1:

- STM-1e electrical interface via the STM1E/4 port units
- OC192/STM64 1+1 protection (unidirectional and non-revertive)
- Extended intermediate reach OC-192/STM-64 1.5 μ m optical interface with strong forward error correction (SFEC)
- OC-48/STM-16 (1.5 μ m) WDM optics (80 wavelengths, compatible with WaveStar OLS 400G)
- OC-48 Unidirectional Path Switch Rings (UPSRs) with STS-1 granularity
- Outgoing OC-48/STM-16 S1 byte synchronization messaging
- Outgoing OC-192/STM-64 S1 byte synchronization messaging
- Enhanced test access
- Multiple protected LAN interfaces/DCC controllers (additional ADJCTL/DCC circuit pack in the System Controller Shelf) Active-Standby
- Login aging
- Additional operations (transmission and communications) interworking between
 - WaveStar BandWidth Managers over OC-48 UPSRs (STS-1 only) and OC-192/STM-64 interfaces: 1+1 protected
 - WaveStar BandWidth Manager and Fujitsu FLM 2400 ADM over OC-48 UPSRs (STS-1 only)
 - WaveStar BandWidth Manager and FT-2000 OC-48 Add/Drop Rings Terminal, Release 9.1 over OC-3 and OC-12 interfaces: 1+1 protected (unidirectional, non-revertive)
 - WaveStar BandWidth Manager and WaveStar ADM 16/1 (Sapphire III) over STM-1 and STM-4 (0x1 protected) interfaces
- Additional transmission interfacing between WaveStar BandWidth Manager and WaveStar Optical Line System (OLS) 400G over OC-48/STM-16 optics via the new OC48/STM16/WDM port units (80 wavelengths)

Major R4.0 features

WaveStar BandWidth Manager provides the following major features in Release 4.0:

- Modular interface growth with a maximum of 36 I/O shelves with a maximum of 48 SWIF pairs
- Sub-Network Connection Protection (SNCP) rings
- Manual ring configuration for start-up
- Full OC-48 Unidirectional Path Switch Rings (UPSRs)
- OC-12 UPSRs with STS-1 granularity
- STS-3, STS-12, and STS-48 adaptive-rate cross-connects (pipe mode)
- ANSI and Telcordia-compliant dual ring interworking (DRI) with interconnect rings
- Basic OC-48 DRI (no interconnected rings)
- Additional cross-connect capacity via the on-shelf cross-connect capacity provided by the SWITCH/STS576 and SWITCH/STS768 packs)
- Additional operations interworking (transmission and communication) between
 - WaveStar BandWidth Managers over STM-4 interfaces: 1+1 protected
 - WaveStar BandWidth Manager and WaveStar TDM 2.5G/10G (2-Fiber), Release 5.0 over OC-3, OC-12, and OC-48 interfaces: 1+1 protected (unidirectional, non-revertive)
 - WaveStar BandWidth Manager and DDM-2000 OC-3 Multiplexer, Release 13 over OC-12 UPSRs, as well as OC-3 and OC-12 interfaces: 1+1 protected (unidirectional, non-revertive)
 - WaveStar BandWidth Manager and DDM-2000 OC-12 Multiplexer, Release 7 over OC-12 UPSRs, as well as OC-3 and OC-12 interfaces: 1+1 protected (unidirectional, non-revertive)
 - WaveStar BandWidth Manager and DMX Access Multiplexer, Release 1.1 over OC-48 UPSRs
 - WaveStar BandWidth Manager and Fujitsu FLM 150 ADM, Release 15 over OC-3 interfaces: 1+1 protected (unidirectional, non-revertive)

- WaveStar BandWidth Manager and Fujitsu FLM 2400 ADM, Release 14.2 and 15 over OC-48 UPSRs (full)
- WaveStar BandWidth Manager and WaveStar TDM 10G (STM-64), Release 3 over 2-fiber STM-16 MS-SPRings and STM-1, STM-4, and STM-16 interfaces: 1+1 protected (unidirectional, non-revertive)
- WaveStar BandWidth Manager and WaveStar ADM 16/1 (Ruby II) over 2-fiber STM-16 MS-SPRing, as well as STM-1, STM-4, and STM-16 interfaces: 1+1 protected (unidirectional, non-revertive and bidirectional, non-revertive)
- Additional transmission interfacing between WaveStar BandWidth Manager and Lucent (Ascend) GX 550 Multiservice WAN, Release Jade M2 (2.2.1.2) Switch over OC-48 interfaces: 1+1 protected (bidirectional, non-revertive)
- Facility loopback
- 30-minute system recovery
- Direct TCP/IP interface on the NE
- Duplex ADJCTL/DCC packs (Active-Active) in the System Controller Shelf
- Maximum sub-network size (1000 NSAPs)
- SDH equipment clock (SEC)
- DS1 timing outputs
- E1 timing inputs
- E1 line timing outputs
- OC-192/STM-64 line timing (with SSM)
- OC-48/STM-16 line timing (with SSM)
- Outgoing OC-12/STM-4 S1 byte synchronization messaging
- Outgoing OC-3/STM-1 S1 byte synchronization messaging
- Incoming OC-192/STM-64 S1 byte synchronization messaging
- Incoming OC-48/STM-16 S1 byte synchronization messaging
- Synchronization mode automatic reconfiguration based on the S1 byte
- Timing reference selection according to ETS 300 417.1.1

Major R4.1 features

WaveStar BandWidth Manager provides the following major features in Release 4.1:

- Sub-Network Connection Protection (SNCP) rings - generalized path-level protection for individual VC-N circuits in SDH input port types
- Duplicated RS-232 on the System Controller Shelf, providing access to raw ASCII TL1 commands via an ASCII terminal or a PC running HyperTerminal
- TCP/IP interface that provides an FTP/FTAM gateway
- Autonomous fault messages
- Additional operations interworking (transmission and communication) between
 - WaveStar BandWidth Manager and Fujitsu FLM 2400 ADM, Release 14.2 and 15 over 2-fiber OC-48 BLSRs
 - WaveStar BandWidth Manager and WaveStar ADM 16/1 (Ruby II) over STM-4 and STM-16 SNCPs
 - WaveStar BandWidth Manager and Nortel Networks TransportNode TN-4T STM-4 Terminal Multiplexer, Release H1.00, over STM-4 SNCPs, STM-1 and STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
 - WaveStar BandWidth Manager and Nortel Networks TransportNode TN-16X, Release H2.00, over STM-4 and STM-16 SNCPs, as well as STM-1, STM-4, and STM-16 interfaces: 1+1 protected (bidirectional, non-revertive)
 - WaveStar BandWidth Manager and Marconi SMA 16/4, Series 3, over STM-4 and STM-16 SNCPs, as well as STM-1, STM-4, and STM-16 interfaces: 1+1 protected (bidirectional, non-revertive)
- Additional transmission interfacing between
 - WaveStar BandWidth Manager and Lucent (Ascend) GX 550 Multiservice WAN, Release Jade M2 (2.2.1.2) Switch over STM-16 and OC-12/STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
 - WaveStar BandWidth Manager and Lucent (Ascend) CBX 500 Multiservice WAN, Release Jade M2 (4.2) Switch over OC-12/STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)

- WaveStar BandWidth Manager supports optical transmission interfacing between Cisco ONS 15454 system and WaveStar BandWidth Manager over OC-48 UPSRs, as well as OC-3 and OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
- WaveStar BandWidth Manager supports optical transmission interfacing between Cisco ONS 15454 system and WaveStar BandWidth Manager over OC-48 UPSRs, as well as OC-3 and OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
- WaveStar BandWidth Manager and Marconi MSH 84/86, Series 3, over STM-1, STM-4, and STM-16 interfaces: 1+1 protected (bidirectional, non-revertive)





2 Network Topologies

Overview

Purpose The information in this chapter is designed to help you evaluate the benefits of the WaveStar BandWidth Manager 4608/1536 platform in your existing or planned network environment.

This chapter illustrates how WaveStar BandWidth Manager enables central office equipment consolidation. The cost savings that WaveStar BandWidth Manager enables are also explained and illustrated.

This chapter also provides detailed descriptions about the applications available with WaveStar BandWidth Manager.

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I | Central Office Consolidation and Bandwidth Management

Overview This section discusses the equipment consolidation and OAM&P simplification realized with WaveStar BandWidth Manager.

Typical central office Figure 2-1 illustrates a typical central office architecture that requires manual cross-connect signal management and separate network elements for each function in the office.

LGX/DSX

In SONET systems, lightguide cross-connect/digital signal cross-connect (LGX/DSX) patch panels are often used to connect various pieces of equipment in a central office.

ODF/DDF

In SDH systems, optical distribution frames/digital distribution frames (ODF/DDF) patch panels are often used to connect various pieces of equipment in a central office.

ADMs

The interoffice facilities network, in the central office in Figure 2-1 consists of multiple OC-192/STM-64 and OC-48/STM-16 Add/Drop Multiplexers (ADMs). These ADMs terminate on LGX or ODF panels, which must be managed manually within the central office. The addition of WaveStar BandWidth Manager in the central office reduces a large percentage of the LG/DSX or ODF/DDF panels.

Expense in a typical central office

The external interconnection cabling and the signal processing/formatting that must be transmitted among the discrete network elements illustrated in Figure 2-1 are extensive and costly.

Reduced reliability

Because multiple interoffice and access ring NEs in a typical central office require numerous interconnections and network element managers, a traditional network is less reliable. The back-to-back cabling associated with interoffice and access ring NEs increases the risk of failures.

High maintenance cost

The manual cross-connections (LGX/DSX or ODF/DDF panels) require constant provisioning and rearrangement. Multiple types of connections are required to accommodate various service rates.

Trouble reports

A large percentage of all trouble reports for DS1 or higher-rate services (SONET) or low order traffic, for example, PDH rates (SDH) are linked directly to the intra-office interconnections between these discrete network elements.

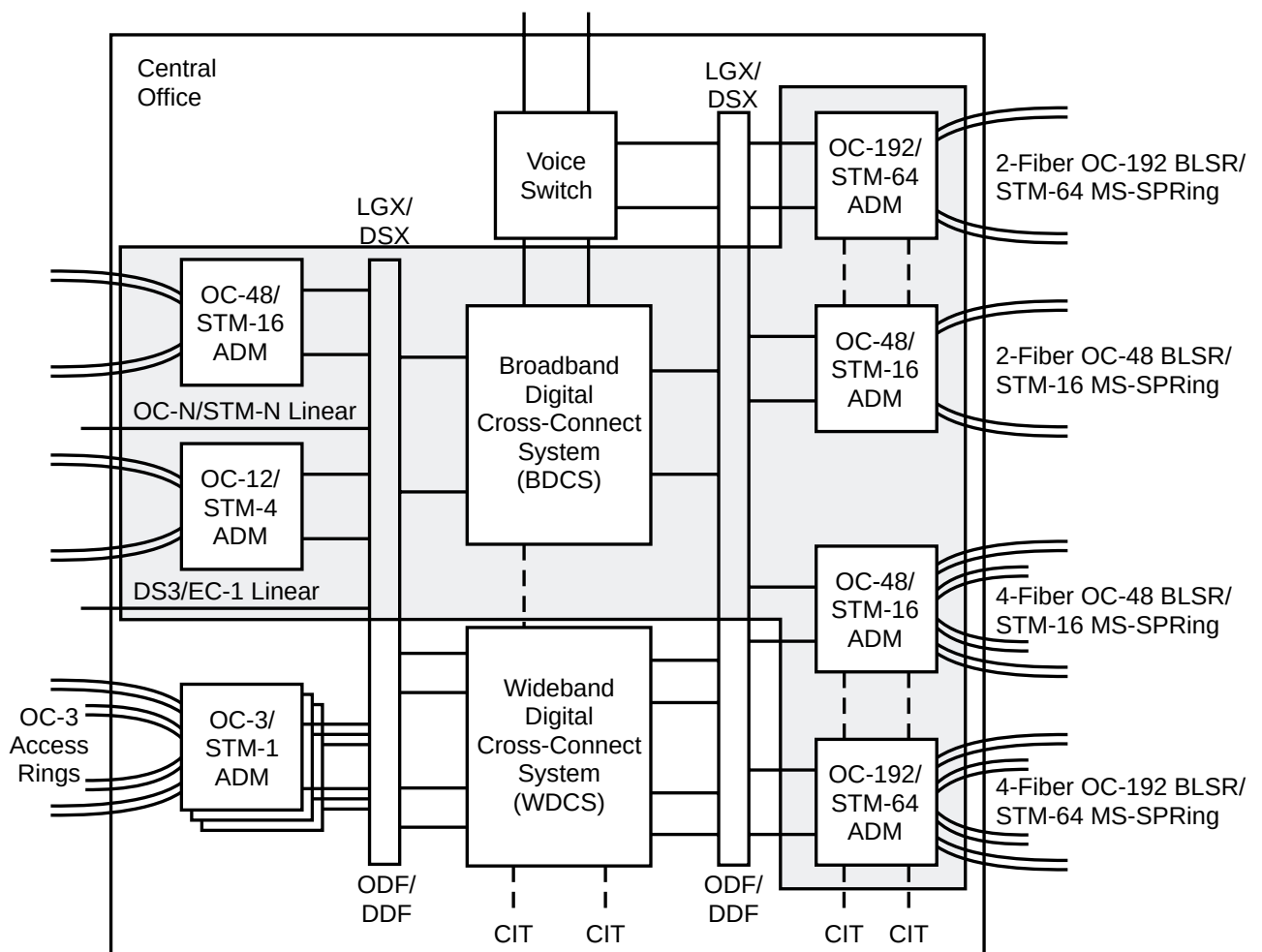
Management of service

The management of OAM&P services across these discrete elements rapidly becomes difficult and error-prone. The multiple discrete NEs each require their own CIT.

CO without WaveStar BandWidth Manager

Figure 2-1 illustrates a typical central office without WaveStar BandWidth Manager. Compare this figure to Figure 2-2 to see the NE reduction realized in a central office with WaveStar BandWidth Manager. The gray area on the right of the figure represents the equipment the WaveStar BandWidth Manager replaces when it is added to the central office.

Figure 2-1 Typical Central Office without WaveStar BandWidth Manager



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Consolidated central office

WaveStar BandWidth Manager integrates the OC-192/STM-64 and OC-48/STM-16 ADM functionality, OC-12/STM-4 access rings functionality, the BDCS functionality, and the optical and electrical linear applications, illustrated in Figure 2-1, into a single network element. This equipment consolidation greatly reduces initial equipment costs, improves reliability, and streamlines operations within the central office. The 2-fiber and 4-fiber Bidirectional Line-Switch Rings (BLSRs)/Multiplex-Section - Shared Protection Rings (MS-SPRings) and Unidirectional Path-Switch Rings (UPSRs) are provided by a single WaveStar BandWidth Manager system rather than multiple ADMs.

In addition to providing ADM functionality, WaveStar BandWidth Manager also provides a highly reliable cross-connect, simplified OAM&P, and multiple optical and electrical interfaces in one bay. WaveStar BandWidth Manager integrates SONET and SDH rates and rings in a single NE.

Broadband cross-connect functionality

WaveStar BandWidth Manager provides a broadband digital cross-connect system (BDCS) functionality, such as interconnections among the ring facilities, without going through the manual cross-connect panel (LGX/DSX or ODF/DDF). WaveStar BandWidth Manager provides a fully non-blocking BDCS functionality (via the 4608/1536 switch fabric) within a single network element. Therefore, cabling between back-to-back interfaces and interconnections between back-to-back low-speed interfaces is eliminated.

Embedded base interface

WaveStar BandWidth Manager is able to interface to existing network equipment from multiple vendors at the following rates:

- Electrical rates
 - DS3
 - EC-1
 - STM-1e
- Optical rates
 - OC-192/STM-64
 - OC-48/STM-16
 - OC-12/STM-4
 - OC-3/STM-1

Simplified OAM&P

Because WaveStar BandWidth Manager integrates multiple OC-192/STM-64 and OC-48/STM-16 ADMs, OC-48 and OC-12 UPSRs, and STM-N Sub-Network Connection Protection (SNCP) rings into a single network element, OAM&P operations are streamlined. The element management system support for WaveStar BandWidth Manager is provided by a WaveStar™ Subnetwork Management System (SNMS).

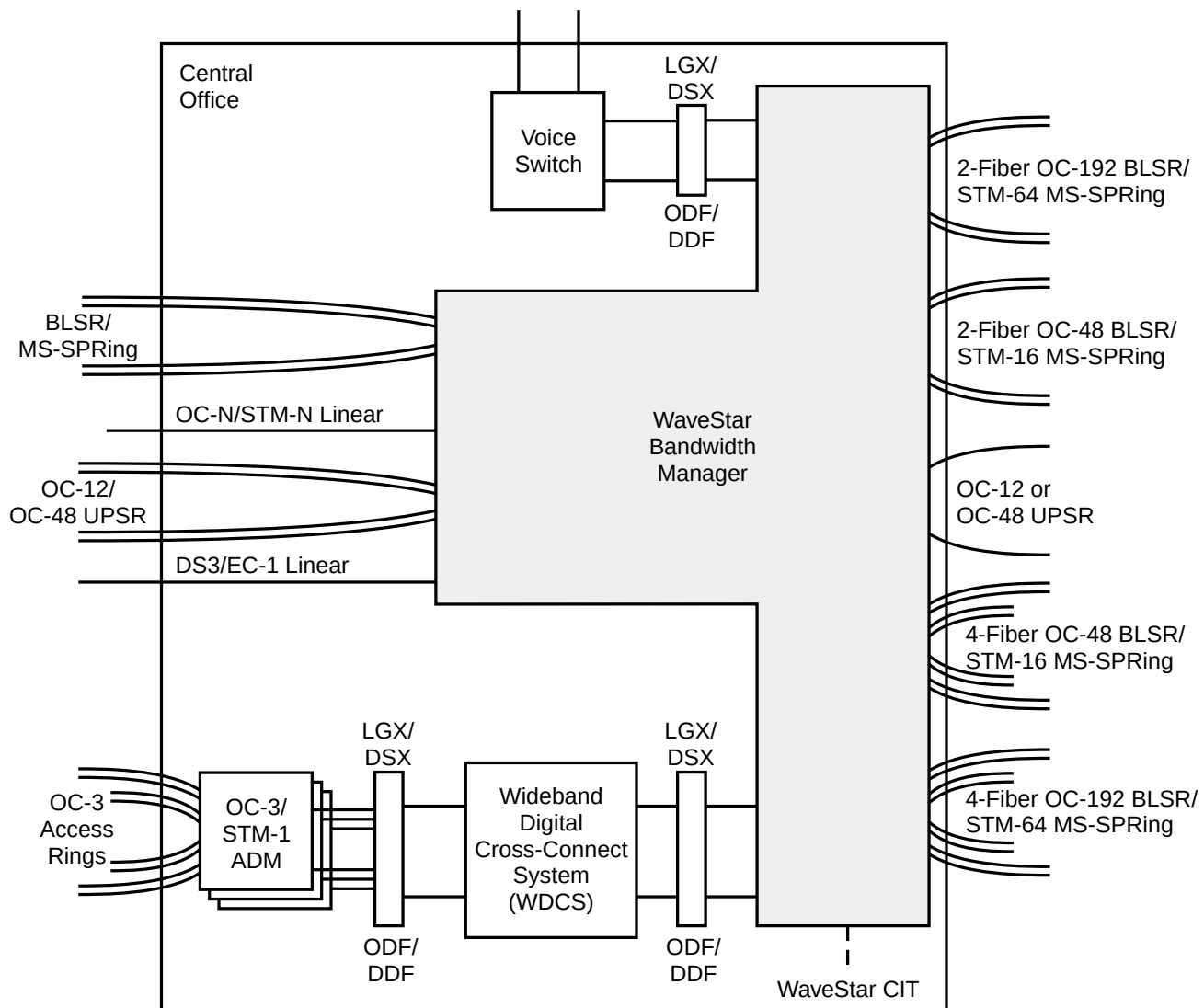
One WaveStar CIT provides access to WaveStar SNMS for the entire WaveStar BandWidth Manager system. In the typical central office Figure 2-1, multiple CITs are needed to manage the multiple ADMs. In Figure 2-2, notice that WaveStar BandWidth Manager only requires a single WaveStar CIT.

Economical capacity growth

Customers can grow the capacity of WaveStar BandWidth Manager in-service. Transmission capacity can be increased modularly and additional interfaces can be added as needed to meet rapidly changing needs, thus minimizing start-up costs. All transmission growth is able to be cross-connected within WaveStar BandWidth Manager, therefore eliminating the need for intra-office cabling and connections that would be necessary in a central office without WaveStar BandWidth Manager.

Figure Figure 2-2 illustrates a central office environment with WaveStar BandWidth Manager. Compare this figure to Figure 2-2 to see the dramatic equipment reduction capable in a central office with WaveStar BandWidth Manager.

Figure 2-2 Consolidated Central Office with WaveStar BandWidth Manager



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References For more information about the switch fabric and other system components, refer to Chapter 3, "Platform Description."



I | Cost Savings

Overview	This section discusses the cost savings that are realized in a consolidated central office with WaveStar BandWidth Manager.
Saving areas	WaveStar BandWidth Manager enables cost savings in the following areas: • Operations/maintenance • Equipment • Central office capacity growth
Operational cost reductions	WaveStar BandWidth Manager provides operational cost savings in the following ways: • Greater automation in the establishment and maintenance of cross-connections • Electronic management of intra-office broadband connections, eliminating manual cross-connects • Elimination of many manual cross-connect panels (LGX/DSX or ODF/DDF panels) and back-to-back inter-equipment cabling • Automation of broadband service provisioning and avoidance of manual administration • Flexible support for multiple broadband rates and asynchronous/synchronous networking • Preventive maintenance strategies that translate into very low maintenance costs • Ultra-fast service restoration and fault-tolerance applications ensuring high reliability • Integration of lightwave interoffice and access lightwave terminals in a signal NE with centralized and consolidated electronic cross-connections

Equipment reductions

WaveStar BandWidth Manager supports equipment cost savings by

- Consolidating central office equipment into WaveStar BandWidth Manager
- Integrating 2-fiber and 4-fiber OC-48 BLSRs/STM-16 MS-SPRings, and 2-fiber and 4-fiber OC-192 BLSRs/STM-64 MS-SPRings, thus eliminating the need for multiple stand-alone lightwave terminals
- Integrating OC-12/STM-4 access rings, thus eliminating the need for multiple stand-alone OC-12/STM-4 ADMs
- Integrating optical and electrical linear applications
- Lowering the cost of interconnections to existing stand-alone lightwave terminals
- Performing grooming, traffic restoration, and provisioning features for the overall network
- Providing DS3, EC-1, OC-192/STM-64, OC-48/STM-16, OC-12/STM-4, and OC-3/STM-1 connectivity to embedded base systems
- Providing flexible mixing of multiple interfaces within a single shelf
- Interfacing directly to the WaveStar OLS systems without OTUs via the DWDM OC48/STM16 and OC192/STM64 optical port units.
- Enabling interworking between SONET and SDH systems within a single NE

Economical capacity growth

The flexible configurations in WaveStar BandWidth Manager permit cost savings from initial installation and throughout the life of the system. This flexibility translates into savings in the following ways:

- Additional transmission capacity can be added on an in-service basis by adding additional I/O Shelves
- Traffic can be cross-connect via the main switch fabric or cross-connect directly on the individual I/O Shelves without consuming capacity on the main switch fabric.



I | Summary of Benefits

Overview This section highlights the major benefits of WaveStar BandWidth Manager.

- Benefits** WaveStar BandWidth Manager
- Provides a fully non-blocking BDCS that is able to route bandwidth between any transport facility within WaveStar BandWidth Manager
 - Reduces OC-192/STM-64 and OC-48/STM-16 ring terminals, office footprint requirements, cabling, and installation costs through high-level equipment integration
 - Provides DS3, EC-1, STM-1e, OC-192/STM-64, OC-48/STM-16, OC-12/STM-4, OC-3/STM-4 connectivity to embedded base systems
 - Increases reliability by reducing the number of discrete NEs in the network
 - Simplifies OAM&P functions and reduces network element complexity by consolidating network element functions
 - Positions the central office for future WaveStar BandWidth Manager feature enhancements

References For information about future releases of WaveStar BandWidth Manager, contact your Account Executive.



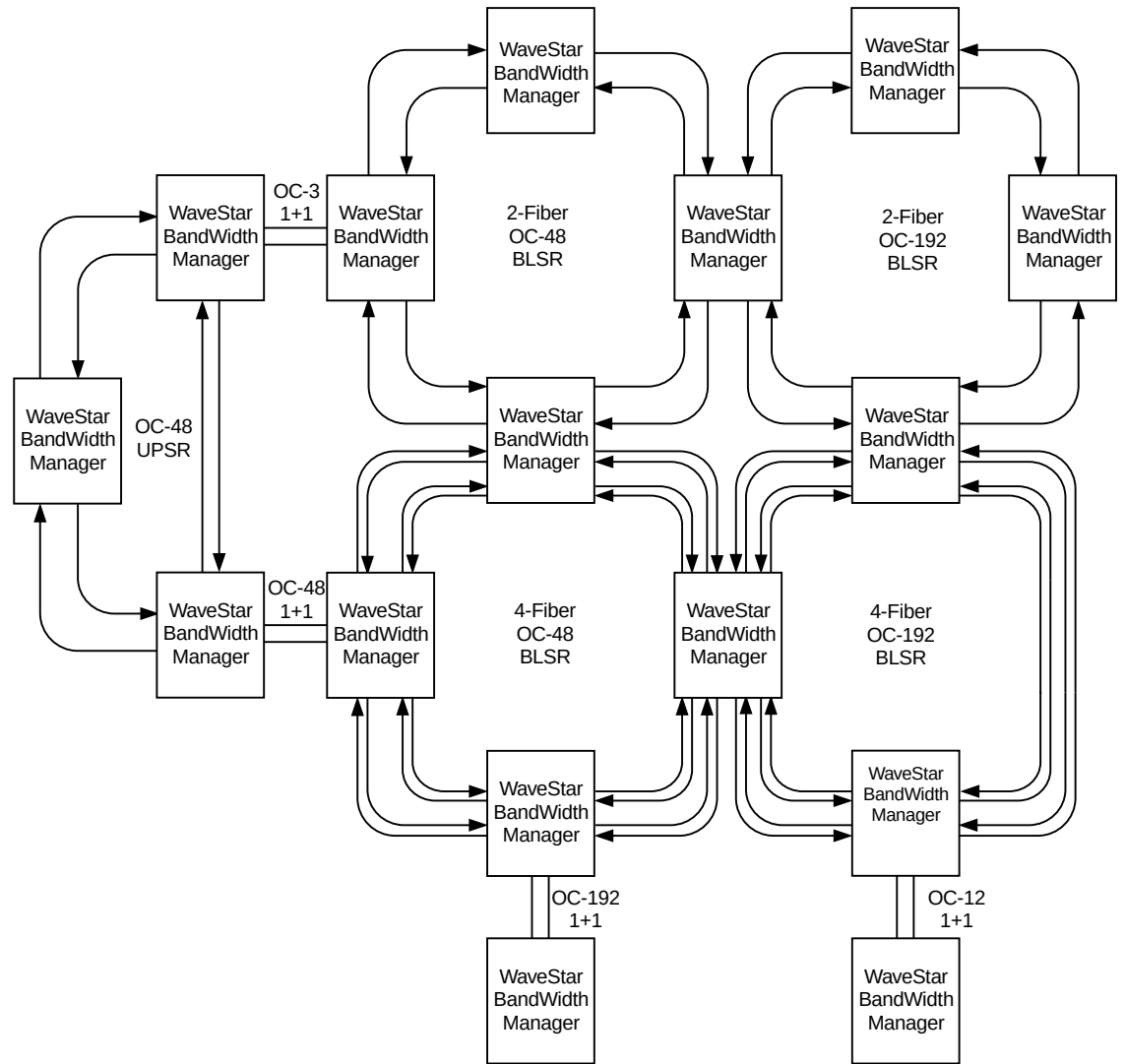
Interworking Between WaveStar BandWidth Managers

Overview WaveStar BandWidth Manager supports transmission and communication (via DCC) interworking between WaveStar BandWidth Managers over multiple interfaces.

Figure (SONET) Figure 2-3 illustrates WaveStar BandWidth Managers interworking over

- Two-fiber OC-192 BLSRs
- Four-fiber OC-192 BLSRs
- Two-fiber OC-48 BLSRs
- Four-fiber OC-48 BLSRs
- OC-48 UPSR
- OC-192 1+1 interfaces
- OC-48 1+1 interfaces
- OC-12 1+1 interfaces
- OC-3 1+1 interfaces

Figure 2-3 Interworking between WaveStar BandWidth Managers (SONET)

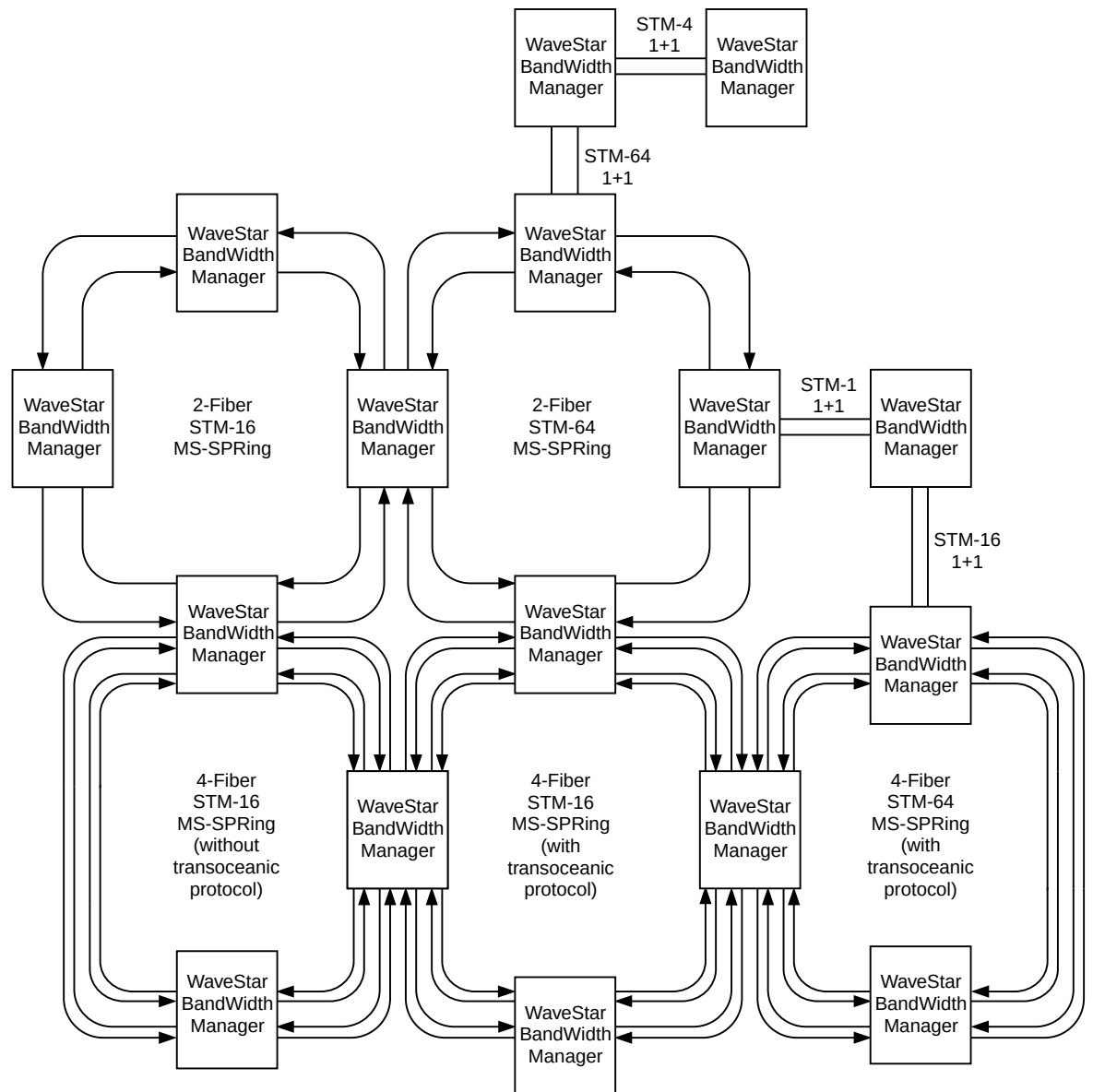


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Figure (SDH) Figure 2-4 illustrates multiple WaveStar BandWidth Managers interworking over

- Two-fiber STM-64 MS-SPRings
- Four-fiber STM-64 MS-SPRings with transoceanic protocol
- Two-fiber STM-16 MS-SPRings
- Four-fiber STM-16 MS-SPRings
- Four-fiber STM-16 MS-SPRings with transoceanic protocol
- STM-64 1+1 interfaces
- STM-16 1+1 interfaces
- STM-4 1+1 interfaces
- STM-1 1+1 interfaces

Figure 2-4 Interworking between WaveStar BandWidth Managers (SDH) Example

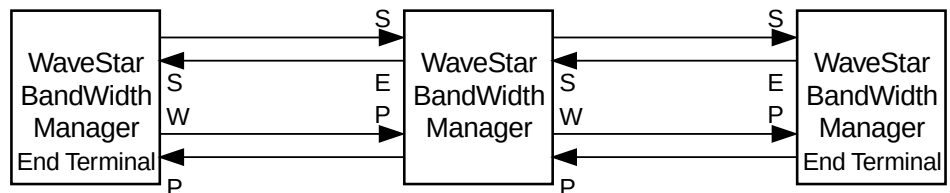


wbwm03017

Figure (open rings) Figure 2-5 illustrates interworking between WaveStar BandWidth Managers over a 4-fiber BLSR/MS-SPRing (open) with two end nodes and one intermediate site. (Up to 13 additional intermediate sites, for a total of 16 nodes on the ring, could be supported.) From left to right in the figure, the first end node is equipped with two port units in the west direction, the intermediate site is equipped with four port units in both directions: east and west, the second end terminal is equipped with two port units in the east direction. Four-fiber BLSRs/MS-SPRings (open) provide flexible routing arrangements for end-node to end-node traffic, end-node to intermediate-site traffic, and intermediate-site to intermediate-site traffic over a common system.

Figure 2-5 could be either a 4-fiber OC-48 or OC-192 BLSR (open) or a 4-fiber STM-16 (open).

Figure 2-5 Interworking between WaveStar BandWidth Managers over 4-Fiber BLSRs/MS-SPRings (Open) Example

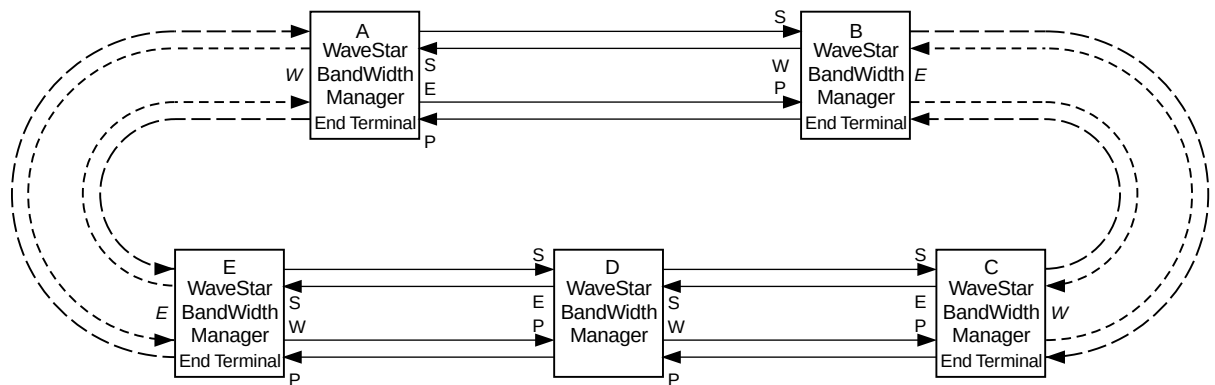


wbwm02017

Closing 4-fiber BLSRs/ MS-SPRings (open)

Figure 2-6 illustrates closing two open 4-fiber BLSRs/MS-SPRings. Network Element (NE) A, B, C, and E are all end terminals and NE D is an intermediate site (two open rings). Therefore, these NEs are equipped with only two port units (OC48/STM16 or OC192/STM64) in either the West (W) or East (E) direction. Typically, four port units are required to terminate a 4-fiber BLSR/MS-SPRing because both directions of traffic must be terminated in a closed ring. The dotted lines on either side of the figure illustrate the fiber that must be added in order to close the ring. Two additional port units must be added to NE A, B, C, and E to terminate the W and E traffic on each side of the figure.

Figure 2-6 Closing 4-Fiber BLSRs/MS-SPRings (Open) Example

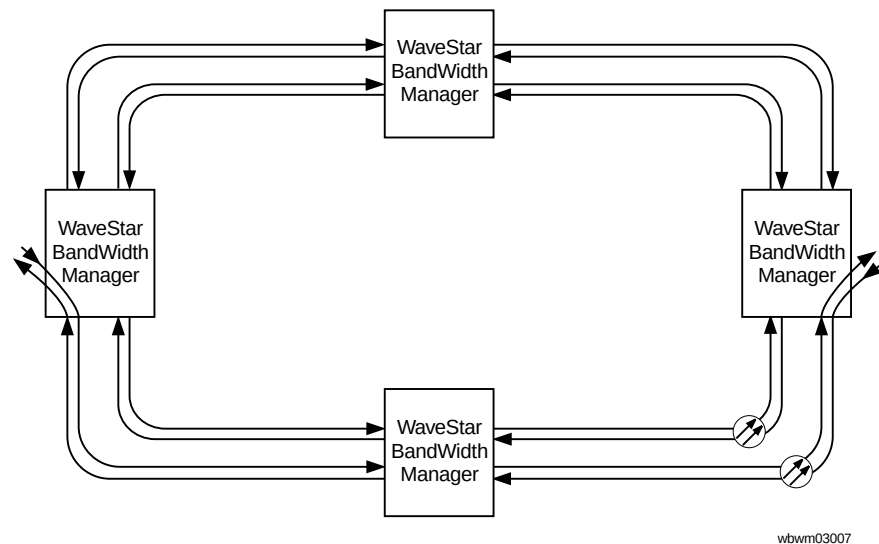


wbwm03012

**Closed 4-fiber
BLSR/MS-SPRing**

Figure 2-7 illustrates normal (non-protection-switched) traffic in a 4-fiber BLSR/MS-SPRing (closed). (Up to 12 additional nodes, for a total of 16 nodes on the ring, could be supported.) In a 4-fiber BLSR/MS-SPRing, two lines of service and protection traffic travel in two directions (East and West) over a single span between two nodes. Each span of the ring consists of two bidirectional lines: two fibers dedicated to service and two to protection. All nodes on the ring are equipped with four port units: two service (SE and SW) and two protection (PE and PW). Either OC48/STM16 or OC192/STM64 port units may be used.

Figure 2-7 Interworking between WaveStar BandWidth Managers over 4-Fiber BLSRs/MS-SPRing (Closed) Example



Important! It is recommended that all WaveStar BandWidth Managers in a ring be equipped with the same release of software.



Overview of WaveStar BandWidth Manager Interworking

Overview This section lists the products and interfaces for WaveStar BandWidth Manager interworking.

Interworking with WaveStar BandWidth Manager WaveStar BandWidth Manager supports transmission and communication (via DCC) interworking between WaveStar BandWidth Manager and various Lucent products, as well as numerous products from other vendors.

Interworking with SONET products

WaveStar BandWidth Manager supports transmission and communication (via DCC) interworking between the following products in the SONET network:

- WaveStar BandWidth Manager and WaveStar TDM 2.5G/10G (2-Fiber), Release 5.0 over
 - 2-fiber OC-48 BLSRs
 - 2-fiber OC-192 BLSRs
 - OC-3 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
 - OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
 - OC-48 interfaces: 1+1 protected (unidirectional, non-revertive)
- WaveStar BandWidth Manager and FT-2000 OC-48 Add/Drop Rings Terminal, Release 9.1 over
 - 2-fiber OC-48 BLSRs
 - OC-3 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
 - OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
- WaveStar BandWidth Manager and Fujitsu FLM 150 ADM, Release 15 over OC-3 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)

- WaveStar BandWidth Manager and Fujitsu FLM 2400 ADM, Release 14.2 and 15 over
 - 2-fiber OC-48 BLSRs
 - OC-48 UPSRs
- WaveStar BandWidth Manager and DDM-2000 OC-3 Multiplexer, Release 13 over
 - OC-12 UPSRs
 - OC-3 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
 - OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
- WaveStar BandWidth Manager and DDM-2000 OC-12 Multiplexer, Release 7 over
 - OC-12 UPSRs
 - OC-3 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
 - OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
- WaveStar BandWidth Manager and Metropolis™ DMX Access Multiplexer, Release 1.1 over OC-48 UPSRs

Interworking with SDH products

WaveStar BandWidth Manager supports transmission and communication (via DCC) interworking between the following products in the SDH network:

- WaveStar BandWidth Manager and WaveStar TDM 10G (STM-64), Release 3.0 over
 - 2-fiber STM-16 MS-SPRings
 - 2-fiber STM-64 MS-SPRings
 - STM-1 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
 - STM-4 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
 - STM-16 interfaces: 1+1 protected (unidirectional, non-revertive)

- WaveStar BandWidth Manager and WaveStar ADM 16/1 (Ruby II Release) over
 - 2-fiber STM-16 MS-SPRings
 - STM-4 SNCPs
 - STM-16 SNCPs
 - STM-1 interfaces: 0x1 protected and 1+1 protected (unidirectional, nonrevertive and bidirectional, non-revertive)
 - STM-4 interfaces: 0x1 protected and 1+1 protected (unidirectional, nonrevertive and bidirectional, non-revertive)
 - STM-16 interfaces: 1+1 protected (unidirectional, nonrevertive and bidirectional, non-revertive)
- WaveStar BandWidth Manager and Nortel Networks TransportNode TN-4T STM-4 Terminal Multiplexer, Release H1.00, over
 - STM-4 SNCPs
 - STM-1 interfaces: 1+1 protected (bidirectional, non-revertive)
 - STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
- WaveStar BandWidth Manager and Nortel Networks TransportNode TN-16X, Release H2.00, over
 - STM-4 SNCPs
 - STM-16 SNCPs
 - STM-1 interfaces: 1+1 protected (bidirectional, non-revertive)
 - STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
 - STM-16 interfaces: 1+1 protected (bidirectional, non-revertive)

- WaveStar BandWidth Manager and Marconi SMA 16/4, Series 3, over
 - STM-4 SNCPs
 - STM-16 SNCPs
 - STM-1 interfaces: 1+1 protected (bidirectional, non-revertive)
 - STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
 - STM-16 interfaces: 1+1 protected (bidirectional, non-revertive)



Interworking with WaveStar TDM 2.5G/10G (2-Fiber)

Overview WaveStar BandWidth Manager supports transmission and communication (via DCC) interworking between WaveStar BandWidth Manager and WaveStar TDM 2.5G/10G (2-Fiber), Release 5.0 over

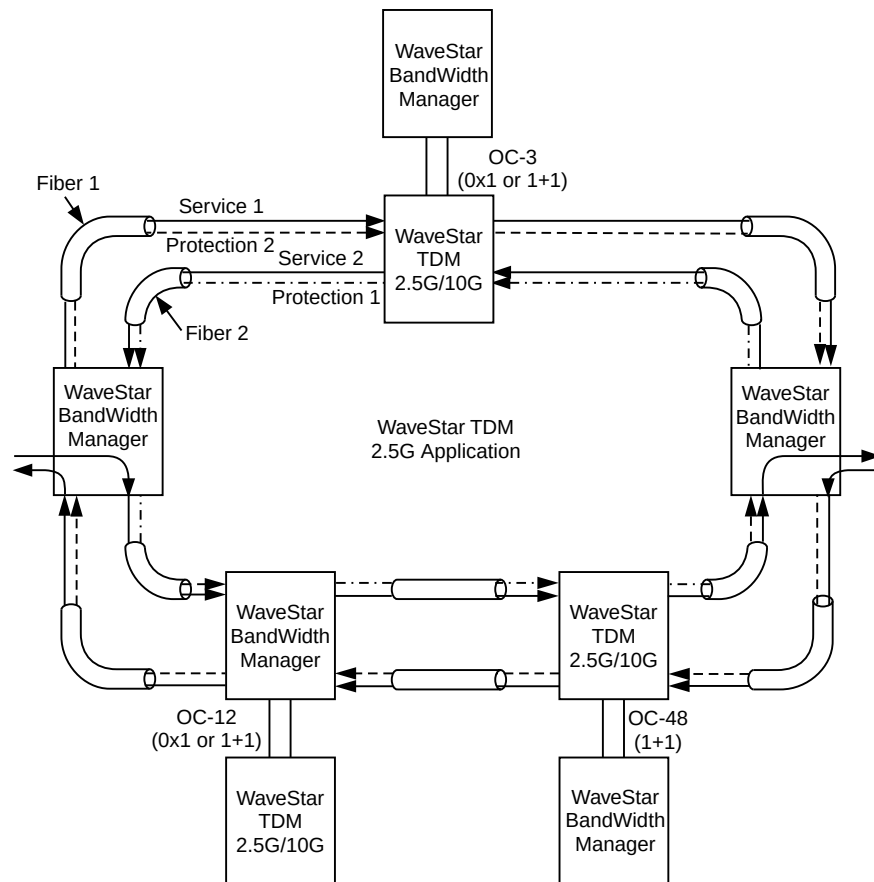
- 2-fiber OC-48 BLSRs
- 2-fiber OC-192 BLSRs
- OC-3 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
- OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
- OC-48 interfaces: 1+1 protected (unidirectional, non-revertive)

Important! As of June 2000, WaveStar TDM 2.5G and WaveStar TDM 10G (OC-192) (2-Fiber) have merged. The new product, WaveStar TDM 2.5G/10G (2-Fiber), supports 2.5G applications and 10G applications.

Figure (2.5G application)

Figure 2-8 illustrates interworking between WaveStar BandWidth Managers and WaveStar TDM 2.5G/10G systems (supporting a 2.5G application) over a 2-fiber OC-48 BLSR, as well as OC-3, OC-12, and OC-48 interfaces.

Figure 2-8 Interworking with WaveStar TDM 2.5G/10G (2.5G Application)



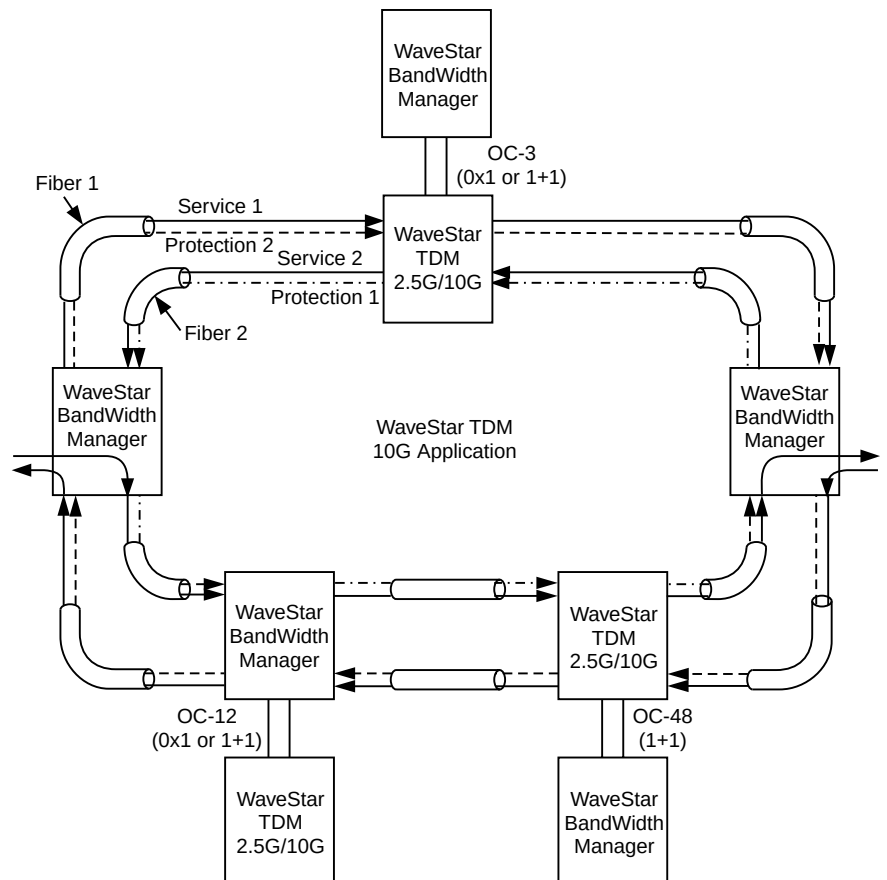
wbwm03015

Important! WaveStar BandWidth Manager supports interworking with WaveStar TDM 2.5G/10G, Release 5.0 and greater.

Figure (10G application)

Figure 2-9 illustrates interworking between WaveStar BandWidth Managers and WaveStar TDM 2.5G/10G systems (supporting a 10G application) over a 2-fiber OC-192 BLSR, as well as OC-3, OC-12, and OC-48 interfaces.

Figure 2-9 Interworking with WaveStar TDM 2.5G/10G (10G Application)



wbwm03026

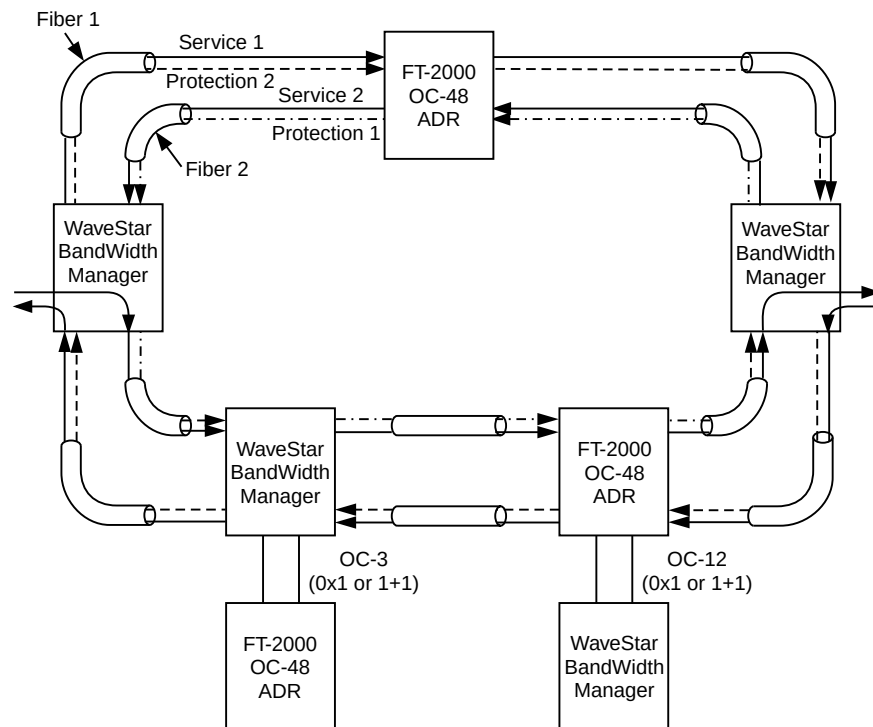
Interworking with FT-2000 OC-48 ADR

Overview WaveStar BandWidth Manager supports transmission and communication (via DCC) interworking between WaveStar BandWidth Managers and FT-2000 OC-48 Add/Drop Ring (ADR) Terminals, Release 9.1 over

- 2-fiber OC-48 BLSRs
- OC-3 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
- OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)

Figure Figure 2-10 illustrates interworking between WaveStar BandWidth Managers and FT-2000 OC-48 ADR Terminals over a 2-fiber OC-48 BLSR, as well as OC-3 and OC-12 interfaces.

Figure 2-10 Interworking with FT-2000 OC-48 ADR



wbwm03011

Important! WaveStar BandWidth Manager supports interworking with FT-2000 OC-48 ADR, Release 9.1 and greater.

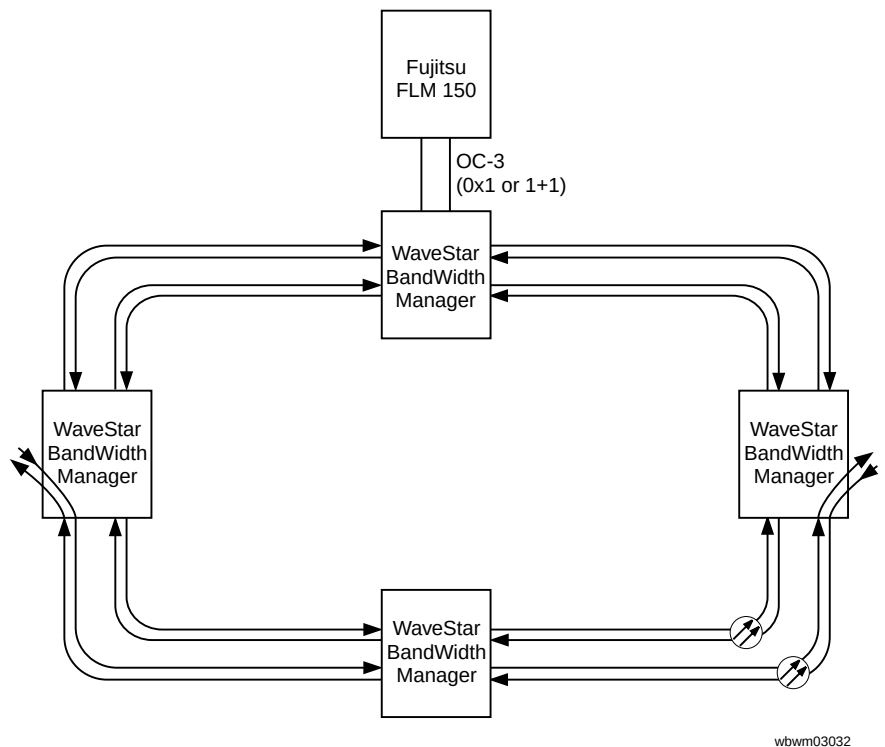
Interworking with Fujitsu FLM ADMs

Overview WaveStar BandWidth Manager supports transmission and communication (via DCC) interworking between WaveStar BandWidth Manager and

- Fujitsu FLM 150 ADM, Release 15 over OC-3 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
- Fujitsu FLM 2400 ADM, Release 14.2 and 15 over
 - 2-fiber OC-48 BLSRs
 - OC-48 UPSRs

Fujitsu FLM 150 ADM Figure 2-11 illustrates interworking between WaveStar BandWidth Manager and Fujitsu FLM 150 ADM over OC-3 interfaces.

Figure 2-11 Interworking with Fujitsu FLM 150 ADM

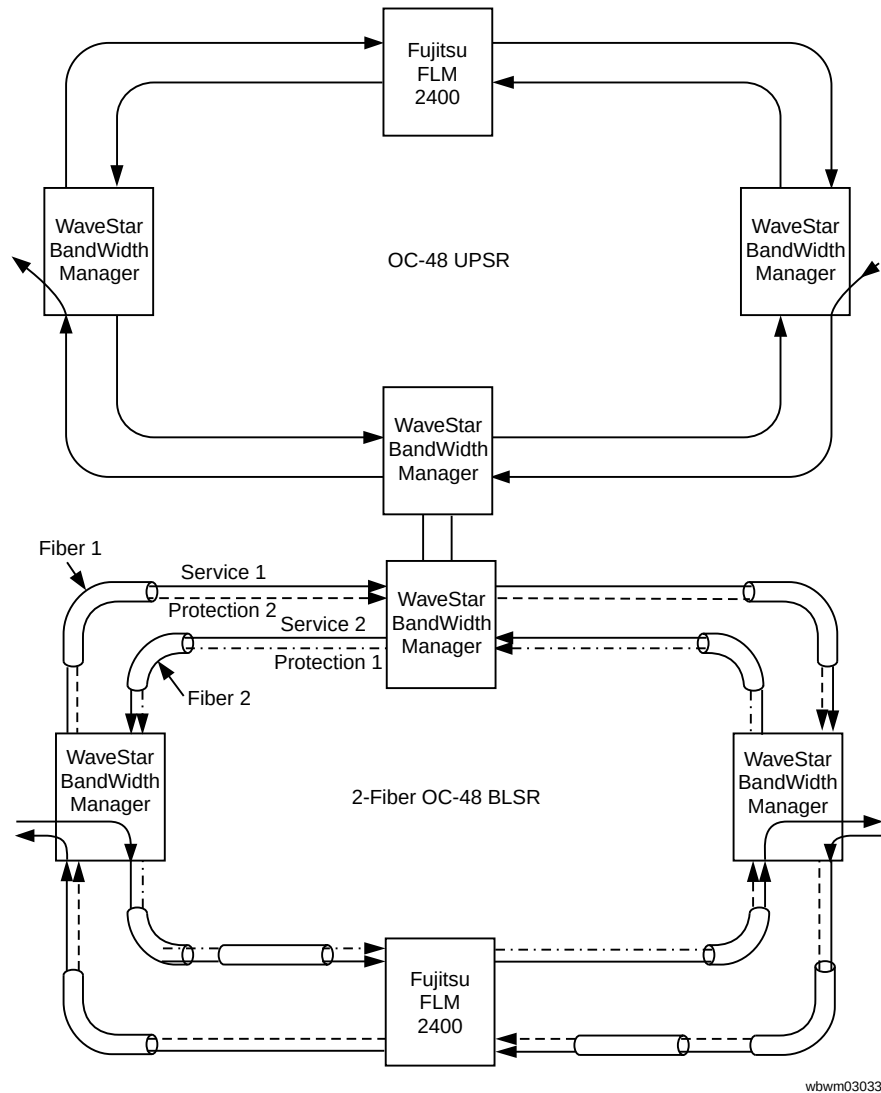


Important! WaveStar BandWidth Manager supports interworking with Fujitsu FLM 150 ADM, Release 15 and greater.

Fujitsu FLM 2400 ADM

Figure 2-12 illustrates interworking between WaveStar BandWidth Managers and Fujitsu FLM 2400 ADMs over an OC-48 UPSR and a 2-fiber OC-48 BLSR.

Figure 2-12 Interworking with Fujitsu FLM 2400 ADM



Important! WaveStar BandWidth Manager supports interworking with Fujitsu FLM 2400 ADM, Release 14.2 and 15 and greater.

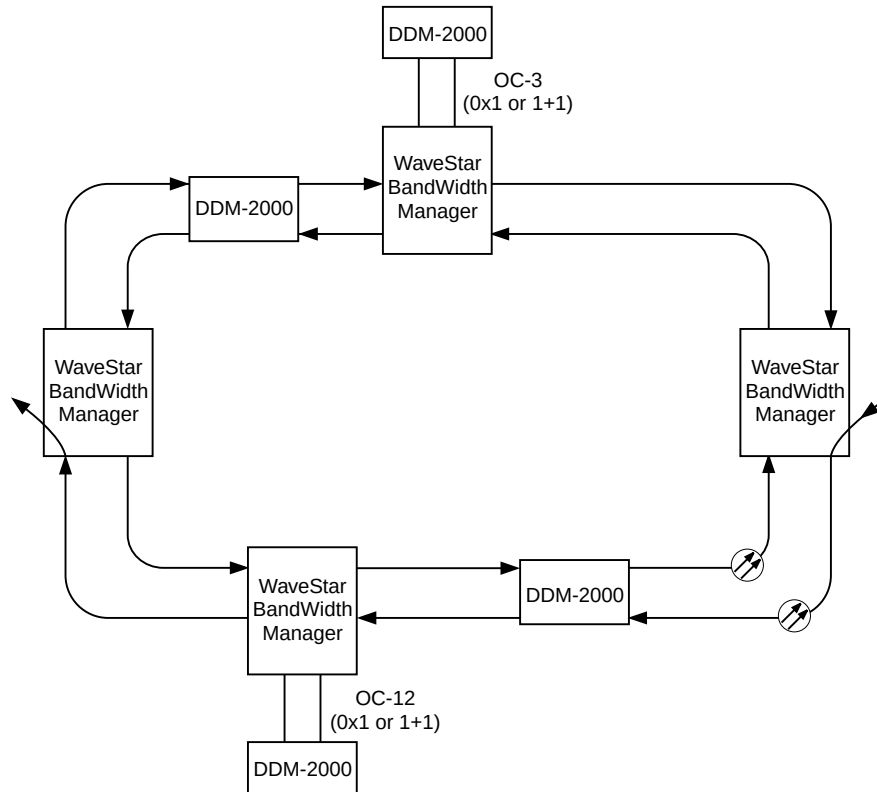


Interworking with DDM-2000 OC-3 and OC-12 Multiplexers

- Overview** WaveStar BandWidth Manager supports transmission and communication (via DCC) interworking between
- WaveStar BandWidth Manager and DDM-2000 OC-3 Multiplexer, Release 13 over
 - OC-12 UPSRs
 - OC-3 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
 - OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
 - WaveStar BandWidth Manager and DDM-2000 OC-12 Multiplexer, Release 7 over
 - OC-12 UPSRs
 - OC-3 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
 - OC-12 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)

Figure Figure 2-13 illustrates interworking between WaveStar BandWidth Managers and DDM-2000 multiplexers over an OC-12 UPSR and OC-3 and OC-12 interfaces.

Figure 2-13 Interworking with DDM-2000 OC-3/OC-12 Multiplexers



Important! WaveStar BandWidth Manager supports interworking with DDM-2000 OC-3 Multiplexer, Release 13 and greater and DDM-2000 OC-12 Multiplexer, Release 7 and greater.

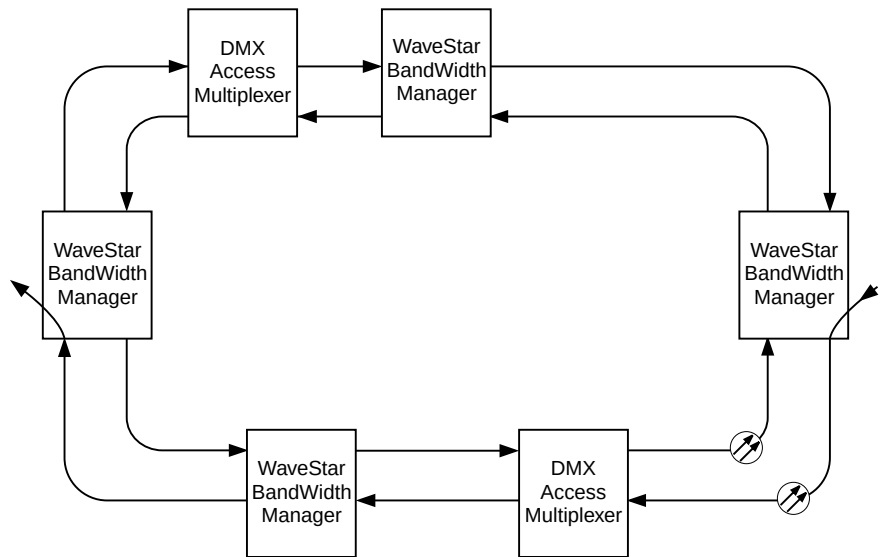


Interworking with Metropolis™ DMX Access Multiplexer

Overview WaveStar BandWidth Manager supports transmission and communication (via DCC) interworking between WaveStar BandWidth Manager and Metropolis DMX Access Multiplexer, Release 1.1 over OC-48 UPSRs.

Figure Figure 2-14 illustrates interworking between WaveStar BandWidth Managers and Metropolis DMX Access Multiplexers over an OC-48 UPSR.

Figure 2-14 Interworking with Metropolis DMX Access Multiplexers



wbwm03029

Important! WaveStar BandWidth Manager supports interworking with Metropolis DMX Access Multiplexer, Release 1.1 and greater.

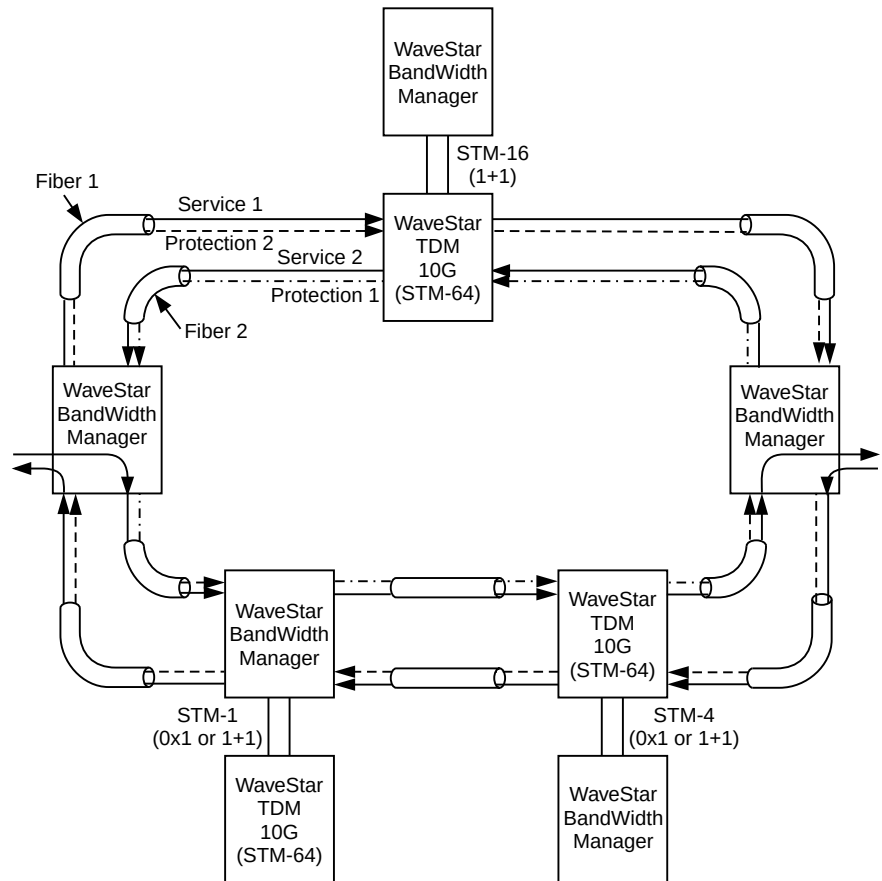


Interworking with WaveStar TDM 10G (STM-64)

- Overview** WaveStar BandWidth Manager supports transmission and communication (via DCC) interworking between WaveStar BandWidth Managers and WaveStar TDM 10G (STM-64), Release 3.0 over
- 2-fiber STM-16 MS-SPRings
 - 2-fiber STM-64 MS-SPRings
 - STM-1 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
 - STM-4 interfaces: 0x1 protected and 1+1 protected (unidirectional, non-revertive)
 - STM-16 interfaces: 1+1 protected (unidirectional, non-revertive)

Figure Figure 2-15 illustrates interworking between WaveStar BandWidth Managers and WaveStar TDM 10G (STM-64) systems over a 2-fiber STM-16 or STM-64 MS-SPRing and STM-1, STM-4, and STM-16 interfaces.

Figure 2-15 Interworking with WaveStar TDM 10G (STM-64)



wbwm03016

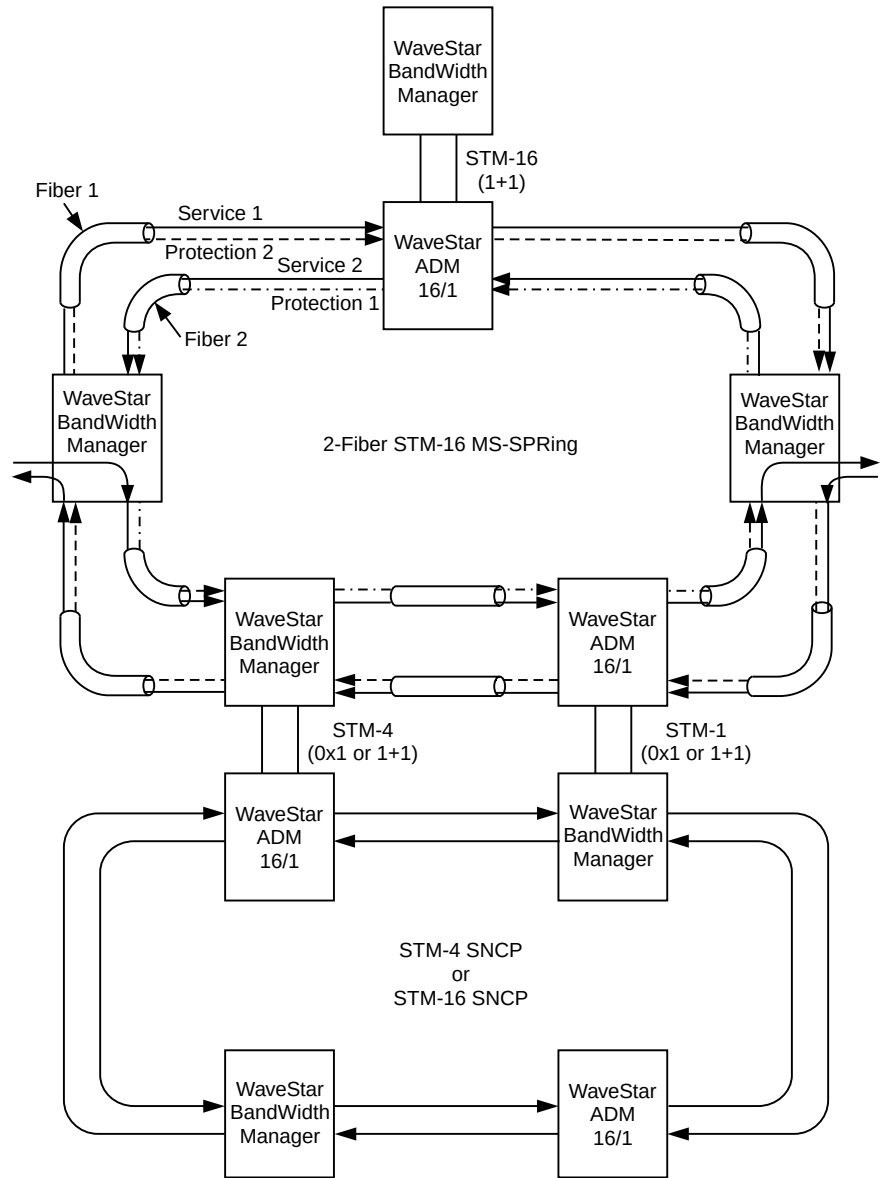
Important! WaveStar BandWidth Manager supports interworking with WaveStar TDM 10G (STM-64), Release 3.0 and greater.

Interworking with WaveStar ADM 16/1 (Ruby II)

- Overview** WaveStar BandWidth Manager supports transmission and communication (via DCC) interworking between WaveStar BandWidth Manager and WaveStar ADM 16/1 (Ruby II) over
- 2-fiber STM-16 MS-SPRings
 - STM-4 SNCPs
 - STM-16 SNCPs
 - STM-1 interfaces: 0x1 protected and 1+1 protected (unidirectional, nonrevertive and bidirectional, non-revertive)
 - STM-4 interfaces: 0x1 protected and 1+1 protected (unidirectional, nonrevertive and bidirectional, non-revertive)
 - STM-16 interfaces: 1+1 protected (unidirectional, nonrevertive and bidirectional, non-revertive)

Figure Figure 2-16 illustrates interworking between WaveStar BandWidth Managers and WaveStar ADM 16/1 (Ruby II) systems over a 2-fiber STM-16 MS-SPRing and an STM-4 or an STM-16 SNCP, as well as STM-1, STM-4, and STM-16 interfaces.

Figure 2-16 Interworking with WaveStar ADM 16/1 (Ruby II)



wbwm03024

Important! WaveStar BandWidth Manager supports interworking with WaveStar ADM 16/1, Ruby II and greater.

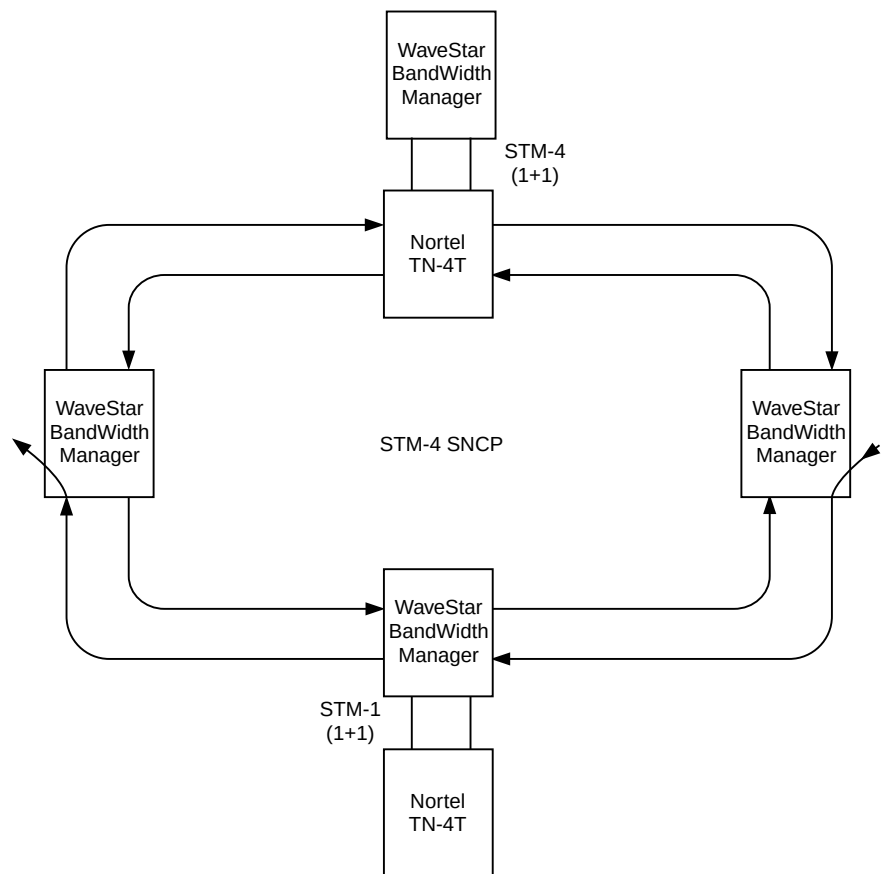
Interworking with Nortel Networks TransportNode TN-4T and TN-16X

- Overview** WaveStar BandWidth Manager supports transmission and communication (via DCC) interworking between WaveStar BandWidth Manager and
- Nortel Networks TransportNode TN-4T STM-4 Terminal Multiplexer, Release H1.00, over
 - STM-4 SNCPs
 - STM-1 interfaces: 1+1 protected (bidirectional, non-revertive)
 - STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
 - Nortel Networks TransportNode TN-16X, Release H2.00, over
 - STM-4 SNCPs
 - STM-16 SNCPs
 - STM-1 interfaces: 1+1 protected (bidirectional, non-revertive)
 - STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
 - STM-16 interfaces: 1+1 protected (bidirectional, non-revertive)

**Nortel Networks
TransportNode TN-4T
STM-4 Terminal Multiplexer**

Figure 2-17 illustrates interworking between WaveStar BandWidth Manager and Nortel Networks TransportNode TN-4T STM-4 Terminal Multiplexer over an STM-4 SNCP, as well as STM-1 and STM-4 interfaces.

Figure 2-17 Interworking with Nortel Networks TransportNode TN-4T STM-4 Terminal Multiplexer

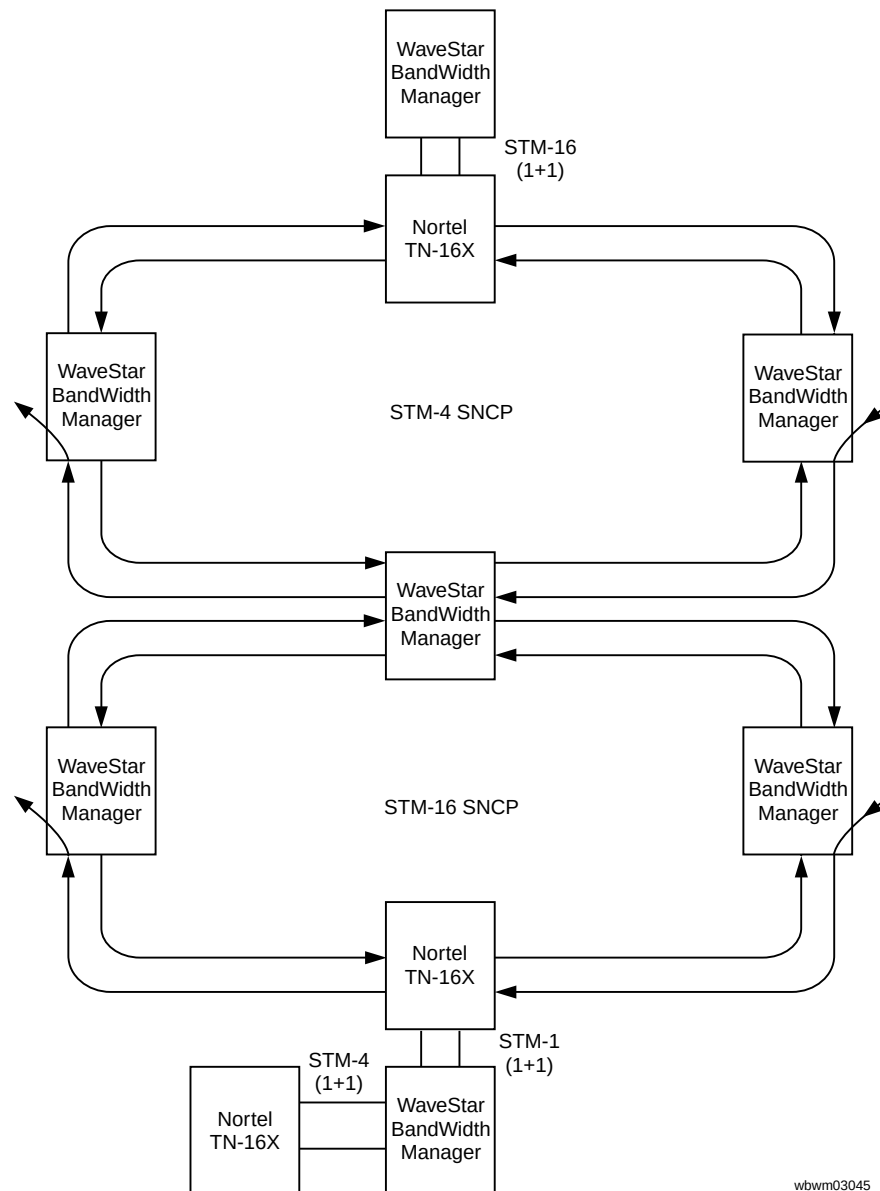


Important! WaveStar BandWidth Manager supports interworking with Nortel Networks TransportNode TN-4T STM-4 Terminal Multiplexer, Release H1.00 and greater.

Nortel Networks TransportNode TN-16X

Figure 2-18 illustrates interworking between WaveStar BandWidth Manager and Nortel Networks TransportNode TN-16X over an STM-4 and STM-16 SNCP, as well as STM-1, STM-4, and STM-16 interfaces.

Figure 2-18 Interworking with Nortel Networks TransportNode TN-16X



Important! WaveStar BandWidth Manager supports interworking with Nortel Networks TransportNode TN-16X, Release H2.00 and greater.

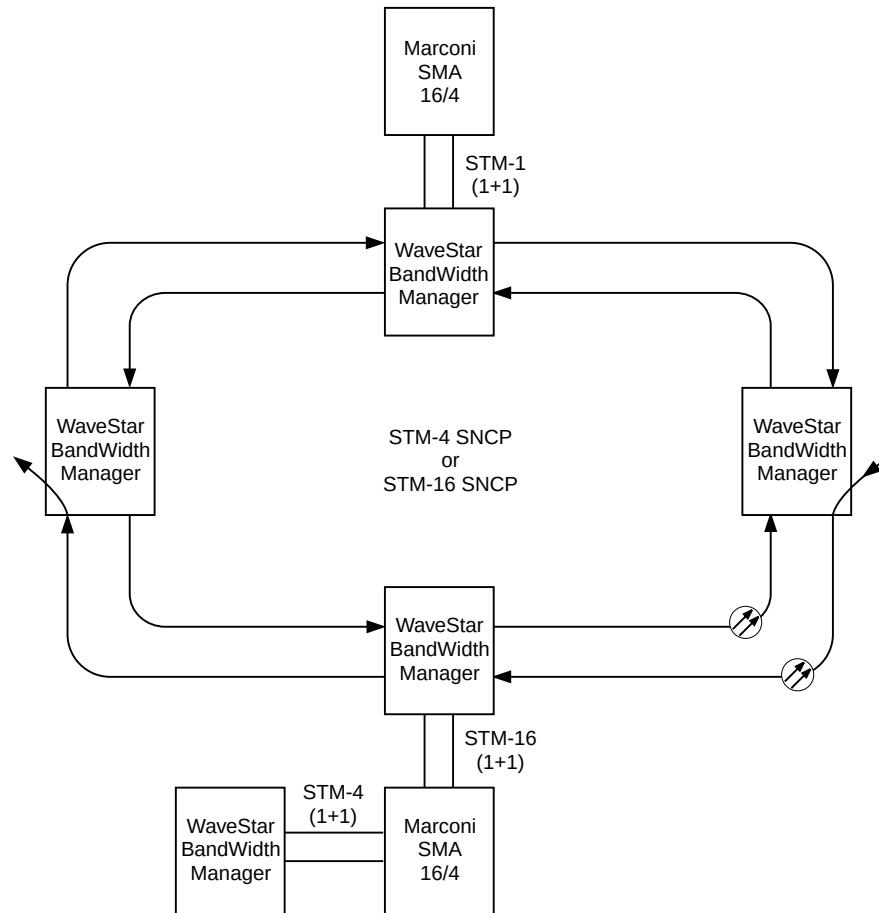


Interworking with Marconi SMA 16/4

- Overview** WaveStar BandWidth Manager supports transmission and communication (via DCC) interworking between WaveStar BandWidth Manager and Marconi SMA 16/4, Series 3, over
- STM-4 SNCPs
 - STM-16 SNCPs
 - STM-1 interfaces: 1+1 protected (bidirectional, non-revertive)
 - STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
 - STM-16 interfaces: 1+1 protected (bidirectional, non-revertive)

Figure Figure 2-19 illustrates optical transmission between WaveStar BandWidth Managers and Marconi SMA 16/4 systems over an STM-4 or an STM-16 SNCP, as well as STM-1, STM-4, and STM-16 interfaces.

Figure 2-19 Interworking with Marconi SMA 16/4



wbwm03043

Important! WaveStar BandWidth Manager supports interworking with Marconi SMA 16/4, Series 3 and greater.



Overview of WaveStar BandWidth Manager Transmission Interfacing

Overview WaveStar BandWidth Manager supports transmission interfacing between WaveStar BandWidth Manager and various other products.

Interfacing with WaveStar BandWidth Manager

WaveStar BandWidth Manager supports transmission interfacing between

- WaveStar BandWidth Manager and WaveStar Optical Line System (OLS) 40G/80G over OC-48/STM-16 optics via the OC48/STM16/DWDM01-16 port units
- WaveStar BandWidth Manager and WaveStar Optical Line System (OLS) 400G, Release 3 over OC-192/STM-64 optics via the OC192/STM64/WDM port units (40 wavelengths) and OC-48/STM-16 optics via the OC48/STM16/WDM port units (80 wavelengths)
- WaveStar BandWidth Manager and Lucent (Ascend) GX 550 Multiservice WAN Switch, Release Jade M2 (2.2.1.2) over
 - OC-12/STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
 - OC-48/STM-16 interfaces: 1+1 protected (bidirectional, non-revertive)
- WaveStar BandWidth Manager and Lucent (Ascend) CBX 500 Multiservice WAN Switch, Release Jade M2 (4.2) over OC-12/STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
- WaveStar BandWidth Manager supports optical transmission interfacing between Cisco ONS 15454 system and WaveStar BandWidth Manager over
 - OC-48 UPSRs
 - OC-3 interfaces: 0x1 and 1+1 protected (unidirectional, non-revertive)
 - OC-12 interfaces: 0x1 and 1+1 protected (unidirectional, non-revertive)

- WaveStar BandWidth Manager and Marconi MSH 84/86, Series 3, over
 - STM-1 interfaces: 1+1 protected (bidirectional, non-revertive)
 - STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
 - STM-16 interfaces: 1+1 protected (bidirectional, non-revertive)

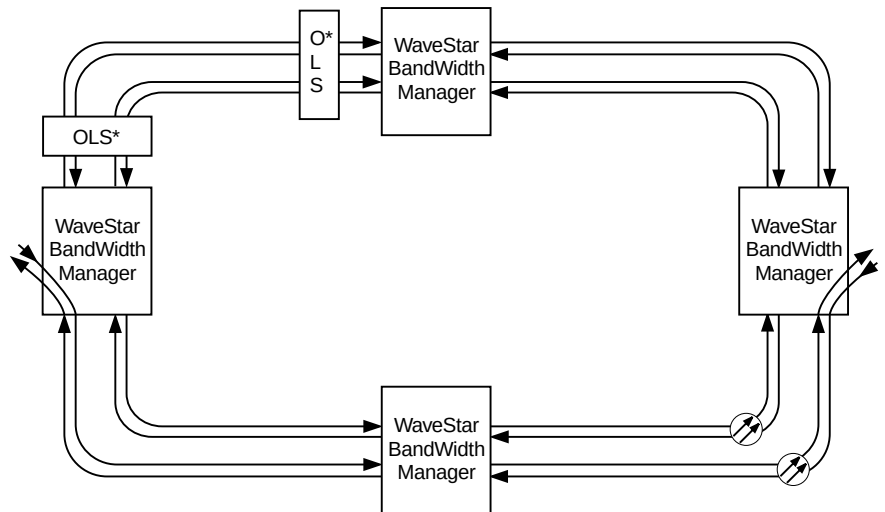


Transmission Interfacing with WaveStar OLS 40G/80G

Overview WaveStar BandWidth Manager supports direct optical transmission interfacing between WaveStar BandWidth Manager and WaveStar Optical Line System (OLS) 40G/80G without OTUs over OC-48/STM-16 interfaces (via the OC48/STM16/DWDM01-16 port units).

OLS 40G Figure 2-20 illustrates optical transmission between two WaveStar BandWidth Managers and two WaveStar OLS 40G systems without OTUs over OC-48 interfaces. The ring in the following figure is a 4-fiber OC-48 BLSR.

Figure 2-20 Interfacing with WaveStar OLS 40G



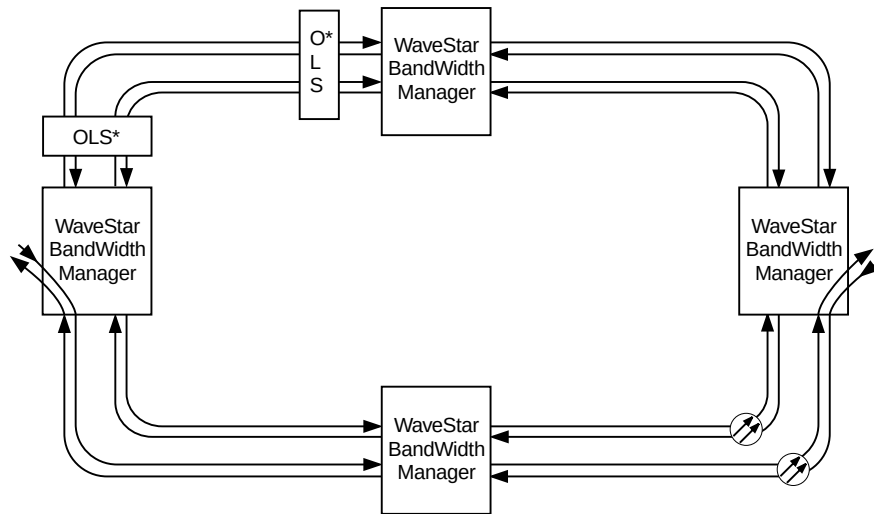
* WaveStar Optical Line System 40G

wbwm03008

Important! WaveStar BandWidth Managers adjacent to the OLS systems must be equipped with OC48/STM16/DWDM01-16 port units in order to eliminate the need for OTUs in the OLS systems.

OLS 80G Figure 2-21 illustrates interworking between two WaveStar BandWidth Managers and two WaveStar OLS 80G systems without OTUs over STM-16 interfaces. The ring in the following figure is a 4-fiber STM-16 MS-SPRing.

Figure 2-21 Interfacing with WaveStar OLS 80G



* WaveStar Optical Line System 80G

wbwm03009

Important! WaveStar BandWidth Managers adjacent to the OLS systems must be equipped with OC48/STM16/DWDM01-16 port units in order to eliminate the need for OTUs in the OLS systems.



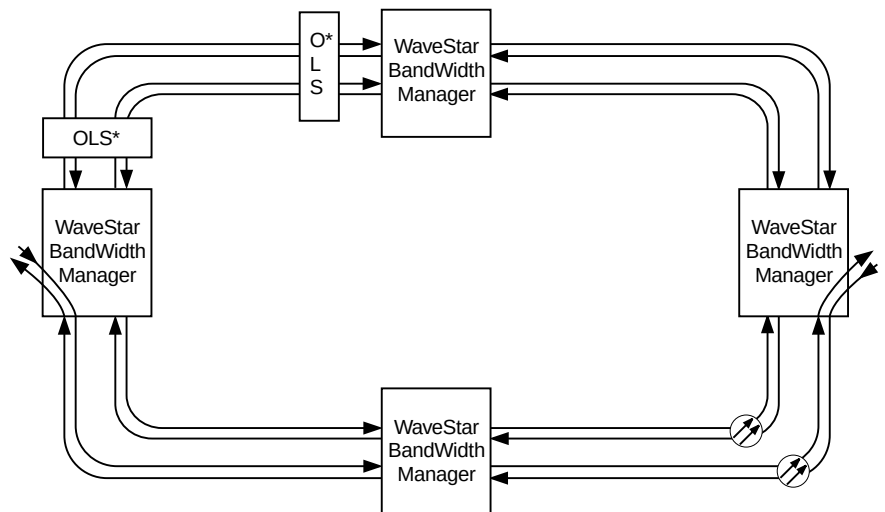
Transmission Interfacing with WaveStar OLS 400G

Overview WaveStar BandWidth Manager supports direct optical transmission interfacing between WaveStar BandWidth Manager and WaveStar Optical Line System (OLS) 400G, Release 3 without OTUs over OC-192/STM-64 (via the 40 wavelengths of OC192/STM64/WDM port units), and over OC-48/STM-16 (via the 80 wavelengths of OC48/STM16/WDM port units).

Figure (OLS 400G) Figure 2-22 illustrates optical transmission between WaveStar BandWidth Managers and WaveStar OLS 400G systems without OTUs over OC-192/STM-64 or OC-48/STM-16 interfaces. The ring in Figure 2-22 could be either a 4-fiber OC-192 BLSR/STM-64 MS-SPRing or a 4-fiber OC-48 BLSR/STM-16 MS-SPRing.

WaveStar BandWidth Manager supports interworking with Release 3 and greater of WaveStar OLS 400G without OTUs.

Figure 2-22 Interfacing with WaveStar OLS 400G



* WaveStar Optical Line System 400G

wbwm03027

Important! WaveStar BandWidth Managers adjacent to the OLS systems must be equipped with either OC192/STM64/WDM or OC48/STM16/WDM port units, in order to eliminate the need for OTUs in the OLS systems.

Valid Applications

Figure 2-23 illustrates a valid application using OC192/STM64/WDM port units with strong forward error correction (SFEC) enabled in the WaveStar BandWidth Manager NE and no OTUs in the WaveStar OLS 400G NEs.

Figure 2-23 Valid Application A with WaveStar OLS 400G

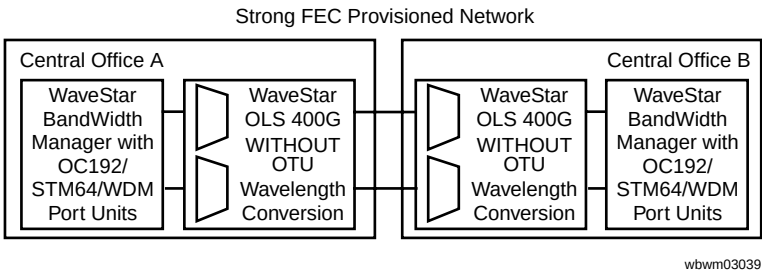
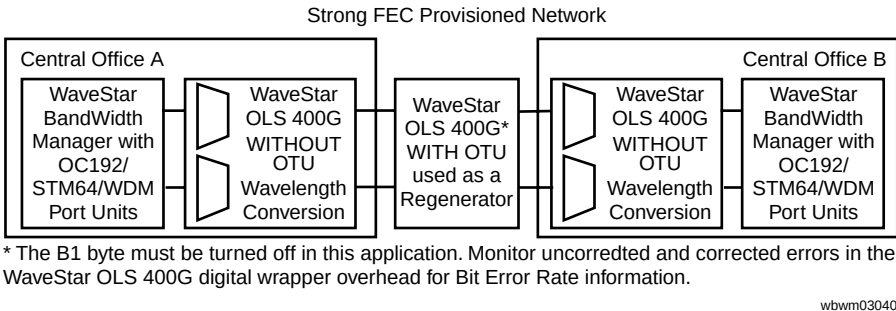


Figure 2-24 illustrates a valid application using OC192/STM64/WDM port units in the WaveStar BandWidth Manager NE and no OTUs in the WaveStar OLS 400G NEs. In this example, it is acceptable to have and WaveStar OLS 400G with OTUs (not directly interfacing with WaveStar BandWidth Manager in the application functioning as a repeater.

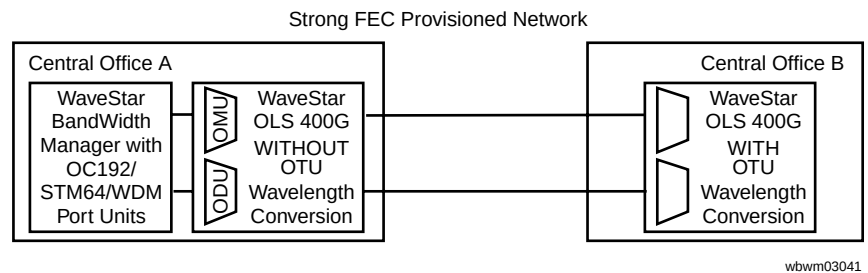
Figure 2-24 Valid Application B with WaveStar OLS 400G



Invalid application

Figure 2-25 illustrates an invalid application. When WaveStar BandWidth Manager is interfacing with WaveStar OLS 400G via the OC192/STM64/WDM port units, neither end of the span may be equipped with OTUs (in the WaveStar OLS 400G NE). The OTUs in OLS scramble the optical signal differently than OC192/STM64/WDM port units. Therefore, a span with OTUs in the WaveStar OLS 400G NE and OC192/STM64/WDM port units in the WaveStar BandWidth Manager NE would be an invalid application.

Figure 2-25 Invalid Application with WaveStar OLS 400G

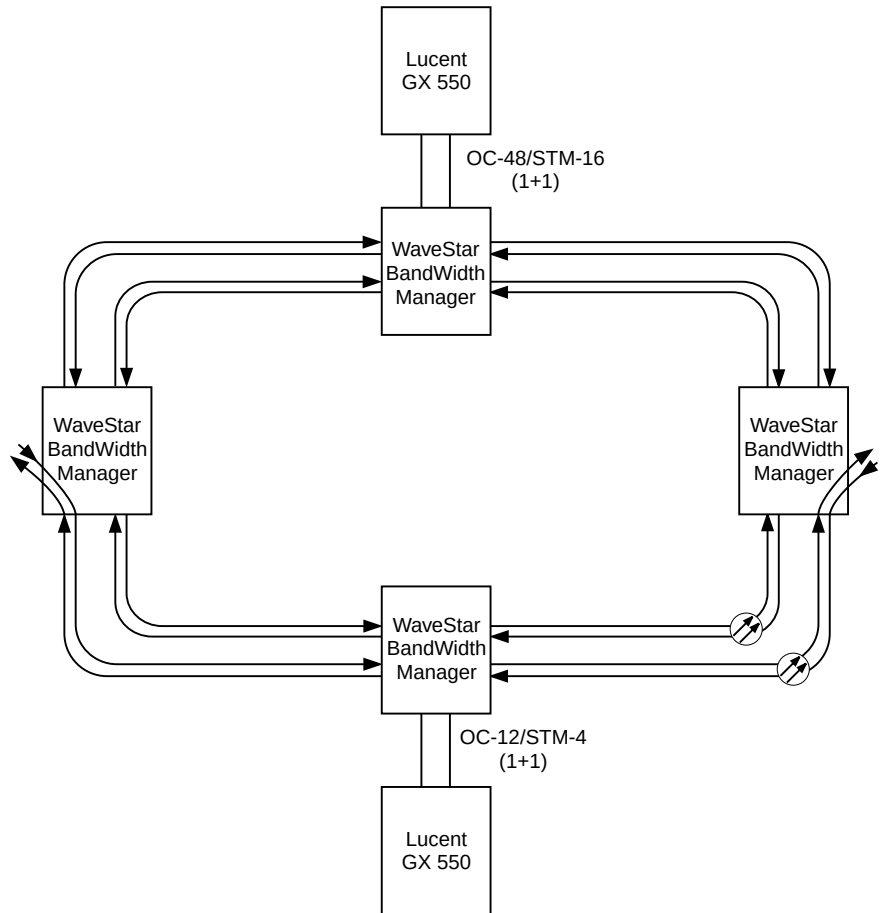


Transmission Interfacing with Lucent GX 550 Multiservice WAN Switch

- Overview** WaveStar BandWidth Manager supports optical transmission interfacing between Lucent (Ascend) GX 550 Multiservice WAN Switch systems and WaveStar BandWidth Manager over
- OC-12/STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
 - OC-48/STM-16 interfaces: 1+1 protected (bidirectional, non-revertive)

Figure Figure 2-26 illustrates interfacing between WaveStar BandWidth Managers and GX 550 systems via OC-48/STM-16 and OC-12/STM-4 interfaces.

Figure 2-26 Interfacing with Lucent GX 550 Multiservice WAN Switch System



wbwm03028

Important! WaveStar BandWidth Manager supports optical transmission between WaveStar BandWidth Manager and Lucent GX 550, Release Jade M2 (2.2.1.2) and greater.

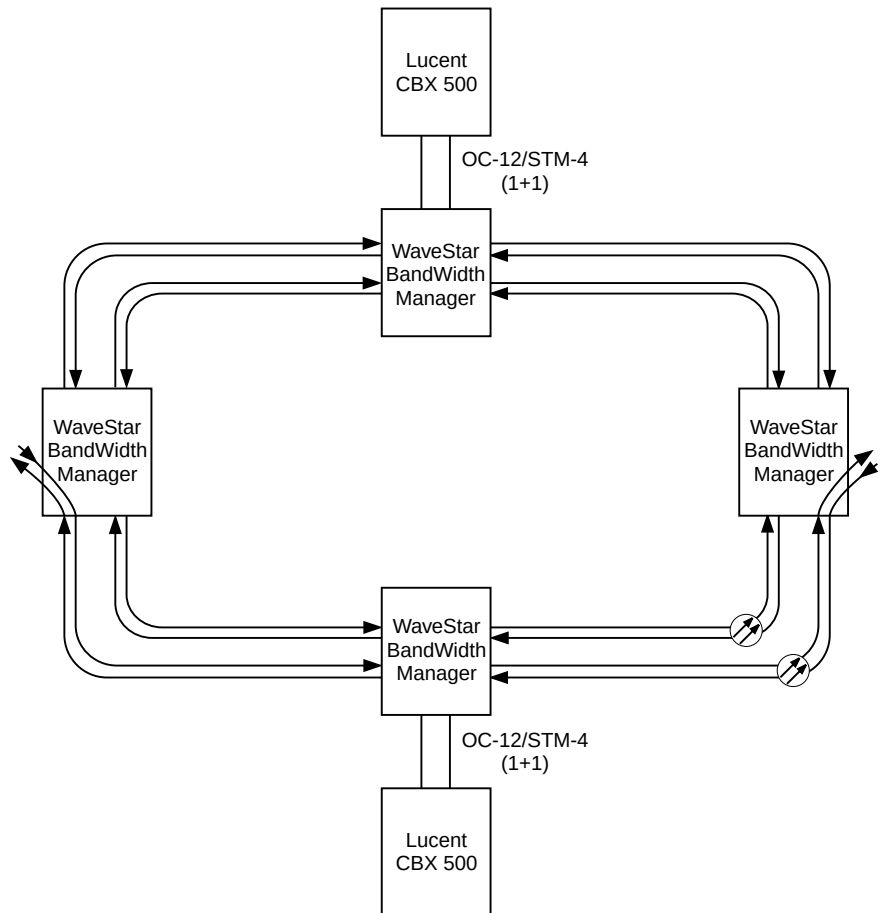


Transmission Interfacing with Lucent CBX 500 Multiservice WAN Switch

Overview WaveStar BandWidth Manager supports optical transmission interfacing between Lucent CBX 500 Multiservice WAN Switch system and WaveStar BandWidth Manager over OC-12/STM-4 interfaces: 1+1 protected (bidirectional, non-revertive).

Figure Figure 2-27 illustrates optical transmission between WaveStar BandWidth Managers and CBX 500 systems over OC-12/STM-4 interfaces.

Figure 2-27 Interfacing with Lucent CBX 500 Multiservice WAN Switch System



wbwm03035

Important! WaveStar BandWidth Manager supports optical transmission between WaveStar BandWidth Manager and Lucent CBX 500, Release Jade M2 (4.2) and greater.

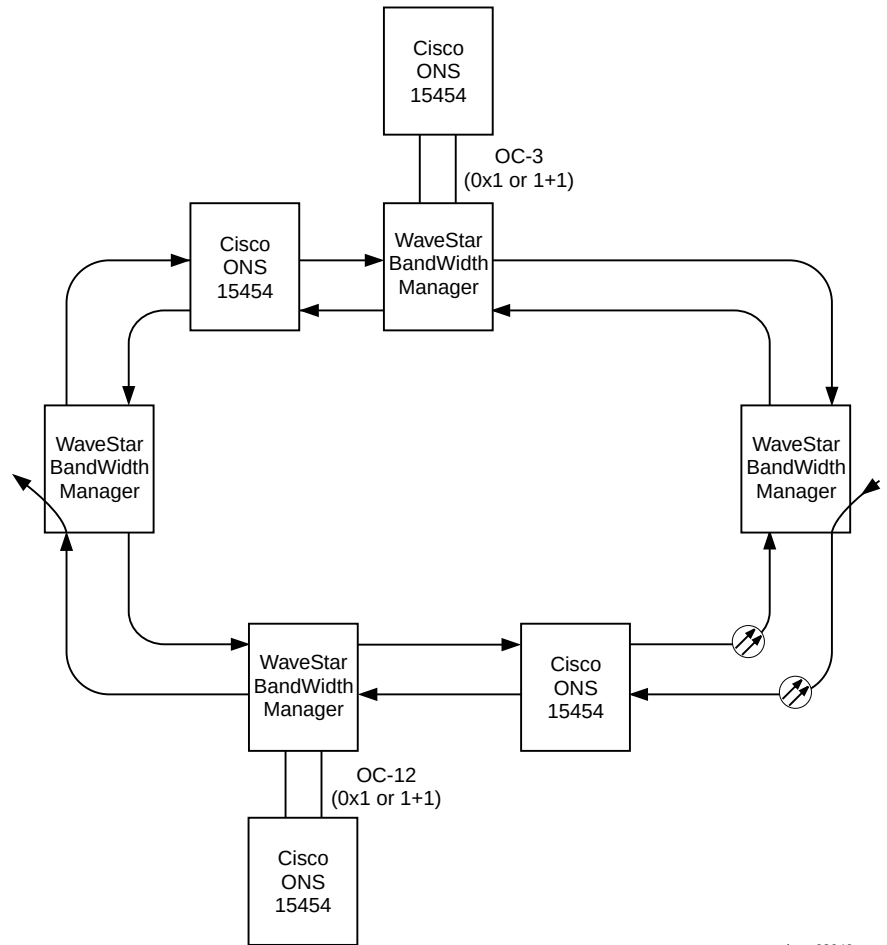


Transmission Interfacing with Cisco ONS 15454

- Overview** WaveStar BandWidth Manager supports optical transmission interfacing between Cisco ONS 15454 system and WaveStar BandWidth Manager over
- OC-48 UPSRs
 - OC-3 interfaces: 0x1 and 1+1 protected (unidirectional, non-revertive)
 - OC-12 interfaces: 0x1 and 1+1 protected (unidirectional, non-revertive)

Figure Figure 2-28 illustrates optical transmission between WaveStar BandWidth Managers and Cisco ONS 15454 systems over an OC-48 UPSR as well as OC-3 and OC-12 interfaces.

Figure 2-28 Interfacing with Cisco ONS 15454



Important! WaveStar BandWidth Manager supports optical transmission between WaveStar BandWidth Manager and Cisco ONS 15454, Release 2.2 and greater.

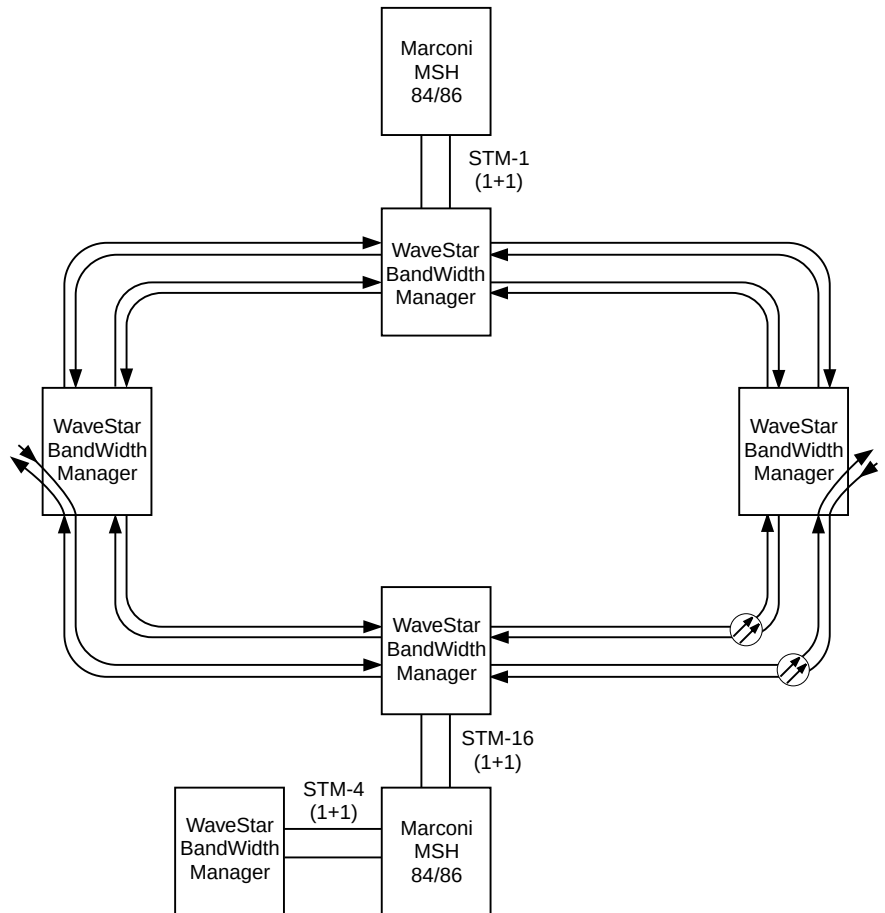
□

Transmission Interfacing with Marconi MSH 84/86

- Overview** WaveStar BandWidth Manager supports optical transmission interfacing between Marconi MSH 84/86 and WaveStar BandWidth Manager over
- STM-1 interfaces: 1+1 protected (bidirectional, non-revertive)
 - STM-4 interfaces: 1+1 protected (bidirectional, non-revertive)
 - STM-16 interfaces: 1+1 protected (bidirectional, non-revertive)

Figure Figure 2-29 illustrates optical transmission between WaveStar BandWidth Managers and Marconi MSH 84/86 systems over STM-1, STM-4, and STM-16 interfaces.

Figure 2-29 Interfacing with Marconi MSH 84/86



wbwm03042

Important! WaveStar BandWidth Manager supports optical transmission between WaveStar BandWidth Manager and Marconi MSH 84/86, Series 3 and greater.





3 Platform Description

Overview

Purpose This section describes WaveStar BandWidth Manager equipment.

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Introduction to WaveStar BandWidth Manager

Overview This section provides a brief introduction to WaveStar BandWidth Manager.

WaveStar BandWidth Manager WaveStar BandWidth Manager is a platform for bandwidth management and integrated 2-fiber and 4-fiber Bidirectional Line-Switch Ring (BLSR)/Multiple Section - Shared Protection Ring (MS-SPRing) applications, as well as Unidirectional Path-Switch Ring (UPSR) and Sub-Network Connection Protection (SNCP) ring applications. WaveStar BandWidth Manager is a modular networking system capable of integrating multiple interoffice transport and broadband digital cross-connect facilities into a single network element.

WaveStar BandWidth Manager is available in a 4608/1536 platform which provides a main switch fabric capable of cross-connecting 4608 STS-1/1536 STM-1 equivalents.

Minimum configurations The WaveStar BandWidth Manager 4608/1536 platform comprises

- The required cable management bays
- Either a 2-bay or 3-bay Control/Switch Complex
- An I/O Complex which may include a combination of Universal I/O Bays, 10G I/O Bays, 10G/Universal I/O Bays, SDH I/O Bays, and/or 10G/SDH I/O Bays

4608/1536 platform

The minimum configuration for the WaveStar BandWidth Manager 4608/1536 platform includes the required cable management bays, either a 2-bay or 3-bay Control/Switch Complex, and an I/O Complex.

Control/Switch Complex

A 2-bay or 3-bay Control Switch/Complex provides fully-duplicated main control, memory, and timing for the platform and a fully-duplicated, single-stage, N^2 , 4608x4608/1536x1536 cross-connect main switch fabric for the platform.

Important! A 2-bay Control/Switch Complex comprises one Control/Switch Bay and one Switch Bay. A 3-bay Control/Switch Complex comprises one System Controller Bay and two Switch Bays.

I/O Complex

An I/O Complex provides electrical and optical transmission interfaces that are housed in Universal I/O Shelves, SDH Universal I/O Shelves, and/or 10G I/O Shelves.

All transmission port units (hardware) are capable of transmitting and receiving SDH-rate and SONET-rate signals. The WaveStar BandWidth Manager software allows you to provision the port unit to accept the appropriate type of signal.



4608/1536 Platform

Overview This section briefly introduces the 4608/1536 platform available in WaveStar BandWidth Manager.

4608/1536 platform description With the WaveStar BandWidth Manager 4608/1536 platform, Lucent enables customers to add capacity to their network as needed without wasting equipment and incurring unnecessary costs. (4608/1536 represents the size of the platform's main switch, 4608 STS-1/1536 STM-1 equivalents.)

The WaveStar BandWidth Manager 4608/1536 platform includes either a 2-bay or 3-bay Control/Switch Complex, an I/O Complex (maximum of 36 I/O Shelves with a maximum of 48 SWIF pairs), and the required cable management bays.

Control/Switch Complex A 2-bay or 3-bay Control/Switch Complex provides fully-duplicated main control, memory, and timing for the platform and a fully-duplicated, single-stage, N^2 , 4608x4608/1536x1536 cross-connect main switch fabric.

Important! The reduced footprint floor plans with the reduced cabling for 2-bay Control/Switch Complexes (Figure 3-1 [NEBs] and Figure 3-2 [ETSI]) are available as of July 1, 2001.

Effective June 1, 2002, the standard footprints (Figure 3-3 and Figure 3-5 [NEBs] and Figure 3-4 and Figure 3-6 [ETSI]) will be DA.

Contact your Account Executive for more information.

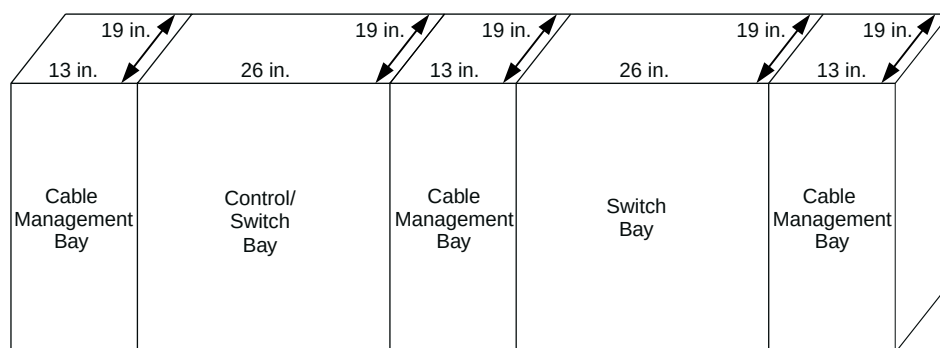
2-bay Control/Switch Complex

A 2-bay Control/Switch Complex comprises one Control/Switch Bay, one Switch Bay, and three required cable management bays.

Figure 3-1 (NEBs) and Figure 3-2 (ETSI) illustrate the 2-bay Control/Switch Complexes for the reduced footprints.

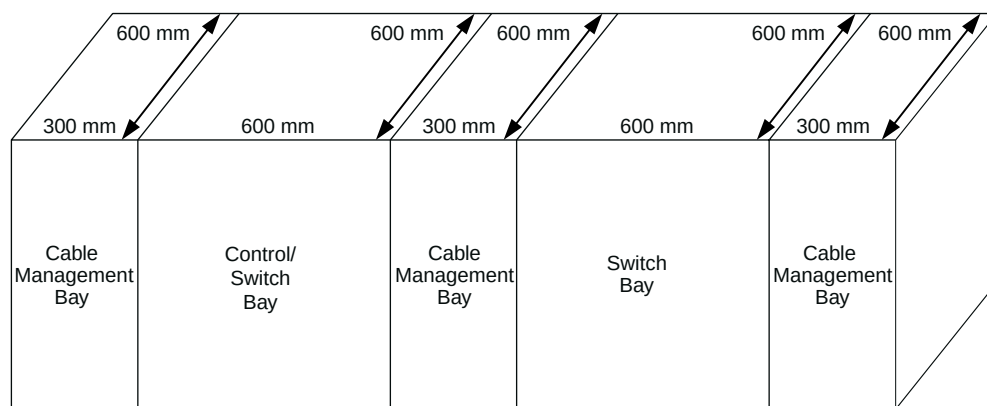
Important! Because the 3-bay Control/Switch Complexes will be DA effective April 1, 2002, the reduced footprint floor plans will only be available with 2-bay Control/Switch Complexes. Please contact your Account Executive for more information.

Figure 3-1 NEBS 2-Bay Control/Switch Complex - Reduced Footprints



wbwm04257

Figure 3-2 ETSI 2-Bay Control Switch Complex - Reduced Footprints

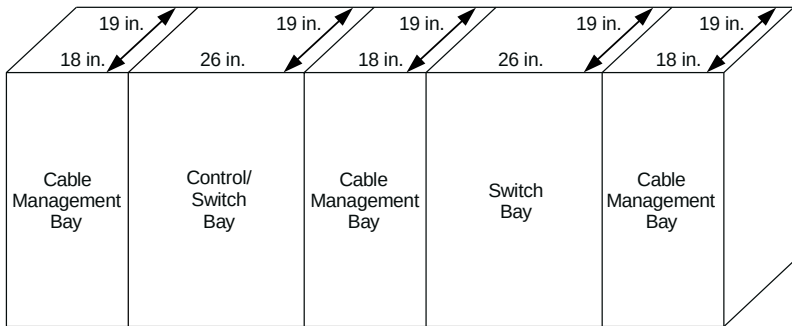


wbwm04258

Figure 3-3 (NEBs) and Figure 3-4 (ETSI) illustrate the 2-bay Control/Switch Complexes for the standard footprints.

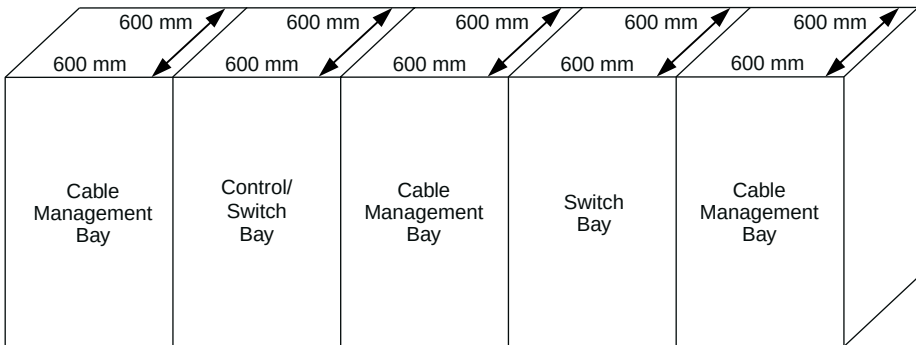
Important! Effective June 1, 2002, the standard footprints will be DA.

Figure 3-3 NEBS 2-Bay Control/Switch Complex -Standard Footprints



wbwm04057

Figure 3-4 ETSI 2-Bay Control Switch Complex - Standard Footprints



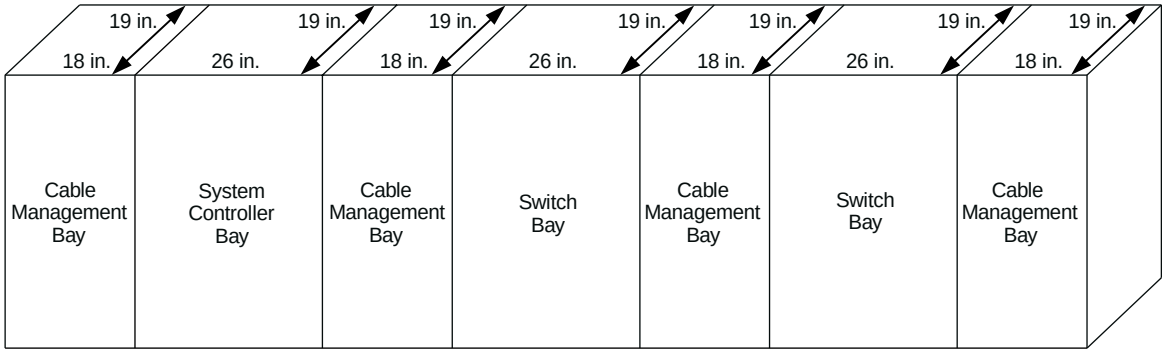
wbwm04158

3-bay Control/Switch Complex

A 3-bay Control/Switch Complex comprises one System Controller Bay, two Switch Bays, and four required cable management bays.

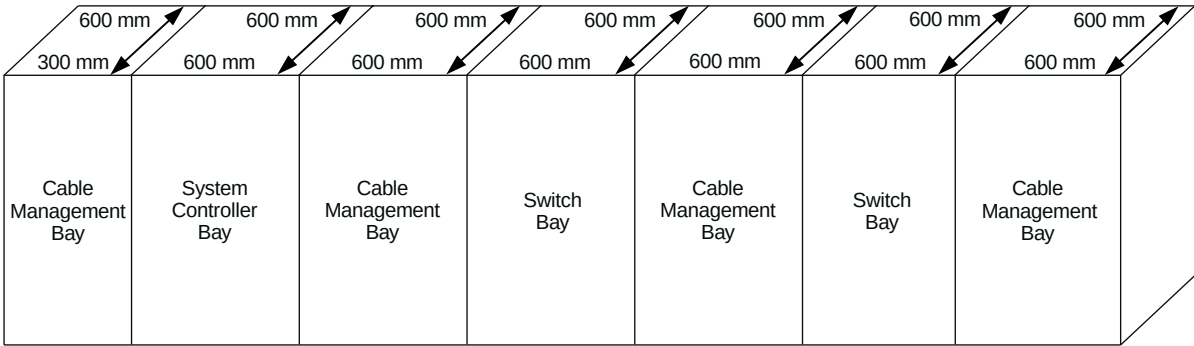
Figure 3-5 (NEBs) and Figure 3-6 (ETSI) illustrate the 3-bay Control/Switch Complexes for the standard footprints.

Figure 3-5 NEBS 3-Bay Control/Switch Complex - Standard Footprints



wbwm04053

Figure 3-6 ETSI 3-Bay Control/Switch Complex - Standard Footprints



wbwm04152

I/O Complex An I/O Complex provides electrical and optical transmission interfaces that are housed in Universal I/O Shelves, SDH Universal I/O Shelves, and/or 10G I/O Shelves.

All transmission port units (hardware) are capable of transmitting and receiving SDH-rate and SONET-rate signals. The WaveStar BandWidth Manager software allows you to provision the port unit to accept the appropriate type of signal.

Universal I/O Shelves

The Universal I/O Shelves are capable of terminating

- 2-fiber OC-48 BLSRs/STM-16 MS-SPRings via OC48/STM16 port units
- 4-fiber OC-48 BLSRs/STM-16 MS-SPRings (open and closed) via OC48/STM16 port units
- 4-fiber STM-16 MS-SPRings with transoceanic protocol (open and closed) via the OC48/STM16 port units
- OC-48 and OC-12 Unidirectional Path-Switch Rings (UPSRs)
- STM-N Sub-Network Connection Protection (SNCP) rings
- Long reach OC-48/STM-16 signals via OC48/STM16 port units
- Short and long reach OC-12/STM-4 signals via OC12/STM4 port units
- Short and long reach OC-3/STM-1 signals via OC3/STM1 port units
- DS3 and EC-1 signals via DS3EC1/8 port units

SDH Universal I/O Shelves

The SDH Universal I/O Shelves are capable of terminating

- 2-fiber OC-48 BLSRs/STM-16 MS-SPRings via OC48/STM16 port units
- 4-fiber OC-48 BLSRs/STM-16 MS-SPRings (open and closed) via OC48/STM16 port units
- 4-fiber STM-16 MS-SPRings with transoceanic protocol (open and closed) via OC48/STM16 port units
- OC-48 and OC-12 unidirectional path-switch rings (UPSRs)
- STM-N Sub-Network Connection Protection (SNCP) rings
- Long reach OC-48/STM-16 signals via OC48/STM16 port units
- Short and long reach OC-12/STM-4 signals via OC12/STM4 port units
- Short and long reach OC-3/STM-1 signals via OC3/STM1 port units
- STM-1e signals via STM1E/4 port units

10G I/O Shelves

The 10G I/O Shelves are capable of terminating

- 2-fiber OC-192 BLSRs/STM-64 MS-SPRings via OC192/STM64 port units
- 4-fiber OC-192 BLSRs/STM-64 MS-SPRings (open and closed) via OC192/STM64 port units
- 4-fiber STM-64 MS-SPRings with transoceanic protocol (open and closed) via OC192/STM64 port units
- STM-64 Sub-Network Connection Protection (SNCP) rings
- Intermediate and extended intermediate reach OC-192/STM-64 signals via OC192/STM64 port units

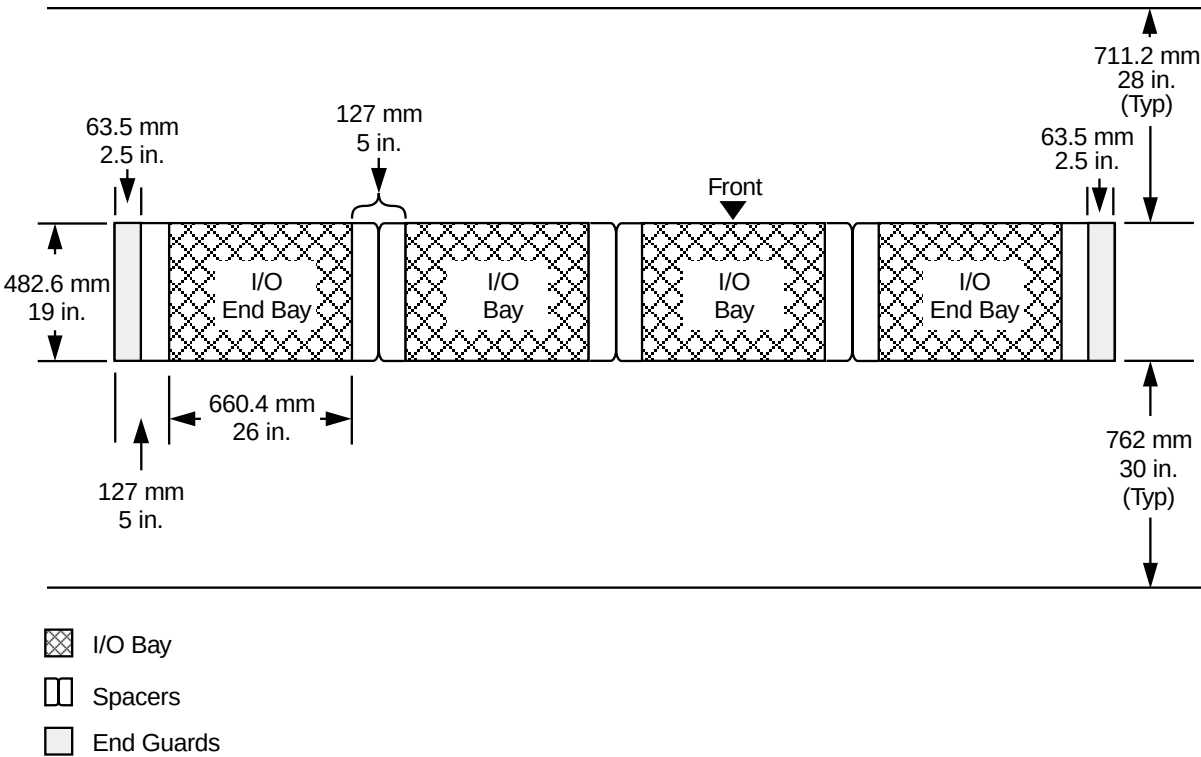
Spacers between I/O Bays The NEBS I/O Complexes require spacers between the I/O Bays. The ETSI I/O Complexes require cable management bays between the I/O Bays.

NEBS I/O Complexes

Figure 3-7 (NEBS) illustrates the spacers required between I/O Bays in NEBS I/O Complexes.

Important! The NEBS I/O Complex is physical the same in the standard and reduced footprints.

Figure 3-7 NEBS I/O Complexes



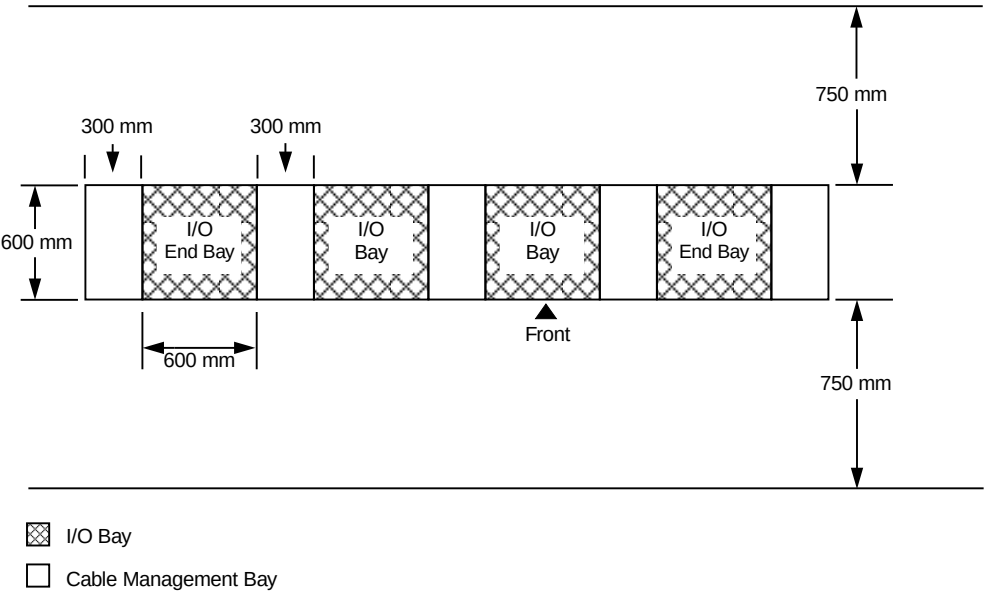
wbwm06002

ETSI I/O Complexes

Figure 3-8 (standard footprints) and Figure 3-9 (reduced footprints) illustrate the cable management bays required between I/O Bays in ETSI I/O Complexes.

Important! The cable management bays in ETSI I/O Complexes (reduced footprints) vary in size depending on the type of I/O Shelves in the adjacent I/O Bays.

Figure 3-8 ETSI I/O Complexes (Standard Footprints)



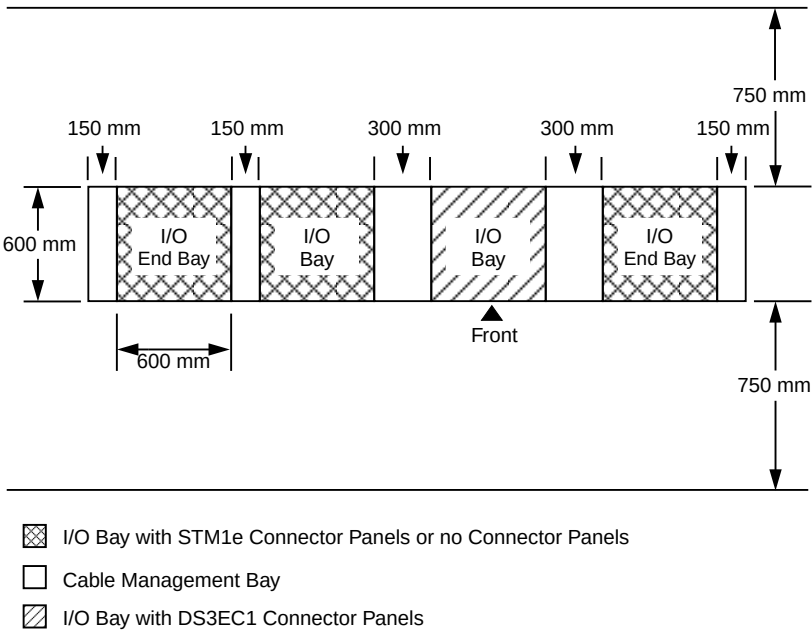
wbwm06112

Figure 3-9 and illustrates the cable management bays required between I/O Bays in ETSI platforms (reduced footprints).

Important! The cable management bays between or adjacent to I/O Bays with STM1e Connector Panels or no connector panels are 150 mm wide. The cable management bays between or adjacent to I/O Bays with DS3EC1 Connector Panels are 300 mm wide. For example, a single 300 mm cable management bay between an I/O bay with DS3EC1 Connector Panels and an I/O Bay with no connector panels is sufficient.

For example, an I/O Bay with a single DS3EC1 Connector Panel on the right side of the bay only requires one 300 mm wide cable management bay on the right side of the bay. The cable management on the left side of the bay should be 150 mm wide.

Figure 3-9 ETSI I/O Complexes (Reduced Footprints)



wbwm06212



Hardware Overview

Overview	WaveStar BandWidth Manager comprises complexes, bays, shelves, modules, circuit packs, and port units.
Definition of complex	A complex is a grouping of one or more equipped bays with a specific, shared functionality.
Types of complexes	The WaveStar BandWidth Manager platforms may be described and illustrated by the following complexes: • Control/Switch Complexes (2-bay or 3-bay) • Switch Complexes • 4608/1536 local I/O Complex
Definition of bay	A bay is a frame containing one or more shelves. Seven-foot seismic Network Equipment-Building System (NEBS) network frames are available for SONET applications. European Telecommunications Standards Institute (ETSI) frames are available for SDH applications. Important! The term <i>bay</i> is interchangeable with rack.
Types of bays	WaveStar BandWidth Manager platforms include the following types of bays: • System Controller Bays • Switch Bays • Control/Switch Bays • Universal I/O Bays • 10G I/O Bays • 10G/Universal I/O Bays • SDH I/O Bays • 10G/SDH I/O Bays
Definition of shelf	A shelf is a small framework (often called a shelf assembly) with cabling that provides slots capable of housing circuit packs and port units. Shelves are mounted in bays. Important! The term <i>shelf</i> is interchangeable with sub-rack.

Types of shelves The WaveStar BandWidth Manager 4608/1536 platform includes the following types of shelves:

- System Controller Shelves
- Switch Shelves
- Universal I/O Shelves
- 10G I/O Shelves
- SDH Universal I/O Shelves

Circuit packs The WaveStar BandWidth Manager circuit packs are grouped according to their functionality into the following three categories:

- Control packs
- Switch packs
- Port units



Control/Switch Complex

Overview This section describes the Control/Switch Complexes in WaveStar BandWidth Manager.

Control Complex The WaveStar BandWidth Manager Control Complex includes one equipped System Controller Shelf, housed in either a Control/Switch Bay (2-bay Control/Switch Complex) or a System Controller Bay (3-bay Control Switch Complex).

Control/Switch Complex The Control/Switch Complex is the basic core of WaveStar BandWidth Manager.

2-bay Control/Switch Complex

The 2-bay Control/Switch Complex comprises the required cable management bays and

- One Control/Switch Bay that is equipped with a System Controller Shelf and a 4608/1536 Switch Shelf
- One Switch Bay that is equipped with a 4608/1536 Switch Shelf

3-bay Control/Switch Complex

The 3-bay Control/Switch Complex comprises the required cable management bays and

- One System Controller Bay that is equipped with a System Controller Shelf
- Two Switch Bays that are equipped with 4608/1536 Switch Shelves



| System Controller Bay

Overview The System Controller Bay provides fully-redundant main controller, timing, and memory functions for WaveStar BandWidth Manager.

Dimensions The dimensions of a NEBS System Controller Bay are

- 2133.6 mm/84 in. high
- 660.4 mm/26 in. wide
- 482.6 mm/19 in. deep

The dimensions of an ETSI System Controller Bay are

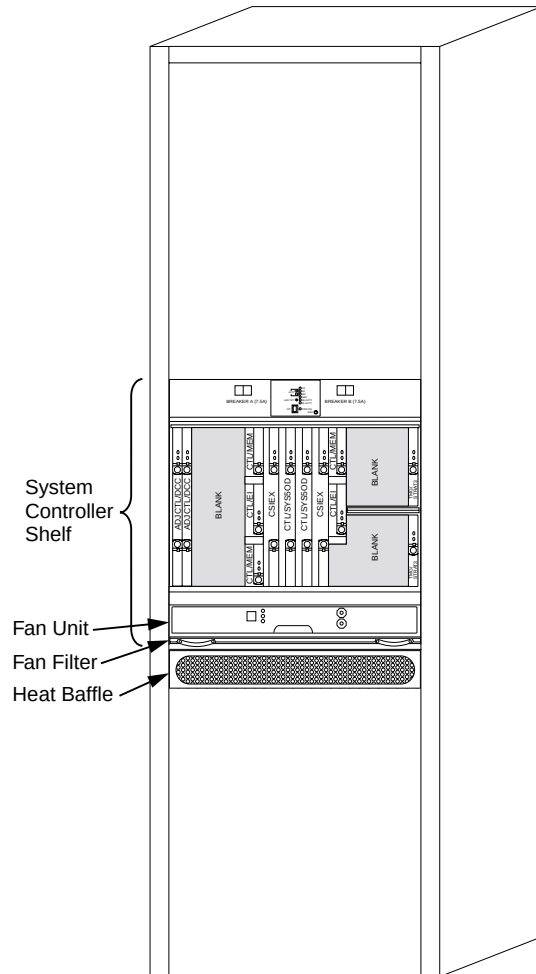
- 2200 mm/86.6 in. high
- 600 mm/23.6 in. wide
- 600 mm/23.6 in. deep

Shelves The bottom shelf space can be used to mount the optional Network Communications Controller (NCC), the middle shelf is equipped as a System Controller Shelf, and the top shelf space is reserved for future features.

System Controller Bay figure

Figure 3-10 illustrates a System Controller Bay in WaveStar BandWidth Manager.

Figure 3-10 System Controller Bay



wbwm04002

Control/Switch Bay

Overview The Control/Switch Bay provides fully-redundant main controller, timing, and memory functions (System Controller Shelf) and the working side of a 4608/1536 switch center (Switch Shelf) for WaveStar BandWidth Manager.

Dimensions The dimensions of a NEBS Control/Switch Bay are

- 2133.6 mm/84 in. high
- 660.4 mm/26 in. wide
- 482.6 mm/19 in. deep

The dimensions of an ETSI Control/Switch Bay are

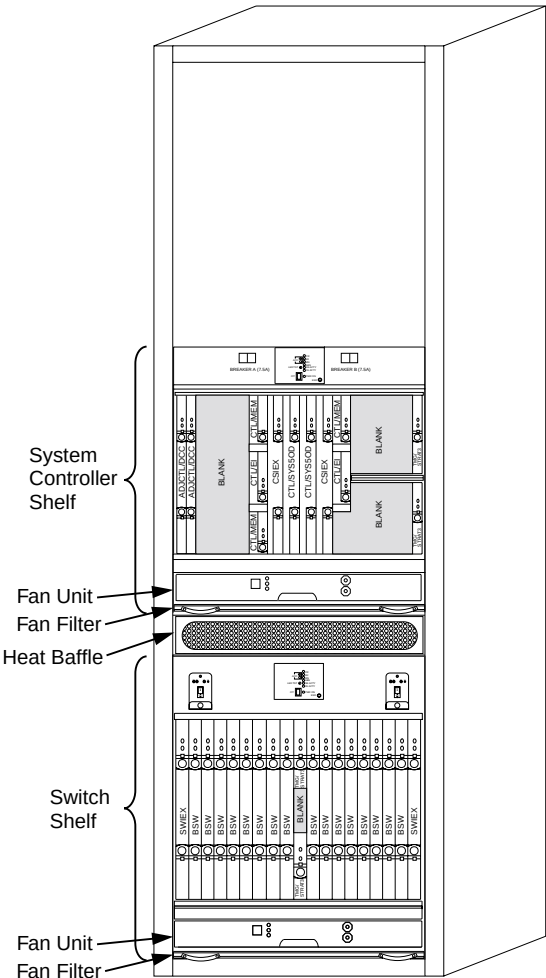
- 2200 mm/86.6 in. high
- 600 mm/23.6 in. wide
- 600 mm/23.6 in. deep

Shelves The Control/Switch Bay is capable of housing three shelves. The bottom shelf space is equipped with a Switch Shelf, the middle shelf space is equipped with a System Controller Shelf, and the top shelf space can be used to mount the optional Network Communications Controller (NCC).

Control/Switch Bay figure

Figure 3-11 illustrates a Control/Switch Bay or a 4608/1536 platform.

Figure 3-11 Control/Switch Bay



Important! If you mount an NCC (optional) in the top shelf space, you must install an additional heat baffle between the NCC and the System Controller Shelf.

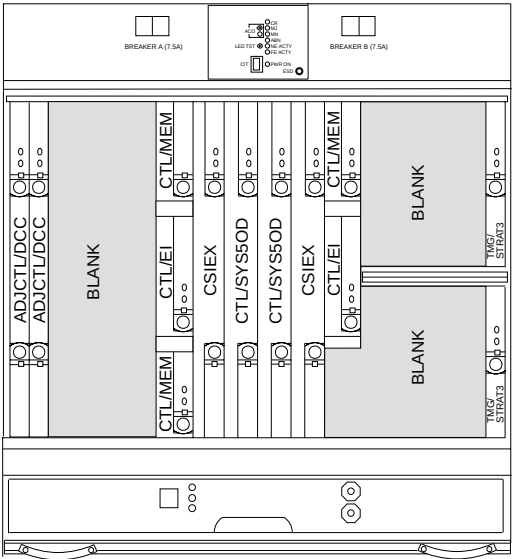
System Controller Shelf

Overview Each WaveStar BandWidth Manager System Controller Bay includes one System Controller Shelf that provides the main control functions for the WaveStar BandWidth Manager 4608/1536 platform.

- Circuit packs** A fully-equipped System Controller Shelf includes the following circuit packs:
- Two ADJCTL/DCC
 - Three CTL/MEM
 - Two CTL/EI
 - Two CSIEX
 - Two CTL/SYS50D
 - Two TMG/STRAT3

System Controller Shelf figure Figure 3-12 illustrates a fully-equipped System Controller Shelf.

Figure 3-12 System Controller Shelf

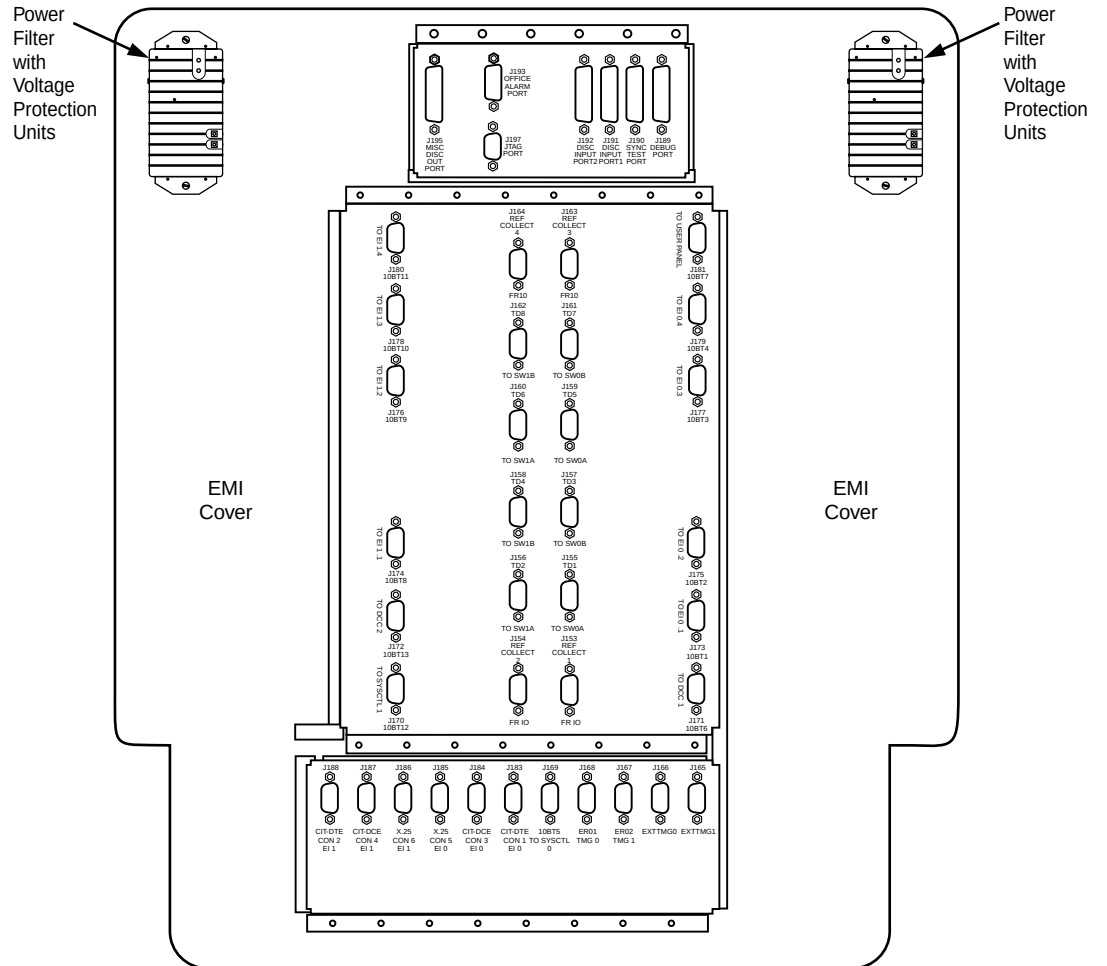


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External shelf backplane interfaces

Figure 3-13 illustrates the System Controller Shelf backplane.

Figure 3-13 System Controller Shelf Backplane



NC-USM-011

The System Controller Shelf backplane provides the following external interfaces:

Table 3-1 System Controller Shelf External Connectors

Connector	Purpose	Status
J197	JTAG Port	NOT USED
J195	Miscellaneous Discrete Output	NOT USED
J193	Office Alarms	
J192	Miscellaneous Discrete Input 1	NOT USED
J191	Miscellaneous Discrete Input 2	NOT USED
J190	Synchronization Test Port	
J189	Debug Port (RS-232 serial interfaces)	
J188	CIT-DTE Connector 2	NOT USED
J187	CIT-DCE Connector 4	NOT USED
J186	X.25 Connector 6	NOT USED
J185	X.25 Connector 5	NOT USED
J184	CIT-DCE Connector 3	NOT USED
J183	CIT-DTE Connector 1	NOT USED
J181	User Panel	
J180	HUB port (EI-1-4)	
J179	HUB port (EI-0-4)	
J178	HUB port (EI-1-3)	
J177	HUB port (EI-0-3)	
J176	HUB port (EI-1-2)	
J175	HUB port (EI-0-2)	
J174	HUB port (EI-1-1)	
J173	HUB port (EI-0-1)	
J172	DCC-1	
J171	DCC-2	
J170	SYSCTL-1	NOT USED
J169	SYSCTL-2	NOT USED
J168	External Timing Reference Out (ERO 1)	
J167	External Timing Reference Out (ERO 2)	

Connector	Purpose	Status
J166	External Timing Reference In (EXTTMG 0)	
J165	External Timing Reference In (EXTTMG 1)	
J164	Timing Collection (Ref Collect 4)	
J163	Timing Collection (Ref Collect 3)	
J162	Timing Distribution (To SW 1B)	NOT USED
J161	Timing Distribution (To SW 0B)	NOT USED
J160	Timing Distribution (To SW 1A)	
J159	Timing Distribution (To SW 0A)	
J158	Timing Distribution (To SW 1B)	NOT USED
J157	Timing Distribution (To SW 0B)	NOT USED
J156	Timing Distribution (To SW 1A)	
J155	Timing Distribution (To SW 0A)	
J154	Timing Collection (Ref Collect 2)	
J153	Timing Collection (Ref Collect 1)	

RS-232 interfaces

WaveStar BandWidth Manager, R4.1 provides duplicated RS-232 interfaces. These RS-232 interfaces allow the user an additional method of logging onto the system and entering raw ASCII TL1 commands from an ASCII terminal or a PC that is running an application like HyperTerminal. The Y-cable plugs into the J189 Debug Port on the backplane of the System Controller Shelf (refer to Figure 3-13). The Y-cable provides access to two independent, redundant RS-232 serial ports on the System Controller Shelf.

Designation label strip

The circuit packs used in the System Controller Shelf must be inserted into the appropriate slots according to the designation label strip illustrated in Figure 3-14.

Figure 3-14 System Controller Shelf Designation Label Strip

Platform Description

DCC 1	DCC 2		PRIMEM 1 EI 0 PRIMEM 0	CSIEX 0	SYSCTL 0	SYSCTL 1	CSIEX 1	SECMEM EI 1	

	TB 1	TMG 1
	TB 0	TMG 0

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Equipped slots

Circuit packs should be inserted into the slots indicated in the following table.

Table 3-2 Equipped Slots – System Controller Shelf

Slot	Circuit Pack
DCC 1 ^a	ADJCTL/DCC
DCC 2 ^a	ADJCTL/DCC
PRIMEM 1 ^b	CLT/MEM
EI 0	CLT/EI
PRIMEM 0	CTL/MEM
CSIEX 0	CSIEX
SYSCTL 0 ^c	CTL/SYS50D
SYSCTL 1 ^c	CTL/SYS50D
CSIEX 1	CSIEX
SEC MEM ^b	CTL/MEM
EI 1	CTL/EI
	Blank
TB 1	Blank
TB 0	
TMG 1 ^d	TMG/STRAT3
TMG 0	TMG/STRAT3

- a) For the DCC slots, the first pack is designated by a 1 and the second pack is designated by a 2. The duplex ADJCTL/DCC packs are Active-Active; both packs carry service.
- b) These packs are one third the height of a normal full-sized pack. Therefore, when placed on top of each other, three of these packs can fit in one normal slot.
- c) The 0 indicates the service pack of a pair goes in that slot. The 1 indicates the protection pack of a pair goes in that slot.
- d) The TMG/STRAT3 packs are half the height of a normal full-sized pack. Therefore, when one pack is placed on top of the other these two packs can fit in one normal slot.

Switch Complexes

Overview This section describes the Switch Complexes in WaveStar BandWidth Manager.

Switch Complex A Switch Complex includes two Switch Shelves, which include logical groupings of BSW switch packs, TMG/STRAT3 circuit packs, and SWIEX circuit packs.

4608/1536 Switch Complex A 4608/1536 Switch Complex (two Switch Shelves) includes two 4608/1536 switch centers, one working and one standby. (A 4608/1536 switch center is a fully-equipped Switch Shelf.) A 4608/1536 Switch Complex can be housed in a Control/Switch Bay and a Switch Bay (2-bay Control/Switch Complex), or two Switch Bays (3-bay Control/Switch Complex).

Important! For WaveStar BandWidth Manager platforms, switch side 1-1 and switch side 2-1 are often used to designate the active and stand-by switch sides, respectively.



Switch Bay

Overview Two Switch Shelves, housed in either two Switch Bays or a Switch Bay and Control/Switch Bay, provide a fully-redundant, cross-coupled main switch fabric for WaveStar BandWidth Manager.

Dimensions The dimensions of a NEBS Switch Bay are

- 2133.6 mm/84 in. high
- 660.4 mm/26 in. wide
- 482.6 mm/19 in. deep

The dimensions of an ETSI Switch Bay are

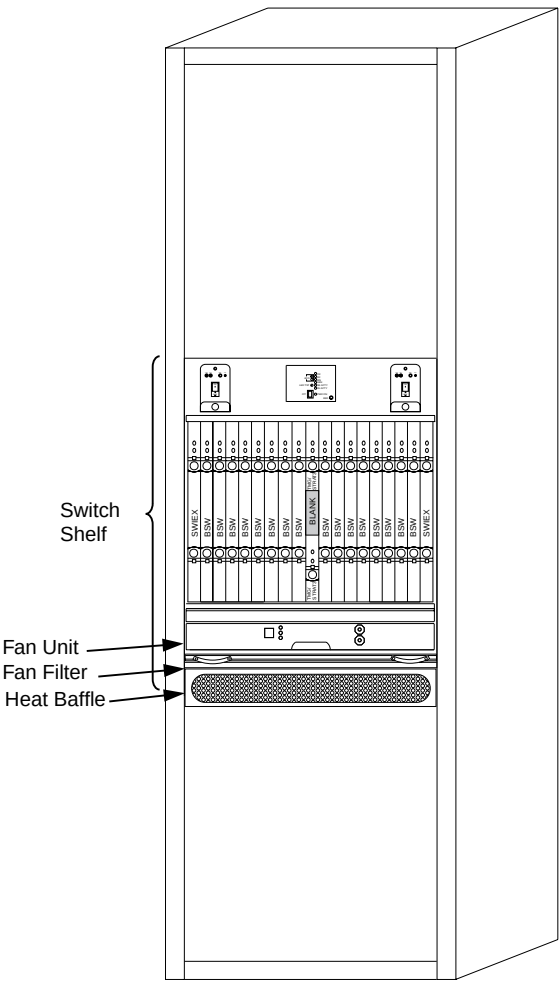
- 2200 mm/86.6 in. high
- 600 mm/23.6 in. wide
- 600 mm/23.6 in. deep

Shelves In a Switch Bay, the middle shelf is equipped as a 4608/1536 Switch Shelf (fully-equipped). The top and bottom spaces are reserved for future releases.

**4608/1536
Switch Bay**

Figure 3-15 illustrates one 4608/1536 Switch Bay (one-half of a 4608/1536 Switch Complex) as it would appear in either a 2-bay or 3-bay Control/Switch Complex.

Figure 3-15 4608/1536 Switch Bay



wbwm04003



Switch Shelf

Overview The two Switch Shelves provide a fully-duplicated, cross-coupled, N² main switch fabric for WaveStar BandWidth Manager.

Circuit packs A populated 4608/1536 Switch Shelf includes the following circuit packs:

- Two SWIEX
- 16 BSW
- Two TMG/STRAT3

Important! A 4608/1536 Switch Shelf is a fully-equipped Switch Shelf.

Definition of switch center A switch center (SWC) is a logical grouping of BSW switch packs, TMG/STRAT3 circuit packs, and SWIEX circuit packs in a Switch Shelf.

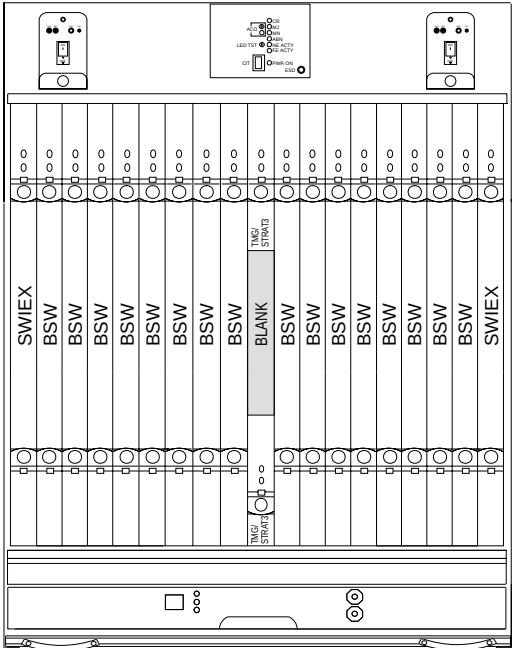
4608/1536 switch center

A 4608/1536 switch center is a fully-equipped Switch Shelf. Therefore, a 4608/1536 Switch Complex (either a Control/Switch Bay and a Switch Bay, or two Switch Bays) includes two 4608/1536 switch centers, one active and one active but in standby-mode.

4608/1536
Switch Shelf

Figure 3-16 illustrates a fully-equipped Switch Shelf.

Figure 3-16 4608/1536 Switch Shelf



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Designation label strip

The circuit packs used in the Switch Shelf must be inserted into the appropriate slots according to the designation label strip illustrated in Figure 3-17.

Figure 3-17 Switch Shelf Designation Label Strip

SWIEX 0	BSW 1	BSW 2	BSW 3	BSW 4	BSW 5	BSW 6	BSW 7	BSW 8	TMG 1 TMG 0
BSW 9	BSW 10	BSW 11	BSW 12	BSW 13	BSW 14	BSW 15	BSW 16	SWIEX 1	

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Equipped slots

Circuit packs should be inserted into the slots indicated in the following table.

Table 3-3 Equipped Slots – 4608/1536 Switch Shelves

Slot	Circuit Pack
SWIEX 0 ^a	SWIEX
BSW 1-8	BSW
TMG 1 ^b	TMG/STRAT3
TMG 0	TMG/STRAT3
BSW 9-16	BSW
SWIEX 1a	SWIEX

a) The 0 indicates the service pack of a pair goes in that slot. The 1 indicates the protection pack of a pair goes in that slot.

b) The TMG/STRAT3 packs are half the height of a normal full-sized pack. Therefore, when one pack is placed on top of the other these two packs can fit in one extra-high slot with a small, blank faceplate in between the two packs.

4608/1536 main switch fabric

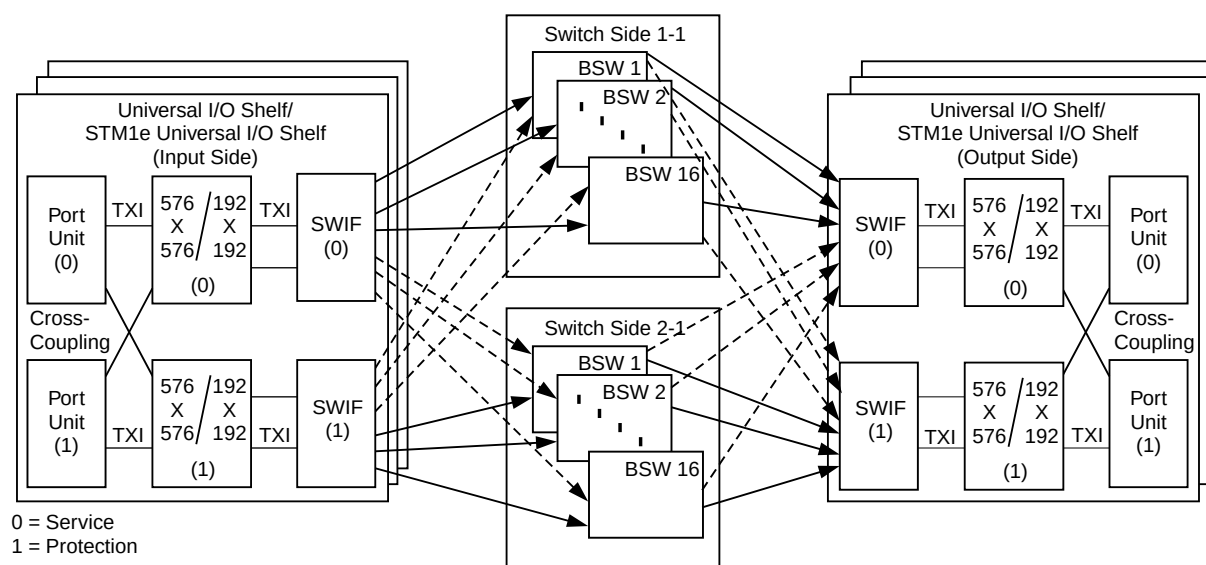
Figure 3-18 and Figure 3-19 illustrate the 4608/1536 main switch fabric with the different types of I/O Shelves and their shelf-based switch fabrics.

Universal I/O Shelves and SDH Universal I/O Shelves

Figure 3-18 provides a functional view of the 4608/1536 main switch fabric interfacing with Universal I/O Shelves or SDH Universal I/O Shelves.

Important! The two SWITCH/STS576 circuit packs in the Universal I/O Shelves and SDH Universal I/O Shelves provide a 576x576/192x192 shelf-based switch fabric.

Figure 3-18 4608/1536 Switch Fabric with Universal I/O Shelves and SDH Universal I/O Shelves – Functional View



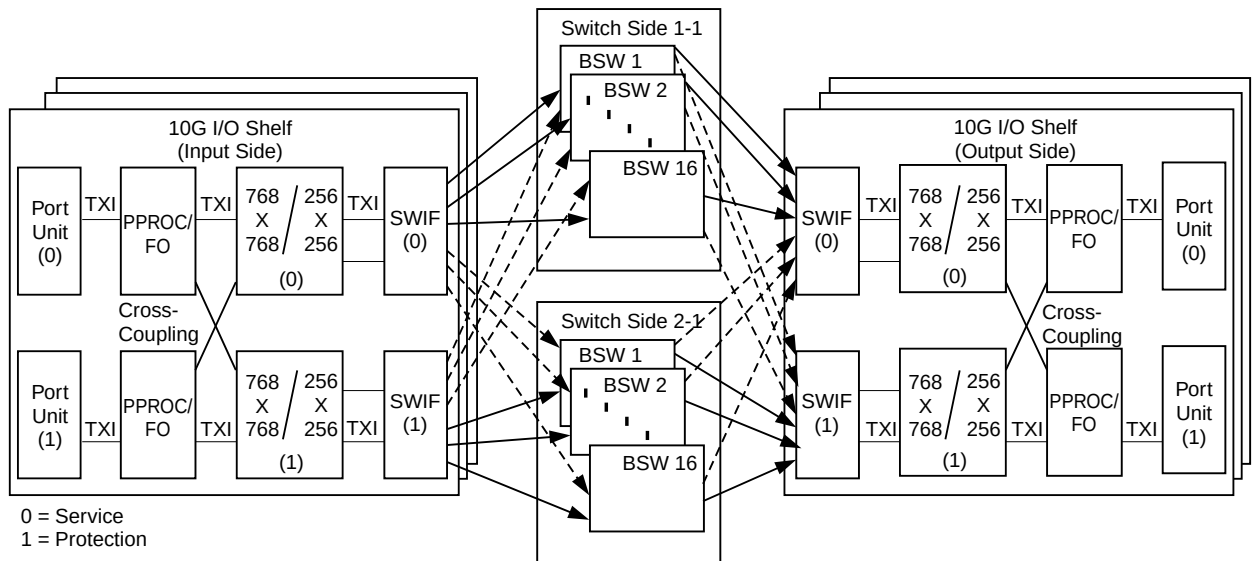
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10G I/O Shelves

Figure 3-19 provides a functional view of the 4608/1536 main switch fabric interfacing with 10G I/O Shelves.

Important! The ten SWITCH/STS768 circuit packs in the 10G I/O Shelves provide an 1152x1152/384x384 shelf-based switch fabric.

Figure 3-19 4608/1536 Switch Fabric with 10G I/O Shelves – Functional View



wbrm04090

I/O Complexes

Overview The WaveStar BandWidth Manager local I/O Complexes are groups of equipped I/O Bays (combination of Universal I/O Bays, 10G I/O Bays, 10G/Universal I/O Bays, SDH I/O Bays, and/or 10G/SDH I/O Bays) that are electrically connected to, and collocated with an associated Switch Complex.

4608/1536 local I/O Complex Because the different I/O Bays house different types of shelves (which may include one to four SWIF pairs), the number of equipped I/O Bays in an 4608/1536 local I/O Complex may vary. However, in R4.1, the total number of I/O Shelves must not exceed 36.

Important! Universal I/O Bays, 10G/Universal I/O Bays, SDH I/O Bays, and 10G/SDH I/O Bays all house two shelves per bay. 10G I/O Bays can house either one or two shelves per bay.



I/O Bays

Overview All transmission interfaces in WaveStar BandWidth Manager are mounted in I/O Bays. A minimum of one I/O Bay (Universal I/O Bay, 10G I/O Bay, 10G/Universal I/O Bay, SDH I/O Bay, or 10G/SDH I/O Bay) is required for the minimum configuration of a 4608/1536 platform. Additional I/O Bays may be added incrementally as needed.

Dimensions The dimensions of a NEBS I/O Bay are

- 2133.6 mm/84 in. high
- 660.4 mm/26 in. wide
- 482.6 mm/19 in. deep

The dimensions of an ETSI I/O Bay are

- 2200 mm/86.6 in. high
- 600 mm/23.6 in. wide
- 600 mm/23.6 in. deep

Types of I/O Bays WaveStar BandWidth Manager provides five different I/O Bays. The I/O Bays house different combinations and configurations of the I/O Shelves available.

Universal I/O Bay

Each Universal I/O Bay houses two Universal I/O Shelves. Each Universal I/O Shelf is divided into a Switch Interface Sub-Shelf and a Facility Interface Sub-Shelf.

10G I/O Bay

Each 10G I/O Bay houses either one or two 10G I/O Shelves. Each 10G I/O Shelf is divided into a CTL/Switch Interface Sub-Shelf and a Facility/SWIF Interface Sub-Shelf.

10G/Universal I/O Bay

Each 10G/Universal I/O Bay houses one 10G I/O Shelf and one Universal I/O Shelf.

SDH I/O Bay

Each SDH I/O Bay houses two SDH Universal I/O Shelves. Each SDH Universal I/O Shelf is divided into a Switch Interface Sub-Shelf and a Facility Interface Sub-Shelf.

10G/SDH I/O Bay

Each 10G/SDH I/O Bay houses one 10G I/O Shelf and one SDH Universal I/O Shelf.

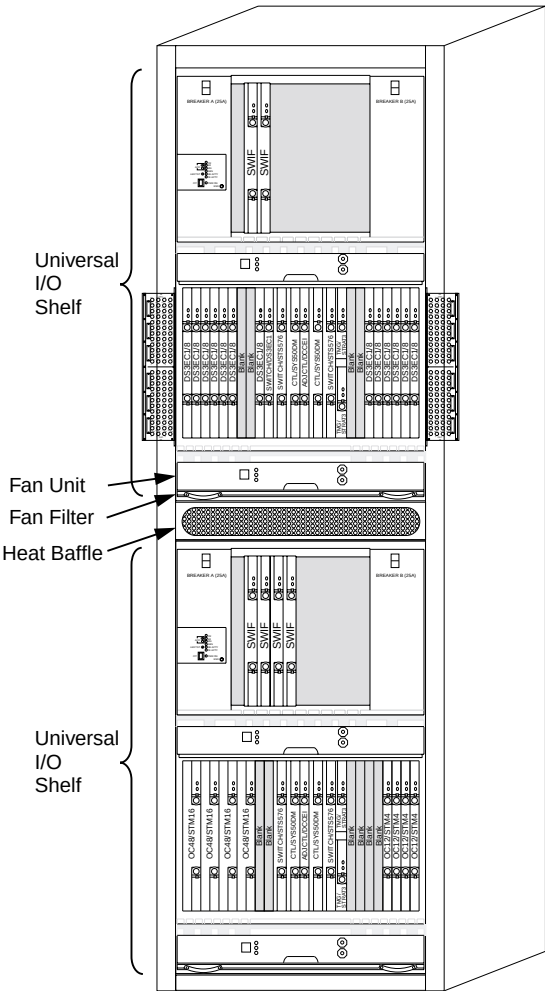


Universal I/O Bay

Universal I/O Bay

Figure 3-20 illustrates a Universal I/O Bay as it may appear in WaveStar BandWidth Manager. The two Universal I/O Shelves in the Universal I/O Bay are each divided into a Switch Interface Sub-Shelf and a Facility Interface Sub-Shelf. In this example, both Switch Interface Sub-Shelves are equipped as SWIF Modules and the two Facility Interface Sub-Shelves are equipped as a DS3EC1 Electrical Module (top) and a Mixed Module (bottom).

Figure 3-20 Universal I/O Bay



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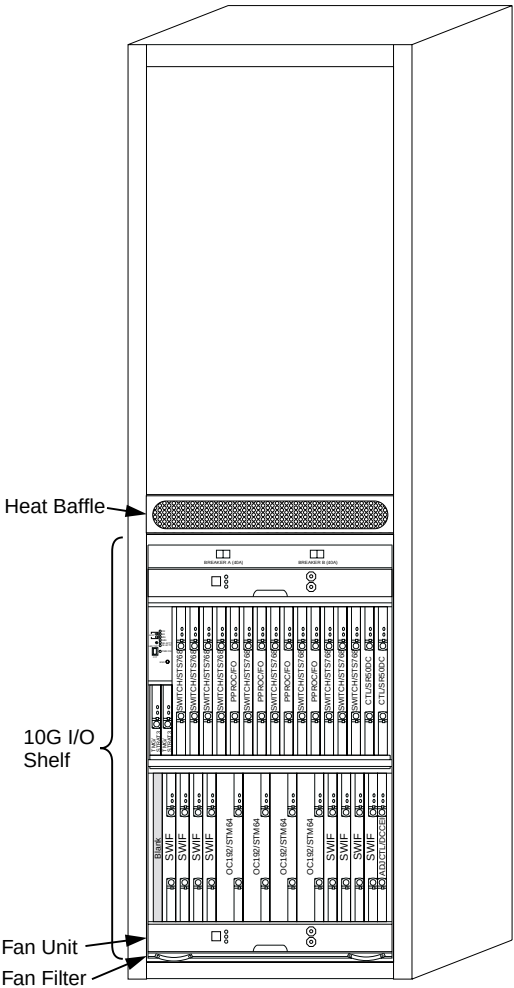
10G I/O Bay

10G I/O Bay Figure 3-21 and Figure 3-22 illustrate 10G I/O Bays in WaveStar BandWidth Manager.

10G I/O Bay with one 10G I/O Shelf

Figure 3-21 illustrates a 10G I/O Bay with one 10G I/O Shelf as it may appear in WaveStar BandWidth Manager. The 10G I/O Shelf in the 10G I/O Bay is divided into a CTL/Switch Interface Sub-Shelf and a Facility/SWIF Interface Sub-Shelf. In this example, the CTL/Switch Interface Sub-Shelf is equipped as CTL/Switch Module and the Facility/SWIF Interface Sub-Shelf is equipped as an OC192/STM64 Optical Module.

Figure 3-21 10G I/O Bay with one 10G I/O Shelf

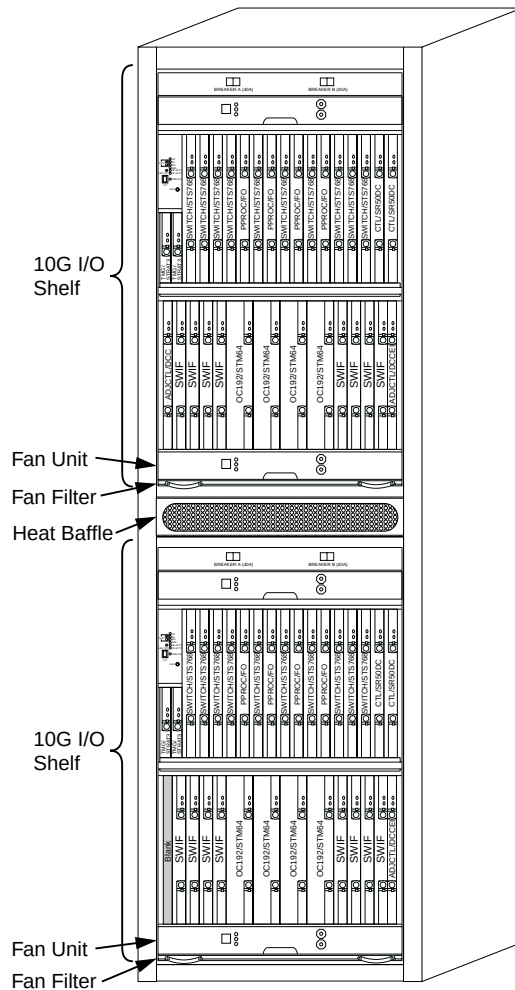


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10G I/O Bay with two 10G I/O Shelves

Figure 3-22 illustrates a 10G I/O Bay with two 10G I/O Shelves as it may appear in WaveStar BandWidth Manager. Each 10G I/O Shelf in this 10G I/O Bay is divided into a CTL/Switch Interface Sub-Shelf and a Facility/SWIF Interface Sub-Shelf. In this example, both CTL/Switch Interface Sub-Shelves are equipped as CTL/Switch Modules and both Facility/SWIF Interface Sub-Shelves are equipped as OC192/STM64 Optical Modules.

Figure 3-22 10G I/O Bay with Two 10G I/O Shelves

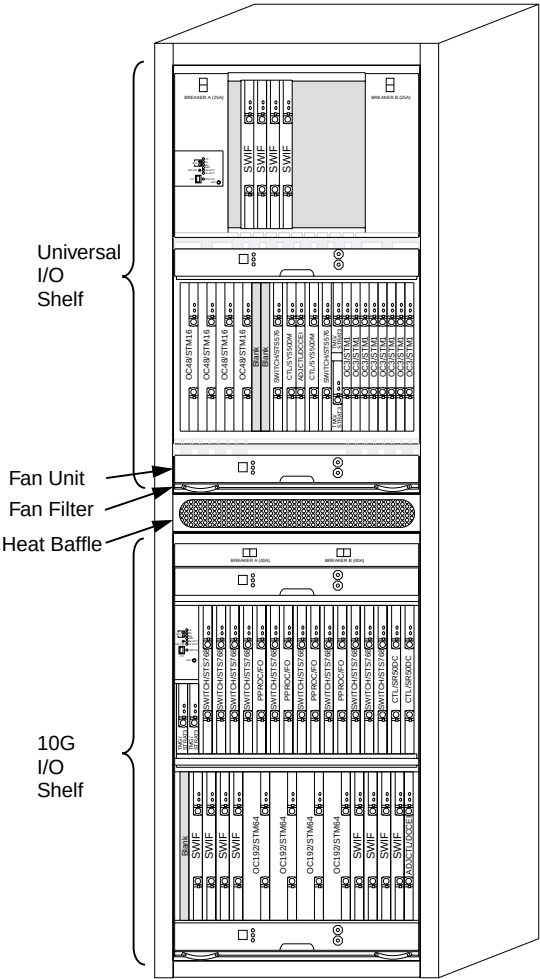


10G/Universal I/O Bay

10G/Universal I/O Bay

Figure 3-23 illustrates a 10G/Universal I/O Bay as it may appear in WaveStar BandWidth Manager. The Universal I/O Shelf (top) is equipped as SWIF Module and an OC48/STM16 Optical Module. The 10G I/O Shelf (bottom) is equipped as a CTL/Switch Module and an OC192/STM64 Optical Module.

Figure 3-23 10G/Universal I/O Bay



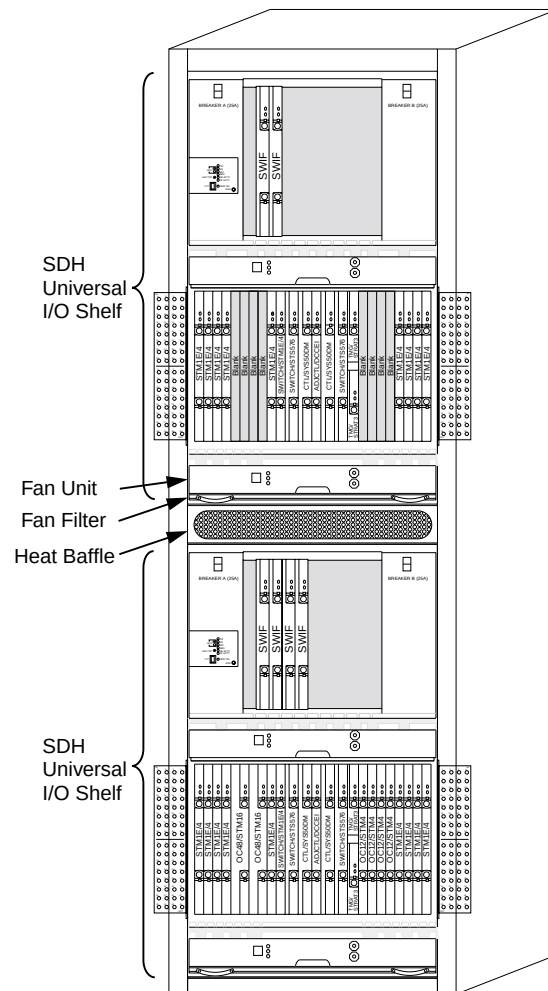
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SDH I/O Bay

SDH I/O Bay Figure 3-24 illustrates an SDH I/O Bay as it may appear in WaveStar BandWidth Manager. The two SDH Universal I/O Shelves in the SDH I/O Bay are each divided into a Switch Interface Sub-Shelf and a Facility Interface Sub-Shelf. In this example, both Switch Interface Sub-Shelves are equipped as SWIF Modules and the two Facility Interface Sub-Shelves are equipped as an STM1e Electrical Module (top) and a Mixed Module (bottom).

Figure 3-24 SDH I/O Bay

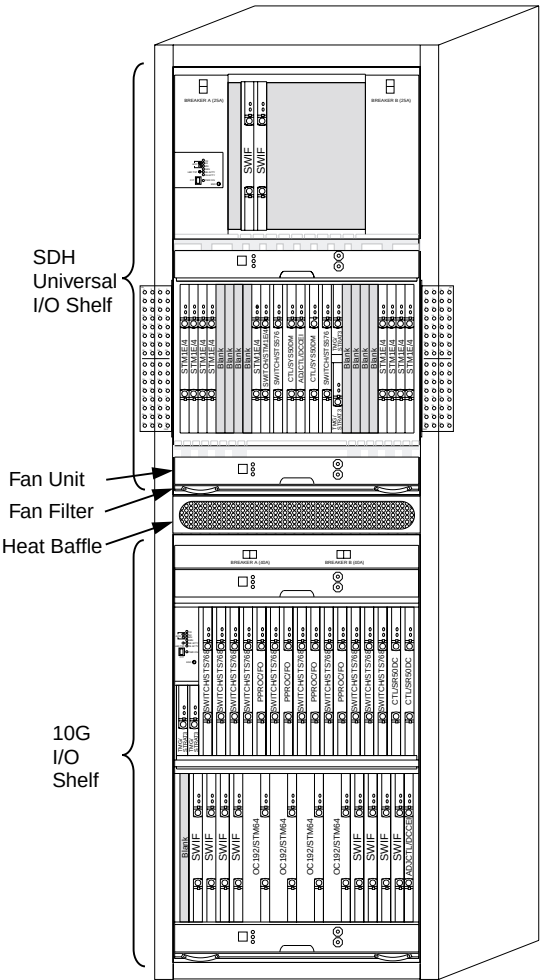


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10G/SDH I/O Bay

10G/SDH I/O Bay Figure 3-25 illustrates a 10G/SDH I/O Bay as it may appear in WaveStar BandWidth Manager. The SDH Universal I/O Shelf (top) is equipped as SWIF Module and an STM1e Electrical Module. The 10G I/O Shelf (bottom) is equipped as a CTL/Switch Module and an OC192/STM64 Optical Module.

Figure 3-25 10G/SDH I/O Bay



wbwm04093



Universal I/O Shelf

Overview The WaveStar BandWidth Manager Universal I/O Shelves house transmission interface port units and switch interface circuit packs. Each shelf is divided into the two following sub-shelves:

- Switch Interface Sub-Shelf (SWIF packs)
- Facility Interface Sub-Shelf (transmission port units)

Switch Interface Sub-Shelf The upper portion of a Universal I/O Shelf, referred to as a Switch Interface Sub-Shelf, provides eight slots for SWIF packs and two slots for future releases.

Facility Interface Sub-Shelf The lower portion of a Universal I/O Shelf, referred to as a Facility Interface Sub-Shelf, provides 16 universal slots for port units and 9 slots for the common circuit packs. The Facility Interface Sub-Shelves house OC-48/STM-16, OC-12/STM-4, and OC-3/STM-1 optical transmission interfaces and the DS3 and EC-1 electrical transmission interfaces.

Modules When equipped with circuit packs and/or port units the sub-shelves are referred to as modules.

Switch Interface

In WaveStar BandWidth Manager, an equipped Switch Interface Sub-Shelf is referred to as a SWIF Module. Depending on the capacity needed by the associated Facility Interface Shelf, a SWIF Module may be equipped with either one pair (96 STS-1/32 STM-1 equivalents) or two pairs (192 STS-1/64 STM-1 equivalents) of SWIF packs. The Switch Interface Sub-Shelves house the packs that provide interfaces between the transmission port units (housed in the Facility Interface Sub-Shelves) and the main switch fabric provided by the Switch Shelves.

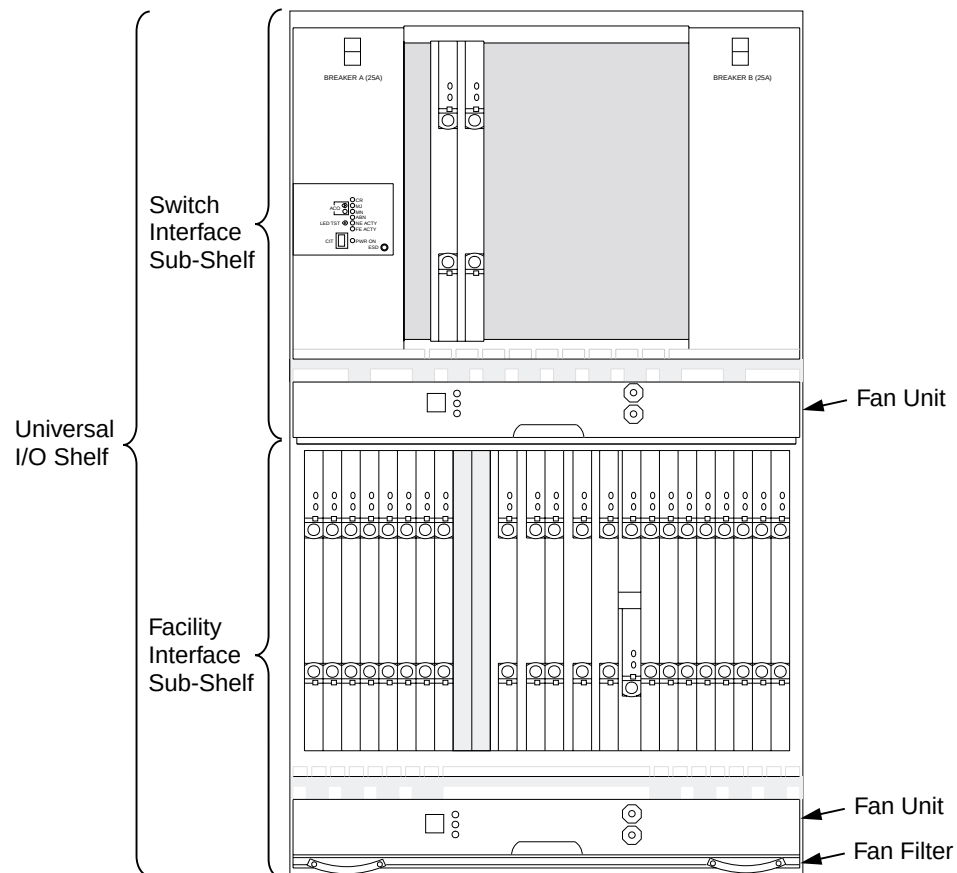
Facility Interface

Depending on the type of port units used, a Facility Interface Sub-Shelf may be equipped as one of the following types of modules:

- DS3EC1 Electrical Module (DS3EC1/8 port units)
- OC48/STM16 Optical Module (OC48/STM16 port units)
- OC12/STM4 Optical Module (OC12/STM4 port units)
- OC3/STM1 Optical Module (OC3/STM1 port units)
- Mixed Module (supported combinations of DS3EC1/8, OC48/STM16, OC12/STM4, and/or OC3/STM1 port units)

Universal I/O Shelf figure Figure 3-26 illustrates a Universal I/O Shelf.

Figure 3-26 Universal I/O Shelf



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Switch Interface Sub-Shelf

Overview A Switch Interface Sub-Shelf, the upper portion of a Universal I/O Shelf, is available to house SWIF switch packs. The term “sub-shelf” simply refers to a designated portion of the Universal I/O Shelf.

Definition of module Because multiple configurations are possible for the sub-shelves of the Universal I/O Shelf, the term “module” is used to describe an equipped sub-shelf.

SWIF Module A SWIF Module is a Switch Interface Sub-Shelf equipped with SWIF packs. Either two or four of the eight available SWIF slots are equipped with one or two SWIF pairs (for a maximum of four SWIF packs).

Designation label strip The Switch Interface Sub-Shelf is equipped from left to right, according to the designation label strip illustrated in Figure 3-27.

Figure 3-27 Switch Interface Sub-Shelf Designation Label Strip

OCRR 0	SWIF 1,0	SWIF 1,1	SWIF 2,0	SWIF 2,1	SWIF 3,0	SWIF 3,1	SWIF 4,0	SWIF 4,1	OCRR 1

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Equipped slots SWIF packs should be inserted in the slots indicated in the following table.

Table 3-4 Equipped Slots – Switch Interface Sub-Shelf

Slot	Circuit Pack
OCRR 0 ^a	Blank
SWIF 1,0 ^b	1 pair of SWIF packs
SWIF 1,1 ^c	
SWIF 2,0	1 pair of SWIF packs
SWIF 2,1	
SWIF 3,0	Blank
SWIF 3,1	Blank
SWIF 4,0	Blank
SWIF 4,1	Blank
OCRR 1a	Blank

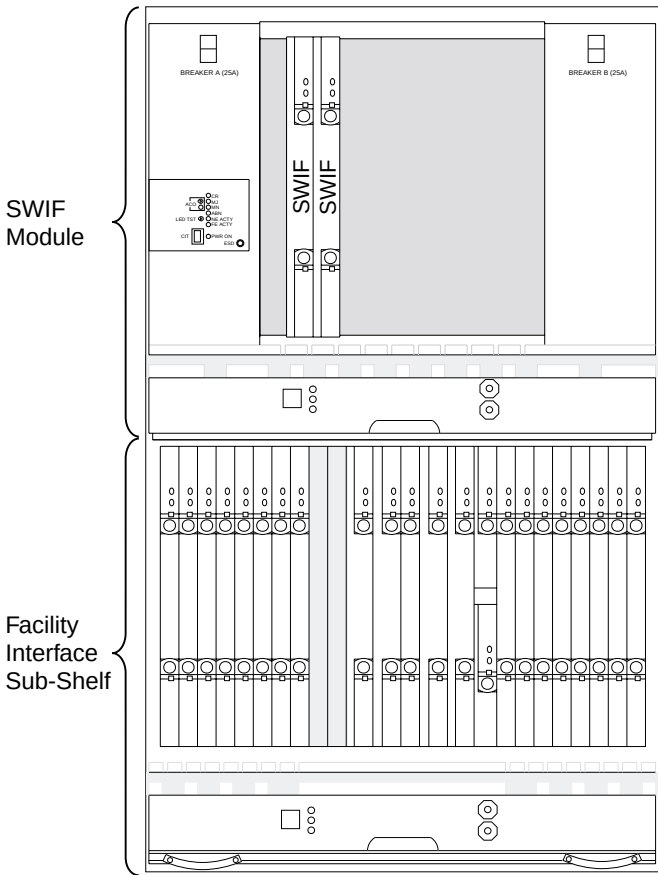
- a) The 0 indicates the service pack of a pair goes in that slot. The 1 indicates the protection pack of a pair goes in that slot.
- b) SWIF 1,0 and 1,1 are equipped first (96 STS-1/32 STM-1 equivalents). SWIF 2,0 and 2,1 are added if an additional 96 STS-1/32 STM-1 equivalents of switch interface capacity are needed by any of the modules, for a total of 192 STS-1/64 STM-1 equivalents. SWIF 1,0 and 1,1 are equipped first (96 STS-1/32 STM-1 equivalents). SWIF 2,0 and 2,1 are added if an additional 96 STS-1/32 STM-1 equivalents of switch interface capacity are needed by any of the modules, for a total of 192 STS-1/64 STM-1 equivalents.
- c) The first number represents the SWIF pair (1-4). The second number, 0 or 1, indicates the service or protection pack, respectively.

SWIF Module

Overview A SWIF Module is a Switch Interface Sub-Shelf that is equipped with SWIF packs.

Figure Figure 3-28 illustrates the SWIF Module of a Universal I/O Shelf. This example assumes that the Facility Interface Sub-Shelf is equipped as an OC3/STM1 Optical Module. Therefore, the SWIF Module is equipped with one SWIF pair (96 STS-1/32 STM-1 equivalents). If the Facility Interface Sub-Shelf was equipped as any of the other Optical Modules, the SWIF Module could be equipped with two SWIF pairs (192 STS-1/64 STM-1 equivalents).

Figure 3-28 SWIF Module of a Universal I/O Shelf



Facility Interface Sub-Shelf

Overview A Facility Interface Sub-Shelf, the lower portion of a Universal I/O Shelf, is available to house common circuit packs and port units. Additional types of interface port units will be available in future releases.

Definition of module Because multiple configurations are possible for the sub-shelves of the Universal I/O Shelf, the term “module” is used to describe an equipped sub-shelf. The term “sub-shelf” simply refers to a designated portion of the Universal I/O Shelf.

Modules The port units used in the sub-shelf determine the type of module. The Facility Interface Sub-Shelf may be equipped as one of the following modules:

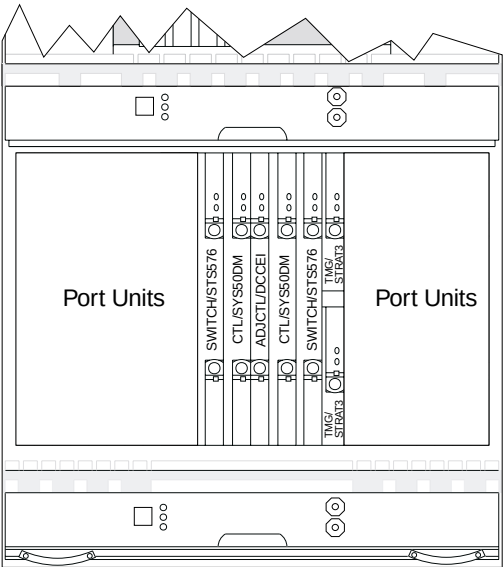
- DS3EC1 Electrical Module
- OC48/STM16 Optical Module
- OC12/STM4 Optical Module
- OC3/STM1 Optical Module
- Mixed Module

Common packs Regardless of the port units used, all modules include the following common circuit packs:

- Two SWITCH/STS576
- Two CTL/SYS50DM
- One ADJCTL/DCCEI
- Two TMG/STRAT3

Figure Figure 3-29 illustrates the common packs used in all Universal I/O Shelves.

Figure 3-29 Common Packs in the Facility Interface Sub-Shelf



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Important! When ordering the Common Circuit Pack Kit for a Universal I/O Shelf, you receive one pair of SWIF packs in addition to the packs illustrated in Figure 3-29.

Universal interface slot

Each Facility Interface Sub-Shelf contains 16 universal interface slots. The unique characteristic of a universal slot is its ability to accept any of the port units that are available in the current and planned future releases of WaveStar BandWidth Manager.

Important! In Figure 3-30, the universal interface slots are designated as slots 1 through 8 and slots 9 through 16.

Designation label strip The Facility Interface Sub-Shelf designation label strip illustrated in Figure 3-30 is used for all modules of the sub-shelf.

Figure 3-30 Facility Interface Sub-Shelf Designation Label Strip

1	2	3	4	5	6	7	8	EPRN	EPROTSW
SWITCH 0	CTLSYSDM 0	DCCEI	CTLSYSDM 1	SWITCH 1	TMG 1 TMG 0	9	10	11	
12	13	14	15	16					

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Important! If a Mixed Module is equipped with DS3EC1/8 port units and 1xN protection is used, then slot 16 must either be equipped with a DS3EC1/8 port unit or left blank.

Important! Slots 7, 8, 9 and 10 cannot be equipped with DS3EC1/8 port units.

Equipped slots

Circuit packs should be inserted in the slots indicated in the following table.

Table 3-5 Equipped Slots – Facility Interface Sub-Shelf

Slot	Circuit Pack
1-6 ^a	DS3EC1/8
1-8	OC48/STM16, OC12/STM4, and/or OC3/STM1
EPRN	DS3EC1/8 (for 1x12 protection of the DS3EC1/8 port units) or Blank for Optical Modules
EPROTSW	SWITCH/DS3EC1 or Blank for Optical Modules
SWITCH 0 ^b	SWITCH/STS576
CTLSYSDEM 0	CTL/SYS50DM
DCCEI	ADJCTL/DCCEI
CTLSYSDEM 1	CTL/SYS50DM
SWITCH 1 ^b	SWITCH/STS576
TMG 1 ^c	TMG/STRAT3
TMG 0	TMG/STRAT3
9-16	OC48/STM16, OC12/STM4, and/or OC3/STM1
11-16 ^a	DS3EC1/8

- a) Slots 7, 8, 9 and 10 are blank when the Facility Interface Sub-Shelf is fully-equipped as a DS3EC1/8 Electrical Module; slots 7 through 10 cannot be equipped with DS3EC1/8 port units.
- b) The 0 indicates the service pack of a pair goes in that slot. The 1 indicates the protection pack of a pair goes in that slot.
- c) The TMG/STRAT3 packs are half the height of a normal full-sized pack. Therefore, when one pack is placed on top of the other these two packs can fit in one normal slot.

DS3EC1 Electrical Module

Overview A DS3EC1 Electrical Module is a Facility Interface Sub-Shelf that is equipped with the common circuit packs and DS3EC1/8 port units.

Common packs A fully-equipped DS3EC1 Electrical Module includes the following common circuit packs:

- Two SWITCH/STST576
- Two CTL/SYS50DM
- One ADJCTL/DCCEI
- Two TMG/STRAT3

Important! When ordering the Common Circuit Pack Kit for a Universal I/O Shelf, you receive one pair of SWIF packs in addition to the packs listed above.

Port units and circuit pack A DS3EC1 electrical module includes

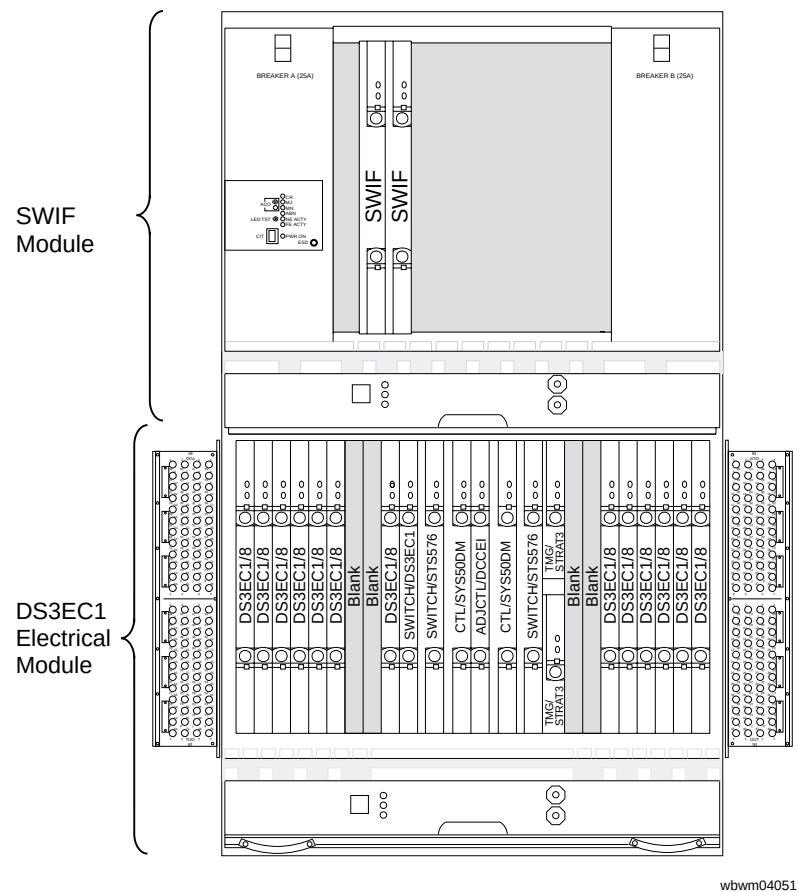
- Twelve DS3EC1/8 port units (located in slots 1-6 and 11-16)
- One DS3EC1/8 port unit (needed for 1x12 protection)
- One SWITCH/DS3EC1 pack

Important! Although four of the universal slots (slots 7-10) remain empty, the module is fully-equipped.

SWIF capacity A DS3EC1 Electrical Module requires one SWIF pair (96 STS-1 equivalents = 8 ports X 12 port units) to drop all the capacity available from the DS3EC1/8 port units to the main switch fabric.

Figure Figure 3-31 illustrates a fully-equipped DS3EC1 Electrical Module of a Universal I/O Shelf.

Figure 3-31 DS3EC1 Electrical Module of a Universal I/O Shelf



OC48/STM16 Optical Module

Overview An OC48/STM16 Optical Module is a Facility Interface Sub-Shelf that is equipped with the common circuit packs and OC48/STM16 port units.

Common packs A fully-equipped OC48/STM16 Optical Module includes the following common circuit packs

- Two SWITCH/STST576
- Two CTL/SYS50DM
- One ADJCTL/DCCEI
- Two TMG/STRAT3

Important! When ordering the Common Circuit Pack Kit for a Universal I/O Shelf, you receive one pair of SWIF packs in addition to the packs listed above.

Port units An OC48/STM16 Optical Module includes either

- Two OC48/STM16 port units for one 2-fiber OC-48 BLSR/STM-16 MS-SPRings
- Two OC48/STM16 port units for one 4-fiber OC-48 BLSR (open) or a 4-fiber STM-16 MS-SPRing (open), assuming that the module is in an end terminal that is terminating an open ring
- Four OC48/STM16 port units for one 4-fiber OC-48 BLSR/STM-16 MS-SPRing (with or without transoceanic protocol)
- Two, four, six, or eight OC48/STM16 port units (1+1 protected)
- One, two, three, or four OC48/STM16 port units (0x1 protected)

Important! Since an OC48/STM16 port unit is a double-width circuit pack, two OC48/STM16 port units occupy four universal slots and four OC48/STM16 port units occupy eight universal slots.

SWIF capacity

An OC48/STM16 Optical Module generally uses one SWIF pair (96 STS-1/32 STM-1 equivalents) to drop 96 STS-1/32 STM-1 equivalents of service capacity from the BLSR/MS-SPRing to the main switch fabric. In addition, any combination of the service and protection capacity from the BLSR/MS-SPRing that totals 192 STS-1/64 STM-1 equivalents can be dropped. If desired, two SWIF pairs are required to drop 192 STS-1/64 STM-1 equivalents of capacity to the main switch.

Table 3-6 SWIF Capacity – OC48/STM16 Optical Module

2-Fiber OC-48 BLSR/ STM-16 MS-SPRing	4-Fiber OC-48 BLSR/ STM-16 MS-SPRing (open) ^a	4-Fiber OC-48 BLSR/ STM-16 MS-SPRing (closed)	Capacity Dropped	STS-1/ STM-1	SWIF Pairs
1	1	NA	all service	48/16	1
			all protection	48/16	1
			all service and protection capacity	96/32	1
2	2	1	all service	96/32	1
			all protection	96/32	1
			combination of service and protection totaling 96 STS-1/32 STM-1 equivalents	96/32	1
			all service and protection capacity	192/64	2
3	3	NA	all service	144/48	2
			all protection	144/48	2
			combination of service and protection totaling 96 STS-1/32 STM-1 equivalents	96/32	1
			combination of service and protection totaling 192 STS-1/64 STM-1 equivalents	192/64	2
4	4	2	all service	192/64	2
			all protection	192/64	2
			combination of service and protection totaling 96 STS-1/32 STM-1 equivalents	96/32	1
			combination of service and protection totaling 192 STS-1/64 STM-1 equivalents	192/64	2

a) This column assumes that the OC48/STM16 Optical Module is an end node of an open ring. The capacity issues for an intermediate node in an open ring are the same as the nodes in a closed ring.

An OC48/STM16 Optical Module equipped with 1+1 and 0x1 protected OC48/STM16 port units can use two SWIF pairs to drop 192 STS-1/64 STM-1 equivalents of service capacity from four working port units to the main switch fabric. If desired, one SWIF pair can be used to drop 96 STS-1/32 STM-1 equivalents of service capacity from two working port units to the main switch fabric.

Table 3-7 SWIF Capacity – OC48/STM16 Optical Module (1+1 and 0x1 Protection)

OC48/STM16	Capacity Dropped	STS-1/ STM-1	SWIF Pairs
1+1 protection: 4 working, 4 protection port units	all service capacity	192/64	2
1+1 protection: 3 working, 3 protection port units	all service capacity	144/48	2
1+1 protection: 2 working, 2 protection port units	all service capacity	96/32	1
1+1 protection: 1 working, 1 protection port unit	all service capacity	48/16	1
0x1 protection: 4 working but unprotected port units	all service capacity	192/64	2
0x1 protection: 3 working but unprotected port units	all service capacity	144/48	2
0x1 protection: 2 working but unprotected port units	all service capacity	96/32	1
0x1 protection: 1 working but unprotected port units	all service capacity	48/16	1

Placement of OC48/STM16 port units

The OC48/STM16 port units must follow specific placement rules when they are provisioned as BLSRs/MS-SPRings.

The protection packs must be either adjacent or symmetrical.

In a Universal I/O Shelf, only the following double-slot pairs are considered *adjacent*:

- 1/2 and 3/4
- 5/6 and 7/8
- 9/10 and 11/12
- 13/14 and 15/16

In a Universal I/O Shelf, only the following double-slot pairs are considered *symmetrical*:

- 1/2 and 15/16
- 3/4 and 13/14
- 5/6 and 11/12
- 7/8 and 9/10

4-fiber BLSR/MS-SPRings

The following table illustrates two examples of the placement and provisioning of OC48/STM16 port units for 4-fiber OC-48 BLSRs/STM-16 MS-SPRings in an OC48/STM16 Optical Module. The protection packs (regardless of the East or West assignment) must be either adjacent or symmetrical.

Table 3-8 OC48/STM16 Port Unit Placement for 4-Fiber BLSRs/MS-SPRings

Slot	Port Unit	Ring	Provisioning Option 1: Adjacent	Ring	Provisioning Option 2: Symmetrical
1	OC48/STM16	1	Service - East	1	Protection -East
2					
3	OC48/STM16		Service - West	2	Service - East
4					
5	OC48/STM16		Protection -East	2	Protection -East
6					
7	OC48/STM16		Protection - West	2	Service - East
8					
9	OC48/STM16	2	Protection -East	2	Service - West
10					
11	OC48/STM16		Protection - West	1	Protection -West
12					
13	OC48/STM16		Service - East	1	Service - West
14					
15	OC48/STM16		Service - West	1	Protection - West
16					

2-fiber BLSR/MS-SPRings

The following table illustrates two examples of the placement and provisioning of OC48/STM16 port units for 2-fiber OC-48 BLSRs/STM-16 MS-SPRings in an OC48/STM16 Optical Module. Because both port units in a 2-fiber BLSR/MS-SPRing carry service and protection traffic, both port units in a 2-fiber ring are considered to be protection packs. Therefore, it is the East and West packs that must be either adjacent or symmetrical.

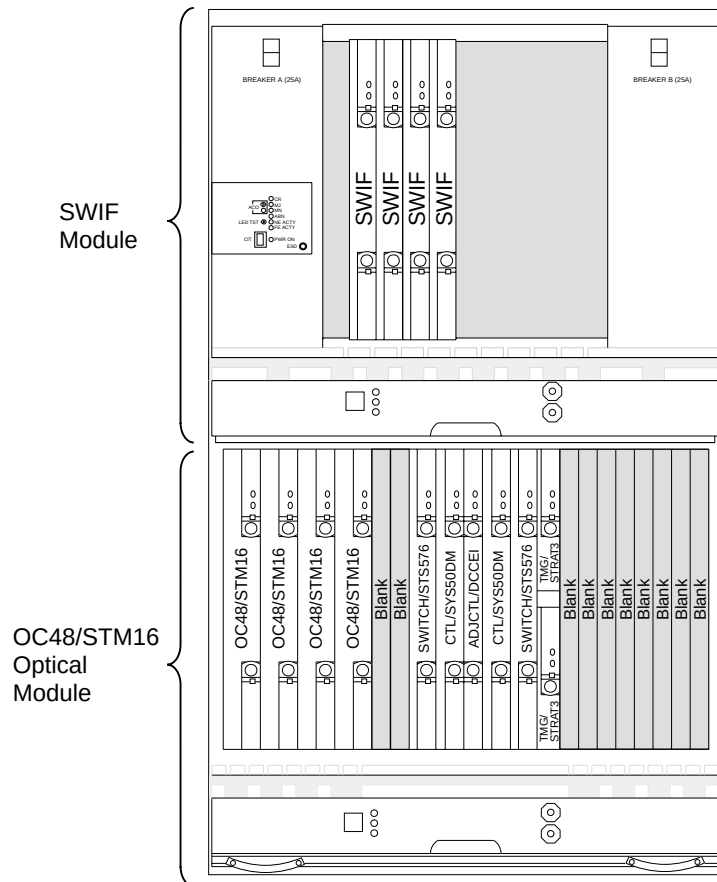
Table 3-9 OC48/STM16 Port Unit Placement for 2-Fiber BLSRs/MS-SPRings

Slot	Port Unit	Ring	Provisioning Option 1: Adjacent	Ring	Provisioning Option 2: Symmetrical
1	OC48/STM16	1	West	1	West
2					
3	OC48/STM16		East	2	West
4					
5	OC48/STM16	2	West	3	East
6					
7	OC48/STM16		East	4	West
8					
9	OC48/STM16	3	West	4	East
10					
11	OC48/STM16		East	3	West
12					
13	OC48/STM16	4	West	2	East
14					
15	OC48/STM16		East	1	East
16					

4-fiber OC-48 BLSR/STM-16 MS-SPRing

Figure 3-32 illustrates an OC48/STM16 Optical Module of a Universal I/O Shelf with one 4-fiber OC-48 BLSR/STM-16 MS-SPRing. In this example, two SWIF pairs are used, indicating that all service and protection capacity from one 4-fiber OC-48 BLSR/STM-16 MS-SPRing, totaling 192 STS-1/64 STM-1 equivalents, is dropped to the main switch fabric, or all service capacity from four unprotected OC48/STM16 port units is dropped to the main switch fabric.

Figure 3-32 OC48/STM16 Optical Module A of a Universal I/O Shelf



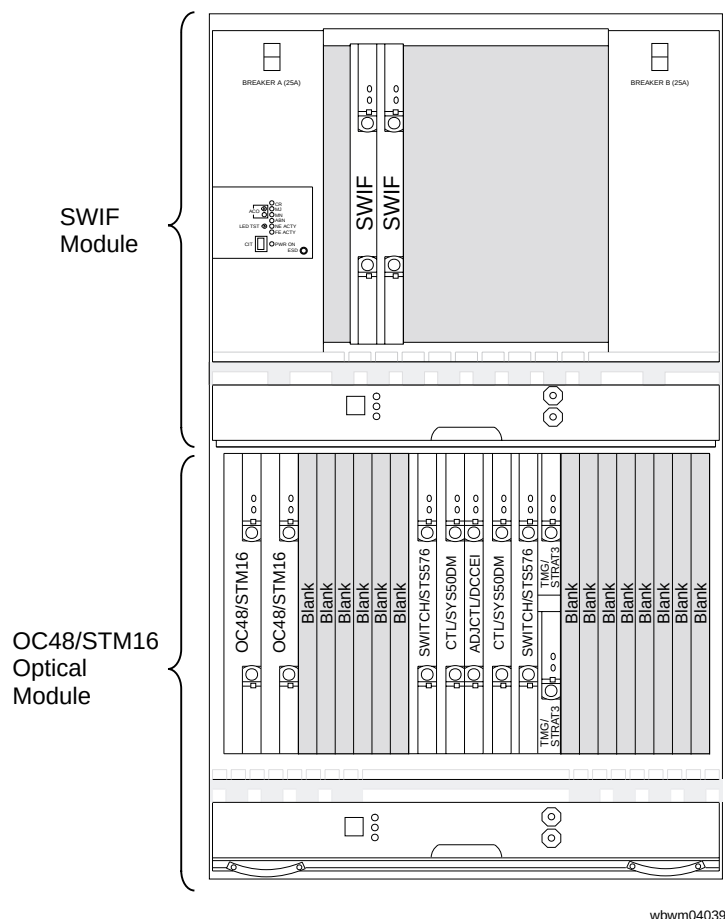
wbwm04013

**4-fiber OC-48 BLSR/STM-16
MS-SPRing (open)**

Figure 3-33 illustrates a second configuration of an OC48/STM16 Optical Module of a Universal I/O Shelf. In this example, one SWIF pair is used, indicating that all service and protection capacity one 4-fiber OC-48 BLSR (open) or one 4-fiber STM-16 MS-SPRing (open), totaling 96 STS-1/32 STM-1 equivalents, is dropped to the main switch fabric, or all service capacity from two unprotected OC48/STM16 port units is dropped to the main switch fabric.

Figure 3-33 assumes that the OC48/STM16 Optical Module is an end node of an open ring. The capacity issues for an intermediate node in an open ring are the same as the nodes in a closed ring.

Figure 3-33 OC48/STM16 Optical Module B of a Universal I/O Shelf

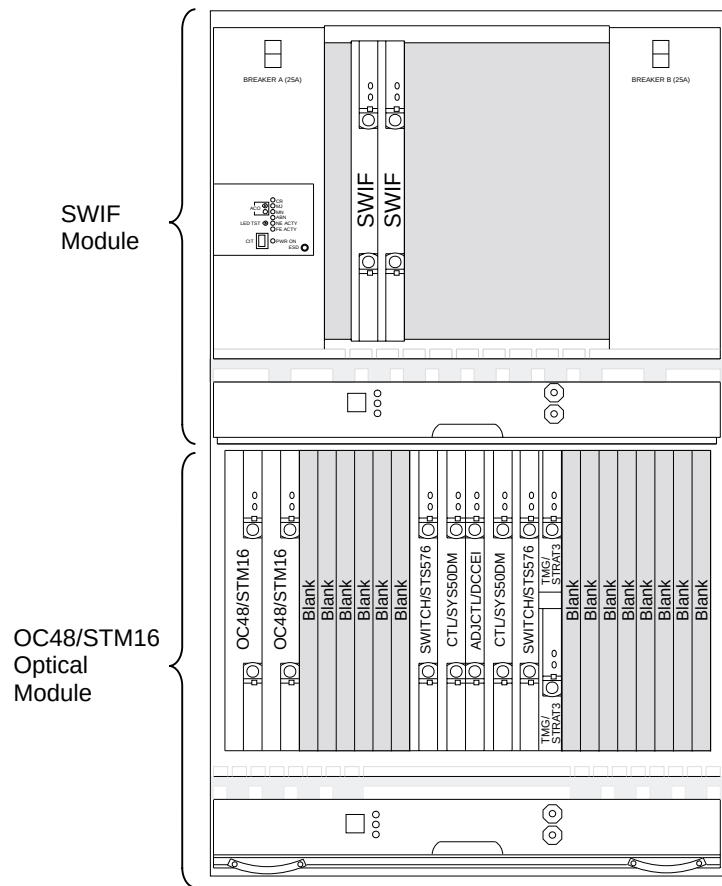


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**2-fiber OC-48 BLSR/STM-16
MS-SPRing**

Figure 3-34 illustrates a third configuration of an OC48/STM16 Optical Module of a Universal I/O Shelf. In this example, one SWIF pair is used, indicating that all service and protection capacity from one 2-fiber OC-48 BLSR/STM-16 MS-SPRing, totaling 96 STS-1/32 STM-1 equivalents, is dropped to the main switch fabric, or all service capacity from two unprotected OC48/STM16 port units is dropped to the main switch fabric.

Figure 3-34 OC48/STM16 Optical Module C of a Universal I/O Shelf



wbwm04039

OC12/STM4 Optical Module

Overview An OC12/STM4 Optical Module is a Facility Interface Sub-Shelf that is equipped with the common circuit packs and OC12/STM4 port units.

Common packs An OC12/STM4 Optical Module includes the following common circuit packs:

- Two SWITCH/STS576
- Two CTL/SYS50DM
- One ADJCTL/DCCEI
- Two TMG/STRAT3

Important! When ordering the Common Circuit Pack Kit for a Universal I/O Shelf, you receive one pair of SWIF packs in addition to the packs listed above.

Port units An OC12/STM4 Optical Module includes OC12/STM4 port units provisioned in one of the following manners:

- 1+1 protection: 8 working, 8 protection port units
- 0x1 protection: 8 working but unprotected port units

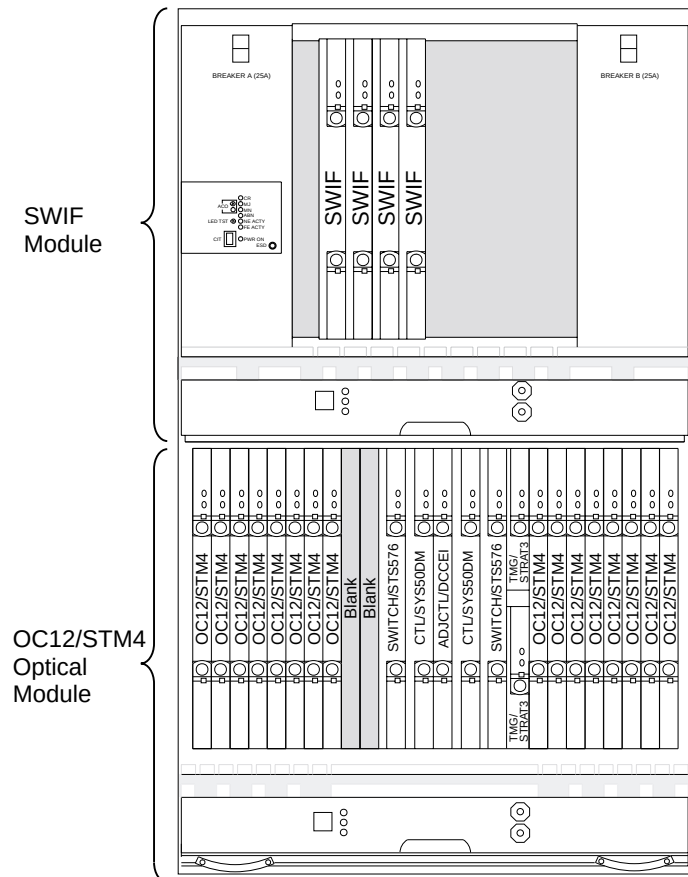
SWIF capacity An OC12/STM4 Optical Module can use two SWIF pairs (192 STS-1/64 STM-1 equivalents) to drop 192 STS-1/64 STM-1 equivalents of capacity to the main switch fabric. If desired, one SWIF pair can be used to drop only 96 STS-1/32 STM-1 equivalents from four working port units to the main switch fabric.

Table 3-10 SWIF Capacity – OC12/STM4 Optical Module

OC12/STM4	Capacity Dropped	STS-1/ STM-1	SWIF Pairs
1+1 protection: 8 working, 8 protection port units	all service capacity	192/64	2
1+1 protection: 4 working, 4 protection port units	all service capacity	96/32	1
0x1 protection: 8 working but unprotected port units	all service capacity	192/64	2
0x1 protection: 4 working but unprotected port units	all service capacity	96/32	1

Figure Figure 3-35 illustrates the OC12/STM4 Optical Module (1+1 protected) of a Universal I/O Shelf. In this example, two SWIF pairs are used, indicating that all the service capacity from the eight working protected OC12/STM4 port units (192 STS-1/64 STM-1 equivalents) is dropped to the main switch fabric.

Figure 3-35 OC12/STM4 Optical Module of a Universal I/O Shelf



wbwm04032

OC3/STM1 Optical Module

Overview An OC3/STM1 Optical Module is a Facility Interface Sub-Shelf that is equipped with the common circuit packs and OC3/STM1 port units.

Common packs An OC3/STM1 Optical Module includes the following common circuit packs:

- Two SWITCH/STST576
- Two CTL/SYS50DM
- One ADJCTL/DCCEI
- Two TMG/STRAT3

Important! When ordering the Common Circuit Pack Kit for a Universal I/O Shelf, you receive one pair of SWIF packs in addition to the packs listed above.

Port units An OC3/STM1 Optical Module includes 16 OC3/STM1 port units provisioned in one of the following manners:

- 1+1 protection: 8 working, 8 protection port units
- 0x1 protection: 16 working but unprotected port units

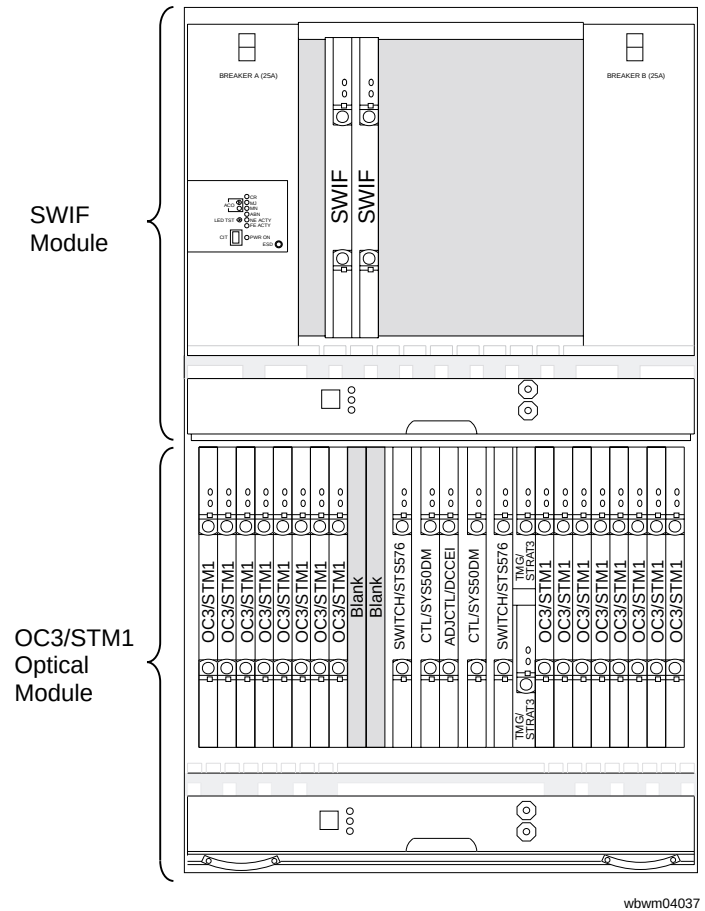
SWIF Capacity An OC3/STM1 Optical Module can use one SWIF pair to drop 96 STS-1/32 STM-1 equivalents of capacity from eight working port units to the main switch fabric. If desired, two SWIF pairs can be used to drop all service capacity from 16 unprotected OC3/STM1 port units, (192 STS-1/64 STM-1 equivalents) to the main switch fabric.

Table 3-11 SWIF Capacity – OC3/STM1 Optical Module

OC3/STM1	Capacity Dropped	STS-1/ STM-1	SWIF Pairs
1+1 protection: 8 working, 8 protection port units	all service capacity	96/32	1
1+1 protection: 4 working, 4 protection port units	all service capacity	48/16	1
0x1 protection: 16 working but unprotected port units	all service capacity	192/64	2
0x1 protection: 8 working but unprotected port units	all service capacity	96/32	1

Figure Figure 3-36 illustrates the OC3/STM1 Optical Module of a Universal I/O Shelf. In this example, one SWIF pair is used, indicating that all service capacity from 16 1+1 protected OC3/STM1 port units (96 STS-1/32 STM-1 equivalents) is dropped to the main switch fabric.

Figure 3-36 OC3/STM1 Optical Module of a Universal I/O Shelf



Mixed Module

Overview A Mixed Module is a Facility Interface Sub-Shelf that is equipped with the common circuit packs and a combination of any of the following port units:

- DS3EC1/8
- OC48/STM16
- OC12/STM4
- OC3/STM1

Common packs A fully-equipped Mixed Module includes the following common circuit packs:

- Two SWITCH/STS576
- Two CTL/SYS50DM
- One ADJCTL/DCCEI
- Two TMG/STRAT3

Important! When ordering the Common Circuit Pack Kit for a Universal I/O Shelf, you receive one pair of SWIF packs in addition to the packs listed above.

Port units and circuit packs A Mixed Module includes a combination of the following port units and circuit packs:

- ≤12 working DS3EC1/8 port units
 - One SWITCH/DS3EC1 pack
 - One protection DS3EC1/8 port unit (needed for 1xN [N ≤ 12] protection of the DS3EC1/8 port units)
- 4 OC48/STM16 port units (one 4-fiber OC-48 BLSR/STM-16 MS-SPRing)
- ≤6 OC48/STM16 port units (1+1 protected: 3 working, 3 protection port units)
- ≤6 OC48/STM16 port units (one, two, or three 2-fiber OC-48 BLSRs/STM-16 MS-SPRings)
- ≤16 OC12/STM4 port units (1+1 protected: 8 working, 8 protection port units)
- ≤16 OC3/STM1 port units (1+1 protected: 8 working, 8 protection port units)

Important! If a Mixed Module is equipped with DS3EC1/8 port units and 1xN protection is used, then slot 16 must either be equipped with a DS3EC1/8 port unit or left blank.

SWIF capacity A Mixed Module generally uses two SWIF pairs to drop 192 STS-1/64 STM-1 equivalents from the port units to the main switch fabric. The amount of traffic cross-connected directly on the shelf using the SWITCH/STS576 packs can not exceed 384 STS-1/128 STM-1 equivalents.

Table 3-12 SWIF Capacity – Mixed Module

Port Units	Capacity Dropped	STS-1/ STM-1	SWIF Pairs
≤12 DS3EC1/8	all service capacity	≤96/32	2
4 OC48/STM16	combination of service and protection from one 4-fiber OC-48 BLSR/STM-16 MS-SPRing	≤192/64	
	all service capacity from one 4-fiber OC-48 BLSR/STM-16 MS-SPRing	≤96/32	
2 OC48/STM16	combination of service and protection from one 2-fiber OC-48 BLSR or one 4-fiber OC-48 BLSR/STM-16 MS-SPRing (open) ^b	≤96/32	
	all service capacity from one 2-fiber OC-48 BLSR or one 4-fiber OC-48 BLSR/STM-16 MS-SPRing (open) ^b	≤48/16	
≤4 OC48/STM16a	all service capacity	≤96/32	
≤16 OC12/STM4a	all service capacity	≤192/64	
≤16 OC3/STM1a	all service capacity	≤96/32	

a) In these examples, the OC48/STM16, OC12/STM4, and OC3/STM1 port units are all 1+1 protected.

b) These rows assume that the Mixed Module is an end node of an open ring. The capacity issues for an intermediate node in an open ring are the same as the nodes in a closed ring.

Important! The port unit quantities listed in the preceding table represent the total number of port units in that shelf. When the port units are 1+1 protected, one half of the port units are working and one half of the port units are protection.

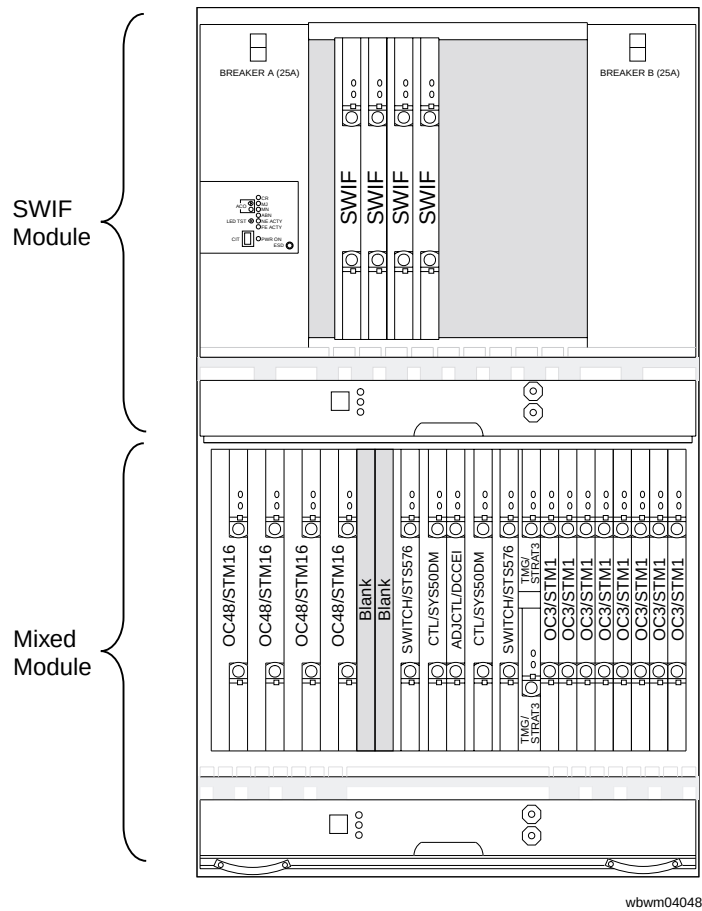
Although a Mixed Module supports multiple combinations of port units, the different types of port units must be placed in the appropriate slots and not exceed the physical capacity of the shelf.

The amount of traffic dropped to the main switch fabric can not exceed 192 STS-1/64 STM-1 equivalents.

Mixed Module configuration A

Figure 3-37 illustrates a possible configuration of a Mixed Module of a Universal I/O Shelf that contains four OC48/STM16 port units (one 4-fiber OC-48 BLSR/STM-16 MS-SPRing) and eight OC3/STM1 port units (1+1 protected). The four working OC3/STM1 port units use 48 STS-1/16 STM-1 equivalents of the available 192 STS-1/64 STM-1 equivalents provided by the two SWIF pairs. Therefore, up to 144 STS-1/48 STM-1 equivalents of capacity can be used by a combination of service and protection capacity from the BLSR/MS-SPRing.

Figure 3-37 Mixed Module A of a Universal I/O Shelf

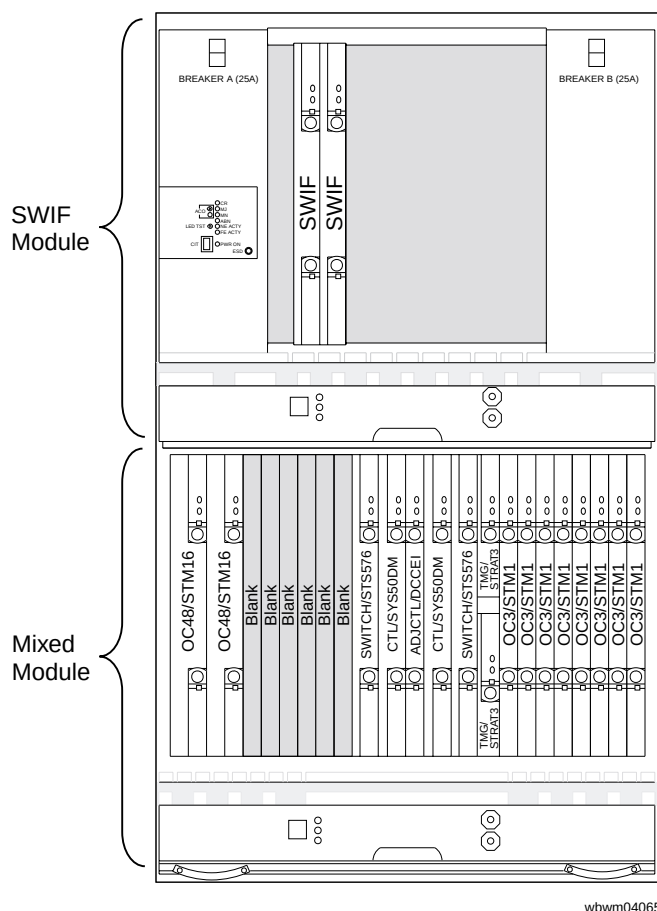


Mixed Module configuration B

Figure 3-38 illustrates a possible configuration of the Mixed Module of a Universal I/O Shelf that contains two OC48/STM16 port units (one 4-fiber OC-48 BLSR [open] or 4-fiber STM-16 MS-SPRing [open]) and eight OC3/STM1 port units (1+1 protected). The service capacity of the open BLSR/MS-SPRing uses 48 STS-1/16 STM-1 equivalents and the four working OC3/STM4 port units use 48 STS-1/16 STM-1 equivalents. When combined, these capacities total 96 STS-1/32 STM-1 equivalents. Therefore, only one SWIF pair is necessary to drop all service capacity to the main switch fabric.

Figure 3-38 assumes that the Mixed Module is an end node of an open ring. The capacity issues for an intermediate node in an open ring are the same as the nodes in a closed ring.

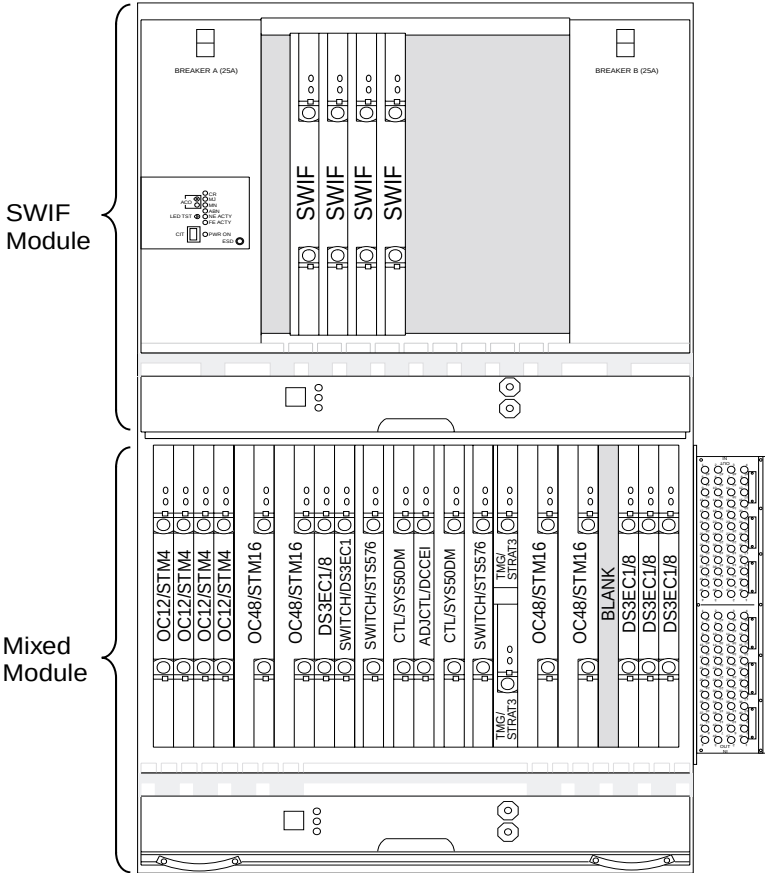
Figure 3-38 Mixed Module B of a Universal I/O Shelf



Mixed Module configuration C

Figure 3-39 illustrates a possible configuration of a Mixed Module of a Universal I/O Shelf that contains four OC48/STM16 port units (one 4-fiber OC-48 BLSR/STM-16 MS-SPRing), three DS3EC1/8 port units (1xN protected), and four OC12/STM4 port units (1+1 protected). When combined, the three working DS3EC1/8 port units (24 STS-1/8 STM-1 equivalents) and the two working OC12/STM4 port units (48 STS-1/16 STM-1 equivalents) use 72 STS-1/24 STM-1 equivalents of the available 192 STS-1/64 STM-1 equivalents provided by the two SWIF pairs. Therefore, up to 120 STS-1/40 STM-1 equivalents of capacity can be used by a combination of service and protection capacity from the BLSR/MS-SPRing.

Figure 3-39 Mixed Module C of a Universal I/O Shelf

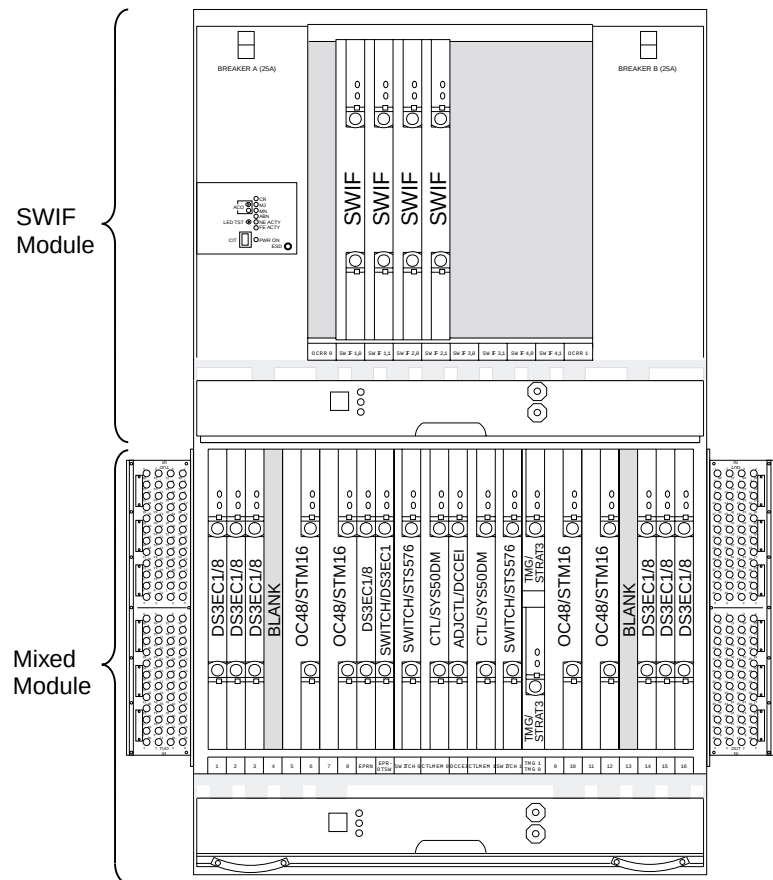


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Mixed Module configuration D

Figure 3-40 illustrates a possible configuration of the Mixed Module of a Universal I/O Shelf that contains four OC48/STM16 port units and six DS3EC1/8 port units. The six working DS3EC1/8 port units use 48 STS-1/16 STM-1 equivalents of the available 192 STS-1/64 STM-1 equivalents provided by the two SWIF pairs. Therefore, 144 STS-1/48 STM-1 equivalents of capacity are available for a combination of service and protection capacity from the BLSR/MS-SPRing.

Figure 3-40 Mixed Module D of a Universal I/O Shelf

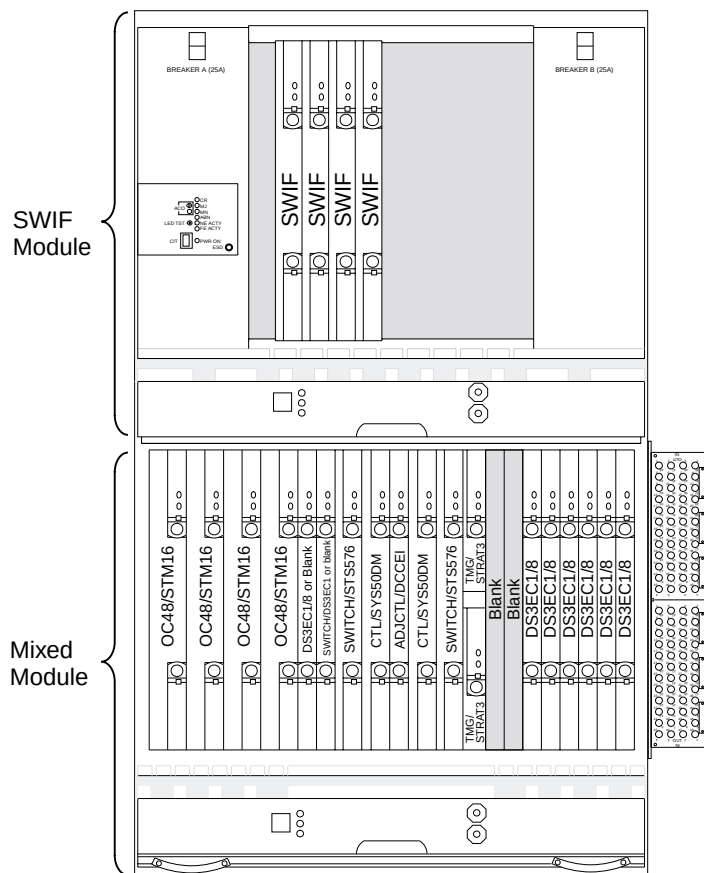


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Mixed Module configuration E

Figure 3-41 illustrates a possible configuration of the Mixed Module of a Universal I/O Shelf that contains four OC48/STM16 port units and six DS3EC1/8 port units. The benefit of this configuration is the division of the optical and electrical port units on separate sides of the shelf. Because the electrical port units are all on the right side of the module, only one DS3EC1 Connector Panel is required. The DS3EC1/8 port units use 48 STS-1/16 STM-1 equivalents of the available 192 STS-1/64 STM-1 equivalents provided by the two SWIF pairs, thus allowing 144 STS-1/48 STM-1 equivalents of capacity to be used by a combination of service and protection capacity from the BLSR/MS-SPRing.

Figure 3-41 Mixed Module E of a Universal I/O Shelf



wbwm04014

DS3EC1 Connector Panel

Overview This section describes the DS3EC1 Connector Panel that is needed for the Facility Interface Sub-Shelf when the sub-shelf is equipped as either a DS3EC1 Electrical Module or a Mixed Module with DS3EC1/8 port units.

Description Each DS3EC1 Connector Panel is equipped with 48 pairs of BNC connectors. Each pair includes one transmit and one receive connector. Therefore, six DS3EC1/8 port units (eight ports each) can be cabled to each panel. Ribbon-cable connects the BNC connectors to the backplane. Each panel is silk-screened with labels that allow the panels to be placed on either side of the shelf (see Figure 3-42).

Determining number of panels Use the following table to determine the number of DS3EC1 Connector Panels needed for each Facility Interface Sub-Shelf. You must know the number and location of the DS3EC1 port units in the sub-shelf.

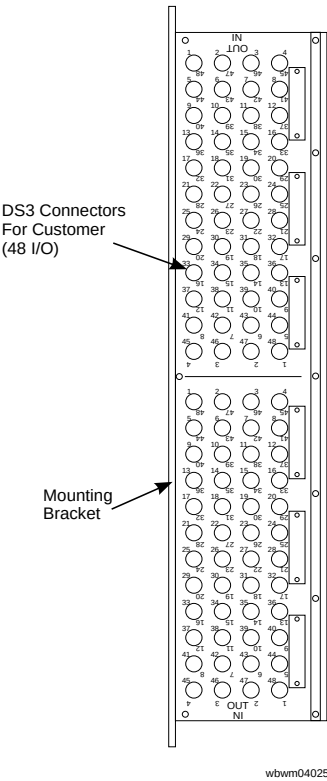
Table 3-13 Determining the Number of DS3EC1 Connector Panels

IF you have...	AND they are located...	THEN you need...
0 DS3EC1/8 port units	NA	0 DS3EC1 Connector Panels.
<6 DS3EC1/8 port units	in slots 1 through 6 OR in slots 11 through 16	1 DS3EC1 Connector Panel.
>6 DS3EC1/8 port units	in slots 1 through 6 AND in slots 11 through 16	2 DS3EC1 Connector Panels.

Quantity and location A Facility Interface Sub-Shelf may include one, two, or no DS3EC1 Connector Panels. The number of panels needed is dependent upon the type, location, and number of port units used in the sub-shelf. The panels are placed on either the left or right side of the shelf, or on both sides of the shelf, depending on the locations of the DS3EC1/8 port units.

Individual panel Figure 3-42 illustrates a DS3EC1 Connector Panel. Each panel may be mounted on either side of the Facility Interface Sub-Shelf. Simply rotate the panel illustrated in Figure 3-42 180 degrees to mount on the left-hand side of a shelf.

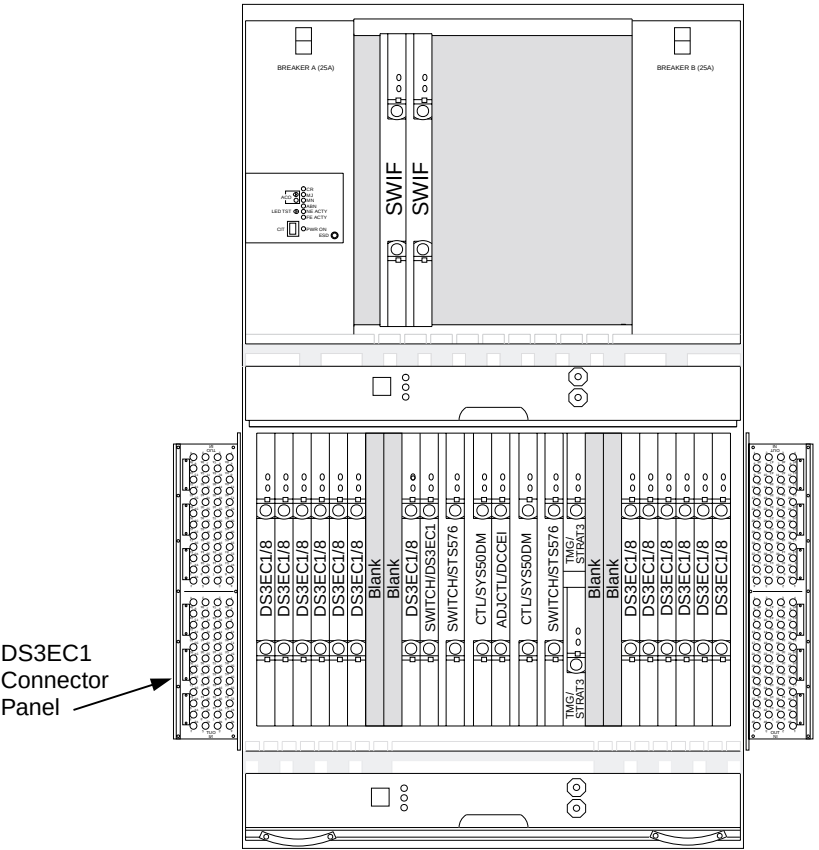
Figure 3-42 DS3EC1 Connector Panel



Mounted panels

Figure 3-43 illustrates a DS3EC1 Electrical Module with two DS3EC1 Connector Panels.

Figure 3-43 DS3EC1 Connector Panels on a DS3EC1 Electrical Module



wbwm04031

| 10G I/O Shelf

Overview The 10G I/O Shelves house the OC192/STM64 transmission interface port units and switch interface circuit packs. Each shelf is divided into the two following sub-shelves:

- CTL/Switch Interface Sub-Shelf (control packs and SWITCH/STS768 switch packs)
- Facility/SWIF Interface Sub-Shelf (transmission port units and SWIF packs)

CTL/Switch Interface Sub-Shelf The upper portion of a 10G I/O Shelf, referred to as a CTL/Switch Interface Sub-Shelf, houses the following common packs:

- Ten SWITCH/STS768 circuit packs
- Two TMG/STRAT3 circuit packs
- Two CTL/SR50DC circuit packs
- Four PPROC/FO circuit packs

Important! When ordering the Common Circuit Pack Kit for a 10G I/O Shelf, you receive one pair of SWIF packs in addition to the packs listed above.

Facility/SWIF Interface Sub-Shelf The lower portion of a 10G I/O Shelf, referred to as a Facility/SWIF Interface Sub-Shelf, houses

- ≤Four OC192/STM64 port units
- One to four SWIF pairs
- One ADJCTL/DCCEI circuit pack

Modules When equipped with circuit packs and/or port units, sub-shelves are referred to as modules.

CTL/Switch Interface

In WaveStar BandWidth Manager, an equipped CTL/Switch Interface Sub-Shelf is referred to as a CTL/Switch Module. A CTL/Switch Module is equipped with ten SWITCH/STS768 circuit packs (shelf-based switch fabric and through-connections), four pointer processor packs, two timing packs, and two control packs.

Facility/SWIF Interface

In WaveStar BandWidth Manager, an equipped Facility/SWIF Interface Sub-Shelf is referred to as an OC192/STM64 Optical Module. An OC192/STM64 Optical Module may be equipped with one to four OC192/STM64 port units and one to four SWIF pairs. The SWIF packs provide the interface between the transmission port units and the main switch fabric provided by the Switch Shelves.

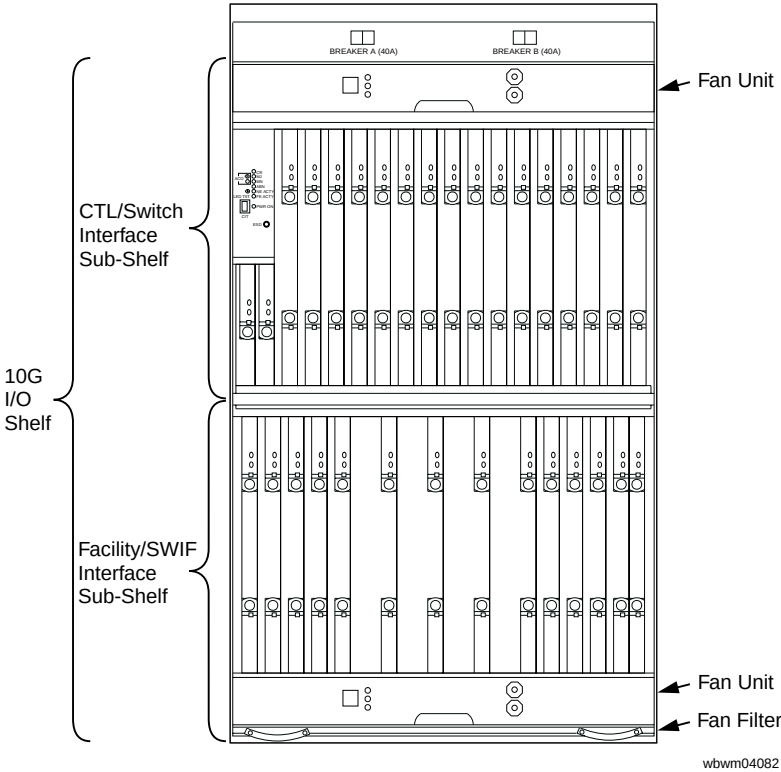
All transmission port units (hardware) are capable of transmitting and receiving SDH-rate and SONET-rate signals. The WaveStar BandWidth Manager software allows you to provision the port unit to accept the appropriate type of signal.

When equipped with the following SWIF pairs, the 10G I/O Shelf consumes the corresponding number of STS-1/STM-1 equivalents on the main switch fabric:

- One pair: 96 STS-1/32 STM-1 equivalents
- Two pairs: 192 STS-1/64 STM-1 equivalents
- Three pairs: 288 STS-1/96 STM-1 equivalents
- Four pairs: 384 STS-1/128 STM-1 equivalents

Figure Figure 3-44 illustrates a 10G I/O Shelf.

Figure 3-44 10G I/O Shelf



CTL/Switch Interface Sub-Shelf

- Overview

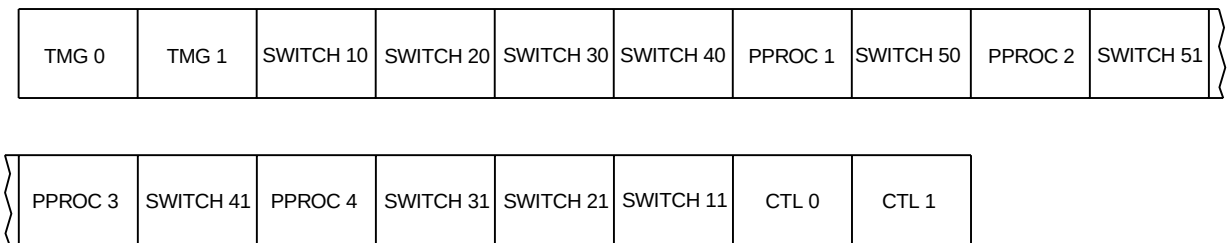
A CTL/Switch Interface Sub-Shelf, the upper portion of a 10G I/O Shelf, is available to house the control and timing packs, the shelf-based switch fabric packs (SWITCH/STS768) packs, and the pointer processor packs.
- Definition of module

Because multiple configurations are possible for the shelves of an I/O Shelf, the term “module” is used to describe an equipped sub-shelf. The term “sub-shelf” simply refers to a designated portion of an I/O Shelf.
- CTL/Switch Module

A CTL/Switch Module is a CTL/Switch Interface Sub-Shelf equipped with circuit packs.
- Designation label strip

The CTL/Switch Interface Sub-Shelf is equipped from left to right, according to the designation label strip illustrated in Figure 3-45.

Figure 3-45 CTL/Switch Interface Sub-Shelf Designation Label Strip



wbwm04070

Equipped slots The appropriate packs should be inserted in the slots indicated in the following table.

Table 3-14 Equipped Slots – CTL/Switch Interface Sub-Shelf

Slot	Circuit Pack
TMG 1a	TMG/STRAT3
TMG 0 ^a	TMG/STRAT3
SWITCH 1,0 ^b	SWITCH/STS768 ^c
SWITCH 2,0	SWITCH/STS768
SWITCH 3,0	SWITCH/STS768
SWITCH 4,0	SWITCH/STS768
PPROC 1 ^d	PPROC/FO
SWITCH 5,0	SWITCH/STS768
PPROC 2 ^d	PPROC/FO
SWITCH 5,1	SWITCH/STS768
PPROC 3 ^d	PPROC/FO
SWITCH 4,1	SWITCH/STS768
PPROC 4 ^d	PPROC/FO
SWITCH 3,1	SWITCH/STS768
SWITCH 2,1	SWITCH/STS768
SWITCH 1,1	SWITCH/STS768
CTL 0	CTL/SR50DC
CTL 1	CTL/SR50DC

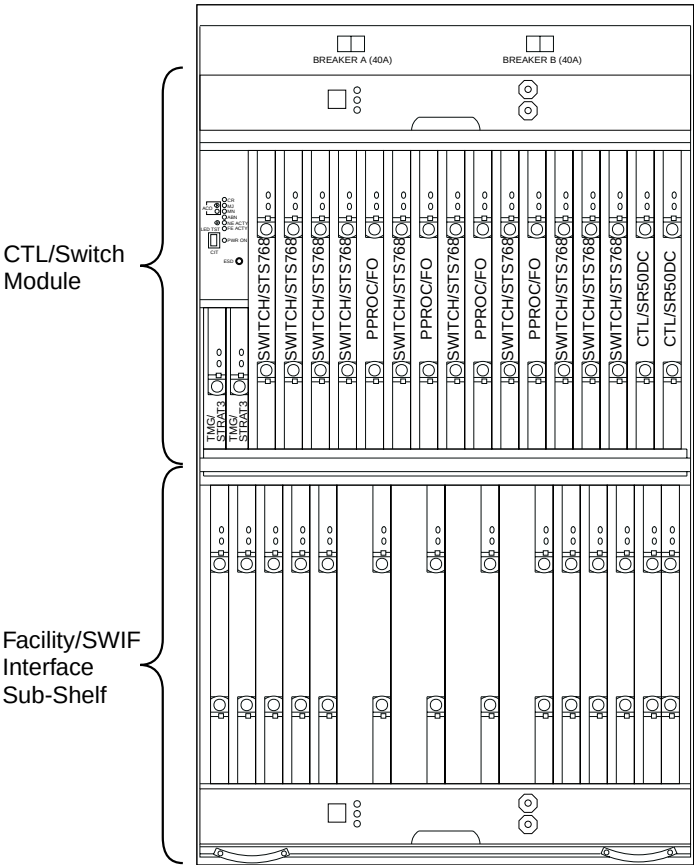
- a) The TMG/STRAT3 packs are half the height of a normal full-sized pack. The 0 indicates the service pack of a pair goes in that slot. The 1 indicates the protection pack of a pair goes in that slot.
- b) The first number represents the SWITCH/STS768 pair (1-4). The second number, 0 or 1, indicates the service or protection pack, respectively.
- c) SWITCH/STS768 equates to SWITCH/STM256 in SDH terminology.
- d) The numbers following PPROC do not represent a protection scheme, but rather quantity.

CTL/Switch Module

Overview A CTL/Switch Module is a CTL/Switch Interface Sub-Shelf that is equipped with circuit packs.

Figure Figure 3-46 illustrates the CTL/Switch Module of a 10G I/O Shelf.

Figure 3-46 CTL/Switch Module of a 10G I/O Shelf



wbwm04083

Facility/SWIF Interface Sub-Shelf

Overview A Facility/SWIF Interface Sub-Shelf, the lower portion of a 10G I/O Shelf, is available to house OC192/STM64 port units and their associated SWIF packs.

Definition of module Because multiple configurations are possible for the shelves of an I/O Shelf, the term “module” is used to describe an equipped shelf. The term “sub-shelf” simply refers to a designated portion of an I/O Shelf.

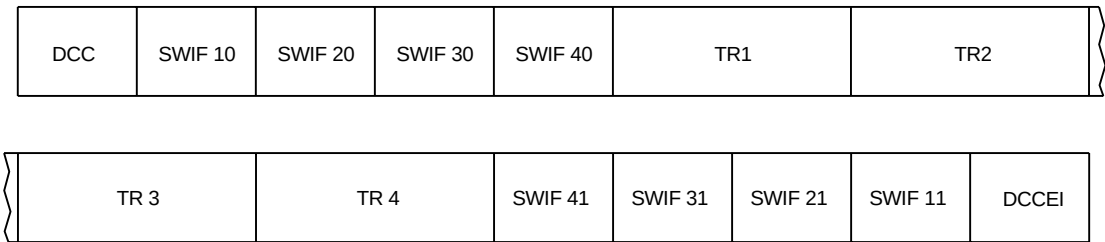
Modules The port units used in the sub-shelf determine the type of module. The Facility/SWIF Interface Sub-Shelf may be equipped as an OC192/STM64 Optical Module.

Facility interface slot Each Facility/SWIF Interface Sub-Shelf contains four 60 mm wide facility interface slots designed for the OC192/STM64 port units.

Important! In Figure 3-47, the facility interface slots are designated as TR1-TR4 (TR represents transmit/receive).

Designation label strip The Facility/SWIF Interface Sub-Shelf designation label strip is illustrated in Figure 3-47.

Figure 3-47 Facility/SWIF Interface Sub-Shelf Designation Label Strip



wbwm04071

Equipped slots

Circuit packs should be inserted in the slots indicated in the following table.

Table 3-15 Equipped Slots – Facility/SWIF Interface Sub-Shelf

Slot	Circuit Pack
DCC	Blank
SWIF 1,0 ^a	SWIF (Service of pair 1)
SWIF 2,0 ^b	SWIF (Service of pair 2)
SWIF 3,0	SWIF (Service of pair 3)
SWIF 4,0	SWIF (Service of pair 4)
TR 1	OC192/STM64
TR 2	OC192/STM64
TR 3	OC192/STM64
TR 4	OC192/STM64
SWIF 4,1	SWIF (Protection of pair 4)
SWIF 3,1	SWIF (Protection of pair 3)
SWIF 2,1	SWIF (Protection of pair 2)
SWIF 1,1	SWIF (Protection of pair 1)
DCCEI	ADJCTL/DCCEI

a) SWIF 1,0 and 1,1 are equipped first (96 STS-1/32 STM-1 equivalents). SWIF 2,0 and 2,1 are added if an additional 96 STS-1/32 STM-1 equivalents of switch interface capacity are needed, for a total of 192 STS-1/64 STM-1 equivalents. SWIF 3,0 and 3,1 are added if an additional 96 STS-1/32 STM-1 equivalents of switch interface capacity are needed, for a total of 288 STS-1/96 STM-1 equivalents. SWIF 4,0 and 4,1 are added if an additional 96 STS-1/32 STM-1 equivalents of switch interface capacity are needed, for a total of 384 STS-1/128 STM-1 equivalents

b) The first number represents the SWIF pair (1-4). The second number, 0 or 1, indicates the service or protection pack, respectively.

OC192/STM64 Optical Module

Overview An OC192/STM64 Optical Module is a Facility/SWIF Interface Sub-Shelf that is equipped with the common circuit packs, OC192/STM64 port units, and one to four SWIF pairs.

Circuit packs A fully-equipped OC192/STM64 Optical Module includes the following circuit packs:

- One ADJCTL/DCCEI
- One to four SWIF pairs

Port units An OC192/STM64 Optical Module includes either

- Two OC192/STM64 port units for
 - one 2-fiber OC-192 BLSR/STM-64 MS-SPRing
 - one 4-fiber OC-192 BLSR/STM-64 MS-SPRing (open)
 - one 4-fiber STM-64 MS-SPRing (open) with transoceanic protocol
- Four OC192/STM64 port units for
 - two 2-fiber OC-192 BLSRs/STM-64 MS-SPRings
 - one 4-fiber OC-192 BLSR/STM-64 MS-SPRing (closed)
 - one 4-fiber STM-64 MS-SPRing with transoceanic protocol
- ≤Four OC192/STM64 1+1 protected port units
- ≤Two OC192/STM64 0x1 protected port units

SWIF capacity An OC192/STM64 Optical Module equipped with a 4-fiber OC-192 BLSR/STM-64 MS-SPRing can use one to four SWIF pairs to drop 96 to 384 STS-1/32 to 128 STM-1 equivalents of capacity from the BLSR/MS-SPRing to the main switch fabric. Refer to the following table for specific examples.

**Table 3-16 SWIF Capacity – OC192/STM64 Optical Module
(OC-192 BLSRs/STM-64 MS-SPRings)**

2-Fiber OC-192 BLSR/STM-64 MS-SPRing	4-Fiber OC-192 BLSR/STM-64 MS-SPRing (open) ^a	4-Fiber OC-192 BLSR/STM-64 MS-SPRing (closed)	Capacity Dropped	STS-1/ STM-1	SWIF Pairs
1	1	NA	all service and protection capacity	384/128	4
			combination of service and/or protection capacity totaling 288 STS-1/96 STM-1 equivalents	288/96	3
			all service capacity or combination of service and/or protection capacity totaling 192 STS-1/64 STM-1 equivalents	192/64	2
			combination of service and/or protection capacity totaling 96 STS-1/32 STM-1 equivalents	96/32	1
2	2	1	all service capacity or combination of service and/or protection capacity totaling 384 STS-1/128 STM-1 equivalents	384/128	4
			combination of service and/or protection capacity totaling 288 STS-1/96 STM-1 equivalents	288/96	3
			combination of service and/or protection capacity totaling 192 STS-1/64 STM-1 equivalents	192/64	2
			combination of service and/or protection capacity totaling 96 STS-1/32 STM-1 equivalents	96/32	1

a) These rows assume that the OC192/STM64 Optical Module is an end node of an open ring. The capacity issues for an intermediate node in an open ring are the same as the nodes in a closed ring.

An OC192/STM64 Optical Module equipped with 1+1 and 0x1 protected OC192/STM64 port units can use two SWIF pairs to drop 192 STS-1/64 STM-1 equivalents of capacity from one working port units to the main switch fabric, or four SWIF pairs to drop 384 STS-1/128 STM-1 equivalents of capacity from two working port units to the main switch fabric.

Table 3-17 SWIF Capacity – OC192/STM64 Optical Module (1+1 and 0x1 Protection)

OC192/STM64	Capacity Dropped	STS-1/ STM-1	SWIF Pairs
1+1 protection: 2 working, 2 protection port units	all service capacity	384/128	4
1+1 protection: 1 working, 1 protection port units	all service capacity	192/64	2
0x1 protection: 2 working but unprotected port units	all service capacity	384/128	4
0x1 protection: 1 working but unprotected port unit	all service capacity	192/64	2

Important! The amount of traffic cross-connected directly on the shelf using the SWITCH/STS768 packs can not exceed 768 STS-1/256 STM-1 equivalents.

**Placement of
protected OC192/STM64
port units**

The OC192/STM64 port units must follow specific placement rules when they are provisioned as BLSRs/MS-SPRings.

The protection packs must be either adjacent or symmetrical.

In a 10G I/O Shelf, only the following slot pairs are considered *adjacent*:

- 1 and 2
- 3 and 4

In a 10G I/O Shelf, only the following slot pairs are considered *symmetrical*:

- 1 and 4
- 2 and 3

4-fiber BLSR/MS-SPRings

The following table illustrates two examples of the placement and provisioning of OC48/STM16 port units for 4-fiber OC-192 BLSRs/STM-64 MS-SPRings in an OC192/STM64 Optical Module. The protection packs (regardless of the East or West assignment) must be either adjacent or symmetrical.

Table 3-18 OC192/STM64 Port Unit Placement for 4-Fiber BLSRs/MS-SPRings

Slot	Port Unit	Ring	Provisioning Option 1: Adjacent	Provisioning Option 2: Symmetrical
TR 1	OC192/STM64	1	Service -West	Service -West
TR 2	OC192/STM64		Service - East	Protection - West
TR 3	OC192/STM64		Protection - West	Protection - East
TR 4	OC192/STM64		Protection - East	Service - East

2-fiber BLSR/MS-SPRings

The following table illustrates two examples of the placement and provisioning of OC192/STM64 port units for 2-fiber OC-192 BLSRs/STM-64 MS-SPRings in an OC192/STM64 Optical Module. Because both port units in a 2-fiber BLSR/MS-SPRing carry service and protection traffic, both port units in a 2-fiber ring are considered to be protection packs. Therefore, it is the East and West packs that must be either adjacent or symmetrical.

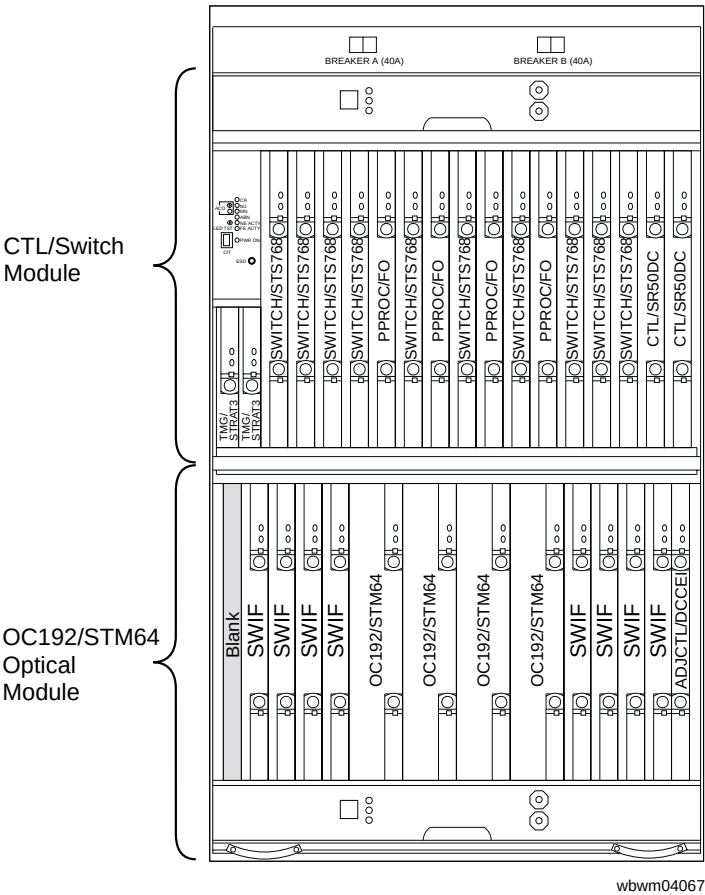
Table 3-19 OC192/STM64 Port Unit Placement for 2-Fiber BLSRs/MS-SPRings

Slot	Port Unit	Ring	Provisioning Option 1: Adjacent	Ring	Provisioning Option 2: Symmetrical
TR 1	OC192/STM64	1	West	1	West
TR 2	OC192/STM64		East	2	West
TR 3	OC192/STM64	2	West		East
TR 4	OC192/STM64		East	1	East

**4-fiber OC-192
BLSR/STM-64 MS-SPRing**

Figure 3-48 illustrates an OC192/STM64 Optical Module of a 10G I/O Shelf equipped with four OC192/STM64 port units. In this example, four SWIF pairs are used which indicates that either all service capacity, or a combination of service and protection capacity from one 4-fiber OC-192 BLSR/STM-64 MS-SPRing, totaling 384 STS-1/128 STM-1 equivalents, is dropped to the main switch fabric. Figure 3-48 could also represent four 1+1 protected port units with all service capacity from the two working OC192/STM64 port units being dropped to the main switch fabric.

Figure 3-48 OC192/STM64 Optical Module A of a 10G I/O Shelf

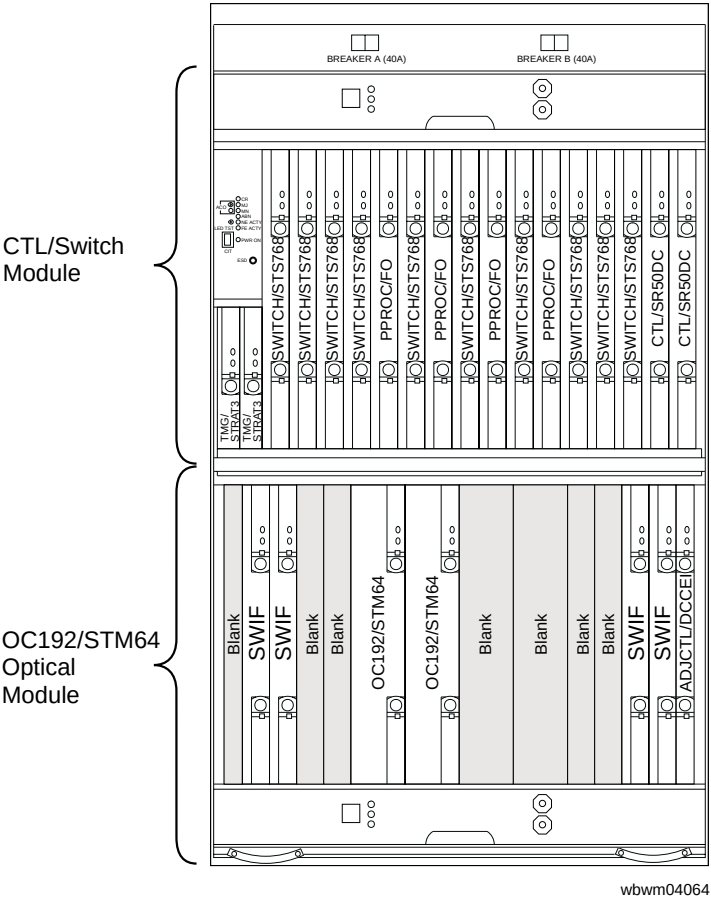


4-fiber OC-192 BLSR/
STM-64 MS-SPRing
(open)

Figure 3-49 illustrates an OC192/STM64 Optical Module of a 10G I/O Shelf equipped with two OC192/STM64 port units. In this example, two SWIF pairs are used which indicates that either all service capacity, or a combination of service and protection capacity from one 4-fiber OC-192 BLSR (open) or 4-fiber STM-64 MS-SPRing (open), totaling 192 STS-1/64 STM-1 equivalents, is dropped to the main switch fabric. Figure 3-49 could also represent two 1+1 protected port units with all service capacity from the working OC192/STM64 port unit being dropped to the main switch fabric.

Figure 3-49 assumes that the OC192/STM64 Optical Module is an end node of an open ring. The capacity issues for an intermediate node in an open ring are the same as the nodes in a closed ring.

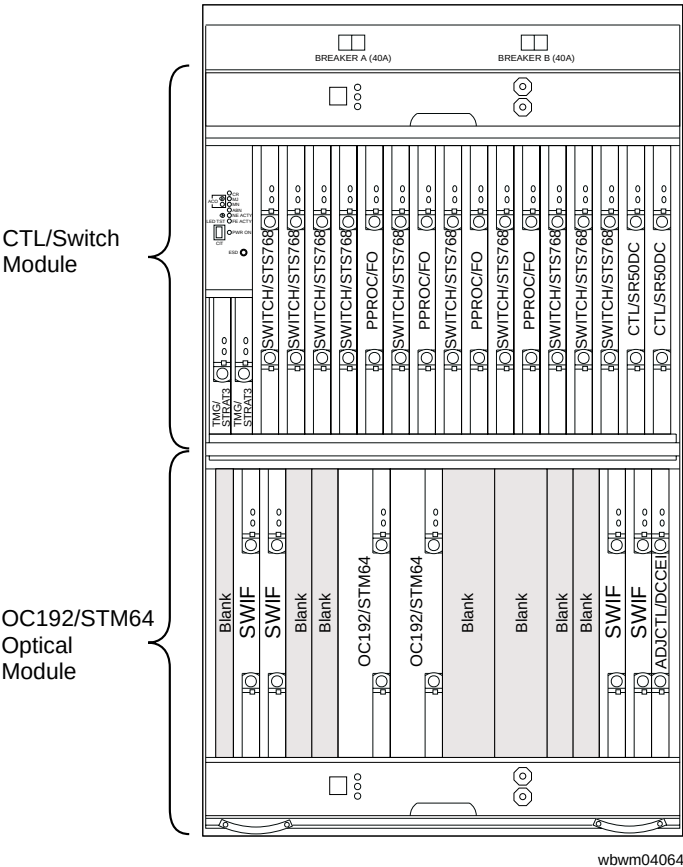
Figure 3-49 OC192/STM64 Optical Module B of a 10G I/O Shelf



2-fiber OC-192 BLSR/
STM-64 MS-SPRing

Figure 3-50 illustrates an OC192/STM64 Optical Module of a 10G I/O Shelf equipped with two OC192/STM64 port units. In this example, two SWIF pairs are used which indicates that either all service capacity, or a combination of service and protection capacity from one 2-fiber OC-192 BLSR/STM-64 MS-SPRing, totaling 192 STS-1/64 STM-1 equivalents, is dropped to the main switch fabric. Figure 3-50 could also represent two 1+1 protected port units with all service capacity from the working OC192/STM64 port unit being dropped to the main switch fabric.

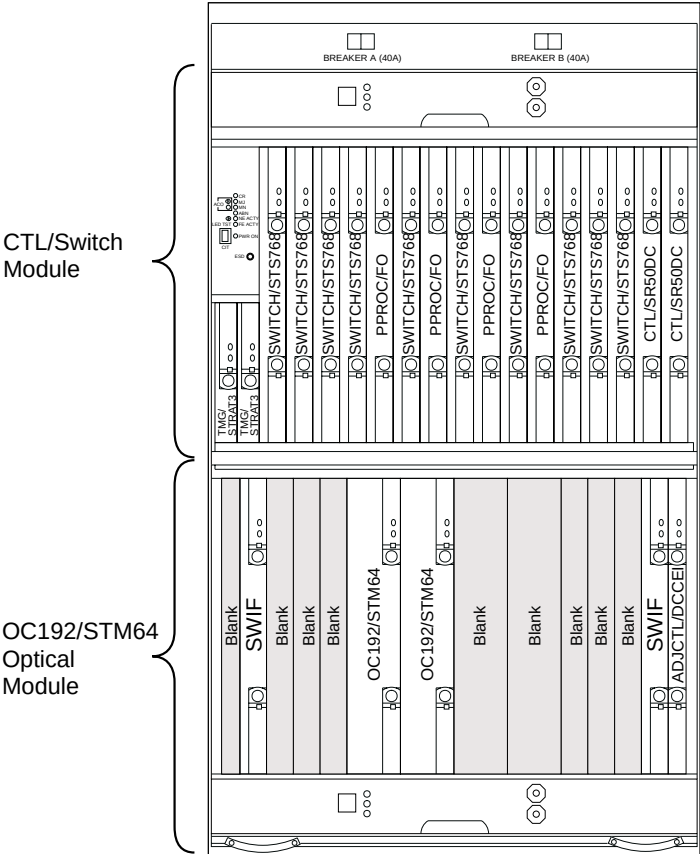
Figure 3-50 OC192/STM64 Optical Module C of a 10G I/O Shelf



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Figure 3-51 illustrates an OC192/STM64 Optical Module of a 10G I/O Shelf equipped with two OC192/STM64 port units. In this example, one SWIF pair is used which indicates that either a portion of the service capacity, or a combination of service and protection capacity from one 2-fiber OC-192 BLSR/STM-64 MS-SPRing, totaling 96 STS-1/32 STM-1 equivalents, is dropped to the main switch fabric.

Figure 3-51 OC192/STM64 Optical Module D of a 10G I/O Shelf



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SDH Universal I/O Shelf

Overview The WaveStar BandWidth Manager SDH Universal I/O Shelves house transmission interface port units and switch interface circuit packs. Each shelf is divided into the two following sub-shelves:

- Switch Interface Sub-Shelf (SWIF packs)
- Facility Interface Sub-Shelf (transmission port units)

Switch Interface Sub-Shelf The upper portion of a SDH Universal I/O Shelf, referred to as a Switch Interface Sub-Shelf, provides eight slots for SWIF packs and two slots for future releases.

Facility Interface Sub-Shelf The lower portion of an SDH Universal I/O Shelf, referred to as a Facility Interface Sub-Shelf, provides 16 slots for port units and 9 slots for the common circuit packs. The Facility Interface Sub-Shelves house OC-48/STM-16, OC-12/STM-4, and OC-3/STM-1 optical transmission interfaces and the STM-1e electrical transmission interfaces.

SDH gateway When used in a SONET system, the SDH Universal I/O Shelf acts as a gateway for SDH STM-1e signals. However, if the optical interfaces are also used in this shelf, they must be provisioned as SDH interfaces as well.

Modules When equipped with circuit packs and/or port units the sub-shelves are referred to as modules.

Switch Interface

In WaveStar BandWidth Manager, an equipped Switch Interface Sub-Shelf is referred to as a SWIF Module. Depending on the capacity needed by the associated Facility Interface Shelf, a SWIF Module may be equipped with either one SWIF pair (96 STS-1/32 STM-1 equivalents) or two SWIF pairs (192 STS-1/64 STM-1 equivalents). The Switch Interface Sub-Shelves house the packs that provide interfaces between the transmission port units (housed in the Facility Interface Sub-Shelves) and the main switch fabric provided by the Switch Shelves.

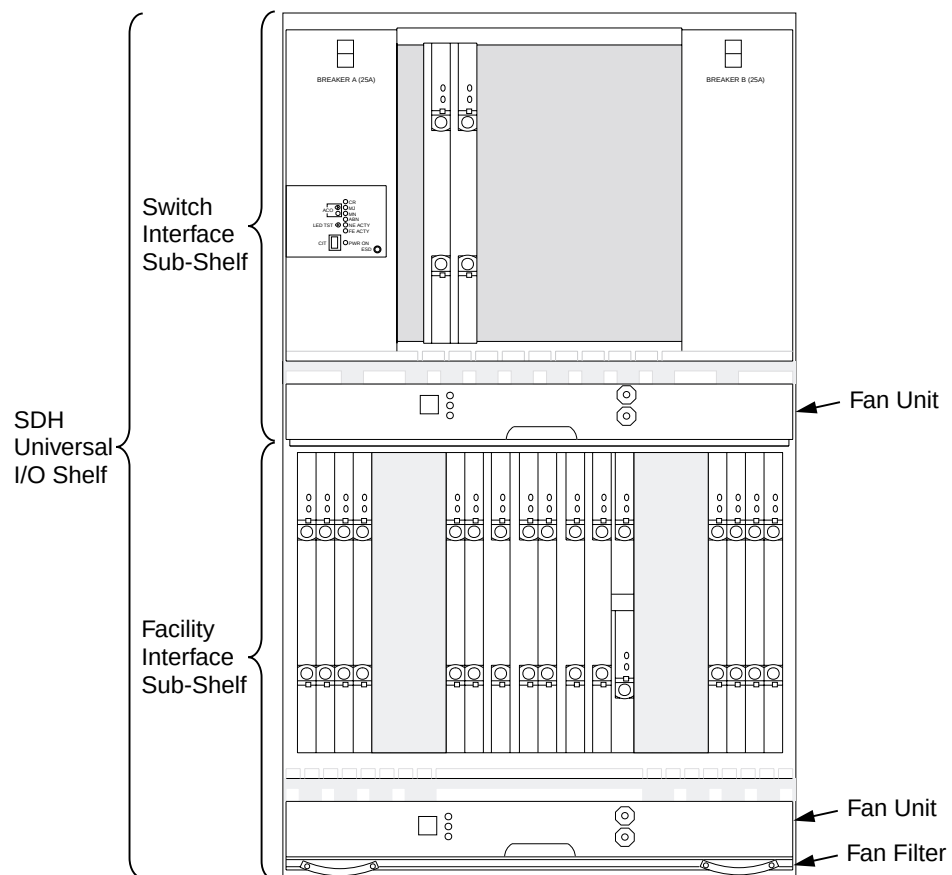
Facility Interface

Depending on the type of port units used, a Facility Interface Sub-Shelf may be equipped as one of the following types of modules:

- STM1e Electrical Module (only STM1E/4 port units)
- Mixed Module (supported combinations of STM1E/4, OC48/STM16, OC12/STM4, and/or OC3/STM1 port units)

Figure Figure 3-52 illustrates a SDH Universal I/O Shelf.

Figure 3-52 SDH Universal I/O Shelf



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Switch Interface Sub-Shelf

Overview A Switch Interface Sub-Shelf, the upper portion of an SDH Universal I/O Shelf, is available to house SWIF switch packs. The term “sub-shelf” simply refers to a designated portion of the shelf.

Definition of module Because multiple configurations are possible for the sub-shelves of the SDH Universal I/O Shelf, the term “module” is used to describe an equipped sub-shelf.

SWIF Module A SWIF Module is a Switch Interface Sub-Shelf equipped with SWIF packs. Either two or four of the eight available SWIF slots are equipped with one or two SWIF pairs (for a maximum of four SWIF packs).

Designation label strip The Switch Interface Sub-Shelf is equipped from left to right, according to the designation label strip illustrated in Figure 3-53.

Figure 3-53 Switch Interface Sub-Shelf Designation Label Strip

OCRR 0	SWIF 1,0	SWIF 1,1	SWIF 2,0	SWIF 2,1	SWIF 3,0	SWIF 3,1	SWIF 4,0	SWIF 4,1	OCRR 1

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Equipped slots SWIF packs should be inserted in the slots indicated in the following table.

Table 3-20 Equipped Slots – Switch Interface Sub-Shelf

Slot	Circuit Pack
OCRr 0 ^a	Blank
SWIF 1,0 ^b	1 pair of SWIF packs
SWIF 1,1 ^c	
SWIF 2,0	1 pair of SWIF packs
SWIF 2,1	
SWIF 3,0	Blank
SWIF 3,1	Blank
SWIF 4,0	Blank
SWIF 4,1	Blank
OCRr 1 ^a	Blank

a) The 0 indicates the service pack of a pair goes in that slot. The 1 indicates the protection pack of a pair goes in that slot.

b) SWIF 1,0 and 1,1 are equipped first (96 STS-1/32 STM-1 equivalents). SWIF 2,0 and 2,1 are added if an additional 96 STS-1/32 STM-1 equivalents of switch interface capacity are needed by any of the modules, for a total of 192 STS-1/64 STM-1 equivalents.

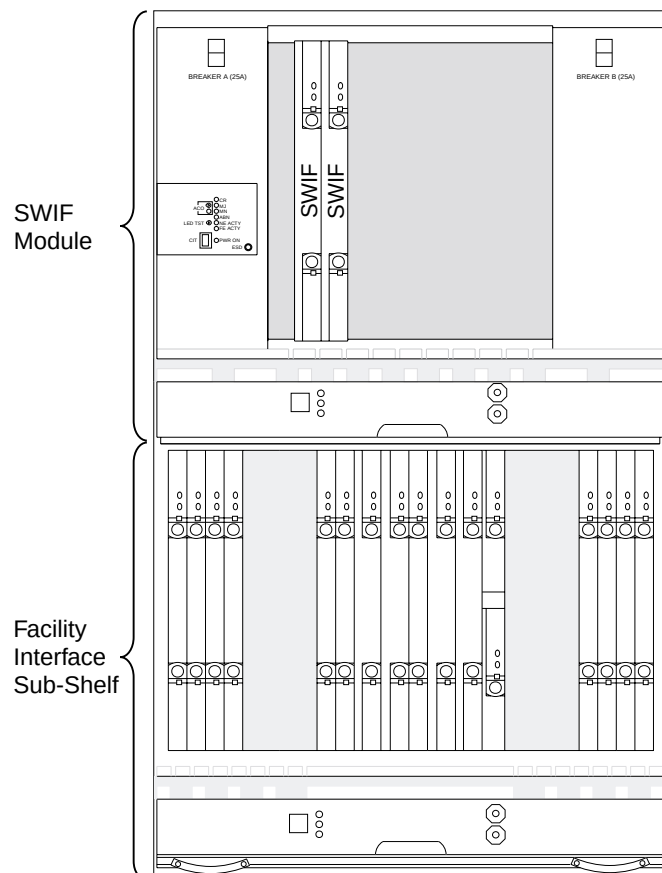
c) The first number represents the SWIF pair (1-4). The second number, 0 or 1, indicates the service or protection pack, respectively.

SWIF Module

Overview A SWIF Module is a Switch Interface Sub-Shelf that is equipped with SWIF packs.

Figure Figure 3-54 illustrates the SWIF Module of an SDH Universal I/O Shelf. This example assumes that the Facility Interface Sub-Shelf is equipped as an STM1e Electrical Module. Therefore, the SWIF Module is equipped with one pair of SWIF packs (96 STS-1/32 STM-1 equivalents). If the Facility Interface Sub-Shelf was equipped as a Mixed Module, the SWIF Module could be equipped with two SWIF pairs (192 STS-1/64 STM-1 equivalents).

Figure 3-54 SWIF Module of an SDH Universal I/O Shelf



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Facility Interface Sub-Shelf

Overview A Facility Interface Sub-Shelf, the lower portion of an SDH Universal I/O Shelf, is available to house common circuit packs and port units. Additional types of interface port units will be available in future releases.

Definition of module Because multiple configurations are possible for the sub-shelves of the Universal I/O Shelf, the term “module” is used to describe an equipped sub-shelf. The term “sub-shelf” simply refers to a designated portion of the shelf.

Modules The port units used in the sub-shelf determine the type of module. The Facility Interface Sub-Shelf may be equipped as one of the following modules:

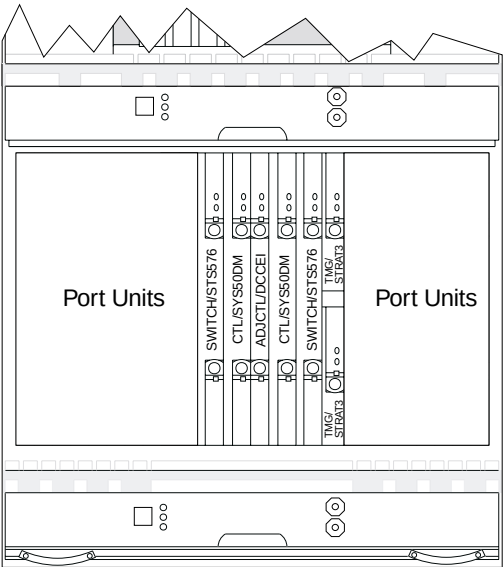
- STM1e Electrical Module
- Mixed Module

Common packs Regardless of the port units used, all SDH Universal I/O Shelves include the following common circuit packs:

- Two SWITCH/STS576
- Two CTL/SYS50DM
- One ADJCTL/DCCEI
- Two TMG/STRAT3

Figure 3-55 illustrates the common packs used in all Facility Interface Sub-Shelf modules.

Figure 3-55 Common Packs in the Facility Interface Sub-Shelf



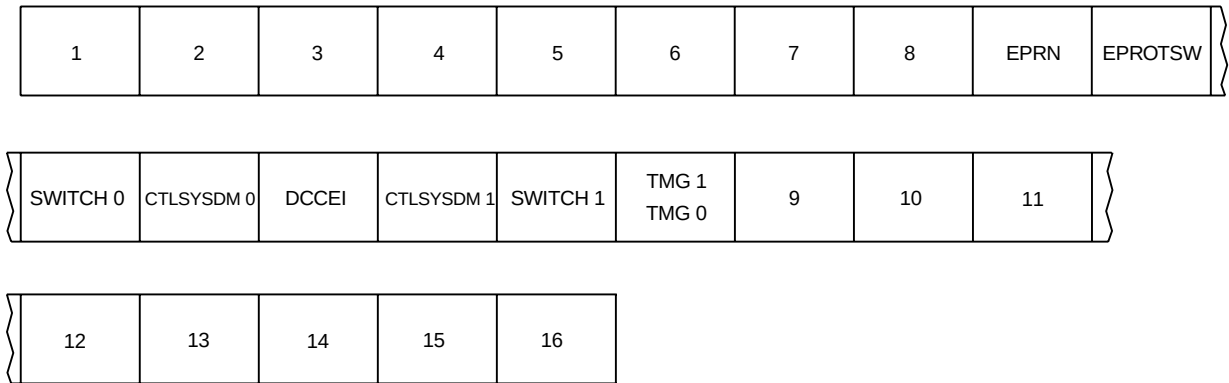
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Important! When ordering the Common Circuit Pack Kit for an SDH Universal I/O Shelf, you receive one pair of SWIF packs in addition to the packs illustrated in Figure 3-55.

Universal interface slot Each Facility Interface Sub-Shelf contains sixteen universal interface slots. The unique characteristic of a universal slot is its ability to accept any of the port units that are available in the current and planned future releases of WaveStar BandWidth Manager.

Designation label strip The Facility Interface Sub-Shelf designation label strip illustrated in Figure 3-56 is used for all modules of the sub-shelf.

Figure 3-56 Facility Interface Sub-Shelf Designation Label Strip



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Important! If a Mixed Module is equipped with STM1E/4 port units and 1xN protection is used, then slot 16 must either be equipped with a STM1E/4 port unit or left blank.
Slots 5 through 8 and 9 through 12 cannot be equipped with STM1E/4 port units.

Equipped slots

Circuit packs should be inserted in the slots indicated in the following table.

Table 3-21 Equipped Slots – Facility Interface Sub-Shelf

Slot	Circuit Pack
1-4 ^a	STM1E/4
1-8	OC48/STM16, OC12/STM4, and/or OC3/STM1 (Mixed Module) or Blank (STM1e Electrical Module)
EPRN	STM1E/4 (for 1xN protection of the STM1E/4 port units)
EPROTSW	SWITCH/STM1E4
SWITCH 0 ^b	SWITCH/STS576
CTLSYS DM 0	CTL/SYS50DM
DCCEI	ADJCTL/DCCEI
CTLSYS DM 1	CTL/SYS50DM
SWITCH 1 ^b	SWITCH/STS576
TMG 1 ^c	TMG/STRAT3
TMG 0	TMG/STRAT3
9-16	OC48/STM16, OC12/STM4, and/or OC3/STM1 (Mixed Module) or Blank (STM1e Electrical Module)
13-16 ^a	STM1E/4

- a) Slots 5 through 12 are blank when the Facility Interface Sub-Shelf is fully-equipped as an STM1e Electrical Module; slots 5 through 12 cannot be equipped with STM1E/4 port units.
- b) The 0 indicates the service pack of a pair goes in that slot. The 1 indicates the protection pack of a pair goes in that slot.
- c) The TMG/STRAT3 packs are half the height of a normal full-sized pack. Therefore, when one pack is placed on top of the other these two packs can fit in one normal slot.

STM1e Electrical Module

Overview An STM1e Electrical Module is a Facility Interface Sub-Shelf that is equipped with the common circuit packs and STM1E/4 port units.

Common packs A fully-equipped STM1e Electrical Module includes the following common circuit packs:

- Two SWITCH/STST576
- Two CTL/SYS50DM
- One ADJCTL/DCCEI
- Two TMG/STRAT3

Important! When ordering the Common Circuit Pack Kit for an SDH Universal I/O Shelf, you receive one pair of SWIF packs in addition to the packs listed above.

Port units and circuit pack A fully-equipped STM1e Electrical Module includes

- Eight STM1E/4 port units (located in slots 1-4 and 13-16)
- One STM1E/4 port unit (needed for 1x8 protection)
- One SWITCH/STM1E4 pack

Important! Although the eight universal slots (slots 5-12) remain empty, the module is fully-equipped.

SWIF capacity An STM1e Electrical Module requires SWIF pair (32 STM-1 equivalents = 4 ports X 8 port units) to drop all the capacity available from the STM1E/4 port units to the main switch fabric.

Important! 32 STM-1 equivalents (SDH) equates to 96 STS-1 equivalents (SONET).



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Issue 7, October 2001

Mixed Module

Overview A Mixed Module is a Facility Interface Sub-Shelf that is equipped with the common circuit packs and a combination of any of the following port units:

- STM1E/4
- OC48/STM16
- OC12/STM4
- OC3/STM1

Common packs A fully-equipped Mixed Module includes the following common circuit packs:

- Two SWITCH/STS576
- Two CTL/SYS50DM
- One ADJCTL/DCCEI
- Two TMG/STRAT3

Important! When ordering the Common Circuit Pack Kit for an SDH Universal I/O Shelf, you receive one pair of SWIF packs in addition to the packs listed above.

Port units and circuit packs

A Mixed Module includes a combination of the following port units and circuit packs:

- ≤8 working STM1E/4 port units
 - One SWITCH/STM1E4 pack
 - One protection STM1E/4 port unit (needed for 1xN [N ≤ 8] protection of the STM1E/4 port units)
- 4 OC48/STM16 port units (one 4-fiber OC-48 BLSR/STM-16 MS-SPRing)
- ≤4 OC48/STM16 port units (1+1 protected: 2 working, 2 protection port units)
- 2 OC48/STM16 port units (one 2-fiber OC-48 BLSR/STM-16 MS-SPRing)
- ≤8 OC12/STM4 port units (1+1 protected: 4 working, 4 protection port units)
- ≤8 OC3/STM1 port units (1+1 protected: 4 working, 4 protection port units)

Important! STM1E/4 port units may only be placed in slots 1-4 and 13-16. OC48/STM16, OC12/STM4, or OC3/STM1 port units may be placed in any universal interface slot (1-16).

SWIF capacity A Mixed Module generally uses two SWIF pairs to drop 192 STS-1/64 STM-1 equivalents from the port units to the main switch fabric.

Table 3-22 SWIF Capacity – Mixed Module

Port Units	Capacity Dropped	STS-1/ STM-1	SWIF Pairs
≤8 STM1E/4	all service capacity	≤96/32	2
4 OC48/STM16	combination of service and protection from one 4-fiber OC-48 BLSR/STM-16 MS-SPRing	≤192/64	
	all service capacity from one 4-fiber OC-48 BLSR/STM-16 MS-SPRing	≤96/32	
2 OC48/STM16	combination of service and protection from one 2-fiber OC-48 BLSR or one 4-fiber OC-48 BLSR/STM-16 MS-SPRing (open) ^b	≤96/32	
	all service capacity from one 2-fiber OC-48 BLSR or one 4-fiber OC-48 BLSR/STM-16 MS-SPRing (open) ^b	≤48/16	
≤4 OC48/STM16 ^a	all service capacity	≤96/32	
≤8 OC12/STM4 ^a	all service capacity	≤96/32	
≤8 OC3/STM1 ^a	all service capacity	≤48/16	

a) In these examples, the OC48/STM16, OC12/STM4, and OC3/STM1 port units are all 1+1 protected.

b) These rows assume that the Mixed Module is an end node of an open ring. The capacity issues for an intermediate node in an open ring are the same as the nodes in a closed ring.

Important! The port unit quantities listed in the preceding table represent the total number of port units in that shelf. When the port units are 1+1 protected, one half of the port units are working and one half of the port units are protection.

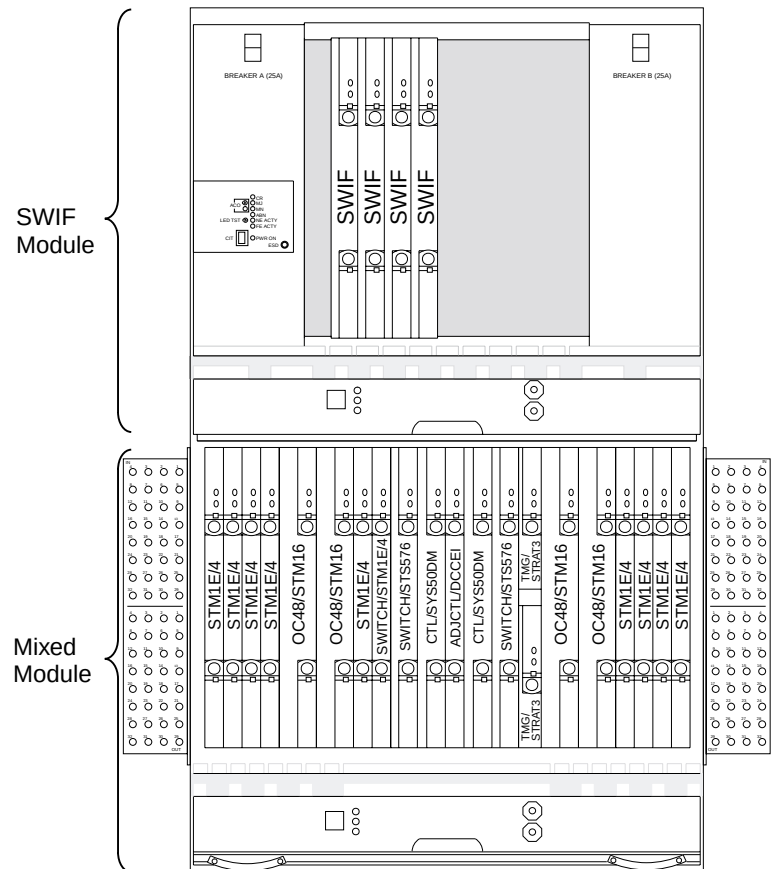
Although a Mixed Module supports multiple combinations of port units, the different types of port units must be placed in the appropriate slots and not exceed the physical capacity of the shelf. The amount of traffic dropped to the main switch fabric can not exceed 192 STS-1/64 STM-1 equivalents.

The amount of traffic cross-connected directly on the shelf using the SWITCH/STS576 packs can not exceed 384 STS-1/128 STM-1 equivalents.

Mixed Module configuration A

Figure 3-58 illustrates a possible configuration of a Mixed Module of a Universal I/O Shelf that contains eight STM1E/4 port units (1xN protected) and four OC48/STM16 port units (one 4-fiber OC-48 BLSR/STM-16 MS-SPRing). The eight working STM1E/4 port units use 96 STS-1/32 STM-1 equivalents of the available 192 STS-1/64 STM-1 equivalents provided by the two SWIF pairs. Therefore, up to 96 STS-1/32 STM-1 equivalents of capacity can be used by a combination of service and protection capacity from the BLSR/MS-SPRing.

Figure 3-58 Mixed Module A of an SDH Universal I/O Shelf

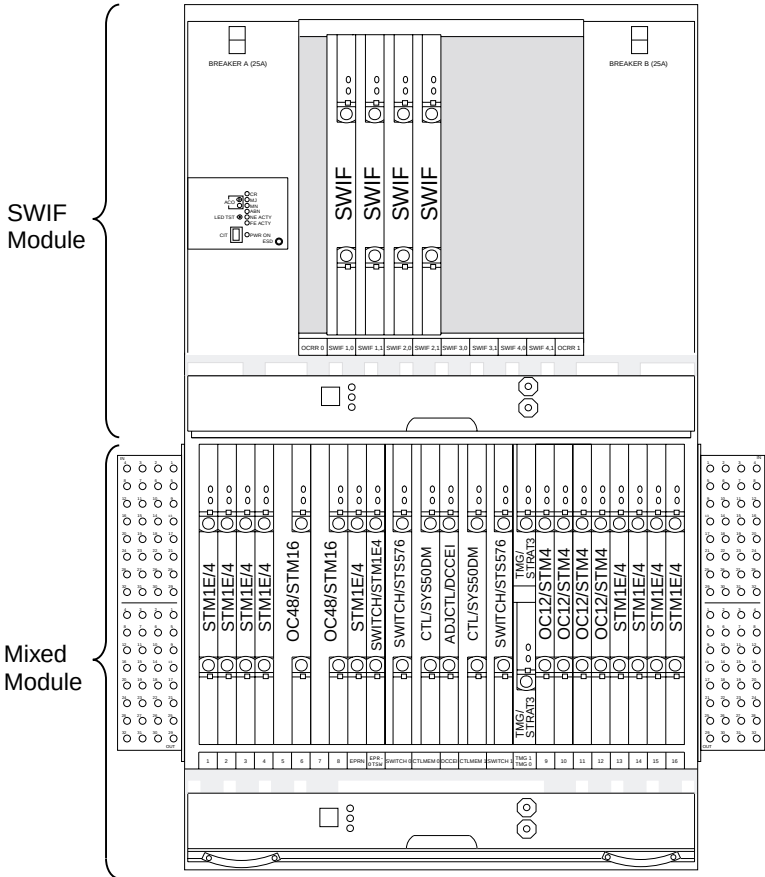


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Mixed Module configuration B

Figure 3-59 illustrates a possible configuration of the Mixed Module of an SDH Universal I/O Shelf that contains eight STM1E/4 port units (1xN protected), two OC48/STM16 port units (one 2-fiber OC-48 BLSR/STM-16 MS-SPRing), and four OC12/STM4 port units (1+1). When combined, the eight working STM1E/4 port units (96 STS-1/32 STM-1 equivalents) and the two working OC12/STM4 port units (48 STS-1/16 STM-1 equivalents) use 144 STS-1/48 STM-1 equivalents of the available 192 STS-1/64 STM-1 equivalents provided by the two SWIF pairs. Therefore, up to 48 STS-1/16 STM-1 equivalents of capacity can be used by a combination of service and protection capacity from the BLSR/MS-SPRing.

Figure 3-59 Mixed Module B of an SDH Universal I/O Shelf



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STM1e Connector Panel

Overview This section describes the STM1e Connector Panel that is needed for the Facility Interface Sub-Shelf when the sub-shelf is equipped as either a STM1e Electrical Module or a Mixed Module with STM1E/4 port units.

Description Each STM1e Connector Panel is equipped with 32 pairs of connectors. Each pair includes one transmit and one receive connector. The STM1e Connector Panels are available with either 43-type (also known as SMB) connectors (75-ohm) or 1.6/5.6 connectors (75-ohm). Four STM1E/4 port units can be cabled to each panel. The bundled cable connects the 43-type or 1.6/5.6 connectors to the backplane.

The STM1e Connector Panels are designed to support future releases of the STM1E port units that will contain eight ports. Therefore, only half of the available connectors on each panel are used by the STM1E/4 port units.

Determining number of panels Use the following table to determine the number of STM1e Connector Panels needed for each Facility Interface Sub-Shelf. You must know the number and location of the STM1E/4 port units in the sub-shelf.

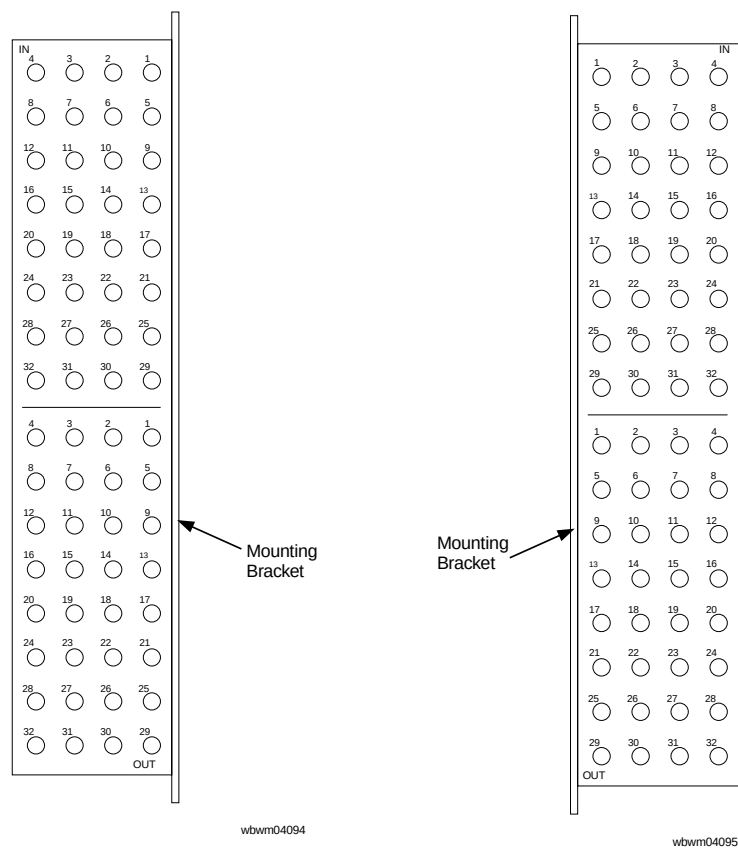
Table 3-23 Determining the Number of STM1e Connector Panels

IF you have...	AND they are located...	THEN you need...
0 STM1E/4 port units	NA	0 STM1e Connector Panels.
< 4 STM1E/4 port units	in slots 1 through 4	1 STM1e Connector Panel (left-mount).
<4 STM1E/4 port units	in slots 13 through 16	1 STM1e Connector Panel (right-mount).
<8 STM1E/4 port units	in slots 1 through 4 AND in slots 13 through 16	2 STM1e Connector Panels (one left-mount, and one right-mount).

Quantity and location A Facility Interface Sub-Shelf may include one, two, or no STM1e Connector Panels. The number of panels needed is dependent upon the type, location, and number of port units used in the sub-shelf. The panels are placed on either the left or right side of the shelf, or on both sides of the shelf, depending on the locations of the STM1E/4 port units.

Individual panels Figure 3-60 illustrates left-mount and a right-mount STM1e Connector Panels.

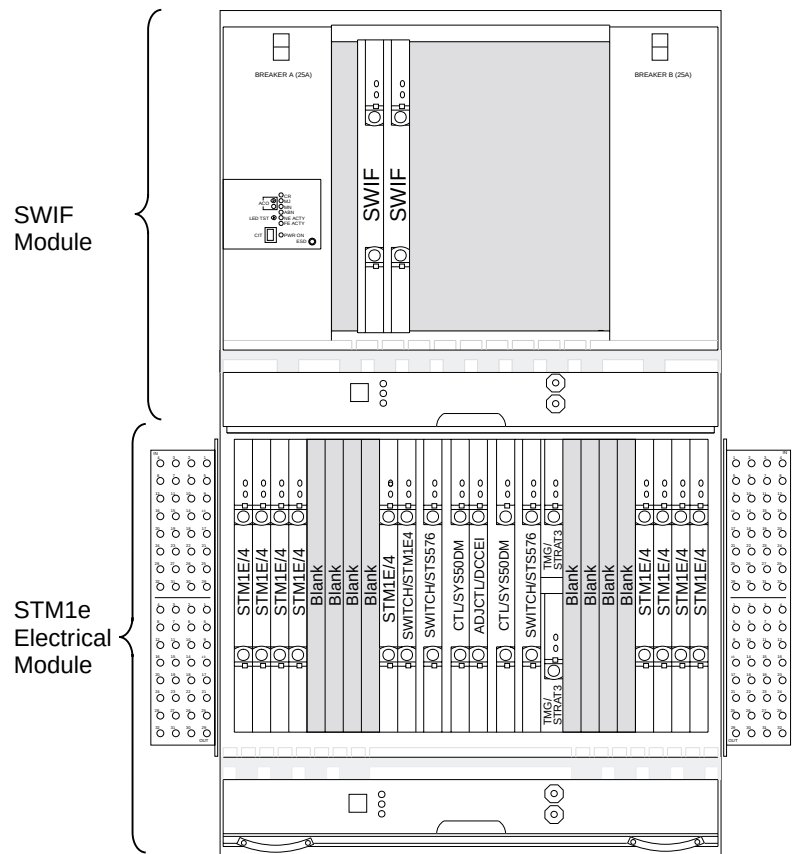
Figure 3-60 STM1e Connector Panels



Mounted panels

Figure 3-61 illustrates an STM1e Electrical Module with two STM1e Connector Panels.

Figure 3-61 STM1e Connector Panels on an STM1e Electrical Module



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Fan Unit

Overview Each fan unit provides forced-air cooling for its associated shelf. This section describes the physical design, purpose, and features of the fan unit that is included with each shelf in WaveStar BandWidth Manager.

Description The fan unit is a plug-in module that fits into position at the bottom of each shelf, just beneath the designation label strip. Each fan unit includes

- Six individual fans
- A filter alarm reset button
- Three LEDs
 - Power on (PWR ON)
 - Filter alarm (FILTER ALM)
 - FAIL
- Two circuit breakers
 - Power feed A (BREAKER A)
 - Power feed B (BREAKER B)

Important! When replacing a fan unit, ensure that the spare fan unit is in hand.

All fan units must be installed and operating in a shelf before any port units/circuit packs are installed.

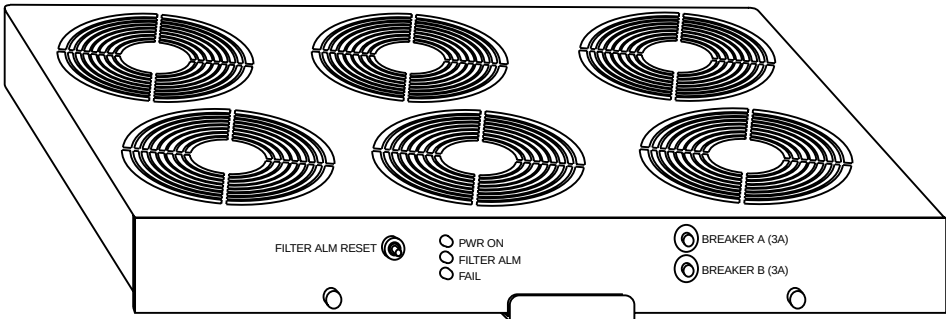
Quantity and location The following table provides the number and location of the fan unit(s) included with each type of shelf.

Table 3-24 Location of Fan Units

Type of Shelf	Number of Fan Units	Location
System Controller Shelf	1	bottom of shelf
Switch Shelf	1	bottom of shelf
Universal I/O Shelf	2	one on bottom of Switch Interface Sub-Shelf
		one on bottom of Facility Interface Sub-Shelf
10G I/O Shelf	2	one on top of CTL/Switch Interface Sub-Shelf
		one on bottom of Facility/SWIF Interface Sub-Shelf
SDH Universal I/O Shelf	2	one on bottom of Switch Interface Sub-Shelf
		one on bottom of Facility Interface Sub-Shelf

Figure Figure 3-62 illustrates the fan unit that is included with each shelf in WaveStar BandWidth Manager.

Figure 3-62 Fan Unit



wbwm04018

Fan Filter

Overview A fan filter, located beneath each fan unit, is also included with each shelf.

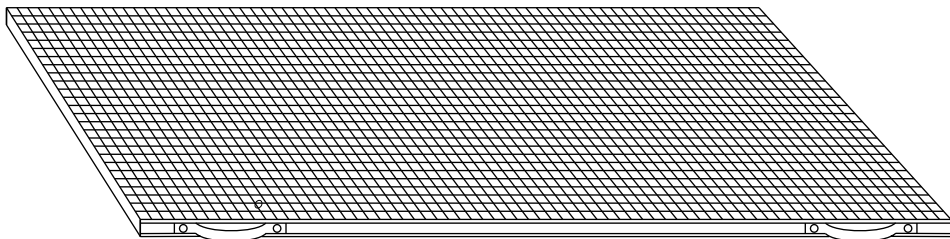
Description Each fan unit is accompanied by a fan filter that keeps dust and debris from entering the fan unit.

Important! Although the I/O Shelves include two fan units, only the bottom fan unit is equipped with a fan filter.

Maintenance The fan filter must be replaced once every 6 months to ensure the proper working condition of the fan unit.

Figure Figure 3-63 illustrates the fan filter.

Figure 3-63 Fan Filter



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Heat Baffle

Overview This section describes the physical design, purpose, and placement of heat baffles in certain bays in WaveStar BandWidth Manager.

Function The heat baffle facilitates air circulation between the two working shelves, thus aiding in the cooling process.

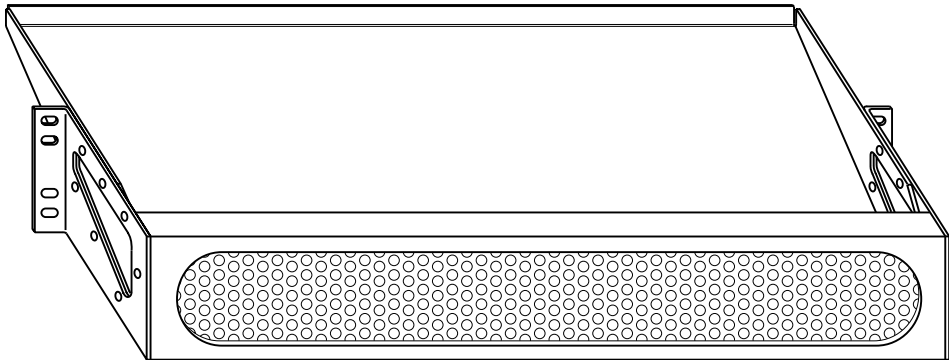
Quantity and location The following table provides the number and location of the heat baffle(s) included with each type of bay.

Table 3-25 Location of Heat Baffles

Bay	Number of Heat Baffles	Location
System Controller Bay	1	one below the System Controller Shelf
Control/Switch Bay	2	one between the System Controller Shelf and the Switch Shelf
Switch Bay	1	one below the Switch Shelf
Universal I/O Bay	1	one between the two Universal I/O Shelves
10G I/O Bay	1	one above the single 10G I/O Shelf
		one between the two 10G I/O Shelves
10G/Universal I/O Bay	1	one between the Universal I/O Shelf and the 10G I/O Shelf
SDH I/O Bay	1	one between the two SDH Universal I/O Shelves
10G/SDH I/O Bay	1	one between the SDH Universal I/O Shelf and the 10G I/O Shelf

Figure Figure 3-64 illustrates the heat baffle in WaveStar BandWidth Manager.

Figure 3-64 Heat Baffle



NC-2.5GAPOG-073



User Panel and Circuit Breakers

Overview All shelves used in WaveStar BandWidth Manager are equipped with similar a user panel and circuit breakers.

User panel Each user panel provides system-level information, such as alarm status, for its associated shelf. Each user panel also provides an ESD wrist strap ground connector and a CIT port to connect a WaveStar CIT to the system.

Circuit breakers Each shelf is equipped with two -48/-60 VDC power circuit breakers, one for each power feed (A and B). The circuit breakers operate if their power feed exceeds normal current ranges. Circuit breakers provide a visual indication of their status via their rocker switches. The normally hidden portion of each rocker switch is red. Should a circuit breaker respond to an overcurrent by cutting off power to the shelf, the hidden red portion of the rocker switch rotates forward and is visible. The circuit breakers can be tripped manually by inserting a small screwdriver blade (or equivalent) into a slot in the rocker.

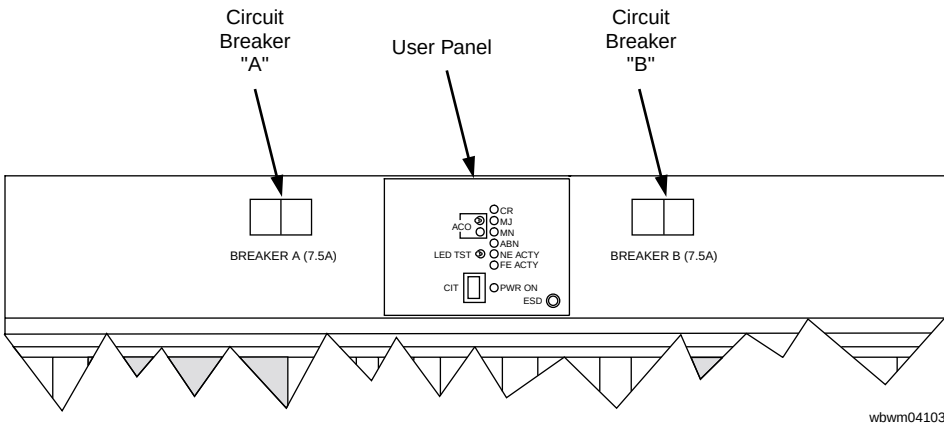
The following table lists the amperage of the circuit breakers for shelves and fan units in WaveStar BandWidth Manager.

Table 3-26 Amps of Circuit Breakers

Equipment	Circuit Breakers
System Controller Shelf	7.5A
Switch Shelf	30A
Universal I/O Shelf	25A
10G I/O Shelf	40A
SDH Universal I/O Shelf	25A
Fan Units	3A

Figure Figure 3-65 illustrates the user panel and circuit breakers that are present on all shelves. The exact placement of these pieces of equipment varies depending on the type of shelf. (Figure 3-65 is the top portion of a System Controller Shelf.)

Figure 3-65 User Panel and Circuit Breakers



In previous releases, all shelves (except the 10G I/O Shelves) had two power filters with voltage protection visible from the front of the shelf. Beginning in Release 4.1, the shelves have been redesigned and the power filters with voltage protection are now incorporated into the power filters (now referred to as power filters with voltage protection) on the back of the shelves. The Switch Shelf is the only shelf in which the power filters with voltage protection are still visible form the front of the shelf.

References

For information about the placement of the equipment illustrated in Figure 3-65 on the different shelves, refer to the illustrations of the individual shelves.



Passive Optic Equipment

Overview WaveStar BandWidth Manager offers OC192/STM64/POU and OC48/STM16/POU passive optic port units that are compatible with the SONET and SDH standards.

Description The Lucent Passive Optics Boxes do not require power, software, or operations support. However, they must be used with the OC48/STM16/POU or OC192/STM64/POU port units. By using the passive optic port units and the Passive Optic Boxes, you are able to increase fiber capacity by a factor of 16.

Port units The OC192/STM64/POU and OC48/STM16/POU port units are both available in 16 different wavelengths (for a total of 32 passive optic port units). Each set of port units is designated by a 16 different 4-digit numeric suffixes that correspond to the frequency of each optical signal.

Passive Optic Boxes The Passive Optics Boxes provide a low-cost solution for transmitting large amount of traffic over one fiber. The Passive Optics Boxes are capable of multiplexing and demultiplexing up to 16 colors together for transmission over a single fiber. The boxes are not dependent upon the rate of the signal; OC-192/STM-64 and OC-48/STM-16 wavelengths may be multiplexed by a single box. The boxes do not require any electricity.

Lucent offers the following options for the Passive Optics Boxes:

- **8-Mux/8-Demux Passive Optics Box:** A single box is capable of multiplexing 8 colors and demultiplexing eight colors within the same box. Two boxes are required; one on each side of transmission. The two boxes are capable of multiplexing and demultiplexing 8 colors for transmission over a single fiber.
- **16-Mux + 16-Demux Passive Optics Boxes:** The 16-Mux box is capable of multiplexing 16 colors and the 16-Demux box is capable of demultiplexing 16 colors. Two boxes are required in each direction, one for multiplexing and one for demultiplexing. Each box is capable of either multiplexing or demultiplexing 16 colors in a for transmission over a single fiber.

Dimensions

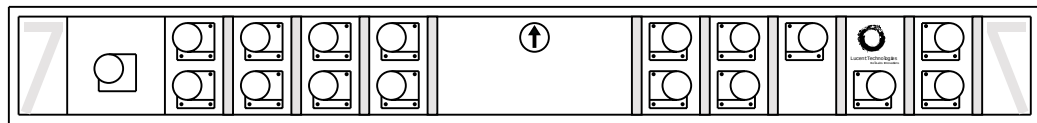
The dimensions of the Passive Optics Boxes are

- 76.2 mm/3 in. high
- 533.4 mm/21 in. wide
- 482.6 mm/19 in. deep

Figure

Figure 3-66 illustrates a Passive Optics Box.

Figure 3-66 Passive Optics Box



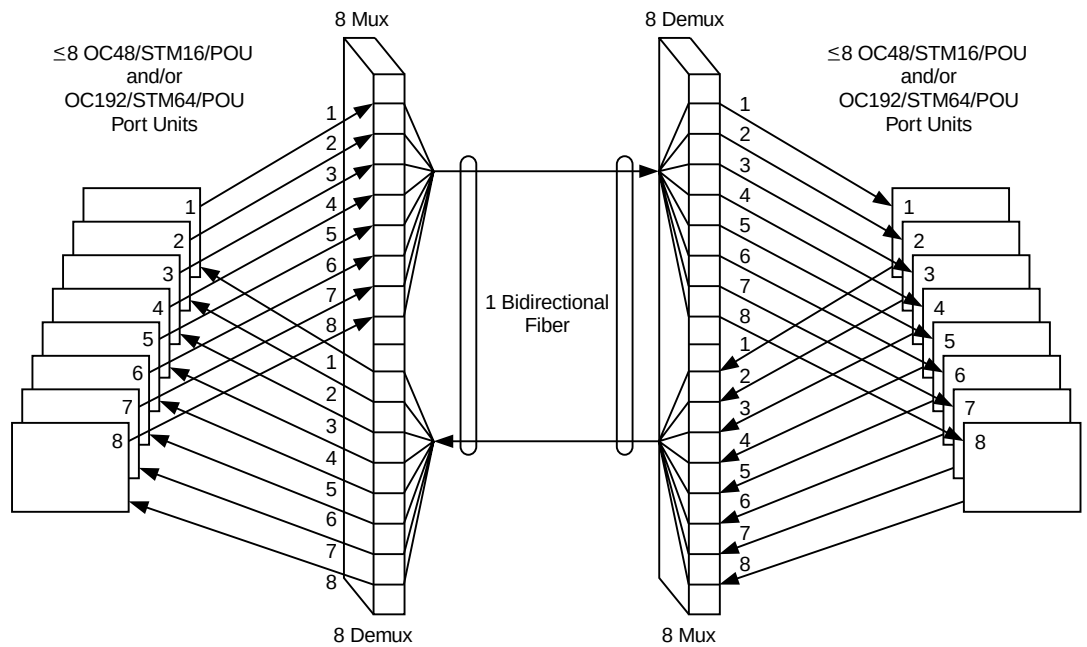
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Protection The passive optic port units support the same protection modes as the standard port units. For example, both sets of passive port units support BLSR/MS-SPRing, 1+1, and 0x1 protection.

8-Mux/8-Demux

Figure 3-67 illustrates two 8-Mux/8-Demux Passive Optics Boxes. The eight port units on each side of transmission may be a combination of OC192/STM64/POU and/or OC48/STM16/POU port units. Each passive port unit is equipped with a bidirectional port (both transmit and receive). The fiber between the two Passive Optics Boxes is bidirectional (transmit and receive).

**Figure 3-67 8-Mux/8-Demux Passive Optics Box
(Functional Diagram)**

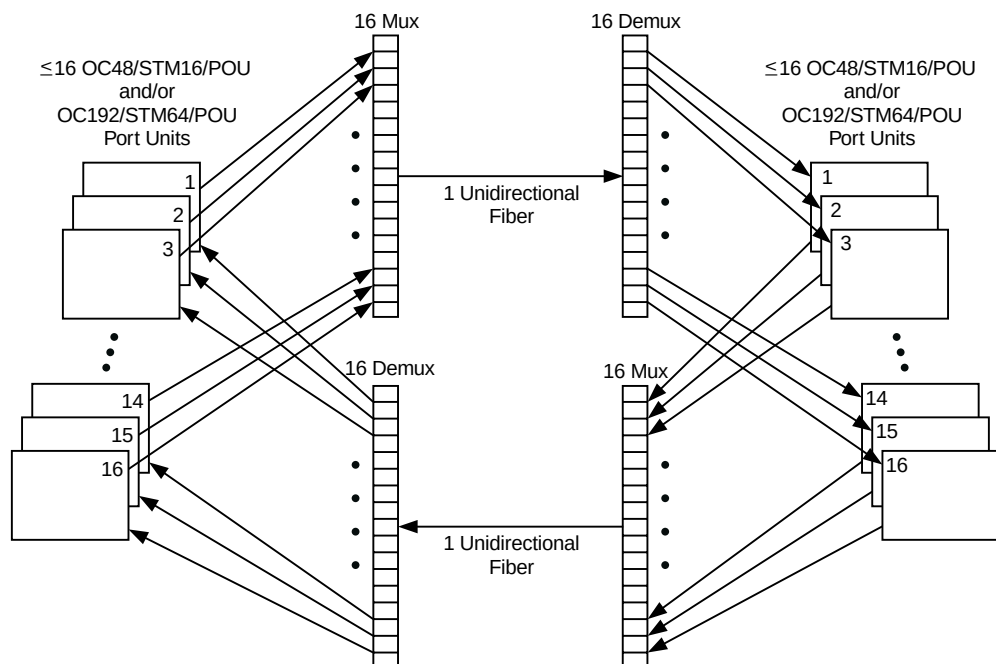


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16-Mux + 16-Demux

Figure 3-68 illustrates four 16-Mux + 16-Demux Passive Optics Boxes; two boxes in each direction. The sixteen port units on each side of transmission may be a combination of OC192/STM64/POU and/or OC48/STM16/POU port units. Each passive port unit is equipped with a bidirectional port (both transmit and receive). The fiber between the two Passive Optics Boxes on the upper portion of the figure is unidirectional in the east direction. The fiber between the two Passive Optics Boxes on the lower portion of the figure is unidirectional in the west direction.

Figure 3-68 16-Mux + 16-Demux Passive Optics Box (Functional Diagram)



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I | Types of Circuit Packs

Overview The WaveStar BandWidth Manager circuit packs are divided into the following three categories, based mainly on their functions:

- Control packs
- Switch packs
- Port units

Control packs The control packs available in WaveStar BandWidth Manager are

- CTL/SR50DC
- PPROC/FO
- CTL/SYS50D
- CTL/SYS50DM
- CTL/EI
- ADJCTL/DCC
- ADJCTL/DCCEI
- CSIEX
- SWIEX
- CTL/MEM
- TMG/STRAT3

Switch packs The switch circuit packs available for use in WaveStar BandWidth Manager are

- SWITCH/STS576
- SWITCH/STS768
- SWITCH/DS3EC1
- SWITCH/STM1E4
- BSW
- SWIF

Port units The port units available for use in WaveStar BandWidth Manager are

- DS3EC1/8 (electrical interface)
- STM1E/4 (electrical interface)
- OC192/STM64 (optical interface)
- OC48/STM16 (optical interface)
- OC12/STM4 (optical interface)
- OC3/STM1 (optical interface)



Control Circuit Packs

Overview	This section describes the function and location of each WaveStar BandWidth Manager control pack.
CTL/SR50DC	The CTL/SR50DC circuit pack, located in the 10G I/O Shelf, provides a secondary level of the control hierarchy. The CTL/SR50DC provides control and memory functions for the 10G I/O Shelf.
PPROC/FO	The PPROC/FO circuit pack, located in the CTL/Switch Interface Sub-Shelf of the 10G I/O Shelf, provides an interface between the OC192/STM64 port units and the SWITCH/STS768 packs. The PPROC/FO packs processes the header information to the SWITCH/STS768 packs.
CTL/SYS50D	The CTL/SYS50D circuit pack, located in the System Controller Shelf, provides the main system control functions for the system. The CTL/SYS50D circuit pack, the CLT/MEM, and CTL/EI circuit packs provide all user interfaces to the system.
CTL/SYS50DM	The CTL/SYS50DM pack, located in the Facility Interface Sub-Shelf of the Universal I/O Shelf, is the second level of the control hierarchy. The CTL/SYS50DM provides control and memory functions for the I/O Shelves.
CTL/EI	The CTL/EI (Control/External Interface) circuit pack, located in the System Controller Shelf, selects the 10Base-T LAN from the ADJCTL/DCC and CTL/SYS50D circuit packs and routes the signal to the backplane.
ADJCTL/DCC	The ADJCTL/DCC (Adjunct Control/32 Data Communications Channels) pack, located in the System Controller Shelf, terminates 32 DCC channels. This circuit pack also provides interfaces to the 10Base-T LAN.
ADJCTL/DCCEI	The ADJCTL/DCCEI (Adjunct Control/32 Data Communications Channels with External Interface) pack, located in the Facility Interface Sub-Shelf of the Universal I/O Shelf and SDH Universal I/O Shelf (all modules), combines the functionalities of the ADJCTL/DCC circuit pack and the CTL/EI circuit pack.

CSIEX The CSIEX (Control System Interface Expander) circuit pack, located in the System Controller Shelf, interfaces to the CTL/SYS50D circuit pack, the SWIEX circuit packs, and the secondary CTL/MEM circuit pack. The CSIEX circuit pack also provides an OS interface to the all I/O Shelves.

SWIEX The SWIEX (Switch Interface Expander) circuit pack, located in the Switch Shelf, distributes the internal system control to the BSW packs. The SWIEX circuit pack also monitors and controls the power supplied to the Switch Shelf.

CTL/MEM The CTL/MEM (Control/Memory) circuit pack, located in the System Controller Shelf, provides both redundant primary (PRI) and non-volatile secondary (SEC) memory. When combined with the CTL/SYS50D and CTL/EI circuit packs, the CTL/MEM circuit pack completes the main system controller complex.

TMG/STRAT3 The TMG/STRAT3 (Stratum 3 Timing) pack, located in the System Controller Shelf, the Switch Shelf, and all I/O Shelves, provides redundant timing distribution to all the shelves. The timing source is traceable to the office BITS clock (SONET) or SEC (SDH).



Switch Circuit Packs

Overview This section describes each WaveStar BandWidth Manager switch circuit pack's function and location.

SWITCH/STS576 The SWITCH/STS576 (576x576 STS-1/192x192 STM-1 Switch) circuit pack, located in all modules of the Facility Interface Sub-Shelf of the Universal I/O Shelves and the SDH Universal I/O Shelves, provides a 576x576/192x192 cross-connect function at the STS-1/STM-1 level, respectively. This pack also provides through connections, on-shelf cross-connections, port unit protection switching, and connection to the main switch fabric for protected signals.

SWITCH/STS768 The SWITCH/STS768 (768x768 STS-1/256x256 STM-1 Switch) circuit pack, located in the CTL/Switch Interface Sub-Shelf of the 10G I/O Shelf, provides an 1152x1152 STS-1/384x384 STM-1 cross-connect function. These packs provide through connections, on-shelf cross-connections, port unit protection switching, and connection to the main switch fabric for protected signals.

SWITCH/DS3EC1 The SWITCH/DS3EC1 (Electrical Protection Switch for up to 96 DS3 signals) pack, located in the Facility Interface Sub-Shelf of the Universal I/O Shelf (DS3EC1 Electrical or Mixed Module), is responsible for implementing the DS3EC1/8 1xN protection switching.

SWITCH/STM1E4 The SWITCH/STM1E4 (Electrical Protection Switch for up to 32 STM-e signals) pack, located in the Facility Interface Sub-Shelf of the SDH Universal I/O Shelf (STM1e Electrical or Mixed Module), is responsible for implementing the STM1E/4 1xN protection switching.

BSW The BSW (Byte Switch) pack, located in the Switch Shelf, cross-connects the byte-sliced signals coming from the SWIF pairs to the 4608 STS-1/1536 STM-1 main switch fabric.

SWIF The SWIF (Switch Interface) pack, located in all I/O Shelves, converts the data format output from the port units into 4608/1536 byte-sliced format utilized by the BSW switch packs (located in the Switch Shelves). The SWIF packs (always used in pairs) also perform cross-coupling best-byte selection.



Port Units

Overview This section describes each WaveStar BandWidth Manager port units' function and location.

DS3EC1/8 The DS3EC1/8 (8 port DS3 interface) port unit, located in the Facility Interface Sub-Shelf of the Universal I/O Shelf (DS3EC1 Electrical Module or Mixed Module), provides WaveStar BandWidth Manager's electrical interface at the DS3-rate. The DS3EC1/8 port unit provides eight bidirectional DS3 line interfaces and a SWITCH/STS576 interface function, as well as supporting electrical protection switching. The protection switching feature provides a selection and fan-out capability for switching between one of the working DS3EC1/8 port units and the protection DS3EC1/8 port unit.

STM1E/4 The STM1E/4 (4 port STM-1e interface) port unit, located in the Facility Interface Sub-Shelf of the SDH Universal I/O Shelf (STM1e Electrical Module or Mixed Module), provides an electrical interface at the SDH STM-1e-rate. The STM1E/4 port unit provides four bidirectional STM-1e line interfaces and a SWITCH/STS576 interface function, as well as supporting electrical protection switching. The protection switching feature provides a selection and fan-out capability for switching between one of the working STM1E/4 port units and the protection STM1E/4 port unit.

OC192/STM64 Two OC192/STM64 port units are necessary to terminate each 2-fiber OC-192 BLSR/STM-64 MS-SPRing. Four OC192/STM64 port units are necessary to terminate each 4-fiber OC-192 BLSR/STM-64 MS-SPRing.

OC192/STM64/1.5IR1

The OC192/STM64/1.5IR1 (Optical Carrier 192/Synchronous Transport Module 64/1.5 μ m Intermediate Reach, 1 Port) port unit, located in the Facility/SWIF Interface Sub-Shelf of the 10G I/O Shelf (OC192/STM64 Optical Module), provides a bidirectional OC-192/STM-16 interface (user-provisionable) in the 1.5 μ m range with multibit forward error correction (FEC) and strong forward error correction (SFEC) (up to 60 km).

OC192/STM64/1.5IRS1

The OC192/STM64/1.5IRS1 (Optical Carrier 192/Synchronous Transport Module 64/1.5 μ m Intermediate Reach, SFEC 1 Port) port unit, located in the Facility/SWIF Interface Sub-Shelf of the 10G I/O Shelf (OC192/STM64 Optical Module), provides a bidirectional OC-192/STM-16 interface (user-provisionable) in the 1.5 μ m range with multibit forward error correction (FEC) and strong forward error correction (SFEC) (up to 30 km).

OC192/STM64/POU

The OC192/STM64/POU (Optical Carrier 192/Synchronous Transport Module 64/Passive Optics Unit) port unit, located in the Facility/SWIF Interface Shelf of the 10G I/O Shelf (OC192/STM64 Optical Module), provides a bidirectional OC-192/STM-16 interface (user-provisionable) in the 1.5 μ m range to WaveStar BandWidth Manager. The OC192/STM64/POU port units support 16 wavelengths for passive optical applications with dense wavelength division multiplexing systems. The 16 different codes of OC192/STM64/POU port units are each designated by a 4-digit numeric suffix that corresponds to the frequency of the optical signal. The OC192/STM64/POU port units are designed to be used in conjunction with the Lucent Technologies' Passive Optics Boxes, either the 8-Mux/8-Demux box or the 16-Mux + 16-Demux Passive Optics Boxes (up to 40 km with the Passive Optics Boxes).

OC192/STM64/WDM

The OC192/STM64/WDM (Optical Carrier 192/Synchronous Transport Module 64/Wavelength Division Multiplexing) port unit, located in the Facility/SWIF Interface Sub-Shelf of the 10G I/O Shelf (OC192/STM64 Optical Module), provides a bidirectional OC-192/STM-64 interface (user-provisionable) in the 1.5 μ m range to WaveStar BandWidth Manager. The 40 different codes of OC192/STM64/WDM port units are each designated by a 4-digit numeric suffix that corresponds to the frequency of the optical signal. The OC192/STM64/WDM port units support 40 wavelengths for applications with WaveStar OLS 400G dense wavelength division multiplexing systems (without OTUs) (up to 25 km with Lucent's WaveStar OLS 400G).

OC48/STM16 Two OC48/STM16 port units are necessary to terminate each 2-fiber OC-48 BLSR/STM-16 MS-SPRing. Four OC48/STM16 port units are necessary to terminate each 4-fiber OC-48 BLSR/STM-16 MS-SPRing.

OC48/STM16/1.3LR1

The OC48/STM16/1.3LR1 (Optical Carrier 48/Synchronous Transport Module 16/1.3 μ m Long Reach, 1 Port) port unit, located in the Facility Interface Sub-Shelf of the Universal I/O Shelf (OC48/STM16 Optical Module or Mixed Module) or the SDH Universal I/O Shelf (Mixed Module), provides a bidirectional OC-48/STM-16 interface (user-provisionable) in the 1.3 μ m range (up to 51 km).

OC48/STM16/1.5LR1

The OC48/STM16/1.5LR1 (Optical Carrier 48/Synchronous Transport Module 16/1.5 μ m Long Reach, 1 Port) port unit, located in the Facility Interface Sub-Shelf of the Universal I/O Shelf (OC48/STM16 Optical Module or Mixed Module) or the SDH Universal I/O Shelf (Mixed Module), provides a bidirectional OC-48/STM-16 interface (user-provisionable) in the 1.5 μ m range (up to 80 km).

OC48/STM16/DWDM01-16

The OC48/STM16/DWDM01-16 (Dense Wavelength Division Multiplexing/Optical Carrier 48/Synchronous Transport Module 16/Wavelengths 1, 2, 3...16) port unit, located in the Facility Interface Sub-Shelf of the Universal I/O Shelf (OC48/STM16 Optical Module or Mixed Module) or the SDH Universal I/O Shelf (Mixed Module), provides a bidirectional OC-48/STM-16 interface (user-provisionable) in the 1.5 μ m range, compatible with ITU signals (up to 25 km with Lucent's WaveStar OLS 40G/80G).

OC48/STM16/POU

The OC48/STM16/POU (Optical Carrier 48/Synchronous Transport Module 16/Passive Optics Unit) port unit, located in the Facility Interface Sub-Shelf of the Universal I/O Shelf (OC48/STM16 Optical Module and Mixed Modules) or the SDH Universal I/O Shelf (Mixed Module), provides a bidirectional OC-48/STM-16 interface (user-provisionable) in the 1.5 μm range to WaveStar BandWidth Manager. The OC48/STM16/POU port units support 16 wavelengths for passive optical applications with dense wavelength division multiplexing systems. The 16 different codes of OC48/STM16/POU port units are each designated by a 4-digit numeric suffix that corresponds to the frequency of the optical signal. The OC48/STM16/POU port units are designed to be used in conjunction with the Lucent Technologies' Passive Optics Boxes, either the 8-Mux/8-Demux box or the 16-Mux + 16-Demux Passive Optics Boxes (up to 55km with the Passive Optics Boxes).

OC48/STM16/WDM

The OC48/STM16/WDM (Optical Carrier 48/Synchronous Transport Module 16/Wavelength Division Multiplexing) port unit, located in the Facility Interface Sub-Shelf of the Universal I/O Shelf (OC48/STM16 Optical Module and Mixed Modules) or the SDH Universal I/O Shelf (Mixed Module), provides a bidirectional OC-48/STM-16 interface (user-provisionable) in the 1.5 μm range to WaveStar BandWidth Manager. The 80 different codes of OC48/STM16/WDM port units are each designated by a 4-digit numeric suffix that corresponds to the frequency of the optical signal. The OC48/STM16/WDM port units support 80 wavelengths for applications with WaveStar OLS 400G dense wavelength division multiplexing systems (without OTUs).

OC12/STM4 WaveStar BandWidth Manager provides two OC12/STM4 port units.

OC12/STM4/1.3SR2

The OC12/STM4/1.3SR2 (Optical Carrier 12/Synchronous Transport Module 4/1.3 μ m Short Reach, 2 Ports) port unit, located in the Facility Interface Sub-Shelf of the Universal I/O Shelf (OC12/STM4 Optical Module or Mixed Module) or the SDH Universal I/O Shelf (Mixed Module), provides two bidirectional (one receive and one transmit) short reach OC-12/STM-4 interface (user-provisionable). The OC12/STM4/1.3SR2 port units may also be used in intermediate reach applications (up to 15 km).

OC12/STM4/1.3LR2

The OC12/STM4/1.3LR2 (Optical Carrier 12/Synchronous Transport Module 4/1.3 μ m Long Reach, 2 Ports) port unit, located in the Facility Interface Sub-Shelf of the Universal I/O Shelf (OC12/STM4 Optical Module or Mixed Module) or the SDH Universal I/O Shelf (Mixed Module), provides two bidirectional (one receive and one transmit) long reach OC-12/STM-4 interface (user-provisionable) (up to 51 km).

OC3/STM1 WaveStar BandWidth Manager provides two OC3/STM1 port units.

OC3/STM1/1.3SR4

The OC3/STM1/1.3SR4 (Optical Carrier 3/Synchronous Transport Module 1/1.3 μ m Short Reach, 4 Ports) port unit, located in the Facility Interface Sub-Shelf of the Universal I/O Shelf (OC3/STM1 Optical Module or Mixed Module) or the SDH Universal I/O Shelf (Mixed Module), provides four bidirectional (one receive and one transmit) short reach OC-3/STM-1 interfaces (user-provisionable). The OC3/STM1/1.3SR4 port units may also be used in intermediate reach applications (up to 15 km).

OC3/STM1/1.3LR4

The OC3/STM1/1.3LR4 (Optical Carrier 3/Synchronous Transport Module 1/1.3 μ m Long Reach, 4 Ports) port unit, located in the Facility Interface Sub-Shelf of the Universal I/O Shelf (OC3/STM1 Optical Module or Mixed Module) or the SDH Universal I/O Shelf (Mixed Module), provides four bidirectional (one receive and one transmit) long reach OC-3/STM-1 interfaces (user-provisionable) (up to 51 km).

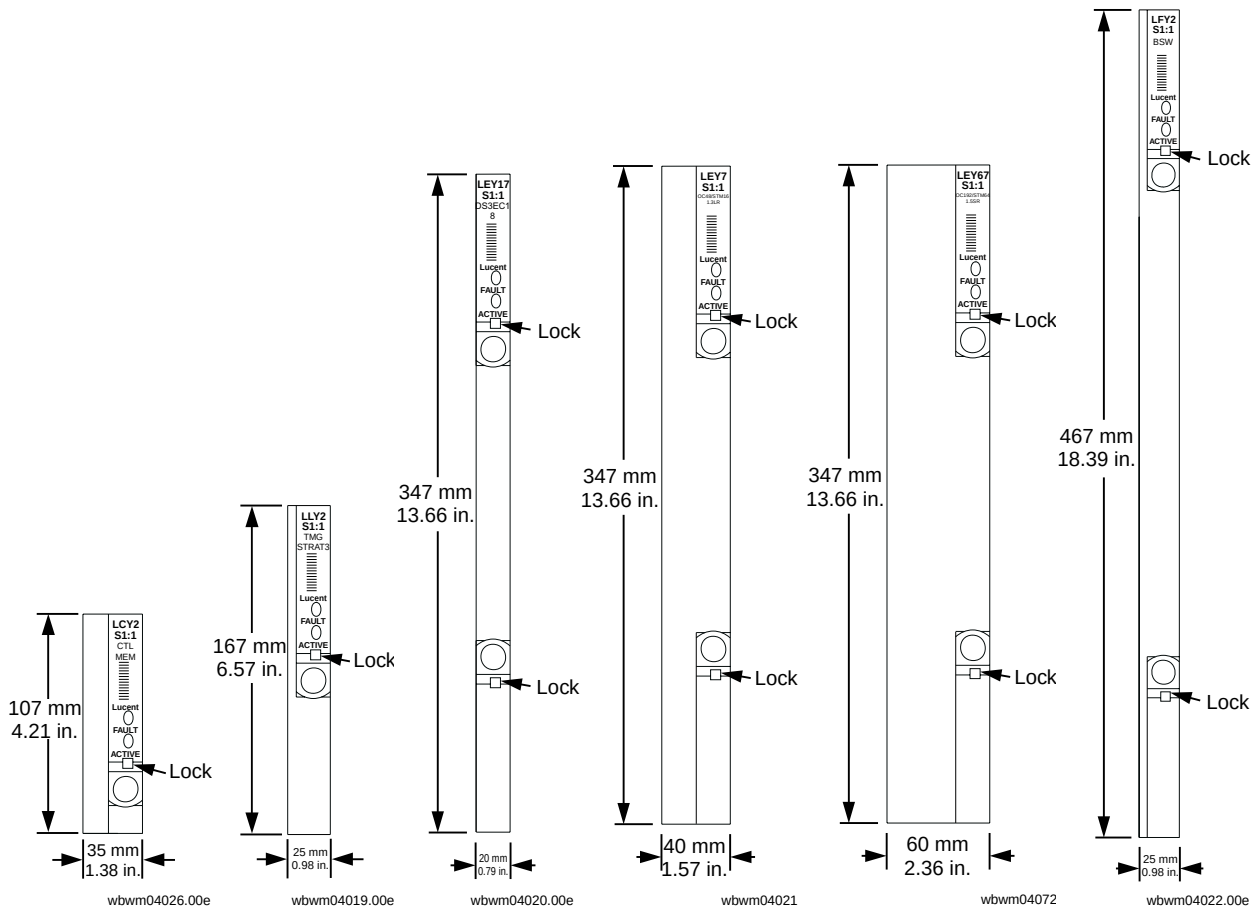


Faceplates

Overview This section illustrates the faceplates and dimensions of the different sizes of circuit packs and port units available in WaveStar BandWidth Manager.

Circuit pack faceplates Figure 3-69 illustrates the some of the different circuit pack and port unit heights and widths available in WaveStar BandWidth Manager. Additional sizes are available.

Figure 3-69 Circuit Pack Faceplates



Important! The OC48/STM16 port units are double-width packs. The OC192/STM64 port units are triple-width packs. Additional packs are available at the heights shown, but the widths may range from 20 mm to 60 mm.

References

For a complete list of the WaveStar BandWidth Manager circuit packs and their dimensions, refer to the section entitled “Equipment Dimensions” in Appendix B “Technical Specifications.”



Power

Overview This section describes the power for the WaveStar BandWidth Manager 4608/1536 platform.

Power distribution This section describes the power distribution in WaveStar BandWidth Manager.

System distribution

WaveStar BandWidth Manager uses a distributed power architecture. The “raw” central office battery voltage(s) are distributed to each shelf of the platform via office cabling.

Shelf distribution

Within each shelf the incoming power is “conditioned” and distributed to all circuit packs and port units in the shelf via internal backplane power layers.

Circuit pack distribution

The board mounted power (BMP) modules present in each circuit pack or port unit convert the incoming battery voltage into the specific voltage(s) required by the various devices in the pack.

Redundant power Two redundant power feeds (“A” power feed and a “B” power feed) are provided to each shelf in the platform. All functional circuitry, including cooling, is powered from both battery feeds. Duplication of the feeders provides maximum power robustness. A shelf can be powered from only one source if two independent sources of DC power are not available. Also, two connections to the same DC power source may be supported.

Power supply voltages WaveStar BandWidth Manager operates from a nominal supply voltage power source of -48 VDC (SONET/SDH) or -60 VDC (SDH).

Normal service range

The normal service range is the range of steady-state voltages over which the equipment maintains specified service characteristics. The normal service range for -48V power is -40.0V to -57.0V. The normal service range for -60.0V power is -50.0V to -72.0V.



Power Filters with Voltage Protection (PFVP)

Overview Each shelf is equipped with two power filters with voltage protection (one for each power feed [A and B]) that are designed to protect the shelf from unusually low voltage.

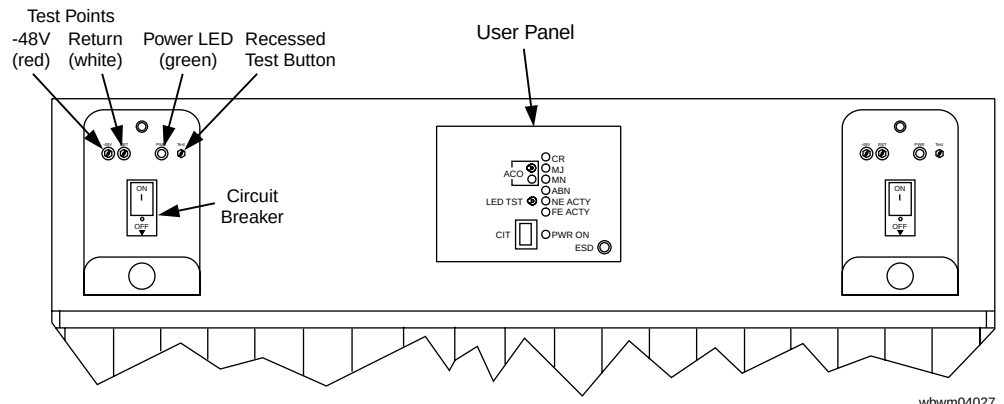
Description The power filters with voltage protection are incorporated into the power filters. All power filters with voltage protection are equipped with green Power LED and the recessed push-button for maintenance testing.

The power filters with voltage protection on the Switch Shelves, System Controller Shelves, Universal I/O Shelves, and SDH Universal I/O Shelves also include test points to verify incoming voltage levels. The -48V test point is red and the Return test point is black (except on the Switch Shelf the Return test point in white). In R4.1, the 10G I/O Shelves do not have test points.

PFVP on the Switch Shelves

Figure 3-70 illustrates the power filters with voltage protection that are visible and accessible from the front of the Switch Shelves.

Figure 3-70 Power Filter with Voltage Protection on a Switch Shelf

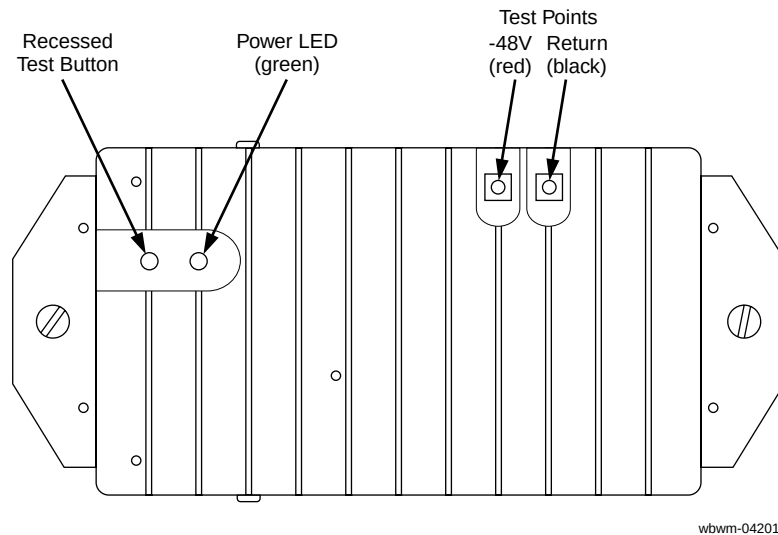


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**PFVPs on the System
Controller Shelf, and the
SDH and Universal I/O
Shelves**

Figure 3-71 illustrates the power filters with voltage protection that are visible and accessible from the rear of the System Controller Shelves, Universal I/O Shelves, and the SDH Universal I/O Shelves.

**Figure 3-71 Power Filters with Voltage Protection on a System
Controller Shelf, Universal I/O Shelf, or an SDH
Universal I/O Shelf**

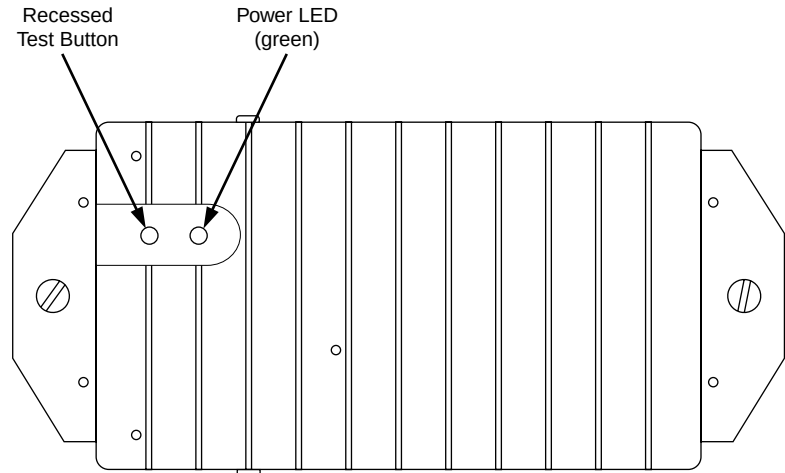


Important! The exact placement and orientation of the PFVPs varies on the different types of shelves.

PFVPs on the 10G I/O Shelves

Figure 3-72 illustrates the power filters with voltage protection that are visible and accessible for the rear of the 10G I/O Shelves.

Figure 3-72 Power Filters With Voltage Protection on a 10G I/O Shelf



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Operation

If the incoming voltage on a power feed drops to $-38.5 \text{ VDC} (\pm 1.0\text{V})$, the power filter with voltage protection associated with that power feed interrupts power to the shelf. (The second power feed responds accordingly to the voltage on its feed. Therefore, if the voltage is in an acceptable range, the second power feed powers the shelf.) The power filters with voltage protection automatically restore power to the shelf when the incoming voltage reaches $-43 \text{ VDC} (\pm 0.5\text{V})$.

Important! The low voltage protection feature only responds to voltages that persist for $\geq 100 \text{ ms}$.

Maintenance testing

Each power filter with voltage protection is equipped with recessed push-button for maintenance testing. Depressing and holding the button simulates a low voltage battery condition that tests the operation of the low voltage cut-off feature. The green Power LED goes out when the button is depressed. When the button is released, the system returns to normal operation, and the green Power LED is illuminated again.

The input voltage can be verified at the test points on the power filters with voltage protection using a digital voltage meter.

Important! The 10G I/O Shelves do not include test points.





4 Operations Interfaces

Overview

Purpose This chapter introduces the operations interfaces of the WaveStar BandWidth Manager. Operations interfaces are interfaces that allow access to a network element and provide communication of alarm and status information on service and equipment. This communication can occur directly or remotely. Direct and remote access to the WaveStar BandWidth Manager is typically obtained through the use of the WaveStar craft interface terminal (CIT). Local operations interfaces include the user panel light-emitting diodes (LEDs) and controls, the circuit pack faceplate LEDs, and office alarms. The 10BaseT Ethernet intraoffice local area network (IAO LAN) supports communication with operations systems (OSs).

Contents The following topics are discussed in this chapter:

WaveStar Craft Interface Terminal (CIT)	4 - 3
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Duplex DCC Controllers (ADJCTL/DCC)	4 - 20

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WaveStar Craft Interface Terminal (CIT)

Introduction	This section provides information about the WaveStar CIT which is the primary tool used to interface with the WaveStar BandWidth Manager.
WaveStar CIT definition	The WaveStar CIT is a personal computer (PC) with WaveStar CIT software installed. The WaveStar CIT provides full graphical user interface (GUI) access to the administrative, maintenance, and provisioning capabilities of the WaveStar BandWidth Manager. The GUI includes pull-down menus and a cross-connect wizard to guide performance of tasks.
Related information	For additional information on the WaveStar CIT and detailed information on minimum PC requirements, refer to Appendix A, WaveStar CIT Tutorial.
WaveStar CIT features/uses	The WaveStar CIT provides a fully-functional GUI through which all WaveStar BandWidth Manager tasks can be performed. The WaveStar CIT provides an easy-to-use interface and security features to prevent unauthorized access. The tasks facilitated by the WaveStar CIT include: • Provisioning • Reporting • Cross-connections • Protection switching • Software download • Backup and restoration of user provisioned data
Security	The WaveStar BandWidth Manager is protected against unauthorized access to the WaveStar CIT system functions (such as provisioning). Security is controlled through logins, passwords, and multiple authorization levels. For more information about security, refer to Chapter 7, Provisioning, Security, and Administration.
WaveStar CIT direct access	Direct access to the WaveStar BandWidth Manager is accomplished through the WaveStar CIT. The WaveStar CIT is connected to the WaveStar BandWidth Manager by the CIT port of the user panel or through two rear panel connectors (J175, J176). The WaveStar CIT

interface is a 10BaseT Ethernet LAN connection (10 Mb/s, 4-wire twisted pair with an RJ45 connector).

For wiring details, refer to 365-371-206, WaveStar BandWidth Manager Installation Manual.

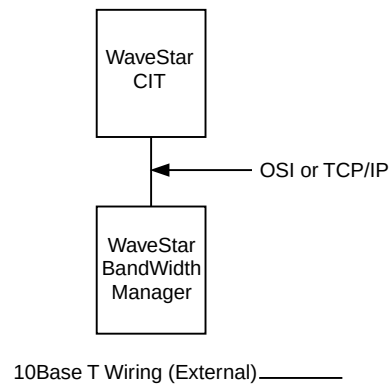
The WaveStar CIT is a graphical user interface (GUI) that supports both OSI and TCP/IP communications with a WaveStar BandWidth Manager.

The communications, whether by OSI or TCP/IP, include the following:

- issuing TL1 commands
- receiving reports
- receiving alarm reports for autonomous events detected by the WaveStar BandWidth Manager
- software downloads (by FTAM for OSI or by FTP for TCP/IP)

Important! CIT direct access to WaveStar BandWidth Manager via OSI must adhere to the “IS-IS Level 2 Routing Guidelines” described in the “Subnetwork” section of this chapter.

Figure 4-1 WaveStar CIT Direct Access



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Operations Systems (OS) Interface

Description The WaveStar BandWidth Manager OS interface is accessed through one of the 10BaseT Ethernet IAO LAN rear panel connectors. The WaveStar BandWidth Manager interface supports Transaction Language 1 (TL1) for commands/messages. This interface is compatible with Telcordia's Network Monitoring and Analysis (NMA), Telcordia's Transport Element Management System (T-EMS), and the WaveStar Subnetwork Management System (SNMS).

The WaveStar BandWidth Manager OS interfaces supported include the following:

- OSI LAN/WAN (to SNMS or other compatible OS)
- TCP/IP (to SNMS)
- TL1/X.25 (via protocol converter to NMA, T-EMS, or other compatible OS)
- TL1 TCP/IP (to NMA, T-EMS, or other compatible OS)
- FTP/FTAM (for software download, etc.)

Important! The example scenarios provided here are based on common (typical) installations and may not reflect the exact manner in which the system is configured. The focus is on how communications work through the operations interfaces, not on the specifics of a particular installation.

IAO LAN access This section explains how the 10BaseT Ethernet IAO LAN is used by the WaveStar BandWidth Manager to communicate with SNMS or another compatible OS using the Open Systems Interconnect (OSI) protocol stack.

IAO LAN function

The IAO LAN serves two main purposes:

- It provides a standard means of connecting a network element into a central office (CO) data communications network (DCN) to provide OS access
- It provides an alternate path for data communications channel (DCC) communications to travel within a subnetwork.

The WaveStar BandWidth Manager IAO LAN is internally connected to the DCC subnetwork so that operations messages on the IAO LAN

can be seamlessly delivered to a remote network element by the DCC and vice-versa (DCC to IAO LAN).

Internal IAO LAN hub

The system supports an internal 4-port 10BaseT Ethernet IAO LAN hub (located on the ADJCTL/DCCEI circuit pack in each shelf). The WaveStar BandWidth Manager 10BaseT Ethernet IAO LAN backplane connectors and the WaveStar CIT port on the user panel are all connected to this internal hub. The internal LAN hub supports direct connection of the WaveStar CIT (or NCC or SNMS) without requiring an external LAN hub.

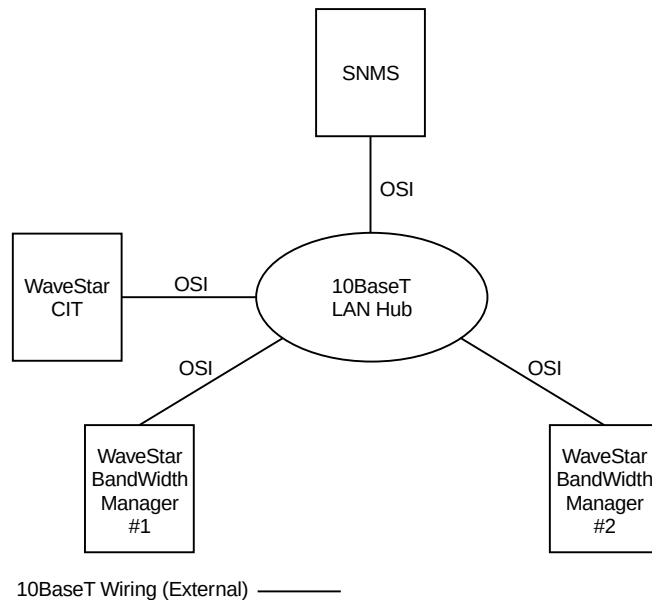
Daisy Chain

The internal IAO LAN hub also supports daisy-chaining of multiple WaveStar BandWidth Manager shelves, for example, in the same bay. A daisy-chain connection is similar to a null-modem connection. Reference is made to a 10BaseT connection where there is no hub. In this connection, the receive pair on one end of the cable is connected to the transmit pair on the opposite end. Conversely, the transmit pair on one end is connected to the receive pair on the opposite end.

Important! A daisy-chain connection can only be repeated five times. A preferred connection would go through an external office LAN hub.

IAO LAN access with OSI protocol

The figure below shows multiple WaveStar BandWidth Manager systems communicating with a local SNMS. The operation of the WaveStar BandWidth Manager within this scenario is similar to the operation described in WaveStar CIT Direct Access, with one exception: SNMS and WaveStar CIT are connected to the WaveStar BandWidth Manager systems through an external LAN hub.

Figure 4-2 OS Access with OSI Protocol

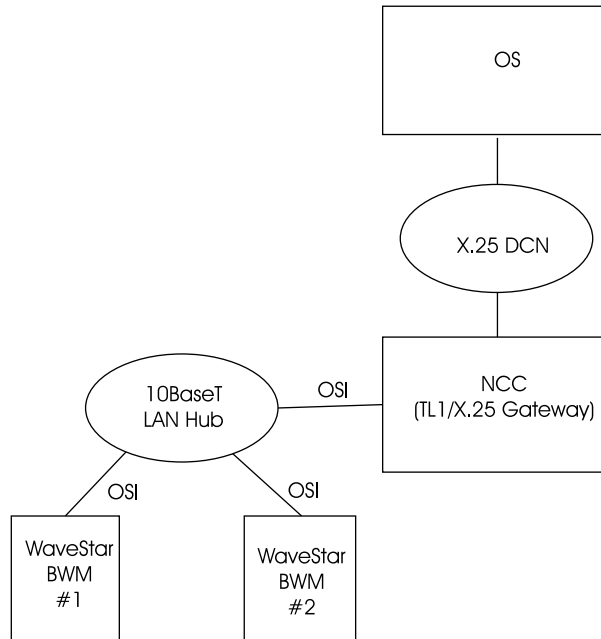
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TL1/X.25

A commercially available protocol converter, such as NCC or AIScout can be used as an X.25 gateway to connect multiple collocated WaveStar BandWidth Manager systems to a remote OS equipped to communicate through an X.25 DCN. (See figure below.) Since the OS communicates through X.25, a gateway is required to provide a mapping between X.25 and OSI. In this scenario, the gateway is an NCC.

The NCC is provisioned to provide a TL1/X.25 gateway between X.25 DCN (OS–NCC) and OSI (NCC–NE). This process is bidirectional, mapping messages originating in the OS to the proper NE NSAP as well as mapping messages originating in the NE to the proper OS X.25 virtual circuit and returning them to the OS.

This interface supports TL1 messages only.

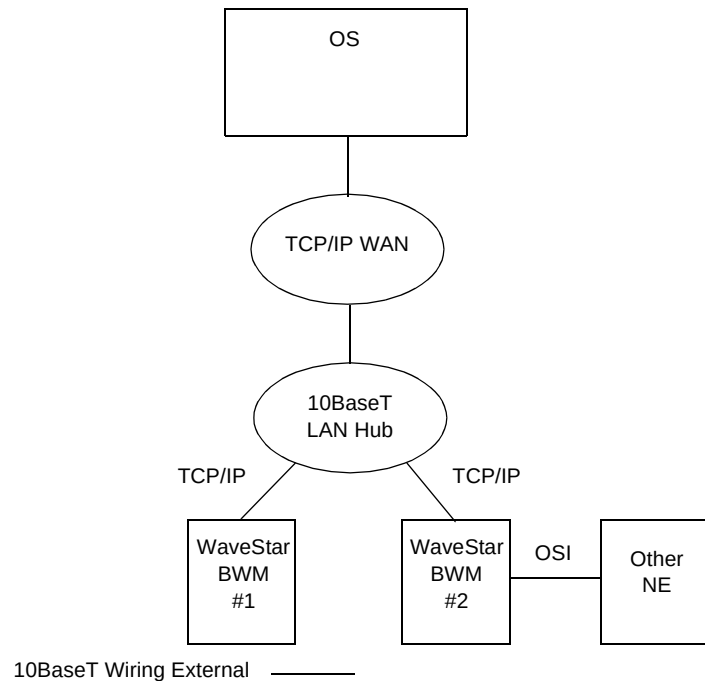
Figure 4-3 OS Access with TL1/X.25

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TCP/IP The WaveStar BandWidth Manager can communicate through a TCP/IP WAN directly, as well as providing a gateway for other network elements.

The WaveStar BandWidth Manager supports file transfers via FTP when directly connected to an IP access DCN. It also supports an FTAM/FTP gateway for file transfers to remote NEs. This allows FTP from an OS to a gateway NE (GNE) and FTAM from the GNE to a remote NE.

In the figure below, BandWidth Manager #2 is provisioned to provide a TCP/IP gateway between TCP/IP and OSI. This process is bidirectional, mapping messages originating in the OS to the proper NE NSAP, as well as mapping messages originating in the NE to the proper OS IP address and returning them to the OS.

Figure 4-4 OS Access with TCP/IP**OS access alternatives**

The following OS access alternatives are available with WaveStar BandWidth Manager.

- OSI LAN to subnetwork
- TCP/IP Gateway to subnetwork
- integrated TCP/IP Gateway to subnetwork (Requires BandWidth Manager R4.0 or later.)
- FTP via TCP/IP
- TL1/X.25 Gateway to subnetwork
- FT-2000 R9.1 or later TL1/X.25 GNE to subnetwork
- TITAN 5500 TL1/X.25 GNE to subnetwork

Wavestar subnetwork management system

The WaveStar SNMS, a separate and optional Lucent Technologies product, can be used as an end-user management system and as an element management layer within a multi-level TMN-based management architecture. When used as an end-user system, SNMS provides a Java-based GUI for users to access and manage WaveStar BandWidth Manager systems with visibility down to the circuit pack, port, and tributary levels. As an end-user system, SNMS provides a complete suite of element management functionality including fault, configuration, and security management. When a network management system (NMS) is used as the primary end-user system, SNMS will

provide the interface between the NMS and the SONET network - translating and forwarding commands and messages between the NMS and the managed network.

TL1 autonomous messages

The WaveStar BandWidth Manager OS interface supports Transaction Language 1 (TL1) autonomous messages. An active TL1 login to the NE is required in order to receive autonomous messages from the NE. For additional details on TL1 autonomous messages, refer to 365-371-207, *WaveStar BandWidth Manager TL1 Message Details*.

TL1 commands

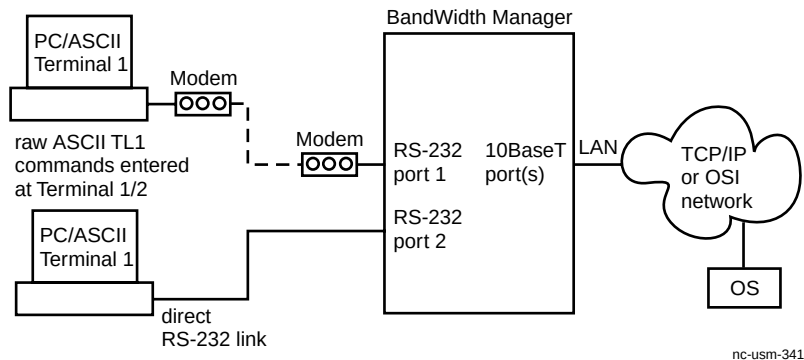
The WaveStar BandWidth Manager OS interface supports TL1 commands. An active TL1 login to the NE is required in order to send commands to the NE and receive responses from the NE. For additional details on TL1 commands, refer to 365-371-207, *WaveStar BandWidth Manager TL1 Message Details*.



Serial Access

Overview Starting with Release 4.1, WaveStar BandWidth Manager provides two RS-232 serial ports on the main shelf. These ports terminate on the ADJCTL/DCC packs (one port per pack). A user can connect to one of these ports either directly or through a modem.

Figure 4-5 One Possible Serial Access Setup



User end There is no special software running at the user end. A user can connect a dumb terminal or a PC running an application such as HyperTerminal and enter raw TL1 commands.

Connecting There is a debug connector (J189) on the System Controller Shelf backplane. This connector has receive and transmit signals for several serial ports. A special Y-cable adapter is connected to the 25-pin J189 connector which provides two DB9 connectors. The user can connect to these for serial access. See Task 250 for details.

BandWidth Manager end The serial ports on the BandWidth Manager support a DTE interface with certain hardware flow control signals looped. The serial interface is configured for 8 data bits, 1 stop bit, no parity, and a default baud rate of 9600. The baud rate can be re-configured via a TL1 command (see *WaveStar BandWidth Manager TL1 Message details, 365-371-207*) or through the CIT (see Task 250, “Accessing and Provisioning RS-232 Ports”).

□

Remote Access

Remote access for CIT and OS

The WaveStar CIT can be connected to the WaveStar BandWidth Manager as previously described for WaveStar CIT direct access or to the 10BaseT IAO LAN hub.

Remote access requires DCC, OSI LAN, or TCP/IP connectivity from the local WaveStar BandWidth Manager to another remote WaveStar BandWidth Manager system. This network operations capability uses the section DCC bytes in the SONET overhead of the optical signals. WaveStar CIT dialogues and OS messages are transmitted in these DCC bytes. The configurations in the following figures allow the WaveStar CIT and OS connected through WaveStar BandWidth Manager #1 to communicate with the other WaveStar BandWidth Manager systems (#2 and #3). The WaveStar CIT and OS support capabilities are equivalent for both local and remote WaveStar BandWidth Manager systems.

Remote access to DDM-2000, FT-2000, Fujitsu FLM-150, and Fujitsu FLM-2400 NEs is supported by WaveStar BandWidth Manager. The WaveStar CIT supports TL1 cut-through access to DDM-2000, FT-2000, Fujitsu FLM-150, and Fujitsu FLM-2400 NEs. ITM-SNC is the Lucent EMS that supports DDM-2000, FT-2000, Fujitsu FLM-150, and Fujitsu FLM-2400 NEs through an IAO LAN or through a TL1/X.25 gateway.

DCC is supported on WaveStar BandWidth Manager, OC-192, optical interfaces.

WaveStar BandWidth Manager DCC is compatible with the TARP releases of the Lucent DDM-2000 and FT-2000 of products. WaveStar BandWidth Manager DCC is also compatible with Tellabs TITAN 5500/s DCS R6.0 (Digital Cross-connect System) and with Fujitsu FLM-150 R14.2 and FLM-2400 R14.2 add/drop multiplexers.

Figure 4-6 WaveStar CIT and OS Remote Access Example using integrated TCP/IP Gateway

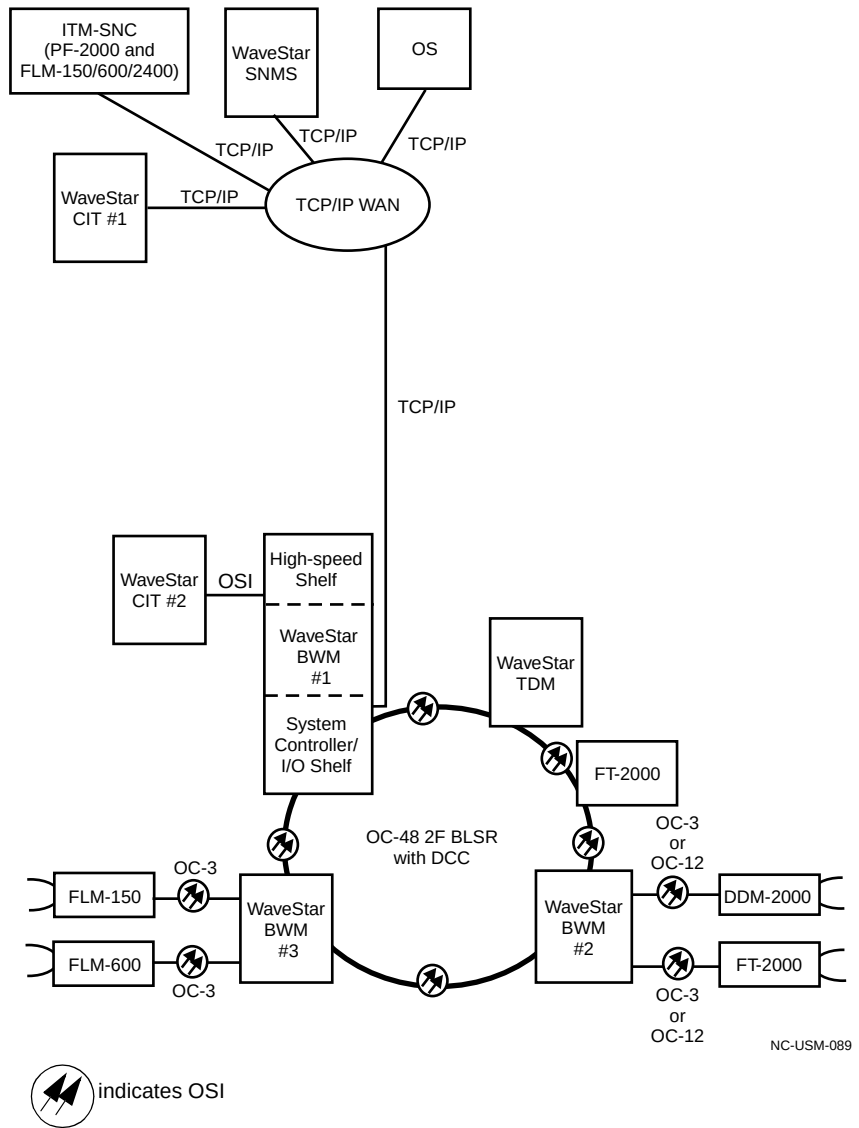
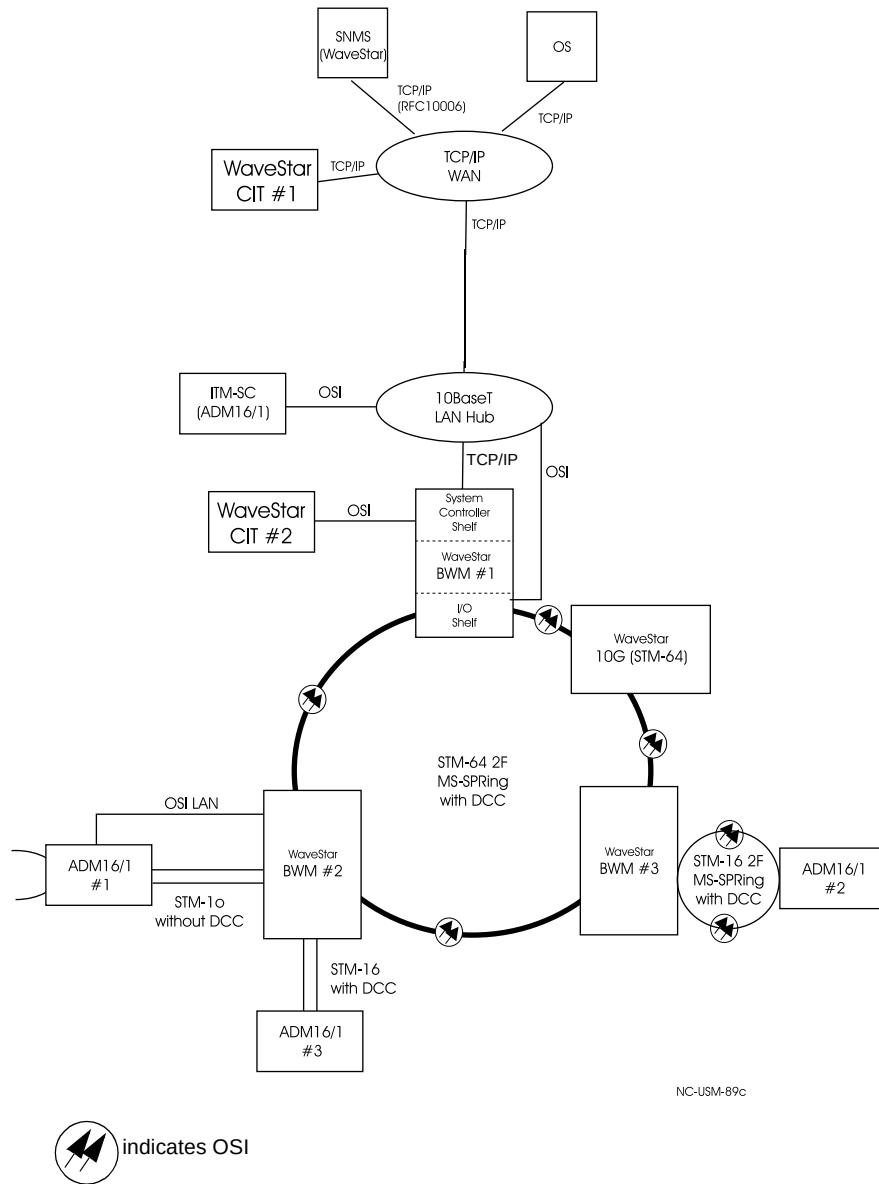


Figure 4-7 WaveStar CIT and OS Remote Access Example



Data Communication Channels

Exchange of network management information

Network management information can be exchanged between network elements via Data Communication Channels (DCCs) using the D1-D12 Section Overhead (SOH) bytes of the first STS-1 frame within an SONET transmission signal or the first STM-1 frame within an SDH transmission signal.

This makes it possible to set up a Data Communication Network (DCN) which uses SONET connections for exchanging network management data.

Please note that all nodes in an area must have DCC connectivity *within the area* to all other nodes in the same area.

The DCC uses OSI protocols.

DCC Types

The Data Communications Channel has two categories: In SONET they are Section DCC (SDCC) and Line DCC (LDCC). In SDH systems they are Regenerator Section DCC (DCC-R) and Multiplexer Section DCC (DCC-M).

Section DCC

The Section Data Communication Channel (SDCC or DCC-R) makes use of the section overhead (SOH) bytes D1-D3 thus providing a transmission channel with a capacity of 192 kbit/s. The Section DCC is automatically set as the default DCC for provisioned (configured) or pre-provisioned optical interface ports.

Line DCC

The Line Data Communication Channel (LDCC or DCC-M) uses the line overhead (LOH) bytes D4-D12 thus providing a transmission channel with a capacity of 576 kbit/s.

Supported data communication channels

SDCC/DCC-R and LDCC/DCC-M are supported for all of the following SONET/SDH rates:

- OC-3/STM-1
- OC-12/STM-4
- OC-48/STM-16
- OC-192/STM-192

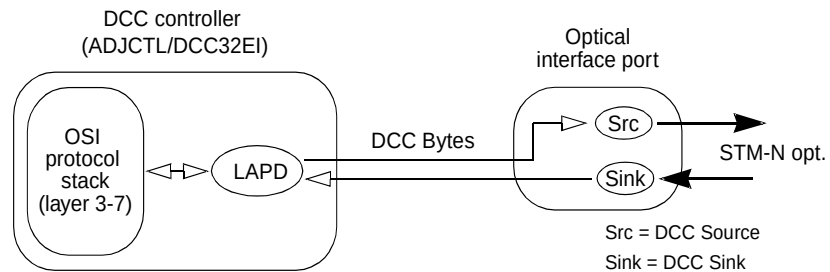
Termination of Data Communication Channels

The system supports the 7-layer OSI protocol stack over the DCC links which terminate on the DCC controller (ADJCTL/DCC32EI). The ADJCTL/DCC32EI circuit pack provides the source and sink of the

DCC bytes to and from the active DCC links via LAPD devices. The LAPD protocol acc. to ITU-T Rec. Q.921 is used. You can define DCC links by assigning DCC terminations to optical interface ports.

The following figure illustrates the functional principle.

Figure 4-8 DCC Links



Max. number of active DCC links

The maximum number of simultaneously supported LAPD channels per DCC controller is 32. Each DCC controller thus can support up to 32 active DCC links. By default the DCCs are disabled and must be enabled by the user.

DCC provisioned state

A Data Communication Channel (either Section DCC or Line DCC) can be in one of the following provisioned states:

- *Enabled*
 - The corresponding DCC bytes are allocated to an optical interface port.
 - The DCC is assigned an LAPD channel.
- *Disabled*
 - The corresponding DCC bytes are no longer allocated to an optical interface port.
 - The DCC is no longer accessed by an LAPD channel.

The provisioned state of a DCC as well as the LAPD channel assignments are persistent over a DCC controller or NE reset.

No DCC protection switching!

The system does not support DCC protection switching. However, the system allows for protection switching of the DCC overhead bytes with the optical interfaces on which they reside. If no protection of the optical interface is provisioned, then the DCC bytes are unprotected as well.

Mandatory DCC access for BLSR

When an BLSR protection group is created and the BLSR management mode is “automatic discovery”, then two DCCs must be *enabled* (one for the east and one for the west port), and each of the DCCs must be assigned an LAPD channel; otherwise the creation of the BLSR protection group will fail due to insufficient resources (LAPD channels).

Important! The following has to be observed:

1. Data Communication Channels used for BLSR management cannot be disabled as long as the BLSR protection group exists and the BLSR management mode is “automatic discovery”.
2. If the neighboring node in an SONET BLSR is an ADM-16/1, then you must enable the Line DCC on the side connected to the ADM-16/1.

Enabling of DCCs

A Data Communication Channel can be enabled manually by user provisioning, always provided that the required number of LAPD channels is available. Please refer to Task 305.

A DCC will be successfully enabled if an LAPD channel exists that

- can be assigned to this DCC in the unprotected mode, or
- can be shared with this DCC in a protected mode.

A DCC channel with its own LAPD channel when in the unprotected mode, can share its LAPD channel when in the 1+1, 1:1 or 1:N protection mode.

DCC pre-provisioning

A DCC can be pre-provisioned to be enabled for a provisioned or pre-provisioned optical interface port even if the DCC controller or port is not physically equipped.

Disabling of DCCs

A Data Communication Channel can be disabled in either of the following ways:

- Automatically when an optical interface port is de-provisioned.
When an optical interface port is provisioned to be removed (de-provisioned), then all enabled DCCs will be disabled, and the corresponding LAPD channels will be released.
- Manually by user provisioning.
Please refer to Task 235.

Important! Disabling a previously enabled DCC at a local NE needs to be coordinated with disabling the same DCC at the opposite end of the DCC link (remote NE) to avoid persistent communication alarms from the remote NE.

LAPD mode The LAPD protocol, which controls communication between the network elements, operates in either of the following modes:

- *Network Side*

The LAPD is assigned as Network. This mode complies with the standards and interoperates successfully with other LAPDs operating in user_side mode.

- *User Side*

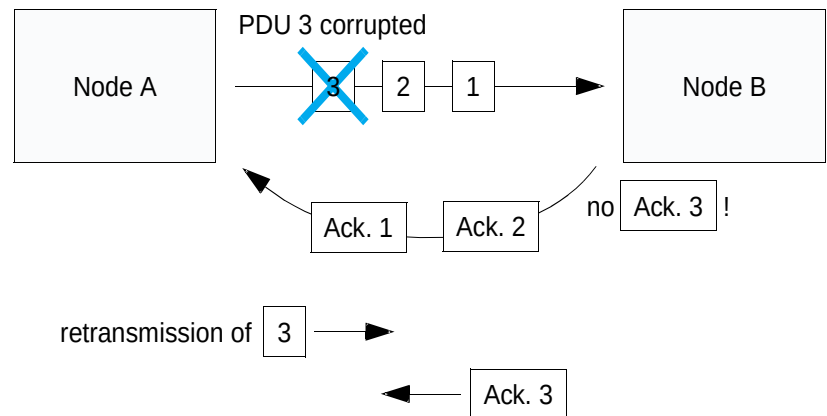
The LAPD is assigned as User. This mode complies with the standards and interoperates successfully with other LAPDs operating in network_side mode.

Please note that the DCCs work according to the master/slave principle, i.e. the LAPD modes of two interconnected SONET ports must be set differently. A corresponding “User-Network Side Failure” alarm will be generated if the LAPD mode is the same at both ends of a DCC.

AIMS and UITS supported The network elements support the Acknowledged Information Transfer Service (AIMS) and the Unacknowledged Information Transfer Service (UITS) as the basis for the LAPD protocol with the AIMS mode being the default mode of operation. The NE attempts to establish communication via AIMS. If this fails, the NE falls back to using UITS over the specific DCC channel.

AIMS and UITS functional principles In the LAPD protocol, all PDUs are sent with a checksum to verify that the data has not been corrupted during the transmission over the DCC link. If a PDU is received with a bad checksum, it is not acknowledged and will be resent:

- In the *Unacknowledged Information Transfer Service* (UITS), corrupted PDUs are ignored and no further actions taken. Upper layers of the OSI stack are responsible for recovery actions.
- In the *Acknowledged Information Transfer Service* (AIMS), PDUs are numbered and transmitted sequentially, and acknowledgement PDUs are sent back from the receiver to the sender. If a PDU is lost, that is, if the sender gets no acknowledgement, the PDU is retransmitted.

Figure 4-9 Functional principle of the AITS**Routing metric**

The shortest-path-first (SPF) algorithm calculates the preferred route between two nodes based on the cost of a route. The cost of a route is described by a single dimensionless routing metric.

The system makes use of the default routing metric as defined in ISO 10589.

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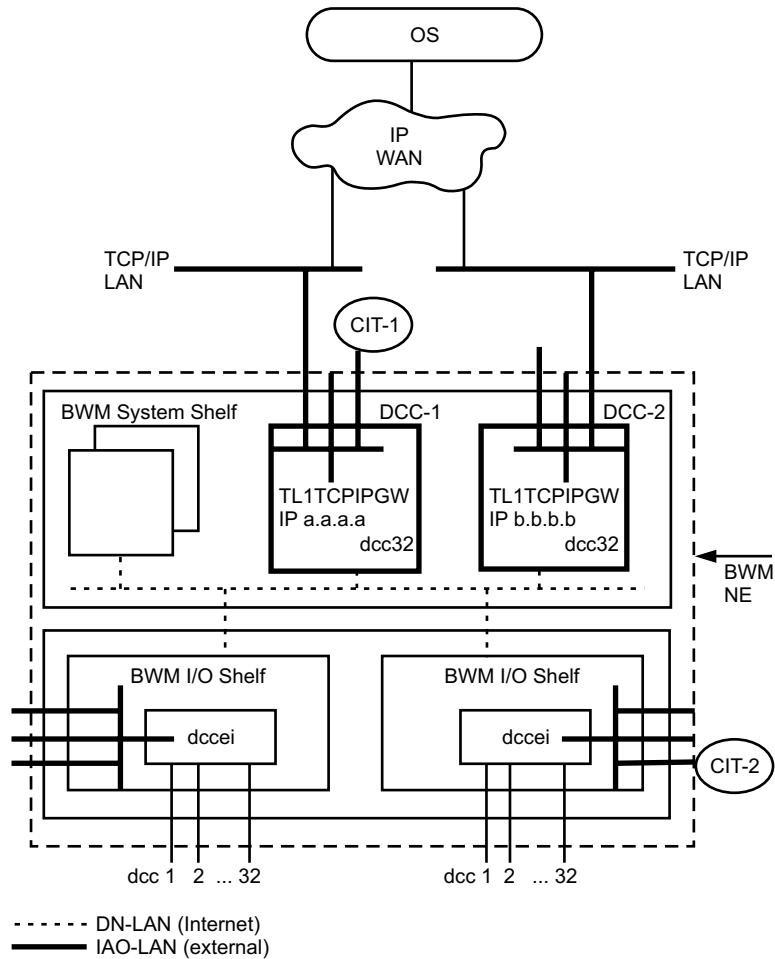
Duplex DCC Controllers (ADJCTL/DCC)

Description Duplex DCC Controllers (ADJCTL/DCC circuit packs) enhance the availability of a BandWidth Manager in a network by introducing a second redundant ADJCTL/DCC in the System Controller Shelf of the BandWidth Manager.

Both the ADJCTL/DCCs are active, thus providing two independent management association endpoints. This removes a single point of failure concern with respect to management of the BandWidth Manager, and allows for continued management of the BandWidth Manager, without interruption, should a ADJCTL/DCC fail.

The BandWidth Manager allows simplex and duplex modes of operation. On system startup, if there is a single ADJCTL/DCC inserted in the System Controller Shelf then the BandWidth Manager operates in simplex mode. As soon as a second ADJCTL/DCC is inserted the system automatically switches to duplex mode.

Duplex DCC Controllers The following figure shows a configuration of duplex active ADJCTL/DCCs in a BandWidth Manager NE with the TL1 TCP/IP Gateway feature.

Figure 4-10 Duplex Active ADJCTL/DCCs with TL1 TCP/IP Gateway

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System Boot and DCC Initialization

When the BandWidth Manager is “booted”, the System Controller (SYSCTL on the System Controller Shelf) downloads the same software image into both ADJCTL/DCCs, DCC-1 and DCC-2. Each ADJCTL/DCC performs a self-test, boots up and initializes.

Provisioning and Alarming

Both ADJCTL/DCCs (DCC-1 and DCC-2) can be independently provisioned, allowing independent management associations from a OS/CIT to the NE. The provisioning changes (for example, changing the area in NSAP) applied to a specific ADJCTL/DCC are not automatically applied to the 2nd ADJCTL/DCC on the System Controller Shelf. The two DCCs are completely independent.

Since the BandWidth Manager NE now has two possible connection endpoints associated with it, the OS is expected to specify which endpoint to connect to. For instance, this could be a manually

provisioned static table on the OS that allows a BandWidth Manager TID to be associated with two NSAPs and/or two IP addresses. The OS can then select either of the addresses when making a connection to the BandWidth Manager.

In duplex mode of operation, if either of the ADJCTL/DCCs is missing, there is a standing equipment alarm.

TL1 TCP/IP Gateway

The TL1 TCP/IP Gateway feature in the BandWidth Manager, allows each ADJCTL/DCC on the System Controller Shelf to act as a TL1 Gateway for IP access DCNs. The BandWidth Manager acts as a gateway between TL1 over TCP/IP to TL1 over OSI. Each ADJCTL/DCC (DCC-1 and DCC-2) can act as an independent gateway. This allows for OSs to connect directly to the BandWidth Manager via TCP/IP.

Multiple Failures and Loop Prevention

If an active ADJCTL/DCC fails, this will be appropriately alarmed. The SYSCTL controller on the System Controller Shelf will attempt to reload and reinitialize the ADJCTL/DCC. Each ADJCTL/DCC is allowed a maximum of two attempts to reboot and reinitialize before being locked out.



Subnetwork

Subnetwork size A subnetwork consists of a group of network elements connected by DCC and/or OSI LAN. The maximum subnetwork size supported by WaveStar BandWidth Manager is 1000 nodes.

Each shelf counts as one node. Therefore, a system with a 2.5G shelf and a 10G shelf would count as two nodes.

If SNMS (or ITM-SNC) is connected to a subnetwork by an OSI LAN, then each SNMS (and ITM-SNC) NSAP also counts toward the maximum subnetwork size. The SNMS (and ITM-SNC) LAN redundancy feature uses a maximum of two NSAPs.

Five WaveStar CITs are allowed in a subnetwork, but additional WaveStar CITs count toward the maximum subnetwork size. The maximum subnetwork size requires IS-IS Level 2 routing.

IS-IS Level 2 Routing IS-IS Level 2 Routing involves the division of subnetworks into multiple areas. Areas are connected by Level 2 Intermediate Systems (ISs) or routers which maintain DCC connectivity throughout the subnetwork. The assignment of WaveStar nodes to areas or to serve as Level 2 ISs is accomplished by provisioning.

Advantages of IS-IS Level 2 Routing The advantage of IS-IS Level 2 Routing is to limit the DCC routing information that must be maintained by each node in a subnetwork. Each node within an area maintains routing tables to route DCC messages to other nodes in the same area. If a node needs to route a DCC message to a node in a different area, the node relies on a Level 2 IS in its own area to route the message to a Level 2 IS in the target area and to route from that Level 2 IS to the target node within that area.

The Level 2 ISs route DCC messages between nodes in different areas. The DCC messages include all of the NE-NE (and OS-NE) communications necessary to support the OI applications, for example, a TL1 login message from a TL1-GNE to a TL1-RNE.

In addition to maintaining a routing table to route DCC messages to other nodes in the same area, Level 2 ISs need to maintain routing information for the Level 2 ISs in all other areas (but not for all nodes within each of these other areas),

IS-IS Level 2 Routing Guidelines The following guidelines are provided for IS-IS level 2 routing

- All nodes in an area must have the same NSAP area address.

- All nodes in an area must have DCC (or OSI LAN) connectivity within the area to all other nodes in the same area.
- At least one Level 2 IS is required in each area (two Level 2 ISs are recommended in each area, when practical, for DCC communications redundancy to and from each area).
- All Level 2 ISs must have DCC connectivity, either directly or indirectly via other Level 2 ISs, to all other Level 2 ISs in the subnetwork to form a single Level 2 subdomain that provides connectivity to all areas.
- To distribute the load of OSI network layer routing messages and processing in a subnetwork, it is recommended, when feasible, but not required that; 1) all area sizes be approximately the same and, 2) the number of Level 2 ISs be about the same as the average area size. For example, a perfectly balanced network of 200 nodes would include 20 nodes per area in each of 10 areas and 20 Level 2 ISs (2 Level 2 ISs per area).

Subnetwork Parameters

The following parameters should be used for subnetwork routing:

- Maximum number of nodes per area: 50
- Maximum number of Level 2 ISs per subnetwork: 50
- Maximum number of WaveStar BandWidth Manager shelves: 36
- Maximum subnetwork size: 1000



Name-to-Address Translation

Overview The communication between network elements and their management systems, such as the CIT, is established by using TL1 command messages.

A TL1 message addresses a network element by its “name”, also referred to as its target identifier (TID), whereas nodes within an OSI network are identified by their NSAP address. Hence a name-to-address translation becomes necessary.

Naming conventions “NE name” and “TID” are used synonymously throughout this manual.

TID to NSAP-address translation The system offers two possible ways to accomplish the TID to NSAP-address translation:

- A static routing table
- The TID Address Resolution Protocol (TARP)

To establish a management association to a remote NE, the CIT first evaluates the static routing table. If the corresponding name/address pair cannot be found in the table, the TARP will automatically be used.

Static routing The complete area address part of the NE’s NSAP address is configurable. Therefore, the CIT allows static routing, i.e. the TID-to-NSAP-address translation is realized by using a static routing table (Name/Address List) stored in the CIT.

Static routing table The static routing table

- must be constructed and maintained manually by a system administrator and
- must be synchronized in *all* CITs managing the network elements.

Important! *Each DCC controller exchange needs to be reflected in the static routing tables of all CITs managing the NEs.*

The IEEE 802.3 MAC address, stored on the DCC controller (ADJCTL/DCCEI) circuit pack during the manufacturing process, is used as the system identifier in the NE’s NSAP address. Hence, when a new DCC controller is inserted, then the system identifier, and so the NSAP address, automatically changes.

After a DCC controller exchange, the static routing tables in all CITs managing the NEs need to be adapted. Please refer to Task 233.

TARP	The TID Address Resolution Protocol (TARP) acc. to Telcordia Technologies (formerly Bellcore) GR-253 standard provides a means to perform the TID to NSAP address translation dynamically by means of TARP Protocol Data Units (TARP PDUs), originating from an end system such as the CIT. Three basic TARP functionalities can be distinguished: • TARP originator functionality • TARP propagation functionality • TARP responder functionality
TARP originator functionality	The TARP originator functionality means the ability to spontaneously originate a TARP PDU type 1, 2 or 5 query (cf. Types of TARP PDUs (4-26)) and broadcast it over the OSI network.
TARP propagation functionality	The TARP propagation functionality means the ability to evaluate a received TARP PDU type 1, 2 or 5 query and to further broadcast it over the OSI network if the requested TID or NSAP address does not match the NE’s TID or NSAP address, and if the requested TID or NSAP address could not be found in the TARP Data Cache (TDC; cf. TARP data cache (4-28)). A TARP propagator decrements the lifetime of a received TARP PDU by one and broadcasts the modified PDU to all of its network neighbors (with the exeption of the previous PDU sender). When the TARP PDU lifetime becomes zero, then no further propagation takes place.
TARP responder functionality.	The TARP responder functionality means the ability to respond to a TARP PDU type 1, 2 or 5 query via a type 3 response (see below).
Types of TARP PDUs	The following table shows the five defined types of TARP PDUs.

Table 4-1 Types of TARP PDUs

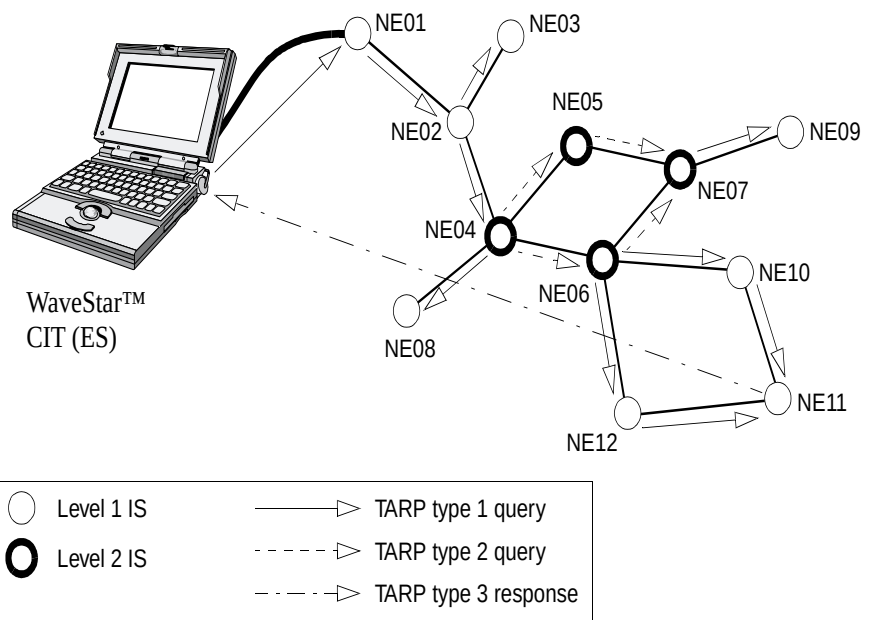
Type	Characteristic	Description
1	Query	Given an NE name (TID), the corresponding NSAP address is requested (restricted to IS-IS level-1 area).
2	Query	Given an NE name (TID), the corresponding NSAP address is requested (IS-IS level-1 and 2 areas).
3	Response	Response to a TARP Query.
4	Autonomous notification	Autonomous notification of a TID or NSAP address change, or a reset indication.
5	Query	Given an NSAP address, the corresponding NE name (TID) is requested.

Supported TARP functionality

The CIT supports the TARP originator functionality which is permanently enabled. network elements support the TARP propagation and TARP responder functionalities. These functionalities can be either enabled or disabled.

TARP Example

The following figure shows an example to illustrate the TARP functional principle.

Figure 4-11 TARP example

When a user requests to establish a management association to NE11 and the corresponding NSAP address cannot be found in the static routing table, then the CIT originates a TARP type 1 query. This query will be propagated over the network until it reaches NE11. NE11 then sends a TARP-type-3 response directly back to the CIT.

Please note that the TARP Data Cache (TDC; cf. TARP data cache (4-28)) was not taken into consideration for this example.

Network services/protocols

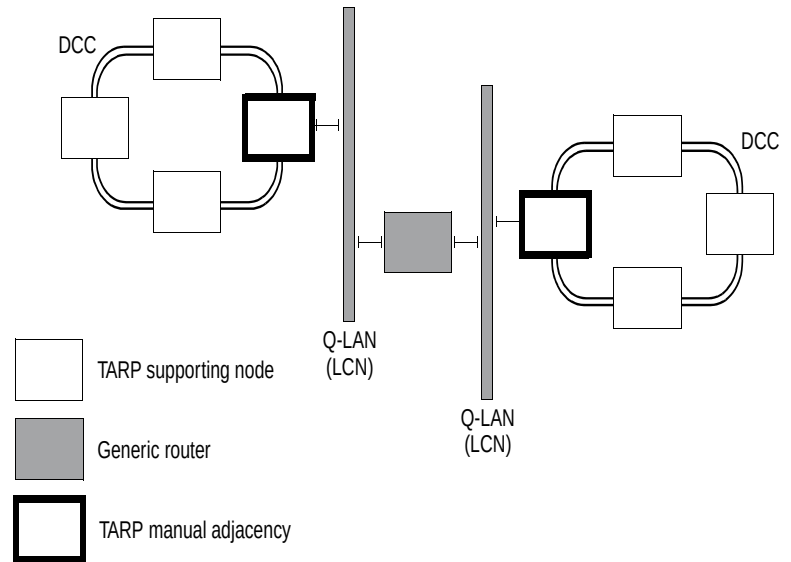
TARP depends on the network layer services and protocols provided by the Connectionless Network Service/Connectionless Network Protocol (CLNS/CLNP) and the ES-IS and IS-IS routing protocols to obtain information about the network neighbors of an NE.

TARP data cache

A local database, the TARP Data Cache (TDC), is used in each NE to store information on the NE's adjacencies, i.e. its direct neighbors in the network. Hence an NE may be able to respond to a TARP query, even if the requested TID or NSAP address does not match the NE's own TID or NSAP address. Thus, the network performance can be enhanced.

TARP manual adjacencies

By using TARP manual adjacencies it is possible to route TARP PDUs over subnetworks which do not support the TARP functionality. However, a precondition is that the nodes within the non-TARP subnetwork are "generic routers". A TARP manual adjacency is simply the Network Entity Title (NET) of a node that supports TARP. This is illustrated in the following figure.

Figure 4-12 TARP Manual Adjacencies**Loop detection**

WaveStar nodes provide a loop detection mechanism to prevent a repeated processing of previously processed TARP PDUs. A loop detection buffer (LDB) in conjunction with an LDB entry timer and an LDB flush timer is used for this purpose. A previously processed and again received TARP PDU is discarded.

Configuration of TARP parameters

For information on the configuration of TARP parameters, please refer to the following procedures:

- Task 232, Configure the LDB Timers for the WaveStar CIT
- Task 236, Configure the TARP Parameters for an NE
- Task 237, Assign TARP Manual Adjacencies

□

| NE name administration

Definition **NE Name (TID)** The NE name, also referred to as the NE’s target identifier (TID), is an alphanumeric string of up to 20 characters, used to uniquely identify a network element within the network.
“NE name” and “TID” are used synonymously throughout this .

- Configuration rules** The following NE name configuration rules must be observed:
- Each NE name must be unique within the network.
 - Each NE name may contain only the characters listed in the table on the next page.
 - Each NE name must be no more than 20 characters in length.
 - The NE name may contain segments separated by hyphens (“-”) or slashes (“/”), but each segment must begin with an alphabetic character.
 - Telcordia operating systems limit names to only alphanumeric characters and hyphens.
 - Please note that NE names are case insensitive.

Examples:
The following are examples for valid and invalid NE names.

- “NE-A1”, “CHICAGO7” or “NY-B3-C5” are valid NE names.
- “NE-01”, “CHICAGO-7” or “NY-3-5” are invalid NE names.

Characters allowed in an NE name The following table lists the characters that may be used in an NE name.

Table 4-2 Characters Allowed in an NE Name

ASCII Character	Description	Code (hex)
A .. Z	Upper case letters	41 .. 5A
a .. z	Lower case letters	61 .. 7A
0 .. 9	Digits	30 .. 39
-	Hyphen	2D
.	Period (full stop)	2E
/	Slash (Solidus)	2F
+	Plus sign	2B

Changing the NE name

For information on how to change the NE name, please refer to Task 329.



OSI Technical Specifications

Overview The tables in this section describe the operating values of the parameters needed for the protocols described in OSI LAN stack references and OSI Section DCC stack references.

LAN Physical and MAC Layer Technical Specifications Table The parameters in the following table are non-provisionable.

Table 4-3 Physical and MAC Layer (ISO 8802-3) Attribute Values

Parameter	Operating Value
Medium	10BASE-T
Maximum Frame Size	1518 octets
Minimum Frame Size	64 octets
Address Size	6 octets
Padding	up to 64
Jam Size	32 ones
Backoff Limit	Random
Tx Attempt	15
Inter Frame Gap	9.6 msec
Slot Time	512 bit times
MA-UNITDATA Request/Indication	Yes
MA-UNITDATA-STATUS Indication	No

LAN Logical Link Control Specifications Table The parameters in the following table are non-provisionable.

Table 4-4 Logical Link Control Layer (ISO 8802-2) Attribute Values

Parameter	Operating Value
LLC Operation Type	Type 1
LLC Class Type	Class 1
C/R bit	0,1
P/F bit	0,1
UI PDU	Command only
XID PDU	Command or Response

Parameter	Operating Value
Test PDU	Command or Response
LLC SAP	FE hex
DL-UNITDATA Request/Indication	Yes

LAN Provisionable Parameters Table The following table lists the LAN parameters that are user-provisionable:

Table 4-5 LAN User-Provisionable Parameters

Parameter	Range	Default Value	Increment
LAN Status - External LAN	Enabled, Disabled	Enabled	Not Applicable
LAN Status - Internal LAN	Enabled, Disabled	Enabled	Not Applicable

DCC - LAPD Specifications Table The following table shows the LAPD non-provisionable parameters.

Table 4-6 DataLink Layer: LAPD (ITU-T Q.920/921) Attribute Values

Parameter	Operating Value
N201	512

DCC - LinkID Specifications Table The following table shows the LinkID Protocol non-provisionable parameters.

Table 4-7 LinkID Protocol (Lucent-Proprietary)

Parameter	Operating Value
SAPI	61
TEI	0

DCC - LAPD Provisionable Parameters Table The following table shows the parameters of the DataLink layer that are user-provisionable.

Table 4-8 DataLink Layer User-Provisionable Parameters

Parameter	Range	Default Value	Increment
T200 timer	0.2 - 25s	1s	0.1sec
N200	1 - 255	3	1
k	1 - 127	7	1

CLNP Network Layer Specifications Table

The parameters in the following table are non-provisionable. This table represents the values held by the attributes of the CLNP protocol engine.

Table 4-9 Network Layer: CLNP (ISO 8473) Attribute Values

Parameter	Operating Value
Category 1 Functions a	Supported
Category 2 Functions b	Not supported
Category 3 Functions c	Not supported d
PDU Lifetime	255 hops e
Segmenting Reassembly queue length	50
NSDU-SNDATA mapping	always 1-1
NSAP length	20 octets f
N-SEL for NET (Network Entity Title)	00 hex
N-SEL for SDH TP4	01 hex
N-SEL for TSB (Transport Service Bridge)	0D hex
N-SEL for SONET TP4	1D hex
N-SEL for TARP	AF hex
CLNP echo	Request/Response
E/R Flag	Yes (default = off)

a.PDU Comp./Decomp., Header Format Analysis, PDU Lifetime Control, Route/Forward/Segment/Reassemble/Discard PDU, Error Reporting and Header Error Detection functions.

b.Security, Complete Source Routing and Complete Route Recording Functions.

c.Partial Source Routing, Partial Route Recording, Priority, QoS Maintenance, Congestion Notification and Padding Functions.

d.Except for QoS Maintenance and Padding functions, which are supported for forwarding only.

e.hop = 0.5s; 127 hops if CLNP PDU is transporting a TARP PDU.

f.ISO DCC syntax - Note: In addition to operating in a SONET environment, BandWidth Manager can also route SDH management traffic (with variable NSAP lengths). However, BandWidth Manager is managed as a SONET entity.

EI-IS Network Layer Specifications Table

The parameters in the following table are non-provisionable. This table represents the values held by the attributes of the ES-IS protocol engine.

Table 4-10 Network Layer: ES-IS (ISO 9542) Attribute Values

Parameter	Operating Value
ES Holding Timer (ESHT)	2 x ESCT + 1
IS Holding Timer (ISHT)	2 x ISCT + 1
IIH Timer	10s
Holding Multiplier	3
Send ES Hellos	No

IS-IS Network Layer Specifications Table

The parameters in the following table are non-provisionable. This table represents the values held by the attributes of the IS-IS protocol engine.

Table 4-11 Network Layer: IS-IS (ISO 10589) Attribute Values

Parameter	Operating Value
Maximum Adjacencies/subnet	50 for LAN, 1 for point-to-point
NSAP format	20 octets (ISO DCC syntax)
IIH Timer for non-Designated Router	10s
IIH Timer for Designated Router	3s
Holding Multiplier	3

Parameter	Operating Value
Maximum LSP generation interval time	900s
Minimum LSP generation interval time	30s
Minimum LSP transmission interval time	5s
Maximum LSP length	512 octets (restricted by the maximum LSP length on DCC connections)
Maximum Age	1200s
Zero Age Lifetime	60s
CSNP interval timer	10s
PSNP Interval timer	2s
Waiting Time timer	60s
Routing metric	Default
Maximum Path metric	1023
Maximum Path splits	1
Maximum Least cost paths	1
Adjacency Alarms	Not supported
SPF hold off timer	5s
Reachable Address Prefix for Interdomain routing	Not supported

Network Layer Provisionable Parameters Table The following table lists the parameters of the Network Layer protocols (CLNP, ES-IS, IS-IS) that are user-provisionable.

Table 4-12 Network Layer User-Provisionable Parameters

Parameter	Range	Default Value	Increment
NSAP-AFI	1 octet	39 hex	1
NSAP-IDI	2 octets	840F hex	1
NSAP-DFI	1 octet	80 hex	1
NSAP-ORG	3 octets	000000 hex	1
NSAP-RES	2 octets	0000 hex	1
NSAP-RD	2 octets	0000 hex	1
NSAP-AREA	2 octets	0000 hex	1
NSAP-N-SEL	1 octet	00 hex	1

Parameter	Range	Default Value	Increment
LAN Designated Router (L1/2) Priority	1 - 127	64	1
Maximum Link Metric (MLM)	1 - 255	14	1
LAN Link metric (External LAN)	1 - MLM	14	1
LAN Link metric (Internal LAN)	1 - MLM	14	1
ESCT timer	10 - 1000s	10s	10s
ISCT timer	10 - 1000s	10s	10s
IS L2 Routing	Enabled, Disabled	Disabled	Not Applicable

**TP4 Transport Layer
Specifications Table**

The following table lists the non-provisionable values held by the attributes of the TP4 protocol engine.

Table 4-13 Transport Layer: TP4 (ISO 8073) Attribute Values

Parameter	Default Value
N (maximum retransmissions)	6
T1 (Local Retransmission Time)	2s
AL (Local Acknowledgment Time)	1s
I (Inactivity Time) Formula $W*2+N$	$(16 * 2) + 6 = 38$
T-SEL (for ISO Session Layer)	5454 hex
Use of Checksum	Not supported
Use of Extended Data TPDU numbering format	Not supported
Use of Selective Acknowledgment	Not supported
Use of Request Acknowledgment	Not supported
TL4 Sever Bit for disconnect on unsuccessful connect request	Yes
Delay Acknowledgment policy	Not supported
Maximum TPDU size	1024
CLTP echo	Not supported
Concatenation	Not supported
QoS	0
Sending queue size	10
TIDU size	2636 octets
Diagnostics T-SEL	Twtr
Adaptive Roundtrip Timer	Yes
Expedited Data Transfer (network expedited) service	Not supported

TP4 Transport Layer Provisionable Parameters Table

The following table represents the parameters of the Transport Layer protocol (TP4) that are user-provisionable:

Table 4-14 Transport Layer: TP4 (ISO 8073) User-Provisionable Parameters

Parameter	Range	Default Value	Increment
W (Window Time)	1 - 255s	16s	1s
Credit window size	1 - 15	5	1

**Session Layer
Specifications Table**

The parameters in the following table are non-provisionable. This table represents the characteristics of the session layer. The Basic Combined Subset and Kernel/Full Duplex are subset options of the session layer standard.

Table 4-15 Session Layer (ISO 8327) Attribute Values

Parameter	Operating Value
Protocol Version	2
S-SEL (for ISO Presentation layer)	5353 hex
Maximum size of SS-user-data	10240 octets

**Presentation Layer
Specifications Table**

The parameters in the following table are non-provisionable. This table represents the values held by the attributes of the presentation layer.

Table 4-16 Presentation Layer Attribute Values

Parameter	Operating Value
P-SEL for FTAM	02 hex
P-SEL for TL1	AF hex
P-SEL for DUA	FD hex
P-SEL for DSA	04 hex
P-SEL for RRP	FC hex

| Hardware User Interface

Introduction WaveStar BandWidth Manager provides a number of switches and indicators that constitute the hardware user interface. Those are summarized below and described in more detail in the Product Description chapter and in the Circuit Pack/Port Unit Description chapter.

User panels User panels are located on each shelf to provide easily visible shelf-level alarm indicators. Each user panel contains a multiple number of LEDs used to indicate status and alarms. Each panel also contains panel buttons and connectors used to test the LEDs, silence audible alarms, connect to system ground, and connect a WaveStar CIT to the system LAN. The switch shelf CIT connector is inoperative.

Circuit pack/port unit faceplate LEDs The faceplate of all circuit packs contain a red FAULT and green ACTIVE LED. The FAULT LED will illuminate when the system detects an error associated with the circuit pack. Illumination of the ACTIVE LED indicates the circuit pack is either active or in standby mode.

Fan unit LEDs and controls Each fan unit contains a faceplate with LEDs and a reset switch. A green PWR ON LED indicates the fan is receiving power. A red FAIL LED illuminates any time an alarm is associated with the fan unit. A red FILTER ALM LED illuminates when the unit requires service for a clogged filter. Additionally there are two controls associated with the fan unit: a FILTER ALM RESET button and two circuit breakers.

Circuit breakers Power circuit breakers for power feeds A and B are provided. Each circuit breaker provides a visual indication of its status via a rocker switch.



Office Alarms Interface

Introduction This section provides information about the WaveStar BandWidth Manager office alarms interface.

Description WaveStar BandWidth Manager provides relays for connection to local office alarms. Relays are provided for each type of alarm condition:

- CR (critical)
- MJ (major)
- MN (minor)

Office alarms The office alarms interface is a set of discrete relays controlling audible and visible office alarms. Separate relays handle critical, major, and minor alarms. If desired, critical and major alarm outputs can be wired so that either, neither, or both of the outputs control the major office alarm.

Steady state current The steady state current for office alarm connections must not exceed 0.9 amps at 60 volts or 1.8 amps at 30 volts. The maximum transient currents (20 msec duration) during initial contact closure must not exceed 9 amps at 60 volts or 18 amps at 30 volts.

Intermittent failures To prevent intermittent failures from causing unnecessary maintenance activity, a provisionable incoming signal alarm delay is provided. The office alarms will not be activated unless an incoming signal condition of greater duration than the alarm delay occurs. When a failure clears, an alarm clear delay prevents premature clearing of the alarm.

Multiple alarms When multiple alarm conditions occur, the highest level office alarm (audible and visible) is activated. When the highest level alarm condition clears, the office alarm signals to the next highest level alarm condition.

Alarm Cut-off The audible office alarms are silenced through activation of the alarm cut-off (ACO) function. Visible alarms are not extinguished by the ACO function.

If the ACO function has been activated to silence the active audible alarm and a “bump down” occurs, the audible alarm remains silent (that is, the lower level visible alarm is activated, but the corresponding

audible alarm is not reactivated). If another alarmable condition occurs while the ACO is active, the highest level audible alarm is activated even if the new condition is a lower level. (For example, if an MJ alarm was active and silenced using the ACO function and an MN alarmable condition occurs, the MJ audible alarm will sound.)



Summary

Introduction	The operations interfaces communicate alarm and status information about the WaveStar BandWidth Manager equipment and services. Operations interfaces include direct and remote access through the WaveStar CIT. Local access can be obtained through the user panel light-emitting diodes (LEDs) and controls, the circuit pack faceplate LEDs, and office alarms. The IAO LAN supports communication with operations systems (OSs).
WaveStar CIT	The WaveStar CIT is a PC that meets minimum requirements loaded with WaveStar CIT software. The WaveStar CIT provides full GUI access to the administrative, maintenance, and provisioning capabilities of the WaveStar NE. The WaveStar BandWidth Manager supports direct and remote access to the CIT.
OS interface	The OS interface is accessed through one of the IAO LAN backplane connectors. This interface is compatible with Telcordia's Network Monitoring and Analysis (NMA), Telcordia's Transport Element Management System (T-EMS), and the Lucent WaveStar Subnetwork Management System (SNMS). The OS interfaces supported include the following: • OSI LAN/WAN (to SNMS or other compatible OS) • TCP/IP (to SNMS) • TL1/X.25 (via protocol converter to NMA, T-EMS, or other compatible OS) • TCP/IP (to NMA, T-EMS, or other compatible OS) • FTP/FTAM (to SNMS for software downloads)
Remote Access	Remote access requires DCC and/or OSI LAN connectivity from the local WaveStar NE to another remote WaveStar system. This network operations capability uses the section DCC bytes in the SONET overhead of the optical signals. WaveStar CIT dialogues and OS messages are transmitted in these DCC bytes.
Serial Access	Starting with Release 4.1, WaveStar BandWidth Manager provides two RS-232 serial ports on the main shelf. These ports terminate on the ADJCTL/DCC packs (one port per pack). A user can connect to one of these ports either directly or through a modem to a dumb terminal or a

PC running an application such as HyperTerminal to enter raw TL1 commands.

Subnetwork Size A subnetwork consists of a group of network elements with DCC and/or OSI LAN connectivity among the network elements. The maximum subnetwork size supported by WaveStar BandWidth Manager is 512 nodes.

Hardware User Interface User panels are located on each shelf to provide easily visible shelf-level alarm indicators. Each user panel contains a multiple number of LEDs used to indicate status and alarms. Each panel also contains panel buttons and connectors used to test the LEDs, silence audible alarms, connect to system ground, and connect a WaveStar CIT to the system LAN.

Office alarms interface The system provides a discrete set of relays controlling audible and visible office alarms. Alarms can be defined as critical, major, or minor. ☐



5 Circuit Pack/Port Unit Descriptions

Overview

Purpose This chapter provides a detailed functional description of the WaveStar BandWidth Manager circuit packs and port units.

Objectives This chapter describes the major functions of each:

- Circuit pack
- Port unit

Related information For related information, see:

- 365-370-101, *WaveStar BandWidth Manager, Applications, Planning, and Ordering Guide (SONET Edition)*
- 365-370-101-SDH, *WaveStar BandWidth Manager, Applications, Planning, and Ordering Guide (SDH Edition)*
- 365-370-104, *WaveStar BandWidth Manager, Operations Systems Engineering Guide*
- 365-370-110, *WaveStar BandWidth Manager, Alarm Messages and Trouble Clearing Guide*

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Circuit Pack/Port Unit and Software Compatibility

Standard Circuit Pack Codes, Names, and Compatible Software

The following table shows the standard circuit packs/port units and the compatible software.

Code	Name	Compatible Software Release						
		1.3.20	2.0.0	2.1.0	3.0.0	3.1.0	3.1.1	4.0.0
LEY2	ADJCTL/DCC Circuit Pack	X	X	X	X	X	X	X
LEY1	ADJCTL/DCCEI Circuit Pack	X	X	X	X	X	X	X
LFY2	BSW Circuit Pack	X	X	X	X	X	X	X
LEZ1	CSIEX Circuit Pack	X	X	X	X	X	X	X
LEZ1B	CSIEX Circuit Pack							X
LCZ1	CTL/EI Circuit Pack	X	X	X	X	X	X	X
LCY2	CTL/MEM Circuit Pack	X	X	X	X	X	X	X
LEY68	CTL/SR50DC		X	X	X	X	X	X
LEY20	CTL/SYS50D Circuit Pack	X	X	X	X			
LEY20B	CTL/SYS50D Circuit Pack					X	X	X
LEY10B	CTL/SYS50DM Circuit Pack	X	X	X	X	X	X	X
LEY17	DS3EC1/8 Port Unit	X	X	X	X	X	X	X
LEY13	OC12/STM4/1.3LR2 Port Unit	X	X	X	X	X	X	X
LEY14	OC12/STM4/1.3SR2 Port Unit	X	X	X	X	X	X	X
LEY15	OC3/STM1/1.3LR4 Port Unit	X	X	X	X	X	X	X
LEY16	OC3/STM1/1.3SR4 Port Unit	X	X	X	X	X	X	X
LEY7	OC48/STM16/1.3LR1 Port Unit	X	X	X	X	X	X	X
LEY8	OC48/STM16/1.5LR1 Port Unit	X	X	X	X	X	X	X
LEY50 - LEY65	OC48/STM16 /DWDM01 - 16 Port Unit			X	X	X	X	X
LEY80 - LEY95	OC48/STM16/POU9590 - POU9210 Port Unit				X	X	X	X
LEY101- LEY180	OC48/STM16/WDM9585 - WDM9190					X	X	X

Circuit Pack/Port Unit Descriptions

Code	Name	Compatible Software Release						
		1.3.20	2.0.0	2.1.0	3.0.0	3.1.0	3.1.1	4.0.0
LEY307	OC48/STM16/1.3LR1 Port Unit					X	X	X
LEY308	OC48/STM16/1.5LR1 Port Unit					X	X	X
LEY67	OC192/STM64/1.5SR1 Port Unit		X	X	X	X	X	X
LEY69	OC192/STM64/1.5IR1 Port Unit				X	X	X	X
LEY97	OC192/STM64/1.5IRS1 Port Unit					X	X	X
LEY201 - LEY240	OC192/STM64/WDM9580 - WDM9190 Port Unit				X	X	X	X
LEY284 - LEY299	OC192/STM64/POU9590 - POU9210 Port Unit				X	X	X	X
LEY72	PPROC/FO Circuit Pack		X	X	X	X	X	X
LEY43	STM1E/4					X	X	X
LFY1	SWIEX Circuit Pack	X	X	X	X	X	X	X
LEY21	SWIF Circuit Pack	X	X	X	X	X	X	X
LEY18	SWITCH/DS3EC1 Circuit Pack	X	X	X	X	X	X	X
LEY41	SWITCH/STM1E4					X	X	X
LEY4	SWITCH/STS576 Circuit Pack	X	X	X	X	X	X	X
LEY73	SWITCH/STS768 Circuit Pack		X	X	X	X	X	X
LLY2	TMG/STRAT3 Circuit Pack	X	X	X	X	X	X	X
LLY2B	TMG/STRAT3 Circuit Pack	X	X	X	X	X	X	X

**NEBS Level 3 Compliant
Circuit Pack Codes,
Names, and Compatible
Software**

The following table shows the NEBS level 3 compliant circuit packs/
port units and the compatible software.

Code	Name	Compatible Software Release						
		1.3.20	2.0.0	2.1.0	3.0.0	3.1.0	3.1.1	4.0.0
LEY2AE	ADJCTL/DCC Circuit Pack				X	X	X	X
LEY1AE	ADJCTL/DCCEI Circuit Pack				X	X	X	X
LFY2AE	BSW Circuit Pack				X	X	X	X
LEZ1AE	CSIEX Circuit Pack				X	X	X	X
LEZ1BE	CSIEX Circuit Pack							X
LCZ1AE	CTL/EI Circuit Pack				X	X	X	X
LCY2AE	CTL/MEM Circuit Pack				X	X	X	X
LEY68AE	CTL/SR50DC				X	X	X	X
LEY20AE	CTL/SYS50D Circuit Pack				X			
LEY20BE	CTL/SYS50D Circuit Pack					X	X	X
LEY10BE	CTL/SYS50DM Circuit Pack				X	X	X	X
LEY17AE	DS3EC1/8 Port Unit				X	X	X	X
LEY13AE	OC12/STM4/1.3LR2 Port Unit				X	X	X	X
LEY14AE	OC12/STM4/1.3SR2 Port Unit				X	X	X	X
LEY15AE	OC3/STM1/1.3LR4 Port Unit				X	X	X	X
LEY16AE	OC3/STM1/1.3SR4 Port Unit				X	X	X	X
LEY7AE	OC48/STM16/1.3LR1 Port Unit				X	X	X	X
LEY8AE	OC48/STM16/1.5LR1 Port Unit				X	X	X	X
LEY50AE - LEY65AE	OC48/STM16 /DWDM01 - 16 Port Unit				X	X	X	X
LEY80AE - LEY95AE	OC48/STM16/POU9590 - POU9210 Port Unit				X	X	X	X
LEY101AE - LEY180AE	OC48/STM16/WDM9585 - WDM9190					X	X	X
LEY307AE	OC48/STM16/1.3LR1 Port Unit					X	X	X
LEY308AE	OC48/STM16/1.5LR1 Port Unit					X	X	X

Code	Name	Compatible Software Release						
		1.3.20	2.0.0	2.1.0	3.0.0	3.1.0	3.1.1	4.0.0
LEY67AE	OC192/STM64/1.5SR1 Port Unit				X	X	X	X
LEY69AE	OC192/STM64/1.5IR1 Port Unit				X	X	X	X
LEY97AE	OC192/STM64/1.5IRS1 Port Unit					X	X	X
LEY201AE - LEY240AE	OC192/STM64/WDM9580 - WDM9190 Port Unit				X	X	X	X
LEY284AE - LEY299AE	OC192/STM64/POU9590 - POU9210 Port Unit				X	X	X	X
LEY72AE	PPROC/FO Circuit Pack				X	X	X	X
LEY43AE	STM1E/4					X	X	X
LFY1AE	SWIEX Circuit Pack				X	X	X	X
LEY21AE	SWIF Circuit Pack				X	X	X	X
LEY18AE	SWITCH/DS3EC1 Circuit Pack				X	X	X	X
LEY41AE	SWITCH/STM1E4					X	X	X
LEY4AE	SWITCH/STS576 Circuit Pack				X	X	X	X
LEY73AE	SWITCH/STS768 Circuit Pack				X	X	X	X
LLY2AE	TMG/STRAT3 Circuit Pack					X	X	X
LLY2BE	TMG/STRAT3 Circuit Pack				X	X	X	X



ADJCTL/DCC Circuit Pack

Purpose of circuit pack The Adjunct Control/Data Communications Channel (ADJCTL/DCC) circuit pack provides access to a 10BaseT local area network (LAN) interface and an operations network interface. The ADJCTL/DCC circuit pack processes and routes messages between the 10BaseT and operations network interfaces using the open system interconnection (OSI) protocol.

ADJCTL/DCC circuit pack faceplate The following figure shows the ADJCTL/DCC circuit pack faceplate.



Faceplate LEDs The ADJCTL/DCC circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder. Flashes on and off when an incoming signal failure, external timing failure, or a memory corruption is detected.
ACTIVE	Green	Lighted when the circuit pack is active/in-service.

Faceplate push-button switch

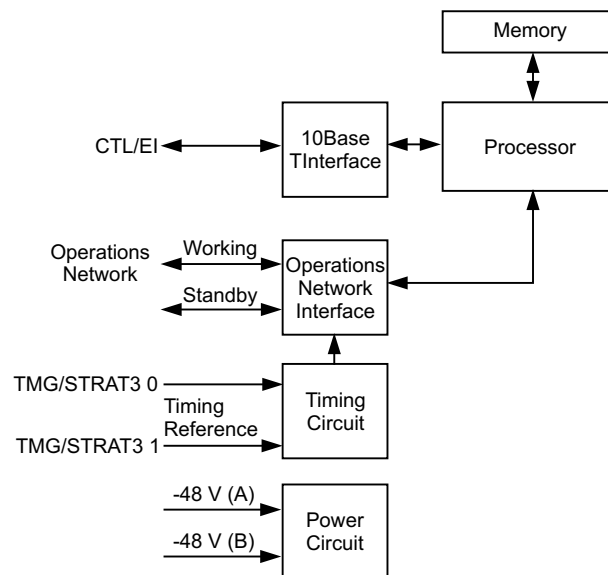
The ADJCTL/DCC circuit pack has a RESET push-button switch recessed on its faceplate. When the RESET push-button switch is pressed, the ADJCTL/DCC circuit pack performs a circuit pack reset.

General description of operation

The ADJCTL/DCC circuit pack processes/routes messages between the 10BaseT and operations network interfaces using the open system interconnection (OSI) or protocol. The 10BaseT LAN interface allows access to the intraoffice LAN (IAOLAN) via the control/external interface (CTL/EI) circuit pack. The operations network interface allows access to the internal operations network.

Functional block diagram

The following figure shows a functional block diagram of the ADJCTL/DCC circuit pack.



NC-USM-041

Control circuitry

The processor controls and monitors the operation of the circuit pack. The processor also performs protocol processing of the open systems interconnection (OSI) 7-layer stack for the 10BaseT interface. The processor also manages communication with other control circuit packs (for example CTL/SYS50D, CTL/SYS50DM, CTL/SR50DC, and ADJCTL/DCCEI) via the operations network.

Memory circuitry The ADJCTL/DCC circuit pack provides the following memory functions.

Start-up memory

The start-up memory consists of one megabyte of flash electrically-erasable programmable read-only memory (flash EEPROM). The start-up memory contains the program that allows the processor to load the executable code and data from the CTL/SYS50D circuit pack into the operating memory. The program allows the processor to start up operation during a powerup or reset condition, or when initializing new software.

Operating memory

The operating memory consists of 32 megabytes of dynamic random access memory (DRAM). The operating memory is used to store executable code and data.

Nonvolatile memory

The nonvolatile memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the circuit pack history such as the Bellcore *Common Language*[®] *CLEI*[™] code and type/version information.

Interface circuitry The ADJCTL/DCC circuit pack provides the following interface functions.

10BaseT interface

The 10BaseT interface provides access to the intraoffice LAN (10 Mb/s ethernet LAN) via the CTL/EI circuit pack. The 10BaseT interface performs protocol processing for physical layer 1 of the OSI 7-layer stack for the intraoffice LAN data.

In the receive direction, the 10BaseT interface accepts intraoffice LAN data from the CTL/EI circuit pack. The intraoffice LAN data is routed to the processor for OSI protocol processing.

In the transmit direction, the 10BaseT interface accepts the intraoffice LAN data from the processor and transmits the information to the CTL/EI circuit pack.

Operations network interface

The operations network interface provides access to the internal operations network. The operations network allows communication with the other control circuit packs (for example, CTL/SYS50D, CTL/SYS50DM, and ADJCTL/DCCEI). For more information about the operations network, refer to *Chapter 6, Control, Transmission, and Synchronization Interfaces*.

Timing circuitry

The timing circuit receives two 6.48-MHz timing reference signals from the TMG/STRAT3 circuit packs. The timing circuit multiplies the 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. If both 6.48-MHz timing reference signals are not available, a free-running 6.48-MHz oscillator provides a reference signal for the timing circuit.

Protection circuitry

The ADJCTL/DCC circuit pack provides the following protection functions.

Control complex protection

Control complex protection is performed by selecting the working or standby operations network signals. The ADJCTL/DCC circuit pack monitors these signals and can select the working or standby signal. The CTL/SYS50D circuit pack can inhibit this selection and make its own selection.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf Stratum 3 Timing (TMG/STRAT3) circuit packs. The ADJCTL/DCC circuit pack monitors these timing reference signals and can select the working or standby timing reference signal until the protection algorithm of the CTL/SYS50D circuit pack makes a selection.

Power circuitry

The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The two power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V and +3.3 V used on the circuit pack.

The ADJCTL/DCC circuit pack monitors the two power sources. If the ADJCTL/DCC circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

Quick reference summary

The ADJCTL/DCC circuit pack performs the following control and interface functions:

- Interfaces with the CTL/EI circuit pack via the 10BaseT interface to send and receive intraoffice LAN data
- Interfaces with the other control circuit packs (for example CTL/SYS50D, CTL/SYS50DM, and ADJCTL/DCCEI) via the operations network interface to send and receive internal operations network data
- Processes and routes messages between the 10BaseT and operations network interfaces using the open system interconnection (OSI) protocol
- Performs internal fault detection and interface with the CTL/SYS50D circuit pack
- Stores inventory information (for example, *Common Language CLEI* code and serial number)
- Controls the circuit pack faceplate FAULT and ACTIVE LEDs



ADJCTL/DCCEI Circuit Pack

Purpose of circuit pack The Adjunct Control/Data Communications Channel External Interface (ADJCTL/DCCEI) circuit pack provides access to the transport overhead bytes and external user interfaces for the system. The overhead bytes include the data communications channel (DCC) bytes orderwire, and user bytes. The DCC and external interface functions are independent of each other.

ADJCTL/DCCEI circuit pack faceplate

The following figure shows the ADJCTL/DCCEI circuit pack faceplate.



NC-USM-039

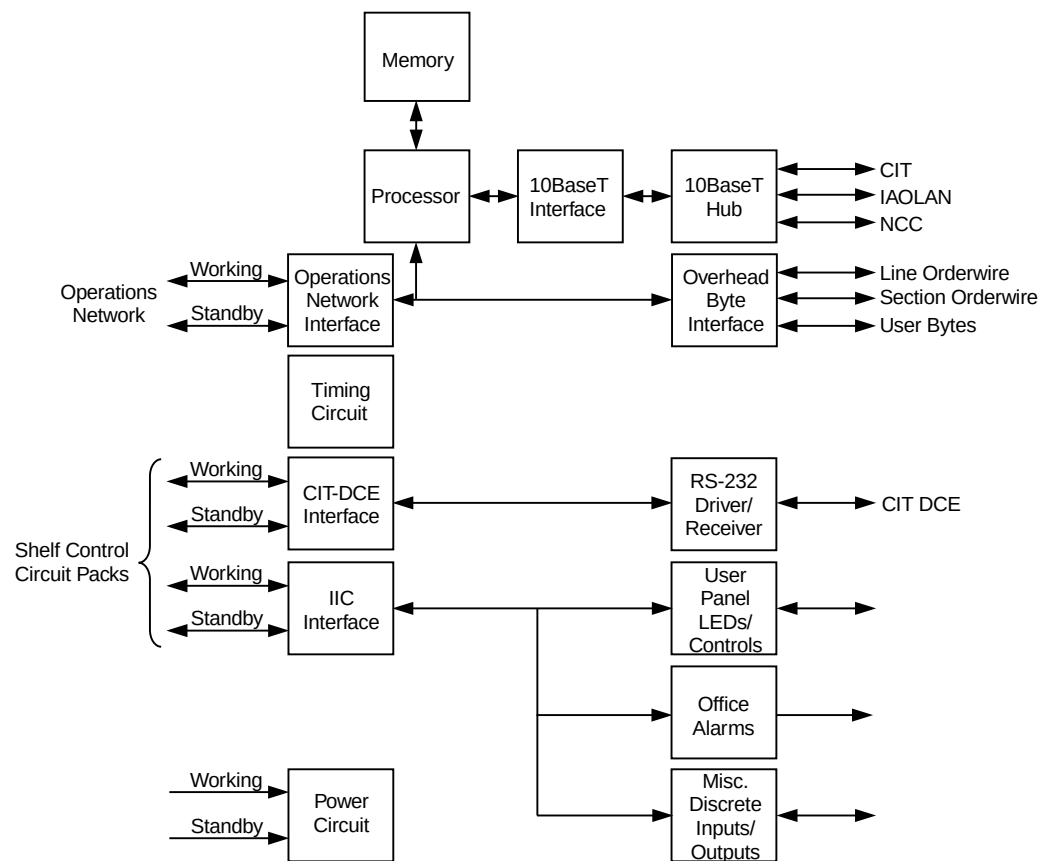
Faceplate LEDs

The ADJCTL/DCCEI circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder.
EI FAULT	Red	Continuously lighted when a failure is detected in the external interface (EI) part of the circuit pack.
ACTIVE	Green	Lighted when the circuit pack is active/in-service.
EI ACTIVE	Green	Lighted when the external interface (EI) part of the circuit pack is active/in-service.

The EI FAULT and EI ACTIVE LEDs are controlled by the CTL/SYS50DM and CTL/SR50DC circuit packs.

Faceplate push-button switch	The ADJCTL/DCCEI circuit pack has a RESET push-button switch recessed on its faceplate. When the RESET push-button switch is pressed, the ADJCTL/DCCEI circuit pack performs a circuit pack reset.
General description of operation	The ADJCTL/DCCEI circuit pack assembles and disassembles the embedded information for the transport overhead bytes. These overhead bytes include section and line data communications bytes, section and line orderwire bytes, and user bytes. The ADJCTL/DCCEI circuit pack also provides external user interfaces.
Functional block diagram	The following figure shows a functional block diagram of the ADJCTL/DCCEI circuit pack.



NC-USM-055

Control circuitry The processor controls and monitors the operation of the circuit pack. The processor also performs protocol processing of the open systems interconnection (OSI) 7-layer stack for the 10BaseT interface. The processor also manages communication with the CTL/SYS50D and CTL/SYS50DM circuit packs via the operations network. In Release 2 and later releases, the processor also manages communication with the CTL/SR50DC circuit pack.

Memory circuitry The ADJCTL/DCCEI circuit pack provides the following memory functions.

Start-up memory

The start-up memory of the LEY1 and LEY1AE ADJCTL/DCCEI circuit packs consist of one megabyte of flash electrically-erasable programmable read-only memory (flash EEPROM). The start-up memory contains the program that allows the processor to load the executable code and data from the CTL/SYS50DM or CTL/SR50DC circuit pack into the operating memory. The program allows the processor to start up operation during a powerup or reset condition, or when initializing new software.

Operating memory

The operating memory of the LEY1 and LEY1AE ADJCTL/DCCEI circuit packs consist of 32 megabytes of dynamic random access memory (DRAM). The operating memory is used to store executable code/data.

Nonvolatile memory

The nonvolatile memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the circuit pack history such as the *CLEI* code and type/version information.

Interface circuitry The ADJCTL/DCCEI circuit pack provides the following external interface functions.

10BaseT interface

The 10BaseT interface provides access to the intraoffice LAN (10 Mb/s ethernet LAN) via the 10BaseT four-port hub. The 10BaseT interface performs protocol processing for physical layer 1 of the OSI 7-layer stack for the intraoffice LAN (IAOLAN) data.

In the receive direction, the 10BaseT interface accepts IAOLAN data from the 10BaseT four-port hub. The IAOLAN data is routed to the processor for OSI protocol processing.

In the transmit direction, the 10BaseT interface accepts the IAOLAN data from the processor and transmits the information to the 10BaseT four-port hub.

Operations network interface

The operations network interface provides access to the CTL/SYS50D and CTL/SYS50DM circuit packs and transmission port units via the operations network. In Release 2 and later releases the operations network interface also provides access to the CTL/SR50DC circuit pack. For more information about the operations network, refer to *Chapter 6, Control, Transmission, and Synchronization Interfaces*.

Overhead byte interface

The overhead byte interface accepts the data communications channel (DCC) bytes from the operations network or the intraoffice LAN (IAOLAN) and the following overhead bytes from the shelf backplane:

- Line orderwire
- Section orderwire
- User

The overhead byte interface multiplexes this information and sends it via the operations network to the transmission port units for transmission over the optical transmission line. This information provides end-to-end communications and maintenance.

In the receive direction, the transmission port units transmit the overhead bytes via the operations network to the overhead byte interface. The overhead byte interface then demultiplexes the DCC and overhead bytes and makes them available for use.

Supported overhead bytes

The ADJCTL/DCCEI circuit packs supports the following overhead bytes.

Name	Overhead byte	Data rate	Access
Orderwire	E1a	64 kb/s	Backplane
Orderwire	E1b	64 kb/s	Backplane
Orderwire	E2a	64 kb/s	Backplane
Orderwire	E2b	64 kb/s	Backplane
User	F1	64 kb/s	Backplane
User	F2	64 kb/s	Backplane
DCC	D1-D3	192 kb/s	IAOLAN
DCC	D4-D12	576 kb/s	IAOLAN

Inter-integrated circuit interface

The inter-integrated circuit (IIC) interface is a communication link between the ADJCTL/DCCEI circuit pack and the CTL/SYS50DM or CTL/SR50DC circuit packs. The inter-integrated circuit interface allows the CTL/SYS50DM or CTL/SR50DC circuit pack to control the user panel and office alarms.

Timing circuitry

A free-running 6.48-MHz oscillator provides a reference signal for the timing circuit. The timing circuit multiplies the 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. The 155.52-MHz timing signal is used to generate all other output timing signals.

User interface circuitry The ADJCTL/DCCEI circuit pack provides the following user interface functions.

Four-Port 10BaseT hub

The four-port 10Base-T hub provides one internal port for the system and three external user ports. The three external user ports are for the:

- WaveStar Craft Interface Terminal (WaveStar CIT)
- Intraoffice LAN (IAOLAN)
- Network Communications Controller (NCC)

CIT DCE

The CIT DCE interface is configured as data circuit equipment (DCE) for direct craft interface terminal (CIT) access. The CIT DCE interface allows direct access to a PC running WaveStar CIT software. The CIT DCE interface supports data rates up to 19200 baud. The CIT DCE interface is reserved for use in a future release.

User panel LEDs and controls

The ADJCTL/DCCEI circuit pack provides the outputs to light the following LEDs on the user panel:

- Critical (CR) alarm
- Major (MJ) alarm
- Minor (MN) alarm
- Abnormal (ABN) status
- Near-end activity (NE ACTY)
- Far-end activity (FE ACTY)
- Power on (PWR ON)

The ADJCTL/DCCEI circuit pack also accepts the alarm cut-off (ACO) and LED test (LED TEST) inputs from the user panel. For more information about the user panel, refer to *Chapter 4, Operations Interfaces*.

Office alarms

The ADJCTL/DCCEI circuit pack provides relays to interface with a central office alarm grid. The relays are controlled by the CTL/SYS50DM or CTL/SR50DC circuit packs. Relays are provided for audible and visible alarms for the following:

- Critical
- Major
- Minor

The normally closed contacts for the critical and major relays provide the alarm closure if power fails. For more information about the office alarms interface, refer to *Chapter 4, Operations Interfaces*.

Protection circuitry

The ADJCTL/DCCEI circuit pack provides the following protection functions.

Control complex protection

Control complex protection is performed by selecting the working or standby signals from the CTL/SYS50DM or CTL/SR50DC circuit packs. The ADJCTL/DCCEI circuit pack monitors these signals and can select the working or standby signal. The CTL/SYS50DM or CTL/SR50DC circuit pack can inhibit this selection and make its own selection.

Power circuitry

The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V and +3.3 V used on the circuit pack.

The ADJCTL/DCCEI circuit pack monitors the two power sources. If the ADJCTL/DCCEI circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

- Quick reference summary** The ADJCTL/DCCEI circuit pack performs the following control and interface functions:
- Interfaces with the 10BaseT interface to send and receive IAOLAN data
 - Interfaces with the CTL/SYS50D, CTL/SYS50DM, CTL/SR50DC, and ADJCTL/DCC circuit packs via the operations network interface to send and receive system messages
 - Processes and routes messages between the 10BaseT and operations network interfaces using the open system interconnection (OSI) protocol
 - Provides communications between the transmission port units and the shelf control circuit packs using the operations network
 - Provides the following external user interfaces:
 - CIT DCE interface for direct local access to the system operating at up to 19200 baud (reserved for future use)
 - Office alarms
 - User panel LEDs and controls
 - User-settable miscellaneous discrete interface that provides environmental inputs and control outputs (reserved for future use)
 - Provides internal fault detection and interfaces with the CTL/SYS50DM or CTL/SR50DC circuit pack
 - Stores inventory information (for example, CLEI code and serial number)
 - Controls the circuit pack faceplate FAULT and ACTIVE LEDs



BSW Circuit Pack

Purpose of circuit pack

The Byte Switch (BSW) circuit pack contains four time-slot interchange devices that are used to form the fully redundant 1+1 main switch fabric.

BSW circuit pack faceplate

The following figure shows the BSW circuit pack faceplate.



NC-USM-038

Faceplate LEDs The BSW circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder.
ACTIVE	Green	Lighted when the circuit pack is active/in-service.

The red FAULT LED is controlled by the Switch Interface Expander (SWIEX) circuit packs.

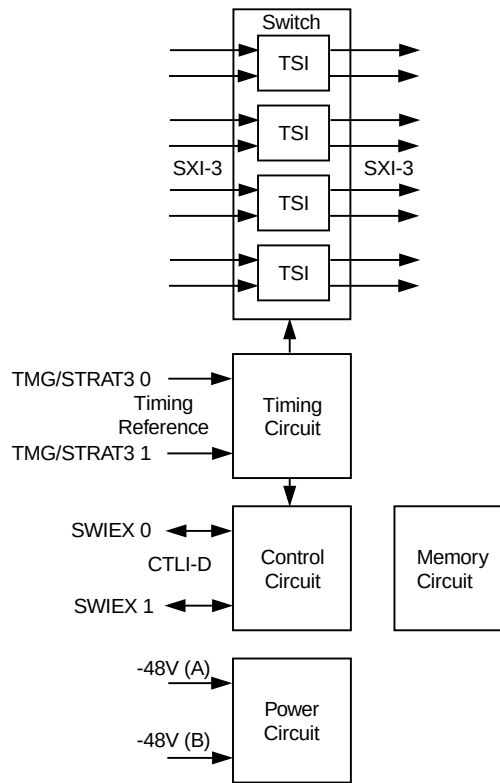
General description of operation

The BSW circuit packs in the Switch Shelf 0 and Switch Shelf 1 form the fully redundant 1+1 main switching fabric. In WaveStar BandWidth Manager system, one switch shelf equipped with 16 BSW circuit packs accepts up to 4608 STS-1/1536 STM-1 inputs and routes them to any one or more of 4608 STS-1/1536 STM-1 outputs. The switch fabric completes the STS-1/STM-1 transmission circuits based on the user-specified cross-connections.

Each BSW circuit pack accepts eight 155.52 Mb/s SXI-3 signals from each SWIF circuit pack. The BSW circuit pack contains four time-slot interchange devices that perform a single-stage STS-1/VC-3 slice switch on eight bytes of the 32-byte slices. The BSW circuit packs combine for a full 32-slice STS-1/VC-3 switch. Each BSW circuit pack outputs eight SXI-3 signals to each SWIF circuit pack.

Functional block diagram

The following figure shows a functional block diagram of the BSW circuit pack.



NC-USM-042

Control circuitry

The BSW circuit pack has no on-board processor. All control and switching information comes from the CTL/SYS50D circuit packs via the control interface for devices (CTLI-D) interface. The BSW circuit pack reports the status of the circuit pack and the incoming signals, as well as the circuit pack inventory information (for example, the *CLEI* code and serial number). The CTL/SYS50D circuit packs use the status information for fault detection and isolation.

Memory circuitry

The nonvolatile inventory memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the port unit history such as the *CLEI* code and type/version information.

Switch circuitry The switch circuitry consists of four time-slot interchange (TSI) devices. Each TSI device accepts two 155.52 Mb/s SXI-3 signals from each Switch Interface (SWIF) circuit pack. (The four TSI devices accept eight SXI-3 signals from each SWIF circuit pack.) Each TSI device performs an STS-1/VC-3 slice switch on 2 bytes of the 32-byte slices and returns 2 SXI-3 signals to each SWIF circuit pack. The TSI device also sends an 8-MHz timing reference signal to each SWIF circuit pack.

Timing circuitry The timing circuit receives two 6.48-MHz timing reference signals from the shelf TMG/STRAT3 circuit packs. The control circuit selects the timing reference signal that is used. The timing circuit multiplies the selected 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. If both 6.48-MHz timing reference signals are not available, a free-running 6.48-MHz oscillator provides a reference signal for the timing circuit.

Protection circuitry The BSW circuit pack provides the following protection functions.

Main switch fabric protection

The BSW circuit packs on the Switch Shelf 0 and the Switch Shelf 1 provide fully redundant 1+1 transmission protection. The BSW circuit packs are protected on an individual circuit pack basis. For example, if the side 0 BSW 1 circuit pack is active and then fails, the system switches to the side 1 BSW 1 circuit pack. The active BSW circuit packs may individually reside in side 0 or side 1.

Control complex protection

Control complex protection is performed by selecting the working or standby CTLI-D signal from the SWIEX circuit packs. The BSW circuit pack monitors these signals and can select the working or standby signal. The CTL/SYS50D circuit pack can inhibit this selection and make its own selection.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The BSW circuit pack monitors these timing reference signals and can select the working or standby timing reference signal until the protection algorithm of the CTL/SYS50D circuit pack makes a selection.

Power circuitry The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +3.3 V used on the circuit pack.

The BSW circuit pack monitors the two power sources. If the circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

Quick reference summary The BSW circuit pack provides the following functions.

Switch functions

The BSW circuit pack performs the following switch functions:

- Receives eight 155.52 Mb/s SXI-3 signals from each SWIF circuit pack
- Performs a single-stage STS-1/VC-3 slice switch on 8 bytes of the 32-byte slices
- Sends eight 155.52 Mb/s SXI-3 signals to each SWIF circuit pack

Timing and control functions

The BSW circuit pack performs the following timing and control functions:

- Selects the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs
- Sends an 8-MHz timing reference signal to each SWIF circuit pack
- Selects the 8 working or 8 standby SXI-3 signals from each SWIF circuit pack
- Performs internal fault detection and interfaces with the SWIEX circuit packs using the CTLI-D interface
- Stores inventory information (for example, the *CLEI* code and serial number)
- Controls the circuit pack faceplate ACTIVE LED



CSIEX Circuit Pack

Purpose of circuit pack The Control System Interface Expander (CSIEX) expands the number of internal interfaces to and from the Control/System 50D (CTL/SYS50D) circuit packs.

Supported CSIEX circuit packs The following table shows the supported CSIEX circuit packs.

Name	Code	Description
CSIEX	LEZ1 and LEZ1AE	To be supplied.
CSIEX	LEZ1B and LEZ1BE	To be supplied.

CSIEX circuit pack faceplate The following figure shows the CSIEX circuit pack faceplate.



NC-USM-037

Faceplate LEDs

The CSIEX circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder.
ACTIVE	Green	Lighted when the circuit pack is active/in-service.

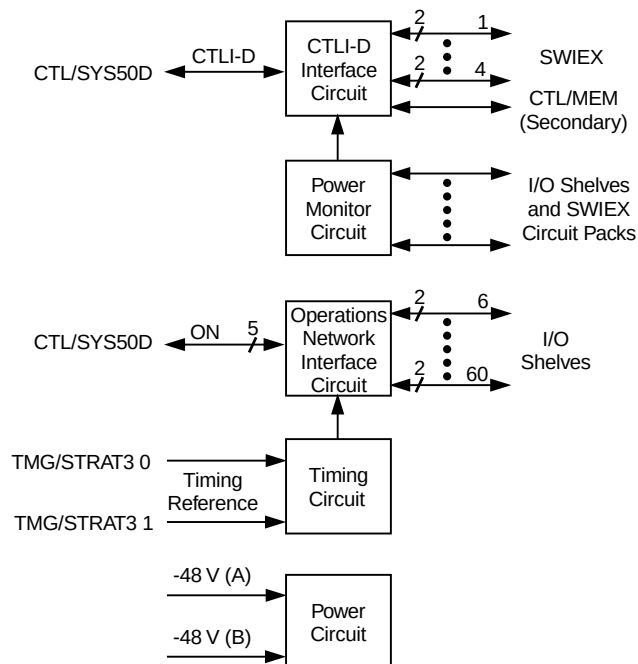
The red FAULT LED is controlled by the Control/System 50D (CTL/SYS50D) circuit packs.

General description of operation

The CSIEX circuit pack acts as a hub that expands the interfaces to and from the CTL/SYS50D circuit pack. The CSIEX circuit pack expands the control interface for devices (CTLI-D) interface to up to four Switch Interface Expander (SWIEX) circuit packs and one secondary CTL/MEM circuit pack. The CSIEX circuit pack also expands the operations network (ON) interface to the working and standby CTL/SYS50DM and CTL/SR50DC circuit packs on I/O Shelves 6 through 24. Up to 60 I/O Shelves will be supported in the future. (The CTL/SYS50D circuit pack provides ON interfaces to the CTL/SYS50DM and CTL/SR50DC circuit packs on I/O Shelves 1 through 5.)

Functional block diagram

The following figure shows a functional block diagram of the CSIEX circuit pack.



NC-USM-043

Control circuitry	The CSIEX circuit pack has no on-board processor. All control and switching information comes from the CTL/SYS50D circuit pack via the control interface for devices (CTLI-D) circuit. The CSIEX circuit pack reports the status of the circuit pack and the incoming signals, as well as the circuit pack inventory information (for example, the <i>CLEI</i> code and serial number). The CTL/SYS50D circuit pack uses the status information for fault detection and isolation.
Memory circuitry	The memory circuitry consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the circuit pack history such as the <i>CLEI</i> code and type/version information.
Interface circuitry	The CSIEX circuit pack provides the following interface functions. Control interface for devices (CTLI-D) circuit The CTLI-D circuit accepts one CTLI-D link from the CTL/SYS50D circuit pack and provides up to eight CTLI-D links to the SWIEX circuit packs and one CTLI-D link to the secondary CTL/MEM circuit pack. The CSIEX circuit pack supports two CTLI-D links to up to four SWIEX circuit packs. Operations network circuit The operations network circuit accepts five operations network links from the CTL/SYS50D circuit pack and provides up to 110 operations network links to the CTL/SYS50DM and CTL/SR50DC circuit packs on the I/O Shelves. The CSIEX circuit pack supports one working and one standby operations network link to up to 55 I/O Shelves. For more information about the operations network, refer to <i>Chapter 6, Control, Transmission, and Synchronization Interface</i>.
Power monitor circuit	The power monitor circuit receives loss of power alarm information from the I/O Shelves and the SWIEX circuit packs. The power monitor circuit reports all loss of power information to the CTL/SYS50D circuit pack via the CTLI-D circuit.
Timing circuitry	The timing circuit receives two 6.48-MHz timing reference signals from the TMG/STRAT3 circuit packs. The timing circuit multiplies the 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. If both 6.48-MHz timing reference signals are not available, a free-running 6.48-MHz oscillator provides a reference signal for the timing circuit.

Protection circuitry Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The CSIEX circuit pack monitors these timing reference signals and can select the working or standby timing reference signal until the protection algorithm of the CTL/SYS50D circuit pack makes a selection.

Power circuitry The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V and +3.3 V used on the circuit pack.

The CSIEX circuit pack monitors the two power sources. If the CSIEX circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

Quick reference summary The CSIEX circuit pack performs the following control functions:

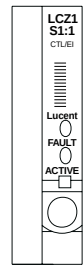
- Expands five operations network links from the CTL/SYS50D circuit pack into 110 operations network links to the CTL/SYS50DM and CTL/SR50DC circuit packs on up to 55 I/O Shelves
- Provides the power reset signal (PWRRST) signals for up to 110 CTL/SYS50DM and CTL/SR50DC circuit packs on up to 55 I/O Shelves
- Receives equipage signals (EQP) from up to 110 CTL/SYS50DM and CTL/SR50DC circuit packs on up to 55 I/O Shelves
- Expands one control interface for devices (CTLI-D) interface from the CTL/SYS50D circuit pack into eight CTLI-D interfaces to up to four SWIEX circuit packs and one secondary CTL/MEM circuit pack
- Monitors loss of power on up to 55 I/O Shelves and reports any loss of power failures to the CTL/SYS50D circuit pack
- Performs internal fault detection and interfaces with the CTL/SYS50D circuit pack using the CTLI-D interface
- Stores inventory information (for example, the *CLEI* code and serial number)
- Controls the circuit pack faceplate ACTIVE LED



CTL/EI Circuit Pack

Purpose of circuit pack The Control/External Interface (CTL/EI) circuit pack provides external user interfaces for the system.

CTL/EI circuit pack faceplate The following figure shows the CTL/EI circuit pack faceplate.



NC-USM-036

Faceplate LEDs The CTL/EI circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder. Flashes on and off when an incoming signal failure is detected.
ACTIVE	Green	Lighted when the circuit pack is active/in-service.

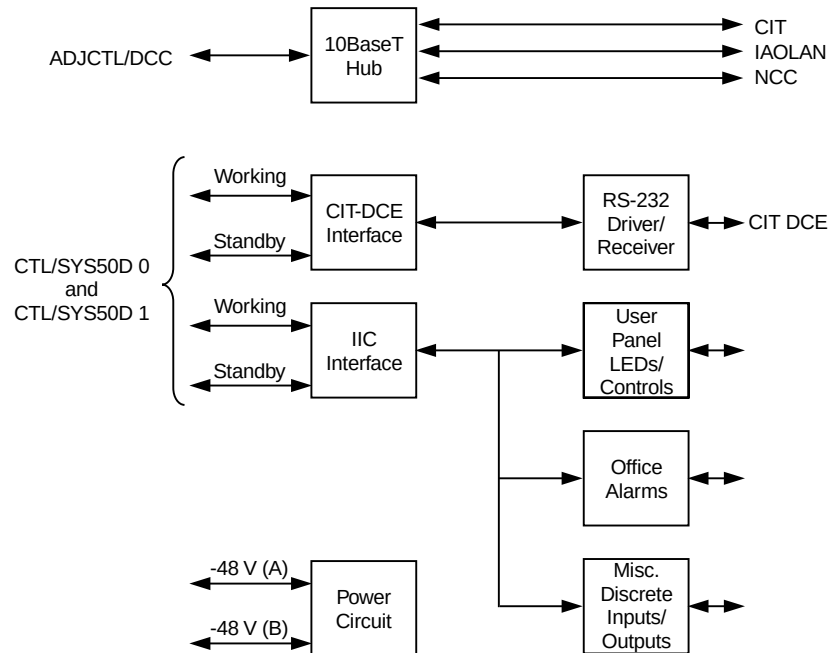
The FAULT and ACTIVE LEDs are controlled by the Control/System 50D (CTL/SYS50D) circuit packs.

General description of operation The CTL/EI circuit pack provides the following external user interfaces:

- Four-port 10BaseT hub
- CIT (DCE) interface (reserved for future use)
- User panel LEDs and controls
- Office alarms interface
- Miscellaneous discrete interface (reserved for future use)

Functional block diagram

The following figure shows a functional block diagram of the CTL/EI circuit pack.



NC-USM-044

Control circuitry

The CTL/EI circuit pack has no on-board processor. All control and switching information comes from the CTL/SYS50D circuit packs via the inter-integrated circuit (IIC) interface. The CTL/EI circuit pack reports the status of the circuit pack and the incoming signals, as well as the circuit pack inventory information (for example, the *CLEI* code and serial number). The CTL/SYS50D circuit packs use the status information for fault detection and isolation.

Memory circuitry

The nonvolatile inventory memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the port unit history such as the *CLEI* code and type/version information.

Interface circuitry

The inter-integrated circuit (IIC) interface is the main communication link between the CTL/EI circuit pack and the CTL/SYS50D circuit packs. The inter-integrated circuit interface allows the CTL/SYS50D circuit packs to monitor and control the user panel, office alarms, and miscellaneous discrete user interfaces.

User interface circuitry The CTL/EI circuit pack provides the following user interface functions.

Four-Port 10BaseT hub

The four-port 10Base-T hub provides one internal port to the associated Adjunct Control/Data Communications Channel (ADJCTL/DCC) circuit pack and three external user ports. The three external user ports are for the:

- Craft interface terminal (CIT)
- Intraoffice LAN (IAOLAN)
- Network communications controller (NCC)

CIT DCE

The CIT DCE interface is configured as data circuit equipment (DCE) for direct craft interface terminal (CIT) access. The CIT DCE interface allows direct access to a PC running WaveStar CIT software. The CIT DCE interface supports data rates up to 19200 baud. The CIT DCE interface is reserved for use in a future release.

User panel LEDs and controls

The CTL/EI circuit pack provides the outputs to light the following LEDs on the user panel:

- Critical (CR) alarm
- Major (MJ) alarm
- Minor (MN) alarm
- Abnormal (ABN) status
- Near-end activity (NE ACTY)
- Far-end activity (FE ACTY)
- Power on (PWR ON)

The CTL/EI circuit pack also accepts the alarm cutoff (ACO) and LED test (LED TEST) inputs from the user panel. For more information about the user panel, refer to *Chapter 4, Operations Interfaces*.

Office alarms

The CTL/EI circuit pack provides relays to interface with a central office alarm grid. The relays are controlled by the CTL/SYS50D circuit packs. Relays are provided for audible and visible alarms for the following:

- Critical
- Major
- Minor

The normally closed contacts for the critical and major relays provide the alarm closure if power fails. For more information about the office alarms interface, refer to *Chapter 4, Operations Interfaces*.

Miscellaneous discretes

The CTL/EI circuit pack accepts 23 user-settable environmental inputs and provides 8 user-settable control outputs. The inputs and outputs are monitored and controlled by the CTL/SYS50D circuit packs. The miscellaneous discrete interface is reserved for use in a future release.

Protection circuitry

Control complex protection is performed by selecting the working or standby signals from the CTL/SYS50D circuit packs. The CTL/EI circuit pack monitors these signals and can select the working or standby signal. The CTL/SYS50D circuit pack can inhibit this selection and make its own selection.

Power circuitry

The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V used on the circuit pack.

The CTL/EI circuit pack monitors the two power sources. If the CTL/EI circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the CTL/EI circuit pack faceplate.

Quick reference summary

The CTL/EI circuit pack performs the following interface functions:

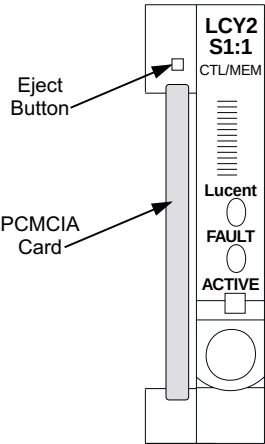
- Interfaces with the ADJCTL/DCC circuit pack via the 10BaseT interface to send and receive IAOLAN data
- Interfaces with the CTL/SYS50D circuit packs via the inter-integrated circuit bus operations network interface to send and receive control messages
- Provides the following external user interfaces:
 - CIT DCE interface for direct local access to the system operating at up to 19200 baud (reserved for future use)
 - Office alarms
 - User panel LEDs and controls
 - User-settable miscellaneous discrete interface that provides environmental inputs and control outputs (reserved for future use)
- Performs internal fault detection and interfaces with the CTL/SYS50D circuit packs
- Stores inventory information (for example, the CLEI code and serial number)



CTL/MEM Circuit Pack

Purpose of circuit pack The Control/Memory (CTL/MEM) circuit pack provides the nonvolatile memory necessary for storing the executable code and data for the system.

CTL/MEM circuit pack faceplate The following figure shows the CTL/MEM circuit pack faceplate.



Faceplate LEDs The CTL/MEM circuit pack provides the following faceplate LEDs.

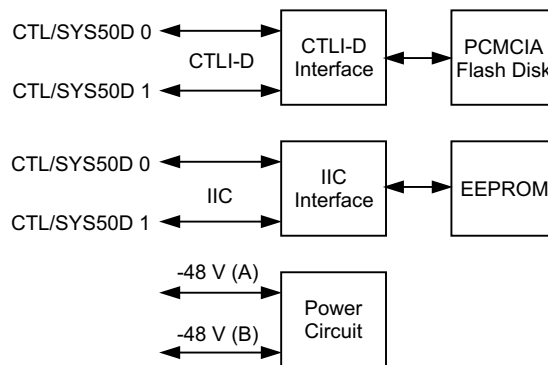
LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder. Flashes on and off when corrupted memory is detected.
ACTIVE	Green	Lighted when the circuit pack is active/in-service.

The FAULT and ACTIVE LEDs are controlled by the Control/System 50D (CTL/SYS50D) circuit packs.

General description of operation The CTL/MEM circuit pack provides nonvolatile program (executable code) and configuration (data) memory for the system. The CTL/MEM circuit pack communicates with the CTL/SYS50D circuit pack via the control interface for devices (CTLI-D) interface.

Functional block diagram

The following figure shows a functional block diagram of the CTL/MEM circuit pack.



NC-USM-046

Control circuitry

The CTL/MEM circuit pack has no on-board processor. All control and switching information comes from the CTL/SYS50D circuit packs via the inter-integrated circuit (IIC) interface. The CTL/EI circuit pack reports the status of the circuit pack and the circuit pack inventory information (for example, the *CLEI* code and serial number). The CTL/SYS50D circuit packs use the status information for fault detection and isolation.

Memory circuitry

The CTL/MEM circuit pack provides the following memory functions.

Nonvolatile program and configuration storage

The program (executable code) and configuration (data) are stored on a Personal Computer Memory Card International Association (PCMCIA) flash disk card. The flash disk card supports up to 220 megabytes of memory. The flash disk cards are removable and can be accessed from the circuit pack faceplate.

Nonvolatile inventory storage

The nonvolatile inventory memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile inventory memory is used to store information about the circuit pack history such as the *CLEI* code and type/version information.

Interface circuitry The CTL/MEM circuit pack provides the following interface functions.

Control interface for devices (CTLI-D) interface

The control Interface for devices (CTLI-D) interface is used to transfer data between the PCMCIA flash disk on the CTL/MEM circuit pack and the CTL/SYS50D circuit packs. The CTL/SYS50D circuit pack sends/requests data to/from the CTL/MEM circuit pack. The CTL/SYS50D circuit pack sends/requests data to/from the secondary CTL/MEM circuit pack via the CSIEX circuit pack.

Inter-integrated circuit (IIC) interface

The IIC interface is the main communication link between the CTL/MEM and the CTL/SYS50 circuit packs. The IIC interface allows the CTL/SYS50D circuit packs to monitor and control the CTL/MEM circuit pack.

Protection circuitry Control complex protection is performed by selecting the working or standby signals from the CTL/SYS50D circuit packs. The CTL/MEM circuit pack monitors these signals and can select the working or standby signals. The CTL/SYS50D circuit pack can inhibit this selection and make its own selection.

Power circuitry The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V and +3.3 V used on the circuit pack.

The CTL/MEM circuit pack monitors the two power sources. If the CTL/MEM circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

Quick reference summary

The CTL/MEM circuit pack performs the following control and interface functions:

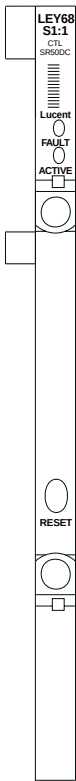
- Provides memory for storing system program (executable code)
- Provides memory for storing configuration information (data)
- Interfaces with the CTL/SYS50D circuit packs via the control interface for devices (CTLI-D) and inter-integrated circuit (IIC) buses
- Performs fault detection and interfaces with the CTL/SYS50D circuit packs
- Stores inventory information (for example, the *CLEI* code and serial number)



CTL/SR50DC Circuit Pack

Purpose of circuit pack The Control/Sub Rack 50DC (CTL/SR50DC) circuit pack provides the main control and memory functions for the 10G I/O Shelf.

CTL/SR50DC circuit pack faceplate The following figure shows the CTL/SR50DC circuit pack faceplate.



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Faceplate LEDs The CTL/SR50DC circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder. Flashes on and off when a memory corruption is detected.
ACTIVE	Green	Lighted when the circuit pack is active/in-service.

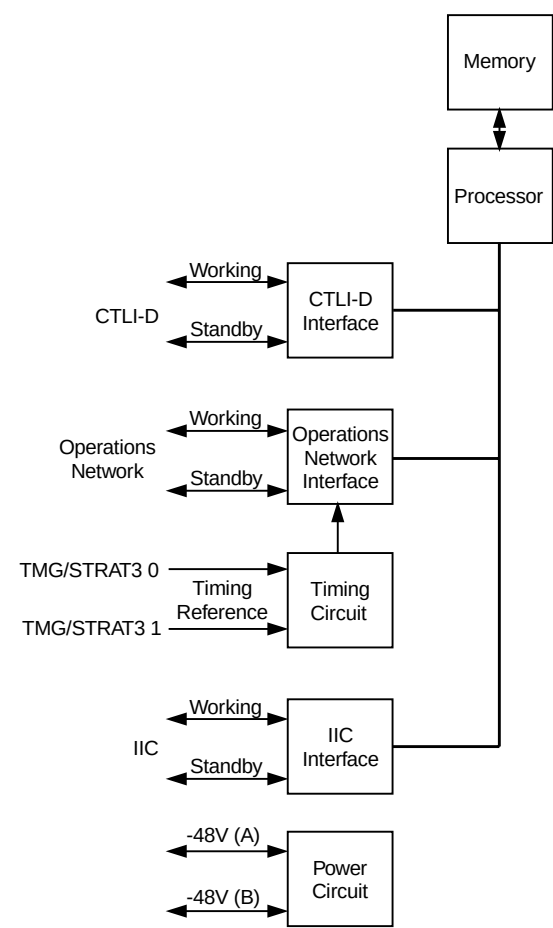
Faceplate push-button switch The CTL/SR50DC circuit pack has a RESET push-button switch recessed on its faceplate. When the RESET push-button switch is pressed, the CTL/SR50DC circuit pack performs a circuit pack reset.

General description of operation

The CTL/SR50DC circuit pack provides control and memory functions for the 10G I/O Shelf. It performs shelf-level computations and performance monitoring.

Functional block diagram

The following figure shows a functional block diagram of the CTL/SR50DC circuit pack.



NC-USM-189

Control circuitry

The processor is the middle-level processor in the system 3-level control hierarchy. The processor controls and monitors the operation of the shelf. The processor also manages communication with other circuit packs via the operations network, control interface for devices, and inter-integrated circuit bus.

Memory circuitry The CTL/SR50DC circuit pack provides the following memory functions.

Start-up memory

The start-up memory consists of 2 megabytes of flash electrically-erasable programmable read-only memory (flash EEPROM). The start-up memory contains the program that allows the processor to load the executable code and data from the secondary operating memory into the operating memory. The program allows the processor to start up operation during a powerup or reset condition, or when initializing new software.

Operating memory

The operating memory consists of up to 64 megabytes of dynamic random access memory (DRAM). The operating memory is used to store the operating executable code (program) and data (configuration information).

Nonvolatile inventory memory

The nonvolatile inventory memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the circuit pack history such as the *CLEI* code and type/version information.

Interface circuitry The CTL/SR50DC circuit pack provides the following interface functions.

Operations network interface

The operations network interface provides access to the ADJCTL/DCCEI, ADJCTL/DCC, transmission port units, and CTL/SYS50D circuit packs via the operations network. For more information about the operations network, refer to *Chapter 6, Control, Transmission, and Synchronization Interfaces*.

Control interface for devices (CTLI-D) interface

The CTLI-D interface provides access to the external interface function of the TMG/STRAT3 and SWITCH/STS768 circuit packs via the CTLI-D bus.

Inter-integrated circuit interface

The inter-integrated circuit interface provides access to the external interface function of the ADJCTL/DCCEI circuit pack via the inter-integrated circuit bus.

Timing circuitry

The timing circuit receives two 6.48-MHz timing reference signals from the TMG/STRAT3 circuit packs. The timing circuit multiplies the 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. If both 6.48-MHz timing reference signals are not available, a free-running 6.48-MHz oscillator provides a reference signal for the timing circuit.

Protection circuitry

The CTL/SR50DC circuit pack provides the following protection functions.

Control complex protection

Control complex protection is performed by selecting the side 0 control complex circuit packs (CTL/SYS50D 0, CTL/EI 0, and CSIEX 0) or the side 1 control complex circuit packs (CTL/SYS50D 1, CTL/EI 1, and CSIEX 1) on the Control Shelf. The CTL/SR50DC circuit packs monitor the working and standby control complexes and can autonomously switch.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The CTL/SR50DC circuit pack monitors these timing reference signals and can select the working or standby timing reference signal.

Power circuitry

The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +3.3 V used on the circuit pack.

The CTL/SR50DC circuit pack monitors the two power sources. If the CTL/SR50DC circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

Quick reference summary The CTL/SR50DC circuit pack provides the following functions.

Control functions

The CTL/SR50DC circuit pack performs the following control and maintenance functions:

- Stores the operating copy of the system executable code and data
- Performs shelf maintenance computations and performance monitoring
- Performs self-audits
- Stores inventory information (for example, the *CLEI* code and serial number)
- Controls the circuit pack faceplate EI FAULT LED on the ADJCTL/DCCEI circuit pack
- Controls the circuit pack faceplate FAULT LED on the SWITCH/STS768 and TMG/STRAT3 circuit packs
- Controls the circuit pack FAULT and ACTIVE LEDs on the circuit pack faceplate

Interface functions

The CTL/SR50DC circuit pack performs the following interface functions:

- Communications with other circuit packs using the operations network
- Communications with other circuit packs using the control interface for devices (CTLI-D) bus
- Communications with other circuit packs using the inter-integrated circuit (IIC) bus



CTL/SYS50D Circuit Pack

Purpose of circuit pack The Control/System 50D (CTL/SYS50D) circuit pack provides the main system control functions for the system.

Supported CTL/SYS50D circuit packs The following table shows the supported CTL/SYS50D circuit packs.

Name	Code	Description
CTL/SYS50D	LEY20 and LEY20AE	Provides 32 megabytes of operating memory.
CTL/SYS50D	LEY20B and LEY20BE	Provides 256 megabytes of operating memory.

CTL/SYS50D circuit pack faceplate The following figure shows the CTL/SYS50D circuit pack faceplate.



NC-USM-034

Faceplate LEDs The CTL/SYS50D circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder.
ACTIVE	Green	Lighted when the circuit pack is active/in-service.

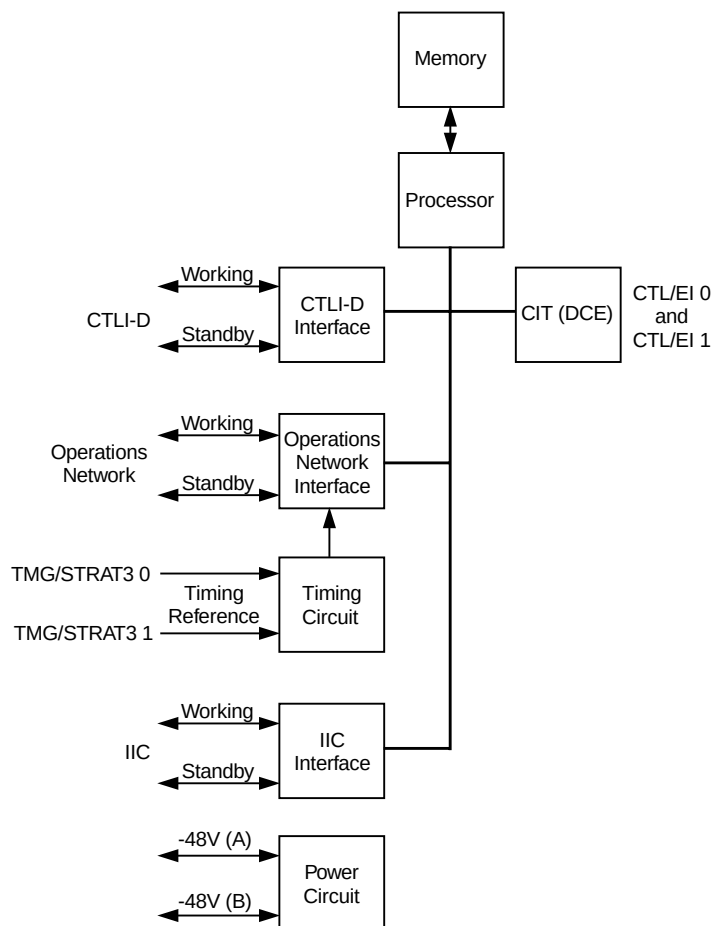
Faceplate push-button switch The CTL/SYS50D circuit pack has a RESET push-button switch recessed on its faceplate. When the RESET push-button switch is pressed, the CTL/SYS50D circuit pack performs a system reset.

General description of operation The CTL/SYS50D circuit pack provides overall administrative control of the system. It performs system-wide computations and performance monitoring. It also provides the serial user interfaces.

The CTL/SYS50D circuit pack also interfaces with the Control/Memory (CTL/MEM), Control/External Interface (CTL/EI), and Control System Interface Expander (CSIEX) circuit packs.

Functional block diagram

The following figure shows a functional block diagram of the CTL/SYS50D circuit pack.



NC-USM-054

Control circuitry

The processor is the highest level processor in the system 3-level control hierarchy. The processor controls and monitors the operation of the circuit pack. The processor also manages communication with other circuit packs via the operations network, control interface for devices, and inter-integrated circuit bus.

Memory circuitry The CTL/SYS50D circuit pack provides the following memory functions.

Start-up memory

The start-up memory consists of one megabyte of flash electrically-erasable programmable read-only memory (flash EEPROM). The start-up memory contains the program that allows the processor to load the executable code and data from the CTL/MEM circuit pack into the operating memory. The program allows the processor to start up operation during a powerup or reset condition, or when initializing new software.

Operating memory

The operating memory of the LEY20B CTL/SYS50D consists of up to 256 megabytes of dynamic random access memory (DRAM). The operating memory of the LEY20 CTL/SYS50D consists of up to 32 megabytes of DRAM. The operating memory is used to store executable code and data.

Nonvolatile inventory memory

The nonvolatile inventory memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the circuit pack history such as the *CLEI* code and type/version information.

Interface circuitry The CTL/SYS50D circuit pack provides the following interface functions.

Operations network interface

The operations network interface provides access to the ADJCTL/DCC, ADJCTL/DCCEI, CTL/SYS50DM, and CTL/SR50DC circuit packs via the operations network. For more information about the operations network, refer to *Chapter 6, Control, Transmission, and Synchronization Interfaces*.

Control interface for devices (CTLI-D) interface

The CTLI-D interface provides access to the CTL/MEM, CTL/EI, and CSIEX circuit packs via the CTLI-D bus.

Inter-integrated circuit interface

The inter-integrated circuit interface provides access to the CTL/MEM and CTL/EI circuit packs via the inter-integrated circuit bus.

Timing circuitry The timing circuit receives two 6.48-MHz timing reference signals from the TMG/STRAT3 circuit packs. The timing circuit multiplies the 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. If both 6.48-MHz timing reference signals are not available, a free-running 6.48-MHz oscillator provides a reference signal for the timing circuit.

User interface circuitry The CTL/SYS50D circuit pack provides the following user interface functions.

CIT DCE

The CIT DCE interface is configured as data circuit equipment (DCE) for direct craft interface terminal (CIT) access. The CIT DCE interface allows direct access to a PC running *WaveStar* CIT software. The CIT DCE interface supports data rates up to 19200 baud. The CIT DCE interface is provided via the CTL/EI circuit pack. The CIT DCE interface is reserved for use in a future release.

Protection circuitry The CTL/SYS50D circuit pack provides the following protection functions.

Control complex protection

Control complex protection is performed by selecting the working or standby CTLI-D and operations network signals. The CTL/SYS50D circuit pack monitors these signals and can select the working or standby signal.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The CTL/SYS50D circuit pack monitors these timing reference signals and can select the working or standby timing reference signal.

Power circuitry The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V and +3.3 V used on the circuit pack.

The CTL/SYS50D circuit pack monitors the two power sources. If the CTL/SYS50D circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

Quick reference summary The CTL/SYS50D circuit pack provides the following functions.

Control functions

The CTL/SYS50D circuit pack performs the following control and maintenance functions:

- Stores the operating copy of the system executable code and data
- Performs system-wide maintenance computations and performance monitoring
- Automatically resets the system during powerup
- Maintains a real-time clock
- Performs self-audits
- Controls the circuit pack faceplate FAULT LED on the CTL/MEM, CTL/EI, CSIEX, and SWIEX circuit packs
- Stores inventory information (for example, the *CLEI* code and serial number)
- Controls the circuit pack FAULT and ACTIVE LEDs on the circuit pack faceplate

Interface functions

The CTL/SYS50D circuit pack performs the following interface functions:

- Communications with other circuit packs using the operations network
- Communications with other circuit packs using the control interface for devices (CTLI-D) bus
- Communications with other circuit packs using the inter-integrated circuit (IIC) bus
- CIT DCE interface via the CTL/EI circuit pack for direct local access to the system operating at up to 19200 baud



CTL/SYS50DM Circuit Pack

Purpose of circuit pack The Control/System 50DM (CTL/SYS50DM) circuit pack provides the main control and memory functions for the I/O Shelf.

CTL/SYS50DM circuit pack faceplate The following figure shows the CTL/SYS50DM circuit pack faceplate.



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Faceplate LEDs The CTL/SYS50DM circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected.
ACTIVE	Green	Lighted when the circuit pack is active/ in-service.
MEM ACTIVE	Green	The MEM ACTIVE LED and the flash disk memory card are not used.

Faceplate push-button switch

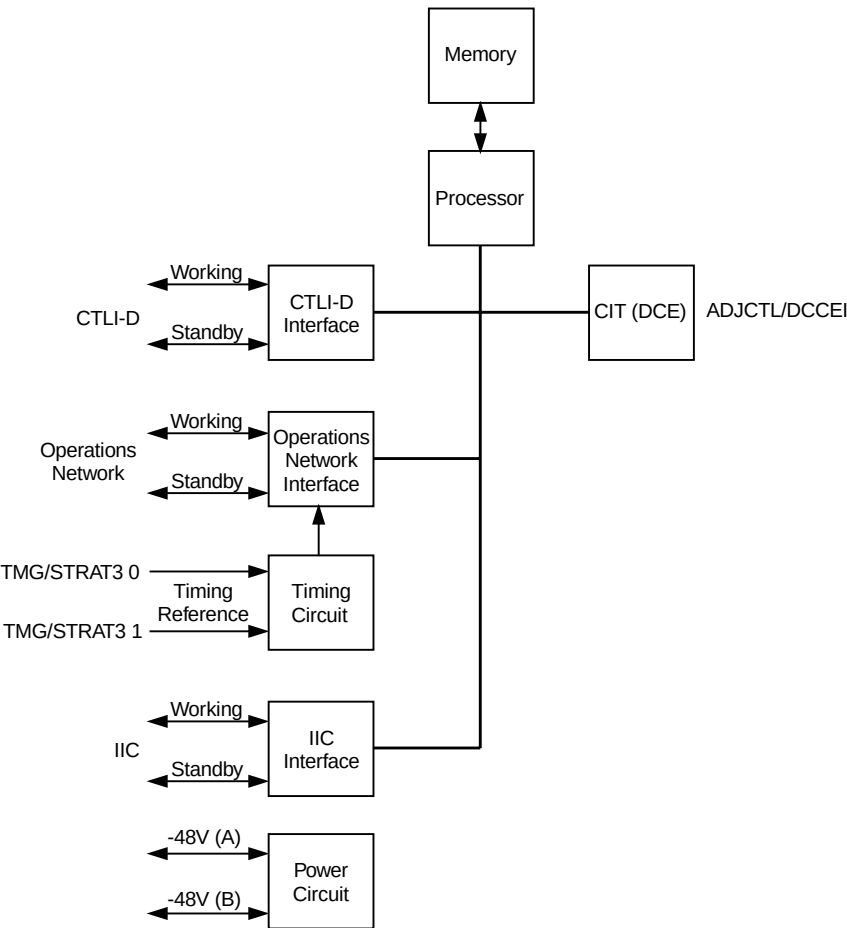
The CTL/SYS50DM circuit pack has a RESET push-button switch recessed on its faceplate. When the RESET push-button switch is pressed, the CTL/SYS50DM circuit pack performs a circuit pack reset.

General description of operation

The CTL/SYS50DM circuit pack provides control and memory functions for the I/O Shelf. It performs shelf-level computations and performance monitoring. It also provides the serial user interfaces.

Functional block diagram

The following figure shows a functional block diagram of the CTL/SYS50DM circuit pack.



NC-USM-191

Control circuitry

The processor is the middle-level processor in the system 3-level control hierarchy. The processor controls and monitors the operation of the circuit pack. The processor also manages communication with other circuit packs via the operations bus, control interface for devices, and inter-integrated circuit bus.

Memory circuitry The CTL/SYS50DM circuit pack provides the following memory functions.

Start-up memory

The start-up memory consists of 2 megabyte of flash electrically-erasable programmable read-only memory (flash EEPROM). The start-up memory contains the program that allows the processor to load the executable code and data from the secondary operating memory into the operating memory. The program allows the processor to start up operation during a powerup or reset condition, or when initializing new software.

Operating memory

The operating memory consists of up to 64 megabytes of dynamic random access memory (DRAM). The operating memory is used to store the operating executable code (program) and data (configuration information).

Nonvolatile inventory memory

The nonvolatile inventory memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the circuit pack history such as the *CLEI* code and type/version information.

Interface circuitry The CTL/SYS50DM circuit pack provides the following interface functions.

Operations network interface

The operations network interface provides access to the ADJCTL/DCCEI, transmission port units, and CTL/SYS50D circuit packs via the operations network. For more information about the operations network, refer to *Chapter 6, Control, Transmission, and Synchronization Interfaces*.

Control interface for devices (CTLI-D) interface

The CTLI-D interface provides access to the external interface function of the TMG/STRAT3 and SWITCH/STS576 circuit packs via the CTLI-D bus.

Inter-integrated circuit interface

The inter-integrated circuit interface provides access to the external interface function of the ADJCTL/DCCEI circuit pack via the inter-integrated circuit bus.

Timing circuitry

The timing circuit receives two 6.48-MHz timing reference signals from the TMG/STRAT3 circuit packs. The timing circuit multiplies the 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. If both 6.48-MHz timing reference signals are not available, a free-running 6.48-MHz oscillator provides a reference signal for the timing circuit.

User interface circuitry

The CTL/SYS50DM circuit pack provides the following user interface functions.

CIT DCE

The CIT DCE interface is configured as data circuit equipment (DCE) for direct WaveStar craft interface terminal (CIT) access. The CIT DCE interface allows direct access to a PC running *WaveStar* CIT software. The CIT DCE interface supports data rates up to 19200 baud. The CIT DCE interface is reserved for use in a future release.

Protection circuitry

The CTL/SYS50DM circuit pack provides the following protection functions.

Control complex protection

Control complex protection is performed by selecting the side 0 control complex circuit packs (CTL/SYS50D 0, CTL/EI 0, and CSIEX 0) or the side 1 control complex circuit packs (CTL/SYS50D 1, CTL/EI 1, and CSIEX 1) on the Control Shelf. The CTL/SR50DC circuit packs monitor the working and standby control complexes and can autonomously switch.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The CTL/SYS50DM circuit pack monitors these timing reference signals and can select the working or standby timing reference signal.

Power circuitry The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V and +3.3 V used on the circuit pack.

The CTL/SYS50DM circuit pack monitors the two power sources. If the CTL/SYS50D circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

Quick reference summary The CTL/SYS50DM circuit pack provides the following functions.

Control functions

The CTL/SYS50DM circuit pack performs the following control and maintenance functions:

- Stores the operating copy of the system executable code and data
- Performs shelf maintenance computations and performance monitoring
- Performs self-audits
- Stores inventory information (for example, the *CLEI* code and serial number)
- Controls the circuit pack faceplate EI FAULT LED on the ADJCTL/DCCEI circuit pack
- Controls the circuit pack faceplate FAULT LED on the SWITCH/STS576 and TMG/STRAT3 circuit pack
- Controls the circuit pack FAULT and ACTIVE LEDs on the circuit pack faceplate

Interface functions

The CTL/SYS50DM circuit pack performs the following interface functions:

- Communications with other circuit packs using the operations network
- Communications with other circuit packs using the control interface for devices (CTLI-D) bus
- Communications with other circuit packs using the inter-integrated circuit (IIC) bus
- CIT DCE interface via the ADJCTL/DCCEI circuit pack for direct local access to the system operating at up to 19200 baud (future)



DS3EC1/8 Port Unit

Purpose of circuit pack The DS3EC1 8-port interface (DS3EC1/8) port unit provides a low speed interface between eight asynchronous DS3 signals and an internal synchronous transmission interface signal (TXI). In Release 2 and later releases, the DS3EC1/8 port unit interfaces with up to eight DS3 and/or synchronous electrical carrier level 1 (EC-1) signals (provisionable).

DS3EC1/8 port unit faceplate The following figures shows the DS3EC1/8 port unit faceplate.



NC-USM-031

Faceplate LEDs The DS3EC1/8 port unit provides the following faceplate LEDs.

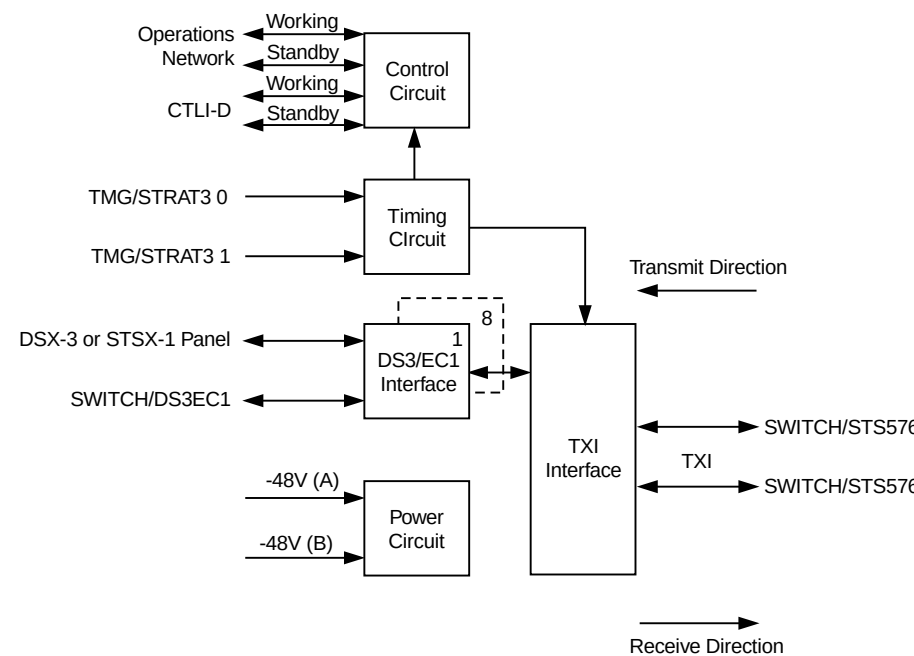
LED	Color	Function
FAULT	Red	Continuously lighted when a port unit failure is detected or the port unit loses one power feeder. Flashes on and off when an incoming signal failure from the DSX-3 or STSX-1 panel (or equivalent) is detected.
ACTIVE	Green	Lighted when the port unit is active/in-service.

General description of operation

The DS3EC1/8 port unit terminates up to eight bidirectional DS3 lines complying with standard DSX-3 signal specifications and/or EC-1 lines complying with SONET signal specifications. The eight electrical signals are converted to STS-1 signals and multiplexed into one internal transmission interface (TXI) signal (622.08 Mb/s). The TXI signal supports up to 12 multiplexed STS-1 signals. The TXI signal is sent to the 576x576 STS-1/192x192 STM-1 switch (SWITCH/STS576) circuit packs. In the transmit direction, the SWITCH/STS576 circuit packs send two TXI signals to the DS3EC1/8 port unit. The DS3EC1/8 port unit selects and demultiplexes one 622.08 Mb/s TXI signal into eight STS-1 signals. The STS-1 signals are converted back to DS3 or EC-1 signals. The DS3EC1/8 port unit also interfaces with the shelf Control/System 50DM (CTL/SYS50DM) circuit pack.

Functional block diagram

The following figure shows a functional block diagram of the DS3EC1/8 port unit.



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Control circuitry

The processor is the third-level processor in the system 3-level control hierarchy. The processor controls and monitors the operation of the port unit. The processor also manages communication with other circuit packs via the operations network and the control interface for devices (CTLI-D) interfaces.

Memory circuitry

The DS3EC1/8 port unit provides the following memory functions.

Start-up memory

The start-up memory consists of one megabyte of flash electrically-erasable programmable read-only memory (flash EEPROM). The start-up memory contains the program that allows the processor to load the executable code and data from the SYS50DM circuit pack into the operating memory. The program allows the processor to start up operation during a powerup or reset condition, or when initializing new software.

Operating memory

The operating memory consists of up to four megabytes of dynamic random access memory (DRAM). The operating memory is used to store the operating executable code (program) and data (configuration information).

Nonvolatile inventory memory

The nonvolatile inventory memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the port unit history such as the *CLEI* code and type/version information.

Transmission circuitry

The DS3EC1/8 port unit provides the following transmission functions.

Receive direction

In the receive direction, the DS3EC1/8 port unit accepts up to eight 44.736 Mb/s bipolar 3-zero substitution (B3ZS) coded DS3 signals and/or 51.84 Mb/s EC-1 signals. These DS3/EC-1 signals are split by the DS3/EC1 interface. One copy of the DS3/EC-1 signals is sent to the SWITCH/DS3EC1 circuit pack (for protection), and the other copy of the DS3/EC-1 signals is processed by the DS3/EC1 interface. The DS3/EC1 interface recovers timing from the DS3/EC-1 signals and sends the received data and recovered clock to the TXI interface.

The TXI interface converts each DS3/EC-1 to an STS-1 format (51.84 Mb/s). The STS-1 path overhead and pointer bytes are also added to the STS-1 signal. The byte multiplexer/demultiplexer then scrambles and multiplexes the eight STS-1 signals into one 622.08 Mb/s TXI signal. The 622.08 Mb/s TXI signal is sent to the SWITCH/STS576 0 and SWITCH/STS576 1 circuit packs.

Transmit direction

In the transmit direction, the SWITCH/STS576 circuit packs send two 622.08 Mb/s TXI signals to the TXI interface. The TXI interface selects one TXI signal and recovers timing. The selected TXI signal is descrambled and demultiplexed into eight STS-1 signals. Each STS-1 signal goes through STS-1 pointer processing, and the STS-1 path overhead is removed and processed. The TXI interface sends eight DS3/EC-1 signals and a clock signal to the DS3/EC1 interface.

The DS3/EC1 interface selects the signals from the TXI interface or the SWITCH/DS3EC1 circuit pack (for protection) and outputs them to the DSX-3 or STSX-1 panel (or equivalent). The DS3/EC1 interface provides eight standard bipolar B3ZS-coded DS3 and/or SONET standard EC-1 signals.

Timing circuitry The timing circuit receives two 6.48-MHz timing reference signals from the shelf TMG/STRAT3 circuit packs. The control circuit selects the timing reference signal that is used. The timing circuit multiplies the selected 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. If both 6.48-MHz timing reference signals are not available, a free-running 6.48-MHz oscillator provides a reference signal for the timing circuit.

Protection circuitry The DS3EC1/8 port unit provides the following protection functions.

DS3EC1/8 port unit protection

Optional 1xN ($N \leq 12$) revertive DS3EC1/8 port unit protection is provided. A DS3/EC-1 protection bus is implemented with on-board relays on the DSX-3/STXS-1 side and with selectors at the TXI level on the SWITCH/STS576 circuit packs. The DS3/EC1 Switch (SWITCH/DS3EC1) circuit pack provides power to these relays and controls their operation. If the +5 volt power on the DS3EC1/8 port unit fails, the relays are still operational and controlled by the SWITCH/DS3EC1 and CTL/SYS50DM circuit packs. Shorting contacts are provided in the DS3EC1/8 port unit backplane connector so that when the port unit is removed, the DSX-3/STXS-1 cables short through to the SWITCH/DS3EC1 circuit pack for routing to the protection DS3EC1/8 port unit. When the DS3EC1/8 port unit is reinserted, the relays are in the protection state until the CTL/SYS50DM circuit pack determines that the port unit is good.

Control complex protection

Control complex protection is performed by selecting the working or standby operations network and CTLI-D signals. The DS3EC1/8 port unit monitors these signals and can select the working or standby signals. The CTL/SYS50DM circuit pack can inhibit this autonomous selection and make its own selection.

Switch fabric protection

Switch fabric protection is performed by selecting the working or standby TXI signals from the shelf SWITCH/STS576 circuit packs. The DS3EC1/8 port unit monitors these TXI signals and can select the working or standby TXI signal. The CTL/SYS50DM circuit pack can inhibit this autonomous selection and make its own selection.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The DS3EC1/8 port unit monitors these timing reference signals and can select the working or standby timing reference signal until the protection algorithm of the CTL/SYS50DM circuit pack makes a selection.

Fault detection circuitry

The DS3EC1/8 port unit provides the following fault detection functions.

Monitoring and testing

The control circuit monitors all the activities on the port unit. The DS3EC1/8 port unit has an in-service and out-of-service built-in test capability. In-service testing is continuous. If an error occurs, the control circuit reports the error to the CTL/SYS50DM circuit pack using the operations network. An out-of-service test is performed whenever the DS3EC1/8 port unit is inserted in a slot or reset.

Loopbacks

In Release 4 and later releases, the DS3EC1/8 port unit supports nearside facility loopbacks. Nearside facility loopbacks allow an incoming DS3 line to be looped back in the port unit to the output of the same line.

Power circuitry

The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V and +3.3 V used on the port unit. The SWITCH/DS3EC1 circuit pack supplies power to the input and output protection relays on the DS3/EC1/8 port unit.

The DS3EC1/8 port unit monitors the two power sources. If the DS3EC1/8 port unit detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the port unit faceplate.

Quick reference summary The DS3EC1/8 port unit provides the following functions.

Receive functions

The DS3EC1/8 port unit performs the following receive functions:

- Receives eight B3ZS-coded DS3 signals (44.736 Mb/s) from a DSX-3 panel (or equivalent) and/or SONET standard EC-1 signals (51.84 Mb/s) from a STSX-1 panel (or equivalent)
- Recovers clock from each DS3/EC-1 signal
- Synchronizes and maps each DS3/EC-1 signal to an STS-1 (51.84 Mb/s) synchronous payload envelope (SPE)
- Inserts STS-1 path overhead and pointer bytes
- Multiplexes eight STS-1 signals to a 622.08 Mb/s TXI signal
- Sends a 622.08 Mb/s TXI signal to each SWITCH/STS576 circuit pack

Transmit functions

The DS3EC1/8 port unit performs the following transmit functions:

- Receives two 622.08 Mb/s TXI signals from the SWITCH/STS576 circuit packs and selects one TXI signal
- Demultiplexes the selected 622.08 Mb/s TXI signal into eight STS-1 signals
- Extracts path overhead and converts STS-1 signals to EC-1 signals
- Extracts the path overhead and the embedded DS3 signal from each STS-1 signal
- Desynchronizes the DS3 signals
- Encodes each DS3 signal into a B3ZS format
- Provides eight DS3 signals to a DSX-3 panel (or equivalent) and/or EC-1 signals to an STSX-1 panel (or equivalent)

Timing and control functions

The DS3EC1/8 port unit performs the following timing and control functions:

- Selects the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs
- Selects the working or standby operations network and CTLI-D signals
- Provides relays for low speed protection switching
- Performs internal fault detection and interfaces with the CTL/SYS50DM circuit packs using the operations network
- Stores inventory information (for example, the *CLEI* code and serial number)
- Controls the circuit pack faceplate FAULT and ACTIVE LEDs



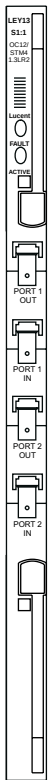
OC12/STM4 Port Unit

Purpose of circuit pack The OC12/STM4 interface (OC12/STM4) port unit provides an interface between two OC-12/STM-4 signals and two internal transmission signals.

Supported OC12/STM64 port units The following table shows the supported OC-12/STM4 port units.

Name	Code	Description
OC12/STM4/1.3LR2	LEY13 and LEY13AE	Supports supports standard 1.3-μm long-reach applications (up to 51 kilometers)
OC12/STM4/1.3SR2	LEY14 and LEY14AE	Supports standard short-reach applications (up to 15 kilometers)

OC12/STM4 port unit faceplate The following figure shows the OC12/STM4 port unit faceplate.



Faceplate LEDs The OC12/STM4 port unit provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a port unit failure is detected or the port unit loses one power feeder. Flashes on and off when an incoming OC-12/STM-4 signal failure from the lightguide cross-connect panel (or equivalent) is detected.
ACTIVE	Green	Lighted when the port unit is active/in-service.

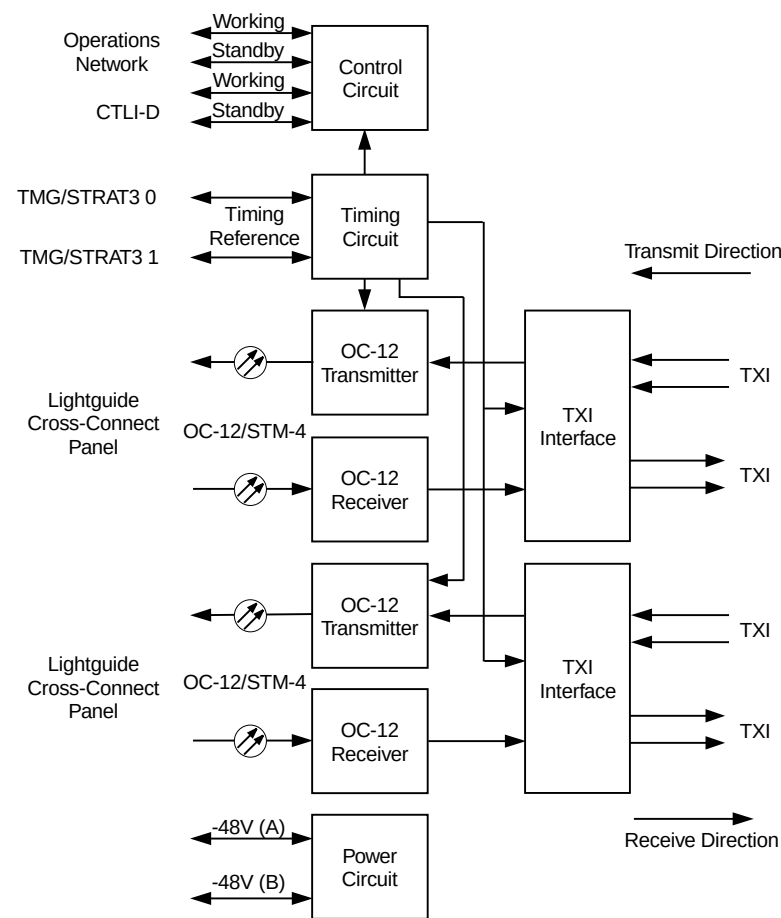
General description of operation

The OC12/STM4 port unit terminates two bidirectional OC-12/STM-4 lines. Each OC-12/STM-4 signal is converted to an electrical STS-12/VC-4-4 signal. The STS-12/VC-4-4 signal is demultiplexed into 12 STS-1/VC-3 signals and converted to a 622.08 Mb/s internal transmission interface (TXI) signal. The TXI signal supports up to 12 multiplexed STS-1/VC-3 signals. The TXI signal is sent to the shelf 576x576 STS-1/192x192 STM-1 Switch (SWITCH/STS576) circuit packs.

In the transmit direction, the SWITCH/STS576 circuit packs send two working TXI signals to the OC12/STM4 port unit. The OC12/STM4 port unit converts each working 622.08 Mb/s TXI signal into 12 STS-1/VC-3 signals. The STS-1 signals are multiplexed into an STS-12/VC-4-4 signal and converted to an OC-12/STM-4 signal for transmission. The OC12/STM4 port unit also interfaces with the shelf Control/System 50DM (CTL/SYS50DM) circuit packs.

Functional block diagram

The following figure shows a functional block diagram of the OC12/STM4 port unit.



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Control circuitry

The processor is a third-level processor in the system 3-level control hierarchy. The processor controls and monitors the operation of the port unit. The processor also manages communication with other circuit packs via the operations network and control interface for devices (CTLI-D) interfaces. For more information about the operations network and CTLI-D, refer to *Chapter 6, Control, Transmission, and Synchronization Interfaces*.

The control circuitry also transmits/receives transport overhead bytes to/from the ADJCTL/DCCEI circuit pack via the operations network.

Memory circuitry The OC12/STM4 port unit provides the following memory functions.

Start-up memory

The start-up memory consists of 256 kilobytes of flash electrically-erasable programmable read-only memory (flash EEPROM). The start-up memory contains the program that allows the processor to load the executable code and data from the SYS50DM circuit pack into the operating memory. The program allows the processor to start up operation during a powerup or reset condition, or when initializing new software.

Operating memory

The operating memory consists of up to 16 megabytes of dynamic random access memory (DRAM). The operating memory is used to store the operating executable code (program) and data (configuration information).

Nonvolatile inventory memory

The nonvolatile inventory memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the port unit history such as the *CLEI* code and type/version information.

Transmission circuitry The OC12/STM4 port unit provides the following transmission functions.

Receive direction

In the receive direction, each OC-12 receiver circuit accepts one incoming OC-12/STM-4 optical signal. The OC-12/STM-4 optical signal is converted into an STS-12/VC-4-4 electrical signal and the line clock and data is recovered. The STS-12/VC-4-4 data and clock signals are sent to the TXI interface.

The TXI interface demultiplexes the STS-12/VC-4-4 signal into 12 STS-1/VC-3 signals and processes the transport and path overhead bytes. After the overhead bytes are processed, the STS-1/VC-3 signals are converted into one TXI signal. The TXI interface circuit retimes the TXI signal, adjusts the pointers, and sends one TXI signal to the SWITCH/STS576 0 circuit pack and one TXI signal to the SWITCH/STS576 1 circuit pack.

Transmit direction

In the transmit direction, each TXI interface circuit receives one TXI signal from the SWITCH/STS576 0 circuit pack and one TXI signal from the SWITCH/STS576 1 circuit pack. The TXI interface circuit selects the TXI signal and demultiplexes it into 12 STS-1/VC-3 signals. The STS-1/VC-3 signals are multiplexed into one STS-12/VC-4-4 signal and transport and path overhead bytes are inserted. The STS-12/VC-4-4 signal is then sent to the OC-12 transmitter circuit.

The OC-12 transmitter circuit converts the STS-12/VC-4-4 signal into an optical 622.08 Mb/s OC-12/STM-4 signal for transmission.

Timing circuitry

The timing circuit receives two 6.48-MHz timing reference signals from the shelf TMG/STRAT3 circuit packs. The control circuit selects the timing reference signal that is used. The timing circuit multiplies the selected 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. If both 6.48-MHz timing reference signals are not available, a free-running 6.48-MHz oscillator provides a reference signal for the timing circuit.

Protection circuitry

The OC12/STM4 port unit provides the following protection functions.

Control complex protection

Control complex protection is performed by selecting the working or standby operations network and CTLI-D signals. The OC12/STM4 port unit monitors these signals and can select the working or standby signals. The CTL/SYS50DM circuit pack can inhibit this selection and make its own selection.

Switch fabric protection

In the receive direction, the OC12/STM4 port unit fans out two TXI signals to the SWITCH/STS576 0 circuit pack and two TXI signals to the SWITCH/STS576 1 circuit pack. In the transmit direction, the OC12/STM4 port unit receives two TXI signals from the SWITCH/STS576 0 circuit pack and two TXI signals from the SWITCH/STS576 1 circuit pack. The OC12/STM4 port unit selects two TXI signals as active and the remaining two TXI signals are standby. If an active TXI signal fails, the OC12/STM4 port unit selects the associated standby TXI signal.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The OC12/STM4 port unit monitors these timing reference signals and can select the working or standby timing reference signal until the protection algorithm of the CTL/SYS50DM circuit pack makes a selection.

Fault detection circuitry

The OC12/STM4 port unit provides the following fault detection functions.

Monitoring and testing

The control circuit monitors all the activities on the port unit. The OC12/STM4 port unit has an in-service and out-of-service built-in test capability. In-service testing is continuous. If an error occurs, the control circuit reports the error to the CTL/SYS50DM circuit pack using the operations network. An out-of-service test is performed during a powerup or reset condition, or when initializing new software.

Loopbacks

In Release 4 and later releases, the OC12/STM4 port unit supports nearside facility loopbacks. Nearside facility loopbacks allow an incoming OC-12/STM-4 line to be looped back in the port unit to the output of the same line.

Power circuitry

The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V and +3.3 V used on the port unit.

The OC12/STM4 port unit monitors the two power sources. If the OC12/STM4 port unit detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the port unit faceplate.

Quick reference summary The OC12/STM4 port unit provides the following functions.

Receive functions

The OC12/STM4 port unit performs the following receive functions:

- Receives two optical 622.08 Mb/s OC-12/STM-4 signals
- Converts each OC-12/STM-4 signal to an electrical STS-12/VC-4-4 signal
- Extracts and processes the transport and path overhead access bytes
- Converts each STS-12/VC-4-4 signal into one 622.08 Mb/s TXI signal
- Sends one TXI signal to the SWITCH/STS576 0 circuit pack and one TXI signal to the SWITCH/STS576 1 circuit pack

Transmit functions

The OC12/STM4 port unit performs the following transmit functions:

- Receives four 622.08 Mb/s TXI signals from the SWITCH/STS576 circuit packs and selects two TXI signals
- Processes and inserts the transport and path overhead access bytes
- Converts each 622.08 Mb/s TXI signal to an STS-12/VC-4-4 signal
- Converts the STS-12/VC-4-4 signal to an optical 622.08 Mb/s OC-12/STM-4 signal for transmission

Timing and control functions

The OC12/STM4 port unit performs the following timing and control functions:

- Selects the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs
- Selects the working or standby TXI signals from the SWITCH/STS576 circuit packs
- Selects the working or standby operations network and CTLI-D signals
- Performs internal fault detection and interfaces with the CTL/SYS50DM circuit packs using the operations network

- Stores inventory information (for example, the *CLEI* code and serial number)
- Controls the port unit faceplate FAULT and ACTIVE LEDs



OC3/STM1 Port Unit

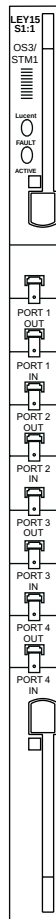
Purpose of circuit pack The OC3/STM1 interface (OC3/STM1) port unit provides an interface between up to four OC-3/STM-1 signals and two internal transmission signals.

Supported OC3/STM4 port units The following table shows the supported OC3/STM1 port units.

Name	Code	Description
OC3/STM1/1.3LR4	LEY15 and LEY15AE	Supports up to four standard 1.3-μm long-reach applications (up to 51 kilometers)
OC3/STM1/1.3SR4	LEY16 and LEY16AE	Supports up to four standard short-reach applications (up to 15 kilometers)

OC3/STM1 port unit faceplate

The following figure shows the OC3/STM1 port unit faceplate.



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Faceplate LEDs

The OC3/STM1 port unit provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a port unit failure is detected or the port unit loses one power feeder. Flashes on and off when an incoming OC-3/ STM-1 signal failure from the lightguide cross-connect panel (or equivalent) is detected.
ACTIVE	Green	Lighted when the port unit is active/in-service.

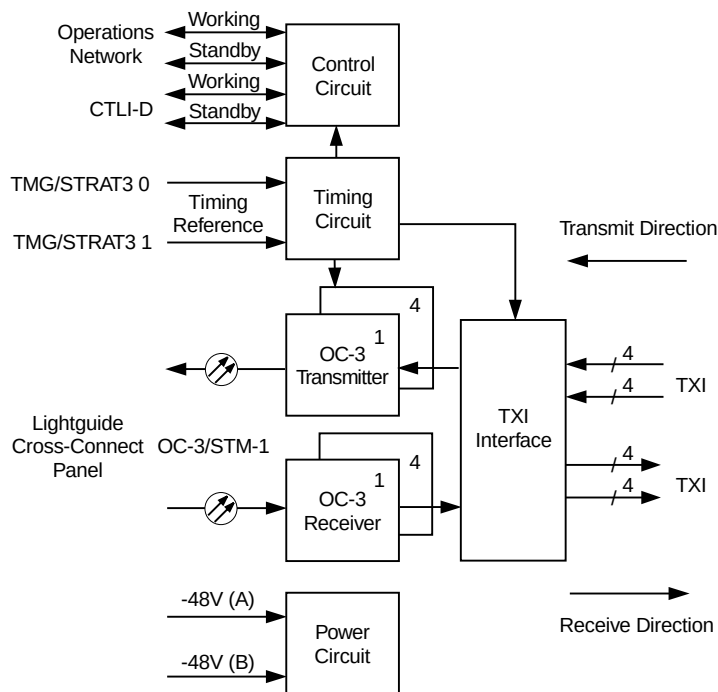
General description of operation

The OC3/STM1 port unit terminates four bidirectional OC-3/STM-1 lines. Each OC-3/STM-1 signal is converted to an electrical STS-3/VC-4 signal. The four STS-3/VC-4 signals are demultiplexed into 12 STS-1/VC-3 signals and converted to a 622.08 Mb/s internal transmission interface (TXI) signal. The TXI signal supports up to 12 multiplexed STS-1/VC-3 signals. The TXI signal is sent to the shelf 576x576 STS-1/192x192 STM-1 Switch (SWITCH/STS576) circuit packs.

In the transmit direction, the SWITCH/STS576 circuit packs send two working TXI signals to the OC3/STM1 port unit. The OC3/STM1 port unit converts the working 622.08 Mb/s TXI signal into 12 STS-1/VC-3 signals. The STS-1/VC-3 signals are multiplexed into four STS-3/VC-4 signals and converted to OC-3/STM-1 signals for transmission. The OC3/STM1 port unit also interfaces with the shelf Control/System 50DM (CTL/SYS50DM) circuit packs.

Functional block diagram

The following figure shows a functional block diagram of the OC3/STM1 port unit.



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Control circuitry The processor is a third-level processor in the system 3-level control hierarchy. The processor controls and monitors the operation of the port unit. The processor also manages communication with other circuit packs via the operations network and the control interface for devices (CTLI-D) interfaces. For more information about the operations network and CTLI-D, refer to *Chapter 6, Control, Transmission, and Synchronization Interfaces*.

The control circuitry also transmits/receives transport overhead bytes to/from the ADJCTL/DCCEI circuit pack via the operations network.

Memory circuitry The OC3/STM1 port unit provides the following memory functions.

Start-up memory

The start-up memory consists of 256 kilobytes of flash electrically-erasable programmable read-only memory (flash EEPROM). The start-up memory contains the program that allows the processor to load the executable code and data from the SYS50DM circuit pack into the operating memory. The program allows the processor to start up operation during a powerup or reset condition, or when initializing new software.

Operating memory

The operating memory consists of up to four megabytes of dynamic random access memory (DRAM). The operating memory is used to store the operating executable code (program) and data (configuration information).

Nonvolatile inventory memory

The nonvolatile inventory memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the port unit history such as the *CLEI* code and type/version information.

Transmission circuitry The OC3/STM1 port unit provides the following transmission functions.

Receive direction

In the receive direction, each OC-3/STM-1 receiver circuit accepts one incoming OC-3/STM-1 optical signal. The OC-3/STM-1 optical signals are converted into STS-3/VC-4 electrical signals and the line clock and data is recovered. The STS-3/VC-4 data and clock signals are sent to the TXI interface.

The TXI interface demultiplexes the 4 STS-3/VC-4 signals into 12 STS-1/VC-3 signals and processes the transport and path overhead bytes. After the overhead bytes are processed, the STS-1/VC-3 signals are converted into one TXI signal. The TXI interface circuit retimes the TXI signal, adjusts the pointers, and sends one TXI signal to the SWITCH/STS576 0 circuit pack and one TXI signal to the SWITCH/STS576 1 circuit pack.

Transmit direction

In the transmit direction, the TXI interface circuit receives one TXI signal from the SWITCH/STS576 0 circuit pack and one TXI signal from the SWITCH/STS576 1 circuit pack. The TXI interface circuit selects the TXI signal and demultiplexes it into 12 STS-1/VC-3 signals. The STS-1/VC-3 signals are multiplexed into four STS-3/VC-4 signals and transport and path overhead bytes are inserted. The STS-3/VC-4 signals are then sent to the OC-3 transmitter circuits.

Each OC-3/STM-1 transmitter circuit converts the STS-3/VC-4 signal into an optical 155.55 Mb/s OC-3/STM-1 signal for transmission.

Timing circuitry The timing circuit receives two 6.48-MHz timing reference signals from the shelf TMG/STRAT3 circuit packs. The control circuit selects the timing reference signal that is used. The timing circuit multiplies the selected 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. If both 6.48-MHz timing reference signals are not available, a free-running 6.48-MHz oscillator provides a reference signal for the timing circuit.

Protection circuitry The OC3/STM1 port unit provides the following protection functions.

Control complex protection

Control complex protection is performed by selecting the working or standby operations network and CTLI-D signals. The OC3/STM1 port unit monitors these signals and can select the working or standby signals. The CTL/SYS50DM circuit pack can inhibit this selection and make its own selection.

Switch fabric protection

In the receive direction, the OC3/STM1 port unit fans out one TXI signal to the SWITCH/STS576 0 circuit pack and one TXI signal to the SWITCH/STS576 1 circuit pack. In the transmit direction, the OC3/STM1 port unit receives one TXI signal from the SWITCH/STS576 0 circuit pack and one TXI signal from the SWITCH/STS576 1 circuit pack. The OC3/STM1 port unit selects one TXI signal as active and the other TXI signal as standby. If the active TXI signal fails, the OC3/STM1 Stratum 3 port unit selects the standby TXI signal.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The OC3/STM1 port unit monitors these timing reference signals and can select the working or standby timing reference signal until the protection algorithm of the CTL/SYS50DM circuit pack makes a selection.

Fault detection circuitry The OC3/STM1 port unit provides the following fault detection functions.

Monitoring and testing

The control circuit monitors all the activities on the port unit. The OC3/STM1 port unit has an in-service and out-of-service built-in test capability. In-service testing is continuous. If an error occurs, the control circuit reports the error to the CTL/SYS50DM circuit pack using the operations network. An out-of-service test is performed during a powerup or reset condition, or when initializing new software.

Loopbacks

In Release 4 and later releases, the OC3/STM1 port unit supports nearside facility loopbacks. Nearside facility loopbacks allow an incoming OC-3/STM-1 line to be looped back in the port unit to the output of the same line.

Power circuitry

The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V and +3.3 V used on the port unit.

The OC3/STM1 port unit monitors the two power sources. If the OC3/STM1 port unit detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the port unit faceplate.

Quick reference summary

The OC3/STM1 port unit provides the following functions.

Receive functions

The OC3/STM1 port unit performs the following receive functions:

- Receives four optical 155.55 Mb/s OC-3/STM-1 signals
- Converts each OC-3/STM-1 signal to an electrical STS-3/VC-4 signal
- Extracts and processes the transport and path overhead access bytes
- Converts the four STS-3/VC-4 signals into one 622.08 Mb/s TXI signal
- Sends one TXI signal to the SWITCH/STS576 0 circuit pack and one TXI signal to the SWITCH/STS576 1 circuit pack

Transmit functions

The OC3/STM1 port unit performs the following transmit functions:

- Receives two 622.08 Mb/s TXI signals from the SWITCH/STS576 circuit packs and selects one TXI signal
- Processes and inserts the transport and path overhead access bytes
- Converts the 622.08 Mb/s TXI signal into four STS-3/VC-4 signals
- Converts each STS-3/VC-4 signal to an optical 155.55 Mb/s OC-3/STM-1 signal for transmission

Timing and control functions

The OC3/STM1 port unit performs the following timing and control functions:

- Selects the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs
- Selects the working or standby TXI signal from the SWITCH/STS576 circuit packs
- Selects the working or standby operations network and CTLI-D signals
- Performs internal fault detection and interfaces with the CTL/SYS50DM circuit packs using the operations network
- Stores inventory information (for example, the *CLEI* code and serial number)
- Controls the port unit faceplate FAULT and ACTIVE LEDs



OC48/STM16 Port Unit

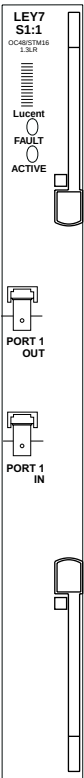
Purpose of circuit pack The OC48/STM16 interface (OC48/STM16) port unit provides an interface between an OC-48/STM-16 signal and four internal transmission signals.

Supported OC48/STM16 port units The following table shows the supported OC48/STM16 port units.

Name	Code	Description
OC48/STM16/1.3LR1	LEY7 and LEY7AE	Supports 1.3- μ m long-reach applications
OC48/STM16/1.5LR1	LEY8 and LEY8AE	Supports 1.5- μ m long-reach applications
OC48/STM16/DWDM	LEY50 - LEY65 and LEY50AE - LEY65AE	Supports 16 wavelengths in applications with WaveStar OLS 40G dense wavelength division multiplexing (DWDM) systems
OC48/STM16/POU	LEY80 - LEY95 and LEY80AE - LEY95AE	Supports 16 wavelengths in passive optical applications with DWDM systems
OC48/STM16/WDM	LEY101 - LEY180 and LEY101AE - LEY180AE	Supports 80 wavelengths in applications with WaveStar OLS 400G DWDM systems
OC48/STM16 1.3LR1	LEY307 and LEY307AE	Cost-reduced version of the LEY7 and LEY7AE. Uses an optical transponder module instead of separate optical transmitters and receivers.
OC48/STM16 1.5LR1	LEY308 and LEY308AE	Cost-reduced version of the LEY8 and LEY8AE. Uses an optical transponder module instead of separate optical transmitters and receivers.

OC48/STM16 port unit faceplate

The following figure shows the OC48/STM16 port unit faceplate.



NC-USM-028

Faceplate LEDs

The OC48/STM16 port unit provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a port unit failure is detected or the port unit loses one power feeder. Flashes on and off when an incoming OC-48/STM-16 signal failure from the lightguide cross-connect panel (or equivalent) is detected.
ACTIVE	Green	Lighted when the port unit is active/in-service.

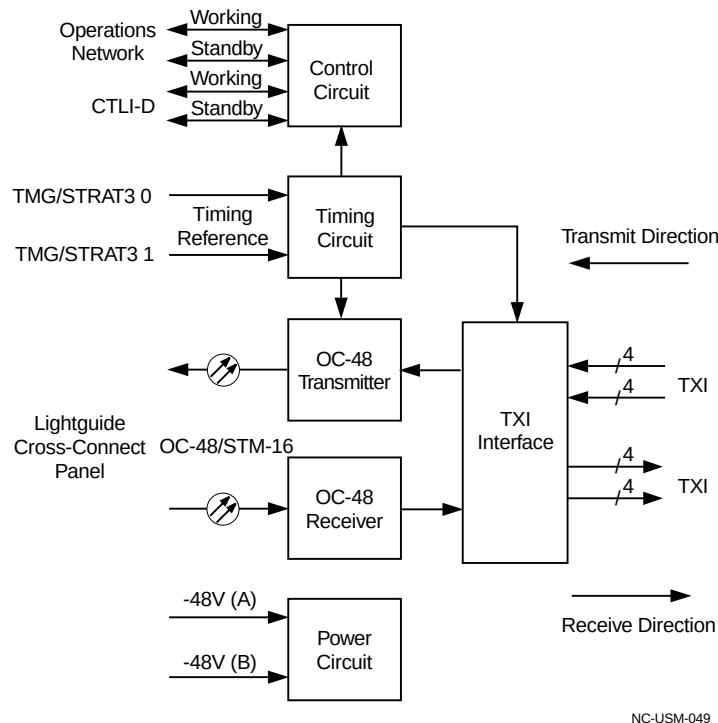
General description of operation

The OC48/STM16 port unit terminates one bidirectional OC-48/STM-16 line. The OC-48/STM-16 signal is converted to an electrical STS-48/VC-4-16 signal. The STS-48/VC-4-16 signal is demultiplexed into four 622.08 Mb/s internal transmission interface (TXI) signals. Each TXI signal supports up to 12 multiplexed STS-1/VC-3 signals. The TXI signals are sent to the shelf 576x576 STS-1 Switch (SWITCH/STS576) circuit packs.

In the opposite direction, the SWITCH/STS576 circuit packs send eight TXI signals to the OC48/STM16 port unit. The OC48/STM16 port unit selects and converts four 622.08 Mb/s TXI signal into one STS-48/VC-4-16 signal. The STS-48/VC-4-16 signal is converted to an OC-48/STM-16 signal for transmission. The OC48/STM16 port unit also interfaces with the shelf Control/System 50DM (CTL/SYS50DM) circuit pack.

Functional block diagram

The following figure shows a functional block diagram of the OC48/STM16 port unit.



Control circuitry

The processor is the lowest level processor in the system control hierarchy. The processor controls and monitors the operation of the port unit. The processor also manages communication with other circuit packs via the operations network and control interface for devices (CTLI-D) interfaces. For more information about the operations network and CTLI-D, refer to *Chapter 6, Control, Transmission, and Synchronization Interfaces*.

The control circuitry also transmits/receives transport overhead bytes to/from the ADJCTL/DCCEI circuit pack via the operations network.

Memory circuitry The OC48/STM16 port unit provides the following memory functions.

Start-up memory

The start-up memory consists of one megabyte of flash electrically-erasable programmable read-only memory (flash EEPROM). The start-up memory contains the program that allows the processor to load the executable code and data from the SYS50DM circuit pack into the operating memory. The program allows the processor to start up operation during a powerup or reset condition, or when initializing new software.

Operating memory

The operating memory consists of up to four megabytes of dynamic random access memory (DRAM). The operating memory is used to store the operating executable code (program) and data (configuration information).

Nonvolatile inventory memory

The nonvolatile inventory memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the port unit history such as the *CLEI* code and type/version information.

Transmission circuitry The OC48/STM16 port unit provides the following transmission functions.

Receive direction

In the receive direction, the OC-48 receiver circuit accepts one incoming OC-48/STM-16 optical signal. The OC-48/STM-16 optical signal is converted into an STS-48/VC-4-16 electrical signal and the line clock and data is recovered. The STS-48/VC-4-16 signal is demultiplexed and sent to the overhead byte processor. After the overhead bytes are processed, the STS-48/VC-4-16 signal is converted into four TXI signals and sent to the TXI interface circuit. The TXI interface circuit retimes the TXI signals, adjusts the pointers, and sends four TXI signals to the SWITCH/STS576 0 circuit pack and four TXI signals to the SWITCH/STS576 1 circuit pack.

Transmit direction

In the transmit direction, the TXI interface circuit receives four TXI signals from the SWITCH/STS576 0 circuit pack and four TXI signals from the SWITCH/STS576 1 circuit pack. The TXI interface circuit selects four TXI signals and sends them to the OC-48 transmitter circuit. The OC-48 transmitter circuit sends the four TXI signals to the overhead byte processor. The four TXI signals are converted into an STS-48/VC-4-16 signal and the overhead bytes are inserted. The STS-48/VC-4-16 signal is converted into an optical 2.488 Gb/s OC-48/STM-16 signal for transmission. The LEY50 - LEY65 and LEY 80 - LEY95 OC48/STM16 port units modulate a tone signal for use with wavelength division multiplexing systems.

Timing circuitry

The timing circuit receives two 6.48-MHz timing reference signals from the shelf TMG/STRAT3 circuit packs. The control circuit selects the timing reference signal that is used. The timing circuit multiplies the selected 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. If both 6.48-MHz timing reference signals are not available, a free-running 6.48-MHz oscillator provides a reference signal for the timing circuit.

Protection circuitry

The OC48/STM16 port unit provides the following protection functions.

Control complex protection

Control complex protection is performed by selecting the working or standby operations network and CTLI-D signals. The OC48/STM16 port unit monitors these signals and can select the working or standby signals. The CTL/SYS50DM circuit pack can inhibit this selection and make its own selection.

Switch fabric protection

In the receive direction, the OC48/STM16 port unit fans out four TXI signals to the SWITCH/STS576 0 circuit pack and four TXI signals to the SWITCH/STS576 1 circuit pack. In the transmit direction, the OC48/STM16 port unit receives four TXI signals from the SWITCH/STS576 0 circuit pack and four TXI signals from the SWITCH/STS576 1 circuit pack. The OC48/STM16 selects the one group of four TXI signals as active and the other group as standby. If the active group fails, the OC48/STM16 port unit selects the standby group of TXI signals.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The OC48/STM16 port unit monitors these timing reference signals and can select the working or standby timing reference signal until the protection algorithm of the CTL/SYS50DM circuit pack makes a selection.

Fault detection circuitry

The OC48/STM16 port unit provides the following fault detection functions.

Monitoring and testing

The control circuit monitors all the activities on the port unit. The OC48/STM16 port unit has an in-service and out-of-service built-in test capability. In-service testing is continuous. If an error occurs, the control circuit reports the error to the CTL/SYS50DM circuit pack using the operations network. An out-of-service test is performed during a powerup or reset condition, or when initializing new software.

Loopbacks

In Release 4 and later releases, the OC48/STM16 port unit supports nearside facility loopbacks. Nearside facility loopbacks allow an incoming OC-48/STM-16 line to be looped back in the port unit to the output of the same line.

Power circuitry

The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V, +3.3 V, –3.3 V, and –5.2 V used on the port unit.

The OC48/STM16 port unit monitors the two power sources. If the OC48/STM16 port unit detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the port unit faceplate.

Quick reference summary

The OC48/STM16 port unit provides the following functions.

Receive functions

The OC48/STM16 port unit performs the following receive functions:

- Receives one optical 2.448 Mb/s OC-48/STM-16 signal
- Converts the OC-48/STM-16 signal to an electrical STS-48/STM-16 signal

- Extracts and processes the overhead access bytes
- Demultiplexes the STS-48/STM-16 signal into four 622.08 Mb/s TXI signals
- Sends four TXI signals to SWITCH/STS576 0 circuit pack and four TXI signals to SWITCH/STS576 1 circuit pack

Transmit functions

The OC48/STM16 port unit performs the following transmit functions:

- Receives eight 622.08 Mb/s TXI signals from the SWITCH/STS576 circuit packs and selects four TXI signals
- Processes and inserts overhead access bytes
- Multiplexes four 622.08 Mb/s TXI signals to an STS-48/STM-16 signal
- Converts the electrical STS-48/STM-16 signal to an optical 2.448 Mb/s OC-48/STM-16 signal for transmission

Timing and control functions

The OC48/STM16 port unit performs the following timing and control functions:

- Selects the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs
- Selects the working or standby TXI signals from the SWITCH/STS576 circuit packs
- Provides a 25.92-MHz reference signal to TMG/STRAT3 circuit packs
- Selects the working or standby operations network and CTLI-D signals
- Performs internal fault detection and interfaces with the CTL/SYS50DM circuit packs using the operations network
- Stores inventory information (for example, the *CLEI* code and serial number)
- Controls the port unit faceplate FAULT and ACTIVE LEDs



OC192/STM64 Port Unit

Purpose of circuit pack

The OC192/STM64 (OC192/STM64) port unit provides an interface between an OC-192/STM64 signal and sixteen internal transmission signals. The capacity of the OC192/STM64 port unit is 192 STS-1/VC-3 equivalent signals or 129,024 2-way voice circuits per fiber.

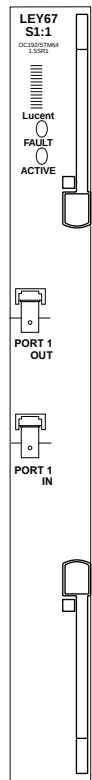
Supported OC192/STM64 port units

The following table shows the supported OC192/STM64 port units.

Name	Code	Description
OC192/STM64/1.5SR1	LEY67 and LEY67AE	Supports 1.5- μ m intermediate reach applications and multibit forward error correction
OC192/STM64/1.5IR1	LEY69 and LEY69AE	Supports 1.5- μ m intermediate reach applications and multibit forward error correction
OC192/STM64/1.5IRS1	LEY97 and LEY97AE	Supports applications with optical amplifiers, multibit forward error correction, and strong forward error correction
OC192/STM64/WDM	LEY201 - LEY240 and LEY201AE - LEY240AE	Supports 40 wavelengths in applications with WaveStar OLS 400G dense wavelength division multiplexing (DWDM) systems
OC192/STM64/POU	LEY284 - LEY299 and LEY284AE - LEY299AE	Supports 16 wavelengths in passive optical applications with dense wavelength division multiplexing (DWDM) systems

OC192/STM64 port unit faceplate

The following figure shows the OC192/STM64 port unit faceplate.



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Faceplate LEDs

The OC192/STM64 port unit provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a port unit failure is detected or the port unit loses one power feeder. Flashes on and off when an incoming OC-192/ STM-64 signal failure from the lightguide cross-connect panel (or equivalent) is detected.
ACTIVE	Green	Lighted when the port unit is active/in-service.

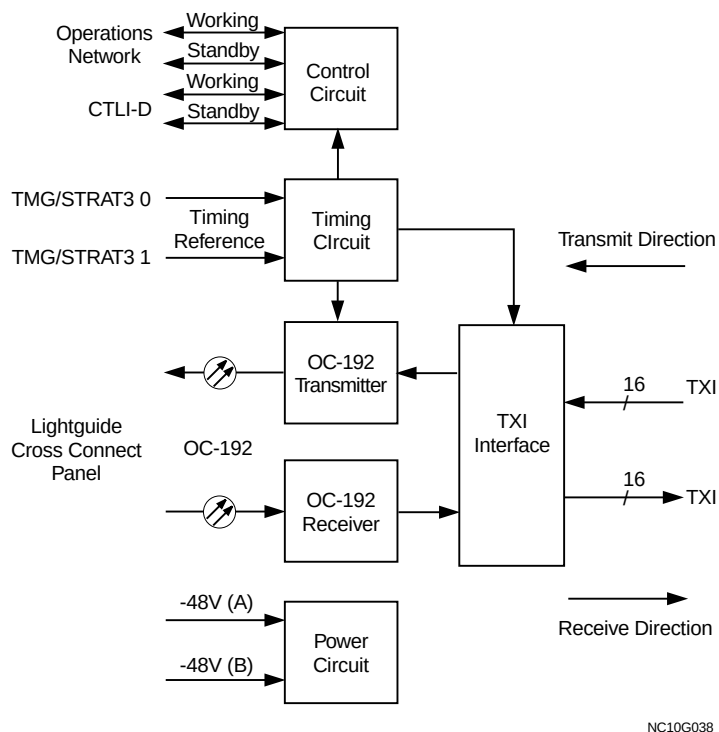
General description of operation

The OC192/STM64 port unit terminates one bidirectional OC-192/ STM64 line. The OC-192/STM64 optical signal is converted to an electrical STS-192 signal. The STS-192 signal is demultiplexed into 16 STS-12 signals and each is converted to a 622.08 Mb/s internal transmission interface (TXI) signal. Each TXI signal supports up to 12 multiplexed STS-1 signals. The TXI signals are sent to the Pointer Processor/Fanout (PPROC/FO) circuit pack.

In the transmit direction, the PPROC/FO circuit pack sends 16 working TXI signals to the OC192/STM64 port unit. The OC192/STM64 port unit converts each working 622.08 Mb/s TXI signal into 16 STS-12 signals. The STS-12 signals are multiplexed into one electrical STS-192 signal and converted to an OC-192/STM64 optical signal for transmission. The OC192/STM64 port unit also interfaces with the shelf Control/ Sub Rack 50DC (CTL/SR50DC) circuit pack.

Functional block diagram

The following figure shows a functional block diagram of the OC192/STM64 port unit.



Control circuitry

The processor is the lowest level processor in the system control hierarchy. The processor controls and monitors the operation of the circuit pack. The processor also manages communication with other circuit packs via the operations network and control interface for devices (CTLI-D) interfaces. For more information about the operations network and CTLI-D, refer to *Chapter 6, Control, Transmission, and Synchronization Interfaces*.

The control circuitry also transmits/receives transport overhead bytes to/from the ADJCTL/DCCEI circuit pack via the operations network.

Memory circuitry The OC192/STM64 port unit provides the following memory functions.

Start-up memory

The start-up memory consists of one megabyte of flash electrically-erasable programmable read-only memory (flash EEPROM). The start-up memory contains the program that allows the processor to load the executable code and data from the CTL/SR50DC circuit pack into the operating memory. The program allows the processor to start up operation during a powerup or reset condition, or when initializing new software.

Operating memory

The operating memory consists of up to four megabytes of dynamic random access memory (DRAM). The operating memory is used to store the operating executable code (program) and data (configuration information).

Nonvolatile inventory memory

The nonvolatile inventory memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the port unit history such as the *CLEI* code and type/version information.

Transmission circuitry The OC192/STM64 port unit provides the following transmission functions.

Receive direction

In the receive direction, each OC-192 receiver circuit accepts one incoming OC-192/STM64 optical signal. The 9.953 Gb/s optical signal is converted into one 9.953 Gb/s electrical STS-192 signal and the line clock and data are recovered. Multibit and strong forward error correction decoding (provisionable) is also performed. The TXI interface demultiplexes the STS-192 signal into 16 STS-12 signals and processes the transport overhead bytes. After the overhead bytes are processed, the 16 STS-12 signals are converted into TXI signals. The TXI interface circuit retimes the TXI signals, adjusts the pointers, and sends 16 TXI signals to the PPROC/FO circuit pack.

Transmit direction

In the transmit direction, the TXI interface circuit receives 16 TXI signals from the PPROC/FO circuit pack. The TXI interface circuit selects each working TXI signal and converts it into 16 STS-12 signals. The STS-12 signals are multiplexed into one 9.953 Gb/s STS-192 electrical signal and transport overhead bytes are inserted. Multibit and strong forward error correction encoding (provisionable) is also performed. The STS-192 signal is then sent to the OC-192 transmitter circuit. The OC-192 transmitter circuit converts the STS-192 electrical signal into an optical 9.953 Gb/s OC-192/STM64 signal for transmission. The LEY201 - LEY 240 and LEY284 - LEY299 OC192/STM64 port units modulate a tone signal for use with dense wavelength division multiplexing systems.

Timing circuitry

The timing circuit receives two 6.48-MHz timing reference signals from the shelf TMG/STRAT3 circuit packs. The control circuit selects the timing reference signal that is used. The timing circuit multiplies the selected 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. If both 6.48-MHz timing reference signals are not available, a free-running 6.48-MHz oscillator provides a reference signal for the timing circuit.

Protection circuitry

The OC192/STM64 port unit provides the following protection functions.

Control complex protection

Control complex protection is performed by selecting the working or standby operations network and CTLI-D signals. The OC192/STM64 port unit monitors these signals and can select the working or standby signals. The CTL/SR50DC circuit pack can inhibit this selection and make its own selection.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The OC192/STM64 port unit monitors these timing reference signals and can select the working or standby timing reference signal until the protection algorithm of the CTL/SR50DC circuit pack makes a selection.

Fault detection circuitry The OC192/STM64 port unit provides the following fault detection functions.

Monitoring and testing

The control circuit monitors all the activities on the port unit. The OC192/STM64 port unit has an in-service and out-of-service built-in test capability. In-service testing is continuous. If an error occurs, the control circuit reports the error to the CTL/SR50DC circuit pack using the operations network. An out-of-service test is performed during a powerup or reset condition, or when initializing new software.

Power circuitry The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V, +3.3 V, –3.3 V, –5.2 V, –8 V, and –10 V used on the circuit pack.

The OC192/STM64 port unit monitors the two power sources. If the OC192/STM64 port unit detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

Quick reference summary The OC192/STM64 port unit provides the following functions.

Receive functions

The OC192/STM64 port unit performs the following receive functions:

- Receives one optical 9.953 Gb/s OC-192/STM64 signal
- Converts each OC-192/STM64 signal to one 9.953 Gb/s electrical STS-192 signal
- Extracts and processes the transport overhead access bytes
- Converts each STS-192 signal into sixteen 622.08 Mb/s TXI signals
- Sends 16 TXI signals to the PPROC/FO circuit pack

Transmit functions

The OC192/STM64 port unit performs the following transmit functions:

- Receives 16 622.08 Mb/s TXI signals from the PPROC/FO circuit pack
- Processes and inserts the transport overhead access bytes

- Converts the sixteen 622.08 Mb/s TXI signals to one 9.953 Gb/s electrical STS-192 signal
- Converts the STS-192 signal to an optical 9.953 Gb/s OC-192/STM64 signal for transmission

Timing and control functions

The OC192/STM64 port unit performs the following timing and control functions:

- Selects the working or standby timing reference signal from the shelf TMG/ STRAT3 circuit packs
- Selects the working or standby operations network and CTLI-D signals
- Performs internal fault detection and interfaces with the CTL/SR50DC circuit packs using the operations network
- Stores inventory information (for example, the CLEI code and serial number)
- Controls the port unit faceplate FAULT and ACTIVE LEDs



PPROC/FO Circuit Pack

Purpose of circuit pack The Pointer Processor w/Fan Out (PPROC/FO) circuit pack performs pointer processing and path monitoring for the 192 STS-1 signals.

PPROC/FO circuit pack faceplate The following figure shows the PPROC/FO circuit pack faceplate.



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Faceplate LEDs The PPROC/FO circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder. Flashes on and off when an incoming signal failure, a loss of timing signal, or a memory fault is detected.
ACTIVE	Green	Lighted when the port unit is active/in-service.

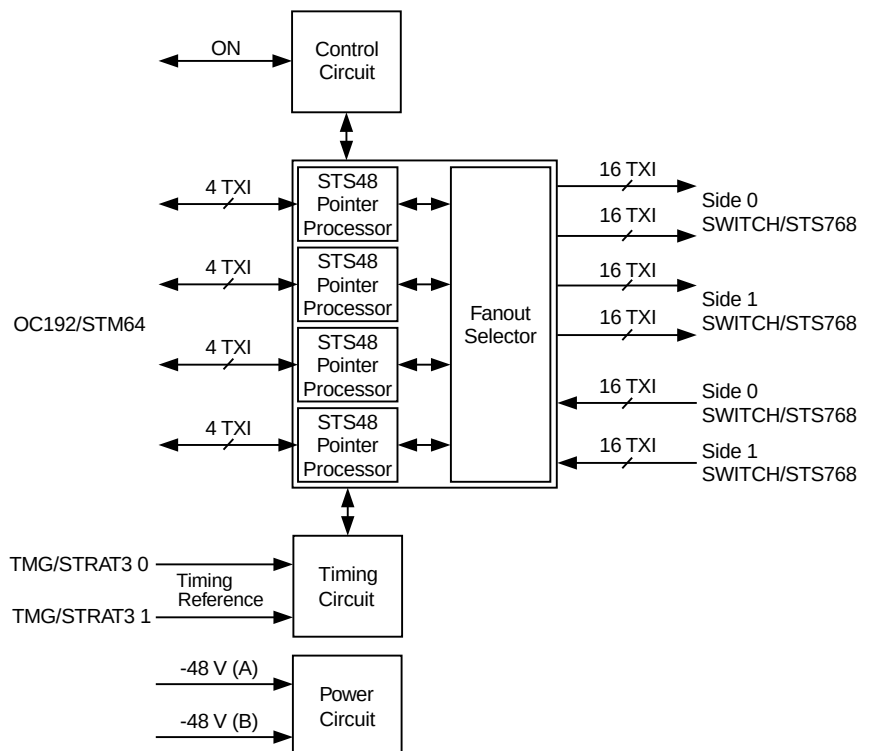
The FAULT and ACTIVE LEDs are controlled by the CTL/SR50DC circuit packs.

General description of operation

The PPROC/FO circuit pack provides pointer processing and path monitoring on an equivalent of 192 STS-1 signals and fans out system synchronized and frame aligned data to the SWITCH/STS768 circuit packs. There are four bidirectional transmission devices on PPROC/FO circuit pack. Each bidirectional transmission device supports 48 STS-1 signals. One PPROC/FO circuit pack supports one OC192/STM64 port unit.

Functional block diagram

The following figure shows a functional block diagram of the PPROC/FO circuit pack.



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Control circuitry

The processor is the lowest level processor in the system control hierarchy. The processor controls and monitors the operation of the circuit pack. The processor also manages communication with other circuit packs via the operations network (ON) and control interface for devices (CTLI-D) interfaces. For more information about the operations network and CTLI-D, refer to *Chapter 6, Control, Transmission, and Synchronization Interfaces*.

Memory circuitry The PPROC/FO circuit pack provides the following memory functions.

Start-up memory

The start-up memory consists of one megabyte of flash electrically-erasable programmable read-only memory (flash EEPROM). The start-up memory contains the program that allows the processor to load the executable code and data from the CTL/SR50DC circuit pack into the operating memory. The program allows the processor to start up operation during a powerup or reset condition, or when initializing new software.

Operating memory

The operating memory consists of up to eight megabytes of dynamic random access memory (DRAM). The operating memory is used to store the operating executable code (program) and data (configuration information).

Nonvolatile inventory memory

The nonvolatile inventory memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the port unit history such as the *CLEI* code and type/version information.

Transmission circuitry In the receive direction, the PPROC/FO circuit pack accepts 16 TXI signals (192 STS-1 equivalent signals), a 155.52-MHz clock, and a 8-KHz frame timing signal from the associated OC192/STM64 port unit. Each STS48 pointer processor accepts four TXI signals. After passing through the STS48 pointer processor, the data is reformatted into TXI signals and fanned out to two working SWITCH/STS768 circuit packs and two protection SWITCH/STS768 circuit packs.

In the transmit direction, the PPROC/FO circuit pack receives two sets of 16 TXI signals from the SWITCH/STS576 circuit packs and selects one set of TXI signals. The selected TXI signals are passed through to the associated OC192/STM64 port unit. There is no pointer processing performed in the transmit direction.

Timing circuitry The timing circuit receives two 6.48-MHz timing reference signals from the shelf TMG/STRAT3 circuit packs. The control circuit selects the timing reference signal that is used. The timing circuit multiplies the selected 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. If both 6.48-MHz timing reference signals are not available, a free-running 6.48-MHz oscillator provides a reference signal for the timing circuit.

Protection circuitry The PPROC/FO circuit pack provides the following protection functions.

Switch fabric protection

In the receive direction, the PPROC/FO circuit pack fans out two sets of 16 TXI signals to the side 0 SWITCH/STS768 circuit packs and two sets of 16 TXI signals to the side 1 SWITCH/STS768 circuit packs. In the transmit direction, the PPROC/FO circuit pack receives one set of 16 TXI signals from the side 0 SWITCH/STS768 circuit packs and one set of 16 TXI signals from the side 1 SWITCH/STS768 circuit packs. The PPROC/FO circuit pack selects one set of 16 TXI signals as working (active) and the other set of 16 TXI signals are protection (standby). If the working SWITCH/STS768 circuit pack fails, the PPROC/FO circuit pack selects the 16 TXI signals from the protection SWITCH/STS768 circuit pack.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The PPROC/FO circuit pack monitors these timing reference signals and can select the working or standby timing reference signal until the protection algorithm of the CTL/SR50DC circuit pack makes a selection.

Fault detection circuitry The control circuit monitors all the activities on the circuit pack. The PPROC/FO circuit pack has an in-service and out-of-service built-in test capability. In-service testing is continuous. If an error occurs, the control circuit reports the error to the CTL/SR50DC circuit pack using the operations network. An out-of-service test is performed during a powerup or reset condition, or when initializing new software.

Power circuitry The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. A modular DC-to-DC converter produces +5 V and +3.3 V used on the circuit pack.

The PPROC/FO circuit pack monitors the two power sources. If the PPROC/FO circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

Quick reference summary The PPROC/FO circuit pack provides the following functions.

Receive functions

The PPROC/FO circuit pack performs the following receive functions:

- Receives 16 622.08 Mb/s TXI signals from the associated OC192/STM64 port unit
- Performs pointer processing and synchronization to the system clock
- Monitors the path overhead
- Extracts and processes the TXI overhead bytes
- Fans out two sets of 16 TXI signals to the side 0 SWITCH/STS768 circuit packs and two sets of 16 TXI signals to the side 1 SWITCH/STS768 circuit packs

Transmit functions

The PPROC/FO circuit pack performs the following receive functions:

- Receives one set of 16 622.08 Mb/s TXI signals from the side 1 SWITCH/STS768 circuit packs and one set of 16 TXI signals from the SWITCH/STS768 circuit packs and selects one set
- Sends 16 TXI signals to the associated OC192/STM64 port unit

Timing and control functions

The PPROC/FO circuit pack performs the following timing and control functions:

- Selects the working or standby timing reference signal from the shelf TMG/ STRAT3 circuit packs
- Selects the working or standby TXI signals from the SWITCH/ STS768 circuit packs
- Performs internal fault detection and interfaces with the CTL/ SR50DC circuit pack using the operations network
- Stores inventory information (for example, the CLEI code and serial number)
- Controls the port unit faceplate FAULT and ACTIVE LEDs



STM1E/4 Port Unit Faceplate

Purpose of circuit pack The STM1E 4-port interface (STM1E/4) port unit provides a low-speed interface between four synchronous STM-1e signals and an internal synchronous transmission interface signal (TXI).

STM1E/4 port unit faceplate The following figure shows the STM1E/4 port unit faceplate.



NC-USM-267

Faceplate LEDs The STM1E/4 port unit provides the following faceplate LEDs.

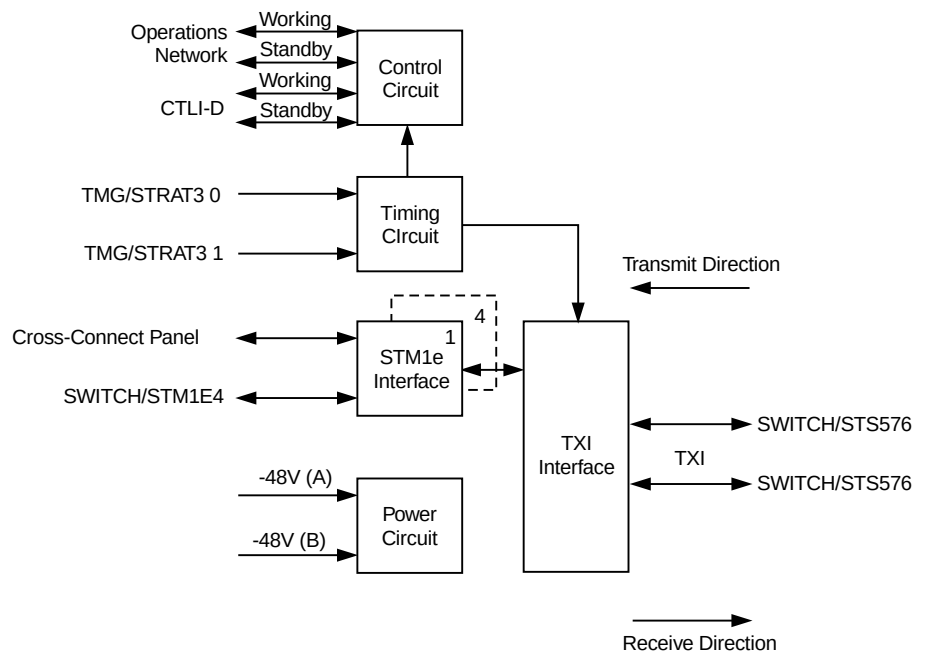
LED	Color	Function
FAULT	Red	Continuously lighted when a port unit failure is detected or the port unit loses one power feeder. Flashes on and off when an incoming signal failure, a loss of timing signal, or a memory fault is detected.
ACTIVE	Green	Lighted when the port unit is active/in-service.

General description of operation

The STM1E/4 port unit terminates up to four bidirectional STM-1e lines complying with standard SDH signal specifications. The four electrical signals are converted to 12 STS-1 signals and multiplexed into one internal transmission interface (TXI) signal (622.08 Mb/s). The TXI signal supports up to 12 multiplexed STS-1 signals. The TXI signal is sent to the 576x576 STS-1/192x192 STM-1 switch (SWITCH/STS576) circuit packs. In the transmit direction, the SWITCH/STS576 circuit packs send two TXI signals to the STM1E/4 port unit. The STM1E/4 port unit selects and demultiplexes one 622.08 Mb/s TXI signal into 12 STS-1 signals. The 12 STS-1 signals are converted back to four STM-1e signals. The STM1E/4 port unit also interfaces with the shelf Control/System 50DM (CTL/SYS50DM) circuit pack.

Functional block diagram

The following figure shows a functional block diagram of the STM1E/4 port unit.



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Control circuitry

The processor is the third-level processor in the system 3-level control hierarchy. The processor is the lowest level processor in the system control hierarchy. The processor controls and monitors the operation of the port unit. The processor also manages communication with other circuit packs via the operations network and the control interface for devices (CTLI-D) interfaces.

Memory circuitry The STM1E/4 port unit provides the following memory functions.

Start-up memory

The start-up memory consists of one megabyte of flash electrically-erasable programmable read-only memory (flash EEPROM). The start-up memory contains the program that allows the processor to load the executable code and data from the SYS50DM circuit pack into the operating memory. The program allows the processor to start up operation during a powerup or reset condition, or when initializing new software.

Operating memory

The operating memory consists of up to 16 megabytes of dynamic random access memory (DRAM). The operating memory is used to store the operating executable code (program) and data (configuration information).

Nonvolatile inventory memory

The nonvolatile inventory memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the port unit history such as the CLEI code and type/version information.

Transmission circuitry The STM1E/4 port unit provides the following transmission functions.

Receive direction

In the receive direction, the STM1E/4 port unit accepts up to four 155.52 Mb/s STM-1e signals. The STM-1e interface recovers timing from the STM1e signals and sends the received data and recovered clock to the TXI interface. The STM1e interface also bridges the incoming STM-1e signals to the SWITCH/STM1E4 circuit pack for protection.

The TXI interface converts the STM-1e signals to 12 STS-1 (51.84 Mb/s) signals. The byte multiplexer/demultiplexer then scrambles and multiplexes the 12 STS-1 signals into one 622.08 Mb/s TXI signal. The 622.08 Mb/s TXI signal is sent to the SWITCH/STS576 0 and SWITCH/STS576 1 circuit packs.

Transmit direction

In the transmit direction, the SWITCH/STS576 circuit packs send two 622.08 Mb/s TXI signals to the TXI interface. The TXI interface selects one TXI signal and recovers timing. The selected TXI signal is descrambled and demultiplexed into 12 STS-1 signals. The 12 STS-1 signals are converted back to four STM-1e signals. The TXI interface sends four STM-1e signals and a clock signal to the STM-1e interface.

The STM-1e interface selects the signals from the TXI interface or the SWITCH/STM1E4 circuit pack (for protection) and outputs them to the local cross-connect panel (or equivalent). The STM-1e interface provides four standard SDH STM-1e signals.

Timing circuitry

The timing circuit receives two 6.48-MHz timing reference signals from the shelf TMG/STRAT3 circuit packs. The control circuit selects the timing reference signal that is used. The timing circuit multiplies the selected 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. If both 6.48-MHz timing reference signals are not available, a free-running 6.48-MHz oscillator provides a reference signal for the timing circuit.

Protection circuitry

The STM1E/4 port unit provides the following protection functions.

STM1E/4 port unit protection

Optional 1xN ($N \leq 8$) revertive STM1E/4 port unit protection is provided. A STM1E/4 port unit protection bus is implemented with on-board relays on the local cross-connect side and with selectors at the TXI level on the SWITCH/STS576 circuit packs. The STM1E/4 Switch (SWITCH/STM1E4) circuit pack provides power to these relays and controls their operation. If the +5 volt power on the STM1E/4 port unit fails, the relays are still operational and controlled by the SWITCH/STM1E4 and CTL/SYS50DM circuit packs. Shorting contacts are provided in the STM1E/4 port unit backplane connector so that when the port unit is removed, the cross-connect cables short through to the SWITCH/STM1E4 circuit pack for routing to the protection STM1E/4 port unit. When the STM1E/4 port unit is reinserted, the relays are in the protection state until the CTL/SYS50DM circuit pack determines that the port unit is good.

Control complex protection

Control complex protection is performed by selecting the working or standby operations network and CTLI-D signals. The STM1E/4 port unit monitors these signals and can select the working or standby signals. The CTL/SYS50DM circuit pack can inhibit this autonomous selection and make its own selection.

Switch fabric protection

Switch fabric protection is performed by selecting the working or standby TXI signals from the shelf SWITCH/STS576 circuit packs. The STM1E/4 port unit monitors these TXI signals and can select the working or standby TXI signal. The CTL/SYS50DM circuit pack can inhibit this autonomous selection and make its own selection.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The STM1E/4 port unit monitors these timing reference signals and can select the working or standby timing reference signal until the protection algorithm of the CTL/SYS50DM circuit pack makes a selection.

Fault detection circuitry

The STM1E/4 port unit provides the following fault detection functions.

Monitoring and testing

The control circuit monitors all the activities on the port unit. The STM1E/4 port unit has an in-service and out-of-service built-in test capability. In-service testing is continuous. If an error occurs, the control circuit reports the error to the CTL/SYS50DM circuit pack using the operations network. An out-of-service test is performed whenever the STM1E/4 port unit is inserted in a slot or reset.

Loopbacks

In Release 4 and later releases, the STM1E/4 port unit supports nearside facility loopbacks. Nearside facility loopbacks allow an incoming STM1E/4 line to be looped back in the port unit to the output of the same line.

Power circuitry The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V and +3.3 V used on the port unit. The SWITCH/STM1E4 circuit pack supplies power to the input and output protection relays on the STM1E/4 port unit.

The STM1E/4 port unit monitors the two power sources. If the STM1E/4 port unit detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the port unit faceplate.

Quick reference summary The STM1E/4 port unit provides the following functions.

Receive functions

The STM1E/4 port unit performs the following receive functions:

- Receives four standard SDH STM-1e signals (155.52 Mb/s) from a local cross-connect panel (or equivalent)
- Recovers clock from each STM-1e signal
- Synchronizes and maps the STM-1e signals to 12 STS-1 (51.84 Mb/s) signals
- Multiplexes 12 STS-1 signals to a 622.08 Mb/s TXI signal
- Sends a 622.08 Mb/s TXI signal to each SWITCH/STS576 circuit pack

Transmit functions

The STM1E/4 port unit performs the following transmit functions:

- Receives two 622.08 Mb/s TXI signals from the SWITCH/STS576 circuit packs and selects one TXI signal
- Demultiplexes the selected 622.08 Mb/s TXI signal into 12 STS-1 signals
- Converts the 12 STS-1 signal back to four STM-1e signals
- Provides four STM-1e signals to a local cross-connect panel (or equivalent)

Timing and control functions

The STM1E/4 port unit performs the following timing and control functions:

- Selects the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs
- Selects the working or standby operations network and CTLI-D signals
- Provides relays for low-speed protection switching
- Performs internal fault detection and interfaces with the CTL/SYS50DM circuit packs using the operations network
- Stores inventory information (for example, the CLEI code and serial number)
- Controls the circuit pack faceplate FAULT and ACTIVE LEDs



SWIEX Circuit Pack

Purpose of circuit pack

The Switch Interface Expander (SWIEX) circuit pack expands two control interface for devices (CTLI-D) interfaces to up to 18 CTLI-D interfaces. The Control/System 50D (CTL/SYS50D) circuit pack uses the CTLI-D interfaces to control the Byte Switch (BSW) and Timing Stratum 3 (TMG/STAT3) circuit packs on the Switch Shelf.

SWIEX circuit pack faceplate

The following figure shows the SWIEX circuit pack faceplate.



NC-USM-027

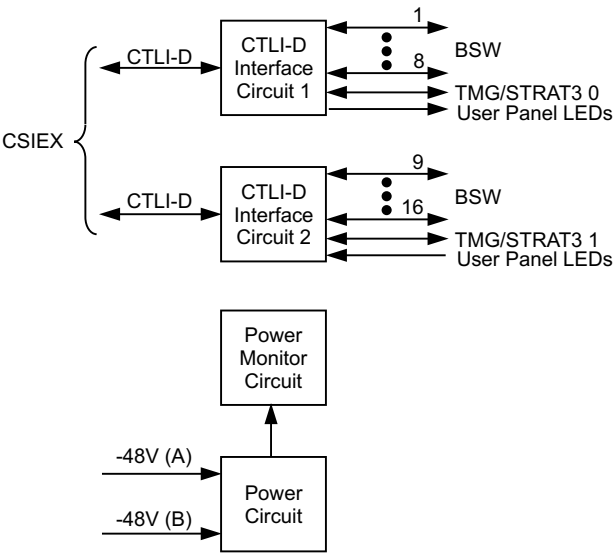
Faceplate LEDs The SWIEX circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder.
ACTIVE	Green	Lighted when the port unit is active/in-service.

The FAULT LED is controlled by the Control/System 50D (CTL/SYS50D) circuit packs.

General description of operation The SWIEX circuit pack acts as a hub that expands control interfaces from the CTL/SYS50D circuit pack to the BSW and TMG/STRAT3 circuit packs on the Switch Shelf. The SWIEX circuit pack expands two control interface for devices (CTLI-D) interfaces to up to 18 CTLI-D interfaces.

Functional block diagram The following figure shows a functional block diagram of the SWIEX circuit pack.



NC-USM-050

Control circuitry The SWIEX circuit pack has no on-board processor. All control and switching information comes from the CTL/SYS50D circuit pack via the control interface for devices (CTLI-D) circuit. The SWIEX circuit pack reports the status of the circuit pack and the incoming signals, as well as the circuit pack inventory information (for example, the CLEI code and serial number). The CTL/SYS50D circuit pack uses the status information for fault detection and isolation.

The SWIEX circuit pack also controls the circuit pack faceplate FAULT LED on the shelf BSW and TMG/STRAT3 circuit packs.

Memory circuitry The memory circuitry consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the circuit pack history such as the *CLEI* code and type/version information.

Interface circuitry The CTLI-D interface circuits expand two CTLI-D interfaces from the CSIEX circuit pack into up to 18 CTLI-D interfaces to the BSW and TMG/STRAT3 circuit packs on the Switch Shelf. The CTL/SYS50D circuit packs control the BSW and TMG/STRAT3 circuit packs via the CTLI-D interface through the CSIEX and SWIEX circuit packs.

The CTLI-D circuits also allow the CTL/SYS50D circuit pack to control the user panel LEDs.

Power monitor circuit The power monitor circuit receives loss of power alarm information from the Switch Shelf and the SWIEX circuit pack. The power monitor circuit reports all loss of power information to the CTL/SYS50D circuit pack via the CTLI-D interfaces.

Power circuitry The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V and +3.3 V used on the circuit pack.

The SWIEX circuit pack monitors the two power sources. If the SWIEX circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

Quick reference summary

The SWIEX circuit pack performs the following control functions:

- Expands two control interface for devices (CTLI-D) interfaces from the CSIEX circuit pack into 18 CTLI-D interfaces to the BSW and TMG/STRAT3 circuit packs on the Switch Shelf
- Allows the CTL/SYS50D circuit pack to control the user panel LEDs
- Monitors shelf and circuit pack loss of power and reports any loss of power failures to the CTL/SYS50D circuit pack
- Performs internal fault detection and interfaces with the CTL/SYS50D circuit pack using the CTLI-D interface
- Stores inventory information (for example, the *CLEI* code and serial number)
- Controls the circuit pack faceplate FAULT LED on the shelf BSW and TMG/STRAT3 circuit packs
- Controls the circuit pack faceplate ACTIVE LED



SWIF Circuit Pack

Purpose of circuit pack The Switch Interface (SWIF) circuit pack provides an interface between eight 622.08 Mb/s internal transmission interface (TXI) signals and 32 155.52 Mb/s switching interface (SXI-3) signals.

SWIF circuit pack faceplate The following figure shows the SWIF circuit pack faceplate.



NC-USM-026

Faceplate LEDs The SWIF circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder.
ACTIVE	Green	Lighted when the port unit is active/in-service.

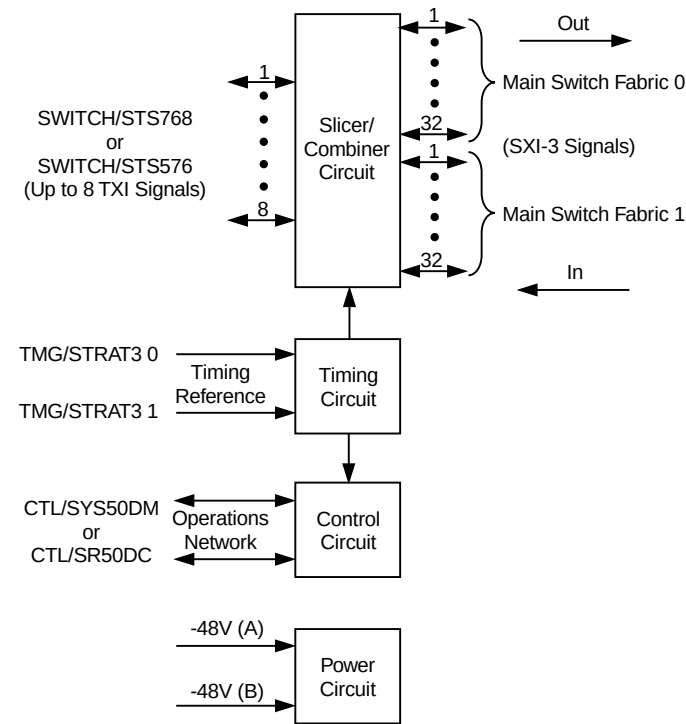
General description of operation

The SWIF circuit pack accepts up to eight TXI signals from the SWITCH/STS576 or SWITCH/STS768 circuit pack. The eight 622.08 Mb/s TXI signals are converted to 32 155.52 Mb/s SXI-3 signals. The SWIF circuit pack sends 32 SXI-3 signals to the Byte Switch (BSW) circuit packs that comprise the working main switch fabric and 32 SXI-3 signals to the BSW circuit packs that comprise the protection main switch fabric. In the opposite direction, the SWIF circuit pack selects 32 SXI-3 signals from the main switch fabrics. The SXI-3 signals are converted back into eight TXI signals and sent to the SWITCH/STS576 circuit pack.

The SWIF circuit pack also interfaces with the shelf Control/System 50DM (CTL/SYS50DM) circuit packs on the Universal I/O shelves or the Control/Sub Rack 50DC (CTL/SR50DC) circuit packs on the 10G I/O shelves.

Functional block diagram

The following figure shows a functional block diagram of the SWIF circuit pack.



NC-USM-051

Control circuitry The control circuit consists of a processor and memory. The processor is a third-level processor in the system 3-level control hierarchy. The processor controls and monitors the operation of the circuit pack. The processor also manages communication with the CTL/SYS50DM or CTL/SR50DC circuit packs via the operations network. For more information about the operations network, refer to *Chapter 6, Control, Transmission, and Synchronization Interfaces*.

Memory circuitry The SWIF circuit pack provides the following memory functions.

Start-up memory

The start-up memory consists of one megabyte of flash electrically-erasable programmable read-only memory (flash EEPROM). The start-up memory contains the program that allows the processor to load the executable code and data from the CTL/SYS50DM or CTL/SR50DC circuit pack into the operating memory. The program allows the processor to start up operation during a powerup or reset condition, or when initializing new software.

Operating memory

The operating memory consists of up to four megabytes of dynamic random access memory (DRAM). The operating memory is used to store the operating executable code (program) and data (configuration information).

Nonvolatile inventory memory

The nonvolatile inventory memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the port unit history such as the *CLEI* code and type/version information.

Slicer/combiner circuitry The SWIF circuit pack provides the following slicer/combiner functions.

Out direction

In the out direction (toward the main switch fabric), the slicer/combiner circuit accepts up to eight 622.08 Mb/s TXI signals from the SWITCH/STS576 or SWITCH/768 circuit pack. The eight TXI signals are converted into 96 51.84 Mb/s TXI-1 signals (equivalent to an STS-1/VC-3 signal). The 96 TXI-1 signals are byte sliced and formatted as 32 working and 32 standby 155.52 Mb/s SXI-3 signals. Each SXI-3 signal carries 25 byte-wide slices of each of the 96 TXI-1 signals to the main Switch Fabric 0 and main Switch Fabric 1.

In direction

In the in direction (away from the main switch fabric), the slicer/combiner circuit accepts 32 155.52 Mb/s SXI-3 signals from main Switch Fabric 0 and 32 155.52 Mb/s SXI-3 signals from main Switch Fabric 1. The selected 32 SXI-3 signals are combined into 8 TXI signals and sent to the SWITCH/STS576 or SWITCH/STS768 circuit pack. The slicer/combiner circuit also extracts an 8-KHz timing reference signal from the 32 SXI-3 signals and sends it to the shelf TMG/STRAT3 circuit packs.

Timing circuitry The timing circuit receives two 6.48-MHz timing reference signals from the shelf TMG/STRAT3 circuit packs. The control circuit selects the timing reference signal that is used. The timing circuit multiplies the selected 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal. If both 6.48-MHz timing reference signals are not available, a free-running 6.48-MHz oscillator provides a reference signal for the timing circuit.

The slicer/combiner circuit extracts an 8-KHz timing reference signal from the 32 SXI-3 signals and sends the timing reference signal to the shelf TMG/STRAT3 circuit packs.

Protection circuitry The SWIF circuit pack provides the following protection functions.

Main switch fabric protection

Main switch fabric protection is performed by selecting the working or standby SXI-3 signal from the main switch fabrics. The SWIF circuit pack monitors the SXI-3 signals and can select the working or standby signal. The CTL/SYS50DM or CTL/SR50DC circuit pack can inhibit this selection and make its own selection.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The SWIF circuit pack monitors these timing reference signals and can select the working or standby timing reference signal until the protection algorithm of the CTL/SYS50DM or CTL/SR50DC circuit pack makes a selection.

Power circuitry The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V and +3.3 V used on the circuit pack.

The SWIF circuit pack monitors the two power sources. If the circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

Quick reference summary The SWIF circuit pack provides the following functions.

Slicer/combiner functions

The SWIF circuit pack performs the following slicer/combiner functions:

- Receives up to eight 622.08 Mb/s TXI signals from the SWITCH/STS576 or SWITCH/STS768 circuit pack
- Converts the eight TXI signals into 96 51.84 Mb/s TXI-1 signals
- Byte slices the 96 TXI-1 signals and formats them into 32 155.52 Mb/s SXI-3 signals
- Sends 32 155.52 Mb/s SXI-3 signals to main Switch Fabric 0 and 32 155.52 Mb/s SXI-3 signals to main Switch Fabric 1

- Receives the 32 155.52 Mb/s SXI-3 signals from main Switch Fabric 0 and 32 155.52 Mb/s SXI-3 signals from main Switch Fabric 1
- Combines the selected 32 SXI-3 signals into eight TXI signals
- Sends the eight TXI signals to the SWITCH/STS576 or SWITCH/STS768 circuit pack

Timing and control functions

The SWIF circuit pack performs the following timing and control functions:

- Selects the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs
- Selects the 32 working or 32 standby SXI-3 signals from the main switch fabrics
- Performs internal fault detection and interfaces with the CTL/SYS50DM or CTL/SR50DC circuit packs using the operations network
- Stores inventory information (for example, the *CLEI* code and serial number)
- Controls the circuit pack faceplate FAULT and ACTIVE LEDs



SWITCH/DS3EC1 Circuit Pack

Purpose of circuit pack

The DS3EC1 switch (SWITCH/DS3EC1) circuit pack is a relay switch circuit pack used to build a low speed protection bus in the transmit and receive directions for the DS3EC1/8 port units.

SWITCH/DS3EC1 circuit pack faceplate

The following figure shows the SWITCH/DS3EC1 circuit pack faceplate.



NC-USM-025

Faceplate LEDs

The SWITCH/DS3EC1 circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder.
ACTIVE	Green	Lighted when the port unit is active/in-service.

The red FAULT LED and the green ACTIVE LED are controlled by the protection DS3EC1/8 port unit.

General description of operation

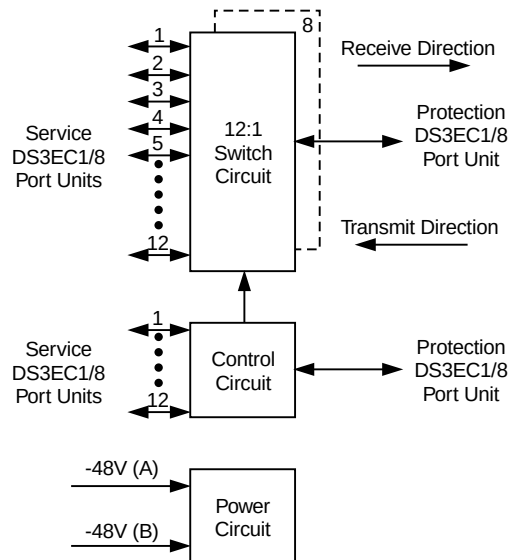
The SWITCH/DS3EC1 circuit pack interfaces with up to 12 service DS3EC1/8 port units and 1 protection DS3EC1/8 port unit.

If a service DS3EC1/8 port unit fails, the input protection switching relays on the failed DS3EC1/8 port unit route the eight electrical signals to the SWITCH/DS3EC1 circuit pack. The SWITCH/DS3EC1 circuit pack switches the eight electrical signals to the protection DS3EC1/8 port unit. In the transmit direction, the SWITCH/DS3EC1 circuit pack accepts the eight electrical signals from the protection DS3EC1/8 port unit and routes them to the output protection switching relays on the failed port unit and on to the DSX-3 panel (or equivalent).

Shorting contacts are provided in the DS3EC1/8 port unit backplane connector so that when the port unit is removed, the electrical cables short through to the SWITCH/DS3EC1 circuit pack for routing to the protection DS3EC1/8 port unit.

Functional block diagram

The following figure shows a functional block diagram of the SWITCH/DS3EC1 circuit pack.



NC-USM-052

Control circuitry The SWITCH/DS3EC1 circuit pack has no on-board processor. The control circuit interfaces with the service DS3EC1/8 port units and the protection DS3EC1/8 port unit. All control information comes from the protection DS3EC1/8 port unit. The protection DS3EC1/8 port unit receives commands from the CTL/SYS50DM circuit packs via the operations network. For more information about the operation network, refer to *Chapter 6, Control, Transmission, and Synchronization Interfaces*.

The SWITCH/DS3EC1 circuit pack also controls the protection switching relays on the service DS3EC1/8 port units.

Memory circuitry The memory circuitry consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the circuit pack history such as the *CLEI* code and type/version information.

Switch circuitry The SWITCH/DS3EC1 circuit pack provides the following switch functions.

Receive direction

In the receive direction, the SWITCH/DS3EC1 circuit pack interfaces with up to 12 service DS3EC1/8 port units and 1 protection DS3EC1/8 port unit. If a service DS3EC1/8 port unit fails, the input protection switching relays of the failed circuit pack feed for each of the eight electrical signals to the SWITCH/DS3EC1 circuit pack. Shorting contacts are also provided in the DS3EC1/8 port unit backplane connectors so that when the port unit is removed, the electrical cables short through to the SWITCH/DS3EC1 circuit pack for routing to the protection DS3EC1/8 port unit. The eight electrical signals are routed into eight switch circuits on the SWITCH/DS3EC1 circuit pack. Each switch circuit performs a 12:1 selection of the signal needing protection and terminates the other signals. The eight electrical signals are routed to the protection DS3EC1/8 port unit.

Transmit direction

In the transmit direction, the SWITCH/DS3EC1 circuit pack accepts eight electrical signals from the protection DS3EC1/8 port unit. Each electrical signal is routed into a switch circuit. Each switch circuit performs a 1:12 selection to output the electrical signals to the output protection switching relays on the failed DS3EC1/8 port unit and on to the cross-connect panel (or equivalent).

When a service DS3EC1/8 port unit is reinserted in a slot, the protection switching relays remain in the protection state until the CTL/SYS50DM circuit pack determines that the port unit is good.

Power circuitry The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V used on the circuit pack. The SWITCH/DS3EC1 circuit pack also supplies +5 V to the input and output protection relays on the service DS3EC1/8 port units.

The protection DS3EC1/8 port unit monitors the two power sources. If the protection DS3EC1/8 port unit detects a failure of an on-board fuse or power converter on the SWITCH/DS3EC1 circuit pack, the red FAULT LED is lighted on the SWITCH/DS3EC1 circuit pack faceplate.

Quick reference summary The SWITCH/DS3EC1 circuit pack provides the following functions.

Switch functions

The SWITCH/DS3EC1 circuit pack performs the following switch functions:

- Receives eight electrical signals from a failed DS3EC1/8 port unit and switches the eight electrical signals to the protection DS3EC1/8 port unit
- Receives eight electrical signals from the protection DS3EC1/8 port unit and switches the eight electrical signals to the correct service DS3EC1/8 port unit and to the cross-connect panel (or equivalent)

Control functions

The SWITCH/DS3EC1 circuit pack performs the following control functions:

- Controls and powers the protection switching relays on the service DS3EC1/8 port units
- Performs internal fault detection and interfaces with the CTL/SYS50DM circuit pack via the protection DS3EC1/8 port unit
- Stores inventory information (for example, the *CLEI* code and serial number)



SWITCH/STM1E4 Circuit Pack

Purpose of circuit pack

The STM1E4 switch (SWITCH/STM1E4) circuit pack is a relay switch circuit pack used to build a low-speed protection bus in the transmit and receive directions for the STM1E/4 port units.

SWITCH/STM1E4 circuit pack faceplate

The following figure shows the SWITCH/STM1E4 circuit pack faceplate.



NC-4SM-265

Faceplate LEDs

The SWITCH/STM1E4 circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder.
ACTIVE	Green	Lighted when the port unit is active/in-service.

The red FAULT LED and the green ACTIVE LED are controlled by the protection STM1E/4 port unit.

General description of operation

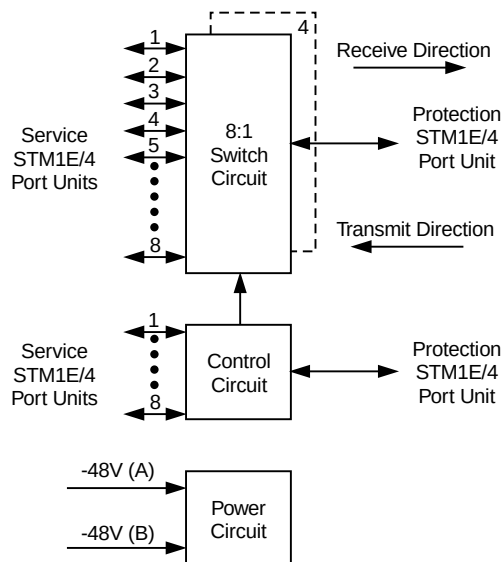
The SWITCH/STM1E4 circuit pack interfaces with up to 8 service STM1E/4 port units and 1 protection STM1E/4 port unit.

If a service STM1E/4 port unit fails, the input protection switching relays on the failed STM1E/4 port unit route the four electrical signals to the SWITCH/STM1E4 circuit pack. The SWITCH/STM1E4 circuit pack switches the four electrical signals to the protection STM1E/4 port unit. In the transmit direction, the SWITCH/STM1E4 circuit pack accepts the four electrical signals from the protection STM1E/4 port unit and routes them to the output protection switching relays on the failed port unit and on to the local cross-connect panel (or equivalent).

Shorting contacts are provided in the STM1E/4 port unit backplane connector so that when the port unit is removed, the electrical cables short through to the SWITCH/STM1E4 circuit pack for routing to the protection STM1E/4 port unit.

Functional block diagram

The following figure shows a functional block diagram of the SWITCH/STM1E4 circuit pack.



NC-USM-266

Control circuitry The SWITCH/STM1E4 circuit pack has no on-board processor. The control circuit interfaces with the service STM1E/4 port units and the protection STM1E/4 port unit. All control information comes from the protection STM1E/4 port unit. The protection STM1E/4 port unit receives commands from the CTL/SYS50DM circuit packs via the operations network. For more information about the operation network, refer to *Chapter 6, Control, Transmission, and Synchronization Interfaces*.

The SWITCH/STM1E4 circuit pack also controls the protection switching relays on the service STM1E/4 port units.

Memory circuitry The memory circuitry consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the circuit pack history such as the CLEI code and type/version information.

Switch circuitry The SWITCH/STM1E4 circuit pack provides the following switch function.

Receive direction

In the receive direction, the SWITCH/STM1E4 circuit pack interfaces with up to 8 service STM1E/4 port units and 1 protection STM1E/4 port unit. If a service STM1E/4 port unit fails, the input protection switching relays on the failed port unit feed each of the four electrical signals to the SWITCH/STM1E4 circuit pack. Shorting contacts are also provided in the STM1E/4 port unit backplane connectors so that when the port unit is removed, the electrical cables short through to the SWITCH/STM1E4 circuit pack for routing to the protection STM1E/4 port unit. The four electrical signals are routed into four switch circuits on the SWITCH/STM1E4 circuit pack. Each switch circuit performs an 8:1 selection of the signal needing protection and terminates the other signals. The four electrical signals are routed to the protection STM1E/4 port unit.

Transmit direction

In the transmit direction, the SWITCH/STM1E4 circuit pack accepts four electrical signals from the protection STM1E/4 port unit. Each electrical signal is routed into a switch circuit. Each switch circuit performs a 1:8 selection to output the electrical signals to the output protection switching relays on the failed STM1E/4 port unit and on to the cross-connect panel (or equivalent).

When a service STM1E/4 port unit is reinserted in a slot, the protection switching relays remain in the protection state until the CTL/SYS50DM circuit pack determines that the port unit is good.

Power circuitry

The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V used on the circuit pack. The SWITCH/STM1E4 circuit pack also supplies +5 V to the input and output protection relays on the service STM1E/4 port units.

The protection STM1E/4 port unit monitors the two power sources. If the protection STM1E/4 port unit detects a failure of an on-board fuse or power converter on the SWITCH/STM1E4 circuit pack, the red FAULT LED is lighted on the SWITCH/STM1E4 circuit pack faceplate.

Quick reference summary

The SWITCH/STM1E4 circuit pack provides the following functions.

Switch functions

The SWITCH/STM1E4 circuit pack performs the following switch functions:

- Receives four electrical signals from a failed STM1E/4 port unit and switches the four electrical signals to the protection STM1E/4 port unit
- Receives four electrical signals from the protection STM1E/4 port unit and switches the four electrical signals to the correct service STM1E/4 port unit and to the cross-connect panel (or equivalent)

Control functions

The SWITCH/STM1E4 circuit pack performs the following control functions:

- Controls and powers the protection switching relays on the service STM1E/4 port units
- Performs internal fault detection and interfaces with the CTL/SYS50DM circuit pack via the protection STM1E/4 port unit
- Stores inventory information (for example, the CLEI code and serial number)



SWITCH/STS576 Circuit Pack

Purpose of circuit pack The 576x576 STS-1/192x192 STM-1 switch (SWITCH/STS576) circuit pack provides a 576x576 STS-1/192x192 STM-1, single-stage, nonblocking switch. The switch allows STS-1/VC-3 equivalent switching between port units on the shelf and between port units and the Switch Interface (SWIF) circuit packs.

SWITCH/STS576 circuit pack faceplate The following figure shows the SWITCH/STS576 circuit pack faceplate.



NC-USM-024

Faceplate LEDs The SWITCH/STS576 circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder.
ACTIVE	Green	Lighted when the port unit is active/in-service.

The red FAULT LED is controlled by the CTL/SYS50DM circuit packs.

General description of operation

The SWITCH/STS576 circuit pack provides a 576x576 STS-1/192x192 STM-1 single-stage, nonblocking switch. The SWITCH/STS576 circuit pack has up to 32 transmission interface (TXI) signal inputs and up to 32 TXI signal outputs. Any input can be routed to any output.

This allows the user-specified cross-connections between:

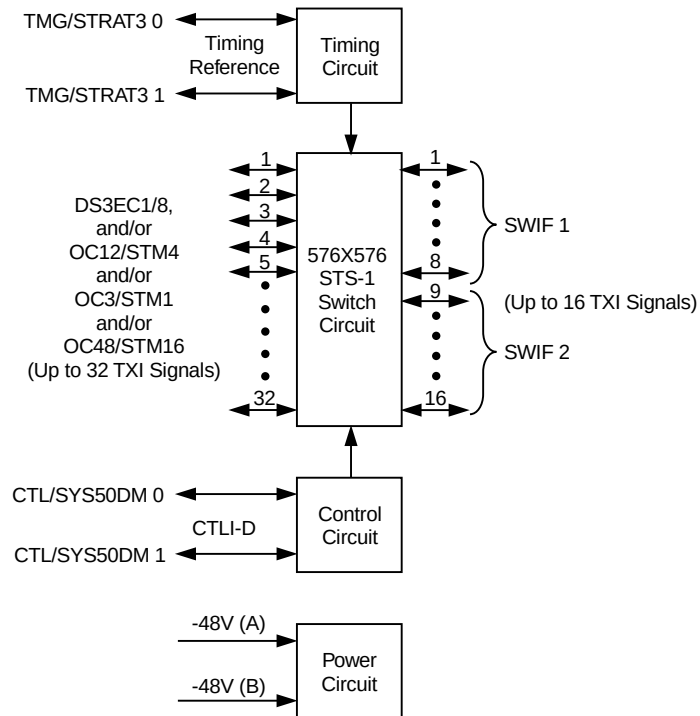
- Port units on the same shelf
- Port units on different shelves via the Switch Interface (SWIF) and Byte Switch (BSW) circuit packs

The SWITCH/STS576 circuit pack also supports:

- 1xN DS3EC1/8 port unit protection switching
- 1xN STM1E/4 port unit protection switching
- 1+1 optical port protection switching
- 2-fiber bidirectional line-switched ring protection switching
- 2-fiber multiplex section shared protection ring switching
- 4-fiber bidirectional line-switched ring protection switching
- 4-fiber multiplex section shared protection ring switching
- Unidirectional path-switched ring (UPSR)/subnetwork connection protection (SNCP) switching

Functional block diagram

The following figure shows a functional block diagram of the SWITCH/STS576 circuit pack.



NC-USM-053

Control circuitry

The SWITCH/STS576 circuit pack has no on-board processor. All control and switching information comes from the CTL/SYS50DM circuit packs via the control interface for devices (CTLI-D) interface. The SWITCH/STS576 circuit pack reports the status of the circuit pack and the incoming TXI signals, as well as the circuit pack inventory information (for example, the *CLEI* code and serial number). The CTL/SYS50DM circuit packs use the status information for fault detection and isolation.

Memory circuitry

The memory circuitry consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the circuit pack history such as the *CLEI* code and type/version information.

Switch circuitry The switch circuit provides transmission connection between the port units on the same shelf and between the port units and the main switch fabric. The SWITCH/STS576 circuit packs accept the following inputs:

- Up to 32 TXI signals from the DS3EC1/8, OC3/STM1, OC12/STM4, and/or OC48/STM16 port units (service and protection)
- Up to 16 TXI signals from 2 SWIF circuit packs

The switch circuit forms a 576x576 STS-1/192x192 STM-1 switch that completes circuits for user-specified cross-connections and protection switching.

The SWITCH/STS576 circuit packs provide the following outputs:

- Up to 32 TXI signals to the DS3EC1/8, OC3/STM1, OC12/STM4, and/or OC48/STM16 port units (service and protection)
- Up to 16 TXI signals to the SWIF circuit packs

Timing circuitry The timing circuit receives two 6.48-MHz timing reference signals from the shelf TMG/STRAT3 circuit packs. The control circuit selects the timing reference signal that is used. The timing circuit multiplies the selected 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal.

Protection circuitry The SWITCH/STS576 circuit pack provides the following protection functions.

Control complex protection

Control complex protection is performed by selecting the working or standby CTLI-D signals. The SWITCH/STS576 circuit pack monitors these signals and can select the working or standby signals. The CTL/SYS50DM circuit pack can inhibit this selection and make its own selection.

STM1E/4 port unit protection

STM1E/4 port unit protection is accomplished by the coordinated operation of the protection STM1E/4 port unit and the SWITCH/STS576 circuit pack. For example, the SWITCH/STS576 circuit pack selects the TXI signal from the protection STM1E/4 port unit to substitute for the TXI signal from a failed service STM1E/4 port unit.

The SWITCH/STS576 circuit pack also routes the TXI signal for the failed service STM1E/4 port unit to the protection STM1E/4 port unit.

STM1E/4 port unit protection switching is performed in response to commands from the CTL/SYS50DM circuit packs via the CTLI-D interface.

DS3EC1/8 port unit protection

DS3EC1/8 port unit protection is accomplished by the coordinated operation of the protection DS3EC1/8 port unit and the SWITCH/STS576 circuit pack. For example, the SWITCH/STS576 circuit pack selects the TXI signal from the protection DS3EC1/8 port unit to substitute for the TXI signal from a failed service DS3EC1/8 port unit.

The SWITCH/STS576 circuit pack also routes the TXI signal for the failed service DS3EC1/8 port unit to the protection DS3EC1/8 port unit.

DS3EC1/8 port unit protection switching is performed in response to commands from the CTL/SYS50DM circuit packs via the CTLI-D interface.

1+1 optical port protection

The 1+1 optical port protection is accomplished by the coordinated operation of the working and standby optical ports and the SWITCH/STS576 circuit pack. For example, the SWITCH/STS576 circuit pack selects the TXI signal from the standby optical port to substitute for the TXI signal from the failed working optical port.

The SWITCH/STS576 circuit pack also routes the TXI signal for the failed working optical port to the standby optical port.

The 1+1 optical port protection switching is performed in response to commands from the CTL/SYS50DM circuit packs via the CTLI-D interface.

2-fiber bidirectional line-switched ring protection switching

The SWITCH/STS576 circuit pack provides all the 2-fiber ring protection switching connections. All 2-fiber ring protection switching occurs at the input and output stages of SWITCH/STS576 circuit packs. During the protection switch, the service traffic for the failed optical port unit is routed to the optical port unit in the opposite direction. For example, if the west OC48/STM16 port unit fails, the service traffic is routed to the east OC48/STM16 port unit.

4-fiber bidirectional line-switched ring/multiplex section shared protection ring switching

The SWITCH/STS576 circuit pack provides all the 4-fiber ring protection switching connections in 4-fiber bidirectional line-switched rings and multiplex section shared protection rings. All 4-fiber ring protection switching occurs at the input and output stages of SWITCH/STS576 circuit packs. During the protection switch, the protection port unit selects the 4 TXI signals from the SWITCH/STS576 circuit pack.

For span protection switching, the SWITCH/STS576 circuit pack makes connections to bridge the add and through signals to the protection port unit in the same span. All drop and through traffic is selected from the protection port unit in the same span.

For loopback protection switching, the SWITCH/STS576 circuit pack makes connections to bridge the add and through signals to protection port unit for the protection line in the other direction. All drop and through traffic is selected from the protection port unit in the other direction. These operations occur at the nodes in a closed 4-fiber ring adjacent to the failure.

The 4-fiber ring protection switching is performed in response to commands from the CTL/SYS50DM circuit packs via the CTLI-D interface.

Unidirectional path-switched ring/subnetwork connection protection switching

The UPSR/SNCP switching is performed in the receive (toward the SWITCH/STS576 circuit pack) direction. If the active incoming path-level signal fails, the working SWITCH/STS576 circuit pack chooses the protection path-level signal. In the transmit (toward the optical line) direction, the working SWITCH/STS576 circuit pack bridges the same path-level signal to the working and protection paths.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The SWITCH/STS576 circuit pack monitors these timing reference signals and can select the working or standby timing reference signal until the protection algorithm of the CTL/SYS50DM circuit pack makes a selection.

Power circuitry The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +3.3 V, +1.4 V, +1.2 V, and +1.0 V used on the circuit pack.

The circuit pack monitors the two power sources. If the circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

Quick reference summary The SWITCH/STS576 circuit pack provides the following functions.

Switch functions

The SWITCH/STS576 circuit pack performs the following switch functions:

- Receives up to 32 TXI signals from the DS3EC1/8, OC-3/STM-1, OC-12/STM-4, and/or OC48/STM16 port units (service and protection)
- Receives up to 16 TXI signals from 2 SWIF circuit packs
- Establishes cross-connections through the 576x576 STS-1/192x192 STM-1 switch based on user-specified cross-connection commands
- Transmits up to 32 TXI signals to DS3EC1/8, OC-3/STM-1, OC-12/STM-4, and/or OC48/STM16 port units (service and protection)
- Transmits up to 16 TXI signals to two SWIF circuit packs

Control functions

The SWITCH/STS576 circuit pack performs the following control functions:

- Performs internal fault detection and interfaces with the CTL/SYS50DM circuit packs using the control interface for devices (CTLI-D) interface
- Stores inventory information (for example, the *CLEI* code and serial number)
- Controls the circuit pack faceplate ACTIVE LED



SWITCH/STS768 Circuit Pack

Purpose of circuit pack

The 768x768 STS-1/256x256 STM-1 switch (SWITCH/STS768) circuit pack provides a 768x768 STS-1/256x256 STM-1, single-stage, nonblocking switch. The switch allows STS-1/VC-3 equivalent switching between port units on the shelf and between port units and the Switch Interface (SWIF) circuit packs.

SWITCH/STS768 circuit pack faceplate

The following figure shows the SWITCH/STS768 circuit pack faceplate.



NC-USM-199

Faceplate LEDs The SWITCH/STS768 circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder.
ACTIVE	Green	Lighted when the port unit is active/in-service.

The red FAULT LED is controlled by the CTL/SR50DC circuit packs.

General description of operation

The SWITCH/STS768 circuit pack provides a 768x768 STS-1/256x256 STM-1 single-stage, nonblocking switch. The SWITCH/STS768 circuit pack has up to 64 transmission interface (TXI) signal inputs and up to 64 TXI signal outputs. Any input can be routed to any output. This allows the user-specified cross-connections between:

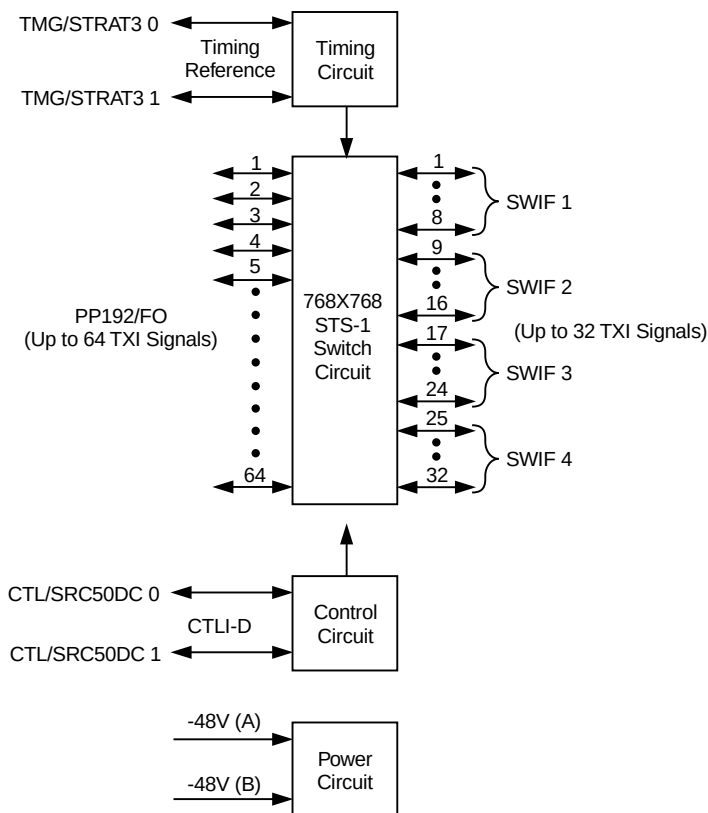
- Port units on the same shelf
- Port units on different shelves via the Switch Interface (SWIF) and Byte Switch (BSW) circuit packs

The SWITCH/STS768 circuit pack also supports:

- 4-fiber bidirectional line-switched ring protection switching
- 4-fiber multiplex section shared protection ring switching
- 2-fiber bidirectional line-switched ring protection switching
- 2-fiber multiplex section shared protection ring switching

Functional block diagram

The following figure shows a functional block diagram of the SWITCH/STS768 circuit pack.



NC-USM-201

Control circuitry

The SWITCH/STS768 circuit pack has no on-board processor. All control and switching information comes from the CTL/SR50DC circuit packs via the control interface for devices (CTLI-D) interface. The SWITCH/STS768 circuit pack reports the status of the circuit pack and the incoming TXI signals, as well as the circuit pack inventory information (for example, the *CLEI* code and serial number). The CTL/SR50DC circuit pack use the status information for fault detection and isolation.

Memory circuitry

The memory circuitry consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the circuit pack history such as the *CLEI* code and type/version information.

Switch circuitry The switch circuit provides transmission connection between the port units on the same shelf and between the port units and the main switch fabric. The SWITCH/STS768 circuit packs accept the following inputs:

- Up to 64 TXI signals from the PPROC/FO circuit packs (service and protection)
- Up to 32 TXI signals from 4 SWIF circuit packs

The switch circuit forms a 768x768 STS-1/256x256 STM-1 switch that completes circuits for user-specified cross-connections and protection switching.

The SWITCH/STS768 circuit packs provide the following outputs:

- Up to 64 TXI signals to the PPROC/FO circuit packs (service and protection)
- Up to 32 TXI signals to the 4 SWIF circuit packs

Timing circuitry The timing circuit receives two 6.48-MHz timing reference signals from the shelf TMG/STRAT3 circuit packs. The control circuit selects the timing reference signal that is used. The timing circuit multiplies the selected 6.48-MHz timing reference signal by 24 to generate an internal 155.52-MHz timing signal.

Protection circuitry The SWITCH/STS768 circuit pack provides the following protection functions.

Control complex protection

Control complex protection is performed by selecting the working or standby CTLI-D signals. The SWITCH/STS768 circuit pack monitors these signals and can select the working or standby signals. The CTL/SR50DC circuit packs can inhibit this selection and make its own selection.

2-fiber bidirectional line-switched ring/multiplex section shared protection ring protection switching

The SWITCH/STS768 circuit pack provides all the 2-fiber ring protection switching connections. All 2-fiber ring protection switching occurs at the input and output stages of SWITCH/STS768 circuit packs. During the protection switch, the service traffic for the failed optical port unit is routed to the optical port unit in the opposite direction. For example, if the west OC192/STM64 port unit fails, the service traffic is routed to the east OC192/STM64 port unit.

4-fiber bidirectional line-switched ring/multiplex section shared protection ring switching

The SWITCH/STS768 circuit pack provides all the 4-fiber ring protection switching connections in 4-fiber bidirectional line-switched rings and multiplex section shared protection rings. All 4-fiber ring protection switching occurs at the input and output stages of SWITCH/STS768 circuit packs. During the protection switch, the protection port unit selects the TXI signals from the SWITCH/STS768 circuit pack.

For span protection switching (open and closed rings), the SWITCH/STS768 circuit pack makes connections to bridge the add and through traffic to the protection port unit in the same span. All drop and through traffic is selected from the protection port unit in the same span.

For loopback protection switching (closed rings only), the SWITCH/STS768 circuit pack makes connections to bridge the add and through traffic to protection port unit for the protection line in the other direction. All drop and through traffic is selected from the protection port unit in the other direction. These operations occur at the nodes in a closed 4-fiber ring adjacent to the failure.

The 4-fiber ring protection switching is performed in response to commands from the CTL/SR50DC circuit packs via the CTLI-D interface.

Timing reference signal protection

Timing reference signal protection is performed by selecting the working or standby timing reference signal from the shelf TMG/STRAT3 circuit packs. The SWITCH/STS768 circuit pack monitors these timing reference signals and can select the working or standby timing reference signal until the protection algorithm of the CTL/SR50DC circuit pack makes a selection.

Power circuitry

The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +3.3 V, +1.4 V, +1.2 V, and +1.0 V used on the circuit pack.

The circuit pack monitors the two power sources. If the circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

Quick reference summary The SWITCH/STS768 circuit pack provides the following functions.

Switch functions

The SWITCH/STS768 circuit pack performs the following switch functions:

- Receives up to 64 from the PPROC/FO circuit packs
- Receives up to 32 TXI signals from 4 SWIF circuit packs
- Establishes cross-connections through the 768x768 STS-1/256x256 STM-1 switch based on user-specified cross-connection commands
- Transmits up to 64 TXI signals to the PPROC/FO circuit packs
- Transmits up to 32 TXI signals to 4 SWIF circuit packs

Control functions

The SWITCH/STS768 circuit pack performs the following control functions:

- Performs internal fault detection and interfaces with the CTL/SR50DC circuit packs using the control interface for devices (CTLI-D) interface
- Stores inventory information (for example, the *CLEI* code and serial number)
- Controls the circuit pack faceplate ACTIVE LED



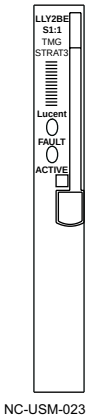
TMG/STRAT3 Circuit Pack

Purpose of circuit pack The Stratum 3 Timing (TMG/STRAT3) circuit packs distribute redundant timing signals to the circuit packs on the Control, Switch, and I/O Shelves.

Supported TMG/STRAT3 circuit packs The following table shows the supported TMG/STRAT3 circuit packs.

Name	Code	Description
TMG/STRAT3 (S1:1,2,3,4,5)	LLY2 and LLY2A	Supports the extended super frame (ESF) format for external DS1 timing reference signals.
TMG/STRAT3 (S1:6 and Later)	LLY2 and LLY2A	Supports the ESF and super frame (SF) formats for external DS1 timing reference signals.
TMG/STRAT3	LLY2B and LLY2BE	Supports the ESF and super frame (SF) formats for external DS1 timing reference signals.

TMG/STRAT3 circuit pack faceplate The following figure shows the TMG/STRAT3 circuit pack faceplate.



Faceplate LEDs The TMG/STRAT3 circuit pack provides the following faceplate LEDs.

LED	Color	Function
FAULT	Red	Continuously lighted when a circuit pack failure is detected or the circuit pack loses one power feeder. Flashes on and off when an incoming DS1 timing reference signal failure is detected.
ACTIVE	Green	Lighted when the circuit pack is active/in-service.

The red FAULT and green ACTIVE LEDs are controlled by the CTL/SYS50D, CTL/SYS50DM, and CTL/SR50DC circuit packs.

General description of operation The TMG/STRAT3 circuit pack supports the following timing modes.

Free-running mode

In the free-running mode, the TMG/STRAT3 circuit pack derives timing from a Stratum 3 oscillator.

Locked mode

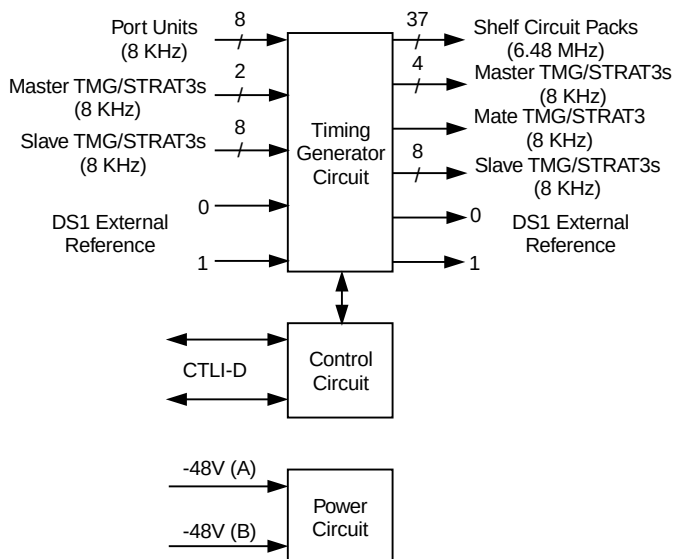
In the locked mode, the TMG/STRAT3 circuit pack derives timing from a timing reference signal input. These references synchronize the local terminal, and any others that may reference it, with other network equipment operating under the same primary clock source.

Holdover mode

In the holdover mode, the timing generator circuit uses storage techniques to maintain the last known good frequency of the reference signal. The holdover mode is entered when the integrity of the reference signal is considered unacceptable or by manual command. In the holdover mode, the on-board oscillator frequency will not degrade below the Stratum 3 level.

Functional block diagram

The following figure shows a functional block diagram of the TMG/STRAT3 circuit pack.



NC-USM-057

Control circuitry

The TMG/STRAT3 circuit pack has no on-board processor. All control information comes from the CTL/SYS50D, CTL/SYS50DM, and CTL/SR50DC circuit packs via the control interface for devices (CTLI-D) interface. The TMG/STRAT3 circuit pack reports the status of the circuit pack and the incoming timing reference signals, as well as the circuit pack inventory information (for example, the *CLEI* code and serial number). The CTL/SYS50D, CTL/SYS50DM, and CTL/SR50DC circuit packs use the status information for fault detection and isolation.

Timing generator circuitry

The timing generator circuit can accept the following reference inputs and selects one of the inputs as the timing reference:

- Two external DS1 reference signal (1.544 MHz) from a Stratum 3 or better source
- One line reference signal (8 kHz) from an OC48/STM16 port unit
- Two reference signals (8 KHz) from the master TMG/STRAT3 circuit packs
- Eight reference signals (8 KHz) from slave TMG/STRAT3 circuit packs

A digital phase-locked loop circuit generates the timing distribution signals.

The timing generator circuit distributes the following timing reference signals:

- 6.48-MHz reference signals to other circuit packs
- Four signals (8 MHz) to master TMG/STRAT3 circuit packs
- One signal (8 MHz) to the mate TMG/STRAT3 circuit pack
- Eight signals (8 MHz) to slave TMG/STRAT3 circuit packs
- Two external DS1 reference signals (1.544 MHz)

Power circuitry

The power circuit accepts two –48 V power feeders or two –60 V power feeders from the backplane. The power feeders are diode OR'd, fused, and filtered. Modular DC-to-DC converters produce +5 V and +3.3 V used on the circuit pack.

The TMG/STRAT3 circuit pack monitors the two power sources. If the circuit pack detects a failure of an on-board fuse or power converter, the red FAULT LED is lighted on the circuit pack faceplate.

Quick reference summary

The TMG/STRAT3 circuit pack performs the following timing and control functions:

- Accepts external timing reference signals, timing reference signals from the port units, and timing reference signals from other TMG/STRAT3 circuit packs
- Generates timing distribution signals
- Supports system timing in the free-running, locked, or holdover modes
- Performs internal fault detection and interfaces with the CTL/SYS50D, CTL/SYS50DM, and CTL/SR50DC circuit packs using the CTLI-D interface
- Stores inventory information (for example, the *CLEI* code and serial number)



Summary

- Introduction** The WaveStar BandWidth Manager system can be equipped with the following circuit packs and port units:
- ADJCTL/DCC circuit pack (LEY2 and LEY2AE)
 - ADJCTL/DCCEI circuit pack (LEY1 and LEY1AE)
 - BSW circuit pack (LFY2 and LFY2AE)
 - CSIEX circuit pack (LEZ1 and LEZ1AE)
 - CTL/EI circuit pack (LCZ1 and LCZ1AE)
 - CTL/MEM circuit pack (LCY2 and LCY2AE)
 - CTL/SR50DC circuit pack (LEY68 and LEY68AE)
 - CTL/SYS50D circuit pack (LEY20, LEY20AE, LEY20B, and LEY20BE)
 - CTL/SYS50DM circuit pack (LEY10B and LEY10BE)
 - DS3EC1/8 port unit (LEY17 and LEY17AE)
 - OC12/STM4 port unit (LEY13, LEY13AE, LEY14, and LEY14AE)
 - OC3/STM1 port unit (LEY15, LEY15AE, LEY16, and LEY16AE)
 - OC48/STM16/1.3LR1 port unit (LEY7 and LEY7AE)
 - OC48/STM16/1.3LR1 port unit (LEY307 and LEY307AE)
 - OC48/STM16/1.5LR1 port unit (LEY8 and LEY8AE)
 - OC48/STM16/DWDM01 - 16 port unit (LEY50-LEY65 and LEY50AE-LEY65AE)
 - OC48/STM16/POUxxxx port unit (LEY80-LEY95 and LEY80AE-LEY95AE)
 - OC48/STM16/WDMxxxx port unit (LEY101-LEY180 and LEY101AE-LEY180AE)
 - OC192/STM64/1.5SR1 port unit (LEY67 and LEY67AE)
 - OC192/STM64/1.5IR1 port unit (LEY69 and LEY69AE)
 - OC192/STM64/1.5IRS1 port unit (LEY97 and LEY97AE)
 - OC192/STM64/WDMxxxx port unit (LEY201-LEY240 and LEY201AE-LEY240AE)
 - OC192/STM64/POUxxxx port unit (LEY284-LEY299 and LEY284AE-LEY299AE)

- PPROC/FO circuit pack (LEY72 and LEY72AE)
- STM1E/4 port unit (LEY43 and LEY43A)
- SWIEX circuit pack (LFY1 and LFY1AE)
- SWIF circuit pack (LEY21 and LEY21AE)
- SWITCH/DS3EC1 circuit pack (LEY18 and LEY18AE)
- SWITCH/STM1E4 (LEY41 and LEY41AE)
- SWITCH/STS576 circuit pack (LEY4 and LEY4AE)
- SWITCH/STS768 circuit pack (LEY73 and LEY73AE)
- TMG/STRAT3 circuit pack (LLY2, LLY2AE, LLY2B, and LLY2BE)





6 Control, Transmission, and Synchronization Interfaces

Overview

Purpose This chapter describes the WaveStar BandWidth Manager system architecture. The system control, transmission, and synchronization architectures are described down to the circuit pack level.

This chapter describes the architecture and components that support the following system functions:

- Control
- Transmission
- Synchronization

Related information For related information see the following chapters in this guide:

- Chapter 2, Network Topologies
- Chapter 4, Operations Interfaces
- Chapter 5, Circuit Pack/Port Unit Descriptions

Contents Below are the contents of this unit:

Control	6 - 2
Transmission	6 - 8
Synchronization	6 - 12
Summary	6 - 27

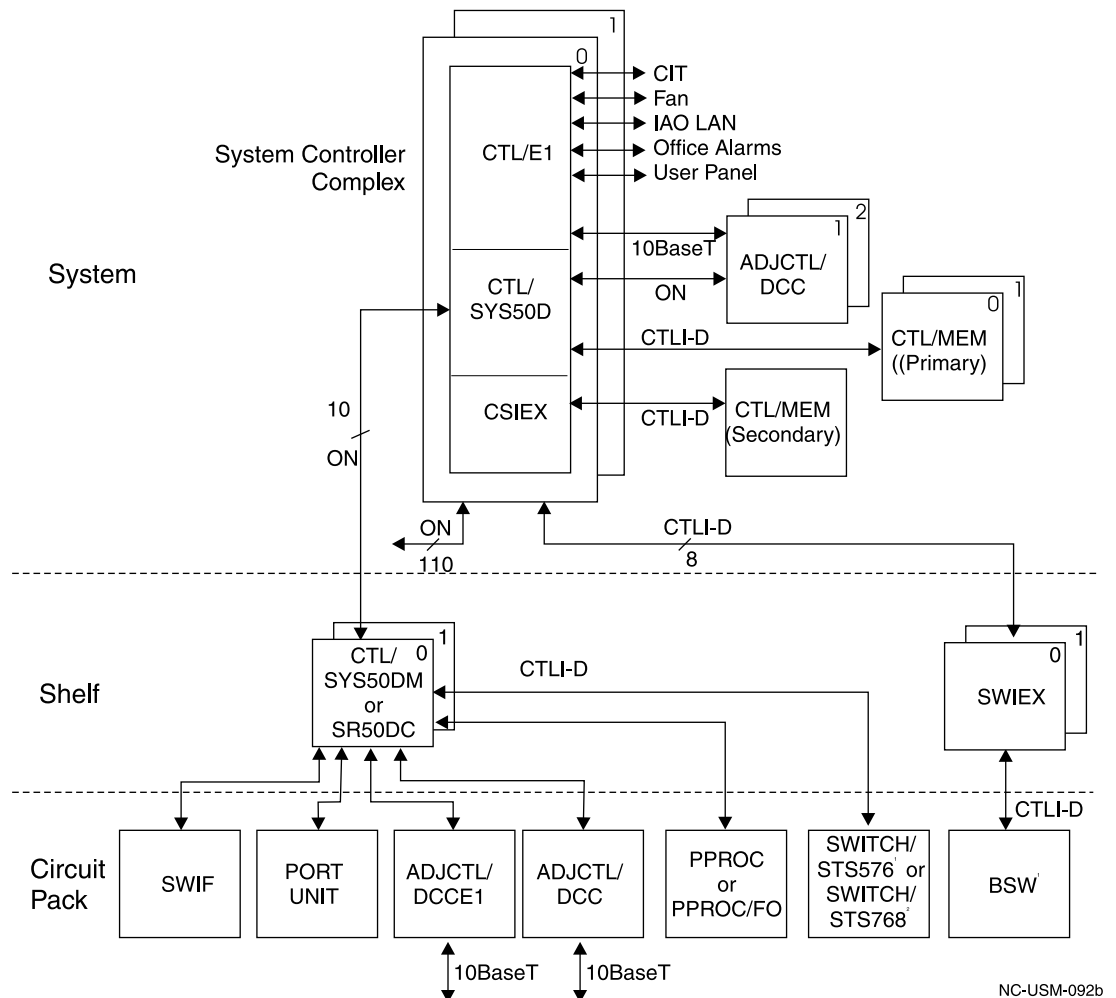
Control

Overview The WaveStar BandWidth Manager shelf functions are controlled by shelf controller circuit packs and by function microcontrollers on the port units (transmission circuit packs). The shelf controllers control the port units and also the timing and switching circuit packs, which have no internal function controllers. Overall system operation is controlled by signals received over the SONET/SDH DCC channels or from the user interface.

System control architecture The WaveStar BandWidth Manager system has a duplicated, three-level system control architecture that supports all platforms. The system control architecture distributes the monitoring and control functions down to the lowest level where a particular function is performed.

The following figure shows the system control architecture for the WaveStar BandWidth Manager system:

Figure 6-1 System Control Architecture



NC-USM-092b

¹The SWITCH/STS576, SWITCH/STS768, and BSW circuit packs do not have board controllers.
²SWITCH/S768 available for 10G I/O Shelf only.

System level The system level of the system control hierarchy consists of the following:

- The duplicated system controller complex
- The Control/Memory (CTL/MEM)
- The Adjunct Control/Data Communications Channel (ADJCTL/DCC) circuit packs.

System controller

The system controller complex consists of the following circuit packs:

- Control/System Controller (CTL/SYS50D)
- Control System Interface Expander (CSIEX)

- Control/External Interface (CTL/EI) circuit packs

The system controller complex performs the non-real time intensive functions requiring overall system knowledge. The system controller complex also plays a major role in providing the extensive operations, administration, maintenance, and provisioning functions.

Active/Standby sides

The Switch Interface Expander (SWIEX) plus the CSIEX, CTL/EI, and SYS50D, are a group of four circuit packs that form a side. Each system control shelf consists of two sides. They are referred to as Side 0 and Side 1. While one side is Active the other side is standby. If, for example, Side 0 is the active side and any one of its four circuit packs fails- then there will be a switch to the Standby side (Side 1). Side 1 now becomes the Active side. When this switch occurs, the new active side performs a soft reset. This reset should complete in approximately 5 to 6 minutes. Subsequently, after the alarmed circuit pack in the opposite side is replaced, that side becomes the new standby side. No switch-back is required! In order to manually switch the controller complex, a switch request must be placed on the SYS50D circuit pack.

Nonvolatile memory

The CTL/MEM circuit packs support the system controller complex with nonvolatile memory. The primary CTL/MEM circuit packs are the primary boot devices for the WaveStar BandWidth Manager system. The secondary CTL/MEM circuit pack is used for secondary database backup.

Adjunct control

The ADJCTL/DCC and ADJCTL/DCCEI circuit packs act as interfaces between operations systems (OS) information on the intraoffice LAN and the OS information on the synchronous optical network (SONET) and synchronous digital hierarchy (SDH) overhead. The ADJCTL/DCC and ADJCTL/DCCEI circuit packs perform SONET and SDH overhead access and processing functions. The ADJCTL/DCC and ADJCTL/DCCEI circuit packs process SONET/SDH section data communications channel (DCC) information and support line and section orderwire (E1 and E2 bytes), and the user channel (F1 byte).

Shelf level The shelf level of the system control hierarchy consists of the following duplicated circuit packs:

- Control/System Controller
- Control/Subrack Controller
- Switch Interface Expander

Control/System Controller (CTL/SYS50DM) circuit packs

The CTL/SYS50DM circuit pack controls the board controllers on the port units and circuit packs of the I/O Shelf. The CTL/SYS50DM circuit packs also control switching on the SWITCH/STS576 circuit packs. The CTL/SYS50DM circuit pack is responsible for fault recovery and system integrity. The CTL/SYS50DM circuit pack communicates with the board controllers and the SWITCH/STS576 circuit packs to activate protection switching.

Control/Subrack Controller (CTL/SR50DC) circuit packs

The CTL/SR50DC circuit pack controls the board controllers on the port units and circuit packs of the 10G I/O Shelf. The CTL/SR50DC circuit packs also control switching on the SWITCH/STS768 circuit packs. The CTL/SR50DC circuit pack is responsible for fault recovery and system integrity. The CTL/SR50DC circuit pack communicates with the board controllers and the SWITCH/STS768 circuit packs to activate protection switching.

Switch Interface Expander (SWIEX) circuit packs

The SWIEX circuit pack allows the CTL/SYS50D circuit pack to control switching on the BSW circuit packs of the Switch Shelf. The SWIEX circuit pack communicates with the CTL/SYS50D circuit pack [via the Control System Interface Expander (CSIEX) circuit pack] and the BSW circuit packs to activate switching.

Circuit pack level

At the circuit pack level of the system control hierarchy is the board controller that is located on each transmission, timing, and protection circuit pack. The board controller consists of a microprocessor and its supporting circuitry. The board controller is responsible for the real-time intensive monitoring and control functions of the transmission, timing, and protection switch circuitry on a circuit pack. The board controller also controls the circuit pack FAULT LED and performs self-maintenance functions, such as audit checks and routine diagnostics.

The Byte Switch (BSW), circuit packs do not have board controllers. The BSW used in Bandwidth Manager include the following: 576x576 STS-1/192x192 STM-1 Switch (SWITCH/STS576), and 768x768 STS-1/256x256 STM-1 Switch (SWITCH/STS768)

**Interlevel processor
communications**

Interlevel processor communications is provided by the operations network (ON). The operations network (ON) is the internal communications path used for all processor-to-processor communications. The operations network allows communications between the following circuit packs:

- CTL/SYS50D and CTL/SYS50DM circuit packs
- CTL/SYS50D and CTL/SR50DC circuit packs
- CTL/SYS50D and ADJCTL/DCC circuit packs
- CTL/SYS50DM circuit pack and the board controllers of the other circuit packs on the Universal I/O Shelf
- CTL/SR50DC circuit pack and the board controllers of the other circuit packs on the 10G I/O Shelf

The operations network also allows communications between all the ADJCTL/DCC and ADJCTL/DCCEI circuit packs to transport data communications channel (DCC) information.

**Switch fabric control and
memory access**

Switch fabric control and access to memory is provided by the control interface for devices (CTLI-D) interface. The control interface for devices interface is used for processor-to-device and processor-to-memory communications. The control interface for devices interface is used between the following:

- CTL/SYS50D and primary CTL/MEM circuit packs
- CSIEX and secondary CTL/MEM circuit pack
- CSIEX and SWIEX circuit packs
- SWIEX and BSW circuit packs
- CTL/SYS50DM and SWITCH/STS576 circuit packs
- CTL/SR50DC and SWITCH/STS768 circuit packs

**Data communication
channel (DCC)
communications**

Data communications channel (DCC) information is transported using the following:

- Internal 10BaseT network: The internal 10BaseT network connects all the ADJCTL/DCCEI and ADJCTL/DCC circuit packs. The internal 10BaseT network is also connected to the intraoffice local area network (IAOLAN). Any ADJCTL/DCCEI or ADJCTL/DCC circuit pack can send/receive DCC traffic via the internal 10BaseT network for transport on the IAOLAN.
- Operations network: The operations network connects the ADJCTL/DCCEI, ADJCTL/DCC, and CTL/SYS50 circuit packs. The ADJCTL/DCCEI circuit packs send/receive DCC traffic to/

from the ADJCTL/DCC circuit pack. The ADJCTL/DCC circuit packs provide access to the intraoffice local area network (IAOLAN).

Access to control features

The extensive control features of the WaveStar BandWidth Manager system are available through several user and operations system (OS) interfaces. In addition to accessing the local WaveStar BandWidth Manager system, the user and OS interfaces can reach a remote terminal using the data communications channel in OC-192/STM-64, OC-48/STM-16, OC-12/STM-4, and OC-3/STM-1 signals. These functions are provided by the CTL/EI, CTL/SYS50D, CTL/SR50DC, CTL/SYS50DM, ADJCTL/DCC, and ADJCTL/DCCEI circuit packs.



Transmission

Introduction The WaveStar BandWidth Manager 1152/384 platform is a digital broadband cross-connect system with DS3, OC-3/STM-1, OC-12/STM-4, OC-48/STM-16, and OC-192/STM-64 interfaces. The WaveStar BandWidth Manager system is based on the WaveStar BandWidth Manager 4608/1536 platform described below.

WaveStar BandWidth Manager 4608/1536 Platform The main switch fabric of the WaveStar BandWidth Manager 4608/1536 platform can accept up to:

- 4608 DS3 signals
- 1536 OC-3/STM-1 signals
- 384 OC-12/STM-4 signals
- 96 OC-48/STM-16 signals
- 24 OC-192/STM-64 signals (Release 2 and later)
- A mix of DS3, OC-3/STM-1, OC-12, OC-48/STM-16, and OC-192/STM-64 signals

Transmission Connections The WaveStar BandWidth Manager system allows DS3, OC-3/STM-1, and OC-12/STM-4 signals to be easily added, dropped, or passed through. The OC-48/STM-16 and OC-192/STM-64 interfaces allow the WaveStar BandWidth Manager system to be used in ring and linear applications.

All transmission connections between the tributaries of port units are provided by the following:

- Shelf-based switch fabric (intrashelf transmission) on the Universal I/O Shelf or 10G I/O Shelf
- Shelf-based switch fabric on the Universal I/O Shelf or 10G I/O and the main switch fabric (intershelf transmission) on the Switch Shelves

The shelf-based switch fabric and the main switch fabric operate independently of each other.

Intrashelf transmission Intrashelf transmission connections are provided by the shelf-based switch fabric on the Universal I/O Shelf and 10G I/O Shelf. The shelf-based switch fabric provides transmission connections between tributaries of port units on the same shelf.

Universal I/O Shelf and SDH Universal I/O Shelf

The shelf-based switch fabric of a Universal I/O Shelf consists of duplicated 576x576 STS-1/192x192 STM-1 Switch (SWITCH/STS576) circuit packs. The SWITCH/STS576 circuit packs form a single-stage, nonblocking switch fabric that provides fully redundant 1+1 transmission protection. Each port unit in the Universal I/O Shelf is connected to both SWITCH/STS576 circuit packs.

10G I/O Shelf

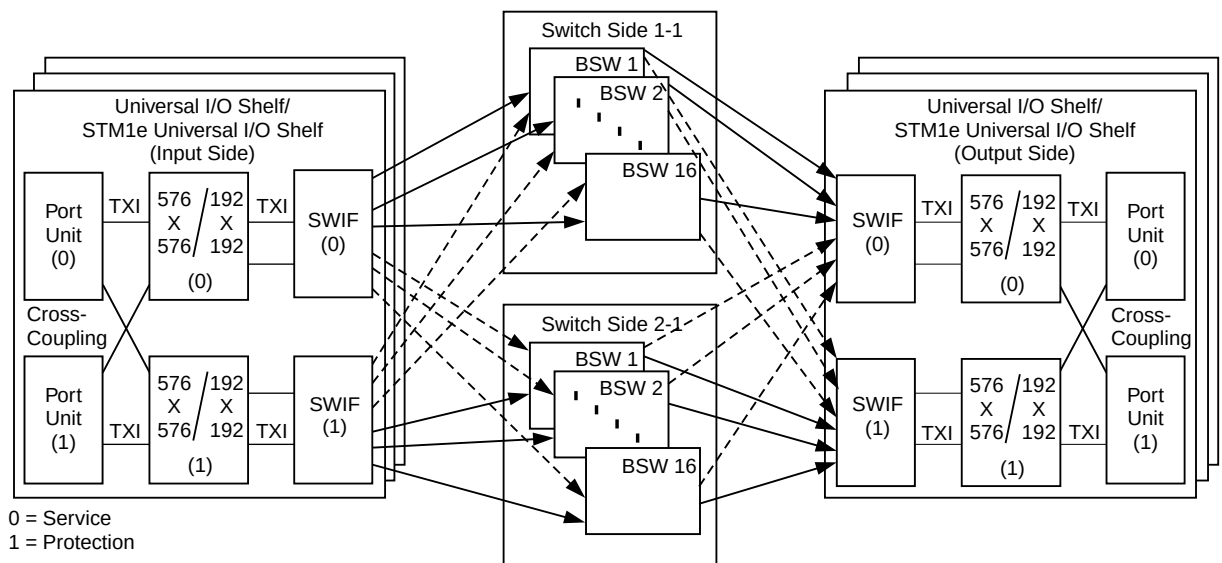
The shelf-based switch fabric of a 10G I/O Shelf consists of duplicated 1152x1152 STS-1/384x384 STM-1 single-stage, nonblocking switch fabric that provides fully redundant 1+1 transmission protection. (See the following figure.)

The shelf-based switch fabric includes 5 working SWITCH/STS768 circuit packs and 5 protection SWITCH/STS768 circuit packs. Each port unit in the 10G I/O Shelf is connected to both shelf-based switch fabrics.

Intershelf transmission

The main switch fabric provides the transmission connections between the shelf-based switch fabrics.

Figure 6-2 Intershelf Transmission Architecture



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The Universal I/O shelf-based switch fabric consists of duplicated 576x576 STS-1/192x192 STM-1 switch (SWITCH/STS576) circuit packs. The SWITCH/STS576 circuit packs form a single-stage,

nonblocking switch fabric that provides fully redundant 1+1 transmission protection. Each port unit in the Universal I/O shelf is connected to both SWITCH/STS576 circuit packs.

The 10G I/O shelf-based switch fabric consists of duplicated 1152x1152 STS-1/384x384 STM-1 single-stage, nonblocking switch fabric that provides fully redundant 1+1 transmission protection. The shelf-based switch fabric includes 5 working SWITCH/STS768 circuit packs and 5 protection SWITCH/STS768 circuit packs. Each port unit in the 10G I/O Shelf is connected to both shelf-based switch fabrics.

The main switch fabric includes:

- Switch Interface (SWIF) circuit packs on each Universal I/O Shelf and 10G I/O Shelf: The SWIF circuit packs convert the STS-1/VC-3 signals into signals compatible with the main switch fabric.
- Byte Switch (BSW) circuit packs on Switch Shelf 0 and Switch Shelf 1:

The Switch Shelves may be equipped with BSW circuit packs to form the following nonblocking switch fabric:

- 4608x4608 STS-1/1536x1536 STM-1 switch fabric

The main switch fabric provides fully redundant 1+1 transmission protection.

Internal multiplexing

Internally, the WaveStar BandWidth Manager system employs standard synchronous multiplexing for add, drop, and through traffic. For example, to add DS3 signals, each DS3EC1/8 port unit accepts up to eight DS3 signals and maps them into 51.84 Mb/s (STS-1/VC-3 tributaries). These add STS-1/VC-3 tributaries are combined with the through STS-1/VC-3 tributaries via the switch fabric and sent to an OC48/STM16 port unit. The OC48/STM16 port unit multiplexes 48 STS-1/VC-3 tributaries to one OC-48/STM-16 signal for transmission over an OC-48/STM-16 line.

To drop DS3 signals, the OC48/STM16 port unit converts the incoming optical OC-48/STM-16 signal to 48 STS-1/VC-3 tributaries. The STS-1/VC-3 tributaries that are designated to be dropped are sent to the DS3EC1/8 port unit via the switch fabric. The DS3EC1/8 port units map the STS-1/VC-3 tributaries into DS3 signals. The STS-1/VC-3 tributaries not designated to be dropped are the through traffic. The through traffic is combined with the add traffic via the switch fabric for transmission in the opposite direction.

Protection If failures occur, the WaveStar BandWidth Manager system provides ring protection switching compliant with bidirectional line-switched ring and multiplex section shared protection ring standards. The WaveStar BandWidth Manager system also provides:

- 1xN (N≤12) DS3EC1/8 port unit protection
- 1+1 optical port protection
- 1+1 shelf-based switch fabric protection
- 1+1 main switch fabric protection

For more information about protection switching, refer to 365-370-110, WaveStar BandWidth Manager Alarm Messages and Trouble Clearing Guide

Cross-connections The WaveStar BandWidth Manager system has no fixed connection, or association, between the tributaries of port units. User specified cross-connections allow any tributary to be cross-connected to any other tributary.

Time slots

The WaveStar BandWidth Manager system has a time slot assignment (TSA) and time slot interchange (TSI) capability. The time slot assignment (TSA) capability allows cross-connections between tributaries in the same ring application. The WaveStar BandWidth Manager system has a time slot interchange capability that allows cross-connections between tributaries in different ring applications.

Protection access

The WaveStar BandWidth Manager system also has the capability to provide *protection access*. Protection access allows any tributary to be cross-connected to any tributary of a protection OC-48/STM-16 or STM-64 line (PE or PW) for low-priority traffic or for restoration purposes.

How to make cross connections

Cross-connections can be made using the WaveStar Craft Interface Terminal (WaveStar CIT) or the message-based operations system interface. For more information about cross-connections, refer to Chapter 7, Provisioning, Security, and Administration.



Synchronization

Timing source The WaveStar BandWidth Manager system synchronizes add, drop, and through signals by using one timing source for all transmission.

How it works

The timing source is normally locked to an external reference signal, such as one from the building integrated timing source (BITS) or internal line reference signals derived from an incoming OC-48/STM-16 or OC-192/STM-64 lines.

Timing circuit packs Two TMG/STRAT3 circuit packs are located in each WaveStar BandWidth Manager shelf. The master timing circuit packs are on the System Controller Shelf and they control the timing for the entire system. These timing signals are used for clock, frame, and multiframe synchronization. The output clock signals of the slave timing generators in the high-speed shelf, and, if it exists, the second tributary shelf, are locked to the active master.

The timing circuit pack also outputs two external timing signals which can be used to drive timing functions external to the WaveStar BandWidth Manager.

SONET Clocks Clocks used for synchronization in a SONET system are categorized as follows:

- STRATUM 2, accuracy is 0.016ppm. The Stratum 2 clock is usually used for a building integrated timing source (BITS)
- STRATUM 3, accuracy is 4.46ppm. This is the level of clock that is used for the TMG/STRAT3 circuit packs.

SDH Clocks The SDH clock used in BWM is the SDH Equipment Clock (SEC), which is equivalent to the SONET STRATUM 3 clock. The SEC for BWM has an accuracy of 4.46ppm.

Control and status **Control**

The behavior of the master TMG/STRAT3 circuit packs is controlled by switching them among several defined states. As commands are issued or as failures occur and are cleared, the timing system switches from one state to another.

Status

The status of the timing is retrievable for user observation. The user can issue commands to obtain status reports or to change the synchronization state manually.

Synchronization protection switching

The TMG/STRAT3 circuit packs and reference signals are protected against failures. Synchronization protection switching includes the following:

- TMG/STRAT3 circuit pack switching
- Synchronization reference switching
- Synchronization mode switching

Synchronization modes

The WaveStar BandWidth Manager system operates in any of three synchronization modes:

- Free-running
- Locked
- Holdover

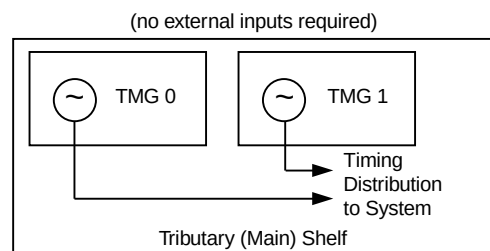
Free running mode

In the free-running mode, the Stratum 3 clock in the active master TMG/STRAT3 circuit pack is not locked to a reference signal.

The standby master TMG/STRAT3 circuit pack remains locked to the active timing generator.

The figure below illustrates the free-running mode, in which the WaveStar BandWidth Manager system is synchronized by timing signals generated in the master TMG/STRAT3 circuit pack.

Figure 6-3 Free-Running Mode



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Locked timing

The following is an overview of locked timing.

Definition

Locked timing is timing in which the active timing generator circuit pack is synchronized to a reference signal, and the standby circuit packs synchronize their timing to the active master circuit pack.

Input timing signals

In the locked timing mode, each of two master TMG/STRAT3 timing generator circuit packs can be provisioned to receive the following reference signals:

- Two reference signals from the BITS or from another network element:
 - DS1 reference signals (SONET). These may be DS1-SF or DS1-ESF signals.
 - E1 reference signals (SDH). These may be 2MHz, 2Mbps unframed, or 2Mbps framed.
- Up to two line references from OC-48/STM16 or OC-192/STM64 port units. The two line references must come from the same I/O shelf.
 - 8-kHz synchronization line reference signals

Important! If using DS1/E1 input, the BWM must select either DS1 or E1 as input. It cannot mix the two types. That is, the system must be provisioned as either SONET or SDH, not both.

How it works

Reference signals enter the system through connectors on the rear of the tributary (MAIN) shelf. The active master TMG/STRAT3 timing generator circuit pack selects one reference signal at a time and derives the timing signals used to synchronize the transmission port units. The standby master is locked to the active master.

Synchronization of timing signals

The reference signals typically are based on a Stratum clock or an SDH clock. The active master TMG/STRAT3 timing generator circuit pack synchronizes its internal Stratum 3 clock to the reference signal. The standby master TMG/STRAT3 circuit pack and the TMG/STRAT3 circuit packs in the other shelves synchronize their internal Stratum 3 clocks to the active master TMG/STRAT3 circuit pack. Then all the timing generator circuit packs distribute clock signals to all the other circuit packs in the system.

Provisionable

The locked mode is provisionable.

Timing reference frequency monitoring

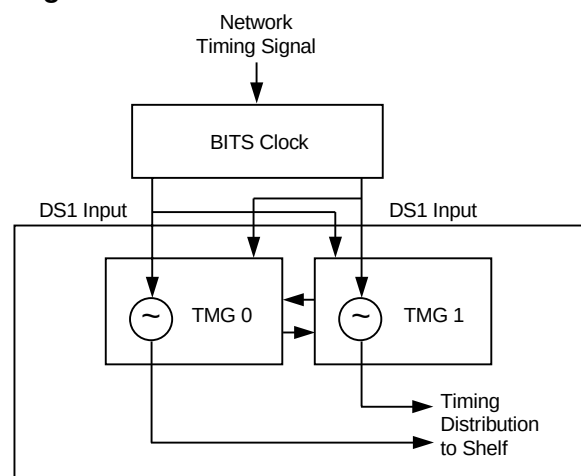
The active reference signal is monitored and compared to the internal oscillators on the active and standby TMG/STRAT3 circuit packs. References for standby timing and station clock are monitored compared to the active timing circuit pack. The frequency measurements are accurate to within 0.5 ppm. If the reference signal deviates by 15.0 ppm from nominal, it is considered unstable. If the difference is within 12.5 ppm, the alarm is cleared. A reference signal which deviates more than 19.6 ppm from nominal will be declared failed.

Error handling

The 8-kHz synchronization reference signal from the OC-48/STM16 or OC-192/STM64 port unit is continuously monitored for error-free operation. If the reference signal becomes corrupted or unavailable, the TMG/STRAT3 circuit packs can select an incoming DS1 or 2MHz/2Mbps synchronization reference signal. If all provisioned synchronization reference signals are corrupted or unavailable, the active master TMG/STRAT3 circuit pack enters the holdover mode.

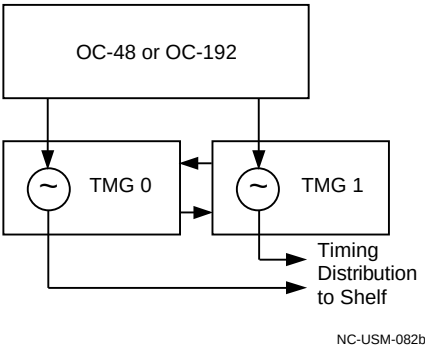
The figures below illustrate the locked timing mode with synchronization reference signals.

Figure 6-4 Locked Timing Mode with DS1 or E1 Reference Signals



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Figure 6-5 Locked Timing Mode with OC-48/STM-16 or OC-192/STM-64 Reference Signals

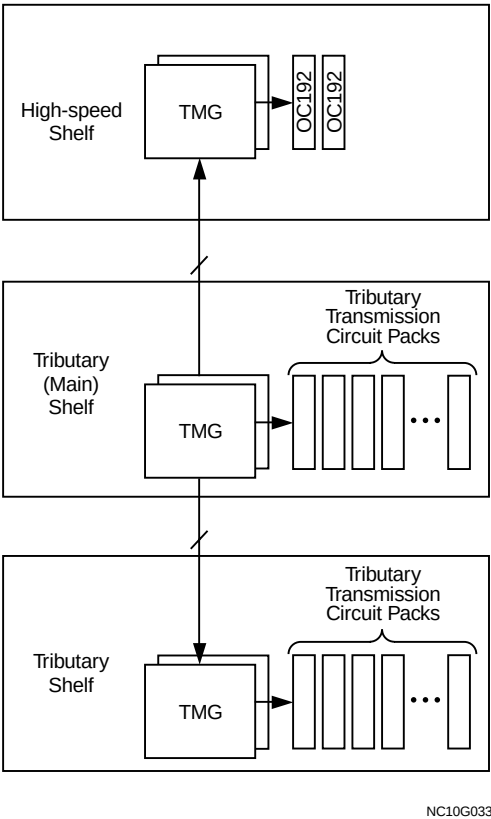


Timing distribution WaveStar BandWidth Manager distributes timing from the master TMG/STRAT3 circuit packs in the first tributary (MAIN) shelf.

Diagram of timing distribution

The figure below is a block diagram showing the timing distribution for the WaveStar BandWidth Manager system.

Figure 6-6 Distribution of Timing Reference Signals



Holdover mode The following is an overview of holdover mode.

Definition

Holdover mode is the mode that the active timing generator enters when all reference signals fail.

Provisioning options

Holdover mode is not provisionable. However, it can be forced by the clock mode protection switch command. If it is forced, it must be cleared in order for the system to return to locked mode.

How it works

In the holdover mode, the active timing generator keeps its internal Stratum 3 clock at the point at which it was synchronized to the last known good reference signal. The standby timing generator remains locked to the active timing generator. When the reference signal is restored, the active timing generator resumes the normal locked timing mode.

Holdover mode is automatically available when the shelf is in the locked timing mode. The TMG/STRAT3 timing generator circuit packs monitor the quality of the reference signals they receive. If one of the reference signals fails, the WaveStar BandWidth Manager system uses another. If all reference signals fail, the WaveStar BandWidth Manager system enters the holdover mode.

Timing protection The following is an overview of timing protection in the system.

Type of protection

The WaveStar BandWidth Manager system uses nonrevertive 1+1 protection switching to protect its timing circuit packs.

How it works

Initially the master TMG/STRAT3 timing generator circuit pack in the lower (0) position of the TMG slot is the active circuit pack, and the master TMG/STRAT3 circuit pack in the upper (1) position of the TMG slot is the standby circuit pack. If the active circuit pack fails and causes a switch to the standby circuit pack, the standby circuit pack becomes the active circuit pack. It remains the active circuit pack, even when the failed circuit pack is replaced. The replacement circuit pack becomes the standby circuit pack. There is no automatic revertive switching.

If the active timing generator fails while in holdover mode, the standby timing generator becomes the active timing generator and switches to holdover mode until the reference signal is restored to acceptable quality.

Manual switching

The user can select the active timing generator with a manual request. The timing generator selected as active must be not failed. The following commands are available:

- Select menu: fault > protection switch> select CP tmg0 or select CP tmg1.
- Select switch type: manual to side 0 or manual to side 1.

Timing provisioning The following table summarizes the provisioning options:

Table 6-1 Timing Provisioning Options

Item	Options	Comments
Timing generator circuit packs	Active or Standby	
Synchronization mode	Free-running or locked	
Locked mode	Reference signals sources	
Free-running mode	none	
Holdover mode	none	
Reference Selection Priority	Disable 1 2 3 4	If Disable, the signal is not used for synchronization reference. Priority 1 is highest priority.
SSM	Enable or Disable	If enable, SSM is stored in S1 byte in the section overhead of the outgoing port of all OC-192 and OC-48 circuit packs If disable, status of STU is sent
QL for incoming reference signal (SONET)	AUTO DUS PRS SIC ST2 ST3 STU	See the table on page 6 - 25 for definitions. If AUTO, the incoming quality level is taken. If not AUTO, then the provisioned value is assigned to the signal. Incoming DS1 reference signals provisioned for SSM must be provisioned with a QL level other than AUTO.
QL for incoming reference signal (SDH)	AUTO DNU PRC SEC SSU-L SSU-T	See the table on page 6 - 25 for definitions. If AUTO, the incoming quality level is taken. If not AUTO, then the provisioned value is assigned to the signal. Incoming E1 reference signals provisioned for SSM must be provisioned with a QL level other than AUTO.
Wait-to-Restore timer	Time to restore	When the signal fails and is restored, the signal status will become WtR for a certain time before it becomes Normal again. That time can be provisioned.

Timing reference signal selection

The timing generator selects one of the provisioned reference signals at a time as the active timing reference for the system. Input signals are

available from the transmission port units and from two DS1 or two 2MHz/2Mbps inputs. The signals used are selected based on provisioned criteria. The user can, however, override the system selection by issuing a Forced/Manual Switch Reference command.

Reference signal selection

The signal to be used for synchronization reference is determined by provisioning options. That selection may be overridden by operator commands.

Provisioning options

Incoming reference signals may be provisioned for quality level (QL) and priority. The determination of which signal to use as reference is based on an acceptable QL (if QL is provisioned) and on priority.

The QL is not adopted from incoming DS1/E1 lines: for those lines, the QL value provisioned for EXTREF1 and EXTREF2 will be used.

Selection when SSM is enabled

When SSM is enabled, the following is the method for selecting synchronization reference signal:

Table 6-2 Synchronization Reference Selection with SSM Enabled

Condition	Result
Condition	Result
Signal eligible for selection	Must meet all of the following criteria: • enabled • no lockout request active • signal status = Normal • QL level higher than DUS/DNU
Selection	Eligible signal with highest QL is selected.
More than one input with highest QL	Signal with the highest priority is selected.
More than one input with highest QL and highest priority	System arbitrarily selects one of the signals. If the active reference was part of this group, then the active reference continues to be the selected signal.

Condition	Result
If an input reference is selected	System QL is the same as the input reference QL.
If no input reference can be selected	The following result: • System Signal Status = “No-signal” • System QL value = DUS/DNU • Active input reference selector arbitrarily selects a signal.
Signal eligible for selection	Must meet all of the following criteria: • enabled • no lockout request active • signal status = Normal • QL level higher than DUS

Selection when SSM is disabled

When SSM is disabled, the following is the method for selecting synchronization reference signal:

Table 6-3 Synchronization Reference Selection with SSM Disabled

Condition	Result
Signal eligible for selection	Must meet all of the following criteria: • enabled • no lockout request active • signal status = Normal
Selection	Eligible signal with highest priority is selected.
More than one input with highest priority	System arbitrarily selects one of the signals. If the active reference was part of this group, then the active reference continues to be the selected signal.
If an input reference is selected	System Signal Status = Normal.
If no input reference can be selected	The following result: • System Signal Status = “No-signal” • System QL value = DUS/DNU • Active input reference selector arbitrarily selects a signal.

Selection commands

The following table lists user commands that can be used to control the system timing reference selection.

Table 6-4 Timing Reference Selection Commands

Command	Effect
Forced/manual switch reference	The selected reference becomes the active reference.
Clear reference switch	The system rules (provisioned options) will determine the active reference.
Lockout reference	The selected reference will never become the active reference.
Clear lockout	The selected reference is again eligible to be selected as the active reference.

Timing distribution WaveStar BandWidth Manager distributes timing from the master TMG/STRAT3 circuit packs to the other circuit packs in the shelf.

External timing outputs The TMG circuit packs also output external timing signals. These signals are derived from the internal timing reference of the first OC-192/STM-64 line. In SONET, the output signal may be either DS1 SF (super frame) or DS1 ESF (extended super frame). In SDH, the output signal is 2MHz or 2Mbps either framed or unframed. Two signals are output from the active TMG circuit pack. Usually the signals must be the same (SF or ESF; framed or unframed). This is a function of the circuit pack. For example, the LLY2B TMG circuit pack supports output of different signals (one SF and one ESF). See the circuit pack description (Chapter 5) to determine the capabilities of your system. When a TMG circuit pack is failed or removed, that timing output signal is no longer available.

These signals are designed to drive timing functions external to the WaveStar BandWidth Manager (such as a BITS clock input). They are accessible from the backplane.

The output of the timing ports may be enabled or disabled. The results of each choice are summarized in the following table:

Table 6-5 External Timing Outputs Enable/Disable

If the Timing Output Port is	Then
Disabled	No signal is available on the timing output port
Enabled	Output may be “not connected” or “line”
Enabled—not connected	If format is SF (unframed): AIS is sent on the output. If format is ESF (framed): All ones (1111) are sent on the output (QL = DUS).
Enabled—line	• If the first line timing reference is connected and not failed, a correct DS1/E1 signal is sent. • If timing is locked on a line reference, the output QL value will be DUS/DNU. • If the first line timing reference is not connected or is declared failed: • <i>If format is SF: AIS is sent</i> • <i>If format is ESF: QL = DUS/DNU is sent</i>

SSM and QL provisioning Provisioning options for SSM and QL are shown on page 6 - 18.

Synchronization status message The synchronization status message (SSM) is used for quality level (QL) controls. The Synchronization Status Message (SSM) is stored in the S1 byte (b5-b8) in the SONET Section overhead or in the lower four bits of the S1 byte of the STM-N signal SOH. SSM is not available on DS1 or 2MHz/2Mbps lines.

Incoming timing references

The incoming timing references are used for synchronization. The SSM on incoming references is used to determine the quality level on that reference. That quality level is compared to the provisioned or default value to determine if the reference should be used for synchronization. When SSM is enabled and a DS1 or 2MHz/2Mbps timing reference is to be used for synchronization, that reference must be provisioned to a QL level.

The signal status on an incoming reference may be one of the following:

Table 6-6 Signal Status

Signal Status	Meaning
Normal	The assigned reference signal is not failed and the wait-to-restore timer has expired.
Wait to Restore (WtR)	The assigned reference signal is available again after a timing link fail, but the wait-to-restore (WtR) timer has not yet expired.
Failed	Reference has failed. No reference signal is available.
Not Connected	The signal is not used for reference.

Under Failed or Not-Connected status, there is no monitoring for SSM. The following table summarizes the SSM status and values for incoming lines when the signal status is Normal or WtR. The table also lists the reported quality level (QL) associated with each SSM.

Table 6-7 SSM and QL values

Received S1/Sa value	Acronym	Reported QL	
		status	value
0000	STU	VALID	STU
0001	PRS	VALID	PRS
0010	PRC	INVALID	-
0011	-	INVALID	-
0100	SSU-T	VALID	SSU-T
0101	-	INVALID	-
0110	-	INVALID	-
0111	ST2	VALID	ST2
1000	SSU-L	VALID	SSU-L
1001	-	INVALID	-
1010	ST3	VALID	ST3
1011	SEC	VALID	SEC
1100	SIC	VALID	SIC
1101	-	INVALID	-
-	ST4	INVALID	ST4
1110	RES	VALID	RES
1111	DUS/DNU	VALID	DUS/DNU

The status acronyms are defined in the following table:

Table 6-8 SSM and QL status

Status	Meaning
DNU	Don't use for synchronization
DUS	Don't use for synchronization
PRC	primary reference clock
PRS	Stratum-1
RES	Reserved for network synchronization use
SEC	SDH equipment clock
SIC	SONET internal clock
SSU-L	synchronization supply unit—local node
SSU-T	synchronization supply unit—transfer node
ST2	Stratum-2
ST3	Stratum-3
ST4	Stratum-4
STU	Synchronized—traceability unknown

**SSM on output timing
signal**

If timing is locked on a line timing reference, the QL on the output timing signal will be DUS/DNU.

If timing is locked on a DS1/E1 reference signal, the QL on the output timing signal will be the provisioned value for that input signal.



Summary

Introduction This chapter discussed the following elements of the WaveStar BandWidth Manager system:

- Control architecture and its components
- Transmission architecture and its components
- Synchronization architecture and its components

Control architecture The WaveStar BandWidth Manager system has a duplicated, three-level system control architecture that supports all platforms. The system control architecture distributes the monitoring and control functions down to the lowest level where a particular function is performed. The three levels are:

- Circuit pack level: At the circuit pack level of the system control hierarchy is the board controller that is located on each transmission, timing, and protection circuit pack. The Byte Switch (BSW), 576x576 STS-1 Switch (SWITCH/STS576), and 768x768 STS-1/256x256 STM-1 Switch (SWITCH/STS768) circuit packs do not have board controllers.
- Shelf level: The shelf level of the system control hierarchy consists of the duplicated Control/System Controller (CTL/SYS50DM) on Universal I/O Shelves, duplicated Control/Subrack Controller (CTL/SR50DC) on 10G I/O Shelves and the duplicated Switch Interface Expander (SWIEX) circuit packs on the Switch Shelves.
- System level: The system level of the system control hierarchy consists of the duplicated system controller complex, the Control/Memory (CTL/MEM), and the Adjunct Control/Data Communications Channel (ADJCTL/DCC) circuit packs.

The system controller complex consists of Control/System Controller (CTL/SYS50D), Control System Interface Expander (CSIEX), Control/External Interface (CTL/EI), and Switch Interface Expander (SWIEX) circuit packs.

Transmission architecture The WaveStar BandWidth Manager system allows DS3, EC-1, OC-3/STM-1, and OC-12/STM-4 signals to be easily added, dropped, or passed through. The OC-48/STM-16 and OC-192/STM-64 interfaces allow the WaveStar BandWidth Manager system to be used in ring and linear applications.

All transmission connections between the tributaries of port units are provided by the following:

- **Intrashelf transmission:** Intrashelf transmission connections are provided by the shelf-based switch fabric on the Universal I/O Shelf and 10G I/O Shelf. The shelf-based switch fabric provides transmission connections between tributaries of port units on the same I/O Shelf.

Intrashelf transmission connections are only used to provide through cross-connections within rings.

- **Intershelf transmission:** Intershelf transmission connections are provided by the shelf-based switch fabric and the main switch fabric. The shelf-based switch fabric and the main switch fabric provide transmission connections between the tributaries of port units in I/O Shelves. The shelf-based switch fabric provides the transmission connections between the tributaries of port units and the main switch fabric. The main switch fabric provides the transmission connections between the shelf-based switch fabrics.

Intershelf transmission connections are used for all cross-connections except through cross-connections within a ring.

Synchronization architecture

The WaveStar BandWidth Manager system can use any of three synchronization modes:

- Free-running
- Locked
- Holdover

The system also supports SSM and QL, which allow the timing selections to be based in part on the quality level of the received signals.

Using the WaveStar CIT or a remote interface, the user can switch synchronization modes and references. The user can also nonrevertively switch between the active and standby TMG/STRAT3 timing generator circuit packs.





7 Provisioning, Security, and Administration

| Overview of this Chapter

- Objectives** On completion of this chapter, you should be knowledgeable on the following:
- Changing passwords, creating and provisioning user logins, and performing system security administration
 - Setting system parameters
 - Provisioning parameters for equipment and protection groups
 - Creating new entities
 - Deleting equipment and protection groups
 - Configuring cross-connections
 - Configuring alarm severity assignment profiles

Purpose This chapter provides an introduction to the administration and configuration of the system. Administration and configuration of the system consist of performing functions necessary for proper system operations and configuring parameters for local system operation. In general, the functions performed in administration and configuration are provisioning functions.

- Related information** For related information, see
- Chapter 8, Performance Monitoring, for information on provisioning performance monitoring functions.

- Chapter 2, Network Topologies.
- “Maintenance and Trouble Clearing” in the *Alarm Messages and Trouble-Clearing Guide* for information on fault management.

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General Provisioning

| Overview of General Provisioning

Purpose of provisioning	Provisioning is assigning values to parameters within a network element (NE) that define how you interface with a NE and how the NE operates on various installed entities. Parameters may be provisioned either locally or remotely. The values of the provisioned parameters determine many of the operating characteristics of a network element.
Provisioning data	There are three complete sets of data (parameters and their values) in the system under normal conditions: • The first set of data contains the system parameters and their original values (values assigned to a parameter at the factory). This set is located in the nonvolatile memory.. • The second set of data contains the system parameters and their current values (values currently being used by the system). This set is also located in the nonvolatile memory.. • The third set of data contains the system parameters and their current values. This set is located in the volatile memory. You can retrieve the values of all provisioned parameters, all reportable system states, and all reportable system status using a view or reports command.
Local or remote provisioning	System software allows local and remote provisioning of all user-provisionable parameters using the WaveStar CIT or from an operations system (OS). The provisionable parameters and values (current and original) are maintained in the nonvolatile memory.
Types of provisioning	There are four types of provisioning: • Auto provisioning • Preprovisioning • Provisioning • Deprovisioning Auto-provisioning allows the NE to discover the NE hardware configuration and to create the associated entities automatically using original or preprovisioned parameters. Provisioning and

preprovisioning are very similar activities that impact the configuration of an NE. Provisioning affects changes to entities known by the NE. Preprovisioning allows the user to make changes to parameters that will influence how an entity will perform in advance of the equipment being present. Deprovisioning is the removal of provisioned parameters.



Auto provisioning

What is auto provisioning	Auto provisioning is the ability of an NE to detect the presence of equipment, validate it, and then assign default original values or preprovisioned parameter values to new equipment. Nonvolatile memory (NVM) and/or hardware registers maintain the parameter values. If you have predefined or preprovisioned some or all of the parameters, the auto provisioning function validates the request and assigns the preprovisioned values or default values as required. Auto-provisioning allows an NE to be set up initially with minimal user intervention. Auto-provisioning also supports a self inventory function which allows operations center personnel to learn about and track activities at a remotely located NE.
Original value provisioning	Installation provisioning is minimized with original default values. Each provisionable parameter is assigned an original value at the factory. A parameter is a characteristic of the system that affects its operation. The parameter value may be a number, text string, or other menu selection. The provisionable parameters and original values are set during installation. The original values assigned at the factory cannot be changed. However, the current values can be overridden through local or remote provisioning.
Circuit pack replacement provisioning	Replacement of a failed circuit pack is simplified by the automatic provisioning of the original circuit pack values. The System Controller circuit packs maintain a provisioning map of the current provisioning values. When a transmission and/or a timing circuit pack is replaced, the System Controller automatically downloads the previous provisioning parameters and values that are stored in the NVM to the new circuit pack.
Equipment removal	The NE detects and reports the removal of equipment. The removal of equipment does not cause the NE to delete any entities. Removal of a piece of equipment may result in equipment alarms and insertion of maintenance signals when the state related data is updated. However, removal of equipment does not necessarily mean that the provisioning of the shelf slot has changed. The user must execute specific commands to remove an entity from the system database.
Items auto provisioned	Some items that are auto-provisioned include the following: • Two super-user logins

- System target identifier (TID) (which must be changed at initial start-up)
- Default threshold-crossing alert (TCA) profiles
- System control circuit packs
- Synchronization circuit packs
- Synchronization default mode
- Default alarm severity assignment profiles (ASAPs)

Items not auto provisioned

Some items that are NOT auto-provisioned include the following:

- Bays
- Shelves
- Optical port protection groups
- Cross-connections



Preprovisioning

What is preprovisioning

Preprovisioning allows you to assign parameter values for an entity before some of the equipment is installed. Parameter modifications may be initiated locally or remotely with a WaveStar CIT or an operations system (OS). Preprovisioning requests may alter default parameter values or parameter values associated with earlier preprovisioned requests.

Preprovisioning allows you to separate the tasks associated with configuring a node to provide service from the manual tasks performed at the node.

Preprovisioning circuit packs

To simplify circuit pack installation, parameters can be preprovisioned before inserting the corresponding circuit pack. All system parameters and values (current and original) are preserved in the system's nonvolatile memory. The parameters and values are protected by the nonvolatile memory if a power failure occurs and are retrievable on demand regardless of the means used for provisioning. The appropriate parameters are automatically downloaded when the corresponding circuit pack is installed. If the proper circuit pack is not installed in an already preprovisioned slot, then an alarm will occur.



Provisioning

Provisioning as a type Provisioning is the modification of certain programmable parameters that define how the node functions with various installed entities. Provisioning requests may alter preprovisioned or auto provisioned values of an entity that already exists. Parameter modifications may be initiated locally or remotely with a WaveStar CIT or an OS. Parameter modifications may be applied to the node via the intraoffice local area network (IAOLAN), WaveStar CIT port, or any data communications channel (DCC). The provisioned data is maintained in NVM and/or hardware registers.

Provisioning hierarchy Some provisioning parameters relate to other provisioning parameters and must be completed in a hierarchical fashion. For example, circuit packs in the system controller shelf must be provisioned before the switch shelf and the switch shelf must be provisioned before the universal I/O shelf. The following is the required order of provisioning or creating new entities if supported by the system and the current software release:

1. Bay
2. Shelf
3. Slot
4. Circuit pack
5. Port
6. Port protection group
7. Tributary
8. Cross-connection

You can retrieve the values of all provisioned parameters, all reportable system states, and all reportable system status using a view or reports command.



Deprovisioning

Deprovisioning function

Deprovisioning is the reverse-order process of provisioning. Deprovisioning modifies the NVM to remove the programmed parameters of an entity. Physically removing an entity from its current shelf slot does not remove any existing provisioning. Existing provisioning is removed by deprovisioning the entity. For example, to deprovision a circuit pack you must:

1. Remove all cross-connections from the circuit pack ports.
2. Delete any port protection group associated with any port on the circuit pack.
3. Deprovision any timing associated with the circuit pack being deleted.
4. Delete the circuit pack.



Administration

Overview of Administration

Objectives of Administration

The objectives of system administration include performing the following:

- Changing passwords
- Changing notifications
- Performing security administration
- Viewing NE administration
- Setting TIDs
- Setting NE defaults
- Performing a LAN reset
- Provisioning data communications
- Setting T1.245 DUA/RA
- Sending TARP PDU request
- Viewing OSI routing map
- Viewing OSI neighbor map

Method of performing administration

The **Administration** menu on the WaveStar CIT System View window allows you to perform administration functions.

Security level required

Only users with at least an S2 security privilege code have access to the **Administration** menu.

Security administration generally requires a user who has been assigned a high enough security authorization level to enter, modify or delete user logins; to modify system security parameters; and to logout other users. The security administrator may be a Super User who has a security authorization level of 5, or it could be a non-Super User who is assigned a security level of 4 or 5. Generally, provisioning of system wide security parameters requires an S4 user privilege code. Provisioning user specific security parameters requires an S5 user privilege code. See “User Types” (7-32) and “User Privilege Codes” (7-34) for more information on authorization levels.



Changing Passwords

Method of changing passwords

The **Administration > Change Password** command on the WaveStar CIT System View menu allows any user to change his or her own password. Only a user with the proper security authorization level can change another user's login or password. See "User Provisioning" (7-27) for information on changing other user's passwords. Any changes made to a user's provisioning takes place the next time the user logs in. If the user is currently logged in, no changes take place until that user logs off and logs back in.

Security level required

Any user may change his or her own password.

Valid passwords

A valid password consists of a sequence of characters ranging from a minimum of six characters to a maximum of ten characters. The password must start with a letter. The password must also contain at least two non-alphabetic characters, with at least one of the two non-alphabetic characters being a symbolic character. User passwords are case sensitive. For details, see "Characters Allowed in a Password" (7-16) and "Characters Not Allowed in a Password" (7-17).

When to change password

The user can change his or her own password at any time. The user must enter their original (old) password, their new password, and then their new password again. The two new password entries must match for the new password to be accepted. The Change Password screen is also automatically invoked immediately after the login screen if a user's password has expired. The user is prevented from performing any other function until the password is successfully changed. This screen is also invoked the first time a login is attempted for a new user ID.



Characters Allowed in a Password

Table of allowed characters in a password

The following table shows the characters that are allowed in a valid password.

Table 7-1 Characters Allowed in a Password

Character	Description	Character	Description
A ... Z	Uppercase letters	*	Asterisk
a ... z	Lowercase letters	[	Left square bracket
0 ... 9	Digits	]	Right square bracket
'	Apostrophe	^	Caret
-	Hyphen	`	Grave accent
(	Left parenthesis	{	Left curly brace
)	Right parenthesis		Vertical bar
.	Period (full stop)	}	Right curly brace
/	Slash (Solidus)	<	Less than
+	Plus sign	>	Greater than
!	Exclamation mark	~	Tilde
%	Percent sign	#	Number sign

Characters Not Allowed in a Password

Table of characters not allowed in a password

The following table shows the characters that are not allowed in a valid password.

Table 7-2 Characters Not Allowed in a Password

Character	Description	Character	Description
	Space	“	Quotation mark
@	Commercial at	&	Ampersand
,	Comma	;	Semicolon
:	Colon	—	horizontal bar (underscore)
=	Equals sign	?	Question mark

Changing Notifications

What are Notifications

The NE provides a set of autonomous messages originated by the NE to advise the user of internal activities. Security provisioning allows a user to identify or change the autonomous messages that he or she receives. Autonomous messages are classified by the following types of information:

- Database changes
- State changes
- Protection switch notifications
- Alarm notifications
- Own command responses only
- All user's command responses
- All the notifications and responses listed above
- Memory administration user only

See "Notification Registration List" (7-37) for related information.

Method of changing notifications

The **Administration > Change Notifications** command on the WaveStar CIT System View menu allows you to change the type of autonomous messages that you may receive. The notification registration is initially set by the system security administrator when your login is set up. You may subsequently change the notification types that you receive. Any changes made to a user's provisioning takes place the next time the user logs in. If the user is currently logged in, no changes take place until that user logs off and logs back in. See "Notification Registration List" (7-37) for related information.

Security level required

All users, except users assigned to the user class of MEMADMIN, have access to change notifications for their own login.

DBCHG notification sent to the MEMADMIN user class is controlled by their user class, not by the Notification Registration List. MEMADMIN users are not allowed to register for any autonomous notification classes.



Notification Registration and Response Types

Database change notification	A DBCHG autonomous message is generated in response to any change in the system database without regard to the cause of the change. Database changes include changes in or creation of entities, changes in user provisionable parameters, or deletion of entities.
State change notification	An STCHG autonomous message is generated to report changes to parameters that are not user provisionable.
Protection switch change notification	A PSCHG autonomous message is generated in response to any equipment protection switch of a duplex equipment unit pair. The message indicates the equipment that was placed in the active state. There is one autonomous message for each circuit pack that becomes active.
Alarm notifications	An ALARM autonomous message is generated to report each alarm that has an alarm level of critical, major, or minor. The alarm severity is included in the message. For each alarm reported in the autonomous message, there is a corresponding clearance message generated when the alarm clears.
All users command response notification	A RESPON autonomous message is generated for each command received and processed by the system, whether or not the command was successful. The contents of this message is the same as the response provided to the originator. The NE checks to identify which users are subscribed to receive this message and sends it to all of them.
All notification registrations	The ALL notification type allows you to subscribe to all messages for all the notification types.
Users own command responses only	Users have the ability to inhibit the reception of autonomous messages to themselves by subscribing to none of the other notification types. Users subscribing to “users own command responses only” receive only messages in response to their own actions.



| Network Element (NE) Security

NE security administration functions	Security administration involves the following: • Viewing user logins • Viewing logged-in users • Logging out NE user • Enabling user logins • Disabling user logins • User provisioning • Security provisioning
Method of security administration	The Administration > Security command from the WaveStar CIT System View menu allows an authorized user to perform security administration.
Security level required	Only users with at least an S2 security privilege code have access to the security administration view screens. Only users with an S5 security privilege code have access to security administration provisioning screens.



Viewing User Logins

User login information	The following information is available on authenticated user logins: • User ID • Security types and user privilege codes • User type • User priority level • Password aging • Inactivity timeout period • Notification list • User class • Observe initialization See “User Login Security Information” (7-22) for a description of these parameters.
Method of viewing user logins	The Administration > Security > View User Logins command allows an authorized user to view information on user logins.
Security level required	Only users with at least an S2 security privilege code have access to the administration view user logins screens.



User Login Security Information

User ID User ID displays the list of valid NE user login IDs. See “User Login IDs and Passwords” (7-28) for more information.

Security types Security types or functional job categories (M, P, PM, S, T) list the authorization level for each functional job category. See “User Types” (7-32) and “User Privilege Codes” (7-34) for more information.

User type User types list the type of user if the authorization levels for each job category listing fall within a predefined set of user privilege codes. See “User Types” (7-32) for more information.

Priority level Priority level is the user’s priority for the execution of commands. For example, if two commands are executed at the same time for the same NE, the command from the user with the highest command priority level is executed first. The command priority level range of values is from 1 to 5. The highest command priority level is 5. The default command priority level is 1.

Password aging Password aging lists the period of time in days before a user’s password expires. The time is an integer with the value of zero or in the range of 7 to 999 days. Values set to zero mean the function is disabled.

User inactivity timeout period User inactivity timeout period indicates the number of minutes of session inactivity before a user is logged out. A value of zero indicates the parameter is disabled. See “User Inactivity Timeout Period” (7-31) for more information on the user inactivity timeout period.

Notification list The Notification List lists the notifications and response types for which the user subscribes. See “User Notification Registration and Response Types” (7-38) for a description of the response types.

User class User Class indicates the class of user and may be one of the following:

- MEMADMIN
- OTHER

Initialization observability Initialization observability indicates whether the user can log in before the shelves finish initializing.



Viewing Logged-In Users

View logged-in users The View Logged-In Users function allows you to view the login ID of users that are presently logged into the system.

Method of viewing logged-in users The WaveStar CIT System View menu **Administration > Security > View Logged-In Users** command allows you to view the login ID of users that are presently logged into the system.

Security level required Only users with at least an S2 security privilege code have access to viewing logged-in users.



Logging Out NE Users

Logout NE user The **Administration > Security > Logout NE User** command allows an authorized user to logout individual users or all users that are logged into the system.

Security level required Only users with an S5 security privilege code have access to the Logout User Screen.



| Disabling a User Login

Disable User Login Disabling a user login prevents the selected user from logging into the NE. If the user is currently logged into the NE, that user is logged out and cannot log back in to the NE while the login is disabled.

An authorized user can disable only a selected user login or all user logins except Super User logins. If selected users are currently logged in, the users are logged out.

Method of disabling user logins The **Administration > Security > Disable User Login** command allows an authorized user to disable individually selected user logins or all user logins into the system.

Security level required Only users with an S4 security privilege code have access to the Security provisioning screen. Only Super Users or users with an S5 security privilege code can provision parameters in the Security screens.



| Enabling a User Login

Enable User Login Enabling a user login allows a previously disabled user access to the NE.

Method of enabling user logins The **Administration > Security > Enable User Login** command allows an authorized user to enable individually selected user logins or all user logins into the system.

Security level required Only users with an S4 security privilege code have access to the Security provisioning screen. Only Super Users or users with an S5 security privilege code can provision parameters in the Security screens.



User Provisioning

User provisioning functions	User provisioning allows an authorized user to perform the following: • Create a new user with proper authentication parameters • Change an existing user's authentication parameters • Delete an existing user • Assign a default user type to a new or existing user • Set user command priority levels • Assign or modify user privilege codes • Assign or modify user's notification registration types
Method of user provisioning	The Administration > Security > User Provisioning command from the WaveStar CIT System View menu allows an authorized user to perform user provisioning.
Security level required	Only users with an S5 security privilege code have access to user provisioning.
New/existing user selection	User provisioning allows you to create a new user login ID with associated password and security parameters. User provisioning also allows you to select an existing user in order to delete the user, change the user's password, or modify the security parameters for the existing user.



User Login IDs and Passwords

User logins and passwords	The WaveStar CIT always tries to connect to a selected NE using the same login and password you have for the WaveStar CIT. If your login and password are the same for both the selected NE and WaveStar CIT, then you are automatically connected to the selected NE. If your login and password are different for the selected NE and WaveStar CIT, then you must enter the correct login and password to connect to the selected NE. Login and password parameters must be administered on a per-NE basis. You may have a different login and/or password on one NE than you have on other NEs. Each NE supports up to 500 logins in the NE security database.
Method of creating or changing user login IDs	The Administration > Security > User Provisioning command from the WaveStar CIT System View menu allows an authorized user to perform user provisioning.
Security level required	Only users with an S5 security privilege code have access to user provisioning.
Default logins and passwords	Two default Super User logins and passwords are initially installed in the WaveStar CIT and the network element (NE). The default values for the Super User logins are LUC01 and LUC02 (LUC-zero-one and LUC-zero-two). The associated passwords are LUC+01 and LUC+02 (LUC-plus sign-zero-one and LUC-plus sign-zero-two). The default password must be changed the first time a Super User logs into the NE.
Super user logins	The Super User logins have full privileges in all functional categories. Each user login is assigned a combination of user privilege codes for each functional category to control access to various system functions. Super User logins have the highest authorization level of five (5) for all functions. The user privilege codes for the Super User logins cannot be changed and no other user can be assigned an authorization level of 5 in <i>all</i> functional categories. See “User Types” (7-32) and “User Privilege Codes” (7-34) for more information on user types and associated user privilege codes. Important! Starting with Release 4.0, Super User login IDs can be changed. As noted below, there are hazards with changing Super User login IDs and passwords.

Don't lose Super User passwords!

A Super User has the power to change any password, including that of a Super User. But beware, if both Super User passwords are forgotten, you must reload the original system software and database to recover the default logins and passwords.

Important! Reloading the original system software and database will reset all system provisioning, including cross-connections, to the original factory default values.

Changing non super user login IDs

The login IDs of non-Super Users cannot be changed, but they can be deleted. Only users with a security user privilege code of S5 can delete other user logins.

Logging in for the first time

All users, including original Super Users, must change their originally assigned password on the first log-in attempt.

Valid login

A valid login consists of any sequence of characters ranging from a minimum of one character to a maximum of ten characters. User logins are case sensitive. The following characters are allowed in a login:

- Uppercase letters (A to Z)
- Lowercase letters (a to z)
- Digits (0 to 9)

Valid passwords

A valid password consists of a sequence of characters ranging from a minimum of six characters to a maximum of ten characters. The password must start with a letter. The password must also contain at least two nonalphabetic characters, with at least one of the two nonalphabetic characters being a symbolic character. User passwords are case sensitive. For detailed information on password format, see “Changing Passwords” (7-15).



| User Password Aging Interval

Password aging	The password aging interval is the number of days allowed before a user’s password expires. When a user’s password expires, the user is prompted to select a new password prior to login. The values for the password aging interval are zero (0) or a range from 7 to 999 days. A value of zero (0) disables password aging. The default value is 90 days.
Method of setting password aging	The Administration > Security > User Provisioning command from the WaveStar CIT System View menu allows an authorized user to perform user provisioning.
Security level required	Only users with an S5 security privilege code have access to user provisioning.



User Inactivity Timeout Period

Inactivity timeout period

The inactivity timeout period is the number of minutes after which a user with an inactive session is logged out. The range of values for the inactivity timeout period is zero (0) to 999 minutes. A value of zero (0) disables inactivity timeout. The default value is 30 minutes.

Method of setting inactivity timeout period

The **Administration > Security > User Provisioning** command from the WaveStar CIT System View menu allows an authorized user to perform user provisioning.

Security level required

Only users with an S5 security privilege code have access to user provisioning.



User Types

What are user types System users are categorized into various user types depending on the type of job the user performs. Some users may have full access to all functions while other users have restricted access to some functions. Each system user is assigned a user type with associated user privilege codes.

Method of setting or changing user types The **Administration > Security > User Provisioning** command from the WaveStar CIT System View menu allows an authorized user to perform user provisioning.

Security level required Only users with an S5 security privilege code have access to user provisioning.

Predefined user types There are six predefined user types. Five of the predefined user types have preassigned user privilege codes (See “User Privilege Codes” (7-34).):

- Super User – M5, P5, PM5, S5, T5
- Privileged User – M5, P5, PM5, S3, T5
- General User – M4, P3, PM4, S1, T4
- Maintenance User – M4, P3, PM1, S1, T4
- Reports Only – M1, P1, PM1, S1, T1
- Other

Users assigned privilege codes that do not match any one of the above five predefined types are classified as “Other.” Any combination of user privilege codes may be assigned to a user classified as “Other” with the following exception: no user except the default Super User login can have an authorization level of 5 in *all* functional categories.

Super User Super Users have access to all user commands including the following:

- Adding or deleting users
- Modifying user passwords and user priority levels
- Assigning user privilege codes and user priority levels
- Assigning and modifying the user notification registration list of other users
- Modifying NE security variables

- Forcing logout of other users
- Retrieving security logs

Privileged User Privileged Users have access to all user commands, including those that are service affecting, except the security-related capabilities that are reserved for users with a security authorization level of 5.

General User General Users have access to all user commands except:

- NE security administration (has capability to change own password)
- System initialization capabilities
- Software installation capabilities
- NE security access capabilities

Maintenance User Maintenance Users have the following capabilities:

- Testing capability
- Retrieving NE information
- Limited service affecting commands
- Changing own password
- Modifying the set of notification types on their own User Notification Registration List within the maximum list set up by the Security Administrator.

Reports Only User Reports Only Users have access only to those capabilities which retrieve information but do not modify the system, with the following exceptions:

- Changing own password
- Modifying the set of notification types on their own User Notification Registration List within the maximum list set up by the Security Administrator.

Reports Only users do not have read access to user login information of other users.



User Privilege Codes

User privilege codes defined	User privilege codes determine the tasks you are permitted to perform. User privilege codes are one- or two-letter and one-digit numbers associated with functional job categories. The letters represent the functional job category. The one-digit number indicates your authorization level. You are given user privilege codes when your login is created or modified.
Functional categories	The five functional job categories and associated user privilege codes are as follows: • Maintenance (M0, M1, M2, M3, M4, M5) • Provisioning (P0, P1, P2, P3, P4, P5) • Performance Monitoring (PM0, PM1, PM2, PM3, PM4, PM5) • Security (S1, S2, S3, S4, S5) • Test (T0, T1, T2, T3, T4, T5)
Authorization levels	The authorization level ranges from zero (0), “No Authorization”, to five (5) for all functional categories except security which ranges from 1 to 5. All users must have a security authorization level of at least 1. An authorization level of 0 disables any user privileges for the associated functional category. Authorization level 0 may also be displayed as “No Authorization”. An authorization level of 1 allows the minimum level of privileges and a level of 5 allows all privileges for a functional category. You must have an authorization level that is equal to or greater than the authorization level required by the command you want to execute in each functional category. The default authorization level is 1 for all functional categories that are not associated with predefined user types.
Typical job functions	The following table shows typical functionality for each of the functional job categories.

Table 7-3 Typical Functionality for Functional Job Categories

Functional Category	Typical Functionality	TL1 Examples
Security (S)	Security administration Software download and install Datacom/protocol provisioning Time of day provisioning Data backup and restore System initialization	ed-dat; ent-ne-secu; restore-db; cpy-mem; ent-ulsdcc-l3; ent-osi; init-sys
Provisioning (P)	Provisioning for normal transmission operations: • Cross-connections • Transmission port provisioning • Circuit connections	ent-assoc; ent/ed/dlt-crs; ed-eqpt; rtrv-tmslt; rtrv-vc3; set-syncn; ed-rdl; ed-rsvn; ed-stm16
Maintenance (M)	Fault management: • Protection switching • Environmental alarms and controls • Synchronization switching • Section and line trace • Alarm tests	test-alm; set-attr-alm; set-attr-cond; ent-asap-prof; ent-protn-grp; inh-alm; init-eqpt; opr-ext-cont; opr-protnsw
Performance Monitoring (PM)	Provisioning and retrieving PM data	init-reg; rtrv-pm; rtrv-tca-asgnmt; rtrv-tca-prof; set-pmday; set-baseline-oline; set-th-supr
Test (T)	Provisioning and operating transmission tests	opr/rls/rtrv-loopback test-auto-local conn/chg/disc-tacc test-trmsn



Priority Level

Priority level defined The command priority level assigns a priority for the execution of commands. For example, if two commands are executed at the same time for the same NE, the command from the user with the highest command priority level is executed first. The command priority level range of values is from 1 to 5. The highest command priority level is five. The default command priority level is 1.

Method of setting command priority level The **Administration > Security > User Provisioning** command from the WaveStar CIT System View menu allows an authorized user to perform user provisioning, including setting command priority level.

Security level required Only users with an S5 security privilege code have access to user provisioning.



Notification Registration List

Notifications The NE provides a set of autonomous messages originated by the NE to advise the user of internal activities. User provisioning allows an authorized user to identify or change the autonomous messages that another user receives. A user may change their own notifications. See “Changing Notifications” (7-18) for more information.

Method of setting notification registrations The **Administration > Security > User Provisioning** command from the WaveStar CIT System View menu allows an authorized user to set notification registrations.

Security level required Only users with an S5 security privilege code have access to user provisioning.



User Notification Registration and Response Types

Notification registration types

The following table lists the Notification and Response types and related registration list values. A combination of these values may be chosen.

Table 7-4 Notifications and Responses

Notification Response Type	Registration List
Responses only to user's own actions	OWN
Database changes	DBCHG
Parameter state changes	STCHG
Protection switch changes	PSCHG
Alarm notifications	ALARMS
All user's command responses	RESPONS
All the notifications and responses listed above	ALL

DBCHG notification sent to the MEMADMIN user class is controlled by their user class, not by the Notification Registration List. MEMADMIN users are not registered for any autonomous notification classes.

User responses only (OWN)

Users have the ability to inhibit the reception of autonomous messages to themselves by subscribing to none of the other notification types. Users assigned to this list only receive messages in response to their own actions.

Database change notification (DBCHG)

A DBCHG autonomous message is generated in response to any change in the system database without regard to the cause of the change. This includes changes in entities or creation of entities, changes in user provisionable parameters, or deletion of entities.

State change notification (STCHG)

An STCHG autonomous message is generated to report changes to parameters that are not user provisionable.

Protection switch change notification (PSCHG)

A PSCHG autonomous message is generated in response to any equipment protection switch of a duplex equipment unit pair. The message indicates the equipment that was placed in the active state.

There is one autonomous message for each circuit pack that becomes active.

**Alarm notifications
(ALARMS)**

An ALARM autonomous message is generated to report each alarm that has an alarm level of critical, major, or minor. The alarm severity is included in the message. For each alarm reported in the autonomous message, there is a corresponding clearance message generated when the alarm clears.

**Command response
notification (RESPONS)**

A RESPONS autonomous message is generated for each command received and processed by the system, whether or not the command was successful. The contents of this message is the same as the response provided to the originator. The NE checks to identify which users are subscribed to receive this message and sends it to all the subscribed users.

All notifications (ALL)

The ALL notification type allows you to subscribe to all messages for all the notification types.



| Security Provisioning

NE security	Network element security provisioning consists of provisioning intervals and thresholds relating to user login attempts and password protection. Security provisioning parameters apply to all user login IDs.
Method of provisioning NE security	The Administration > Security > Security Provisioning command allows an authorized user to perform security provisioning.
Security level required	Only users with at least an S4 security privilege code have access to the Security Provisioning Screen.
User ID lockout threshold	The User ID Lockout Threshold is the number of sequential invalid login attempts after which a user id will be locked out and an intruder alert alarm is raised. The threshold value is an integer with a value ranging from 2 to 99 login attempts. The default threshold value is 5. Since the WaveStar CIT always attempts to login to a NE using the same login ID as for the WaveStar CIT, if the login ID is different on the NE then the first attempt to login will count as one failed login attempt. If the User ID Lockout Threshold is set to 2, then only one more failed login attempt is permitted.
User ID lockout interval	The User ID Lockout Interval is the number of minutes a user ID will be locked out of the system after the number of sequential login attempts exceeds the User ID Lockout Threshold. The number of minutes ranges in value from 1 to 99. The default value is 10. Setting the User ID Lockout Interval parameter to “Disable” eliminates user ID lockout.
User ID aging period	The user ID aging period is the number of days within which a non-Super User needs to log in or their login is automatically disabled. A Super User or system administrator with S5 security privileges can reenable the login. This parameter provides a means for disabling inactive logins. The range of values is from 1 to 999 days or "Disable." The default value is 10 days. User ID aging does not apply to Super User logins.



Viewing NE Administration

Access to NE administration information

General information concerning the network element may be obtained using the **Administration > View NE Administration** command from the System View menu of the WaveStar CIT.

View of NE administration

Viewing NE administration provides the following information:

TID/NE Name

This is the user provisioned designation of the network element name.

NE Type

This is the type of network element.

Switch Size

This is switch size incorporated within the node.

Interface Standard Default

This is the provisioned default setting for the system interface standard, either SONET or SDH.

AID and NSAP information

This box provides information on the relevant DCC controller addresses and NSAP addresses. NSAP address fields are also listed separately.



Viewing MAC Addresses

MAC addresses The IEEE 802.3 MAC address is stored on the DCC controller (ADJCTL/DCCEI) circuit pack during the manufacturing process. The MAC address is unique for each DCC controller and is used as the system identifier in the NE's NSAP address. Therefore, when a new DCC controller is inserted, the system identifier and the NSAP address automatically changes.

Method of viewing MAC addresses The **Administration > View MAC addresses** command from the WaveStar CIT System View menu allows you to view MAC addresses.



| Setting the Target Identifier (TID)

Target Identifier (TID)	The Target Identifier (TID) is the name used to identify a local network element within a network. The TID is used in all WaveStar CIT and OS reports and is the destination NE for all remote logins. Each NE in the network must have a unique TID which is stored in nonvolatile memory (NVM). The TID is generally set at the time of installation but may be changed.
Method of setting the target identifier (TID)	The Administration > Set TID command allows an authorized user to set or change the network element (NE) TID. The NE must be in maintenance condition before setting the TID. See “Circuit Order/Provisioning Tasks”, “Change a Node’s TID (T 329)” for the task-related function.
Security level required	Only users with at least an S3 security privilege code have access to setting or changing the TID.
Characters allowed in the TID	Each NE TID must be unique within the network. The TID may be from 1 to 20 characters in length. The following table lists the characters that may be used in an NE name.

Table 7-5 Characters Allowed in an NE Name

ASCII Character	Description	Code (hex)
A .. Z	Upper case letters	41 .. 5A
a .. z	Lower case letters	61 .. 7A
0 .. 9	Digits	30 .. 39
-	Hyphen	2D
.	Period (full stop)	2E
/	Slash (Solidus)	2F
+	Plus sign	2B

Important! TIDs are *not* case sensitive. Lowercase letters are translated into uppercase letters before they are stored in the network element.



| Setting NE Defaults

NE defaults Network element defaults are set at the time of installation before the system is placed into service. The NE defaults consist of the Interface Standard Default and System Switch Size. Only the Interface Standard Defaults provisionable after the system is in service.

System switch size The switch size parameter is only set at the time of installation and determines the size of the main switch fabric that is installed in the node. After this parameter is set it cannot be changed. After the switch fabric size is set up initially it cannot be dynamically changed while maintaining existing cross-connections. If this parameter is not provisioned properly at start up, the only recourse is to download a new database that contains the switch size parameter that is not set.

Interface standard default The interface standard default is set at the time of initial installation, but it may be changed. The interface standard determines whether the system default optical port transmission interface will be SONET or SDH. If the default interface standard is changed after initial service is set up, the change will not affect ports that are already established but it will affect the default for ports that are established after the change.



| LAN Reset

What is a LAN reset A LAN reset causes the system to reset the IAO LAN interface on a specified DCC circuit pack. The IAO LAN interface on the DCC circuit pack must be enabled before you can perform a LAN reset.

Method of LAN resets The **Administration > LAN Reset** command from the WaveStar CIT System View menu enables you to reset the LAN interface on a selected DCC circuit pack.

Security level required Only users with at least an S4 security privilege code have access to resetting the LAN.



| Data Communications

Data communications functions	Data communications functions provide the means to perform the following: • LAN management • Network layer provisioning • Transport layer provisioning • TARP provisioning • TARP manual adjacency provisioning • TCP/IP provisioning • T1.245 registration manager provisioning
Method of provisioning data communications	The Administration > Data Communications command from the WaveStar CIT System View menu enables the user to perform data communications administration. Note that each DCC circuit pack that appears in the tree structure of the Data Communications dialog box represents one node within the network element.
Security level required	All users with an S1 security user privilege code have access to the Administration display screens. Most Data Communications provisioning requires an S3 or S4 security user privilege code.
Related information	See <i>Chapter 4, Operations Interfaces</i>, for detailed information on data communications concepts and arrangements.

LAN Management

Overview This section provides information on LAN management provisioning, a part of data communications provisioning.

Method of LAN management The **Administration > Data Communication** command from the WaveStar CIT System View menu enables you to perform LAN management for a selected DCC circuit pack.

Security level required Only users with at least an S4 security privilege code have access to LAN management.

Internal LAN settings Individual parts of a network element are interconnected through an internal LAN called the Operations Network (ON). The internal LAN is used to exchange management information.

Internal LAN Channel

The Internal LAN Channel parameter allows you to Enable or Disable the internal LAN communications channel. The default is Enabled.

Internal Max Link Metric

The Max Link Metric parameter specifies the number of times a TARP message can travel through the network when it is trying to find its destination NE. This limit keeps the message from creating excess overhead by continuously circling the network. The value may be from 1 to 63. The default value is 14.

External LAN settings The system allows access to an external LAN, the Intraoffice LAN (IAO-LAN), by means of three 10-BaseT Ethernet interfaces on 4-wire RJ-45 connectors.

External LAN Channel

The External LAN Channel parameter allows you to Enable or Disable the external LAN communications channel. The default is Enabled.

External Max Link Metric

The Max Link Metric parameter specifies the number of times a TARP message can travel through the network when it is trying to find its destination NE. This limit keeps the message from creating excess

overhead by continuously circling the network. The value may be from 1 to 63. The default value is 14.

LAN router priority The LAN router priority parameter sets the priority of the LAN router. A higher number equals a higher priority routing. Values range from 1 to 127.



Network Layer

Overview This section provides information on network layer provisioning, a part of data communications provisioning.

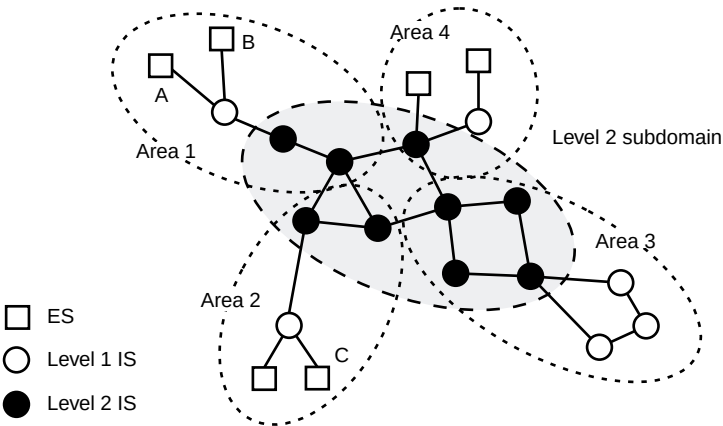
Method of provisioning the network layer To configure network layer parameters for a selected DCC circuit pack from the WaveStar CIT System View select **Administration > Data Communications**, then select the DCC pack, then select the **Network Layer** tab. This tab is divided into frames as described below “Security level required”.

Security level required Only users with at least an S3 security privilege code have access to network layer parameters.

Network Service Access Point frame This frame displays the current NSAP address for the selected DCC circuit pack (node) and contains a **Modify** button that allows you to change the NSAP address.

Intermediate vs. end An intermediate node or system routes data between nodes and networks or parts of a network. An end node or system communicate with each other on an end-to-end basis via intermediate systems. A network can also be divided into areas as shown below.

Figure 7-1 Areas of a Network



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Intermediate System frame Use this frame if the node is to be used as an intermediate system (IS). An IS can be set to function as a level 1 IS only or as both a level 1 and level 2 IS. (Level 1 IS only is the default.) A level 1 IS provides interconnectivity between nodes in an area. A level 2 IS provides

interconnectivity between areas. The Configuration Timer sets the number of seconds between IS Hellos, which are messages that an IS sends to its neighbors to announce its presence.

End System frame

Use this frame if the node is to be used as an end system (ES). The Configuration Timer in this frame sets the number of seconds between ES Hellos, which are messages that an ES sends to its neighbors to announce its presence.

***CLNP Lifetime Control
Parameter frame***

CLNP stands for connectionless network protocol. The CLNP Control sets the maximum number of hops that a protocol data unit (PDU) can make before it will no longer be forwarded. A direct transmission link between two nodes is referred to as a hop.



| Transport Layer

Overview	This section provides information on transport layer provisioning, a part of data communications provisioning.
Method of provisioning the transport layer	To configure transport layer parameters for a selected DCC circuit pack from the WaveStar CIT System View select Administration > Data Communications , then select the DCC pack, then select the Transport Layer tab. This tab is divided into controls as described below “Security level required”.
Security level required	Only users with at least an S3 security privilege code have access to transport layer parameters.
Window Timer control	Use this control to set the maximum number of seconds to wait before retransmitting up-to-date window information. The allowed range is 1 to 255 seconds.
Transport Credit control	Use this control to set the maximum number of outstanding unacknowledged transport PDUs allowed on a transport connection. The allowed range is 1 to 15 PDUs.
Local Acknowledgement Timer control	Use this control to set the maximum number of seconds which can elapse between the receipt of TPDU by the local transport entity from the network layer and the transmission of the corresponding acknowledgement. In this way a number of TPDU’s may be received before acknowledgement by a single ACK PDU. The allowed range is 1 to 255 seconds.
Maximum TPDU Size control	Use this control to set the maximum number of PDUs allowed on a transport connection. The allowed range is 1 to 15 PDUs.



TARP

TARP	The TID Address Resolution Protocol (TARP) acc. to Telcordia Technologies (formerly Bellcore) GR-253 standard provides a means to perform the TID to NSAP address translation dynamically by means of TARP Protocol Data Units (TARP PDUs), originating from an end system such as the CIT. Three basic TARP functionalities can be distinguished: • TARP originator functionality • TARP propagation functionality • TARP responder functionality
Method of provisioning TARP	The Administration > Data Communications command from the WaveStar CIT System View menu enables the user to select the appropriate DCC circuit pack and TARP tab to perform TARP administration functions.
Security level required	Only users with at least an S3 security privilege code have access to transport layer parameters.
TARP originator functionality	The TARP originator functionality means the ability to spontaneously originate a TARP PDU type 1, 2 or 5 query (cf.) and broadcast it over the OSI network.
TARP propagation functionality	The TARP propagation functionality means the ability to evaluate a received TARP PDU type 1, 2 or 5 query and to further broadcast it over the OSI network if the requested TID or NSAP address does not match the NE's TID or NSAP address, and if the requested TID or NSAP address could not be found in the TARP Data Cache (TDC; cf.). A TARP propagator decrements the lifetime of a received TARP PDU by one and broadcasts the modified PDU to all of its network neighbors (with the exception of the previous PDU sender). When the TARP PDU lifetime becomes zero, then no further propagation takes place.
TARP responder functionality.	The TARP responder functionality means the ability to respond to a TARP PDU type 1, 2 or 5 query via a type 3 response (cf.).
Loop detection	Nodes provide a loop detection mechanism to prevent a repeated processing of previously processed TARP PDUs. A loop detection buffer (LDB) in conjunction with an LDB entry timer and an LDB

flush timer is used for this purpose. A previously processed and again received TARP PDU is discarded.



T1.245 Registration Manager

Overview	This section provides information on provisioning the T1.245 Registration Manager, a part of data communications provisioning. The T1.245 <i>Directory</i> is a collection of open systems that share information as part of Open Systems Interconnection (OSI). The information held by the Directory is called the Directory Information Base (DIB). A <i>Directory System Agent (DSA)</i> accesses the Directory on behalf of the user, in this case a node on the BandWidth Manager corresponding to the selected DCC circuit pack in the Data Communications window. A <i>Registration Manager</i> allows the node to register its DSA address and Name Prefix information in the Directory.
Method of provisioning the transport layer	To configure transport layer parameters for a selected DCC circuit pack from the WaveStar CIT System View select Administration > Data Communications, then select the DCC pack, then select the T1.245 Registration Manager tab. This tab is divided into frames as described below “Security level required”
Security level required	Only users with at least an S3 security privilege code have access to T1.245 Registration Manager parameters.
T1.245 Directory Services Registration Manager Function frame	Use this frame to enable or disable the Registration Manager.
Registration Manager frame	Use this frame to view or modify the NSAP and IP addresses of the Directory System Agent (DSA).
Name Prefixes frame	Use this frame to view or enter the following Name Prefixes: • Country Name Prefix • Org. Name Prefix • Org. Unit 1 Name Prefix • Org. Unit 2 Name Prefix



TCP/IP

Overview This section provides information provisioning Internet Protocol (IP) addresses, a part of data communications provisioning.

Method of provisioning the transport layer To configure the IP addresses for a selected DCC circuit pack from the WaveStar CIT System View select **Administration > Data Communications**, then select the DCC pack, then select the **TCP/IP** tab. This tab is divided into controls described below “Security level required”.

Security level required Only users with at least an S3 security privilege code have access to transport layer parameters.

IP Address control The current IP address for the selected DCC circuit pack itself appears here. Click on the **Modify** button to change it. Every computer has a unique IP address used for TCP/IP communications.

IP Subnet Mask control The current IP subnet mask for the selected DCC circuit pack appears here. Click on the **Modify** button to change it. The subnet mask allows computers on the same LAN to communicate directly, without using a router.

IP Default Router Address control The current IP address for the default router appears here. Click on the **Modify** button to change it. The default router is the router used to communicate with computers on other LANs.



TCP/IP Gateway

Overview This section provides information provisioning TCP/IP gateway (also known as TL1 TCP/IP gateway) parameters, a part of data communications provisioning. A TCP/IP gateway connects a network that uses Internet Protocol (IP) to a network that uses Open Systems Interconnection (OSI). OSI is the usual protocol that SONET and SDH network elements use to communicate with one another.

Example Suppose you have a WaveStar CIT connected over an IP network to a BandWidth Manager called BWM-1. BWM-1 is connected over an OSI network to another BandWidth Manager called BWM-2. If BWM-1 is provisioned to be a TCP/IP gateway then you can use your CIT to communicate with BWM-2. BWM-1 translates the IP protocol to OSI.

Method of provisioning the TCP/IP gateway

The gateway must reside on the system controller shelf. To configure the TCP/IP gateway parameters for a selected DCC circuit pack from the WaveStar CIT System View select **Administration > Data Communications**, then select the DCC pack *on the system controller shelf*, then select the **TCP/IP Gateway** tab. This tab is divided into frames described below “Security level required”.

Security level required

Only users with at least an S3 security privilege code have access to transport layer parameters.

TCP/IP Gateway Control frame

Use this frame to enable or disable the selected DCC pack to function as a TCP/IP gateway.

TCP/IP Gateway Host List frame

Use this frame to create or modify the list of network elements that have access to the gateway. For each network element you enter its IP address and select its open system (OS) type from a drop-down menu.

Encoding Mode Port Numbers frame

Use this frame to set the TCP port numbers over which the gateway is accessible for each TL1 encoding mode. The allowed range is 0 to 65,535.



| TARP Manual Adjacencies

Overview This section provides information on provisioning TARP manual adjacencies, a part of data communications provisioning.

By using TARP manual adjacencies it is possible to route TARP PDUs over subnetworks which do not support the TARP functionality. However, a precondition is that the nodes within the non-TARP subnetwork are “generic routers”. A TARP manual adjacency is simply the Network Entity Title (NET) of a node that supports TARP.

Method of provisioning TARP manual adjacencies To configure TARP manual adjacencies for a selected DCC circuit pack from the WaveStar CIT System View select **Administration > Data Communications**, then select the DCC pack, then select the **TARP Manual Adj** tab. This tab is divided into frames as described below “Security level required”.

Security level required Only users with at least an S3 security privilege code have access to network layer parameters.

TARP Manual Adjacency One frame This frame displays the current NSAP address for TARP manual adjacency one. Use the **Modify** button to change this address.

TARP Manual Adjacency Two frame Use the Modify button to display or change the NSAP address for TARP manual adjacency two.



TARP/X.500 Gateway

What is the TARP/X.500 Gateway

The TARP/X.500 gateway (T5GW) function uses X.500 services on behalf of other systems. T5GW acts as a gateway between TARP and X.500 for TID resolution by registering TARP systems in the directory information base (DIB) and resolving TARP requests via X.500. T5GW is responsible for creating DIB entries for all TARP-only systems in its Level 1 area to which it has TARP connectivity. Since T5GW does not distinguish TARP-only systems from systems that use both TARP and X.500, T5GW creates DIB entries for all TARP systems, whether they do or do not support X.500.

Method of setting TARP/X.500 gateway parameters

The **Administration > Data Communications** command from the WaveStar CIT System View menu allows access to setting TARP/X.500 gateway parameters.

Security level required

Only users with at least an S3 security privilege code have access to setting TARP/X.500 parameters.

Discovering TARP systems

The T5GW system must discover all TARP systems in the same area and make sure the systems are registered in the DIB. TARP systems are discovered by use of information from the IS-IS protocol, and DIB entries are added or modified as necessary. When contacted, T5GW systems create or update the entries in the DIB for all TARP systems discovered in the same area.

T5GW systems perform the following discovery procedure for TARP only systems (for example, PF2000 systems):

1. For each new System ID in the area, except the T5GW system itself, the T5GW constructs the set of potential NSAPs for TARP on the new System IDs. NSAPs are constructed by prepending each area address to the System ID, and then appending the TARP selector field (SEL). A System ID is considered new if it does not exist in the T5GW Area Cache (TAC).
2. For each NSAP constructed, the T5GW originates a TARP Type 5 protocol data unit (PDU) query. Between sending the PDUs, the T5GW waits for a small interval to avoid flooding. Any TARP Type 3 PDU responses received to the query causes the information to be updated in the DIB and entered into the TAC. The small anti-flooding interval is provisionable. Entries in the

TAC are deleted if the NSAP no longer matches any local area address. Pre-existing TAC entries for systems are updated on receipt of their TARP Type 4 PDUs.

When is the discovery procedure run	The discovery procedure runs: • At system initialization • When new System IDs appear in the area • If the set of local area addresses changes • Immediately after the TAC is emptied (flushed) by user request.
Enabling or disabling TARP/X.500 gateway	The TARP/X.500 gateway functionality may be enabled or disabled. The default is enabled.
Discovery timer (Timer E)	The discovery timer value determines how frequently the T5GW performs the discovery procedure. If the T5GW is capable of receiving IS-IS notifications when a system in the local Level 1 area becomes reachable, then the discovery timer may be configured to run less frequently. The discovery timer value range is from 10 to 2550 minutes in increments of 10 minutes. The default discovery timer value is 20 minutes.
Anti-flooding timer (Timer F)	The T5GW anti-flooding timer is used to avoid flooding the network with TARP Type 5 PDU queries and TARP Type 3 responses that are generated during the T5GW discovery procedure. The anti-flooding timer determines the interval between PDU queries. The value range is from 1 second to 60 seconds in increments of 0.5 seconds. The default value is 1 second.



Configuration

| Overview of Configuration

Objectives of configuration	The objectives of system configuration includes performing the following functions: • Provisioning parameters for protection groups or equipment • Creating new bays, shelves, circuit packs, and port protection groups • Deleting equipment and protection groups • Configuring DCC terminations • Creating new cross-connections using the Cross Connection Wizard • Provisioning timing and synchronization functions • Performing alarm configurations and assignment of Alarm Severity Assignment Profiles • Performing system software functions.
Method of performing system configuration	The Configuration menu on the WaveStar CIT System View window allows you to perform system configuration functions.
Security level required	All users with at least a P1 provisioning user privilege code have access to the Configuration menu. However, individual configuration functions may be accessible only to users with the appropriate access level for the selected function.



Access Identifiers (AIDs)

Overview This section specifies the Access Identifier (AID) parameter details for SONET TL1 command parameters.

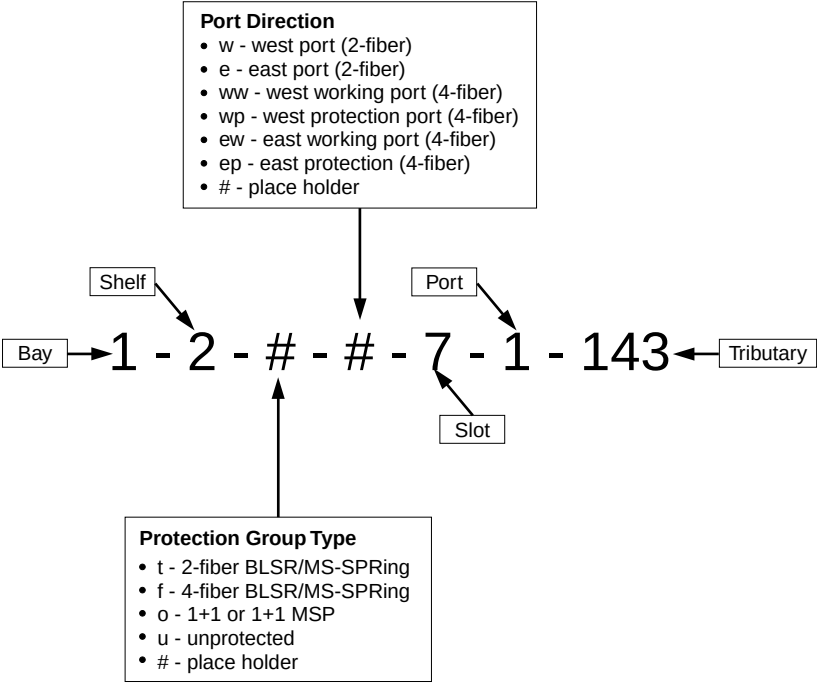
Several of the TL1 commands allow a range of entities to be specified as input parameters in the TL1 command syntax. These entities are specified in the AID definitions shown in the following tables. This section addresses only those entities (for example, packs, ports, protection groups) that are visible to users.

The following types of parameters are used by the TL1 commands:

- External user AIDs specified as input parameters
- Performance monitoring (PM) parameters
- Alarm/event condition type parameters
- Password character parameters

AID general format The general format for an AID consists of seven fields separated by hyphens (-), as illustrated below.

Figure 7-2 AID General Format with Example



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The number (#) character

The number (#) character can be used as a placeholder in an AID field to represent a null value. Using one or more #(s) in a TL1 input command causes the AID fields (with #s) to be filled in appropriately in the TL1 output message.

A “u-#” will be returned in the protection group-side/line fields of the output AID only when the (optical) port protection group type is “u” for unprotected.

Using the AID field value, “all”

The AID definitions allow the use of the term “all” in one or more AID fields within a compound AID definition.

Table 7-6 Using the AID value, all

The AID value, all ... CAN be used to identify the following AID entities:	The AID value, all ... CANNOT be used to identify the following AID entities:
Bay	Protection Group
Shelf	Side/Line
Slot	
Port	
Tributary	

However, if the AID value *all* is used in

- Bay and/or Shelf AID fields, then *all* cannot be specified in any other AID field.
- Slot, Port, and/or Tributary AID fields, then *all* cannot be specified in the Bay and/or Shelf AID fields.

AID field length requirements

An AID may not exceed 20 characters in length including the hyphen (-) character. As a result, when entering “all-all-all” to specify the “slot-port-trib,” the user must use “#-#” in the protection group and side/line fields.

Global notes on the external user AIDs tables

The following notes apply to all external user AIDs tables.

Note 1

OC-48 dual slots are identified by the EVEN slot, not the ODD slot.

Note 2

All protection group numbers are two-character representations. All slot numbers are two-character representations. For example, slot 1 is identified as “01”.

Note 3

The Input AID column refers to AIDs that are input via the user and/or user interface. The Output AID column refers to AIDs that are sent from the NE (network element).

AID parameter examples The following table lists some general examples of AIDs. For a full listing of the AIDs of all entities, see the Operation System Engineering Guide.

Table 7-7 System AID examples

Entity	Input AID	Output AID
System	system	system
Universal I/O Bay	{1-96}, all	{1-96}
I/O Shelf	{1-96}-{1-2},all	{1-96}-{1-2}
1+1 Facility Protection Group	{1-96}-{1-2}-o{01-99,all}	{1-96}-{1-2}-o{01-99}
4F BLSR Facility Protection Group East/West Side	{1-96}-{1-2}-f{01-99}-{e,w} {w,p}	{1-96}-{1-2}-f{01-99}-{e,w} {w,p}
	Note: {e,w} denotes the East side or West side Note: {w,p} denotes the working side or the protection side.	
2F BLSR Facility Protection Group	1-1-t{01-99, all}	1-1-t{01-99}
System Controller (SC) shelf dcc1 slot	sc-1-#-#-dcc1	sc-1-#-#-dcc1
Switch Shelf swiex0 unit	sw{1-4}-1-#-#-swiex0	sw{1-4}-1-#-#-swiex0
Universal Shelf Port Card Slot	{1-96}-{1-2}-#-#{01-16}	{1-96}-{1-2}-#-#{01-16}
System Controller (SC) dcc1 slot	sc-1-#-#-dcc1	sc-1-#-#-dcc1
Switch Shelf swiex0 unit	sw{1-4}-1-#-#-swiex0	sw{1-4}-1-#-#-swiex0
Universal Shelf Port Unit	{1-96}-{1-2}-#-#{01-16}-cp	{1-96}-{1-2}-#-#{01-16}-cp

Entity	Input AID	Output AID
OC-48 port	{1-96}-{1-2}-#-#- {02,04,06,08,...14,16}- {1,all}}	{1-96}-{1-2}-#-#- {02,04,06,08,...14,16}-1
OC-48 port	1-1-#-#-{02, 04, 06, 08,...14, 16}-{1,all}	1-1-#-#-{02, 04, 06, 08,...14, 16}-1
Universal Shelf OC-48 Tributary	{1-96}-{1-2}-#-#- {02,04,06,08,...14,16}- {1,all}-{1-48,all}}	{1-96}-{1-2}-#-#- {02,04,06,08,...14,16}- {1,all}-{1-48}}



| System Provisioning

System provisioning parameters

System equipment provisioning parameters include:

- Date
- Time
- Alarm Severity Assignment Profile

Other types of general system parameters may be found in “Administration” (7-14).

Method of provisioning system parameters

The **Configuration > Provision** command from the WaveStar CIT System View menu displays the Provision Parameters for Protection Group or Equipment screen. A system AID entry or system selection in this screen displays the parameters associated with the entire system.

Security level required

Only users with at least P3 provisioning, M3 maintenance, and S4 security user privilege codes have access to system provisioning. For more information on user privilege codes, see “User Privilege Codes” (7-34).

Date parameters

The date parameter in system provisioning permits entry or selection of year, month, and day. The Date field displays the current PC date if no date has been set. Dates are displayed in a format specific to the country in which the WaveStar CIT is being used. The WaveStar CIT retrieves country information from the PC’s system data. For example, the date in the United States might be displayed as 12/30/01 (mm/dd/yy) and elsewhere as 30/12/01 (dd/mm/yy). Both time and date must be set by the user for either to be valid.

Time parameters

The time parameter in system provisioning permits entry or selection of the current time in hours and minutes. The Time field displays the current PC time if no time has been set. Time is displayed in a format specific to the country in which the WaveStar CIT is being used. The WaveStar CIT retrieves country information from the PC’s system data. For example, time in the United States might be displayed as 10:44 p.m. and elsewhere as 22:44. Both time and date must be set by the user for either to be valid.



Bay Provisioning

**Bay provisioning
parameters**

There is no bay provisioning at this time. Selection of a bay from the Equipment Selection Screen disables the provision command option.



| Shelf Provisioning

Shelf provisioning parameters Shelf provisioning parameters include the shelf locator string and SS bit override.

Method of shelf provisioning The **Configuration > Provision** command from the WaveStar CIT System View menu displays the Provision Parameters for Protection Group or Equipment screen. A shelf AID entry or shelf selection in this screen displays the parameters associated with a shelf.

Security level required Only users with a security privilege code of at least P3, provisioning, have access to shelf provisioning. For more information on security privilege codes, see “User Types” (7-32).

What is SS bit override The system provides a capability to provision the value of the “SS bits” in the H1 overhead byte of each STS-1/VC-3 constituent of a cross-connected signal. The SS bits are bits 5 and 6 of the H1 byte, which is the first of the three pointer bytes in the SONET/SDH overhead. When this **SS Override** parameter is disabled, the system sets the output of cross-connected signals to have ss =10, as per previous BandWidth Manager releases. When it is enabled, it sets the ss bits of cross-connected signals to SS = 00. This capability was added to BandWidth Manager Release 4.0 in order to provide interworking with any SONET network elements that may alarm on receiving SS bits that are not set to 00. SS override is provisioned at the I/O shelf level and must be enabled, when needed, on I/O shelves that contain the input of cross-connections that terminate on ports that connect to these SONET NEs (because the BandWidth Manager sets the SS bits on the input side of a cross-connection).



Slot/Circuit Pack Provisioning

Slot/circuit pack provisioning parameters

Provisioning of slots or circuit packs involves the assignment of an Alarm Severity Assignment Profile to the slot or circuit pack.

Method of slot/circuit pack provisioning

The **Configuration > Provision** command from the WaveStar CIT System View menu displays the Provision Parameters for Protection Group or Equipment screen. A slot or circuit pack AID entry or slot or circuit pack selection in this screen displays the parameters associated with a slot or circuit pack.

Security level required

Only users with at least P3 provisioning, S3 security, and M1 maintenance user privilege codes have access to slot or circuit pack provisioning. For more information on security user privilege codes, see “User Types” (7-32).

Alarm severity assignment profile (ASAP)

The ASAP parameter for slot and circuit pack provisioning allows you to select an equipment ASAP to be assigned to slots or circuit packs. See “Alarm Severity Assignment Profiles” (7-163) for more information on alarm severity assignment profiles.

Unprovisioned and empty slots

ASAPs may be assigned to slots that have no circuit packs installed or to slots that have not been preprovisioned for a type of circuit pack.

Preprovisioned or equipped slots

ASAPs may be assigned to slots that are unequipped but have been preprovisioned for a type of circuit pack or to slots that are already equipped with circuit packs. In addition, when the ASAP is assigned to the preprovisioned or equipped slot, you may also elect to assign the same profile to either one of the following:

- This circuit pack only, or
- All packs, this type, this shelf

SWIF circuit packs

The BSW Port Identifier parameter has a value of from 1 to 48 for 4608/1536 switches. The parameter value is set at the time of installation and defines the SWIF circuit pack locations for the software. Office records must be used to locate the value of the BSW port identifier since it is a function of how the SWIF circuit pack slots were wired to the switch shelf.



| Optical Port Provisioning

Optical port provisioning parameters	Optical port provisioning allows you to configure parameters associated with a selected optical port.
Method of optical port provisioning	The Configuration > Provision command from the WaveStar CIT System View menu displays the Provision Parameters for Protection Group or Equipment screen. A port AID entry or port selection in this screen displays the parameters associated with the port.
Security level required	Only users with at least P3 provisioning, S3 security, and M1 maintenance user privilege codes have access to optical port provisioning. For more information on security privilege codes, see “User Types” (7-32).



Optical Port Provisioning Parameters

Port monitoring mode Port monitoring modes represent the monitoring state for each port in the system at any given time. Each port monitoring mode has its own characteristics for signal failure alarms and performance monitoring (PM) data collection. Transitions between modes occur due to events such as applying a good signal and WaveStar CIT commands. The detection of a fault does not affect the state of the port monitoring mode. The port modes are auto (AUTO), monitored (MON), not monitored (NMON).

Auto (AUTO)

AUTO refers to a port that is available for automatic provisioning. A port transitions from the AUTO mode to the MON mode if a good signal is detected. The original port monitoring mode value is AUTO. When the port monitoring mode is AUTO, the port is not alarmed.

Monitored (MON)

MON refers to a port that is fully monitored and alarmed.

Not monitored (NMON)

NMON refers to a port that is not monitored and does not transition to the MON state even if a good signal is detected. Any port modes may be user-provisioned independently to the NMON state at any time, regardless of the auto-provisioned mode of the terminating interface slot. The port mode is used to suppress alarms.

Optical interface standard

The system interface standard default is set at the time of initial installation, but it may be changed for a selected port. The system interface standard determines whether the system default optical port transmission interface will be SONET or SDH. If the default interface standard is changed after initial service is set up, the change will not affect ports that are already established but it will affect the default for ports that are established after the change.

Tributary mode

Tributary mode displays the current tributary rate mode. This field displays FIXED or ADAPTIVE rate.

Adaptive-rate tributary operation

For OC-n ports in adaptive-rate operation, supported signal rates are not preprovisioned for the ports as in fixed-rate operation. On the

logical input tributaries associated with a port with Adaptive-Rate (Pipe) Tributary operation, the system allows any of the signal rates supported by the port to be received. The signal rates of the logical input tributaries are allowed to vary over time between the supported rates.

Adaptive-rate valid signals

The system identifies and accommodates transitions in the supported signal rates without requiring any user intervention, for example, a change in the signal rates from three STS-1s to one STS-3c. Fault monitoring and performance monitoring adjust as required.

Fixed-rate tributary operation for input and output ports

In fixed-rate operation, you must provision the signal rates for the input tributaries of the port for all the supported signal rates on an optical port. The provisioned signal rates for the input tributaries are independent of any signal rates provisioned for the output tributaries of the port.

Valid signals

On each logical input tributary associated with a port with fixed-rate tributary operation, the system detects if a valid signal is received at the provisioned signal rate for the associated input tributary of the port. If a valid signal is not received, the system performs fault monitoring. This applies to all logical input tributaries, both working and protection. A logical input tributary in a port protection group is associated with the port tributary from which it is selected normally, in the absence of a line protection switching event.

Protection switches

During a protection switch in any port protection group, when a protection port tributary is selected by the working logical input tributary it is protecting, the provisioning of the working tributary determines the behavior on the protection tributary. When there is no cross-connection to the output of the working tributary, the output of the protection tributary is an unequipped signal at the same rate as the unequipped signal on the working tributary's output. When there is no protection switch active, the provisioning of the port tributary associated with the protection logical input tributary determines the behavior on a protection port tributary.

Fault monitoring

Fault monitoring, signal maintenance, and performance monitoring use the provisioned signal rates for the input port as the expected rates. An

incoming signal composed of valid rates smaller or higher than the provisioned rate for a tributary results in generation of either Loss of Pointer (LOP) or Signal Rate Mismatch (SRM). This applies whether or not any cross-connection exists.

Cross-connections

Cross-connections may be provisioned only at the cross-connection rate which matches the provisioned signal rate for the associated input tributary. Cross-connection legs in opposite directions, from an input tributary and to an output tributary, may be provisioned independently and may be at different rates if the input and output tributary rates differ.

Fixed-rate tributary input signal rate list

The rate of a requested cross-connection must match the provisioned signal rate of each involved input and output tributary that is on a port provisioned for fixed-rate tributary operation. You must provision fixed rate ports for the list of expected input signal rates across the port's bandwidth. Depending on the product, software release, port unit supported, and the type of port selected, the signal rates may be a combination of supported STS-1/VC-3, STS-3C/VC-4, STS-12C/VC-4-4C, or STS-48C/VC-4-16C signal rates.

SONET OCn fixed-rate signal rate list examples

The fixed-rate tributary signal rate list parameter for OC-n ports is a list of STS rates across the port bandwidth. The sum of the numbers represents the number of STS-1s across the port's bandwidth. For example, the representation 91-13-112-241 for a SONET OC-48 port equals 9 STS1s + 1 STS3 + 1 STS12 + 24 STS-1s for a total signal rate of 48. The default value of the tributary input signal rates is all STS-1s. Many combinations of signal rates exist. The following are only some examples of signal rate list representations.

OC-3

OC-3 ports support STS-1 and STS-3c rates.

- If you provision 3 STS-1s for an OC-3 port, the signal rate representation would show 31 (3 STS-1s).
- If the port is provisioned for one STS-3c, the signal rate representation would show 13 (1 STS-3c).

Important! Port bandwidth signal rates must start on their respective boundaries. For STS-3c, the boundaries are STS#1, #4, #7, #10, et cetera).

OC-12

OC-12 ports support STS-1, STS-3c, and STS-12c rates.

- If the port is provisioned for 12 STS-1s, the signal rate representation would show 121 (12 STS-1s).
- If the port is provisioned for four STS-3c signals, the signal rate representation would show 43 (4 STS-3c).
- If the port is provisioned for six STS-1s, one STS-3c, and 3 STS-1s, the signal rate representation would show 61-13-31 (6 STS-1s, 1 STS-3c, 3 STS-1s). The hyphens represent the division of signal rates.

Important! Port bandwidth signal rates must start on their respective boundaries. For STS-12c, the boundaries are STS#1, #13, #25, #37, et cetera).

OC-48

OC-48 ports support STS-1, STS-3c, STS-12c, and STS-48c rates.

- If the port is provisioned for 48 STS-1s, the signal rate representation would show 481 (48 STS-1s).
- If the port is provisioned for 16 STS-3c signals, the signal rate representation would show 163 (16 STS-3c).
- If the port is provisioned for 4 STS-12c signals, the signal rate representation would show 412 (4 STS-12c).
- If the port is provisioned for 9 STS-1s, 1 STS-3c, 1 STS-12c, and 24 STS-1s, the signal rate representation would show 91-13-112-241 (9 STS-1s, 1 STS-3c, 1 STS-12c, 24 STS-1s). The hyphens represent the division of signal rates.
- If the port is provisioned for 1 STS-48c, the signal rate representation would show 148 (1 STS-48c).

OC-192

OC-192 ports support STS-1, STS-3c, STS-12c, and STS-48c rates.

- If the port is provisioned for 192 STS-1s, the signal rate representation would show 1921 (192 STS-1s).
- If the port is provisioned for 64 STS-3c signals, the signal rate representation would show 643 (64 STS-3c).
- If the port is provisioned for 16 STS-12c signals, the signal rate representation would show 1612 (16 STS-12c).

- If the port is provisioned for 48 STS-1s, 4 STS-12c signals, 24 STS-1s, 1 STS-48c, and 2 STS-12c signals, the signal rate representation would show 481-412-241-148-212 (48 STS-1s, 4 STS-12c, 24 STS-1s, 1 STS-48c, 2 STS-12c). The hyphens represent the division of signal rates.
- If the port is provisioned for 4 STS-48c, the signal rate representation would show 448(4 STS-48c)

SDH STM fixed-rate signal rate list examples

The fixed-rate tributary signal rate list parameter for STM ports is a list of VCn rates across the port bandwidth. The default value of the tributary input signal rates are all VC4s. Many combinations of signal rates exist. The following are only some examples of signal rate list representations.

STM1

STM1 ports support VC3 and VC4 rates. A VC3 is equivalent to one-third of a STM1 bandwidth. A VC4 is equivalent to one STM1.

- If the port is provisioned for 3 VC3s, the signal rate representation would show 33 (3 VC3s).
- If the port is provisioned for 1 VC4, the signal rate representation would show 14 (1 VC4).

STM4

STM4 ports support VC3, VC4, and VC4-4c rates. A VC3 is equivalent to one-third of a STM1 bandwidth. A VC4 is equivalent to one STM1. A VC4-4c is equivalent to one STM4.

- If the port is provisioned for 12 VC3s, the signal rate representation would show 123 (12 VC3s).
- If the port is provisioned for 4 VC4s, the signal rate representation would show 44 (4 VC4).
- If the port is provisioned for 1 VC4-4c, the signal rate representation would show 14c (1 VC4-4c).
- If the port is provisioned for 3 VC3s, 2 VC4s, and 3 VC3s1, the signal rate representation would show 33-24-33 (3 VC3s - 2 VC4s - 3 VC3s).

STM16

STM16 ports support VC3, VC4, VC4-4c, and VC4-16c rates. A VC3 is equivalent to one-third of a STM1 bandwidth. A VC4 is equivalent to

one STM1. A VC4-4c is equivalent to one STM4. A VC4-16c is equivalent to one STM16.

- If the port is provisioned for 48 VC3s, the signal rate representation would show 483 (48 VC3s).
- If the port is provisioned for 16 VC4s, the signal rate representation would show 164 (16 VC4s).
- If the port is provisioned for 4 VC4-4c signals, the signal rate representation would show 44c (4 VC4-4c).
- If the port is provisioned for 1 VC4-16c signal, the signal rate representation would show 116c (1 VC4-16c).
- If the port is provisioned for 1 VC4-4C, 6 VC3s, 2 VC4s, and 2 VC4-4c signals, the signal rate representation would show 14c-63-24-24c (1 VC4-4c - 6 VC3s - 2 VC4s - 2 VC4-4c).

STM64

STM64 ports support VC3, VC4, VC4-4c, VC4-16c rates. A VC3 is equivalent to one-third of a STM1 bandwidth. A VC4 is equivalent to one STM1. A VC4-4c is equivalent to one STM4. A VC4-16c is equivalent to one STM16.

- If the port is provisioned for 64 VC4s, the signal rate representation would show 644 (64 VC4s).
- If the port is provisioned for 16 VC4-4c signals, the signal rate representation would show 164c (16 VC4-4c).
- If the port is provisioned for 8 VC4-4c signals and 32 VC4s, the signal rate representation would show 84c-324 (8 VC4-4c - 32 VC4s).

Tributary unequipped signal rate list

The provisioned signal rates for the output tributaries determine the unequipped signal rates for tributaries without a cross-connection. Both the input and output tributary signal rates determine the allowed rates for cross-connections. See “Fixed-rate tributary input signal rate list” (7-73) for the format of signal rates.

Force DUS

The Force DUS (do not use for synchronization) on output setting may be set to enabled or disabled. If set to enabled, a DUS signal is sent out from the port and prevents the line from being used for synchronization.

EBER AIS enable

The excessive bit error rate AIS enable (EBER AIS enable) or Excessive Maintenance Inhibit parameter inhibits the actions for some

maintenance signals such as line signal failures and signal degrades when set to TRUE. When set to FALSE the actions will not be inhibited.

SONET optical line signal degrade (BER) threshold	For SONET ports, the BER threshold parameter selects the optical line bit error rate (signal degrade) threshold. Possible values are $10E^{-5}$, $10E^{-6}$ (default), $10E^{-7}$, $10E^{-8}$, or $10E^{-9}$.
SONET optical line signal failure (EBER) threshold	For SONET ports, the EBER threshold selects the optical line excessive bit error rate (EBER signal failure) threshold. Possible values are $10E^{-3}$ (default), $10E^{-4}$, or $10E^{-5}$.
MS DEXC threshold	For SDH ports, the MS DEXC threshold selects the multiplex section DEXC threshold. Possible values are 10^{-3} (default), 10^{-4} , or 10^{-5} .
MS degrade threshold	For SDH ports, the MS degrade threshold selects the multiplex section degrade threshold. Possible values are 10^{-5} , 10^{-6} , 10^{-7} , 10^{-8} or 10^{-9} .
FEC encoding/decoding	For OC-192 ports, the FEC Encoding/Decoding parameter enables or disables forward error correction (FEC). Possible values are Enabled or Disabled.
FEC correction	For OC192 ports, the FEC Correction parameter enables or disables the correction processing <i>if</i> FEC Encoding/Decoding is enabled. If FEC Encoding/Decoding is set to Disabled, enabling FEC Correction has no effect. Possible values are Enabled or Disabled.
FEC type	For OC192 ports, the FEC Type parameter allows you to select either In-Band or Out-Band FEC. The default is In-Band. If Out-Band is selected at one end, then it must be selected at the other end or a loss of signal (LOS) alarm will be generated. Selection of the Out-Band FEC type increases the line rate from approximately 9.95 Gbps to 10.66 Gbps.
Alarm severity profile	The alarm severity profile allows you to assign a port alarm severity assignment profile to the selected port.
Apply to option	The Apply To option allows you to select one of the following unless the system interface standard has been changed for the selected port:

This Port Only

This selection applies the port parameters for the port being provisioned to only the selected port displayed on the screen.

All Ports of this type, This Pack

This selection allows you to apply all the parameter settings for the port being provisioned to all ports of this type on the same circuit pack.

All Ports of this type, This Shelf

This selection allows you to apply the parameter settings for the port being provisioned to all ports of this type on all the same circuit pack types on the shelf.



Electrical Port Provisioning

Electrical port provisioning Electrical port provisioning allows you to configure the DS3/EC1 or STM1E parameters associated with a selected electrical port.

Method of electrical port provisioning The **Configuration > Provision** command from the WaveStar CIT System View menu displays the Provision Parameters for Protection Group or Equipment screen. A port AID entry or port selection in this screen displays the parameters associated with the port.

Security level required Only users with at least P3 provisioning, S3 security, and M1 maintenance user privilege codes have access to electrical port provisioning. For more information on security privilege codes, see “User Types” (7-32).



DS3 Electrical Port Provisioning Parameters

Electrical interface type The electrical interface type parameter allows you to choose the port's transmission characteristic as DS3 or EC1. The default is DS3.

PTF standard The path termination function (PTF) standard parameter allows you select the interface standard of path termination function of the port. Values are SONET or SDH.

PTF FM cross-connection dependency The path termination function, fault monitoring (PTF FM) parameter creates a dependency between the existence of a cross-connection to a DS3 port and the fault behavior of the termination function. The possible values of the parameter are “yes” or “no”. The default value for SONET ports is “yes”. The default value for SDH ports is “no.”

PTF FM set to “Yes”

When a cross-connection in the DS3 output direction does not exist and the PTF FM cross-connection dependency parameter is set to “Yes,” the DS3 output port transmits a DS3 Idle Signal on detection of a defect that requires an action. An Unequipped defect detected at the PTF is not reported.

PTF FM set to “No”

When a cross-connection in the DS3 output direction does not exist and the PTF FM cross-connection dependency parameter is set to “No,” the DS3 output port transmits a DS3 AIS Signal on detection of a defect that requires an action. An Unequipped defect detected at the PTF is reported according to the assigned ASAP.

The actual signal insertion (DS3 AIS or DS3 IS) is also governed by the provisioning of the associated Output Mode for the DS3 port. When a cross-connection in the DS3 output direction exists, the system performs normal fault processing (for example, a UNEQ defect results in an UNEQ failure being declared and DS3 AIS sent downstream).

PTF TP monitoring mode The PTF (path termination function) TP tributary monitoring mode parameter sets the tributary monitoring mode of the tributary. The values may be

MON

Indicates that alarm monitoring is taking place on the port.

NMON (initial value)

Indicates that alarm monitoring is not occurring on the port.

DS3 port directionality

The Port Directionality parameter allows you choose the direction of possible transmission. The values are:

Bidirectional (default)

Supports transmission in both directions, transmit and receive.

Unidirectional transmit

Supports transmission only in the transmit direction. The transmit direction is where the signal exits the system to the cable medium outside the system.

Unidirectional receive

Supports transmission only in the receive direction. The receive direction is where the signal enters the system from the cable medium outside the system.

Important! If a port is provisioned for unidirectional port operation for a single direction of transmission, then you cannot provision a cross-connection to or from a tributary in the direction which is not selected for unidirectional port operation.

DS3 signal format

The DS3 signal format allows you to select the format of the DS3 signal. Possible values of the DS3 signal format are

C-bit parity (initial value)

Supports a C-bit parity channelized DS3 format. It may support full P-bit parity VMR, VM, or no VM monitoring. It may also use full C-bit parity monitoring.

M23

Supports the M23 channelized DS3 format. It may support full P-bit parity VMR, VM, or no VM monitoring. The C-bit monitoring is disabled for this format.

Framed

Supports the standard M-frame DS3 format. It may be channelized or unchannelized. It may support full P-bit parity VMR, VM or no VM monitoring;

Unframed and Clear Channel

When this format has been set, the system disables P-bit parity VMR, VM, and C-bit parity monitoring.

Signal degrade BER threshold

The signal degrade BER threshold specifies the signal degrade Bit Error Rate (BER) threshold for DS3 ports. The values may be:

- 4×10^{-4} or
- 10^{-6} (default)

DS3 incoming alarm severity assignment profile (ASAP)

The DS3 incoming ASAP parameter allows you to assign and view the details of an alarm severity assignment profile to be applied to the incoming port direction.

DS3 out ASAP

The DS3 out ASAP parameter allows you to assign and view the details of an alarm severity assignment profile to be applied to the outgoing port direction.

Port monitoring mode

Port monitoring mode represents the monitoring state for each port in the system at any given time. Each port's monitoring mode has its own characteristics for signal failure alarms and performance monitoring (PM) data collection. Transitions between modes occur due to events such as applying a good signal and WaveStar CIT commands. The detection of a fault does not affect the state of the port monitoring mode. The port modes in are auto (AUTO), monitored (MON), not monitored (NMON).

Auto (AUTO)

AUTO refers to a port that is available for automatic provisioning. A port transitions from the AUTO mode to the MON mode if a good signal is detected. The original port monitoring mode value is AUTO. When the port monitoring mode is AUTO, the port is not alarmed.

Monitored (MON)

MON refers to a port that is fully monitored and alarmed whether or not it is cross- connected.

Not monitored (NMON)

NMON refers to a port that is not monitored and does not transition to the MON state even if a good signal is detected. Any port modes may be user-provisioned independently to the NMON state at any time,

regardless of the auto-provisioned mode of the terminating interface slot. The port mode is used to suppress alarms.

Violation monitoring mode The violation monitoring mode parameter supports the DS3 P-bit parity violation monitoring and removal. You may select one of the following:

VMR

Violation monitoring and removal (VMR) supports P-bit parity violation monitoring and removal on the outgoing (toward the DSX cable interface) DS3 signals.

VM

Violation monitoring without removal (VM) supports P-bit parity violation monitoring on the outgoing (toward the DSX cable interface) DS3 signals, but no corrections are made.

No VM

Indicates no violation monitoring will occur. This is the default for the violation monitoring mode.

Path trace generation The path trace parameter shows the value of the outgoing J1 byte path trace for the terminated DS3 service. It may be up to 64 ASCII characters converted from the hexadecimal representation. If a series of two hexadecimal digits cannot be converted to ASCII characters, then the WaveStar CIT displays a left bracket ([), the letters hex, the two hexadecimal digits, and a right bracket()], for each set of two hexadecimal digits which cannot be converted.

Path trace write format The values for the path trace write are:

Single byte value

The single byte (hexadecimal format using the printable T.50/ASCII character set) is repeated over and over, with no terminating/initial sequence. The initial value is 0x00, the ASCII null character. This is the default for SDH.

16-byte

16-byte hexadecimal format using the printable T.50/ASCII character set, with the first byte being a CRC-7. The initial value is a header byte followed by 15 0x00's (the ASCII null character). For the 16-byte format you can manually calculate the checksum by using the CRC toggle button.

64-byte

64-byte hexadecimal format using the printable T.50/ASCII character set. The initial value is 62 0x00's (the ASCII null character) followed by a carriage return, line feed. This is the default for SONET.

Apply To option

The **Apply To** option allows you to select one of the following unless the electrical interface type has been changed from the original setting for the selected port:

This Port Only

This selection applies the port parameters for the port being provisioned to only the selected port displayed on the screen.

All Ports of this type, This Pack

This selection allows you to apply all the parameter settings for the port being provisioned to all ports of this type on the same circuit pack.

All Ports of this type, This Shelf

This selection allows you to apply the parameter settings for the port being provisioned to all ports of this type on all the same circuit pack types on the shelf.



EC1 Electrical Port Provisioning Parameters

Electrical interface type	The electrical interface type parameter allows you to choose the port's transmission characteristic as DS3 or EC1. The default is DS3.
Signal degrade BER threshold	The signal degrade BER threshold specifies the Signal Degrade Bit Error Rate (BER) threshold for EC1 ports. The values may be 10^{E-5} (default), $10E^{-6}$, $10E^{-7}$, $10E^{-8}$, or $10E^{-9}$.
Signal failure (EBER) threshold	The EBER threshold selects the excessive bit error rate (EBER signal failure) threshold. Possible values are $10E^{-3}$ (default), $10E^{-4}$, or $10E^{-5}$.
EBER AIS enable	The excessive bit error rate AIS (EBER AIS) or Excessive Maintenance Inhibit parameter inhibits the actions for some maintenance signals such as line signal failures and signal degrades when set to Disabled. When set to Enabled, the actions will not be inhibited.
Alarm severity assignment profile (ASAP)	The ASAP parameter allows you to assign and view the details of an alarm severity assignment profile to be applied to this port.
Port monitoring mode	Port monitoring mode represents the monitoring state for each port in the system at any given time. Each port's monitoring mode has its own characteristics for signal failure alarms and performance monitoring (PM) data collection. Transitions between modes occur due to events such as applying a good signal and WaveStar CIT commands. The detection of a fault does not affect the state of the port monitoring mode. The port modes are auto (AUTO), monitored (MON), and not monitored (NMON). Auto (AUTO) AUTO refers to a port that is available for automatic provisioning. A port transitions from the AUTO mode to the MON mode if a good signal is detected. The original port monitoring mode value is AUTO. When the port monitoring mode is AUTO, the port is not alarmed. Monitored (MON) MON refers to a port that is fully monitored and alarmed whether or not it is cross connected.

Not monitored (NMON)

NMON refers to a port that is not monitored and does not transition to the MON state even if a good signal is detected. Any port modes may be user-provisioned independently to the NMON state at any time, regardless of the auto-provisioned mode of the terminating interface slot. The port mode is used to suppress alarms.

Apply To option

The **Apply To** option allows you to select one of the following unless the electrical interface type has been changed for the selected port from the original setting:

This Port Only

This selection applies the port parameters for the port being provisioned to only the selected port displayed on the screen.

All Ports of this type, This Pack

This selection allows you to apply all the parameter settings for the port being provisioned to all ports of this type on the same circuit pack.

All Ports of this type, This Shelf

This selection allows you to apply the parameter settings for the port being provisioned to all ports of this type on all the same circuit pack types on the shelf.



AU-3/AU-4 Adaptation

Overview There are two methods of multiplexing a VC-3 signal into an STM-N signal. One is called *SONET mode mapping* and one is called *SDH mode mapping*. SONET mode mapping packages one VC-3 signal into an AU-3 signal and then maps three AU-3s into an STM-1. SDH mode mapping packages three VC-3 signals into an AU-4 signal and then maps one AU-4 into an STM-1. The SONET and SDH mode mappings are incompatible, in that equipment implementing one of the methods cannot generally locate VC-3s within a signal that has been produced by equipment using the other method. AU-3 to AU-4 adaptation allows a signal multiplexed by SONET mode mapping to be demultiplexed by equipment that uses SDH mode mapping. AU-4 to AU-3 adaptation allows a signal multiplexed by SDH mode mapping to be demultiplexed by equipment that uses SONET mode mapping.

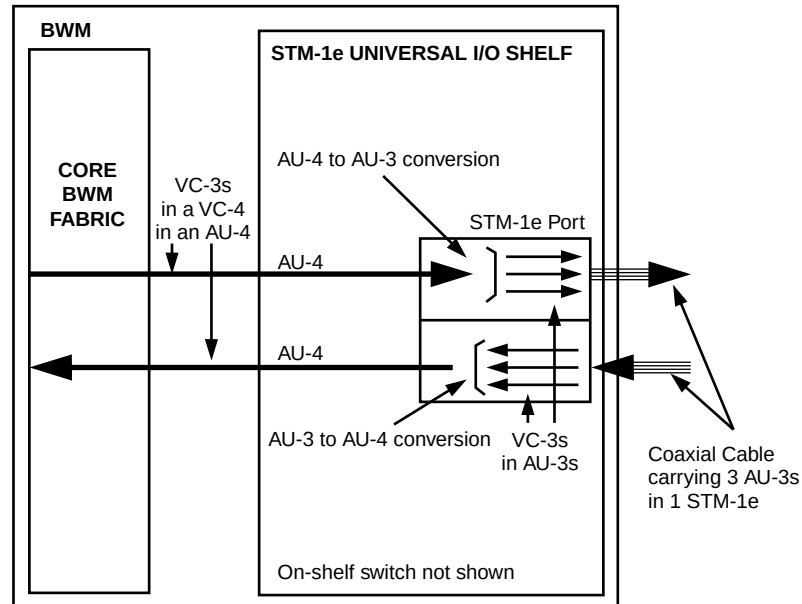
Main application The main application for the AU-3/AU-4 adaptation feature is in the international transport of DS3s. In spite of the fact that the DS3 signal is considered part of the North American transmission hierarchy, and thus more closely associated with SONET networks than SDH networks, a growing number of DS3s originate/terminate outside North America, and are transported, all or part of the way, over SDH networks. DS3s are carried in VC-3s. Depending on the equipment where the VC-3 originates, a SONET or SDH mode mapping may be applied to prepare the VC-3 for transport across the network or networks. An adaptation function is needed when the terminating equipment does not support the same VC-3 mapping as the originating equipment.

Basic adaptation In the ingress port direction, BandWidth Manager provides a SONET-to-SDH mode adaptation. Thus, when the adaptation feature is enabled in the ingress port direction, BandWidth Manager recovers VC-3s from (up to three) AU-3s contained within the incoming STM-1e signal. It then re-maps/re-multiplexes the VC-3s, by SDH mode mapping into a high-order VC-4 which is placed within an AU-4. The resulting VC-4/AU-4 is directed (by the on shelf switch) to the core of BandWidth Manager where it can subsequently be cross-connected to an outgoing VC-4/AU-4 tributary of an STM-N port.

In the egress port direction, BandWidth Manager provides a SDH-to-SONET mode adaptation. Thus, when the feature is enabled in the egress port direction, an AU-4 signal is received from the BandWidth

Manager core switch (where it has presumably entered via an STM-N port), and the high-order VC-4 contained within the AU-4 is terminated. The adaptation function recovers the VC-3s that were contained in the high-order VC-4, and then re-maps each recovered VC-3 into an AU-3. The AU-3s are mapped into the STM-1e signal exiting the port.

Figure 7-3 Basic AU-3/AU-4 Adaptation Architecture



nc-usm-336

Note

The figure above shows the signal going through the core switch fabric to connect to the STM-N port on a different shelf. However, core switch capacity can be saved by instead connecting to an STM-N port on the same shelf.

Generalized adaptation

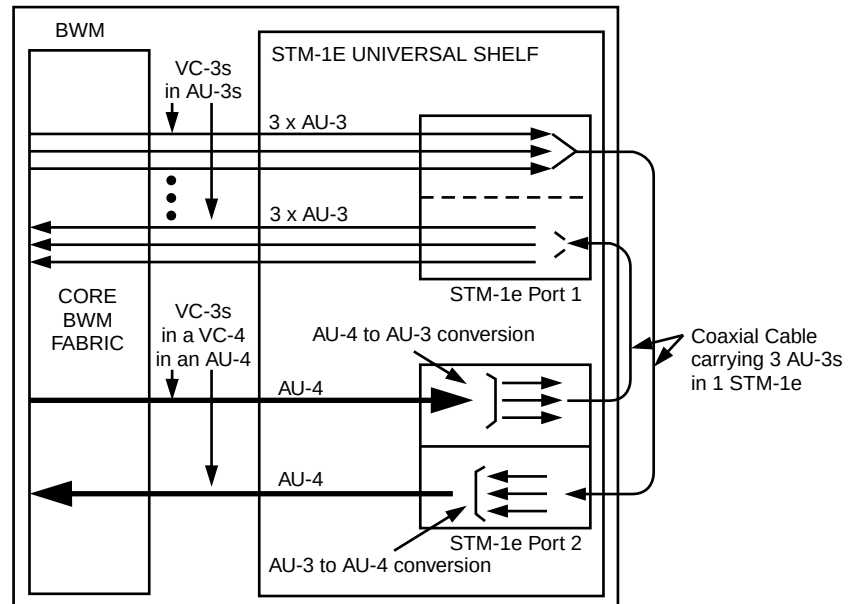
When SONET mode mapped VC-3s (VC-3 in AU-3s) enter/exit BandWidth Manager via ports other than STM-1e ports (e.g., via STM-N optical ports, or via BandWidth Manager DS3 ports which map DS3s into VC-3s in AU-3s), the signals can still be adapted; however, it takes additional engineering and BandWidth Manager resources. The figure below illustrates this generalized adaptation architecture.

In this case, VC-3s contained within AU-3s enter BandWidth Manager through one or more STM-N ports. Up to three of these VC-3s are cross-connected through BandWidth Manager to the outgoing VC-3 tributaries of a single STM-1e port, referred to here as Port 1.

Adaptation is not enabled on this port. Hence, the STM-1e line level signal leaving BandWidth Manager from Port 1 contains VC-3s in AU-3s. The output of Port 1 is cabled to the input of a second STM-1e port, referred to here as Port 2. (Port 2 may reside on the same shelf, and even on the same circuit pack as Port 1.) AU-3-to-AU-4 adaptation functionality is enabled in the ingress direction on Port 2. Hence Port 2 converts the incoming SONET mode mapped signal (VC-3's in AU-3s) to an SDH mode mapped signal (VC-3s contained in a high-order VC-4 in an AU-4). The high-order VC-4 so formed is then cross-connected through BandWidth Manager to an outgoing VC-4 tributary on an STM-N port where it exits BandWidth Manager.

In the opposite direction of transmission, up to three VC-3s may be contained within an higher-order VC-4 in an AU-4 as it enters BandWidth Manager through an STM-N port. The higher-order VC-4 containing the VC-3s is cross-connected through BandWidth Manager to the outgoing VC-4 tributary on STM-1e Port 2. AU-4 to AU-3 adaptation is enabled in the egress direction on Port 2. Hence, the STM-1e line level signal exiting BandWidth Manager from Port 2 has VC-3s contained in AU-3s. The output of Port 2 is cabled to the input of STM-1e Port 1. Adaptation is not enabled on Port 1. Hence the signal being transported toward the core of BandWidth Manager from Port 1 has VC-3s in AU-3s. These VC-3s in AU-3s are cross-connected to outgoing VC-3 tributaries in up to three different STM-N ports.

It should be emphasized that, although two STM-1e ports are used in providing the generalized adaptation capability, only one of them has adaptation enabled. The adaptation on that port is done in exactly the same way as it is done for basic adaptation.

Figure 7-4 Generalized AU-3/AU-4 Adaptation Architecture

NC-USM-304

Note

The figure above shows the signal going through the core switch fabric to connect to the STM-N port on a different shelf. However, core switch capacity can be saved by instead connecting to an STM-N port on the same shelf.



STM1E Port Provisioning Parameters

Electrical interface type	The electrical interface type parameter displays the port's transmission characteristic as STM1E.
AU-3/AU-4 adaptation parameters	For an explanation of AU-3/AU-4 adaptation see "AU-3/AU-4 Adaptation" (7-87). None <i>None</i> means leave the signal in its original form. Input <i>Input</i> means convert the incoming signal from AU-3 to AU-4, but leave the outgoing signal in its original form. Output <i>Output</i> means convert the outgoing signal from AU-4 to AU-3 but leave the incoming signal in its original form. Both <i>Both</i> means convert the incoming signal from AU-3 to AU-4 and convert the outgoing signal from AU-4 to AU-3.
Port monitoring mode	Port monitoring mode represents the monitoring state for each port in the system at any given time. Each port's monitoring mode has its own characteristics for signal failure alarms and performance monitoring (PM) data collection. Transitions between modes occur due to events such as applying a good signal and WaveStar CIT commands. The detection of a fault does not affect the state of the port monitoring mode. The port modes are auto (AUTO), monitored (MON), and not monitored (NMON). Auto (AUTO) AUTO refers to a port that is available for automatic provisioning. A port transitions from the AUTO mode to the MON mode if a good signal is detected. The original port monitoring mode value is AUTO. When the port monitoring mode is AUTO, the port is not alarmed.

Monitored (MON)

MON refers to a port that is fully monitored and alarmed whether or not it is cross connected.

Not monitored (NMON)

NMON refers to a port that is not monitored and does not transition to the MON state even if a good signal is detected. Any port modes may be user-provisioned independently to the NMON state at any time, regardless of the auto-provisioned mode of the terminating interface slot. The port mode is used to suppress alarms.

Fixed-rate tributary rate list

The rate of a requested cross-connection must match the provisioned signal rate of each involved input and output tributary that is on a port provisioned for fixed-rate tributary operation. You must provision fixed rate ports for the list of expected input signal rates across the port's bandwidth. The signal rates may be VC-3 or VC-4 signal rates.

STM1E fixed-rate input signal rate list

The fixed-rate tributary signal rate list parameter for STM1E ports is a list of VCn rates across the port bandwidth. The default value of the tributary input signal rates are all VC3s. The following are examples of signal rate list representations.

STM1E

STM1E ports support VC3 and VC4 rates. A VC3 is equivalent to one-third of an STM1 bandwidth. A VC4 is equivalent to one STM1.

- If the port is provisioned for 3 VC3s, the signal rate representation would show 33 (3 VC3s).
- If the port is provisioned for 1 VC4, the signal rate representation would show 14 (1 VC4).

Tributary unequipped output signal rate list

The provisioned signal rates for the output tributaries determine the unequipped signal rates for tributaries without a cross-connection. Both the input and output tributary signal rates determine the allowed rates for cross-connections. The format of the unequipped output signal rates is the same as the input signal rate list.

EBER AIS enable

The excessive bit error rate AIS (EBER AIS) or Excessive Maintenance Inhibit parameter inhibits the actions for some maintenance signals such as line signal failures and signal degrades when set to Disabled. When set to Enabled, the actions will not be inhibited.

MS DEXC threshold	A multiplex section excessive error defect (MS DEXC) is detected on any STM-N signal on which the B2 BER exceeds a pre-selected threshold. The MS DEXC threshold parameter may be provisioned with the value of 10^{-3} , 10^{-4} , or 10^{-5} . The default is 10^{-3} .
MS Degrade threshold	A multiplex section degrade defect (MS DEG) is detected on any STM-N signal on which the B2 BER exceeds a pre-selected threshold. The MS Degrade Threshold parameter may be provisioned over the range 10^{-5} to 10^{-9} . The default value is 10^{-6} . Possible values are 10^{-5} , 10^{-6} , 10^{-7} , 10^{-8} or 10^{-9} .
Alarm severity assignment profile (ASAP)	The ASAP parameter allows you to assign and view the details of an alarm severity assignment profile to be applied to this port.
Apply To option	The Apply To option allows you to select one of the following: This Port Only This selection applies the port parameters for the port being provisioned to only the selected port displayed on the screen. All Ports of this type, This Pack This selection allows you to apply all the parameter settings for the port being provisioned to all ports of this type on the same circuit pack. All Ports of this type, This Shelf This selection allows you to apply the parameter settings for the port being provisioned to all ports of this type on all the same circuit pack types on the shelf.



Tributary Provisioning

What is tributary provisioning Tributary provisioning allows you to configure the tributary parameters associated with a selected port.

Method of tributary provisioning The **Configuration > Provision** command from the WaveStar CIT System View menu displays the Provision Parameters for Protection Group or Equipment screen. A tributary AID entry or tributary selection in this screen displays the parameters associated with the tributary.

Security level required Only users with at least P3 provisioning, S3 security, and M1 maintenance user privilege codes have access to tributary provisioning. For more information on security privilege codes, see “User Types” (7-32).



Tributary Provisioning Parameters

Tributary monitoring mode	The tributary monitoring mode parameter sets the tributary monitoring mode of the tributary. The values may be MON Indicates that alarm monitoring is taking place on the tributary. NMON (initial value) Indicates that alarm monitoring is not occurring on the tributary.
DEXC threshold	An excessive error defect (DEXC) is detected on any STS-N signal on which the B2 BER exceeds a pre-selected threshold. The DEXC threshold parameter may be provisioned with the value of 10^{-3}, 10^{-4}, or 10^{-5}. The default is 10^{-3}.
DEG threshold	A degrade defect (DEG) is detected on any STS-N signal on which the B2 BER exceeds a pre-selected threshold. The MS Degrade Threshold parameter may be provisioned over the range 10^{-5} to 10^{-9}. The default value is 10^{-6}. Possible values are 10^{-5}, 10^{-6}, 10^{-7}, 10^{-8} or 10^{-9}.
Alarm severity assignment profile (ASAP)	The ASAP parameter allows you to assign and view the details of an alarm severity assignment profile to be applied to this port.
Path trace generation	The path trace parameter shows the value of the outgoing J1 byte path trace for the terminated STS-1 service. It may be up to 64 ASCII characters converted from the hexadecimal representation. If a series of two hexadecimal digits cannot be converted to ASCII characters, then the WaveStar CIT displays a left bracket ([), the letters hex, the two hexadecimal digits, and a right bracket()], for each set of two hexadecimal digits which cannot be converted.
Path trace write format	The values for the path trace write are: Single byte value The single byte (hexadecimal format using the printable T.50/ASCII character set) is repeated over and over, with no terminating/initial sequence. The initial value is 0x00, the ASCII null character.

16-byte

16-byte hexadecimal format using the printable T.50/ASCII character set, with the first byte being a CRC-7. The initial value is a header byte followed by 15 0x00's (the ASCII null character). For the 16-byte format you can manually calculate the checksum by using the CRC toggle button.

64-byte

64-byte hexadecimal format using the printable T.50/ASCII character set. The initial value is 62 0x00's (the ASCII null character) followed by a carriage return, line feed. This is the default for SONET.

Apply To option The **Apply To** option allows you to select one of the following:

This Tributary

This selection applies the tributary parameters for the tributary being provisioned to only the selected tributary displayed on the screen.

All Tributaries, This Port

This selection allows you to apply all the parameter settings for the tributary being provisioned to all tributaries of the same circuit pack port.

All Tributaries, This Pack

This selection allows you to apply the parameter settings for the tributary being provisioned to all tributaries of this type on all the ports on the same circuit pack.



Provisioning Parameters for Existing Protection Groups

Provisioning versus creating protection groups

Provisioning protection groups in this section involves provisioning or changing a limited number of parameters for existing protection groups. “Overview of New Optical Port Protection Groups” (7-107) enables you to create a new optical port protection group with the chosen type of protection.

Method of provisioning protection groups

The **Configuration > Provision** command from the WaveStar CIT System View menu displays the Provision Parameters for Protection Group or Equipment screen. A protection group AID entry or existing protection group selection under the protection group (**Ptn Grp**) tab displays the parameters associated with the protection group.

Security level required

Only users with at least an M4 maintenance user privilege code have access to protection group provisioning. For more information on security privilege codes, see “User Types” (7-32).



Changing 1+1 Port Protection Group Parameters

1+1 protection ports An existing 1+1 protection group cannot be redefined. Instead, a user would have to delete the protection group. Deletion of the protection group automatically reassigns any port members of the group to 0x1 protection. The NE denies any request to delete a protection group which has a cross-connection established or an active protection switch on one or more of the involved ports.



Changing 2-Fiber BLSR/MS-SPRing Port Protection Group Parameters

Protection group ID and port type

The protection group ID and port type are displayed for the selected protection group.

2-Fiber BLSR/MS-SPRing protection ports

An existing 2-Fiber BLSR/MS-SPRing port protection group cannot be redefined. Instead, a user would have to delete the protection group. Deletion of the protection group automatically reassigns any port members of the group to 0x1 protection. The NE denies any request to delete a protection group which has a cross-connection established or an active protection switch on one or more of the involved ports.

Ring ID

Ring IDs uniquely identify all the rings in the network and identify all the nodes intended for the same ring. The Ring ID is a 1- to 15-character ASCII string that identifies a ring. The characters may be letters, digits, or hyphens, but the Ring ID cannot be zero (0). The Ring ID may be edited, but remember that the Ring ID must be unique for each ring in the network. Although the RingID must be unique for each ring in the network, each node on the same ring **MUST** have the same Ring ID.

Wait to Restore for revertive/nonrevertive switching

The Wait to Restore parameter controls the revertive/nonrevertive functionality of protection switching. The range is from 0 to 12 minutes, plus an infinity option. Infinity is equivalent to nonrevertive. The value zero permits a revertive switch from the protection line to the working line, immediately after detecting that the working line is functional. It may be desirable to allow the line to stabilize for a number of minutes before performing the revertive switch. The default value is 5 minutes.



Changing 4-Fiber BLSR/MS-SPRing Port Protection Group Parameters

Protection group ID and port type

The protection group ID and port type are display only for the selected protection group.

Interface standard

The interface standard displays the interface standard of the selected protection group as SONET or SDH. This parameter is display only.

4-Fiber BLSR/MS-SPRing protection ports

In some cases, you may want to remove or add ports in a 4-Fiber BLSR/MS-SPRing protection group.

Removing ports

Removing the ports associated with a single direction in a 4-Fiber BLSR/MS-SPRing two-sided node does not dissolve the protection group but changes the node from a two-sided node to a one-sided node. The one-sided node would then become an end node in an open ring. Ports removed from the 4-Fiber BLSR/MS-SPRing protection group revert back to 0x1 protection. The NE denies any request to remove a side from a protection group which has a cross-connection established or an active protection switch on one or more of the involved ports.

Assigning ports

Assigning ports in a single direction to a one-sided node in an open ring converts the node to a two-sided node in preparation for converting to a closed ring.

Ring ID

Ring IDs uniquely identify all the rings in the network and identify all the nodes intended for the same ring. The Ring ID is a 1- to 15-character ASCII string that identifies a ring. The characters may be letters, digits, or hyphens, but the Ring ID cannot be 0. The Ring ID may be edited but remember that the Ring ID must be unique for each ring in the network.

Ring switch Wait to Restore

The ring switch Wait to Restore parameter controls the revertive/nonrevertive functionality of ring loop-back switching. The value range is from 0 to 12 minutes, plus the infinity option. Infinity is equivalent to nonrevertive. The value zero (0) permits a revertive switch from the protection line to the working line immediately after detecting that the working line is functional. The default value for this

parameter is 5 minutes to allow time for the line to stabilize before allowing a revertive switch.

Span switch Wait to Restore

The span switch Span Wait to Restore parameter controls the revertive/nonrevertive functionality for span switching. The range is from 0 to 12 minutes, plus the infinity option. Infinity is equivalent to nonrevertive. The value zero (0) permits a revertive switch from the protection line to the working line immediately after detecting that the working line is functional. The default value for this parameter is 5 minutes to allow time for the line to stabilize before allowing a revertive switch.

Important! There is no service impairment when transitioning from the working port to the protection port. However, there may be a minor service hit when transitioning from the protection port to the working port.

Protection switching mode

The Protection Switching Mode parameter allows you to select either Ring Loopback switching or Shortened Path for the protection switching mode of 4-Fiber MS-SPRing rings. Both ring and span loopback switching are used for closed 4-Fiber BLSR/MS-SPRing rings that generally have a circumference of less than 1200 kilometers. Shortened path provides a feature for protection switching in closed 4-Fiber MS-SPRing rings with transoceanic protocol. Shortened path protection switching reduces the impact of propagation delay on signal quality in rings with a circumference greater than 1200 kilometers. See Chapter 2, Network Topologies for more information on 4-Fiber closed MS-SPRing rings with transoceanic protocol.

BLSR alarm severity assignment profile

The BLSR alarm severity assignment profile allows you to select a BLSR Alarm Severity Assignment Profile for this protection group.



| Changing 1XN Electrical Protection Group Parameters

Shelf AID and protection group ID

The Shelf AID and protection group ID are displayed for the selected protection group.

Wait to restore for revertive/nonrevertive switching

The Wait to Restore parameter controls the amount of time before a working electrical interface circuit pack is switched back into service after a protection switch. The range is from 0 to 12 minutes, plus an infinity option. Infinity is equivalent to nonrevertive. The value zero (0) permits a revertive switch from the protection circuit pack to the service circuit pack immediately after detecting that the service circuit pack is functional. It may be desirable to wait a number of minutes to allow a working service circuit pack to stabilize before being switched back into service.

Any change to the Wait to Restore parameter during a protection switch will not take affect until the Wait to Restore interval is completed. The default value is 5 minutes.



| Creating New Bays

Overview Creating a new bay allows you to assign an AID value to a new bay before the equipment is physically installed or after the equipment is installed. You must create the bay in the system database to define the bay's presence within the system.

Method of creating new bays The **Configuration > Create New > Bay** command from the WaveStar CIT System View menu allows an authorized user to create new bays.

Security level required Only users with a P3 provisioning privilege code have access to creating new bays.

Bay AID values Bay AID values range from 1-99.



Creating New Shelves

Overview Creating a new shelf allows you to assign parameter values to a new shelf in a bay before the equipment is physically installed or after the equipment is installed. You must create the shelf in the system database to define the shelf's presence within the system.

Method of creating new shelves The **Configuration > Create New > Shelf** command from the WaveStar CIT System View menu allows an authorized user to create new shelves.

Security level required Only users with a P3 provisioning privilege code have access to creating new shelves.

Shelf parameters Shelf parameters are as follows (see "Shelf Provisioning" (7-68) for details):

- Shelf type
- Shelf AID
- ON cable identifier
- BSW port identifier
- SS bit override
- Shelf locator string

Shelf type The Shelf Type parameter allows you to select the type of shelf being created. You select the shelf type from the provisioning screen menu.

Shelf AID The Shelf AID is the access identifier necessary to identify the shelf. See "Access Identifiers (AIDs)" (7-62) for more information on AIDs.

ON cable identifier The ON Cable Identifier parameter is a integer value from 1 to 48. The ON cable identifier is the Operation Network Cable Port Identifier (ONCPI) value that is recorded at the time of SWIF circuit pack installation and is a function of how the shelf is wired.

BSW port identifier The BSW Port Identifier parameter has a value of from 1 to 48 for 4608/1536 switches. The parameter value is set at the time of SWIF circuit pack installation and defines the SWIF circuit pack locations for the software. Office records must be used to locate the value of the

BSW port identifier since it is a function of how the SWIF circuit pack slots were wired to the switch shelf.



| Creating New Circuit Packs

Overview Creating a new circuit pack allows you to preprovision an empty shelf slot for future installation of a predetermined type of circuit pack.

Method of creating new circuit packs The **Configuration > Create New > Circuit Pack** command from the WaveStar CIT System View menu allows an authorized user to create new circuit packs.

Security level required Only users with a P3 provisioning privilege code have access to creating new circuit packs.

New circuit pack type parameter Circuit pack types may be chosen from a menu in which only valid circuit pack types for the selected slot are listed. You may not create or remove circuit packs that are required for proper shelf operation.



Overview of New Optical Port Protection Groups

What are optical port protection groups	Optical port protection groups are an association of protected optical interface ports used for line protection. The group of ports represent both a protection switching entity and a set of lines that carry services to or from another network element. Port protection groups also determine the set of logical tributaries from and to which cross-connections can be provisioned. See Chapter 2, Network Topologies and Chapter 6, Control, Transmission, and Synchronization Interfaces for more information on the behavior and features of optical port protection groups.
Method of creating new optical port protection groups	The Configuration > Create New > Protection Group command from the WaveStar CIT System View menu allows an authorized user to create new optical port protection groups.
Security level required	Only users with a P3 provisioning privilege code have access to creating new optical port protection groups.
Types of optical port protection groups	The number of ports on each optical circuit pack depends on the type of circuit pack. Within an optical port unit circuit pack, each port may be provisioned independently. Each port may be provisioned to operate in a separate port protection group or operate as unprotected. Each port protection group consists of a specific number of ports that are assigned roles for specific lines in a specific line protection switching configuration. The types of optical port protection groups are: • 1+1 optical line protection • 1+1 SDH multiplex section protection (MSP) • 2-Fiber bidirectional line-switched ring (BLSR) • 2-Fiber SDH multiplex section shared protection ring (MS-SPRing) • 4-Fiber SONET bidirectional line-switched ring (BLSR) • 4-Fiber SDH multiplex section shared protection ring (MS-SPRing)
Default optical port protection	The default for all optical interface ports is 0x1 unprotected operation. The user may then assign other supported protection switching states (port protection groups) to a port as required for the type of port interface. When a port is provisioned for unprotected operation, neither

the input nor the output of the port is included in a port protection group. An optical interface port provisioned for unprotected operation operates independently of other ports.

General provisioning guidelines for optical port protection groups

The following are general provisioning guidelines for optical port protection groups:

- All selected ports in an optical port protection group must be of the same optical rate.
- All ports in the port protection group must be provisioned first before provisioning the port protection group.
- Ports in an optical port protection group must be on the same shelf but on different circuit packs.
- Ports may not be selected if they are already assigned to a port protection group.
- All selected ports in an optical port protection group must be provisioned for the same Interface Standard, either all SONET or all SDH.
- At least two data communication channels (DCCs) must be available for BLSR port protection groups.

Protection group access identifiers (AIDs)

An NE can be provisioned to provide multiple protection groups. Each protection group within the NE must have a unique ID. The protection group AID is used to distinguish the different port protection groups within one NE. Some port protection group AIDs may be assigned to non-BLSR/MS-SPRing port protection groups and may conflict with RingIDs assigned by a network manager for a BLSR/MS-SPRing port protection group.

The protection group AID consists of four subfields. These fields are bay, shelf, protection group type, and user supplied 2-digit numeric identifier. The NE automatically assigns the bay, shelf, and protection group type fields of the AID when you select a shelf and the protection type. You must assign a unique 2-digit numeric identifier. For more information on access identifiers, see “Access Identifiers (AIDs)” (7-62).

The protection group type identifier is defined as follows:

- t – 2-Fiber BLSR/MS-SPRing
- f – 4-Fiber BLSR/MS-SPRing
- o – 1+1 or 1+1 MSP
- u – unprotected



Overview of a 1+1 Optical Port Protection Group

What is a 1+1 port protection group

In a 1+1 port protection group, the head-end electrical signal is permanently bridged to both a working and protection line so that the same payload is transmitted identically to the tail-end working and protection equipment. At the tail-end, the working and protection optical signals are monitored independently. The receive equipment selects either the working or protection line as the one carrying service based on the protection switch criteria.

A 1+1 port protection group may be used for either SONET 1+1 line protection or for SDH 1+1 multiplex section protection (MSP).

Placement of circuit packs/port units

The NE is flexible and does not require that the working and protection circuit packs be located in adjacent slots. The NE does not require a 1-to-1 association for the ports of the working and protection circuit pack and the assignment of working and protection ports is provisionable. However, follow the recommended provisioning guidelines to simplify the network management.

Requirements

The following requirements apply to provisioning working and protection port units:

- All selected ports in an optical port protection group must be of the same optical rate.
- Ports in an optical port protection group must be on the same shelf but on different circuit packs.
- Split configurations with 1+1 in one direction and 0x1 in the other direction are not permitted. Both directions of transmission are chosen simultaneously.

Recommendations

The following recommendations apply to provisioning working and protection port units:

- Whenever practical, the circuit pack containing the protection port should be in a slot adjacent to the circuit pack containing the working port.

- Create a logical association of the working port on a circuit pack to the associated protection port on another circuit pack (for example, working port #1 to protection port #1).
- Avoid configurations in which multiple working-to-protection associations involve more than two circuit packs.



1+1 Optical Port Protection Group Parameters

Protection type The protection type parameter allows you to select the type of port protection group you are creating. Depending on the protection type you select, subsequent selection of parameters will differ.

Protection group AID The port protection group AID must be unique within the NE. The protection group AID identifies the different port protection groups within one NE.

The protection group AID consists of four subfields. These fields are bay, shelf, protection group type, and user supplied 2-digit numeric identifier from 01-99. The NE automatically assigns the bay, shelf, and protection group type fields of the AID when you select a shelf and the protection type. You must assign a unique 2-digit numeric identifier. For more information on access identifiers, see Access Identifiers in this chapter. The protection group type identifier for a 1+1 protection group is an “o” indicating one+one (1+1).

Interface standard The interface standard displays the value of SONET or SDH when a port is selected to remind you that all ports in the protection group must be of the same interface standard.

Protocol The protocol parameter displays the 1+1 protection switching protocol. You may be able to choose the value of bidirectional or unidirectional protection switching after selecting the ports, if supported for the selected ports and in the software release you have. If this feature is not supported, the default value of unidirectional is displayed.

Working and protection port AIDs The 1+1 protection switching system has two lines (pairs of optical fibers) between line terminating equipment. Physically, these optical fibers terminate on the optical interfaces at each end of the span. The transmit and receive line that carries the automatic protection switch channel is called the protection line. The other transmit and receive line is called the working line. Once the working and protection lines have been defined, the definitions of the working line and protection line cannot be changed without removing the protection group entirely.

Working Port AID

The working port AID field allows you to select a working port for the 1+1 optical port protection group. The port selection is limited to

optical ports on the shelf that are available and support this type of port protection group.

Protection Port AID

The protection port AID field allows you to select a protection port for the 1+1 optical port protection group. The port selection is limited to optical ports on the shelf that are available and support this type of port protection group.

Port type

The port type is the optical rate of the selected ports and is displayed when you select a port.

APS alarm severity assignment profile

You may assign an automatic protection switch (APS) alarm severity assignment profile to this protection group. For more information on alarm severity assignment profiles, see “Alarm Severity Assignment Profiles” (7-163).



Overview of a 2-Fiber BLSR/MS-SPRing Protection Group

What is a 2-Fiber BLSR/MS-SPRing

The system supports multiple 2-Fiber Bidirectional Line Switched Ring (BLSR)/Multiplex Section - Shared Protection Ring (MS-SPRing) port protection groups. A 2-Fiber BLSR/MS-SPRing ring is a subnetwork which consists of a set of nodes where:

- Each node is a terminal that interfaces with two optical spans.
- Each optical span interconnects two nodes.
- Each optical span consists of one line or one bidirectional pair of fibers.
- The set of nodes is interconnected by the spans into a complete, closed loop (a closed ring).

One side of each node is called the west side and the opposite side is called the east side. You provision the ports terminating the optical spans as east or west ports. The port terminating the optical span on the west side of a node is called the west port. The port terminating the optical span on the east side of a node is called the east port.

See Chapter 2, Network Topologies in this manual for more information on a 2-Fiber BLSR/MS-SPRing port protection group.

OC-48/STM16 port protection group slot restrictions

Each OC-48/STM16 port unit occupies two slot positions. For each OC-48/STM16 2-Fiber BLSR/MS-SPRing port protection group in the WaveStar TDM 2.5G or 2.5G-STM1E I/O shelf, two OC-48/STM16 circuit packs are required. The two OC-48/STM16 circuit packs (ports) must be in slots located in one of two ways, either adjacent pairs or symmetric pairs, as follows:

- Adjacent pairs
 - Slots 2 and 4 or
 - Slots 6 and 8 or
 - Slots 10 and 12 or
 - Slots 14 and 16
- Symmetric pairs
 - Slots 8 and 10 or
 - Slots 6 and 12 or
 - Slots 4 and 14 or
 - Slots 2 and 16

See “Placement of OC48/STM16 port units” (3-58) for a more detailed illustration.

**OC-192/STM64 port
protection group slot
restrictions**

Two OC-192/STM64 circuit packs in the 10G I/O shelf are required to provide the two ports for a 2-Fiber BLSR/MS-SPRing. The two circuit packs (ports) must be in slots located in one of two ways, either adjacent pairs or symmetric pairs.

- Adjacent pairs
 - Slots tr1 and tr2 or
 - Slots tr3 and tr4.
- Symmetric pairs
 - Slots tr1 and tr4 or
 - Slots tr2 and tr3.

See “Placement of protected OC192/STM64 port units” (3-89) for a more detailed illustration.



2-Fiber BLSR/MS-SPRing Protection Group Parameters

Protection type The protection type parameter allows you to select the type of port protection group you are creating. Depending on the protection type you select, subsequent selection of parameters will differ.

Protection group AID The port protection group AID must be unique within the NE. The protection group AID identifies the different port protection groups within one NE.

The protection group AID consists of four subfields. These fields are bay, shelf, protection group type, and user supplied 2-digit numeric identifier from 01-99. The NE automatically assigns the bay, shelf, and protection group type fields of the AID when you select a shelf and the protection type. You must assign a unique 2-digit numeric identifier. For more information on access identifiers, see Access Identifiers in this chapter. The protection group type identifier for a 2-Fiber BLSR/MS-SPRing is a “t” indicating *two-fiber*.

Ring ID Ring IDs uniquely identify all the rings in the network and identify all the nodes intended for the same ring. The Ring ID is a 1- to 15-character ASCII string that identifies the ring. The characters may be letters, digits, or hyphens, but the Ring ID cannot be zero. The Ring ID must be unique for each ring in the network. Although the RingID must be unique for each ring in the network, each node on the same ring MUST have the same Ring ID.

Ring side and line A 2-Fiber BLSR/MS-SPRing ring node contains two optical interface ports cabled for the same 2-Fiber BLSR/MS-SPRing ring. When an optical interface port is provisioned as a member of a 2-Fiber BLSR/MS-SPRing port protection group, the port (line) is assigned a ring side (west or east) to identify its role. A 2-Fiber BLSR/MS-SPRing has two lines identified as the west port and east port.

2-Fiber BLSR/MS-SPRing port assignments Port assignments for a 2-Fiber BLSR/MS-SPRing are selected from a list of available and allowable port AIDs. For a 2-Fiber BLSR/MS-SPRing, you provision the two ports as:

- One port as the “West port”
- One port as the “East port”

**Wait to restore for
revertive/nonrevertive
switching**

The Wait to Restore parameter controls the revertive/nonrevertive functionality of protection switching. The range is from 0 to 12 minutes, plus an infinity option. Infinity is equivalent to nonrevertive. The value zero permits a revertive switch from the protection line to the working line immediately after detecting that the working line is functional. It may be desirable to allow the line to stabilize for a number of minutes before performing the revertive switch. The default value is 5 minutes.

**Data communications
channels (DCC)**

The data communications channels (DCCs) are used for NE-to-NE data communications and for NE-to-subnetwork communications. A DCC channel must be enabled on each ring side of the NE to support automatic ring discovery communications. The DCC is enabled by default as a result of circuit pack insertion if DCC channels are available. Creation of BLSR/MS-SPRing protection groups require at least two DCC channels. If no DCC channels are available, you will need to free up two DCC channels and enable the DCC on the BLSR/MS-SPRing ports.

LAPD channels

Link Access Protocol on the D-channel (LAPD) channels associated with the DCC channels must be provisioned for each side of the NE, one for the East side and another for the West side. The values are User Side or Network Side. The LAPD channels must be set opposite for each end of the optical span. The default is User Side.



Overview of a 4-Fiber BLSR/MS-SPRing Protection Group

4-Fiber BLSR/MS-SPRing port protection groups

The system supports multiple 4-Fiber Bidirectional Line Switched Ring (BLSR)/Multiplex Section - Shared Protection Ring (MS-SPRing) port protection groups. The protection groups may be

- 4-Fiber open or closed BLSR port protection groups.
- 4-Fiber open or closed MS-SPRing port protection groups.
- 4-Fiber open or closed rings with Transoceanic Protocol.

Depending on the software release and the type of I/O interface shelf, the 4-Fiber BLSR/MS-SPRing port protection groups may consist of OC-48/STM16 or OC-192/STM64 optical port units. 4-Fiber rings with Transoceanic Protocol are MS-SPRing rings provisioned with an extra parameter to support rings with a circumference greater than 1200 kilometers.

See Chapter 2, Network Topologies, for more information on 4-Fiber BLSR/MS-SPRing port protection groups.

What is a 4-fiber open BLSR/MS-SPRing

An open 4-fiber ring is a subnetwork which consists of a set of nodes where

- Each node is a terminal that interfaces with either one or two spans.
- There are two end nodes, each of which interfaces with only one span.
- Any additional nodes between the end nodes interface with two spans.
- Each span interconnects two nodes.
- Each span consists of two bidirectional pairs of fibers (two lines).
- The set of nodes is interconnected by the spans into a linear chain instead of a closed loop.

What is a 4-fiber closed BLSR/MS-SPRing

A closed 4-fiber ring is a subnetwork which consists of a set of nodes where

- Each node is a terminal that interfaces with two spans.
- Each span interconnects two nodes.
- Each span consists of two bidirectional pairs of fibers (two lines).
- The set of nodes is interconnected by the spans into a complete closed loop or ring.

- All spans operate at the same rate.

**OC-48/STM16 port
protection group slot
restrictions**

Each OC-48/STM16 port unit occupies two slot positions in the 2.5G or 2.5G-STM1E I/O shelf. Each OC-48/STM16 4-fiber BLSR/MS-SPRing port protection group requires two or four OC-48/STM16 circuit packs depending on whether the node is an end node, an intermediate node in an open ring, or a node in a closed ring.

Closed ring node or intermediate node in an open ring

A 4-fiber BLSR/MS-SPRing port protection group with four ports (2-sided node) requires the two protection lines to be in slots that are located in one of two ways, adjacent pairs or symmetric pairs.

- Adjacent pairs
 - Slots 2 and 4 or
 - Slots 6 and 8 or
 - Slots 10 and 12 or
 - Slots 14 and 16
- Symmetric pairs
 - Slots 8 and 10 or
 - Slots 6 and 12 or
 - Slots 4 and 14 or
 - Slots 2 and 16

The location of the working (service) lines is not limited; but they should be located similarly, in order to avoid using more than one of the remaining pairs of slots which can be used for other BLSR/MS-SPRings.

End node (1-sided node) in an open ring

For a 4-fiber BLSR/MS-SPRing port protection group with two ports (1-sided node), there is no limitation on port slot locations. The slot locations should be planned to allow growth to a 4-fiber BLSR/MS-SPRing group with four ports (2-sided node).

**OC-192/STM64 port
protection group slot
restrictions**

An OC-192/STM64 4-fiber BLSR/MS-SPRing port protection group in the 10G I/O shelf requires two or four OC-192/STM64 port units depending on whether the node is an end node, an intermediate node in an open ring, or a node in a closed ring.

Closed ring node or intermediate node in an open ring

An OC-192/STM64 4-fiber BLSR/MS-SPRing port protection group with four ports (2-sided node) requires the two protection lines to be in slots that are located in one of two ways, adjacent pairs or symmetric pairs.

- Adjacent pairs
 - Slots tr1 and tr2, or
 - Slots tr3 and tr4
- Symmetric pairs
 - Slots tr1 and tr4, or
 - Slots tr2 and tr3

The location of the working (service) lines must be the remaining pair of slots. For example, if the protection lines are in slots tr1 and tr2, the working lines must be in slots tr3 and tr4.

End node (1-sided node) in an open ring

For a 4-fiber BLSR/MS-SPRing port protection group with two ports (1-sided node) there are no restrictions, but the slot locations should be planned to allow growth to a 4-fiber BLSR/MS-SPRing group with four ports (2-sided node).



4-Fiber BLSR/MS-SPRing Protection Group Parameters

Protection type The protection type parameter allows you to select the type of port protection group you are creating. Depending on the protection type you select, subsequent selection of parameters will differ.

Protection group AID The port protection group AID must be unique within the NE. The protection group AID identifies the different port protection groups within one NE.

The protection group AID consists of four subfields. These fields are bay, shelf, protection group type, and user supplied 2-digit numeric identifier from 01-99. The NE automatically assigns the bay, shelf, and protection group type fields of the AID when you select a shelf and the protection type. You must assign a unique 2-digit numeric identifier. For more information on access identifiers, see Access Identifiers in this chapter. The protection group type identifier for a 4-Fiber BLSR/MS-SPRing is an “f” indicating four (4)-fiber.

Ring ID Ring IDs uniquely identify all the rings in the network and identify all the nodes intended for the same ring. The Ring ID is a 1- to 15-character ASCII string that identifies the ring. The characters may be letters, digits, or hyphens, but the RingID cannot be zero (0). The Ring ID must be unique for each ring in the network.

Ring side and line When an optical interface port is provisioned as a member of a 4-Fiber BLSR/MS-SPRing port protection group, the port (line) is assigned a ring-side (West or East) and line name (working or protection) to identify its role. A 4-fiber BLSR/MS-SPRing has 4 lines identified by West and East ring-sides and as working and protection lines within each side.

Closed 4-Fiber BLSR/MS-SPRing port assignments Port assignments for a node in a closed 4-Fiber BLSR/MS-SPRing are selected from a list of available and allowable ports. For a 4-Fiber BLSR/MS-SPRing, you provision the four ports as:

- One port as the “West working port”
- One port as the “West protection port”
- One port as the “East working port”
- One port as the “East protection port”

Open 4-fiber BLSR/MS-SPRing port assignments

Port assignments for an end node in an open 4-Fiber BLSR/MS-SPRing are selected from a list of available and allowable ports. For an end node (one-sided) in an open 4-Fiber BLSR/MS-SPRing, you provision only two ports in one of following ways:

- One port as the “West working port” and one port as “West protection port”
- One port as the “East working port” and one port as “East protection port.”

Protection switching mode

The Protection Switching Mode parameter allows you to select either Ring Loopback switching or Shortened Path for the protection switching mode of 4-Fiber MS-SPRing rings. Both ring and span loopback switching are used for closed 4-Fiber BLSR/MS-SPRing rings that generally have a circumference of less than 1200 kilometers. Shortened path provides a feature for protection switching in closed 4-Fiber MS-SPRing rings with transoceanic protocol. Shortened path protection switching reduces the impact of propagation delay on signal quality in rings with a circumference greater than 1200 kilometers. See Chapter 2, Network Topologies for more information on 4-Fiber closed MS-SPRing rings with transoceanic protocol.

Ring switch Wait to Restore

The ring switch Wait to Restore parameter controls the revertive/nonrevertive functionality of ring loop-back switching. The value range is from 0 to 12 minutes, plus the infinity option. Infinity is equivalent to nonrevertive. The value zero (0) permits a revertive switch from the protection line to the working line immediately after detecting that the working line is functional. The default value for this parameter is 5 minutes to allow time for the line to stabilize before allowing a revertive switch.

Span switch wait to restore

The span switch Span Wait to Restore parameter controls the revertive/nonrevertive functionality for span switching. The range is from 0 to 12 minutes, plus the infinity option. Infinity is equivalent to nonrevertive. The value zero (0) permits a revertive switch from the protection line to the working line immediately after detecting that the working line is functional. The default value for this parameter is 5 minutes to allow time for the line to stabilize before allowing a revertive switch.

Important! There is no service impairment when transitioning from the working port to the protection port. However, there may

be a minor service hit when transitioning from the protection port to the working port.

Data communications channels (DCC)

The data communications channels (DCCs) are used for NE-to-NE data communications and for NE-to-subnetwork communications. A DCC channel must be enabled on each ring side of the NE to support automatic ring discovery communications. The DCC is enabled by default as a result of circuit pack insertion if DCC channels are available. Creation of BLSR/MS-SPRing protection groups require at least two DCC channels. If no DCC channels are available, you will need to free up two DCC channels and enable the DCC on the BLSR/MS-SPRing ports.

LAPD channels

Link Access Protocol on the D-channel (LAPD) channels associated with the DCC channels must be provisioned for each side of the NE, one for the East side and another for the West side. The values are User Side or Network Side. The LAPD channels must be set opposite for each end of the optical span. The default is User Side.



| Manual Ring Maps

Overview A ring map for a Bidirectional Line Switched Ring (BLSR) is a list of nodes in order around the ring. By default a network element (NE) uses automatic ring discovery (ARD) to configure the ring map. A user can also configure a manual ring map. The NE continues to use the ARD ring map until the user disables ARD and activates the manual ring map.

If changes are made to the manual ring map after it has been activated, they are applied to what is called the inactive map, meaning that they do not take effect until the map is activated again.

Method of configuring a manual ring map To configure a manual ring map select **Configure > Configure Manual Ring Map** from the WaveStar CIT System View menu, then select a ring, then click the **Select** button to display the *Configure Manual Ring Map* dialog box. The manual ring map only takes effect when activated.

Method of activating a manual ring map To activate a manual ring map for a given ring first disable automatic ring discovery as follows. Select **Configure > Provision**, then select the **Ptn Grp** tab, then select the ring, then select the **Disable** option next to **Automatic Ring Discovery**. Then activate the manual ring map as follows. Select **Configure > Acitvate Manual Ring Map** from the WaveStar CIT System View menu, then select the ring, then click the **Select** button to activate the manual ring map for that ring.

Security level required Only users with at least an M3 maintenance user privilege code have access to configuring and activating manual ring maps.

NE name When you add a node to a ring map you enter the name of the NE that corresponds to the new node. This is the TID. See “Setting the Target Identifier (TID)” (7-43) for the rules for TIDs.

Node ID When you add a node to a ring map you enter a node ID (NID) for the new node. This must be an integer from 0 to 15 and must be unique on the ring.



1XN DS3/EC1 Electrical Protection Groups

What is a 1XN electrical protection group

The system supports 1xN *equipment* protection for DS3/EC-1 port units. The 1xN electrical protection group is not created through software provisioning but is created through equipment provisioning. The 1xN equipment protection switching group uses one DS3/EC1 protection port unit to protect up to 12 service DS3/EC1 port units in the same shelf. An equipment defect affecting only one port or all the ports on a service DS3/EC1 circuit pack causes all the traffic on the service circuit pack to be switched to the protection circuit pack.

The system supports 0X1 unprotected operation of DS3/EC-1 port units by not equipping the shelf with a protection port unit and the associated protection switch circuit pack.

DS3/EC1 port unit slots

DS3/EC-1 port units may be installed in any of 12 port unit slots in the WaveStar TDM 2.5G I/O interface shelf. The 12 slots are slots which can be wired to an electrical connector panel. The slots are 1 through 6, and slots 11 through 16. Slot 16 is a preferred location for a DS3/EC-1 port unit because slot 16 cannot be used for any optical port unit when the shelf is equipped for 1xN DS3/EC1 electrical equipment protection.

DS3/EC1 protection units

The protection DS3/EC1 circuit pack is installed in the **eprn (DS3EC1/8)** slot and the DS3/EC1 protection switch circuit pack is installed in the **eprotsw (SWITCH/DS3EC1)** slots in the shelf. See the Circuit Order/Provisioning tasks in this manual to create a 1XN electrical equipment protection group.



1XN DS3/EC1 Electrical Protection Group Parameters

Method of provisioning 1XN electrical protection group parameters

The 1xN electrical protection group is created through equipment provisioning [See “1XN DS3/EC1 Electrical Protection Groups” (7-125).] The **Configuration > Provision** command from the WaveStar CIT System View menu displays the Provision Parameters for Protection Group or Equipment screen. A protection group AID entry or existing protection group selection under the protection group (**Ptn Grp**) tab displays the parameters associated with the protection group.

Security level required

Only users with at least an M4 maintenance user privilege code have access to protection group provisioning. For more information on security privilege codes, see “User Types” (7-32).

Wait to restore for revertive/nonrevertive switching

The Wait to Restore parameter controls the amount of time before a working electrical interface circuit pack is switched back into service after a protection switch. The range is from 0 to 12 minutes, plus an infinity option. Infinity is equivalent to nonrevertive. The value zero permits a revertive switch from the protection circuit pack to the service circuit pack immediately after detecting that the service circuit pack is functional. It may be desirable to wait a number of minutes to allow a working service circuit pack to stabilize before being switched back into service.

Any change to the Wait to Restore parameter during a protection switch will not take affect until the Wait to Restore interval is completed. The default value is 5 minutes.



1XN STM1E Electrical Protection Groups

What is a 1XN electrical protection group

The system supports 1xN *equipment* protection for STM1E/4 port units. The 1xN electrical protection group is not created through software provisioning but is created through equipment provisioning. The 1xN equipment protection switching group uses one STM1E/4 protection port unit to protect up to 8 service STM1E/4 port units in the same shelf. An equipment defect affecting only one port or all the ports on a service STM1E/4 circuit pack causes all the traffic on the service circuit pack to be switched to the protection circuit pack.

The system supports 0X1 unprotected operation of STM1E/4 port units by not equipping the shelf with a protection port unit and the associated protection switch circuit pack.

STM1E/4 port unit slots

STM1E/4 port units may be installed in any of 8 port unit slots in the WaveStar TDM 2.5G-STM1E I/O interface shelf. The 8 slots are slots which can be wired to an electrical connector panel. The slots are 1 through 4, and slots 13 through 16. Slot 16 is a preferred location for a STM1E/4 port unit because slot 16 cannot be used for any optical port unit when the shelf is equipped for 1xN STM1E/4 electrical equipment protection.

STM1E/4 protection units

The protection STM1E/4 circuit pack is installed in the **eprn (STM1E)** slot and the STM1E/4 protection switch circuit pack is installed in the **eprotsw (SWITCH/STM1E)** slots in the shelf. See the Circuit Order/Provisioning tasks in this manual to create a 1XN electrical equipment protection group.



| 1XN STM1E Electrical Protection Group Parameters

Method of provisioning 1XN electrical protection groups	The Configuration > Provision command from the WaveStar CIT System View menu displays the Provision Parameters for Protection Group or Equipment screen. A protection group AID entry or existing protection group selection under the protection group (Ptn Grp) tab displays the parameters associated with the protection group.
Security level required	Only users with at least an M4 maintenance user privilege code have access to protection group provisioning. For more information on security privilege codes, see “User Types” (7-32).
Wait to restore for revertive/nonrevertive switching	The Wait to Restore parameter controls the amount of time before a working electrical interface circuit pack is switched back into service after a protection switch. The range is from 0 to 12 minutes, plus an infinity option. Infinity is equivalent to nonrevertive. The value zero permits a revertive switch from the protection circuit pack to the service circuit pack immediately after detecting that the service circuit pack is functional. It may be desirable to wait a number of minutes to allow a working service circuit pack to stabilize before being switched back into service. Any change to the Wait to Restore parameter during a protection switch will not take affect until the Wait to Restore interval is completed. The default value is 5 minutes.



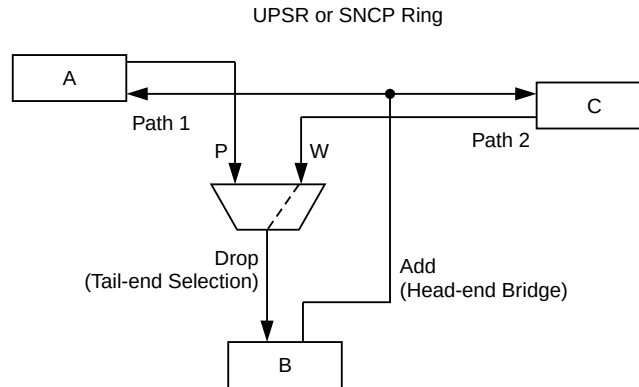
Overview of a UPSR or SNCP

What is a UPSR A Unidirectional Path-Switched Ring (UPSR) provides path-level protection for STS-N circuits within a physical ring network. The ring is usually comprised of unprotected (0x1) lines at the same OC-N rate which are connected in a ring topology. Typically all (or most) of the circuits within the ring are path-protected. Each direction of a circuit is bridged onto opposite tributaries at an add node (head-end), passed through intermediate nodes on both sides of the ring, and selected at a drop node (tail-end). Each two-way circuit uses a time slot of bandwidth all the way around the ring since both a working and protection path are dedicated to it. The term “unidirectional” (the U in UPSR) refers to the fact that every circuit is normally selected from the same direction (i.e., either clockwise or counter-clockwise), although the protection may typically be non-revertive.

What is an SNCP ring A Sub-Network Connection Protection (SNCP) ring is the same as a UPSR except that it carries VC-N (SDH) circuits instead of STS-N (SONET) circuits.

What is SNCP Sub-Network Connection Protection (SNCP) in its general form is the same as an SNCP ring except that the circuits do not have to travel on a physical ring. In other words, the two add legs of a circuit do not have to go in each direction around a ring, they simply have to follow two separate network paths to the same destination network element.

UPSR or SNCP parameters A UPSR or SNCP ring is not a single protection group. Instead there is a path protection group associated with each add/drop cross-connection into/out of the ring. Each of these add/drop cross connections has parameters that you can set when you create the cross-connection or by modifying it later.

Figure 7-5 “UPSR/SNCP Ring Add, Drop” Cross-Connection

NC-USM-301

- Add/Drop Rate** The add/drop or circuit rate can be STS-1, STS-3, STS-12, STS-48, VC-3, VC-4, VC-4-4c, or VC-4-16c. If interworking with a DDM product on an OC-12 UPSR, all circuits must be STS-1.
- Path 2 NE name** You set this parameter by selecting the network element for Path 2 by selecting its target identifier (TID) from a drop-down menu. Path 2 may be set to be the working leg, as depicted above, or the protection leg.
- Add/Drop NE name** You set this parameter by selecting the network element for the add/drop by selecting its target identifier (TID) from a drop-down menu.
- Path 1 NE name** You set this parameter by selecting the network element for Path 1 by selecting its target identifier (TID) from a drop-down menu. Path 1 may be set to be the working leg, as depicted above, or the protection leg.
- Output mode** This parameter is described under “Cross-Connection Output Signal Provisioning” (7-147).
- PP reversion behavior** You set this parameter by selecting either **Non-Revertive** or **Revertive** from a drop-down menu. Non-Revertive means that if the working signal fails and the path switches to the protection side, the path will not revert to the working side even if the signal is regained. Revertive means that the path will revert to the working side after the number of minutes set using the **Configuration > Path Protection Type > System Path Level Wait to Restore** command.
- PP holdoff behavior** You set this parameter by selecting either **No-Holdoff** or **With Holdoff** from a drop-down menu. No-Holdoff means that if the working signal

fails the path switches immediately. With Holdoff means that if the working signal fails the path switches after waiting for a number of milliseconds set using the **Configuration > Path Protection Type > System Path Level Holdoff Time** command.



| Path Protection Type

Overview The path protection type option allows you to provision parameters which apply to ALL Path Protection type protection groups. Path protection type groups, such as unidirectional path switched rings (UPSR), are established by using cross-connections. This parameter from the Configuration menu allows you set two parameters which apply to all the path protection type groups on the NE. Other parameters are set when the cross-connections are made.

Method of provisioning path protection types The **Configuration > Path Protection Type** command from the WaveStar CIT System View menu displays the Path Protection Type Provisioning screen.

Security level required Only users with at least an M4 maintenance user privilege code have access to path protection type provisioning. For more information on security privilege codes, see “User Types” (7-32).

System path level wait to restore The System Path Level Wait to Restore parameter allows you to specify the amount of time before a path protection switch is allowed to restore to the original path. The value may be set to an integer value from 0 to 12 minutes, or INFINITE. A value of INFINITE indicates that the switch will never restore automatically.

System path level hold off time (ms) The System Path Level Hold Off Time (ms) parameter allows you to specify the amount of time before a protection switch occurs. The value may be set to an integer value from 0 to 10000, which indicates time in one millisecond (ms) intervals from 0 to 10 seconds. Ten seconds equals 10,000 milliseconds.



Cross-Connection Provisioning

- Cross-connections** Cross-connections are defined as SONET or SDH path-level connections between logical input and output tributaries of specific ports. The logical input and output tributaries in each type of port or port protection group are the only entities from and to which the user can provision cross-connections. For a port which is not in a port protection group, such as an electrical port or unprotected optical port, a logical tributary is the same entity as a port tributary. For a port which is in a port protection group, the logical tributary refers to the port tributary used for normal transmission in the absence of a line protection switch. The transmission connectivity required for line protection switching is determined automatically by the provisioning and current state of the port protection group.
- Port tributary** A port tributary is a path-level unit of bandwidth within a port, or the constituent signal(s) being carried in this unit of bandwidth (for example, an STS-1/VC-3, STS-3c/VC-4, or STS-12c/VC-4-4C tributary within an OC-N/STM-N port). A port tributary is an STS-1/VC-3 tributary unless specified otherwise. For a port which is not in a port protection group (for example, an unprotected optical port), a port tributary is the same entity as a logical tributary.
- Logical tributary** A logical tributary is a path-level unit of bandwidth within a port or in the signal(s) being carried in the path-level unit of bandwidth. For example, a logical tributary may be an STS-1/VC-3, STS-3c/VC-4, or STS-12c/VC-4-4C tributary within an OC-N/STM-N line in a port protection group. A logical tributary is generally an STS-1/VC-3 tributary unless otherwise specified. A logical tributary is the same as the port tributary in an unprotected optical port.
- A logical tributary is associated with a particular service (unit of traffic) carried to or from another network element. The operations on a logical tributary include cross-connections and path-level fault and performance monitoring. Some operations apply to logical input and/or output tributaries, and others to logical input tributaries only. The operations which apply to a port tributary can apply to a logical tributary only when it is the same entity.
- Working tributary** A working tributary is a port tributary carrying traffic which can be protected in a port protection group. A working tributary may also be a logical tributary associated with a port tributary.

Protection tributary A protection tributary can be used to protect the traffic carried by a working tributary in a port protection group. A protection tributary may also be a logical tributary associated with a port tributary if protection access is supported in the port protection group.

Protection access Protection access is the ability to provide traffic on protection tributaries when the port tributaries are not being used to carry the protected working traffic.



Cross-Connection Rates

Cross-connection rates

The system cross-connects SONET signal Synchronous Payload Envelopes (SPE) and SDH High Order (HO) virtual containers intact with no bits altered. Cross-connection rate defines the path-level bandwidth that the cross-connection can carry. SONET cross-connect rates include STS-1, STS-3, STS-12, and STS-48. SDH rates supported are VC-3, VC-4, VC-4-4c and VC-4-16c.

Fixed-rate tributary operation

The rate of a cross-connection must match the provisioned rate of each involved input and output tributary that is on a port provisioned for fixed-rate tributary operation. See “Fixed-rate tributary input signal rate list” (7-73) and “Tributary unequipped signal rate list” (7-76) for more information.

Adaptive-rate tributary operation

With adaptive rate operation, tributaries are not provisioned for a particular expected rate, rather they adapt to the concatenation structure of the incoming signal. Cross-connections may be provisioned at any cross-connection rate that is supported for the logical tributaries associated with the input and output ports. A cross-connection leg can carry any set of constituent signals for which the total of the constituent signal rates does not exceed the cross-connection rate. Cross-connection legs in opposite directions, from an input tributary and to an output tributary, can be provisioned independently and at different rates. See “Adaptive-rate tributary operation” (7-71) for more information.

SONET/SDH interconnectivity

The system supports SONET/SDH cross-connection interworking between ports provisioned with an interface standard of SDH or SONET.

DS3/STS-1 gateway cross-connections

Signals from DS3 interfaces are mapped into STS-1 or VC-3 payloads and are cross-connected as STS-1s or VC-3s. The DS3 signals are handled transparently with no bits altered. The system allows a cross-connection between a DS3 port with its path terminating function (PTF) provisioned for one standard (for example, SDH) and a port provisioned for the other standard (for example, SONET).



Cross-Connection Types

- Cross-Connection Types** The system allows you to create these types of cross-connections:
- 2-way point-to-point (default)
 - 1-way point-to-point
 - 1-way path protected
 - 1-way adjunct path protected
 - ring interworking, drop & continue, BLSR/MS-SPRing primary node
 - ring interworking, drop & continue, BLSR/MS-SPRing primary nodes in same NE
 - UPSR/SNCP ring add, drop
 - UPSR/SNCP ring-to-ring, single node interconnection, same NE

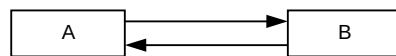
BLSR/MS-SPRing vs. UPSR/SNCP

Signals in a BLSR or MS-SPRing are protected by the fact that the entire ring is a single protection group. For this reason, cross-connections within the ring are generally point-to-point instead of path-protected. Signals in a UPSR or SNCP are protected by the fact that each cross-connection into or out of the ring is path-protected. Each working signal has a protection signal going around the ring in the opposite direction.

2-way point-to-point

A 2-way point-to-point cross-connection consists of two legs that provide a bi-directional connection between two tributaries. Each leg, or direction, must be at the same cross-connection rate. You could view a 2-way point-to-point cross-connection as two 1-way point-to-point cross-connections, except that you can set it up or take it down with a single command.

Figure 7-6 “2-Way Point-to-Point” Cross-Connection



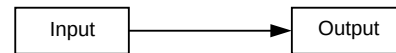
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Note on 1-way cross-connections

If one direction of a tributary of a given port is provisioned as a 1-way cross-connection, the signal in the other direction can either be terminated with no cross-connection or it can be cross-connected independently to a tributary on another port.

**1-way
point-to-point**

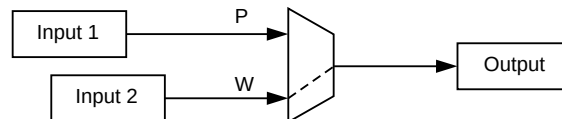
A 1-way point-to-point cross-connection consists of a single leg connecting an input tributary to an output tributary at the selected cross-connection rate. A single command to the network element sets up or takes down a 1-way point-to-point cross-connection.

Figure 7-7 “1-Way Point-to-Point” Cross-Connection

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1-way path protected

A 1-way path-protected cross-connection consists of a working leg from one input tributary and a protection leg from a second input tributary to the same output tributary. These legs make up a path protection group. Each leg must be at the same cross-connection rate.

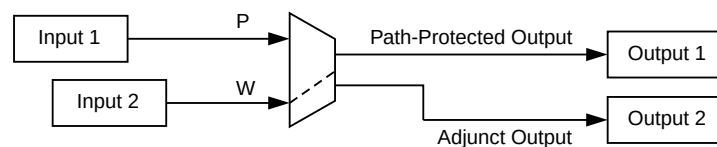
Figure 7-8 “1-Way Path-Protected” Cross-Connection

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**1-way adjunct
path-protected**

A 1-way adjunct path-protected cross-connection consists of an adjunct working leg from one input tributary and an adjunct protection leg from a second input tributary to the same adjunct output tributary.

To create a 1-way adjunct path-protected cross-connection you select an existing path-protected cross-connection and then select an adjunct output tributary. The result is that the signal is going to both the original path-protected output tributary and the new adjunct path-protected output tributary.

Figure 7-9 “1-Way Adjunct Path-Protected” Cross-Connection

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Dual Ring Internetworking

In Release 4 and later releases, The WaveStar BandWidth Manager system supports 2-fiber and 4-fiber OC-48 BLSR DRI when the two DRI nodes are BandWidth Managers. DRI protection switching protects a circuit with a termination in one ring and the other termination in another ring when an interconnecting node or line fails. DRI protection switching takes place in response to automatically detected failures or external commands from a WaveStar CIT or operations system (OS). For information about the **Fault > Protection Switch...** command, refer to the online help available with the WaveStar CIT.

Switch request priorities

The following table shows the DRI protection switching priorities (in descending order of priority) used by the WaveStar BandWidth Manager system.

Switch Priorities (Descending Order)	Source of Request
Clear	WaveStar CIT/OS
Lockout of Protection	WaveStar CIT/OS
Forced Switch	WaveStar CIT/OS
Automatic Path Selector Criteria	Automatic
Manual Switch	WaveStar CIT/OS
Wait to Restore	Automatic

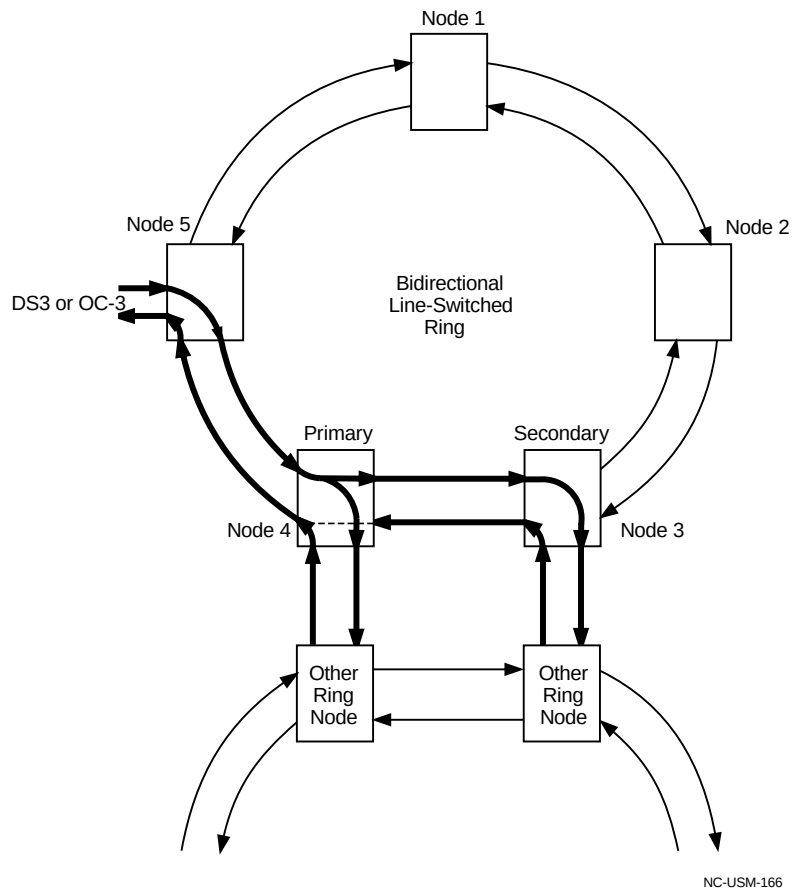
If a higher or equal priority switch request exists, a new switch request is denied.

**Unidirectional
revertive/nonrevertive
switching**

DRI protection switching is unidirectional and revertive or nonrevertive. Unidirectional refers to protection switching that is performed in one direction only. For a given 1-way circuit, DRI protection switching is only performed in the add direction. When a fault occurs, traffic switches from the primary to secondary node. DRI protection switching may be provisioned as revertive or nonrevertive. In nonrevertive switching when the fault clears, traffic does *not* automatically switch back (revert) to the primary node. In revertive switching when the fault clears, traffic does automatically switch back (reverts) to the primary node.

DRI architecture The following figure shows a DRI application with two rings. One ring is a bidirectional line-switched ring equipped with the WaveStar BandWidth Manager system. The other ring could be another line-switched ring equipped with the WaveStar BandWidth Manager system or a path-switched ring.

Figure 7-10 DRI Application



The figure also shows a 2-way DRI circuit. The 2-way DRI circuit is routed to/from the termination node (node 5) in the bidirectional line-switched ring through the primary node (node 4) and secondary node (node 3) to the other ring. (The primary and secondary nodes are not required to be adjacent nodes.)

**UPSR/SNCP
ring add, drop**

A UPSR/SNCP ring add, drop cross-connection could be viewed as a combination of the following 1-way cross-connections:

- two point-to-point cross-connections into the ring (or one bridged cross-connection into the ring) – this sends an equal signal in each direction around the ring, providing the two legs of the path protection group

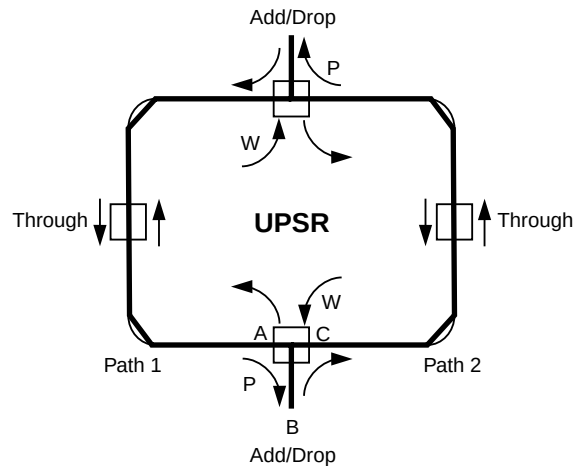
- one path-protected cross-connection out of the ring

To put it another way, looking at the figures below:

- the Add (sometimes called the *head-end bridge*) consists of two 1-way point-to-point cross-connections – one from B to A and one from B to C
- the Drop (sometimes called the *tail-end selection*) consists of one 1-way path-protected cross-connection with A and C as the inputs and B as the output

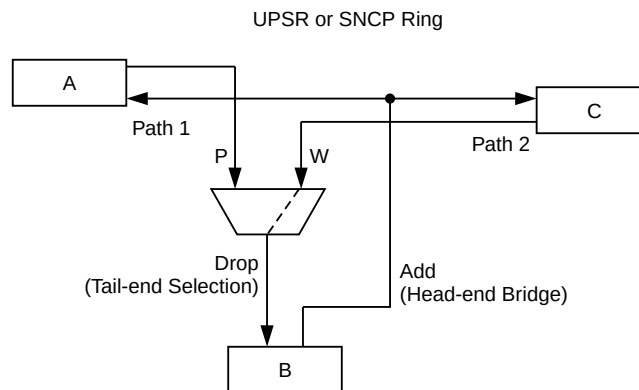
Note that a UPSR/SNCP through cross-connection is a point-to-point cross-connection. The following two figures show the relationship between the add/drop function on the ring and the cross-connection that forms it.

Figure 7-11 Unidirectional Path-Switched Ring (or SNCP Ring)



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Figure 7-12 “UPSR/SNCP Ring Add, Drop” Cross-Connection



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**UPSR/SNCP
ring-to-ring,
single node
interconnection, same NE**

A UPSR/SNCP ring-to-ring, single node interconnection, same NE cross-connection could be viewed as the following two pairs of 1-way cross-connections:

- a path-protected cross-connection plus an adjunct path-protected cross-connection from Ring 1 to Ring 2
- a path-protected cross-connection plus an adjunct path-protected cross-connection from Ring 2 to Ring 1

The following two figures show the relationship between the ring-to-ring connection and the cross-connection that forms it.

Figure 7-13 Single Node Interconnection of UPSRs (or SNCP Rings) in the Same Network Element (Single Homing)

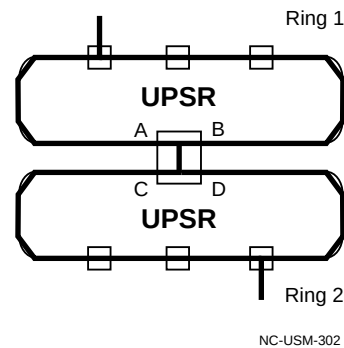
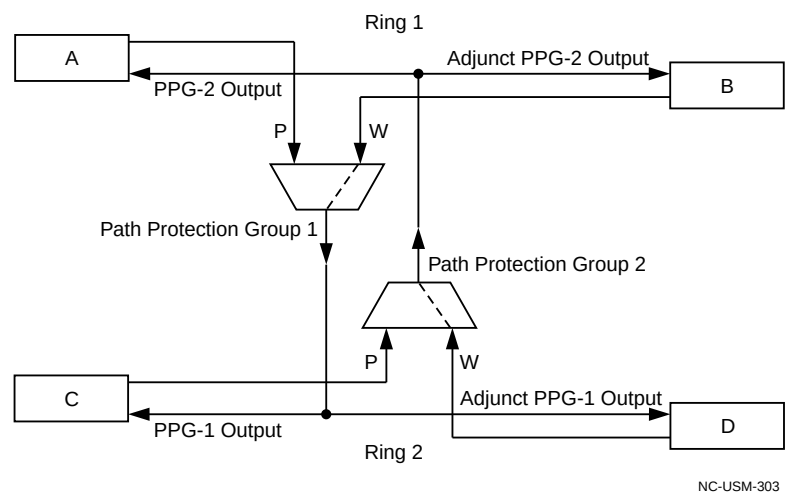


Figure 7-14 “UPSR/SNCP Ring-to-Ring, Same NE” Cross-Connection



Bridging Cross-Connections

Bridge (1X2 broadcast) A bridge is a cross-connection leg with the same input tributary as that of an existing cross-connection leg, thereby forming a 1:2 “bridge” from an input tributary to two output tributaries.

Bridging is generally used for facility rolling and testing. Bridging is supported for each of the supported cross-connect rates. Any existing cross-connection can be bridged to a second output tributary without impairing the existing signal. Also, either half of a bridged signal may be taken down without impairing the remaining cross-connected signal.

The system supports the following requests for 1:2 bridging:

- Add a 1-way cross-connection from the input leg of an existing 1-way or 2-way cross-connection to a new output to form a 1:2 cross-connection in one direction
- Remove either leg of an existing 1:2 cross-connection, independent of the order in which the legs were originally set up in one direction
- Bridged cross-connections involving a DS3 port as the input or a DS3 port as one or both of the outputs
- Bridged cross-connections among any combinations of supported ports (for example, SDH and SONET) if the individual cross-connection legs are required to be supported between port combinations.



Rolling Cross-Connections

What is rolling a cross-connection

A roll operation consists of moving the input of any existing leg of any cross-connection from a given tributary to a second tributary, while leaving the output unchanged. A roll is used as a tail-end switch in a “facility or tributary rolling” operation, whereby traffic is moved from one facility to another or from one tributary to another on a facility. The head-end side of a facility or tributary roll usually has a bridge established in one NE so that the traffic flows on both the old and new facilities, minimizing the signal interruption time when the roll is carried out to that introduced by the roll itself in the other NE. All necessary cross-connection paths must be completed on the new facility before performing this operation.

When is it allowed

A roll is allowed for any leg of a point-to-point cross-connection and, beginning with Release 4.0, for a path-protected cross-connection where the roll will not move the path selection to a different shelf.

What to do when denied

If an attempted roll of a path-protected cross-connection is denied because the roll would move the path selection, you can still perform the roll by first converting the cross-connection to point-to-point.

Where is path selection

If both inputs to a path protected cross-connection come from the same shelf then the path selection is located on the input shelf. If the inputs come from different shelves then the path selection is located on the output shelf.

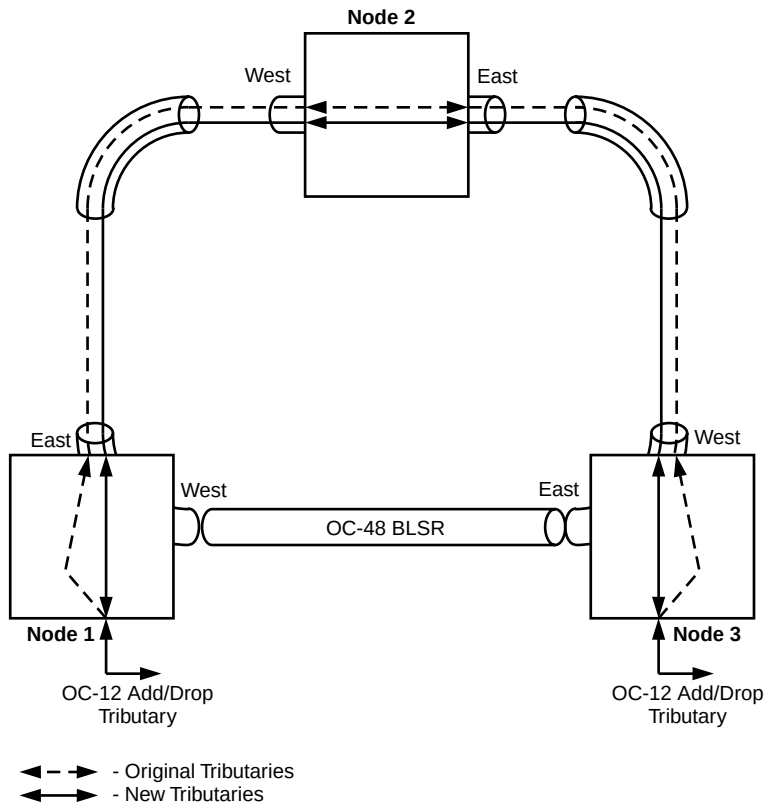


Facility or Tributary Roll

BLSR example One type of facility or tributary roll takes a signal that is coming into a ring on a given tributary and moves it to a different tributary on that same ring. The three stages of this type of roll are illustrated below with an example of rolling an OC-12 tributary within an OC-48 BLSR.

Stage 1 The figure below depicts stage 1 of the roll, which is to bridge the output from the add/drop tributary to a new BLSR tributary. The input to the add/drop still comes from the original BLSR tributary.

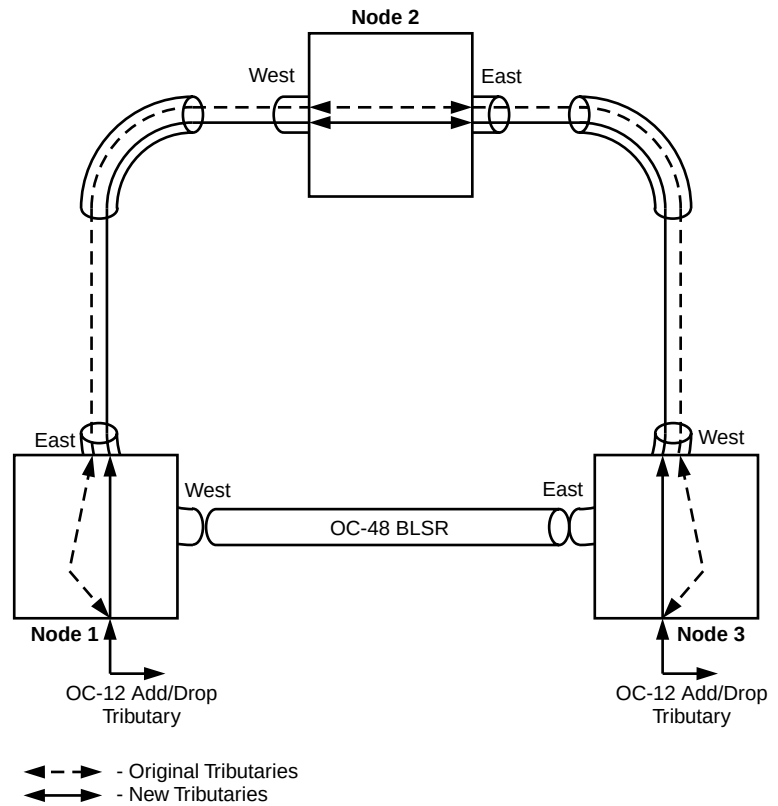
Figure 7-15 Stage 1 of a BLSR Roll



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Stage 2 The figure below depicts stage 2 of the roll, which is to roll the input to the add/drop so that it comes from the new BLSR tributary instead of the original BLSR tributary. The output from the add/drop is still going to both the original and new BLSR tributaries.

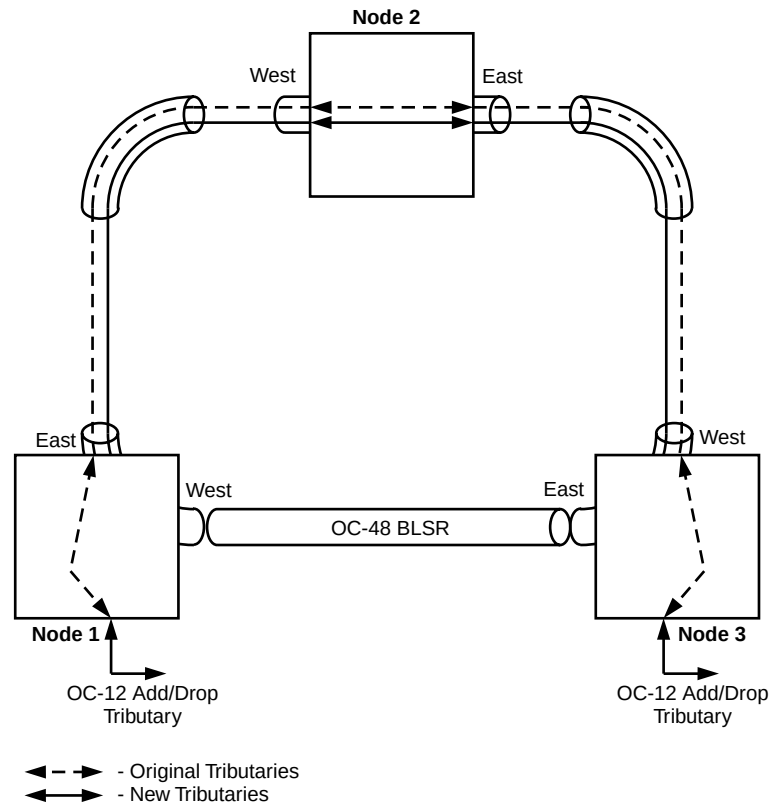
Figure 7-16 Stage 2 of a BLSR Roll



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Stage 3 The figure below depicts stage 3, the final stage of the roll, which is to delete the cross-connection between the add/drop and the original BLSR tributary.

Figure 7-17 Stage 3 of a BLSR Roll



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Cross-Connection Output Signal Provisioning

Cross-connection output mode

Cross-connection output mode provisioning refers to the capability to provision whether a cross-connected signal emerges from the system (“normal” mode) or whether a signal is injected on the output instead of the cross-connected signal (“terminated” mode). This capability implements the “Terminate and Leave” function of test access and generally allows you to send keep-alive signals downstream during the process of setting up/trouble shooting an end-to-end connection through a network.

This is a per-tributary feature that can be set independently for each cross-connection at the time of the cross-connection or later. The default setting is “normal”.

You can provision the output signal content of a cross-connection on any/all port tributaries.

The provisioning options include:

- Normal mode – where the cross-connected signal is output
- Terminated mode – where a maintenance signal is output (with the cross-connection still mapped)

For DS3 ports the terminated modes are:

- DS3 idle – Output
- DS3 AIS – Output

For a SONET or SDH port the terminated modes are:

- Unequipped signal – Output
- AIS-P/AU-AIS – Output

The default is that the cross-connected signal is output. This applies to 1-way cross-connections (including a bridge), 2-way cross-connections, rolls and test access commands. The signal output is provisionable independently for each tributary of a 2-way cross-connection. This capability is available during and after the time of cross-connection setup. This capability only applies to a tributary with an existing cross-connection leg in its output direction or to a request to set up a cross-connection leg to the output of a tributary.

When you select the terminated output mode on a cross-connected tributary, it is treated as a forced condition that persists until you select the normal output mode. In the “terminated” mode, the autonomous transmission signal maintenance associated with upstream faults will

not overwrite the provisioned output signal. When you select the normal output mode (cross-connected signal emerges), then the transmission signal maintenance behaves as normally expected.

Cross-connection output signal provisioning for ports provisioned for SONET and fixed-rate tributary operation apply on an STS-Nc basis. In the terminated mode the selected maintenance signal is at the STS-Nc level for tributaries associated with an STS-N cross-connection.

Cross-connection output signal provisioning for ports provisioned for SDH and fixed-rate tributary operation apply on an VC-N or VC-4-Nc basis, corresponding to the rate of the cross-connection.

In the terminated mode the selected maintenance signal is at the:

- VC-N rate for tributaries associated with a VC-N cross-connection (N=3,4)
- VC-4-Nc rate for tributaries associated with a VC-4-Nc cross-connection (for supported values of N)

Tributaries without cross-connections

STS-N(c) unequipped signals are inserted on the output of all tributaries of a SONET-provisioned port for fixed-rate tributary operation for which there are no cross-connections provisioned in the output direction. This applies whether or not the input direction of the port is cross-connected. The rate of the unequipped signal corresponds on a per-tributary basis to the provisioned output rate of that tributary (for example, STS-1, STS-3c, STS-12c). This applies to both the service and protection bandwidths.

VC-N/VC-4-Nc unequipped signals are inserted on the output of all tributaries of a SDH-provisioned port for fixed-rate tributary operation for which there are no cross-connections provisioned in the output direction. This applies whether or not the input direction of the port is cross-connected. The rate of the unequipped signal corresponds on a per-tributary basis to the provisioned output rate of that tributary (for example, VC-3, VC-4). This applies to both the service and protection bandwidths.

DS3 tributaries without cross-connections

A DS3 port that is equipped outputs a DS3 idle signal when there is no cross-connection provisioned in its output direction. This applies whether or not the input direction of the DS3 port is cross-connected.

A DS3 port that is equipped outputs the following maintenance signal when there is no cross-connection provisioned in its output direction:

- DS3 AIS, when the path terminating function (PTF) cross-connection dependency is disabled, meaning that the fault behavior of the DS3 egress is de-coupled from the existence/absence of a cross-connection
- DS3 IDLE, when PTF cross-connection dependency is enabled, meaning that the fault behavior of the DS3 egress is coupled to the existence/absence of a cross-connection

This applies whether or not the input direction of the DS3 port is cross-connected.



Cross-Connection Safeguards

Cross-connection mismatch

The command structure provides safeguards against unintentional corruption of service when a mismatch exists between the topology associated with a cross-connection request and the legs of existing cross-connections between the relevant tributaries. This safeguard is shown as denials of the request.

The command structure provides safeguards for the following cases:

- A request for an operation that expects an existing cross-connection leg when no such cross-connection leg exists between the relevant tributaries such as an attempt to disconnect or roll.
- A request for a two-way operation when the relevant tributaries have only 1-way cross-connections between them such as a 2-way disconnection request.

The command structure provides the ability to take down any one-way point-to-point leg in any cross-connection via a single command to the network element. You can do this even though the leg may be a leg in a 2-way leg pair. You can do this without having to perform an extra step such as changing a 2-way cross-connection to two 1-way cross-connections.

Path protected cross-connections

The command structure also provides the following safeguards against unintentional corruption of service which involve cross-connections with a path-protected cross-connection topology:

- A request for an operation on a cross-connection with a path-protected topology when the relevant tributaries have a point-to-point cross-connection between them in the specified direction (that is, an attempt to delete a path-protected connection or convert it to a point-to-point connection).
- A request for an operation on a cross-connection with a point-to-point topology when the relevant tributaries have a path-protected cross-connection between them in the specified direction (that is, an attempt to delete a point-to-point connection or convert it to a path-protected connection).
- A request to delete one leg from a path-protected cross-connection, which has two legs.

The command structure provides the ability to take down any one-way path-protected cross-connection via a single command to the network

I element. You can do this even though both of the legs in the path-protected connection may be in a two-way leg pair.



Source and Destination NEs for BLSR/MS-SPRing Traffic in General

Overview This section explains when and how to select source and destination network elements (NEs) for cross-connections on a bidirectional line-switched ring (BLSR) or multiplex section shared protection ring (MS-SPRing) and why that selection is important.

When to select When provisioning cross-connections involving BLSR/MS-SPRing ports you must select source and/or destination NEs. If the source AID of a cross-connection is on a BLSR/MS-SPRing port, you must select a source NE. If the output AID of a cross-connection is on a BLSR/MS-SPRing port, you must select a destination NE.

How to select In general, the source NE is where the traffic carried by the cross-connection enters the ring. The destination NE is where the traffic exits the ring. For applications of this rule, see the following sections of this chapter:

- “Source and Destination NEs for Single BLSR/MS-SPRing Traffic” (7-153)
- “Source and Destination NEs for Multiple BLSR/MS-SPRing Traffic” (7-154)
- “Source and Destination NEs for BLSR/MS-SPRing TSI Traffic” (7-156)

Why it's important A BLSR or MS-SPRing records the source and destination NEs in a squelch map. The ring uses its squelch map to determine transoceanic mode protection switching, and to eliminate (squelch) the chance of misconnecting traffic if a ring becomes segmented.

LocA and locZ When you are working in TL1, the source NE TID is called *locA* and the destination NE TID is called *locZ*.



Source and Destination NEs for Single BLSR/MS-SPRing Traffic

Example The following figure shows traffic that traverses a single BLSR or MS-SPRing, staying on the same time slot.

Figure 7-18 Single BLSR or MS-SPRing Traffic

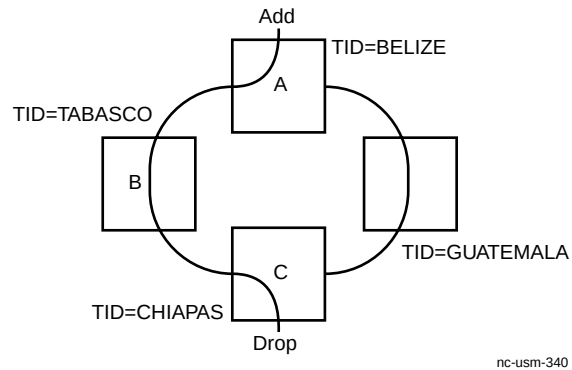


Table 7-8 Source and Destination NE Required Values (single ring example)

XConn	Type	Source NE	Dest NE
A	Add	none	CHIAPAS
B	Through	BELIZE	CHIAPAS
C	Drop	BELIZE	none

Source and Destination NEs for Multiple BLSR/MS-SPRing Traffic

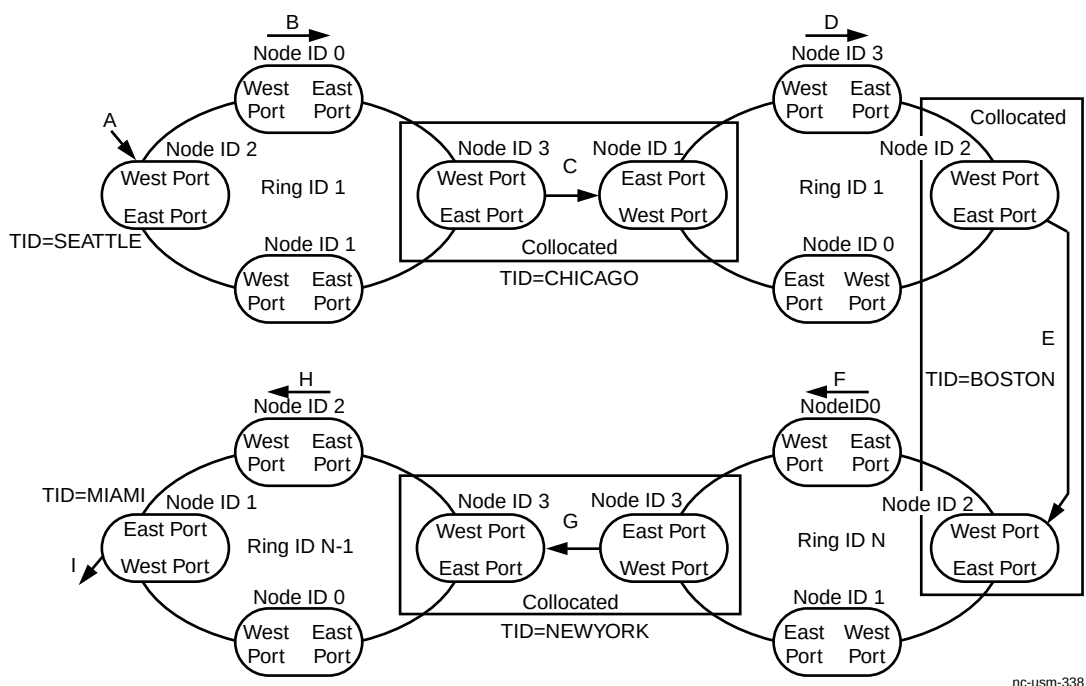
Overview The word *ring* in this section means a bidirectional line-switched ring (BLSR) or multiplex section shared protection ring (MS-SPRing). Determining the source and destination network elements (NEs) for traffic that traverses multiple rings is a little more complicated than it is for traffic that traverses a single ring.

General rule On multiple rings, as on a single ring, the source NE is where the traffic carried by the cross-connection enters the ring. The destination NE is where the traffic exits the ring. For the through cross-connections and the add and drop cross-connections that only involve one ring, this rule is enough. The question is, for ring-to-ring cross-connections, which ring do we mean when we say “the ring”.

Ring-to-ring rule For a ring-to-ring cross-connection:

- the source NE is where the traffic carried by the cross-connection enters the ring that holds the source tributary
- the destination NE is where the traffic carried by the cross-connection exits the ring that holds the destination tributary

Example The following figure shows traffic that traverses several BLSRs or MS-SPRings.

Figure 7-19 Multiple BLSR or MS-SPRing Traffic

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Table 7-9 Source and Destination NE Required Values (multiple ring example)

XConn	Type	Source NE	Dest NE
A	Add	none	CHICAGO
B	Through	SEATTLE	CHICAGO
C	Ring-to-Ring	SEATTLE	BOSTON
D	Through	CHICAGO	BOSTON
E	Ring-to-Ring	CHICAGO	NEWYORK
F	Through	BOSTON	NEWYORK
G	Ring-to-Ring	BOSTON	MIAMI
H	Through	NEWYORK	MIAMI
I	Drop	NEWYORK	none

Source and Destination NEs for BLSR/MS-SPRing TSI Traffic

Overview A time slot is the last number in the AID of a source or destination tributary of a cross-connection. Normally traffic in a BLSR or MS-SPRing stays on the same time slot. When the traffic does switch time slots, it is called time slot interchange (TSI). You may use TSI to access bandwidth that would not be available any other way. The disadvantage is that you lose protection against failures that isolate source or destination NEs where TSI occurs.

TSI cross-connection When traffic passes through a node with TSI it is called a “TSI” cross-connection.

Source NE Follow the path of the traffic toward the source tributaries until you get to an NE that has a TSI cross-connection or an NE that has an add cross-connection. That is your source NE.

Destination NE Follow the path of the traffic toward the destination tributaries until you get to an NE that has a TSI cross-connection or an NE that has a drop cross-connection. That is your destination NE.

Example The following figure shows traffic that uses time slot interchange.

Figure 7-20 TSI Traffic

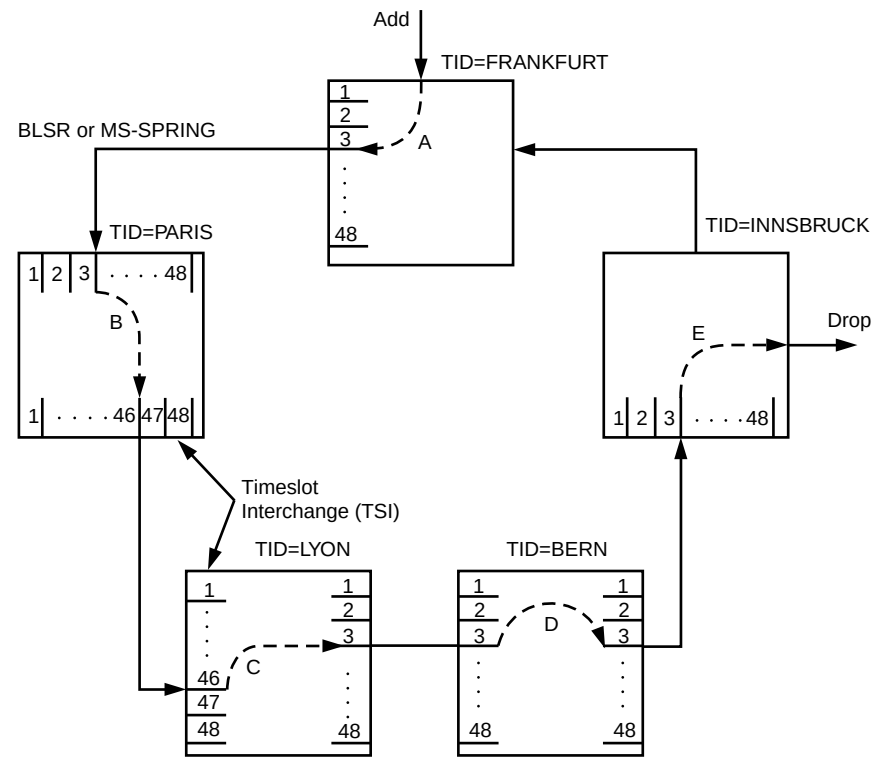


Table 7-10 Source and Destination NE Required Values (TSI example)

XConn	Type	Source NE	Dest NE
A	Add	none	PARIS
B	TSI	FRANKFURT	LYON
C	TSI	PARIS	INNSBRUCK
D	Through	LYON	INNSBRUCK
E	Drop	LYON	none

Cross-Connection Wizard

Introduction Cross-connections may be configured using the WaveStar CIT Cross Connection Wizard. The Cross Connection Wizard is opened by selecting the menu sequence **Configuration > Cross Connection** from the System View screen of the NE. The wizard will lead you through a series of windows or screens in which you identify all the attributes of the cross-connection.

Cross-connection sequence Creating or modifying a cross-connection involves the following sequence:

1. Complete all port provisioning and protection provisioning before creating a cross-connection.
2. Select the rate, cross-connection type, and ports involved in the cross-connection.
3. Identify the tributaries for the cross-connection from a display of tributaries corresponding to the selected ports.
4. Complete the cross-connection by selecting cross-connection parameters and the source and destination node TIDs needed for a ring squelch map, if applicable.

Cross-connection wizard action screen The cross-connection action selection screen displays first when the Cross Connection Wizard is opened. The cross-connection action selection screen allows you to select whether you want to create, modify, or delete a cross-connection. Screen options include:

- **Create New** – The Create New option causes the Create New Cross Connection screens to open where you can make the choices necessary to create a new cross-connection.
- **Modify Parameters** – The Modify Parameters option causes the Modify Cross Connection Parameters Screens to open where you make the choices necessary to modify a cross-connection.
- **Delete** – The Delete option causes the Delete Cross Connection screens to open where you make the choices necessary to delete a cross-connection.
- **Roll** – The Roll option causes the Roll Selection screens to open where you select a port and tributary to be used for a cross-connection roll. A roll consists of disconnection of the circuit

cross-connect input tributary to output tributary followed within the required completion time by a cross-connection of new input tributary to output tributary.

Signal rate auto set checked (on)	The Signal Rate Auto Set option allows you to override a fixed-rate port's input or unequipped signal rate provisioning. See "STM1E fixed-rate input signal rate list" (7-92) and "Tributary unequipped signal rate list" (7-76). If a selected port tributary for the source/destination tributary has a tributary mode of fixed and the Signal Rate Auto Set selection is checked (auto select), the tributary rate selections are not constrained by the port's tributary input signal rate list or unequipped output signal rate list.
Signal rate auto set unchecked (off)	If the Signal Rate Auto Set selection is unchecked (no auto select) and the input signal rate list/unequipped output signal rate list does not match your rate selection for the source/destination tributary, the fixed-rate mode will prevent the port tributary selection for your selected rate. Both the input signal rate and the output signal rate must match your rate selection. For example, if the tributary input signal rate of an OC3 port is STS3c, you cannot select that port for an STS1 cross-connection. If the tributary input signal rate of an OC3 port is STS1, STS1, STS1, you cannot select that port for an STS3c cross-connection.
Create new Cross Connection screens	The following Cross-Connection Wizard screen flow allows you to create new cross-connections: 1. The Rate/Type screen – The Rate/Type screen allows you to select the cross-connection rate and the cross-connection type. 2. Source and Destination Tributary screen – The Source and Destination Tributary screen allows you to select the source port and tributary and the destination port and tributary for a cross-connection. 3. Cross Connection Parameter screen – The Cross Connection Parameter screen allows you to establish or modify the provisionable parameters for an existing or new cross-connection.
Rate/Type screen	• The Rate/Type screen allows you to select the cross-connection rate and the cross-connection type. The selection of cross-connection rates may include rates such as STS-1/VC-3, STS-3/VC-4, STS-12/VC-4-4c, or STS-48/VC-4-16c. The selection of cross-connection types may include:

- 2-way point-to-point (default)
- 1-way point-to-point
- 1-way path protected
- 1-way adjunct path protected
- ring interworking, drop & continue, BLSR/MS-SPRing primary node
- ring interworking, drop & continue, BLSR/MS-SPRing primary nodes in same NE
- UPSR/SNCP ring add, drop
- UPSR/SNCP ring-to-ring, single node interconnection, same NE

Source and Destination Tributary screen

Depending on whether you are selecting a source tributary or destination tributary, a Source Tributary or Destination Tributary selection screen opens.

Source Tributary screen

The Source Tributary screen allows you to select the source port and tributary for a cross-connection. Port selection is confined to the ports which support the previously chosen cross-connection rate. Protection ports of a 1+1 protection group or ports on the protection unit of any 1xN electrical protection group are not selectable. Protection ports or tributaries for a BLSR/MS-SPRing may be selected.

Tributary displays

Tributaries associated with the selected port are displayed according to the selected cross-connect rate. The following is also displayed for each tributary:

- AIDs of the tributaries in the group are displayed.
- Availability of the tributaries to be used for the cross-connection source is displayed. Availability is yes or no.
- An indication of whether the tributary is a protection tributary is displayed. The indication is yes or no. A tributary numbered 25-48 of an OC48 port which is either a West or East port of a 2-fiber BLSR is a protection tributary. A tributary of a West or East protection port in a 4-fiber BLSR/MS-SPRing is a protection tributary.

Destination Tributary screen

The Destination Tributary screen allows you to select the destination tributary for a cross-connection. The Destination Tributary screen is the same as the Source Tributary screen (See “Source Tributary screen” (7-160).) except for the availability field. The Destination

Tributary screen availability field indicates whether the tributary or group of tributaries are available for use as a cross-connection destination.

Source and destination tributaries on the same BLSR

If both the source and destination tributaries are part of the same BLSR and the tributary numbers are not the same, then a confirmation message appears stating that the tributary is involved in a time slot interchange and will not have normal BLSR protection. Not having normal BLSR protection means that the traffic is protected but not against failures that isolate a node. The user can then go back and select a different tributary or click OK and continue with the selection.

Cross Connection Parameter screen

The Cross Connection Parameter screen allows you to modify provisionable parameters for an existing or new cross-connection. The screen may already be populated with defaults or current settings may be displayed.

The parameter screen includes the following parameters. Some parameters may not apply to the cross-connection selection and will be dimmed on the screen.

- New or existing Source AID – Displays the new or existing Source AID of the cross-connection.
- New or existing Destination AIDs – Displays the new or existing Destination AID for the cross-connection.
- Source Ring ID – The Source Ring ID displays the Ring ID associated with the source tributary on a port which is part of a BLSR/MS-SPRing.
- Source NE Name – The Source NE Name applies to a source cross-connect leg which is part of a BLSR. This field displays or lists NE TIDs (NE name) you may select to assign as the Source NE Name.
- Destination Ring ID – The Destination Ring ID field lists the Ring ID of a Destination tributary on a port which is part of a BLSR/MS-SPRing.
- Destination NE Name – The Destination NE Name applies to a destination cross-connect leg which is part of a BLSR. This field displays or lists NE TIDs (NE name) you may select to assign as the Destination NE Name.

- Source to Destination Output Mode – This field allows you to set or display the provisioned output mode for the Source to Destination leg and has the values of Normal, Terminated - AIS, and Terminated - Unequipped (Sonet) or Idle (DS3).
- Destination to Source Output Mode – This field allows you to set or display the provisioned output mode for the Destination to Source leg of a 2-way cross-connection and has the values of Normal, Terminated - AIS, and Terminated - Unequipped (Sonet) or Idle (DS3).
- Cross Connection Type – This field displays the selected cross-connect type such as one-way point to point or two-way point to point.
- Cross Connection Rate – This field displays the selected cross-connection rate such as STS-1/VC-3 or STS-3c/VC-4.
- Action – This field displays the action you chose to perform.

Modify Cross Connection Parameters

The Modify Cross Connection Parameter selection invokes the following sequence of wizard screen:

1. Existing Cross Connection Selection screen
2. Leg Selection screen for any point to point or path protection cross-connection
3. Cross Connection Parameter screen

Delete Cross Connection

The Delete Cross Connection selection invokes the following sequence of wizard screens:

1. Existing Cross Connection Selection screen
2. Cross Connection Leg Selection screen to allow you to select one or more cross-connection legs for deletion, if applicable
3. Delete Cross Connection Summary screen



Alarm Severity Assignment Profiles

Alarm severity assignment profile (ASAP)

The system allows you to provision (customize) alarm levels and the inhibiting of the generation/reporting of specific alarms. This process is created using alarm severity assignment profiles (ASAPs). The five alarm levels or conditions are as follows:

- Critical (CR) – An alarm notification message is reported to the management system(s) and local office alarms are generated.
- Major (MJ) – An alarm notification message is reported to the management system(s) and local office alarms are generated.
- Minor (MN) – An alarm notification message is reported to the management system(s) and local office alarms are generated.
- Not reported (NR) – No alarm notification message or local office alarms are generated/reported.
- Not alarmed (NA) – An alarm notification message is reported to the management system(s), but no local office alarms are generated.

There are two types of profiles: Service Dependent and Service Independent. Service Dependent profiles enable you to set separate alarm levels for Service Affecting and Non-Service Affecting. The anomaly condition to alarm level (for example, Loss of Signal = CR) is provisionable within one of the ASAP types. Different units of: (a) equipment, (b) types of communication facilities, (c) types of port protection groups, and (d) service applications will each have a different set of anomaly conditions – thus, the need for different groupings or profile types. Each profile type has a unique identity/profile name.

Important! A particular NE may interconnect to multiple different local and toll network providers. Each of these network providers may have slight differences in terms of alarm definition and alarm treatment. Therefore, the system supports multiple ASAP profile types.

Method of provisioning ASAPs

To provision ASAPs select the **Configuration > Alarms > Alarm Severity Assignment Profile** command from the WaveStar CIT System View menu.





8 Performance Monitoring

Overview

Purpose This chapter provides an overview of performance monitoring (PM), including the following:

- What is PM
- PM parameter groups
- Enabling and disabling PM for ports and tributaries
- Threshold crossing alerts (TCAs)
- Quality of service alarms
- The functions of PM TCA profiles
- What physical and transmission parameters are monitored
- Value ranges and defaults for the system threshold profiles

Related information For related information, see the following:

- Chapter 7, *Provisioning, Security, and Administration*
- 365-370-110, *WaveStar BandWidth Manager Alarm, Messages and Trouble Clearing Guide*

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Introduction to Performance Monitoring

Definition Performance monitoring (PM) is the in-service, nonintrusive monitoring and reporting of transmission quality.

Purpose of PM PM helps proactive maintenance detect and correct degrading signal conditions that are not yet severe enough to initiate protection switching or alarming.

PM data registers The following registers are provided for all parameters:

15-minute Registers	Day Registers
One current	One current
One previous	One previous
31 recent	

The system retrieves and reports the contents of any parameter storage register. The WaveStar CIT may be used to initialize (set to zero) the current 15-minute and/or current 24-hour registers locally or remotely. This capability enables the user to verify that a repair to a failed facility was successful.

How registers are updated An explanation of how registers are updated is given below.

15-minute registers

The registers are updated with a push-down methodology. At 0, 15, 30, and 45 minutes on the system clock, the contents of the 30th recent register is moved to the 31st recent register. The contents of each of the other recent registers are moved to the next higher register. The contents of the previous register are moved to the first recent register. The contents of the current register are moved to the previous register. The new measured value is placed in the current register.

Day registers

At day boundaries (midnight as defined by the local time/date function), the current day PM register is written to the previous day storage register and the current day register is set to zero. The day boundary is midnight by default, but may be provisioned to a different time.

PM during failed conditions	When a trouble condition is detected, the system stops accumulating PM parameters affected by the failure. PM parameters are inhibited during unavailable time per GR-253-CORE. All unaffected performance parameters continue to be accumulated during a trouble condition.
Threshold profiles	Threshold profiles hold the threshold values of PM parameters that require thresholding. PM values stored in threshold profiles determine the threshold crossing alerts of a monitored value for a port or tributary. One threshold profile of each parameter group type may be associated with each port or tributary. The Performance menu in the System View window of the WaveStar CIT allows the user to create, modify, or delete profiles; view profile information; and assign profiles to port and tributaries.
Maximum number of threshold profiles	The maximum number of threshold profiles is limited to nonvolatile memory (NVM) space. The system supports the following maximum number of default and user-created profiles: • 10 physical profiles • 30 section/line port-level profiles • 80 path-level profiles • 80 DS3 profiles
Enabling/Disabling TCA reporting	TCA reporting can be enabled or disabled either as individual parameters or as parameter groups. Individual parameters Threshold Crossing Alert (TCA) reporting may be enabled or disabled on a parameter basis using threshold profiles. When the threshold value of a parameter is set to zero, no quality of service (QOS) alarm message is generated. Enabling/disabling the TCA reporting of an individual parameter is independent of any other parameter. Parameter groups The system does not support enabling/disabling TCA reporting at a group level for a parameter grouping such as line. Reporting on such a parameter group can be disabled by setting all parameters for the parameter group to zeros in the threshold profile. For example, setting

the threshold values of all line PM parameters to zero will disable the TCA reporting on the line level.

Retrieving TCAs

All TCAs are retrievable either locally or remotely via the WaveStar CIT. If provisioned for autonomous TCA reporting, the message-based operations system interface can communicate TCA reports to the operations centers.

**Provisioning TCA
parameter thresholds**

The current 15-minute and current 24-hour thresholds for each PM parameter can be provisioned according to a profile using the WaveStar CIT.

Crossing TCA threshold

Whenever the current 15-minute or the current day (24-hour) threshold for a performance-monitoring parameter is either reached or exceeded, the system generates a threshold-crossing alert (TCA) in the form of a quality of service (QOS) alarm. The alarm condition is then entered into the appropriate performance-monitoring report.



Performance Monitoring Modes

Overview PM has two modes.

Monitoring Mode	What is monitored
Port	Physical, section, and line parameters
Tributary	Path parameters

The two monitoring modes are enabled or disabled independently. The monitoring mode values are set during provisioning of a port or a tributary on a port unit.

Port monitoring mode Port monitoring mode may be set to one of three options:

Option	Description
AUTO (automatic)	Enables the fault management function to continue monitoring the port and disables the PM function pending a trigger event. When a valid incoming signal is detected on a port set to AUTO, the port monitoring mode is automatically set to MON and the PM function is enabled.
MON (monitored)	Disables line-level fault management and PM functions for the port.
NMON (not monitored)	Disables line-level fault management and PM functions for the port.

Tributary monitoring mode The tributary path (TP) monitoring mode may be set to one of two options:

Option	Description
MON (monitored)	Enables the path-level fault management and PM functions
NMON (not monitored)	Disables the path-level fault management and PM functions

PM mode — enable/disable Details of the PM mode are given below.

Levels

The user can enable or disable PM on three levels:

- Port
- Tributary
- Parameter group

How to

PM mode is enabled or disabled using the WaveStar CIT System View Performance menu to provision a port or tributary with PM TCA profile information.

Disabled

When the PM mode is disabled, the following occur:

- The port and tributary monitoring modes are disabled.
- PM data collection stops.
- No TCAs are reported.



SONET Performance Monitoring

SONET PM parameter groups

PM parameter groups consist of the following:

- Physical PM
- Section/near-end line PM
- Far-end line PM
- Path PM
- Incoming DS3 PM
- Outgoing DS3 PM

SONET physical-layer PM

This section discusses the physical-layer PM in a SONET environment.

What is monitored

At the physical layer, service and protection optical laser port units are monitored.

Prerequisite

The optical laser circuit pack must be physically installed to activate the physical-layer PM.

Threshold values

Physical-layer PM is measured not in time intervals, but as a snap-shot in time. The threshold values of the physical-layer PM parameters are set and cannot be changed by provisioning.

Parameters monitored

See the following table for a list of the parameters that are monitored to detect any degradation in the performance of the laser:

Table 8-1 Optical Performance Parameters

Parameter	Description
Laser Bias Current (LBC)	This parameter monitors the laser bias current of each active laser transmitter. This parameter does not vary among the optical circuit packs and is stored in system nonvolatile memory (NVM). The upper limit is 150 percent of the initial factory value. There is no lower limit.
Optical Power Transmit (OPT)	This parameter monitors the average optical output power of each active laser transmitter. This parameter varies among the different optical circuit packs and is therefore not stored in the system NVM but is stored in the inventory NVM for each circuit pack. This parameter has two values: high and low. The high value is +1dBm above the initial factory value, and the low value is -1dBm below the initial factory value.
Optical Power Received (OPR)	This parameter monitors the average optical power received. This parameter varies among the different optical circuit packs and is therefore stored in the inventory NVM of each circuit pack instead of the system NVM. This parameter has two values: high and low. The high value is -10 dBm nominal, and the low value is -29 dBm nominal.

SONET section-layer PM This section discusses the section-layer PM in a SONET environment.

What is monitored

Section-layer PM applies to service and protection optical ports and electrical interfaces.

Parameters monitored

The following table lists the monitored SONET section-layer parameters.

Table 8-2 Section-Layer PM Parameters

Parameter	Description
Section (B1) Coding Violations (CV-S)	The CV-S parameter is a count of bit interleaved parity (BIP) B1 bit errors at the section layer for OC-3, OC-12, OC-48, and OC-192 sections. Up to eight section BIP errors can be detected per STS-N frame. Each error increments the CV-S current second register.
Section (B1) Errored Seconds (ES-S)	The ES-S parameter increments once for each second in which at least one of the following is detected: • section-layer bit interleaved parity (BIP) error • a severely errored frame (SEF) • a loss of signal (LOS) defect is detected.
Section (B1) Severely Errored Seconds (SES-S)	The SES-S parameter increments once for each second in which there are any of the following: • one or more LOS defects • one or more loss of frame (LOF) defects • the number of BIP errors for the signal rates listed below: • EC-1 — 51 BIP errors or more • OC-3 — 154 BIP errors or more • OC-12 — 615 BIP errors or more • OC-48 — 2459 BIP errors or more • OC-192 — 9835 BIP errors or more
Section (B1) Severely Errored Frame Seconds (SEFS-S)	The SEFS-S parameter increments once for each second in which one or more near-end SEF defects are detected.

SONET line-layer PM This section discusses the line-layer PM in a SONET environment.

What is monitored

Line-layer PM parameters apply to optical and electrical interfaces in NEs that terminate EC-1, OC-3, OC-12, OC-48, and OC-192 lines. Both near-end and far-end parameters are monitored.

Parameters monitored

The following table lists the monitored SONET line-layer parameters.

Table 8-3 Sonet Line-Layer Parameters

Parameter	Description
Near-End Line Coding Violations (CV-L)	The near-end CV-L parameter uses the B2 byte in the incoming SONET signal to increment once for each BIP (B2) error detected. Up to 8 times N (8 X N) BIP errors can be detected for each STS-N frame. For example, eight BIP errors can be detected for each STS-1 frame.
Far-End Line Coding Violations (CV-LFE)	The far-end CV-LFE parameter is a count of the number of BIP errors detected by the far-end NE and reported in the line overhead. For SONET signal rates below OC-48, up to 8 X N BIP errors per STS-N frame can be indicated. For OC-48 and OC-192 signals, up to 255 BIP errors per STS-N frame can be indicated. The CV-LFE current-second register increments for each BIP error indicated.
Near-End Line Errored Seconds (ES-L)	The ES-L parameter increments once for every second that contains at least one BIP error, or once for each alarm indication signal (AIS) line defect.

Parameter	Description
Far-End Errored Seconds (ES-LFE)	The ES-LFE parameter increments once for every second where one or more far-end line-layer BIP errors or AIS line defects are detected.
Near-End Line Forward Error Correction Corrected (FECC-L)	The FECC-L parameter is a count of corrected transmission errors at the Line Layer. Up to 72 FECC-L counts can be detected per STS-192 frame, with each event incrementing the FECC-L current second register. A single FECC-L count relates to the correction of one bit error. Two bit errors (multi-bit) can be corrected per block (36 blocks per frame) for a total of 72 bits correctable per frame. There is no far-end FECC-L parameter.
Near-End Line Forward Error Correction Uncorrected (FECU-L)	The FECU-L parameter is a count of uncorrected transmission errors at the Line Layer. Up to 36 FECU-L events can be detected per STS-192 frame, with each event incrementing the FECU-L current second register. A single FECU-L count relates to the detection of transmission errors in a block that were too severe to be corrected using the multi-bit error correction algorithm. One uncorrectable event per block is possible (36 blocks per frame) for a total of 36 per frame. There is no far-end FECU-L parameter.

Parameter	Description
Near-End Line Severely Errored Seconds (SES-L)	The SES-L parameter increments once each second for any of the following: • an AIS-L defect • BIP errors that meet or exceed the numbers for the lines listed below: • EC-1 -- 51 BIP • OC-3 -- 154 BIP • OC-12 -- 615 BIP • OC-48 -- 2459 BIP • OC-192 -- 9835 BIP
Far-End Line Severely Errored Seconds (SES-LFE)	The SES-LFE parameter increments once each second for each far-end AIS-L defect or once for each second that contains a number of BIP errors for the signal rates listed for the SES-L parameter.
Near-End Line Unavailable Seconds (UAS-L)	The UAS-L parameter increments once each second that the line is considered unavailable. Unavailable seconds are counted after ten consecutive severely errored seconds (SES) and continue until there are ten consecutive seconds without a severely errored second.
Far-End Line Unavailable Seconds (UAS-LFE)	The UAS-LFE parameter increments once for each second where SES-LFE is detected after ten consecutive seconds with SES-LFE detected. UAS-LFE continues to increment once for each second until ten consecutive seconds without SES-LFE are detected.

Section/Line profile default values and ranges

The following table lists the section/line default profile values and ranges.

Table 8-4 Section/Line Default Values and Ranges

Parameter	15 minutes		1 day	
	Default	Range	Default	Range
CV-S for OC-3	140	1-16777215	1344	1-2147483647
CV-S for OC-12	560	1-16777215	5376	1-2147483647
CV-S for OC-48	2240	1-16777215	21504	1-2147483647
CV-S for OC-192	8960	1-16777215	86016	1-2147483647
ES-S	25	1-900	250	1-86400
SES-S	10	1-810	40	1-77760
SEFS-S	5	1-900	10	1-86400
CV-L and CV-LFE for EC-1	47	1-16777215	448	1-2147483647
CV-L and CV-LFE for OC-3	140	1-16777215	1344	1-2147483647
CV-L and CV-LFE for OC-12	560	1-16777215	5376	1-2147483647
CV-L and CV-LFE for OC-48	2240	1-16777215	21504	1-2147483647
CV-L and CV-LFE for OC-192	8960	1-16777215	86016	1-2147483647
ES-L and ES-LFE	25	1-900	250	1-86400
SES-L and SES-LFE	10	1-810	40	1-77760
FECC-L for OC-192 only	5184	1-5184000	497664	1-497664000
FECU-L for OC-192 only	2592	1-2592000	248832	1-248832000
UAS-L and UAS-LFE	10	1-900	10	1-86400

STS-1 Path PM

This section discusses the STS-1path-level PM in a SONET environment.

What is monitored

The system monitors both near-end and far-end path PM parameters on terminated and intermediate SONET STS-1 paths that are cross-connected through the system. For example, DS3 interfaces terminate STS-1 paths.

Parameters monitored

The following table lists the monitored SONET STS-1 path parameters.

Table 8-5 STS-1 Path PM Parameters

Parameter	Description
Near-End STS Path Coding Violations (CV-P)	The CV-P parameter increments once for each BIP (B3 byte) error detected in the incoming STS path overhead. Up to eight BIP errors can be detected per frame. The near-end NE uses the remote defect indicator-path (RDI-P) in the line overhead to send the BIP violations count back to the far-end NE.
Far-End STS Path Coding Violations (CV-PFE)	The CV-PFE parameter increments once for each BIP error reported by the REI-P indication from the other end. This parameter is sometimes called far end bit error (FEBE).
Near-End STS Path Errored Seconds (ES-P)	The ES-P parameter increments once for each second that one or more STS path-layer BIP errors are counted or an AIS-P or LOP-P defect is detected. The near-end NE uses the remote defect indicator-path (RDI-P) in the line overhead to send the count back to the far-end NE.
Far-End STS Path Errored Seconds (ES-PFE)	The ES-PFE parameter increments once for each second that one or more far-end STS path-layer BIP errors or AIS-P or LOP-P defects are detected and reported by the REI-P indication from the other end.
Near-End Severely Errored Seconds (SES-P)	The SES-P parameter increments once for each second that an AIS-P or LOP-P defect is detected or 2400 STS path-layer BIP errors are detected.
Far-End Severely Errored Seconds (SES-PFE)	The SES-PFE parameter increments once for each second that 2400 or more STS path-layer BIP errors or one or more AIS-P or LOP-P defects are detected and reported by the REI-P indication from the other end.
Near-End STS Path Unavailable Seconds (UAS-P)	The UAS-P parameter increments once each second that another SES-P is detected after ten consecutive SES-Ps are detected. The UAS-P continues to increment once each second that an SES-P is detected until ten consecutive seconds occur without an SES-P being detected.
Far-End STS Path Unavailable Seconds (UAS-PFE)	The UAS-PFE parameter increments once each second that another SES-PFE is detected after ten consecutive SES-PFEs are detected. The UAS-PFE continues to increment once each second that an SES-PFE is detected until ten consecutive seconds occur without an SES-PFE being detected.

DS3 Performance Monitoring -- Parameters

DS3 line-layer PM This section discusses the DS3 line-layer PM in a SONET environment.

What is monitored

The system provides full-time line and path PM for both near-end and far-end PM parameters on DS3 interface ports. The system monitors the PM parameters incoming from the DS3 facility and outgoing to the DS3 facility.

Parameters monitored

The following table lists the monitored DS3 line-layer parameters.

Table 8-6 DS3 Line-Layer PM Parameters

Parameter	Description
DS3 Line Coding Violations (CV-L)	The CV-L parameter increments once for each bipolar violation (BPV) error detected at the line layer.
DS3 Line Errored Seconds (ES-L)	The ES-L parameter increments once for each second where one or more BPV errors are detected or one or more LOS defects are detected.
DS3 Line Severely Errored Seconds (SES-L)	The SES-L parameter increments once for each second that has one or more LOS defects, or where 2444 BPVs or more at a minimum BER of 7.5×10^{-5} are detected or 44 BPVs or more at a minimum BER of 1×10^{-6} are detected.
DS3 Line Loss of Signal Seconds (LOSS-L)	The LOSS-L parameter increments once for each second where one or more LOS defects are detected.

DS3 path-layer PM This section discusses the DS3 path-layer PM in a SONET environment.

What is monitored

The system provides P-bit and CP-bit monitoring modes. Each mode supports P-bit correction (violation monitoring and removal [VMR]) on the outgoing DS3 signal toward the DS3 facility. The following table defines P-bit and CP-bit monitoring and correction in each of the VMR and DS3 PM framed and unframed modes.

Bit parity errors used to derive the counts depend on the PM mode as follows:

PM Mode	Description
pbit	DS3 P-bit parity check coding violations determine PM counts.
cbit	DS3 CP-bit parity check coding violations determine PM counts.

Error correction

Monitoring and correction of the P-bits are based on the VMR and PM mode provisioning of the DS3 interface. CP-bits are never corrected. CP-bits are copies of the P-bits inserted by the path originator and are not changed by any non-path terminating equipment.

Parameters monitored

The following table lists the DS3 interface and PM provisioning parameters.

Table 8-7 DS3 Interface and PM Provisioning Parameters

Framing	DS3 SF	PM Mode	VMR Mode	Monitor P-bits	Correct P-bits	Monitor C-bits
Framed	Framed or M23	pbit	VMR	x	x	
			VM	x		
			No VM			
	C-Bit Parity	cbit	VMR		x	x
			VM			x
			No VM			x
Unframed	Clear Channel	b3zs	No VM			

Near-end DS3 path PM The following table lists the monitored near-end DS3 path parameters.

Table 8-8 Near-end DS3 Path Parameters

Parameter	Description
DS3 Path Coding Violations (CV-P)	The CV-P parameter increments once for each parity error detected at the path level. The CV-P parameter applies to all framed DS3 PM modes. Unidentical P-bits corresponding to the same DS-3 M-frame also increment the CV-P parameter in P-bit mode. For C-bit mode, the three C-bits in subframe 3 of a C-bit formatted DS3 frame carry the DS3 path-parity information. At the DS3 transmitter, the CP bits in the DS3 C-bit frame are set equal to the two P-bits in frame "n". These CP bits are then inserted into frame "n+1". Since the CP bits are not modified in any way while passing through the network, the DS3 high-speed receiver can determine if errors occurred in the DS3 path. The DS3 receiver computes the parity of frame "n" and compares that parity with the value received in the CP bits in frame "n+1". If the values do not match, DS3 path parity violations are counted
DS3 Path Errored Seconds (ES-P)	The ES-P parameter increments once for each second that contains one or more parity errors, one or more SEF defects, or one or more AIS defects. The ES-P parameter applies to all framed DS3 PM modes.
DS3 Path Errored Seconds A (ESA-P)	The ESA-P parameter increments once for each second where exactly one parity error is detected and no SEF or AIS defects are detected. The ESA-P parameter applies to all framed DS3 PM modes.

Parameter	Description
DS3 Path Errored Seconds B (ESB-P)	The ESB-P parameter increments once for each second where both of the following are true: - no SEF or AIS defects are detected - parity errors are detected in the following ranges (1. or 2.): - From 1 to 2444 parity errors at a minimum BER of 7.5×10^{-5} - From 1 to 44 parity errors at a minimum BER of 1×10^{-6} The ESB-P parameter applies to all framed DS3 PM modes.
DS3 Path Severely Errored Seconds (SES-P)	The SES-P parameter increments once for each second where either of the following is true: - one or more AIS or SEF defects are detected - more than the following number of parity errors are detected (1 or 2): 2444 parity errors at a minimum BER of 7.5×10^{-5}. 44 parity errors at a minimum BER of 1×10^{-6} The SES-P parameter applies to all framed DS3 PM modes.
DS3 SEF/AIS Seconds-Path (SAS-P)	The SAS-P parameter increments once for each second where the either of the following are detected: - one or more AIS defects - one or more SEF defects The SAS-P parameter applies to all framed DS3 PM modes.

Parameter	Description
DS3 Path AIS Seconds (AISS-P)	The AISS-P parameter increments once for each second that has the following: • one or more AIS defects. The AISS-P parameter applies to all framed DS3 PM modes.
DS3 Path Unavailable Seconds (UAS-P)	The UAS-P parameter is a count of 1-second intervals in which the DS3 path is unavailable after ten consecutive DS3 SES-Ps. The ten SES-Ps are included in the count of unavailable time. Once unavailable, the UAS-P continues to increment once for each second until ten consecutive seconds occur without an SES-P detected. The 10-second period without an SES-P is not counted as unavailable time. The UAS-P parameter applies to DS3 p-bit and F&M bit PM modes.
DS3 Path Failure Counts (FC-P)	The FC-P parameter increments once for the beginning of each DS3 AIS or LOF event. The FC-P parameter applies to all framed DS3 PM modes.

Far-end DS3 path PM

This section discusses the far-end DS3 path-layer PM in a SONET environment.

What is monitored

Far-end DS3 path PM is only performed for C-bit parity formatted DS3 signals. The system transmits the far end bit error (FEBE) information back to the near end using the C-bits of the fourth M-subframe of the DS3 signal. Far-end PM only monitors DS3 signals that have a standard M-frame format and defined to be C-bit parity.

Parameters monitored

The following table lists the far-end DS3 path parameters.

Table 8-9 Far-end DS3 Path Parameters

Parameter	Definition
Far-End DS3 Path Code Violation (CV-PFE)	The CV-PFE parameter increments once for each occurrence of a received FEBE message indicating one of the following path errors at the far end: • DS3 C-bit • F-bit • M-bit
Far-End DS3 Path Errored Seconds	The ES-PFE parameter increments once for each second that contains one of the following: • an M-frame with three FEBE messages indicating errors • one or more far-end SEFs • one or more far-end AIS defects
Far-End DS3 Path Errored Seconds A (ESA-PFE)	The ESA-PFE parameter increments once for each second containing both of the following: • one M-frame with three FEBE messages indicating errors • no far-end SEFs or AIS defects

Parameter	Definition
Far-End DS3 Path Errored Seconds B (ESB-PFE)	The ESB-PFE parameter increments once for each second that contains all of the following: • no far-end SEFs or AIS defects • the following number of M-frames with FEBE messages indicating errors (1. or 2.): 1. From 1 to 2444 at a minimum BER of 7.5×10^{-5} 2. From 1 to 44 at a minimum BER of 10×10^{-6}
Far-End DS3 Path Severely Errored Seconds (SES-PFE)	The SES-PFE parameter increments once for each second that has any of the following: • a FEBE message indicating one or more far-end SEFs • one or more far-end AIS defects • more than 2444 far-end FEBE errors at a minimum BER of 7.5×10^{-5} • more than 44 far-end FEBE at a minimum BER of 1×10^{-6}
Far-End DS3 Path SEF/AIS Seconds (SAS-PFE)	The SAS-PFE parameter increments once for each second where one or more of the following is detected: • far-end SEF • far-end AIS defects

Parameter	Definition
Far-End DS3 Path Unavailable Seconds (UAS-PFE)	The UAS-PFE parameter is a count of one second intervals in which the DS3 path is unavailable after ten consecutive DS3 SES-PFEs. The ten SES-PFEs are included in the count of unavailable time. Once unavailable, the UAS-PFE continues to increment once for each second until ten consecutive seconds occurs without an SES-PFE detected. The 10-second period without an SES-PFE is not counted in unavailable time.
Far-end DS3 Path Failure Counts (FC-PFE)	The FC-PFE parameter increments once for each DS3 remote alarm indication (RAI). A failure that begins in one time period and ends in another time period is counted in the time period in which it began.

DS3 profile default values and ranges

The following table lists the default values and ranges for the default DS3 profile.

Table 8-10 DS3 Profile Default Values and Ranges

Parameter	15 minutes		1 day	
	Default	Range	Default	Range
CV-L	387	1-16383	3865	1-1048575
ES-L	25	1-900	250	1-86400
SES-L	4	1-900	40	1-86400
CV-P and CV-PFE	382	1-16383	3820	1-1048575
ES-P and ES-PFE	25	1-900	250	1-86400
ESA-P and ESA-PFE	25	1-900	250	1-86400
ESB-P and ESB-PFE	25	1-900	250	1-86400
SES-P and SES-PFE	4	1-810	40	1-77760
SAS-P and SAS-PFE	2	1-900	8	1-86400
UAS-P and UAS-PFE	10	1-900	10	1-86400

STM-N Performance Parameters

What is monitored This section describes the PM parameters that are applicable to STM-1, STM-4, STM-16, and STM-64 signals.

Performance Thresholds STM-N performance parameters are assigned thresholds that are used to measure degraded performance. When a PM threshold is crossed, a report is sent to the OS. All threshold crossings that are associated with a particular path are correlated by the OS, and then the source of the degradation is identified.

Physical layer PM This section discusses the physical-layer PM in an SDH environment.

What is monitored

Physical layer PM applies to service and protection optical laser port units.

Prerequisite

The optical laser circuit pack must be physically installed to activate the physical layer PM.

Threshold values

Physical layer PM is not measured in time intervals but as a snap-shot in time. The threshold values of the physical layer PM parameters are set and cannot be changed by provisioning.

Parameters monitored

The following table lists the parameters that PM monitors to detect degrading performance of the laser.

Table 8-11 Optical Performance Parameters

Parameter	Description
Laser Bias Current (LBC)	This parameter monitors the laser bias current of each active laser transmitter. This parameter does not vary among the optical circuit packs and is stored in system nonvolatile memory (NVM). The upper limit is 150 percent of the initial factory value. There is no lower limit.
Optical Power Transmit (OPT)	This parameter monitors the average optical output power of each active laser transmitter. This parameter varies among the different optical circuit packs and is therefore not stored in the system NVM, but it is stored in the inventory NVM of each circuit pack. This parameter has two values: high and low. The high value is +1 dBm above the initial factory value and the low value is -1 dBm below the initial factory value.
Optical Power Received (OPR)	This parameter monitors the average optical power received. This parameter varies among the different optical circuit packs and is therefore stored in the inventory NVM of each circuit pack instead of the system NVM. This parameter has two values: high and low. The high value is -10 dBm nominal, and the low value is -29 dBm nominal.

STM-N transmission performance parameters

The following table lists the STM-N transmission performance that WaveStar BandWidth Manager monitors.

Table 8-12 STM-N Transmission Performance Parameters

Facility	Measured Provisionable Parameters
STM-N Regenerator Section (RS)	• Background Block Errors (RS_N_BBE) • Errored Seconds (RS_N_ES) • Severely Errored Seconds (RS_N_SES) • Unavailable Seconds (RS_N_UAS)

Facility	Measured Provisionable Parameters
STM-N Multiplex Section (MS)	• Background Block Errors (MS_N_BBE) • Background Block Errors Far End (MS_F_BBE) • Errored Seconds (MS_N_ES) • Errored Seconds Far End (MS_F_ES) • Forward Error Correction Corrected (MS_N_FECC) • Forward Error Correction Uncorrected (MS_N_FECU) • Severely Errored Seconds (MS_N_SES) • Severely Error Seconds Far End (MS_F_SES) • Unavailable Seconds (MS_N_UAS) • Unavailable Seconds Far End (MS_F_UAS)

Facility	Measured Provisionable Parameters
STM-N HOVC Path	• Background Block Errors (VC_N_BBE) • Background Block Errors Far End (VC_F_BBE) • Errored Seconds (VC_N_ES) • Errored Seconds Far End (VC_F_ES) • Severely Errored Seconds (VC_N_SES) • Severely Error Seconds Far End (VC_F_SES) • Unavailable Seconds (VC_N_UAS) • Unavailable Seconds Far End (VC_F_UAS)

STM-N Performance Monitoring Processing

Purpose	This section describes the STM-N PM parameters.
Derived parameters	WaveStar BandWidth Manager processes the raw PM parameters into derived parameters. The derived parameters are based on the condition of the incoming STM-N signal during a given second. The tables below describe the PM parameters for the facilities monitored.
STM-N regenerator section	This section discusses the PM for a regenerator section in an SDH environment.

Parameters monitored

The following table shows the STM-N regenerator section parameters monitored by WaveStar BandWidth Manager.

Table 8-13 STM-N Regenerator Section Parameters

Parameter	Description
B1 background block errors (RS_N_BBE)	Regenerator section BBEs are reflected in the B1 byte of the regenerator section overhead. WaveStar BandWidth Manager calculates the errors in the received frame and compares that value to the errors received in the following frames. Each error is then reflected in the RS_N_BBE count. In the outgoing direction, WaveStar BandWidth Manager calculates a B1 value and writes it into the outgoing SDH regenerator overhead of the STM-N line.
Errored seconds (RS_N_ES)	An RS_N_ES is a second during which WaveStar BandWidth Manager detects any of the following: • one or more B1 block errors • an RS_SEF defect • an STM_LOS defect

Parameter	Description
Severely errored seconds (RS_N_SES)	An RS_N_SES is a second in which either of the following is true (1 or 2): 1. the number of errored blocks (detected at the RS layer) is equal to or greater than a provisionable declaration threshold (RS_N_SES_DT) (Default=2400) 2. at least one RS_N_DS defect is present
Unavailable seconds (RS_N_UAS)	An RS_N_UAS is a second during which the STM-N regenerator section is “unavailable.” The regenerator section is considered unavailable from the beginning of ten consecutive RS_N_SESs until the beginning of ten consecutive seconds, none of which are severely errored.

STM-N multiplex section PM

The following describes multiplex section PM in an SDH environment.

Parameters Monitored

The following table shows the STM-N multiplex section parameters monitored by WaveStar BandWidth Manager.

Table 8-14 STM-N Multiplex Section Parameters

Parameter	Description
B2 background block errors (MS_N_BBE)	Multiplex section byte BBEs are reflected in the B2 byte of the multiplex section overhead. WaveStar BandWidth Manager calculates the errors in the received frame and compares that value to the errors received in the following frames. Each error is reflected in the MS_N_BBE count. In the outgoing direction, WaveStar BandWidth Manager calculates a B2 value and writes it into the outgoing SDH multiplex section overhead of the STM-N line.
Background block errors far end (MS_F_BBE)	The MS_F_BBE parameter counts the number of block errors detected by the far end and reported by the MS_REI indication of the multiplex section overhead. The MS_F_BBE current second register increments for each block error indicated by the incoming MS_REI.
Errored seconds (MS_N_ES)	An MS_N_ES is a second during which WaveStar BandWidth Manager detects either of the following: - one or more B2 block errors - an STM-N MS_AIS.

Parameter	Description
Errored seconds far end (MS_F_ES)	An MS_F_ES is a second during which WaveStar BandWidth Manager detects either of the following: - one or more far-end multiplex section block errors as reported by the MS_REI indication of the multiplex section overhead - an MS_RDI defect.
Forward error corrections corrected near end (MS_N_FECC)	The MS_N_FECC parameter is a count of corrected transmission errors at the Multiplex Section Layer. Up to 72 MS_N_FECC counts can be detected per frame, with each event incrementing the MS_N_FECC current second register. The MS_N_FECC count is inhibited when an STMdLOS, STMdLOF, or MSdAIS defect is present for that entity. A single MS_N_FECC count relates to the correction of one bit error. Two bit errors (multi-bit) can be corrected per block (36 blocks per frame) for a total of 72 bits correctable per frame. There is no Far-end MS_N_FECC parameter.

Parameter	Description
Forward error corrections uncorrected near end (MS_N_FECU)	The MS_N_FECU parameter is a count of uncorrected transmission errors at the Line Layer. Up to 36 MS_N_FECU events can be detected per frame, with each event incrementing the MS_N_FECU current second register. The MS_N_FECU count is inhibited when an STMdLOS, STMdLOF, or MSdAIS defect is present for that entity. A single MS_N_FECU count relates to the detection of transmission errors in a block that were too severe to be corrected using the multi-bit error correction algorithm. One uncorrectable event per block is possible (36 blocks per frame) for a total of 36 per frame. There is no Far-end MS_N_FECU parameter
Severely errored seconds near end (MS_N_SES)	An MS_N_SES is a second in which either of the following is true: - the number of errored blocks (detected at the MS layer) is equal to or greater than a provisionable declaration threshold (MS_N_SES_DT) - at least one MS_N_DS defect is present.

Parameter	Description
Severely errored seconds far end (MS_F_SES)	An MS_F_SES is a second in which - No MS_N_DS defect is present AND either of the following is true: - the far end errored block count (as indicated by the MS REI count) is equal to or greater than a provisionable declaration threshold (MS_F_SES_DT) - at least one MS_RDI defect is present

Parameter	Description
Unavailable seconds near end (MS_N_UAS)	The MS_N_UAS parameter increments once for every second that the MS was considered unavailable (at any point during the second). An MS becomes unavailable at the onset of 10 consecutive seconds that qualify as MS_N_SESs, and continues to be unavailable until the onset of 10 consecutive seconds that do not qualify as MS_N_SESs. The (un)available time can not be determined if it is unknown whether the previous 10 seconds are Severely Errored or non-Severely Errored. Thus the MS_N_SES must be processed to determine whether the MS_N_SES are consecutively present or absent.
Unavailable seconds far end (MS_F_UAS)	The MS_F_UAS parameter increments once for every second that the Far End MS was considered unavailable (at any point during the second). A Far End MS becomes unavailable at the onset of 10 consecutive seconds that qualify as MS_F_SESs, and continues to be unavailable until the onset of 10 consecutive seconds that do not qualify as MS_F_SESs. The (un)available time can not be determined if it is unknown whether the previous 10 seconds are Severely Errored on non-Severely Errored. Thus the MS_F_SES must be processed to determine whether the MS_F_SES are consecutively present or absent.

STM-N high-order path layer PM

Parameters monitored

The following table shows the STM-N intermediate high-order path parameters monitored by WaveStar BandWidth Manager.

Table 8-15 STM-N High-Order Path Parameters

Parameter	Description
B3 background block errors near end (VC_N_BBE)	High-order path near-end background block errors (VC_N_BBE) are reflected in the B3 byte of the path overhead. A near end block is errored if the received B3 byte (BIP) does not match the BIP calculated from the previous received block. The B3 byte comparison is performed on a per-byte basis instead of a per-bit basis as at the multiplex section layer. The VC_N_BBE parameter increments once for every errored block in a given second if there are - no VC_N_SES - no VC_N_DS Otherwise, the VC_N_BBE is set to zero for that second.
B3 background block errors far end (VC_F_BBE)	The VC_F_BBE parameter increments once for every far end errored block (as indicated by the HP REI count) in a given second if there are - no VC_F_SES - no VC_N_DS Otherwise, the VC_F_BBE is set to zero for that second. The VC_F_BBE count increments by one for each block in the HP REI count that is equal to or greater than one.

Parameter	Description
Errored seconds near end (VC_N_ES)	A VC_N_ES parameter increments for each second in which either of the following is true: - one or more errored blocks are detected at the high-order path layer - a VC_N_DS defect is present. A near-end block is errored if the received B3 byte (BIP) does not match with the BIP calculated from the previous block. At the high-order path layer, the B3 byte comparison is performed on a per-byte basis instead of a per-bit basis as at the multiplex section layer.
Errored seconds far end (VC_F_ES)	A VC_F_ES parameter increments for each second in which - no VC_N_DS is present AND at least one of the following is true: - the far end errored block count (as indicated by the HP REI count) is equal to or greater than one - at least one high-order path remote defect indication (HPdRDI) is present. The high-order path RDI indication is an indication back upstream at the high-order path layer that the local system has detected a defect on the path signal originating at the upstream system.

Parameter	Description
Severely errored seconds near end (VC_N_SES)	A VC_N_SES parameter increments for each second in which either of the following is true: - the number of errored blocks (detected at the high-order path layer) is equal to or greater than a provisionable declaration threshold (VC_N_SES_DT) - an VC_N_DS defect is present. A near-end block is errored if the received B3 byte (BIP) does not match with the BIP calculated from the previous block. At the high-order path layer, the B3 byte comparison is performed on a per-byte basis instead of a per-bit basis as at the multiplex section layer.
Severely errored seconds far end (VC_F_SES)	A VC_F_SES parameter increments for each second in which - no VC_N_DS defect is present AND at least one of the following is true: - the far end errored block count (as indicated by the HP REI count) is equal to or greater than a provisionable declaration threshold (VC_F_SES_DT) - at least one HPdRDI defect is present.

Parameter	Description
Unavailable seconds near end (VC_N_UAS)	The VC_N_UAS parameter increments once for every second that the high-order path was considered unavailable at any point during the second. A high-order path becomes unavailable at the onset of ten consecutive seconds that qualify as VC_N_SESs and continues to be unavailable until the onset of ten consecutive seconds that do not qualify as VC_N_SESs. The unavailable time cannot be determined if it is unknown whether the previous ten seconds are Severely Errored on non-Severely Errored. Therefore, the VC_N_SESs must be processed to determine whether the VC_N_SESs are consecutively present or absent.
Unavailable seconds far end (VC_F_UAS)	The VC_F_UAS parameter increments once for every second that the Far End high-order path was considered unavailable at any point during the second. A Far End high-order path becomes unavailable at the onset of ten consecutive seconds that qualify as VC_F_SESs, and continues to be unavailable until the onset of ten consecutive seconds that do not qualify as VC_F_SESs. The unavailable time cannot be determined if it is unknown whether the previous ten seconds are Severely Errored or non-Severely Errored. Therefore, the VC_F_SESs must be processed to determine whether the VC_F_SESs are consecutively present or absent.

SDH RS/MS profile default values and ranges

The following table shows the default threshold values and allowable ranges of SDH RS/MS profile parameters.

Table 8-16 SDH RS/MS Profile Default Values and Ranges

		15 Minutes		1 Day	
SDH Layer	Parameter	Default	Range	Default	Range
RS	RS_N_ES	180	1-900	1500	1-86400
	RS_N_SES	15	1-810	20	1-77760
	RS_N_BBE	9000	1-16777215	48000	1-2147483647
	RS_N_UAS	15	1-900	20	1-86400
MS	MS_N_ES MS_F_ES	50	1-900	150	1-86400
	MS_N_FECC for STM-64 only	5184	0 - 5184000	497664	0 - 497664000
	MS_N_FECU for STM-64 only	2592	0 - 2592000	248832	0 - 248832000
	MS_N_SES MS_F_SES	10	1-810	15	1-77760
	MS_N_BBE MS_F_BBE	STM-1e: 228000 STM-1o: 228000 STM-4: 912000 STM-16: 3648000 STM-64: 14592000	1-6777215	STM-1e: 432000 STM-1o: 432000 STM-4: 1728000 STM-16: 6912000 STM-64: 27648000	1-2147483647
	MS_N_UAS MS_F_UAS	15	1-900	20	1-86400

SDH HOVC profile default values and ranges

The following table shows the default threshold values and allowable ranges of SDH HOVC profile parameters.

Table 8-17 SDH HOVC Path Profile Default Values and Ranges

			15 Minutes		1 Day	
SDH Layer	Parameter	VC-N Rate	Default	Range	Default	Range
HOVC Path	VC_N_ES	VC-3	150	1-900	600	1-86400
	VC_F_ES	VC-4 VC-4-4c	180		1500	
	VC_N_SES VC_F_SES	VC-3 VC-4 VC-4-4c	15	1-810	20	1-77760
	VC_N_BBE VC_F_BBE	VC-3 VC-4	36000	1-65535	48000	1-8388607
		VC-4-4c		1-16777215		1-2147483647
	VC_N_UAS VC_F_UAS	VC-3 VC-4 VC-4-4c	15	1-900	20	1-86400

Invalid Parameters/Invalid Data Flags

Invalid parameters In some situations, a section, line, or path performance parameter is considered invalid and is marked invalid with a flag. The flag is attached to the data and travels with the data. The following tables summarize the conditions that may cause a parameter to be flagged as invalid and list the invalid data flags.

Parameter invalid conditions

The following table summarizes the conditions and the parameters affected in a SONET environment.

Table 8-18 Invalid Parameter Conditions—SONET
 (** Comment: v405-90-10 **)

Condition	parameters to be marked invalid
A change in (DS3) SES threshold	individual affected parameter
Automatic Laser Shutdown (ALS)	Physical parameter: LBC, LBC _b , OPT, OPT _b
Concatenated signal format change	all path parameters
Detected read error of hardware PM register by software	all PM parameters of associated HW register
DS3 signal format change between one that supports PM and one that does not support PM	line and near-end and far-end path parameters of incoming direction and near-end path parameters of outgoing direction
DS3 PM enable/disable	line and near-end and far-end path parameters of incoming direction and near-end path parameters of outgoing direction
DS3 signal format change between one that supports PM and one that does not support PM	line and near-end and far-end path parameters of incoming direction and near-end path parameters of outgoing direction
Facility/equipment Protection due to equipment failure	all path parameters
Far end parameters inhibited due to near end defects	inhibited far end line and path parameters
Physical PM enable/disable	physical parameters
PM start change (24 hour boundary, 0-23)	all current day registers
register initialization	all registers being initialized
Restart of system controller software that affects the entire system	all

Condition	parameters to be marked invalid
SONET line far-end PM enable/disable	line far-end parameters
SONET path PM enable/disable	near-end and far-end path parameters
SONET section/line near-end PM enable/disable	section/line near-end parameters
SW processing error	individual parameter
system/SRC/PU out of service (SRC applies to BWM only)	all parameters of associated ports
Time/date change or port unit pack (re)insertion	all

Parameter invalid conditions--SDH

The following table summarizes the conditions and the parameters affected in an SDH environment.

Table 8-19 Invalid Parameter Conditions—SDH
 (** Comment: v405-90-10 **)

Condition	parameters to be marked invalid
A change in (SDH) SES declaration threshold	individual affected parameter
Automatic Laser Shutdown (ALS)	physical parameter: LBC, LBC _b , OPT, OPT _b
Detected read error of hardware PM register by software	all PM parameters of associated HW register
facility/equipment protection due to equipment failure	all path parameters
Far end parameters inhibited due to near end defects	inhibited far end line and path parameters
PM start change (24 hour boundary, 0-23)	all current day registers
register initialization	all registers being initialized
Restart of system controller software that affects the entire system	all
SDH HOVC path PM enable/disable	near-end and far-end HOVC path parameters
SDH MS far-end PM enable/disable	MS far-end parameters
SDH Physical PM enable/disable	physical parameters
SDH RS/MS near-end PM enable/disable	RS/MS near-end parameters
SW processing error	individual parameter
system/SRC/PU out of service	all parameters of associated ports
time/date change or port unit pack (re)insertation	all
time/date change or port unit pack (re)insertation	all

Condition	parameters to be marked invalid
SDH Physical PM enable/disable	physical parameters
SDH RS/MS near-end PM enable/disable	RS/MS near-end parameters

Invalid Data Flags

The following table lists the conditions that can cause an invalid data flag to be generated and the flag values for those conditions.

Table 8-20 Invalid Data Flags

Condition	Invalid Flag Output Report
Any of the following will cause the invalid flag to be generated: - time/date change to shorter interval or earlier minute, hour, day, month, or year - port unit pack (re)insertion - restart of system controller software (in the middle of an interval) - system/SRC out of service or back to service (cold boot) - system/SRC out of service or back to service (warm boot in the middle of an interval) - PU out of service or back to service	1-01
Any of the following will cause the invalid flag to be generated: - time/date change to longer interval or later minute, hour, day, month, or year - restart of system controller software (at boundary between intervals) - system/SRC out of service or back to service (warm boot at the boundary between intervals)	1-02
PM enable/disable or MON/NMON	1-03
Concatenated signal format change	1-05
SW processing error	1-08
Far end parameters inhibited due to near end defects	1-09
Facility/equipment protection due to equipment failure	1-10
PM start change to shorter interval	1-11
PM start change to longer interval	1-12
Register initialization	1-13
Detected read error of hardware PM register by software	1-14
DS3 signal format change from one that supports PM to one that does not	1-15
DS3 signal format change from one that does not support PM to one that does	1-16
A change in (SDH) SES declaration threshold	1-17
Automatic Laser Shutdown (ALS)	1-18

Part I

Acceptance Tasks



Acceptance Task List

Accept New Electrical Cables to a Port - - - - - T103
Accept New Optical Fibers to a Port - - - - - T102

Task 102: Accept New Optical Fibers to a Port

Purpose Use this procedure to test new optical fibers between a port and the corresponding lightguide cross-connect panel or other terminating equipment.

Important! This procedure is used only if the new optical fibers were installed and not tested. If the installation has not been completed (including associated port unit installation), notify the installation personnel or refer to *WaveStar Bandwidth Manager Installation Manual, 365-370-100* to complete the installation. *If you completed the installation following the procedures in WaveStar Bandwidth Manager Installation Manual, 365-370-100, do not perform this procedure.*

Important! It is assumed that installation of the new optical fibers has been completed (including associated port unit installation) for the engineered configuration and that the WaveStar BandWidth Manager system is in service. *If at any point in this procedure the WaveStar BandWidth Manager system fails to respond in the indicated way, refer the trouble to installation personnel.*

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap.

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



WARNING

Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if beam is viewed directly or

with improper optical instruments. Avoid direct exposure to beam.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components. See “Electrostatic Discharge (ESD) Considerations” in Appendix D, “Safety”.



CAUTION

If an optical connection is broken during this procedure, clean the fibers and connectors. Refer to Supporting Task “Task 703: Clean Optical Fibers and Connectors” (-1).

Related information

For related information, see the following sections in this document:

- Chapter 6, “Control, Transmission, and Synchronization Interfaces”
- Chapter 7, “Provisioning, Security, and Administration”
- Supporting Task “Task 703: Clean Optical Fibers and Connectors” (-1)
- Appendix A, “CIT Tutorial”
- Appendix D, “Safety”.

Before you begin this task, verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to accept a new optical fiber to a port.

-
- 1** At the WaveStar CIT, select **Fault>NE Alarm List...** or click on **Alarm List** to obtain an NE Alarm List, and verify that there are no active alarms.

-
- 2** Perform a cross-connect loopback on the circuit(s) associated with the new fiber for testing.

Reference: Operations Task “Task 203: Loop Back Circuit(s) for Testing” (-1)

- 3** Release the cross-connect loopback on the circuit(s).

Reference: Operations Task “Task 209: Release Looped Back Circuit(s)” (-1)

- 4** Select **Fault>NE Alarm List...** or click on **Alarm List** to obtain an NE Alarm List and verify that there are no active alarms.
-

- 5** The new optical fibers have passed the acceptance tests and are ready for service.

END OF STEPS



Task 103: Accept New Electrical Cables to a Port

Purpose Use this procedure to test new electrical cables between a port and the corresponding cross-connect panel or other terminating equipment.

Important! This procedure is used only if the new electrical cables were installed and not tested. If the installation has not been completed (including associated port unit installation), notify the installation personnel or refer to *WaveStar BandWidth Manager Installation Manual, 365-370-100* to complete the installation. *If you completed the installation following the procedures in WaveStar BandWidth Manager Installation Manual, 365-370-100, do not perform this procedure.*

Important! It is assumed that installation of the new electrical cables has been completed (including associated port unit installation) for the engineered configuration and that the WaveStar BandWidth Manager system is in service. *If at any point in this procedure the WaveStar BandWidth Manager system fails to respond in the indicated way, refer the trouble to installation personnel.*

Required equipment Use the following equipment to complete this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

See “Electrostatic Discharge (ESD) Considerations” in Appendix D, “Safety”.

Related information For related information, see the following sections in this document:

- Chapter 6, “Control, Transmission, and Synchronization Interfaces”
- Chapter 7, “Provisioning, Security, and Administration”
- Appendix A, “CIT Tutorial”
- Appendix D, “Safety”.

Before you begin this task, verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to accept a new electrical cable to a port.

.....

1 At the WaveStar CIT, select **Fault>NE Alarm List...** or click on **Alarm List** to obtain an NE Alarm List and verify that there are no active alarms.

.....

2 Perform a cross-connect loopback on the circuit(s) associated with the new cable for testing.

Operation Task 203, “Loop Back Circuit(s) for Testing”

.....

3 Release the cross-connect loopback on the circuit(s).

Operation Task 209, “Release Looped Back Circuit(s)”

.....

4 Select **Fault>NE Alarm List...** or click on **Alarm List** to obtain an NE Alarm List and verify that there are no active alarms.

.....

5 The new electrical cables have passed the acceptance tests and are ready for service.

.....

END OF STEPS



Part II

Operation Tasks



Operation Task List

Accessing and Provisioning Serial (RS-232) Ports - - - - -	T250
Change Maximum Number of Backups to WaveStar CIT - - - - -	T241
Change Network Element Date/Time - - - - -	T224
Change Network Element Security Parameters- - - - -	T218
Change (Your Own) Notification Registration List - - - - -	T216
Change (Your Own) Password - - - - -	T201
Configure TCP/IP Parameters (including FTAM-FTP Gateway) - - - -	T245
Create New Test Access Session in the MON(E, F, EF) Mode - - - -	T210
Create New Test Access Session in the SPLT(E, F, A, B, AB, or EF) Mode - - - - -	T211
Create/Modify/Delete a Download Profile - - - - -	T251
Delete a Test Access Session - - - - -	T213
Download Software - - - - -	T249
Enable or Disable User Login(s) - - - - -	T221
Install Software (Initial Installation/Upgrade/Change) into WaveStar CIT and Network Element - - - - -	T202
Log in/Log out of Network Element- - - - -	T223
Log Out Other User Session(s) - - - - -	T217
Loop Back Circuit(s) for Testing - - - - -	T203
Loop Back Line(s) for Testing - - - - -	T226
Manually Backup Database to Secondary Memory (Release 3.0) - - -	T214
Manually Backup Database to Secondary Memory (Release 3.1 and Later)- - - - -	T240
Manually Backup Database to WaveStar CIT (Release 3.0 and Earlier- - - - -	T205

Manually Backup Database to WaveStar CIT (Release 3.1 and Later) - - - - -	T239
Manually Restore Database From Secondary Memory (Release 3.0) - - - - -	T215
Manually Restore Database From Secondary Memory (Release 3.1 and Later) - - - - -	T243
Manually Restore Database From WaveStar CIT (Release 3.0 and Earlier) - - - - -	T206
Manually Restore Database From WaveStar CIT (Release 3.1 and Later) - - - - -	T242
Modify the Test Access Mode of a Test Access Session - - - - -	T212
Modify, Delete, or Add a User's Login Parameters - - - - -	T200
Prepare New PCMCIA Flash Disk(s) - - - - -	T246
Release Looped Back Circuit(s) - - - - -	T209
Release Looped Back Line(s) - - - - -	T227
Replace Fan Filter - - - - -	T207
Replace Primary PCMCIA Flash Disks - - - - -	T237
Replace Primary and Secondary PCMCIA Flash Disks - - - - -	T229
Replace Secondary PCMCIA Flash Disk- - - - -	T238
Test Low Voltage Protection Unit (LVPU) or Power Filter with Voltage Protection (LFVP) - - - - -	T225
Verify Receive Path Trace - - - - -	T208
View Test Access Session(s) - - - - -	T222

Task 200: Modify, Delete, or Add a User's Login Parameters

- Purpose** Use this procedure to:
- Modify an existing user's login parameters. This includes the following:
 - Password
 - User class
 - Password aging interval (Release 3.1 and later)
 - Inactivity timeout (Release 3.0 and later)
 - User type and privilege codes
 - Priority levels
 - Notification registration list
 - Initialization observability
 - Delete an existing user's login parameters
 - Add a new user's login parameters.

Important! This task is for administrators only. To modify your own password, refer to Operations Task 201, "Change (Your Own) Password".

Important! If the user has super user privilege, super user logins (including your own) cannot be modified or deleted.

Required equipment The WaveStar Craft Interface Terminal (CIT) is required to complete this task

Related information For related information, see the following sections in this document:

- Chapter 4, "Operations Interfaces"
- Chapter 7, "Provisioning, Security, and Administration"
- Operations Task 201, "Change (Your Own) Password"
- Operations Task 216, "Change (Your Own) Notification Registration List"
- Appendix A, "CIT Tutorial"

Before you begin

Before you begin this task:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the user's login and any user security parameters that must be provisioned.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following steps to modify, delete, or add a user's login parameters:

- 1 At the WaveStar CIT, select **Administration>Security>User Provisioning....**

Result: The *User Provisioning* screen appears.

2

If you want to ...	Then go to...
modify a user's login parameters,	Step 3.
delete a user's login parameters,	Step 5.
add a new user's login parameters,	Step 7.

- 3 Select the existing user's login to be modified, change the appropriate parameter(s), and click on **Modify**.

Result: A dialog box appears asking you to confirm the change(s).

- 4 Select **Administration>Security>View User Logins...** and verify that the user's login parameters have been modified.

STOP! End of Task.

- 5 Select the existing user's login to be deleted and click on **Delete**.

Result: A dialog box appears asking you to confirm deleting the user login.

-
- 6** Select **Administration>Security>View User Logins...** and verify that the user's login has been deleted.

STOP! End of Task.

- 7** Enter the specified parameters for the new user's login and click on **Add**.

Result: Dialog boxes appear asking you to confirm adding a new user's login and saving the new user's login in the CIT security database. After the dialog boxes appear, close the *User Provisioning* screen.

- 8** Select **Administration>Security>View User Logins...**, and verify that the new user's login has been added.

END OF STEPS



Task 201: Change (Your Own) Password

Purpose Use this procedure to change the password for your current user login. To administer passwords and other login parameters for other users, refer to Operation Task T 200, Modify, Delete, or Add a User's Login Parameters.

Required equipment The WaveStar Craft Interface Terminal (CIT) is required to perform this task.

Related information For related information, see the following sections in this document:

- Chapter 4, "Operations Interfaces"
- Chapter 7, "Provisioning, Security, and Administration"
- Operations Task T 200, "Modify, Delete, or Add a User's Login Parameters"
- Appendix A, "CIT Tutorial"

Before you begin Before you begin this task:

- Verify that the new password has not been used previously. The new password cannot be a password used for this login in the past.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar Bandwidth Manager system.

Task Complete the following steps to change your own password:

-
- 1** At the WaveStar CIT *System View*, select **Administration>Change Password...**, make the password change as needed, and click on **OK**.

Result: A dialog box appears asking you to confirm the password change. Click on **Yes** and another dialog box appears asking if you want to save the password change in the CIT security database. Click on **Yes**.

Your CIT and local NE password is now changed. To change your password at another NE, repeat this procedure at the NE.

END OF STEPS



Task 202: Install Software (Initial Installation/Upgrade/Change) into WaveStar CIT and Network Element

- Purpose** Use this procedure to:
- Install the WaveStar BandWidth Manager and WaveStar CIT software onto a new system.
 - Upgrade/change an existing WaveStar BandWidth Manager system and WaveStar CIT.

- Required equipment** The following equipment is required to perform this task:
- WaveStar Craft Interface Terminal (CIT)
 - Wrist strap.

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components. See “Electrostatic Discharge (ESD) Considerations” in “About This Information Product”.

- Related information** For related information, see:
- *Chapter 7, Provisioning, Security, and Administration*
 - *WaveStar BandWidth Manager, Installation Manual, 365-370-100*
 - *WaveStar BandWidth Manager, Release 4.0, Software Release Description*
 - *WaveStar BandWidth Manager, Release 3.1.2, Software Release Description*
 - *WaveStar BandWidth Manager, Release 3.1.1, Software Release Description*

- *WaveStar BandWidth Manager, Release 3.1.0, Software Release Description*
- *WaveStar BandWidth Manager, Release 3.0.15, Software Release Description*
- *WaveStar BandWidth Manager, Release 3.0.14, Software Release Description*
- *WaveStar BandWidth Manager, Release 3.0.13, Software Release Description*
- *WaveStar BandWidth Manager, Release 3.0.11, Software Release Description*
- *WaveStar BandWidth Manager, Release 3.0.7, Software Release Description*
- *WaveStar BandWidth Manager, Release 3.0, Software Release Description*
- *WaveStar BandWidth Manager, Release 2.2, Software Release Description*
- *WaveStar BandWidth Manager, Release 2.1, Software Release Description*
- *WaveStar BandWidth Manager, Release 2.0, Software Release Description*
- *WaveStar BandWidth Manager, Release 1.3.30, Software Release Description*
- *WaveStar BandWidth Manager, Release 1.3.20, Software Release Description*

Task Complete the following steps to install software onto a WaveStar CIT and WaveStar BandWidth Manager system.

Important! It is possible to access software from a source other than the CD-ROM, but it is still critical to follow the procedures in the software release description.

- 1** Verify that the software package consists of a CD-ROM and the appropriate Software Release Description:
 - *WaveStar BandWidth Manager, Release 4.0, Software Release Description*
 - *WaveStar BandWidth Manager, Release 3.1.2, Software Release Description (109081588)*
 - *WaveStar BandWidth Manager, Release 3.1.1, Software Release Description (109045765)*
 - *WaveStar BandWidth Manager, Release 3.1.0, Software Release Description (108923970)*
 - *WaveStar BandWidth Manager, Release 3.0.15, Software Release Description (109081562)*
 - *WaveStar BandWidth Manager, Release 3.0.14, Software Release Description (109035592)*
 - *WaveStar BandWidth Manager, Release 3.0.13, Software Release Description (109019141)*
 - *WaveStar BandWidth Manager, Release 3.0.11, Software Release Description (108902248)*
 - *WaveStar BandWidth Manager, Release 3.0.7, Software Release Description (108880733)*
 - *WaveStar BandWidth Manager, Release 3.0, Software Release Description (108847096)*
 - *WaveStar BandWidth Manager, Release 2.2, Software Release Description (108847542)*
 - *WaveStar BandWidth Manager, Release 2.1, Software Release Description (108799255)*
 - *WaveStar BandWidth Manager, Release 2.0, Software Release Description (108692450)*
 - *WaveStar BandWidth Manager, Release 1.3.30, Software Release Description (C08720509)*

- *WaveStar BandWidth Manager, Release 1.3.20, Software Release Description (108688235)*

2

If...	Then...
Initial installation,	go to Step 3.
Upgrade/change, accessing software CD-ROM to CIT to PCMCIA card	go to Step 4.
Upgrade/change, accessing software by another method	go to Step

3 Refer to and perform the appropriate software procedure (initial installation) according to *WaveStar BandWidth Manager, Installation Manual, 365-370-100* .

STOP! End of Task.

4 Refer to and perform the appropriate software procedure (upgrade/change) per the Software Release Description.

STOP! End of Task.

5 Refer to and perform the appropriate software procedure (upgrade/change) per the Software Release Description, but substitute a file transfer method described in Task 249.

END OF STEPS



Task 203: Loop Back Circuit(s) for Testing

Purpose Use this procedure to perform a cross-connect loopback on the following out-of-service circuits in an in-service WaveStar BandWidth Manager:

- DS3 and EC-1
- OC-3/STM-1
- STM-1e
- OC-12/STM-4
- OC-48/STM-16
- OC-192/STM64.

Each new circuit in the network must be looped back individually.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap
- SONET/SDH transmission Test Set.

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if the beam is viewed directly or with improper optical instruments. Avoid direct exposure to beam.

**CAUTION**

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

**CAUTION**

Comply with the proper transmission levels at the local cross-connect before applying a test signal.

Related information For related information, see the following sections in this document:

- *Chapter 7, Provisioning, Security, and Administration*
- *Operation Task T 209, Release Looped Back Circuit(s)*
- *Appendix A, CIT Tutorial.*

Before you begin Before you begin this task:

- Obtain the work instructions for this task and note the assigned addresses (AIDs).
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to perform a cross-connect loopback on an out-of-service circuit in an in-service WaveStar BandWidth Manager system.

-
- 1** At the WaveStar CIT, select **Fault>Analysis>Cross-Connect Loopback...**

Result: The Crossconnect Loopback screen appears.

- 2** Open the bay, shelf, circuit pack, port, and tributary details by clicking on the plus (+) sign next to each entity.



CAUTION

Traffic and service interruption can occur to other tributaries if they are accidentally looped back. Recheck the address (AID) of the tributary being looped back. Do not perform cross-connect loopbacks on tributaries with existing cross-connections.

- 3 Highlight the required tributary and click on **Select**.

Result: The Cross Connect Loopback screen appears.

Important! A cross-connect loopback remains in effect until deactivated.

- 4 Select the Loopback Rate, verify the information on the screen, and click on **Operate**.

Result: A dialog box appears asking you to confirm executing this command.

-
- 5 Repeat Step 1 through Step 4 for any remaining tributaries.

-
- 6 The tributary(ies) is now looped back. To verify, select **View>Loopback...**, highlight the tributary AID, and click on **Select**.



CAUTION

Comply with the proper transmission levels at the local cross-connect before applying a test signal.

Important! If any optical connections are broken, clean the fiber connectors before reconnecting. Refer to Supporting Task T 703.

- 7 To confirm the loopback, connect a test set to the line at the local cross-connect. Transmit the appropriate interface signal to the IN port for the selected tributary and measure the interface signal received from the OUT port. Confirmation occurs when the test set shows error free transmission.

END OF STEPS



Task 205: Manually Back Up Database to WaveStar CIT (Release 3.0 and Earlier)

Purpose Use this procedure to develop a detailed method of procedure per local operating instructions to manually back up the network element database (current NE data) to the WaveStar CIT:

- Before/after major provisioning data changes
- Periodically according to local policy.

Important! Changes to the network element software generic and database are covered in the applicable Software Release Description document for the current software generic. This document should be reviewed prior to doing this task for any detailed procedures or cautions that may apply to software management of the generic running on your system.

Required privilege codes A privilege code of at least S4 is required to backup the network element database. A privilege code of at least S1 is required to view the Database Info screen.

Required equipment The following equipment is required to perform this task:

- WaveStar CIT
- WaveStar BandWidth Manager Release 3.0 or earlier software.

Important! If the system is equipped with Release 3.1 or later software, refer to *Operation Task T 239, Manually Back Up Database To WaveStar CIT (Release 3.1 and Later)*.

Safety precautions

To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.

**CAUTION**

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

Related information

For related information, see the following sections in this document:

- *Chapter 7, Provisioning, Security, and Administration*
- *Operation Task T 206, Manually Restore Database From WaveStar CIT (Release 3.0 and Earlier)*
- *Appendix A, CIT Tutorial.*

Before you begin

Before you begin this task:

- Obtain the work instructions for this task.
- Review the applicable software release description for any detailed procedures or cautions that may apply to software management of the generic running on your system.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following steps to manually back up the network element database (current NE data) to the WaveStar CIT in systems with Release 3.0 or earlier software.

-
- 1** At the WaveStar CIT, select **Configuration>Software>Remote Backup...**

Result: A dialog box appears showing that the PRI database will back up to *C:\Program Files\Lucent Technologies\Wavestar CIT\backups\TID\Release#\YYMMDDHHMMSS* and asking if you wish to continue.

- 2** Record the path/destination of the backup folder/files and click on **Yes**.

Result: The NE Data Backup in Progress screen appears.

- 3** When the NE Data Backup in Progress screen disappears and the backup is complete, select **View>NE Data...**

Result: The Select Database screen appears.

- 4** Expand the **Look In:** field by clicking on the down arrow and click on **CIT**.

Result: The Select Database screen for the CIT appears.

- 5** Double click on the latest (modified) backup folder, and click on **OK**.

Result: The Database Info screen appears.

-
- 6** Verify that the Last Backup Time and Last Backup Destination parameters are correct and click on **Close**.

E N D O F S T E P S



Task 206: Manually Restore Database From WaveStar CIT (Release 3.0 and Earlier)

Purpose Use this procedure to develop a detailed method of procedure per local operating instructions to manually restore the network element database (NE data) from the WaveStar CIT after a known or suspected database corruption.

Important! Changes to the network element software generic and database are covered in the applicable Software Release Description document for the current software generic. This document should be reviewed prior to doing this task for any detailed procedures or cautions that may apply to software management of the generic running on your system.

Required privilege codes A privilege code of at least S4 is required to restore the network element database. A privilege code of at least S1 is required to view the Database Info screen.

Required equipment The following equipment is required to perform this task:

- WaveStar CIT
- WaveStar BandWidth Manager Release 3.0 or earlier software.

Important! If the system is equipped with Release 3.1 or later software, refer to *Operation Task T 242, Manually Restore Database From WaveStar CIT (Release 3.1 and Later)*.

Safety precautions

To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.

**CAUTION**

Restoring the database can be service-affecting. If provisioning changes were made after the last backup files were created, examine the history log and use the appropriate WaveStar CIT commands to manually apply the recent provisioning changes to the just-restored database.

**CAUTION**

Depending on the number of database changes that have occurred since the last backup, manually applying recent changes after a restore can be a time-intensive process. Make absolutely sure that a restore is necessary before performing this task.

**CAUTION**

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system, to prevent electrostatic discharge damage to sensitive components.

Related information

For related information, see the following sections in this document:

- *Chapter 7, Provisioning, Security, and Administration*
- *Operations Task T 205, Manually Back Up Database to WaveStar CIT (Release 3.0 and Earlier)*
- *Appendix A, CIT Tutorial*

Before you begin

Before you begin this task:

- Review the applicable software release description for any detailed procedures or cautions that may apply to software management of the generic running on your system.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following to manually restore the network element database (NE data) from the WaveStar CIT to primary memory in systems with Release 3.0 or earlier software:

-
- 1 At the WaveStar CIT, select **Fault>Enter/Exit Maintenance Condition....**

Result: The Enter/Exit Maintenance Condition screen appears.

- 2 View the Enter/Exit Maintenance Condition screen.

If the current maintenance condition is...	Then click on...
on,	Close , and go to Step 3.
off,	Enter Maintenance Condition.... , and go to Step 3. Result: A dialog box appears asking you to confirm entering the Maintenance Condition.

- 3 Select **Configuration>Software>Remote Restore....**

Result: The Restore Database screen appears.

- 4 Expand the **Look In:** field by clicking on the down arrow, and click on **CIT**.

Result: The Restore Database screen for the CIT appears.



CAUTION

Be careful to select the correct backup files to restore to network element. The WaveStar CIT compares the target identifier (TID) of the selected backup files with the network element TID. If the TIDs do not match, the WaveStar CIT displays an error message and the restore command is denied.

- 5 Double click on the database to be restored, and click on **Restore**.

Result: Two dialog boxes appear asking if you wish to continue. Click on **YES**, and the NE Data Restore in Progress screen appears. The database is copied into the *previous* folder of primary memory, and the system performs a reset. During the reset, the database is copied into the *current* folder of primary memory and becomes active. During the reset, the system automatically disconnects the WaveStar CIT.

-
- 6 Log in to the WaveStar BandWidth Manager system.

Reference: Operation Task T 223

-
- 7 Select **View>NE Data...**

Result: The Select Database screen appears.

-
- 8 Expand the **Look In:** field by clicking on the down arrow, and click on **NE TID**.

Result: The Restore Database screen for the system appears.

-
- 9 Double click on **Current**.

Result: The Database Info screen appears.

-
- 10** Verify that the Last Restore Time and Last Restore Source parameters are correct, and click on **Cancel**.

END OF STEPS



Task 207: Replace Fan Filter

- Purpose** Use this procedure:
- Every 6 months, as part of routine fan maintenance
 - When instructed to do so as part of a trouble-clearing task.



CAUTION

*If you are performing this task in response to an alarm, you **MUST** start from the trouble-clearing task associated with that alarm. Though performing this task may be referenced as part of the trouble-clearing process, there will be other information in the trouble-clearing task that is specific and **CRITICAL** to clearing the trouble.*

- Required equipment** The following equipment is required to perform this task:
- WaveStar Craft Interface Terminal (CIT)
 - Wrist strap.

- Safety precautions** To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager product, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

- Related information** For related information, see the following sections in this document:
- Chapter 3, “Platform Description”
 - Chapter 4, “Operations Interfaces”

Before you begin Before you begin this task, obtain the work instructions for this task, and note the assigned addresses (AIDs).

Task Complete the following steps to replace a fan filter.

.....

1 Obtain a replacement fan filter.

.....

2 If required, remove the shelf cover.

Reference: T 705

.....

3 Remove the fan filter by grasping the two pull tabs and pulling the fan filter out of the shelf.

.....

4 Insert the replacement fan filter into the shelf so that the two pull tabs are positioned at the front of the shelf.

.....

5 Replace the shelf cover.

Reference: T 705

.....

6 Discard the dirty fan filter.

.....

END OF STEPS

.....



Task 208: Verify Receive Path Trace

Purpose Use this procedure as part of the routine (preventive) maintenance of a system. The frequency of performing this task is left to the discretion of the user, based on the particular system being maintained. The purpose of this task is to ensure that the receive path traces for a tributary match the expected path trace (as defined in the work instructions/office records).

Discrepancies between the receive path trace and the work instructions do not necessarily indicate an immediate problem. However, the importance of following the work instructions for path traces lies in distributing network traffic evenly. Noncompliance with work instructions can result in poor utilization of system resources and affect quality of service.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap.

Safety precautions In order to assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand all warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

Related information For related information, see the following sections in this document:

- Chapter 2, “Maintenance/Trouble Clearing” in *WaveStar BandWidth Manager Alarm Messages and Trouble-Clearing Guide*, 365-370-110,
- Chapter 4, “Operations Interfaces”
- Task 314, “Circuit Order/Provisioning”
- Appendix A, “CIT Tutorial”.

Before you begin

Before you begin this task:

- Obtain the work instructions for this task, and note the assigned addresses (AIDs) and provisioned path trace character string.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following steps to verify the provisioned path trace(s).

-
- 1** From the work instructions/office records, determine the path trace character string to be observed for each path to be verified. (Path is between the source and destination network elements.)

.....

2

If the assigned AID is a...	Then retrieve the provisioned path trace character string for the...
DS3 or EC-1 port,	port. Reference: “Retrieve the Provisioned Path Trace for a DS3 or EC-1 Port” (-4)
OC-3/STM-1, OC-12/STM-4, OC-48/STM-16, or OC-192/STM-64 tributary,	tributary. Reference: “Retrieve the Provisioned Path Trace for an OC-3/STM-1, OC-12/STM-4, OC-48/STM-16, or OC-192/STM-64 Tributary” (-5)

-
- 3** Compare the **STS/VC Path Trace (J1 Byte)** character string (obtained in the previous step) with the path trace character string from the work instructions/office records, and make a note of any differences.

4

If...	Then...
additional paths are to be verified,	click on Close , and go to Step 1.
no additional paths are to be verified,	click on Close .

END OF STEPS



**SE 208-1: Retrieve the Provisioned Path Trace
for a DS3 or EC-1 Port**

- Task** Perform the following steps to retrieve the provisioned value of the path trace character string for a DS3 or EC-1 port.
-

1

At the WaveStar CIT, select **Fault>Analysis>View Current DS3 Maintenance Signal....**

.....

2

Open the bay, shelf, circuit pack, and port details by clicking on the plus (+) sign next to each entity.

.....

3

Highlight the required DS3 or EC-1 port and click on **Select**.

Result: The *View Current DS3 Maintenance Signal* screen appears.

.....

4

Observe the **STS Path Trace (J1 Byte)** character string.

.....

END OF STEPS

☐

T 2 0 8 - 4

365-370-109 R4.1
Issue 7, October 2001

SE 208-2: Retrieve the Provisioned Path Trace for an OC-3/STM-1, OC-12/STM-4, OC-48/STM-16, or OC-192/STM-64 Tributary

Task Perform the following steps to retrieve the provisioned value of the path trace character string for an OC-3/STM-1, OC-12/STM-4, OC-48/STM-16 or OC-192/STM-64 tributary.

1 At the WaveStar CIT, select **Fault>Analysis>View Current Optical Maintenance Signal...**

2 Open the bay, shelf, circuit pack, port, and tributary details by clicking on the plus (+) sign next to each entity.

3 Highlight the required tributary and click on **Select**.

Result: The *View Current Optical Maintenance Signal* screen appears.

4 Observe the **STS Path Trace (J1 Byte)** character string.

END OF STEPS



Task 209: Release Looped Back Circuit(s)

Purpose Use this procedure to release a cross-connect loopback on the following out-of-service circuits in an in-service WaveStar BandWidth Manager system:

- DS3
- EC-1
- OC-3/STM-1
- STM-1e
- OC-12/STM-4
- OC-48/STM-16
- OC-192/STM64.

Each looped back circuit in the network must be released individually.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap.

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.

Recheck the address (AID) of the tributary being looped back.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system, to prevent electrostatic discharge damage to sensitive components.

- Related information** For related information, see the following sections in this document:
- *Chapter 7, Provisioning, Security, and Administration*
 - *Operations Task T 203, Loop Back Circuit(s) for Testing*
 - *Appendix A, CIT Tutorial.*

- Before you begin** Before you begin this task:
- Obtain the work instructions for this task, and note the assigned addresses (AIDs).
 - Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to release a cross-connect loopback on a circuit(s).

-
- 1** At the WaveStar CIT, select **Fault>Analysis>Cross-Connect Loopback....**

Result: The Cross-Connect Loopback screen appears.

- 2** Open the bay, shelf, circuit pack, port, and tributary details by clicking on the plus (+) sign next to each entity.
-

- 3** Highlight the required tributary and click on **Select**.

Result: The Cross-Connect Loopback screen appears.

- 4** Verify the information on the screen (Tributary AID, Port Type/Rate, Loopback Rate, Cross-Connect Status, Cross-Connect Loopback Status, and the Test Access Status) and click on **Release**.

Important! Pay particular attention to the Tributary AID, Cross-Connect Status, and the Test Access Status.

- 5** Repeat Step 1 through Step 4 for any remaining tributaries.

-
- 6** The tributary(ies) is released from the looped back condition. To verify, select **View>Loopback...**, highlight the tributary AID, and click on **Select**.

END OF STEPS



Task 210: Create New Test Access Session in the MON(E, F, or EF) Mode

Purpose Use this procedure to create a new test access session in the following test access modes:

- MONE
- MONF (Release 3.1 and later)
- MONEF.

A new test access session can be created only in the MONE, MONF, or MONEF test access mode initially. To change the test access mode of an existing test access session, refer to *Operation Task T 212, Modify the Test Access Mode of a Test Access Session*.

In Release 3.1 and earlier releases, test access cross-connections must be made in the main switch fabric. Therefore, test access is not supported on tributaries that are part of:

- Bidirectional line-switched rings (BLSR)/multiplex section shared protection rings (MS-SPRing) and unidirectional path-switched ring (UPSR)/sub-network connection protection (SNCP) through cross-connections
- UPSR/SNCP path-protected cross-connections.

In Release 4 and later releases, test access supports on-shelf cross-connections.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap.

Safety precautions

To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.

**CAUTION**

Traffic and service interruption can occur on tributaries if they are accidentally tested. Recheck the address (AID) of the tributary(ies) being tested and the test access tributary(ies).

**CAUTION**

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

Related information

For related information, see the following sections in this document:

- *Operation Task T 211, Create New Test Access Session in the SPLT(A, B, E, F, AB, or EF) Mode*
- *Operation Task T 212, Modify the Test Access Mode of a Test Access Session*
- *Operation Task T 213, Delete a Test Access Session*
- *Operation Task T 222, View Test Access Session(s)*
- *Appendix A, WaveStar CIT Tutorial.*

For related information in *WaveStar BandWidth Manager Alarm Messages and Trouble-Clearing Guide*, 365-370-110, see Chapter 2, “Maintenance/Trouble Clearing”.

Before you begin

Before you begin this task:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the test access mode, rate, and the assigned addresses (AIDs) of the tributary(ies) to be tested and the test access tributary(ies). (Refer to *WaveStar BandWidth Manager Alarm Messages and Trouble-Clearing Guide*, 365-370-110, Chapter 2, “Maintenance/Troubleclearing” for a list of supported test access rates, test access tributaries, and ports.)
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following steps to create a new test access session in the MON(E, F, or EF) test access mode.

-
- 1 At the WaveStar CIT, select **Fault>Analysis>Test Access**.

Result: The *Test Access Wizard* screen appears.

-
- 2 Click on **Create** a new test access session, then click on **Next**.

-
- 3 Follow the directions in the remaining *Test Access Wizard* screens to create a new test access session in the MON(E, F, or EF) test access mode.

Reference: “MON(E, F, and EF) Test Access Modes” (-5)

-
- 4 Verify the test access session parameters, then click on **Finish** at end of the *Test Access Wizard* screens.

Important! A test access session remains in effect until deleted.

Result: A Dialog box appears asking you to confirm creating a new test access session in the MON(E, F, or EF) test access mode. Click on **Yes**, and the *Test Access Wizard* screen appears.

5 Click on **View existing test access sessions**, then click on **Next**.

6 Use the **Browse** button to select a shelf, circuit pack, port, or tributary.

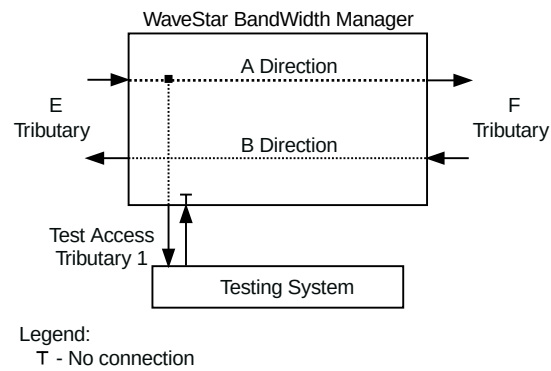
Follow the directions in the remaining *Test Access Wizard* screens, and verify that the test access session was created. Then click on **Finish**.

END OF STEPS



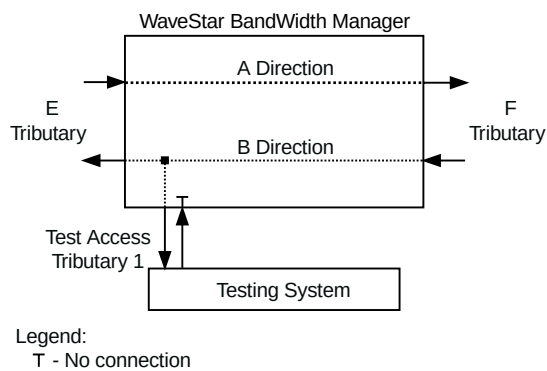
SE 210-1: MON(E, F, and EF) Test Access Modes

MONE Test Access Mode



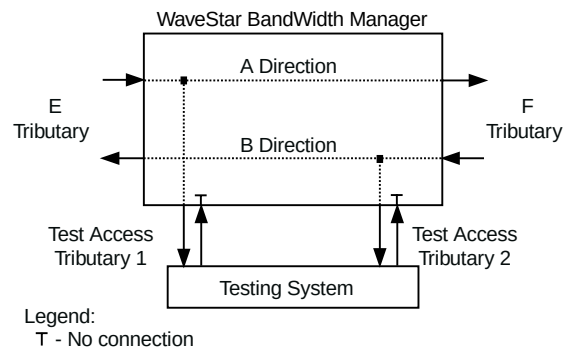
NC-USM-147

MONF Test Access Mode



NC-USM-258

MONEF Test Access Mode



NC-USM-144



Task 211: Create New Test Access Session in the SPLT(A, B, E, F, AB, or EF) Mode

Purpose Use this procedure to create a new test access session in the following test access modes:

- SPLTA (Release 3.1 and later)
- SPLTB (Release 3.1 and later)
- SPLTE
- SPLTF (Release 3.1 and later)
- SPLTAB (Release 3.1 and later)
- SPLTEF (Release 3.1 and later).

A new test access session must be created in the MON(E, F, or EF) test access mode initially and then changed:

- From MON(E or F) to SPLT(A, B, E, F)
- From MONEF to SPLT(AB or EF).

In Release 3.1 and earlier releases, test access cross-connections must be made in the main switch fabric. Therefore, test access is not supported on tributaries that are part of:

- Bidirectional line-switched rings (BLSR)/multiplex section shared protection rings (MS-SPRing) and unidirectional path-switched ring (UPSR)/sub-network connection protection (SNCP) through cross-connections
- UPSR/SNCP path-protected cross-connections.

In Release 4 and later releases, test access supports on-shelf cross-connections.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap.

Safety precautions

To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.

**CAUTION**

Traffic and service interruption can occur on tributaries if they are accidentally tested. Recheck the address (AID) of the tributary(ies) being tested and the test access tributary(ies).

**CAUTION**

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

Related information

For related information, see the following sections in this document:

- Operations Task T 210, “Create New Test Access Session in the MON(E, F, or EF) Mode”
- Operations Task T 212, “Modify the Test Access Mode of a Test Access Session”
- Operations Task T 213, “Delete a Test Access Session”
- Operations Task T 222, “View Test Access Session(s)”
- Appendix A, “CIT Tutorial”.

For related information in *WaveStar BandWidth Manager Alarm Messages and Trouble-Clearing Guide, 365-370-110*, see Chapter 2, “Maintenance/Trouble Clearing”.

Before you begin

Before you begin this task:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the test access mode, rate, and the assigned addresses (AIDs) of the tributary(ies) to be tested and the test access tributary(ies). (Refer to *WaveStar BandWidth Manager Alarm Messages and Trouble-Clearing Guide, 365-370-110*, Chapter 2, “Maintenance/Trouble Clearing” for a list of supported test access rates, test access tributaries, and ports.)
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following steps to create a new test access session in the SPLT(A, B, E, F, AB, or EF) test access mode.

-
- 1 At the WaveStar CIT, select **Fault>Analysis>Test Access**.

Result: The *Test Access Wizard* screen appears.

Important! A new test access session must be created in the MON(E, F, or EF) test access mode initially and then modified.

- 2 Click on **Create a New Test Access Session**, then click on **Next**.

- 3

If a test access session is required in the...	Then follow the directions in the remaining screens to create a new test access session in the...
SPLTA, SPLTB, SPLTE, or SPLTF test access mode,	MONE or MONF test access mode. Reference: “SPLT(A, B, E, F, AB, and EF) Test Access Modes” (-5)
SPLTAB or SPLTEF test access mode,	MONEF test access mode. Reference: “SPLT(A, B, E, F, AB, and EF) Test Access Modes” (-5)

Important! A test access session remains in effect until deleted.

- 4** Verify the test access session parameters, then click on **Finish** at the end of the *Test Access Wizard* screens.

Result: A Dialog box appears asking you to confirm creating a new test access session in the MON(E, F, or EF) test access mode. Click on **Yes**, and the *Test Access Wizard* screen appears.

- 5** Modify the test access mode of the test access session created in Step 4 as required from:

- MON(E or F) to SPLT(A, B, E, F)
- MONEF to SPLT(AB or EF).

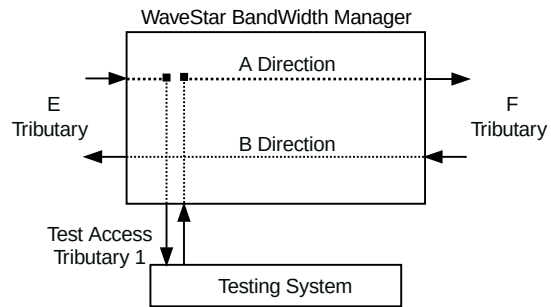
Reference: Operations Task T 212

END OF STEPS



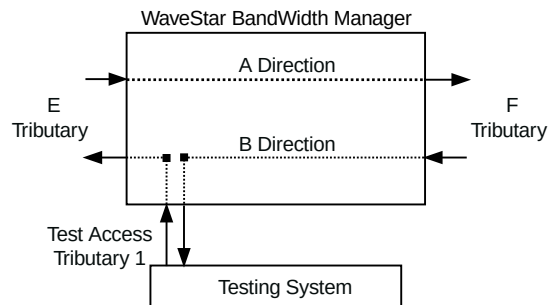
SE 211-1: SPLT(A, B, E, F, AB, and EF) Test Access Modes

SPLTA Test Access Mode



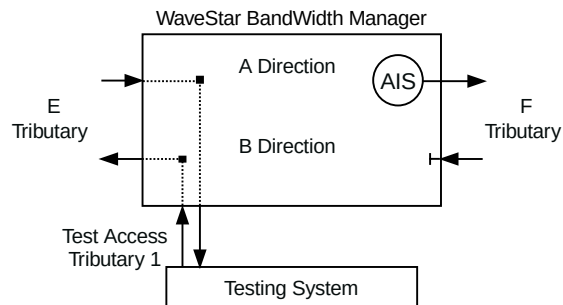
NC-USM-259

SPLTB Test Access Mode



NC-USM-260

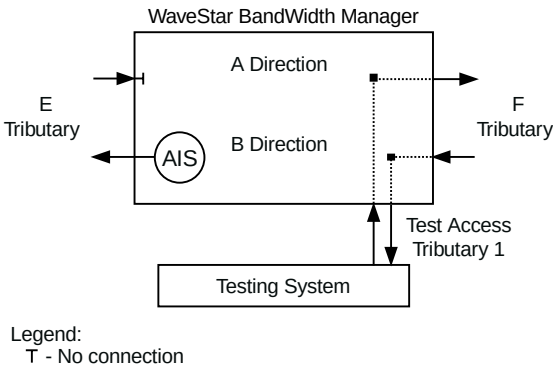
SPLTE Test Access Mode



Legend:
T - No connection

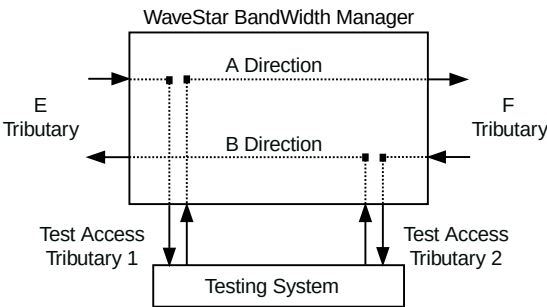
NC-USM-146

SPLTF Test Access Mode



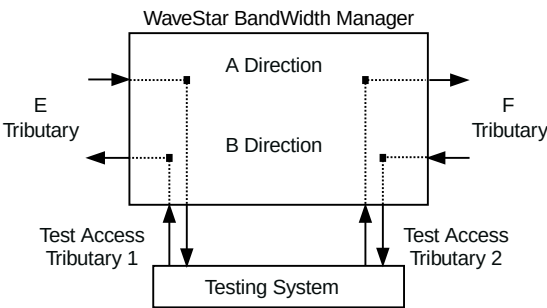
NC-USM-261

SPLTAB Test Access Mode



NC-USM-262

SPLTEF Test Access Mode



NC-USM-145



Task 212: Modify the Test Access Mode of a Test Access Session

- Purpose** Use this procedure to change the test access mode of a test access session among the following groups of test access modes:
- MONE, MONF (Release 3.1 and later), SPLTE, SPLTF (Release 3.1 and later), SPLTA (Release 3.1 and later), or SPLTB (Release 3.1 and later)
 - MONEF, SPLTEF, or SPLTAB (Release 3.1 and later).

- Required equipment** The following equipment is required to perform this task:
- WaveStar Craft Interface Terminal (CIT)
 - Wrist strap.

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Traffic and service interruption can occur on tributaries if they are accidentally tested. Recheck the address (AID) of the tributary(ies) being tested and the test access tributary(ies).



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

- Related information** For related information, see the following sections in this document:
- Operations Task T 210, “Create New Test Access Session in the MON(E, F, or EF) Mode”
 - Operations Task T 211, “Create New Test Access Session in the SPLT(A, B, E, F, AB, or EF) Mode”

- Operations Task T 213, “Delete a Test Access Session”
- Operations Task T 222, “View Test Access Session(s)”
- Appendix A, “CIT Tutorial”.

For related information in *WaveStar BandWidth Manager Alarm Messages and Trouble-Clearing Guide*, 365-370-110, see Chapter 2, “Maintenance/Trouble Clearing”.

Before you begin Before you begin this task:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the test access mode, rate, and the assigned addresses (AIDs) of the tributary(ies) to be tested and the test access tributary(ies).
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to modify the test access mode of a test access session.

-
- 1** At the WaveStar CIT, select **Fault>Analysis>Test Access**.

Result: The *Test Access Wizard* screen appears.

-
- 2** Click on **Modify** an existing test access session’s mode, then click on **Next**.

Important! In Release 3.0 and earlier releases, the test access mode changes are limited between MONE and SPLTE, and between MONEF and SPLTEF. The system changes between the test access modes automatically.

- 3** Follow the directions in the remaining *Test Access Wizard* screens to modify the test access mode of a test access session.

Important! The test access session remains in effect until deleted.

- 4 Verify the test access session parameters, then click on **Finish** at the end of the *Test Access Wizard* screens.

Result: A dialog box appears asking you to confirm modifying the test access mode. Click on **Yes** and the *Test Access Wizard* screen appears.

- 5 Click on **View existing test access sessions**, then click on **Next**.
-

- 6 Follow the directions in the remaining *Test Access Wizard* screens, and verify that the test access session was modified. Then click on **Finish**.

Use the **Browse** button to select a shelf, circuit pack, port, or tributary. For more information about parameters on the *Test Access Wizard* screens, select **Help**.

END OF STEPS



Task 213: Delete a Test Access Session

Purpose Use this procedure to delete an existing test access session.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap.

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Recheck the address (AID) of the tributary(ies) being tested and the test access tributary(ies).



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

Related information For related information, see the following sections in this document:

- Operations Task T210, “Create New Test Access Session in the MON(E, F, or EF) Mode”
- Operations Task T 211, “Create New Test Access Session in the SPLT(A, B, E, F, AB, or EF) Mode”
- Operations Task T 212, “Modify the Test Access Mode of a Test Access Session”
- Operations Task T 222, “View Test Access Session(s)”
- Appendix A, “CIT Tutorial”.

For related information in *WaveStar BandWidth Manager, Release 4.0, Alarm Messages and Trouble-Clearing Guide, 365-370-110*, see Chapter 2, “Maintenance/Trouble-Clearing”.

Before you begin

Before you begin this task:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the assigned addresses (AIDs) of the tributary(ies) tested and the test access tributary(ies).
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to delete an existing test access session.

.....

1 At the WaveStar CIT, select **Fault>Analysis>Test Access**.

Result: The *Test Access Wizard* screen appears.

.....

2 Click on **Delete an existing test access session**. Then click on **Next**.

.....

3 Follow the directions in the remaining *Test Access Wizard* screens to delete a test access session.

.....

4 Verify the test access session parameters, then click on **Finish** at end of the *Test Access Wizard* screens.

Result: A dialog box appears asking you to confirm deleting the test access session. Click on **Yes**, and the *Test Access Wizard* screen appears.

.....

5 Click on **View existing test access sessions**. Then click on **Next**.

.....

Important! Use the **Browse** button to select a shelf, circuit pack, port, or tributary.

6 Follow the directions in the remaining *Test Access Wizard* screens, and

.....

verify that the test access session was deleted. Then click on **Finish**.

END OF STEPS



Task 214: Manually Back Up Database to Secondary Memory (Release 3.0)

Purpose Use this procedure to develop a detailed method of procedure per local operating instructions to manually back up the network element database (current NE data) to the secondary memory:

- Before/after major provisioning data changes
- Periodically according to local policy.

When primary memory is backed up to secondary memory only data files that are required to reboot the system are copied. The log files are not copied from primary memory to secondary memory. This minimizes reboot time (high priority) when the secondary memory is used to reboot the system. Therefore, the contents of primary memory and secondary memory are different and disk utilization is not the same.

Important! Changes to the network element software generic and database are covered in the applicable Software Release Description document for the current software generic. This document should be reviewed prior to doing this task for any detailed procedures or cautions that may apply to software management of the generic running on your system.

Required privilege codes A privilege code of at least S4 is required to backup the network element database. A privilege code of at least S1 is required to view the Database Info screen.

Required equipment The following equipment is required to perform this task:

- WaveStar CIT
- WaveStar BandWidth Manager Release 3.0 software.

Important! If the system is equipped with Release 3.1 or later software, refer to *Operation Task T 240, Manually Back Up Database To Secondary Memory (Release 3.1 and Later)*.

If a new PCMCIA flash disk is used, the disk must be reformatted (Label field must be blank) and scanned for disk errors before use. Refer to *Operation Task T 246, Prepare New PCMCIA Flash Disk(s)*.

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

Related information For related information, see the following sections in this document:

- *Chapter 7, Provisioning, Security, and Administration*
- *Operation Task T 215, Manually Restore Database From Secondary Memory to Network Element (Release 3.0)*
- *Operation Task T 246, Prepare New PCMCIA Flash Disk(s)*
- *Appendix A, CIT Tutorial.*

Before you begin

Before you begin this task:

- Obtain the work instructions for this task.
- Review the applicable software release description for any detailed procedures or cautions that may apply to software management of the generic running on your system.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following steps to manually back up the network element database (current NE data) to the secondary memory in systems with Release 3.0 software.

-
- 1** At the WaveStar CIT, select **Configuration>Software>Copy NVM....**

Result: The Copy NVM screen appears.

- 2** Select the *Type of Data* to be backed up (**Data**), the *Type of Copy* to be performed (**Active Primary to Secondary**), and click on **OK**.

Result: A dialog box appears asking you to confirm copying the active primary NVM to secondary NVM. Click on **Yes** and the Copy screen appears.

- 3** When the Copy screen disappears, select **View>NE Data...**

Result: The Select File screen appears.

- 4** Expand the **Look In:** field by clicking on the down arrow and click on the network element TID (target identifier).

Result: The Select Database screen appears.

- 5** Double click on **Secondary**.

Result: The Database Info screen appears.

-
- 6** Verify that the Last Backup Destination and Last Local Backup Time parameters are correct and click on **Close**.

E N D O F S T E P S



Task 215: Manually Restore Database From Secondary Memory (Release 3.0)

Purpose Use this procedure to develop a detailed method of procedure per local operating instructions to manually restore the network element database (NE data) from the secondary memory after a known or suspected database corruption.

Important! Changes to the network element software generic and database are covered in the applicable Software Release Description document for the current software generic. This document should be reviewed prior to doing this task for any detailed procedures or cautions that may apply to software management of the generic running on your system.

Required privilege codes A privilege code of at least S4 is required to restore the network element database. A privilege code of at least S1 is required to view the Database Info screen.

Required equipment The following equipment is required to perform this task:

- WaveStar CIT
- WaveStar BandWidth Manager Release 3.0 software.

Important! If the system is equipped with Release 3.1 or later software, refer to *Operation Task T 243, Manually Restore Database From Secondary Memory (Release 3.1 and Later)*.

Safety precautions

To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Restoring the database can be service-affecting. If provisioning changes were made after the last backup files were created, examine the history log and use the appropriate WaveStar CIT commands to manually apply the recent provisioning changes to the just-restored database.



CAUTION

Depending on the number of database changes that have occurred since the last backup, manually applying recent changes after a restore can be a time-intensive process. Make absolutely sure that a restore is necessary before performing this task.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system, to prevent electrostatic discharge damage to sensitive components.

Related information

For related information, see the following sections in this document:

- *Chapter 7, Provisioning, Security, and Administration*
- *Operation Task T 214, Manually Back Up Database to Secondary Memory (Release 3.0)*
- *Appendix A, CIT Tutorial*

Before you begin

Before you begin this task:

- Review the applicable software release description for any detailed procedures or cautions that may apply to software management of the generic running on your system.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following to manually restore the network element database (NE data) from the secondary memory to primary memory in systems with Release 3.0 software:

-
- 1 Locate the PCMCIA flash disks that have been used for backing up the network element database. Verify that each PCMCIA flash disk has a unique label or identifier that corresponds to the system being restored.

-
- 2 Verify the contents of the PCMCIA flash disk(s).

Reference: SE 215-1



CAUTION

Be careful to select the correct backup PCMCIA flash disk to use in the network element database restoration. If an incorrect PCMCIA flash disk is selected, service may be affected.

- 3 Determine which PCMCIA flash disk to use to restore the network element database.

-
- 4 If required, insert the PCMCIA flash disk into the CTL/MEM circuit pack in the SECMEM slot.

Reference: Supporting Task T 702

-
- 5 At the WaveStar CIT, select **Fault>Enter/Exit Maintenance Condition...**

Result: The Enter/Exit Maintenance Condition screen appears.

6 View the Enter/Exit Maintenance Condition screen.

If the current maintenance condition is...	Then click on...
on,	Close , and go to Step 7.
off,	Enter Maintenance Condition... , and go to Step 7. Result: A dialog box appears asking you to confirm entering the Maintenance Condition. Click on Yes .

7 Select **Configuration>Copy>NVM....**

Result: The WBM-Copy NVM screen appears.

8 Select the *Data Type* to be copied (**Data**) and the *Type of Copy* to be performed (**Secondary to Active Primary**). Verify the *Restoration Option* (**Include Restore**) is selected and click on **OK**.

Result: A dialog box appears asking you to confirm copying and restoring the contents of secondary memory to primary memory. Click on **YES**, and the NE Data Restore in Progress screen appears. The database is copied into the *previous* folder of primary memory, and the system performs a reset. During the reset, the database is copied into the *current* folder of primary memory and becomes active. During the reset, the system automatically disconnects the WaveStar CIT.

9 Log in to the WaveStar BandWidth Manager system.

Reference: Operation Task T 223

10 Select **View>NE Data...**

Result: The Select Database screen appears.

-
- 11** Expand the **Look In:** field by clicking on the down arrow, and click on **NE TID**.

Result: The Restore Database screen for the system appears.

- 12** Double click on **Current**.

Result: The Database Info screen appears.

- 13** Verify that the Last Restore Source and Last Local Restore Time parameters are correct, and click on **Cancel**.

END OF STEPS



SE 215-1: Verify Contents of PCMCIA Flash Disk(s)

Procedure Perform the following steps to verify the contents of the backup PCMCIA flash disk(s).

1

IF the CTL/MEM circuit pack in the SECMEM slot is ...	THEN go to ...
equipped with a PCMCIA flash disk,	Step 3.
not equipped with a PCMCIA flash disk,	Step 2.

2 Insert a PCMCIA flash disk into the CTL/MEM circuit pack in the SECMEM slot.

Reference: Supporting Task T 702

3 At the WaveStar CIT, select **View>NE Data...**

Result: The Select Database screen appears.

4 Double click on **Secondary**.

Result: A line of data for *Secondary* appears.

5 Select the line of data for *Secondary* and click on **OK**.

Result: A longer line of data will appear.

6 Find the *Last Local Backup Time* and record this information for the PCMCIA flash disk.

7 Remove the PCMCIA flash disk from the CTL/MEM circuit pack in the SECMEM slot.

Reference: Supporting Task T 702

-
- 8** Repeat Step 2 through Step 7 to verify the contents of the remaining PCMCIA flash disks.

END OF STEPS



Task 216: Change (Your Own) Notification Registration List

- Purpose** Use this procedure to:
- Delete notification types from your own notification registration list.
 - Add notification types (that you previously deleted) to your own notification registration list.

To change the notification registration list for other users, refer to Operations Task T 200, “Modify, Delete, or Add a User’s Login Parameters”.

Required equipment Use the WaveStar Craft Interface Terminal (CIT) to perform this task.

- Related information** For related information, see the following sections in this document:
- Chapter 7, “Provisioning, Security, and Administration”
 - Operations Task T 200, “Modify, Delete, or Add a User’s Login Parameters”
 - Appendix A, “CIT Tutorial”.

- Before you begin** Before you begin this task:
- Obtain the work instructions for this task.
 - Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to change your own notification registration list:

-
- 1** At the WaveStar CIT *System View*, select **Administration>Change Notifications....**

Result: The *Change Notification* screen appears.

- 2** Change the notification registration list as required, and click on **OK**.

END OF STEPS



Task 217: Log Out Other User Session(s)

Purpose Use this procedure to log out:

- An active user session
- All active user sessions.

Important! This task is for administrators only.

Required equipment Use the WaveStar Craft Interface Terminal (CIT) to perform this task.

Related information For related information, see the following sections in this document:

- Chapter 7, “Provisioning, Security, and Administration”
- Appendix A, “CIT Tutorial”.

Before you begin Before you begin this task:

- Obtain a list of the user(s) to be logged out
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to log out other user session(s):

-
- 1** At the WaveStar CIT *System View*, select **Administration>Security>Logout NE User....**

Result: The *Log Out User* screen appears.

- 2**

If logging out...	Then...
one user,	select the desired user, and click on Logout One .
all users,	click on Logout All .

-
- 3** Select **Administration>Security>View Logged-In Users...** to obtain a list of logged-in users and verify that the desired user(s) have been logged out.

END OF STEPS



Task 218: Change Network Element Security Parameters

Purpose Use this procedure to change the value of the:

- User ID Lockout parameters
- User ID Aging parameters.

Important! This task is for administrators only.

Required equipment Use the WaveStar Craft Interface Terminal (CIT) to perform this task.

Related information For related information, see the following sections in this document:

- Chapter 7, “Provisioning, Security, and Administration”
- Appendix A, “CIT Tutorial”.

Before you begin Before you begin this task:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the network element security parameter(s) to be changed and the new value(s).
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to change the network element security parameter(s):

-
- 1** At the WaveStar CIT *System View*, select **Administration>Security>Security Provisioning....**

Result: The *Provision NE Security* screen appears.

-
- 2** Change the network element security parameter(s) according to the work instructions, and click on **OK**.

Result: A dialog box appears asking you to confirm changing the network element security parameters.

END OF STEPS



Task 221: Enable or Disable User Login(s)

- Purpose** Use this procedure to:
- Disable a user's login
 - Disable all user logins
 - Enable a user's login that was previously disabled
 - Enable all user logins.

This task is for administrators only.

Required equipment Use the WaveStar Craft Interface Terminal (CIT) to perform this task.

- Related information** For related information, see the following sections in this document:
- Chapter 7, "Provisioning, Security, and Administration"
 - Appendix A, "CIT Tutorial".

- Before you begin** Before you begin this task:
- Obtain a list of the user login(s) to be enabled or disabled.
 - Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to enable or disable user login(s):

1

If the user login(s) are to be...	Then...
enabled,	go to Step 2.
disabled,	go to Step 4.

2 At the WaveStar CIT *System View*, select **Administration>Security>Enable User Login...**

Result: The *Enable User Login* screen appears.

3

If enabling...	Then...
one user login,	select the user login, and click on Enable only the selected user login . Then click on OK . <i>STOP! End of Task.</i>
all user logins,	click on Enable all the user logins . Then click on OK . <i>STOP! End of Task.</i>

4 At the WaveStar CIT System View, select
Administration>Security>Disable User Login....

Result: The *Disable User Login* screen appears.

5

If disabling...	Then...
one user login,	select the user login, and click on Disable only the selected user login . Then click on OK . <i>STOP! End of Task.</i>
all user logins,	click on Disable all the user logins . Then click on OK .

END OF STEPS



Task 222: View Test Access Session(s)

Purpose	Use this procedure to view an existing test access session(s).
Required equipment	The following equipment is required to perform this task: • WaveStar Craft Interface Terminal (CIT) • Wrist strap.
Safety precautions	To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Recheck the address (AID) of the tributary(ies) being tested and the test access tributary(ies).



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

Related information	For related information, see the following sections in this document: • Operations Task T 210, “Create New Test Access Session in the MON(E, F, or EF) Mode” • Operations Task T 211, “Create New Test Access Session in the SPLT(A, B, E, F, AB, or EF) Mode” • Operations Task T 212, “Modify the Test Access Mode of a Test Access Session” • Operations Task T 213, “Delete a Test Access Session” • Appendix A, “CIT Tutorial”.

For related information in *WaveStar BandWidth Manager Alarm Messages and Trouble-Clearing Guide*, 365-370-110, see Chapter 2, “Maintenance/Trouble Clearing”.

Before you begin Before you begin this task:

-
- Verify that the work instructions identify the assigned addresses (AIDs) of the tributary(ies) tested and the test access tributary(ies).
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to view an existing test access session(s).

.....

1 At the WaveStar CIT, select **Fault>Analysis>Test Access**.

Result: The *Test Access Wizard* screen appears.

.....

2 Click on **View existing test access sessions**, then click on **Next**.

.....

Important! Use the **Browse** button to select a shelf, circuit pack, port, or tributary.

3 Follow the directions in the remaining *Test Access Wizard* screens to view an existing test access session(s). Then click on **Finish**.

.....

END OF STEPS

.....



Task 223: Log in/Log out of Network Element

- Purpose** Use this procedure to:
- Log in to a network element
 - Log out of a network element

- Required equipment** The following equipment is required to perform this task:
- Personal computer (PC) with WaveStar Craft Interface Terminal (CIT) software installed
 - 10BaseT ethernet cable

Important! The PC must meet the minimum requirements stated in Appendix A, “CIT Tutorial.”

- Related information** For related information, see the following sections in this document:
- Chapter 4, “Operations Interfaces”
 - Chapter 7, “Provisioning, Security, and Administration”
 - Appendix A, “CIT Tutorial”

- Before you begin** Before you begin this task:
- If logging in to a network element, obtain a valid login and password for the WaveStar CIT and network element.
 - If logging in to a network element, obtain the target identifier (TID) of the desired network element.

- Task** Complete the following steps to log in or log out of a network element.

1

If...	Then...
logging in to a network element,	go to Step 2.
logging out of a network element,	go to Step 9.

Important! If you encounter difficulty in the following steps, refer to Appendix A, “CIT Tutorial.”

- 2** *Logging in to a Network Element.* Verify that the WaveStar CIT is safely

positioned on the PC tray or safely secured on a cart or table.

-
- 3** If necessary, connect the WaveStar CIT to the network element using a 10BaseT ethernet cable from the PC LAN card to the CIT connector on the User Panel of the System Control Shelf.
-

- 4** If necessary, turn the PC power switch to ON.
-

- 5** Double click on the WaveStar CIT icon (on the PC desktop).

Result: The Login to WaveStar CIT dialog box appears.

Important! The WaveStar CIT default login is LUC01, and the default password is LUC+01.

- 6** Enter a valid login and password, and click on **OK**.

Result: The WaveStar CIT screen appears with the Legal Notice dialog box. Read the legal notice and click **OK**.

Important! The WaveStar CIT attempts to log in to the network element using the same login ID and password that was used to log in to the WaveStar CIT. If the network element login/password and the WaveStar CIT login/password are different, the WaveStar CIT prompts for the network element login and password. The network element default login is LUC01 and the default password is LUC+01.

- 7** Enter a valid target identifier (TID) in the TID field, and click on **System**. Then click on **Connect**.

Result: The network element Legal Notice dialog box appears.

-
- 8** Read the network element legal notice (note the user privilege codes) and click on **OK**.

Result: The network element *System View* screen appears.

STOP! End of Task.

-
- 9** *Logging out of a Network Element.* At the *System View* screen, select **Select File>NE Disconnect**.

Result: A dialog box appears asking you to confirm disconnecting the WaveStar CIT from the network element. Click on **Yes**.

END OF STEPS



Task 224: Change Network Element Date/Time

Purpose	Use this procedure to change the following parameters of the network element: • Date • Time
Required privilege code(s)	A privilege code of at least M1+S4+P3+PM3 is required to change the date and/or time parameter(s). A privilege code of at least M1+P1+S1+PM1 is required to view the date and/or time parameters.
Required equipment	The WaveStar Craft Interface Terminal (CIT) is required to perform this task.
Related information	For related information, see the following sections in this document: • Chapter 7, “Provisioning, Security, and Administration” • Appendix A, “CIT Tutorial”
Before you begin	Before you begin this task: • Obtain the work instructions for this task. • Verify that the work instructions identify the parameter(s) to be changed and the new value(s). • Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.
Task	Complete the following steps to change the network element date and/or time parameter(s): 1 At the WaveStar CIT, select Configuration>Provision... Result: The <i>Provision Parameters for Protection Group or Equipment</i> screen appears. 2 Enter Sys t em in the <i>Enter AID:</i> field or click on WaveStar BandWidth Manager. Then click on Provision.

-
- 3** Change the network element date and/or time parameter(s) according to the work instructions, and click on **Apply**.

Result: A dialog box appears asking you to confirm executing the command. Click on **Yes**.

- 4** Click on **Close** to exit the *Provision Parameters for Protection Group or Equipment* screen.
-

- 5** Select **View>View Equipment Details....**

Result: The *View Equipment Details* screen appears.

- 6** Enter *Sys t em* in the *Enter AID:* field or click on *WaveStar BandWidth Manager*. Then click on **Select**.
-

- 7** Verify that the network element date and/or time parameter(s) was provisioned correctly, and click on **Close**.

END OF STEPS



Task 225: Test Low Voltage Protection Unit (LVPU) or Power Filter with Voltage Protection (LFVP)

Purpose Some shelves have a power filter with a separate Low Voltage Protection Unit (LVPU) and other shelves have a Power Filter with Voltage Protection (LFVP) as a single unit. All LVPUs and some PFVPs have a test button on the front. Some PFVPs have a test button on the rear.

Perform this task once per year or at periodic time intervals that are deemed appropriate locally.

Important! A good time to perform this periodic task would be while the craft is already on-site for the purpose of changing the fan filters.

Required equipment The following list is the minimum set of equipment required to complete this task:

- WaveStar Craft Interface Terminal (CIT)
- Pointed nonconductive tool.

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

To avoid service interruption, make sure both power feeds are supplying power to the shelf before conducting this test.

Task summary The steps below summarize this task.

1. Make sure the NE has no power failure alarm on any shelf.
2. For the A-feed, locate the test button on the front or back of the shelf.
3. Press and hold the test button until fan unit shows a red fail LED.

4. Wait 30 seconds, then verify that the PWR ON LED is lighted. If not, call Technical Support.
5. If the PWR ON LED is lighted, verify that the PWR alarm has cleared. If not, call Technical Support.
6. Repeat steps 2-5 for the B-feed.
7. Repeat the entire process until every shelf is tested.

Example Test Buttons

Figure 0-1 Front Test Button Examples

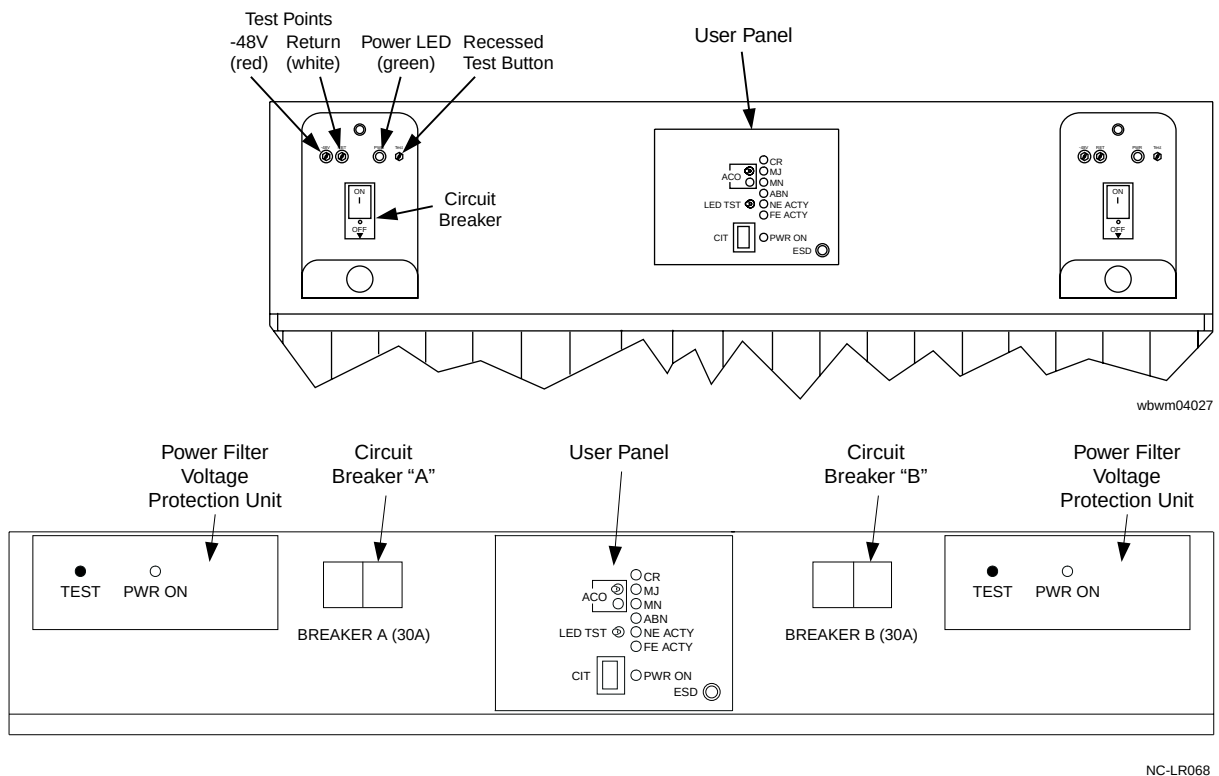
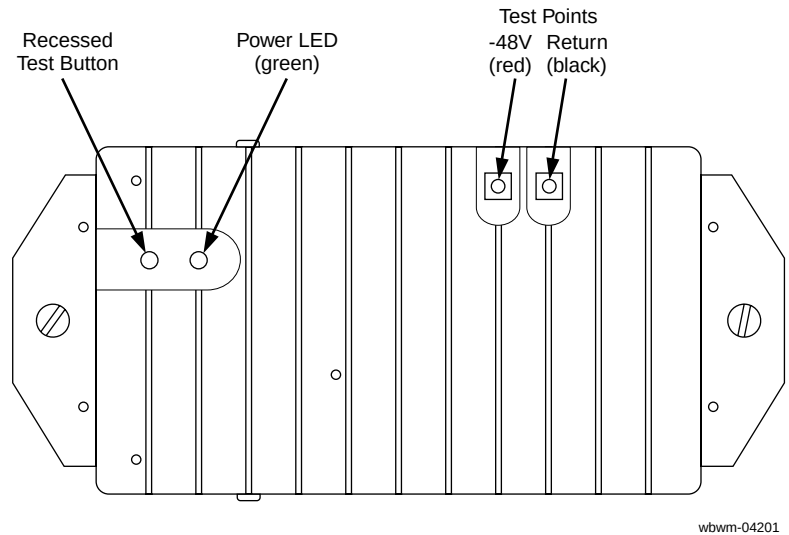
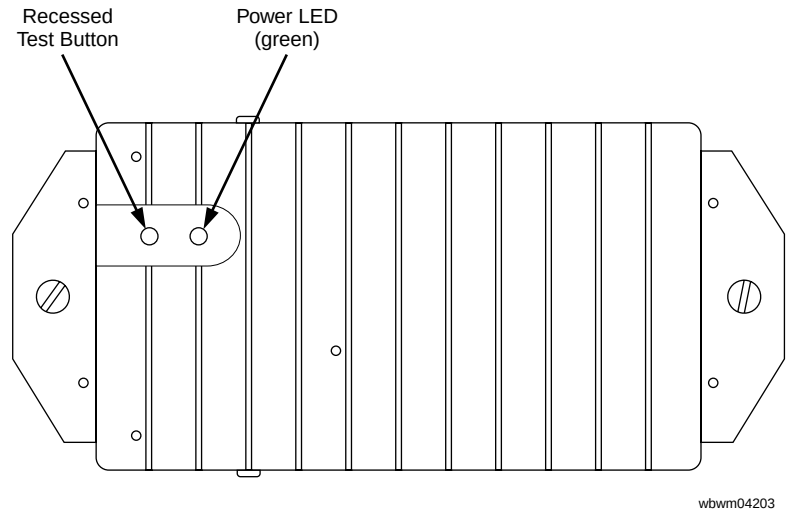


Figure 0-2 Rear Test Button Examples



Task details

Important! Each shelf has two power feeds. They are referred to as A-feed and B-feed. Each feed is monitored with an individual low voltage protection unit (LVPU). Each LVPU contains the following main functional components: (a) voltage monitor circuit, (b) relay, (c) unit test circuit, and (d) green LED (which is labeled PWR ON). The on-site craft can activate the test circuit by pressing (and holding until the fan filters show a red failure LED — approximately 5 seconds) the recessed TEST button. Following successful completion of the LVPU test, the green (PWR ON) LED should light continuously.

Complete the following steps to test the LVPU for correct operation.

- 1 From the *System View* screen, click on the **Alarm List** button. Is there a power failure alarm for this NE?

If...	Then...
YES,	clear this alarm. Reference: T 505
NO,	continue.

- 2 Compare the examples on the previous page to your subject shelf.

If the subject shelf has a test button...	Then...
on the front	continue with Step 3.
on the rear	continue with Step 12.

Important! This test results in a user-induced power failure on the A-feed while the **TEST** button is depressed. Exactly what happens is: (1) for the first second or two, the shelf will exhibit an MN alarm because of the power failure; and (2) once the fan unit indicates a fail, the user panel will show a CR, and the MN will be extinguished. To the on-site craft, this transition from MN to CR is almost transparent because it happens very fast. However, in the alarm log you can see the MN (resulting from the power failure) as it occurs, and then a fan failure will happen approximately one second later.

This test will have completed successfully whenever (a) the PWR ON LED lights continuously, (b) the CR LED is extinguished, and lastly (c) the fans spin at their normal speed.

- 3 *Test the LVPU or LFVP on all shelves with a test button on the front (see Figure 0-1).* Instruct the on-site craft to:

1. Go to the front of the identified bay and shelf.
2. Locate the recessed TEST access hole for the A-feed (front left side of the User Panel next to the green LED).

3. Insert the pointed nonconductive tool into the hole. Press gently and hold until the fan unit (that is associated with this shelf) shows a red fail LED — approximately 5 seconds.
4. Release the test button.

-
- 4 Wait 30 seconds, and ask the on-site craft whether or not the PWR ON LED is lighted. Is the PWR ON LED lighted?

If...	Then...
YES,	continue with Step 5.
NO,	this test failed, and the LVPU or PFVP should be replaced. Escalate to your next higher level of technical support.

-
- 5 From the *System View* screen, click on the **Update Alarms** button.

-
- 6 Has the alarm (Probable Cause = PWR) cleared?

If...	Then...
YES,	continue with Step 7.
NO,	escalate to your next higher level of technical support.

-
- 7 Instruct the on-site craft to:
 1. Locate the recessed TEST access hole for the B-feed (front right side of the User Panel).
 2. Insert the pointed nonconductive tool into the hole. Press gently and hold until the fan unit (that is associated with this shelf) shows a red fail LED — approximately 5 seconds.
 3. Release the test button.

-
- 8** Wait 30 seconds, and ask the on-site craft whether or not the PWR ON LED is lighted. Is the PWR ON LED lighted?

If...	Then...
YES,	continue with Step 9.
NO,	this test failed, and the LVPU or PFVP should be replaced. Escalate to your next higher level of technical support.

-
- 9** From the *System View* screen, click on the **Update Alarms** button.
-

- 10** Has the alarm (Probable Cause = PWR) cleared?

If...	Then...
YES,	continue with Step 11.
NO,	escalate to your next higher level of technical support.

-
- 11** Are there other shelves to be tested?

If...	Then...
YES,	continue with Step 2.
NO,	<i>STOP! End of Task.</i>

Important! For some shelves, the power filter and voltage protection are combined into a single rear-mounted unit. The LED and TEST access hole are both located within the heat-sink area of this unit and adjacent to one another.

This test results in a user-induced power failure on the A-feed while the TEST button is depressed. Exactly what happens is: (1) for the first second or two, the shelf will exhibit an MN alarm because of the power failure; and (2) once the fan unit indicates a

fail, the user panel will show a CR and the MN will be extinguished. To the on-site craft, this transition from MN to CR is almost transparent because it happens very fast. However, in the alarm log you can see the MN (resulting from the power failure) as it occurs, and then a fan failure will happen approximately one second later.

This test will have completed successfully whenever (a) the PWR ON LED lights continuously, (b) the CR LED is extinguished, and lastly (c) the fans spin at their normal speed.

12 Test the LVPU or PFVP on all shelves with a test button on the rear (see Figure 0-2). Instruct the on-site craft to:

1. Go to the rear of the identified bay and shelf.
2. Locate the recessed access hole for the A-feed (rear right side of the shelf).
3. Insert the pointed nonconductive tool into the hole. Press gently and hold until the fan unit (that is associated with this shelf) shows a red fail LED — approximately 5 seconds.
4. Release the test button.

13 Wait 30 seconds, and ask the on-site craft whether or not the PWR ON LED is lighted. Is the PWR ON LED lighted?

If...	Then...
YES,	continue with Step 14.
NO,	this test failed, and the PFVP should be replaced. Escalate to your next higher level of technical support.

14 From the *System View* screen, click on the **Update Alarms** button.

15 Has the alarm (Probable Cause = PWR) cleared?

If...	Then...
YES,	continue with Step 16.

If...	Then...
NO,	escalate to your next higher level of technical support.

16 Instruct the on-site craft to:

1. Locate the recessed access hole for the B-feed (rear left-side of the shelf).
2. Insert the pointed nonconductive tool into the hole. Press gently and hold until the fan unit (that is associated with this shelf) shows a red fail LED — approximately 5 seconds.
3. Release the test button.

17 Wait 30 seconds, and ask the on-site craft whether or not the PWR ON LED is lighted. Is the PWR ON LED lighted?

If...	Then...
YES,	continue with Step 17.
NO,	this test failed, and the PFVP should be replaced. Escalate to your next higher level of technical support.

18 From the *System View* screen, click on the **Update Alarms** button.

19 Has the alarm (Probable Cause = PWR) cleared?

If...	Then...
YES,	continue with Step 19.
NO,	escalate to your next higher level of technical support.

.....

20 Are there other shelves (LVPUs) to be tested?

If...	Then...
YES,	continue with Step 2.
NO,	<i>STOP! End of Task.</i>

.....

END OF STEPS



Task 226: Loop Back Line(s) for Testing

Purpose Use this procedure to perform a nearside facility loopback on the following out-of-service lines in an in-service system:

- DS3
- EC-1
- STM-1e
- OC-3/STM-1
- OC-12/STM-4
- OC-48/STM-16

Important! Nearside facility loopbacks loop the incoming line (at the port) back to the local cross-connect panel.

Required privilege code(s) A privilege code of at least M3+S1+P1 is required to loopback a line(s). A privilege code of at least M1+P1+S1 is required to view the port loopback status.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (WaveStar CIT)
- Wrist strap
- SONET transmission test set

Safety precautions

To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.

**CAUTION**

Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if the beam is viewed directly or with improper optical instruments. Avoid direct exposure to beam.

**CAUTION**

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system, to prevent electrostatic discharge damage to sensitive components.

**CAUTION**

Comply with the proper transmission levels at the local cross-connect before applying a test signal.

Related information

For related information, see *Chapter 2, Maintenance/Trouble Clearing* in 365-370-110, *WaveStar BandWidth Manager Alarm Messages and Troubleclearing Guide*, and the following sections in this document:

- *Chapter 7, Provisioning, Security, and Administration*
- *Operation Task 227, Release Looped Back Line(s)*
- *Appendix A, CIT Tutorial*

Before you begin

Before you begin this task:

- Obtain the work instructions for this task and note the assigned addresses (AIDs).
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following steps to perform a facility loopback on an out-of-service line in an in-service WaveStar BandWidth Manager system.

-
- 1 At the WaveStar CIT, select **Fault>Analysis>Facility Loopback...**

Result: The Facility Loopback screen appears

- 2 Open the bay, shelf, circuit pack, and port details by clicking on the plus (+) sign next to each entity.
-

**CAUTION**

Traffic and service interruption can occur to other lines if they are accidentally looped back. Recheck the address (AID) of the line being looped back. Do not perform facility loopbacks on lines with existing cross-connections.

- 3 Highlight the required port and click on **Select**.

Result: The Facility Loopback screen appears.

Important! A facility loopback remains in effect until released (deactivated).

- 4 Select the **Loopback Type**, verify the information on the screen, and click on **Operate**.

Result: A dialog box appears asking you to confirm executing this command.

- 5 Repeat Step 1 through Step 4 for any remaining lines.

-
- 6 The line(s) is now looped back. To verify, select **View>Loopback...**, highlight the port AID, and click on **Select**.
-



CAUTION

Comply with the proper transmission levels at the local cross-connect before applying a test signal.

Important! If any optical connections are broken, clean the fiber connectors before reconnecting. Refer to Supporting Task T 703.

- 7 To confirm the loopback, connect a test set to the line at the local cross-connect. Transmit the appropriate interface signal to the IN port for the selected line and measure the interface signal received from the OUT port. Confirmation occurs when the test set shows error free transmission.

END OF STEPS



Task 227: Release Looped Back Line(s)

Purpose Use this procedure to release a nearside or farside facility loopback on the following out-of-service line in an in-service system:

- DS3
- EC-1
- STM-1e
- OC-3/STM-1
- OC-12/STM-4
- OC-48/STM-16

Each looped back line in the network must be released individually.

Important! Nearside facility loopbacks loop the incoming line (at the port) back to the local cross-connect panel.

Required Privilege Code(s) A privilege code of at least M3+S1+P1 is required to release a looped back line(s). A privilege code of at least M1+P1+S1 is required to view the port loopback status.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (WaveStar CIT)
- Wrist strap

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.

Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if the beam is viewed directly or with improper optical instruments. Avoid direct exposure to beam.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system, to prevent electrostatic discharge damage to sensitive components.

Related information For related information, see *Chapter 2, Maintenance/Trouble Clearing* in 365-370-110, *WaveStar BandWidth Manager Alarm Messages and Troubleclearing Guide*, and the following sections in this document:

- *Chapter 7, Provisioning, Security, and Administration*
- *Operation Task 226, Loop Back Line(s) for Testing*
- *Appendix A, CIT Tutorial*

Before you begin

Before you begin this task:

- Obtain the work instructions for this task.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following steps to release a facility loopback on a line(s).

-
- 1** At the WaveStar CIT, select **Fault>Analysis>Facility Loopback...**

Result: The Facility Loopback screen appears.

-
- 2** Open the bay, shelf, circuit pack, and port details by clicking on the plus (+) sign next to each entity.

-
- 3** Highlight the required port and click on **Select**.

Result: The Facility Loopback screen appears.

-
- 4** Verify the information on the screen (Port AID, Port Type/Rate, and Facility Loopback Status) and click on **Release**.

-
- 5** Repeat Step 1 through Step 4 for any remaining lines.

-
- 6** The line(s) is released from the looped back condition. To verify, select **View>Loopback...**, highlight the port AID, and click on **Select**.

.....
E N D O F S T E P S



Task 229: Replace Primary and Secondary PCMCIA Flash Disks

- Purpose** Use this procedure to:
- Replace the PCMCIA flash disk in the Primary CTL/MEM (PRIMEM 1 and PRIMEM 0) and Secondary CTL/MEM (SECMEM) circuit packs. The PCMCIA flash disks should be replaced every three years (recommended) to prevent wearout.
 - Upgrade the PCMCIA flash disk in the Primary CTL/MEM (PRIMEM 1 and PRIMEM 0) and Secondary CTL/MEM (SECMEM) circuit packs with higher capacity flash disks.

To replace/upgrade the The PCMCIA flash disk in the Primary CTL/MEM (PRIMEM 1 and PRIMEM 0) circuit packs only, refer to Operation Task T 237.

To replace/upgrade the The PCMCIA flash disk in the Secondary CTL/MEM (SECMEM) circuit pack only, refer to Operation Task T 238.

Required Privilege Code(s) A privilege code of at least M4+ S4+ P1 is required to perform this task.

- Required equipment** The following equipment is required to perform this task:
- WaveStar Craft Interface Terminal (WaveStar CIT)
 - Wrist strap
 - Marking pen and stickers to clearly mark each PCMCIA flash disk with the date put into service and the contents.
 - Three replacement PCMCIA flash disks (for example, Lucent Technologies 220 Megabyte PC AT Flash Card - Part No. 201-099-405)

Important! The Lucent Technologies 220 Megabyte PC AT Flash Card (Part No. 201-099-405) is recommended. However, any compatible PCMCIA flash disk may be used if the disk is reformatted (Label field must be blank) and scanned for disk errors before use. Refer to *Operation Task T 246, Prepare New PCMCIA Flash Disk(s)*.

Safety precautions

To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling PCMCIA flash disks or working on a WaveStar BandWidth Manager system, to prevent electrostatic discharge damage to sensitive components.



CAUTION

Do not remove the PCMCIA flash disk from the CTL/MEM circuit pack when the green ACTIVE LED is lighted (steady or flashing). Removing the PCMCIA flash disk when the green ACTIVE LED is lighted can damage files and create errors (for example, lost clusters and/or missing/damaged sectors).



CAUTION

Do not forcibly remove the PCMCIA flash disk by applying manual force. Always use the Eject button on the circuit pack faceplate.

Related information

For related information, see *Chapter 2, Maintenance/Trouble Clearing* in 365-370-110, *WaveStar BandWidth Manager, Alarm Messages and Troubleclearing Guide*, and the following sections in this document:

- *Chapter 6, Control, Transmission, and Synchronization Interfaces*
- *Appendix A, WaveStar CIT Tutorial*
- *Operation Task T 237, Replace Primary PCMCIA Flash Disks*
- *Operation Task T 238, Replace Secondary PCMCIA Flash Disk*
- *Operation Task T 246, Prepare New PCMCIA Flash Disk(s)*

Before you begin

Before you begin this task:

- Obtain the work instructions for this task.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.
- Verify the current version of network element software using the **Help>About This Network Element...** command.

Task

Complete the following steps to replace/upgrade the PCMCIA flash disk in the Primary CTL/MEM (PRIMEM 1 and PRIMEM 0) and Secondary CTL/MEM (SECMEM) circuit packs .

-
- 1** At the WaveStar CIT, select **Fault>NE Alarm List...** or click on **Alarm List** to obtain an NE Alarm List.
-

- 2** View the NE Alarm List.

IF there are...	THEN...
no alarms listed,	go to Step 3.
alarms listed,	go to 365-370-110, <i>WaveStar BandWidth Manager, Alarm Messages and Trouble Clearing Guide</i> and clear all alarms before proceeding to Step 3.

.....

- 3** Locate the CTL/MEM circuit pack in the SECMEM slot and remove the PCMCIA flash disk.

Reference: Supporting Task T 702

.....

- 4** If required, use a marking pen and sticker to clearly mark the PCMCIA flash disk removed in Step 3 as a backup disk to restore the system if needed.
-

- 5** Obtain a replacement PCMCIA flash disk and clearly mark the date put into service and the contents using a marking pen and sticker.

-
- 6** Insert the replacement PCMCIA flash disk into the CTL/MEM circuit pack (in the SECMEM slot).

Reference: Supporting Task T 702

- 7** Copy the generic and database from the active primary memory to secondary memory using the **Configuration>Software>Copy NVM...** command. This creates a bootable PCMCIA flash disk.

Reference: SE 229-1

Important! In Releases prior to Release 4, the **Configuration>Software>Copy NVM...** command does not copy the LOG directory.

- 8** If required (optional), retrieve all the log files and save the information in the CIT TL1 log file.
-

- 9** Select **Fault>Enter/Exit Maintenance Condition>Enter Maintenance Condition...** to enter the maintenance condition .

Result: A dialog box appears asking you to confirm entering the maintenance condition. Click on **Yes**. The system is now in maintenance condition.

- 10** Locate the CTL/MEM circuit packs in the PRIMEM 0 and PRIMEM 1 slots and remove PCMCIA flash disk from both circuit packs.

Reference: Supporting Task T 702

- 11** If required, use a marking pen and sticker to clearly mark the PCMCIA flash disks removed in Step 10 as backup disks to restore the system if needed.

-
- 12** Locate the CTL/MEM circuit pack in the SECMEM slot and remove the PCMCIA flash disk. This PCMCIA flash disk is used in the next step.

Reference: Supporting Task T 702

- 13** Insert the PCMCIA flash disk removed in Step 12 into the CTL/MEM circuit pack in the PRIMEM 0 slot.

Reference: Supporting Task T 702

- 14** Obtain a replacement PCMCIA flash disk and clearly mark the date put into service and the contents using a marking pen and sticker.
-

- 15** Insert the replacement PCMCIA flash disk into the CTL/MEM circuit pack in the SECMEM slot.

Reference: Supporting Task T 702

- 16** Select **Fault>Enter/Exit Maintenance Condition>Exit Maintenance Condition...** to exit the maintenance condition.

Result: A dialog box appears asking you to confirm exiting the maintenance condition. Click on **Yes** and the system performs a reset. During the reset the system automatically disconnects the WaveStar CIT and dialog box appears informing you that communication with the network element is lost. Click on **OK**.

- 17** After the system reset is complete (approximately 20 minutes depending on equipage), obtain a replacement PCMCIA flash disk and clearly mark the date put into service and the contents using a marking pen and sticker.

Important! The PCMCIA flash disk in the primary CTL/MEM circuit packs (PRIMEM 0 and PRIMEM 1) provide mirror images of each other and are both active.

- 18** Insert the replacement PCMCIA flash disk into the CTL/MEM circuit pack in the PRIMEM 1 slot.

Result: The contents of the PCMCIA flash disk in the CTL/MEM circuit pack (PRIMEM 0) is automatically copied to the PCMCIA flash disk in the CTL/MEM circuit pack in slot PRIMEM 1.

Reference: Supporting Task T 702

-
- 19** Log in to the network element.

Reference: Operation Task T 223

-
- 20** Select **Fault>NE Alarm List...** or click on **Alarm List** to obtain an NE Alarm List and verify that there are no alarms.

-
- 21** Select **Help>About This Network Element...** and verify the current version of network element software .

END OF STEPS

SE 229-1: Copy Generic and Database from Active Primary Memory to Secondary Memory

Procedure Perform the following steps to copy the generic and database from the active primary memory to secondary memory.

-
- 1** At the WaveStar CIT, select **Configuration>Software>Copy NVM...**

Result: The WBM-Copy NVM screen appears.

-
- 2** Select the Data Type (**Both**), the Type of Copy (**Active Primary To Secondary**), and click on **OK**.

Result: A dialog box appears asking you to confirm copying the active primary NVM to secondary NVM. Click on **Yes**. The WBM-Progress Indicator screen appears and the CTL/MEM circuit pack faceplate LEDs flash on and off.

-
- 3** Wait for the WBM-Progress Indicator screen to disappear and the CTL/MEM circuit pack faceplate LEDs to stop flashing (approximately 5 minutes).

END OF STEPS



Task 237: Replace Primary PCMCIA Flash Disks

- Purpose** Use this procedure to:
- Replace the PCMCIA flash disk in the Primary CTL/MEM (PRIMEM 1 and PRIMEM 0) circuit packs. The PCMCIA flash disks should be replaced every three years (recommended) to prevent wearout.
 - Upgrade the PCMCIA flash disk in the Primary CTL/MEM (PRIMEM 1 and PRIMEM 0) circuit packs with higher capacity flash disks.

To replace/upgrade the The PCMCIA flash disk in the Primary CTL/MEM (PRIMEM 1 and PRIMEM 0) and the Secondary CTL/MEM (SECMEM) circuit packs, refer to Operation Task T 229.

To replace/upgrade the The PCMCIA flash disk in the Secondary CTL/MEM (SECMEM) circuit pack only, refer to Operation Task T 238.

Required Privilege Code(s) A privilege code of at least M4+ S4+ P1 is required to perform this task.

- Required equipment** The following equipment is required to perform this task:
- WaveStar Craft Interface Terminal (WaveStar CIT)
 - Wrist strap
 - Marking pen and stickers to clearly mark each PCMCIA flash disk with the date put into service and the contents.
 - Two replacement PCMCIA flash disks (for example, Lucent Technologies 220 Megabyte PC AT Flash Card - Part No. 201-099-405)

Important! The Lucent Technologies 220 Megabyte PC AT Flash Card (Part No. 201-099-405) is recommended. However, any compatible PCMCIA flash disk may be used if the disk is reformatted (Label field must be blank) and scanned for disk errors before use. Refer to *Operation Task T 246, Prepare New PCMCIA Flash Disk(s)*.

Safety precautions

To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling PCMCIA flash disks or working on a WaveStar BandWidth Manager system, to prevent electrostatic discharge damage to sensitive components.



CAUTION

Do not remove the PCMCIA flash disk from the CTL/MEM circuit pack when the green ACTIVE LED is lighted (steady or flashing). Removing the PCMCIA flash disk when the green ACTIVE LED is lighted can damage files and create errors (for example, lost clusters and/or missing/damaged sectors).



CAUTION

Do not forcibly remove the PCMCIA flash disk by applying manual force. Always use the Eject button on the circuit pack faceplate.

Related information

For related information, see *Chapter 2, Maintenance/Trouble Clearing* in 365-370-110, *WaveStar BandWidth Manager, Alarm Messages and Troubleclearing Guide*, and the following sections in this document:

- *Chapter 6, Control, Transmission, and Synchronization Interfaces*
- *Appendix A, WaveStar CIT Tutorial*
- *Operation Task T 229, Replace Primary and Secondary PCMCIA Flash Disks*
- *Operation Task T 238, Replace Secondary PCMCIA Flash Disk*
- *Operation Task T 246, Prepare New PCMCIA Flash Disk(s)*

Before you begin

Before you begin this task:

- Obtain the work instructions for this task.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.
- Verify the current version of network element software using the **Help>About This Network Element...** command.

Task

Complete the following steps to replace/upgrade the PCMCIA flash disk in the Primary CTL/MEM (PRIMEM 1 and PRIMEM 0) circuit packs.

-
- 1** At the WaveStar CIT, select **Fault>NE Alarm List...** or click on **Alarm List** to obtain an NE Alarm List.
-

- 2** View the NE Alarm List.

IF there are...	THEN...
no alarms listed,	go to Step 3.
alarms listed,	go to 365-370-110, <i>WaveStar BandWidth Manager, Alarm Messages and Trouble Clearing Guide</i> and clear all alarms before proceeding to Step 3.

.....

- 3** Locate the CTL/MEM circuit pack in the SECMEM slot and remove the PCMCIA flash disk. Keep the PCMCIA flash disk for use later in this procedure.

Reference: Supporting Task T 702

.....

- 4** Obtain a replacement PCMCIA flash disk and clearly mark the date put into service and the contents using a marking pen and sticker.
-

- 5** Insert the replacement PCMCIA flash disk into the CTL/MEM circuit pack (in the SECMEM slot).

Reference: Supporting Task T 702

-
- 6** Copy the generic and database from the active primary memory to secondary memory using the **Configuration>Software>Copy NVM...** command. This creates a bootable PCMCIA flash disk.

Reference: SE 229-1

Important! In Releases prior to Release 4, the **Configuration>Software>Copy NVM...** command does not copy the LOG directory.

- 7** If required (optional), retrieve all the log files and save the information in the CIT TL1 log file.

-
- 8** Select **Fault>Enter/Exit Maintenance Condition>Enter Maintenance Condition...** to enter the maintenance condition .

Result: A dialog box appears asking you to confirm entering the maintenance condition. Click on **Yes**. The system is now in maintenance condition.

-
- 9** Locate the CTL/MEM circuit packs in the PRIMEM 0 and PRIMEM 1 slots and remove PCMCIA flash disk from both circuit packs.

Reference: Supporting Task T 702

-
- 10** If required, use a marking pen and sticker to clearly mark the PCMCIA flash disks removed in Step 9 as backup disks to restore the system if needed.

-
- 11** Locate the CTL/MEM circuit pack in the SECMEM slot and remove the PCMCIA flash disk. This PCMCIA flash disk is used in the next step.

Reference: Supporting Task T 702

-
- 12** Insert the PCMCIA flash disk removed in Step 11 into the CTL/MEM circuit pack in the PRIMEM 0 slot.

Reference: Supporting Task T 702

- 13** Insert the original PCMCIA flash disk removed in Step 3 into the CTL/MEM circuit pack in the SECMEM slot.

Reference: Supporting Task T 702

- 14** Select **Fault>Enter/Exit Maintenance Condition>Exit Maintenance Condition...** to exit the maintenance condition.

Result: A dialog box appears asking you to confirm exiting the maintenance condition. Click on **Yes** and the system performs a reset. During the reset the system automatically disconnects the WaveStar CIT and dialog box appears informing you that communication with the network element is lost. Click on **OK**.

- 15** After the system reset is complete (approximately 20 minutes depending on equipage), obtain a replacement PCMCIA flash disk and clearly mark the date put into service and the contents using a marking pen and sticker.
-

Important! The PCMCIA flash disk in the CTL/MEM circuit packs (PRIMEM 0 and PRIMEM 1) provide mirror images of each other and are both active.

- 16** Insert the replacement PCMCIA flash disk into the CTL/MEM circuit pack in the PRIMEM 1 slot.

Result: The contents of the PCMCIA flash disk in the CTL/MEM circuit pack (PRIMEM 0) is automatically copied to the PCMCIA flash disk in the CTL/MEM circuit pack in slot PRIMEM 1.

Reference: Supporting Task T 702

17 Log in to the network element.

Reference: Operation Task T 223

18 Select **Fault>NE Alarm List...** or click on **Alarm List** to obtain an NE Alarm List and verify that there are no alarms.

19 Select **Help>About This Network Element...** and verify the current version of network element software.

END OF STEPS

Task 238: Replace Secondary PCMCIA Flash Disk

Purpose Use this procedure to:

- Replace the PCMCIA flash disk in the Secondary CTL/MEM (SECMEM) circuit pack. The PCMCIA flash disks should be replaced every three years (recommended) to prevent wearout.
- Upgrade the PCMCIA flash disk in the Secondary CTL/MEM (SECMEM) circuit pack with higher capacity flash disks.

To replace/upgrade the The PCMCIA flash disk in the Primary CTL/MEM (PRIMEM 1 and PRIMEM 0) and the Secondary CTL/MEM (SECMEM) circuit packs, refer to Operation Task T 229.

To replace/upgrade the The PCMCIA flash disk in the Primary CTL/MEM (PRIMEM 1 and PRIMEM 0) circuit packs only, refer to Operation Task T 237.

Required Privilege Code(s) A privilege code of at least M4+ S4+ P1 is required to perform this task.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (WaveStar CIT)
- Wrist strap
- Marking pen and stickers to clearly mark each PCMCIA flash disk with the date put into service and the contents.
- One replacement PCMCIA flash disk (for example, Lucent Technologies 220 Megabyte PC AT Flash Card - Part No. 201-099-405)

Important! The Lucent Technologies 220 Megabyte PC AT Flash Card (Part No. 201-099-405) is recommended. However, any compatible PCMCIA flash disk may be used if the disk is reformatted (Label field must be blank) and scanned for disk errors before use. Refer to *Operation Task T 246, Prepare New PCMCIA Flash Disk(s)*.

Safety precautions

To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling PCMCIA flash disks or working on a WaveStar BandWidth Manager system, to prevent electrostatic discharge damage to sensitive components.



CAUTION

Do not remove the PCMCIA flash disk from the CTL/MEM circuit pack when the green ACTIVE LED is lighted (steady or flashing). Removing the PCMCIA flash disk when the green ACTIVE LED is lighted can damage files and create errors (for example, lost clusters and/or missing/damaged sectors).



CAUTION

Do not forcibly remove the PCMCIA flash disk by applying manual force. Always use the Eject button on the circuit pack faceplate.

Related information

For related information, see *Chapter 2, Maintenance/Trouble Clearing* in 365-370-110, *WaveStar BandWidth Manager, Alarm Messages and Troubleclearing Guide*, and the following sections in this document:

- *Chapter 6, Control, Transmission, and Synchronization Interfaces*
- *Appendix A, WaveStar CIT Tutorial*
- *Operation Task T 237, Replace Primary PCMCIA Flash Disks*
- *Operation Task T 229, Replace Primary and Secondary PCMCIA Flash Disks*
- *Operation Task T 246, Prepare New PCMCIA Flash Disk(s)*

Before you begin

Before you begin this task:

- Obtain the work instructions for this task.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following steps to replace/upgrade the PCMCIA flash disk in the Secondary CTL/MEM (SECMEM) circuit pack.

-
- 1** At the WaveStar CIT, select **Fault>NE Alarm List...** or click on **Alarm List** to obtain an NE Alarm List.
-

- 2** View the NE Alarm List.

IF there are...	THEN...
no alarms listed,	go to Step 3.
alarms listed,	go to 365-370-110, <i>WaveStar BandWidth Manager, Alarm Messages and Trouble Clearing Guide</i> and clear all alarms before proceeding to Step 3.

-
- 3** Locate the CTL/MEM circuit pack in the SECMEM slot and remove the PCMCIA flash disk.

Reference: Supporting Task T 702

- 4** If required, use a marking pen and sticker to clearly mark the PCMCIA flash disk removed in Step 3 as a backup disk to restore the system if needed.
-

- 5** Obtain the replacement PCMCIA flash disk and clearly mark the date put into service and the contents using a marking pen and sticker.

-
- 6** Insert the replacement PCMCIA flash disk into the CTL/MEM circuit pack (in the SECMEM slot).

Reference: Supporting Task T 702

-
- 7** Select **Fault>NE Alarm List...** or click on **Alarm List** to obtain an NE Alarm List and verify that there are no alarms.

END OF STEPS



Task 239: Manually Back Up Database to WaveStar CIT (Release 3.1 and Later)

Purpose Use this procedure to develop a detailed method of procedure per local operating instructions to manually back up the network element database (current NE data) to the WaveStar CIT:

- Before/after major provisioning data changes
- Periodically according to local policy.

Important! Changes to the network element software generic and database are covered in the applicable Software Release Description document for the current software generic. This document should be reviewed prior to doing this task for any detailed procedures or cautions that may apply to software management of the generic running on your system.

Required privilege codes A privilege code of at least S4 is required to backup the network element database. A privilege code of at least S1 is required to view the Database Info screen.

Required equipment The following equipment is required to perform this task:

- WaveStar CIT
- WaveStar BandWidth Manager Release 3.1 or later software.

Important! If the system is equipped with Release 3.0 or earlier software, refer to *Operation Task T 205, Manually Back Up Database To WaveStar CIT (Release 3.0 and Earlier)*.

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

Related information For related information, see the following sections in this document:

- *Chapter 7, Provisioning, Security, and Administration*
- *Operation Task T 242, Manually Restore Database From WaveStar CIT (Release 3.1 and Later)*
- *Operation Task T 241, Change Maximum Number of Backups to WaveStar CIT*
- *Appendix A, CIT Tutorial.*

Before you begin

Before you begin this task:

- Obtain the work instructions for this task.
- Review the applicable software release description for any detailed procedures or cautions that may apply to software management of the generic running on your system.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following steps to manually back up the network element database (current NE data) to the WaveStar CIT in systems with Release 3.1 or later software.

-
- 1 At the WaveStar CIT, select **Configuration>Software>Remote Backup...**

Result: The *WBM TID-Backup Database* screen appears.

- 2 Verify that **CIT** appears in the **Backup to/Via:** field, record the destination path /folder name (*YYMMDDHHMMSS*), and click on **Backup**.

Result: A dialog box appears asking you to confirm backing up the primary database (PRI) to *C:\Program Files\Lucent Technologies\WaveStarCIT\backups\TID\Release#\YYMMDDHHMMSS*. Click on **Yes**.

If the provisioned maximum number of backups to the CIT is reached, a dialog box appears informing you that the maximum number of backups to the CIT has been reached and asking you to confirm overwriting the last backup folder. Click on **Yes** and the *WBM TID-Progress Indicator* screen appears.

- 3 When the *WBM TID-Progress Indicator* screen disappears (approximately 10 to 20 minutes depending on equipage) and the backup is complete, select **View>NE Data...**

Result: The *WBM TID-Select Database* screen appears.

-
- 4 Verify that the network element target identifier (TID) appears in the **Look In:** field, and click on **Open**.

Result: The *WBM TID-Database Info* screen appears.

- 5 Click on the **Remote** tab and verify that the *Last Backup Time* and *Last Backup Location* parameters in the *Running* row are correct. (If necessary, scroll right to view the parameters.) Click on **Close**.

END OF STEPS



Task 240: Manually Back Up Database to Secondary Memory (Release 3.1 and Later)

Purpose Use this procedure to develop a detailed method of procedure per local operating instructions to manually back up the network element database (current NE data) to the secondary memory:

- Before/after major provisioning data changes
- Periodically according to local policy.

When primary memory is backed up to secondary memory only data files that are required to reboot the system are copied. The log files are not copied from primary memory to secondary memory. This minimizes reboot time (high priority) when the secondary memory is used to reboot the system. Therefore, the contents of primary memory and secondary memory are different and disk utilization is not the same.

Important! Changes to the network element software generic and database are covered in the applicable Software Release Description document for the current software generic. This document should be reviewed prior to doing this task for any detailed procedures or cautions that may apply to software management of the generic running on your system.

Required privilege codes A privilege code of at least S4 is required to backup the network element database. A privilege code of at least S1 is required to view the Database Info screen.

Required equipment The following equipment is required to perform this task:

- WaveStar CIT
- WaveStar BandWidth Manager Release 3.1 or later software.

Important! If the system is equipped with Release 3.0 software, refer to *Operation Task T 214, Manually Back Up Database To Secondary Memory (Release 3.0)*.

Safety precautions

To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.

**CAUTION**

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

Related information

For related information, see the following sections in this document:

- *Chapter 7, Provisioning, Security, and Administration*
- *Operation Task T 215, Manually Restore Database From Secondary Memory to Network Element*
- *Appendix A, CIT Tutorial.*

Before you begin

Before you begin this task:

- Obtain the work instructions for this task.
- Review the applicable software release description for any detailed procedures or cautions that may apply to software management of the generic running on your system.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following steps to manually back up the network element database (current NE data) to the secondary memory in systems with Release 3.1 or later software.

-
- 1** At the WaveStar CIT, select **Configuration>Software>Copy NVM....**

Result: The *WBM TID-Copy NVM* screen appears.

- 2** Select the *Type of Data* to be backed up (**Data**), the *Type of Copy* to be performed (**Active Primary to Secondary**), and click on **OK**.

Result: A dialog box appears asking you to confirm copying the active primary NVM to secondary NVM. Click on **Yes** and the *WBM TID-Progress Indicator* screen appears.

- 3** When the *WBM TID-Progress Indicator* screen disappears (approximately 10 to 20 minutes depending on equipage) and the backup is complete, select **View>NE Data...**

Result: The *WBM TID-Select Database* screen appears.

- 4** Verify that the network element target identifier (TID) appears in the **Look In:** field, and click on **Open**.

Result: The *WBM TID-Database Info* screen appears.

-
- 5** Click on the **Local** tab and verify that the *Last Local Backup Time* parameter in the *Running* row is correct. (If necessary, scroll right to view the parameter.) Click on **Close**.

END OF STEPS



Task 241: Change Maximum Number of Backups to WaveStar CIT

Purpose Use this procedure to change the maximum number of backup folders allowed on a WaveStar CIT. The maximum number of backup folders may be 1 to 10 or infinite.

The provisioned maximum number of backup folders is implemented and maintained on an individual WaveStar CIT basis. For example, two WaveStar CITs may have different values for the provisioned maximum number of backup folders.

If the provisioned maximum number of backup folders is reached, the system overwrites the last backup folder.

Required privilege codes A privilege code of at least S4 is required to change the maximum number of backup folders allowed on the WaveStar CIT.

Required equipment The following equipment is required to perform this task:

- WaveStar CIT
- WaveStar BandWidth Manager Release 4 or later software.

Related information For related information, see the following sections in this document:

- *Chapter 7, Provisioning, Security, and Administration*
- *Operation Task T 240, Manually Back Up Database to WaveStar CIT (Release 3.1 and Later)*
- *Appendix A, CIT Tutorial.*

- Before you begin** Before you begin this task:
- Obtain the work instructions for this task.
 - Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to change the maximum number of backup folders allowed on a WaveStar CIT.

-
- 1** At the WaveStar CIT, select **Configuration>Software>Remote Backup....**

Result: The *WBM TID-Backup Database* screen appears.

.....

- 2** Verify that **CIT** appears in the **Backup to/Via:** field and click on **Setup** (at the bottom of the screen).

Result: The *Provision Backup Number* screen appears.

.....

Important! The maximum number of backups to the WaveStar CIT may be from 1 to 10 or infinite.

- 3** Enter or select the **Maximum Number of Backups to CIT per System** and click on **OK**.
-

- 4** Click on **Close** to close the *WBM TID-Backup Database* screen.

.....

END OF STEPS

.....



Task 242: Manually Restore Database From WaveStar CIT (Release 3.1 and Later)

Purpose Use this procedure to develop a detailed method of procedure per local operating instructions to manually restore the network element database (NE data) from the WaveStar CIT after a known or suspected database corruption.

Important! Changes to the network element software generic and database are covered in the applicable Software Release Description document for the current software generic. This document should be reviewed prior to doing this task for any detailed procedures or cautions that may apply to software management of the generic running on your system.

Required privilege codes A privilege code of at least S4 is required to restore the network element database. A privilege code of at least S1 is required to view the Database Info screen.

Required equipment The following equipment is required to perform this task:

- WaveStar CIT
- WaveStar BandWidth Manager Release 3.1 or later software.

Important! If the system is equipped with Release 3.0 or earlier software, refer to *Operation Task T 206, Manually Restore Database From WaveStar CIT (Release 3.0 and Earlier)*.

Safety precautions

To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.

**CAUTION**

Restoring the database can be service-affecting. If provisioning changes were made after the last backup files were created, examine the history log and use the appropriate WaveStar CIT commands to manually apply the recent provisioning changes to the just-restored database.

**CAUTION**

Depending on the number of database changes that have occurred since the last backup, manually applying recent changes after a restore can be a time-intensive process. Make absolutely sure that a restore is necessary before performing this task.

**CAUTION**

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system, to prevent electrostatic discharge damage to sensitive components.

Related information

For related information, see the following sections in this document:

- *Chapter 7, Provisioning, Security, and Administration*
- *Operations Task T 239, Manually Back Up Database to WaveStar CIT (Release 3.1 and Later)*
- *Appendix A, CIT Tutorial*

Before you begin

Before you begin this task:

- Review the applicable software release description for any detailed procedures or cautions that may apply to software management of the generic running on your system.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following to manually restore the network element database (NE data) from the WaveStar CIT to primary memory in systems with Release 3.1 or later software:

-
- 1** At the Wavestar CIT, select **Fault>Enter/Exit Maintenance Condition>Enter Maintenance Condition...** to enter the maintenance condition.

Result: A dialog box appears asking you to confirm entering the maintenance condition. Click on **Yes**.

- 2** Select **Configuration>Software>Remote Restore....**

Result: The *WBM TID-Restore Database* screen appears.



CAUTION

Be careful to select the correct backup folder to restore to network element. The WaveStar CIT compares the target identifier (TID) of the selected backup folder with the network element TID. If the TIDs do not match, the WaveStar CIT displays an error message and the restore command is denied.

- 3 Verify that **CIT** appears in the **Restore From/Via:** field and double-click on the the *most recent backup folder* in the **Name** column.

Result: A dialog box appears asking if you wish to continue. Click on **Yes** and the *WBM TID-Progress Indicator* screen appears. The database is copied into the *previous* folder of primary memory.

After the *WBM TID-Progress Indicator* screen disappears, one or more *Communication Failure* dialog boxes appear informing you that communication with the network element is lost. (After a successful restore, the system resets and automatically disconnects the WaveStar CIT). Click on **OK**. The system performs a reset (after a delay of 1 to 2 minutes), and the database is copied into the *current* folder of primary memory and becomes active.

-
- 4 When the system reset is complete (approximately 25 to 60 minutes depending on equipage), log in to the WaveStar BandWidth Manager system.

Reference: *Operation Task T 223, Log In/Log Out of Network Element*

-
- 5 Select **View>NE Data...**

Result: The *WBM-TID Select Database* screen appears.

-
- 6 Verify that the network element target identifier (TID) appears in the **Look In:** field and click on **Open**.

Result: The *WBM TID-Database Info* screen appears.

-
- 7 Click on the **Remote** tab and verify that the *Last Restore Time* and *Last Restore Source* parameters in the *Running* row are correct. (If necessary, scroll right to view the parameters.) Click on **Close**.

END OF STEPS



Task 243: Manually Restore Database From Secondary Memory (Release 3.1 and Later)

Purpose Use this procedure to develop a detailed method of procedure per local operating instructions to manually restore the network element database (NE data) from the secondary memory after a known or suspected database corruption.

Important! Changes to the network element software generic and database are covered in the applicable Software Release Description document for the current software generic. This document should be reviewed prior to doing this task for any detailed procedures or cautions that may apply to software management of the generic running on your system.

Required privilege codes A privilege code of at least S4 is required to restore the network element database. A privilege code of at least S1 is required to view the Database Info screen.

Required equipment The following equipment is required to perform this task:

- WaveStar CIT
- WaveStar BandWidth Manager Release 3.1 or later software.

Important! If the system is equipped with Release 3.0 software, refer to *Operation Task T 215, Manually Restore Database From Secondary Memory (Release 3.0)*.

If a new PCMCIA flash disk is used, the disk must be reformatted (Label field must be blank) and scanned for disk errors before use. Refer to *Operation Task T 246, Prepare New PCMCIA Flash Disk(s)*.

Safety precautions

To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Restoring the database can be service-affecting. If provisioning changes were made after the last backup files were created, examine the history log and use the appropriate WaveStar CIT commands to manually apply the recent provisioning changes to the just-restored database.



CAUTION

Depending on the number of database changes that have occurred since the last backup, manually applying recent changes after a restore can be a time-intensive process. Make absolutely sure that a restore is necessary before performing this task.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system, to prevent electrostatic discharge damage to sensitive components.

Related information

For related information, see the following sections in this document:

- *Chapter 7, Provisioning, Security, and Administration*
- *Operation Task T 240, Manually Back Up Database to Secondary Memory (Release 3.1 and Later)*
- *Operation Task T 246, Prepare New PCMCIA Flash Disk(s)*
- *Appendix A, CIT Tutorial*

Before you begin

Before you begin this task:

- Review the applicable software release description for any detailed procedures or cautions that may apply to software management of the generic running on your system.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following to manually restore the network element database (NE data) from the secondary memory to primary memory in systems with Release 3.1 or later software:

-
- 1 Locate the PCMCIA flash disks that have been used for backing up the network element database. Verify that each PCMCIA flash disk has a unique label or identifier that corresponds to the system being restored.

-
- 2 Verify the contents of the PCMCIA flash disk(s).

Reference: *SE 243-1 Verify Contents of PCMCIA Flash Disk(s)*



CAUTION

Be careful to select the correct backup PCMCIA flash disk to use in the network element database restoration. If an incorrect PCMCIA flash disk is used, service may be affected or a database mismatch condition may occur. A database mismatch condition is indicated when there is no WaveStar CIT access and the active CTL/SYS50D circuit pack FAULT LED and ACTIVE LED flash alternately. If a database mismatch occurs, contact the next level of technical support.

- 3 Determine which PCMCIA flash disk to use to restore the network element database.

-
- 4 If required, insert the PCMCIA flash disk into the CTL/MEM circuit pack in the SECMEM slot.

Reference: *Supporting Task T 702 Remove/Insert a PCMCIA (NVM) Card*

-
- 5 At the WaveStar CIT, select **Fault>Enter/Exit Maintenance Condition>Enter Maintenance Condition...** to enter Maintenance Condition.

Result: A dialog box appears asking you to confirm entering the Maintenance Condition. Click on **Yes**.

- 6 Select **Configuration>Software>Copy NVM....**

Result: The *WBM TID-Copy NVM* screen appears.

- 7 Select the *Data Type* to be copied (**Data**) and the *Type of Copy* to be performed (**Secondary to Active Primary**). Verify the *Restoration Option* (**Include Restore**) is selected and click on **OK**.

Result: A dialog box appears asking you to confirm copying and restoring the contents of secondary memory to primary memory. Click on **Yes** and the *WBM TID-Progress Indicator* screen appears. The database is copied into the *previous* folder of primary memory.

After the *WBM TID-Progress Indicator* screen disappears, one or more *Communication Failure* dialog boxes appear informing you that communication with the network element is lost. (After a successful restore, the system resets and automatically disconnects the WaveStar CIT). Click on **OK**. The system performs a reset (after a delay of 1 to 2 minutes), and the database is copied into the *current* folder of primary memory and becomes active.

- 8 When the system reset is complete (approximately 25 to 60 minutes depending on equipage), log in to the WaveStar BandWidth Manager system.

Reference: *Operation Task T 223, Log In/Log Out of Network Element*

- 9 Select **View>NE Data...**

Result: The *WBM-TID Select Database* screen appears.

-
- 10** Verify that the network element target identifier (TID) appears in the **Look In:** field and click on **Open**.

Result: The *WBM TID-Database Info* screen appears.

- 11** Click on the **Local** tab and verify that the *Last Local Restore Time* parameter in the *Running* row is correct. (If necessary, scroll right to view the parameters.) Click on **Close**.

END OF STEPS



SE 243-1: Verify Contents of PCMCIA Flash Disk(s)

Procedure Perform the following steps to verify the contents of the PCMCIA flash disk(s).

1

IF the CTL/MEM circuit pack in the SECMEM slot is ...	THEN go to ...
equipped with a PCMCIA flash disk,	Step 3.
not equipped with a PCMCIA flash disk,	Step 2.

2 Insert a PCMCIA flash disk into the CTL/MEM circuit pack in the SECMEM slot.

Reference: *Supporting Task T 702 Remove/Insert a PCMCIA (NVM) Card*

3 At the WaveStar CIT, select **View>NE Data...**

Result: The *WBM TID-Select Database* screen appears.

4 Verify that the network element target identifier (TID) appears in the **Look In:** field and click on **Open**.

Result: The *WBM TID-Database Info* screen appears.

5 Click on the **Local** tab and find the *Last Local Backup Time* parameter in the *Backup* row. (If necessary, scroll right to view the parameter.) Record this information for the PCMCIA flash disk and click on **Close**.

6 If required, remove the PCMCIA flash disk from the CTL/MEM circuit pack in the SECMEM slot.

Reference: *Supporting Task T 702 Remove/Insert a PCMCIA (NVM) Card*

-
- 7** If required, repeat Step 2 through Step 6 to verify the contents of the remaining PCMCIA flash disks.

END OF STEPS



Task 244: Configure TCP/IP Parameters for a Network Element (including FTAM-FTP Gateway)

Purpose Use this procedure to configure the IP addresses for a network element (NE) so that an interface such as a WaveStar Craft Interface Terminal (CIT) can communicate with the NE using TCP/IP. Also use this procedure to enable or disable the FTAM-FTP gateway. To take advantage of the duplex DCC circuit packs (“active-active”), you must configure both DCC packs.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Changing IP addresses will interrupt any TCP/IP communications occurring on the network element.

Related information For related information, see the following sections in this document:

- Operations Task T245, “Configure the TCP/IP Gateway Parameters for an NE”
- Chapter 7, “TCP/IP” (7-56)

Before you begin Before you begin this task:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the assigned address(es) to be used for TCP/IP communications.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to configure the IP addresses for the NE.

- 1** At the WaveStar CIT System View, select **Administration > Data Communications**.

Result: The *Data Communications* screen appears with the Equipment Explorer on the left.

- 2** Use the Equipment Explorer to expand the system controller bay and shelf.

Result: The DCC circuit pack(s) appear.

- 3** Highlight a DCC circuit pack.

- 4** Click on the **Select** button.

Result: The data communications options for that circuit pack appear on the right.

- 5** Select the **TCP/IP** tab.

Result: The current IP addresses appear.

- 6** Click on the **Modify** button next to *IP Address* and enter the new IP address.

- 7** Click on the **Modify** button next to *IP Subnet Mask* and enter the new IP subnet mask.

- 8** Click on the **Modify** button next to *IP Default Router Address* and enter the new IP default router address.

.....

9 Next to *FTP Gateway Status*, select **Enable** or **Disable** to enable or disable this BandWidth Manager to serve as a gateway for other NEs, using the selected DCC.

.....

10 Click on the **OK** button.

Result: A Stack Reset message appears.

.....

11 Click on the **Yes** button.

Result: The CIT logs out of the NE.

.....

12 Repeat steps 1-10 for the second DCC. Remember that each DCC must have a unique IP address.

.....

END OF STEPS

.....



Task 245: Configure TCP/IP Gateway Parameters for a Network Element

Purpose Use this procedure to configure the TCP/IP gateway parameters for a network element (NE) to make it a gateway NE. A TCP/IP gateway connects a network that uses Internet Protocol (IP) to a network that uses Open Systems Interconnection (OSI). OSI is the usual protocol that SONET network elements use to communicate with one another.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Changing TCP/IP gateway parameters could interrupt any TCP/IP communications occurring on the network element.

Related information For related information, see the following sections in this document:

- Operations Task T244, “Configure the TCP/IP Parameters for an NE”
- Chapter 7, “TCP/IP Gateway” (7-58)

Before you begin Before you begin this task:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the assigned parameters to be used for TCP/IP gateway communications.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.
- Verify that the IP addresses for the NE have been set according to Operations Task T244.

Task Complete the following steps to configure the IP addresses for the NE.

-
- 1** At the WaveStar CIT System View, select **Administration > Data Communications**.

Result: The *Data Communications* screen appears with the Equipment Explorer on the left.

-
- 2** Use the Equipment Explorer to expand the system controller bay and shelf.

Result: The DCC circuit pack(s) appear.

-
- 3** Highlight a DCC circuit pack.

-
- 4** Click on the **Select** button.

Result: The data communications options for that circuit pack appear on the right.

-
- 5** Select the **TCP/IP Gateway** tab.

Result: The current TCP/IP gateway parameters appear.

-
- 6** Use the controls on this screen to enable or disable the gateway, modify the host list, or modify the encoding port numbers.

-
- 7** Click on the **OK** button.

Result: A Stack Reset message appears.

8 Click on the **Yes** button.

Result: The CIT logs out of the NE.

E N D O F S T E P S



Task 246: Prepare New PCMCIA Flash Disk(s)

Purpose Use this procedure to prepare a new PCMCIA flash disk(s) for use in the WaveStar BandWidth Manager system.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (WaveStar CIT)
- PCMCIA flash disk(s) (for example, Lucent Technologies 220 Megabyte PC AT Flash Card - Part No. 201-099-405)

Important! The Lucent Technologies 220 Megabyte PC AT Flash Card (Part No. 201-099-405) is recommended. However, any compatible PCMCIA flash disk may be used if the disk is reformatted (Label field must be blank) and scanned for disk errors before use.

Related information For related information, see the following sections in this document:

- *Chapter 6, Control, Transmission, and Synchronization Interfaces*
- *Appendix A, WaveStar CIT Tutorial*
- *Operation Task T 214, Manually Back Up Database to Secondary Memory (Release 3.0)*
- *Operation Task T 229, Replace Primary and Secondary PCMCIA Flash Disks*
- *Operation Task T 237, Replace Primary PCMCIA Flash Disks*
- *Operation Task T 238, Replace Secondary PCMCIA Flash Disk*
- *Operation Task T 240, Manually Back Up Database to Secondary Memory (Release 3.1 and Later)*

Task Complete the following steps to prepare a new PCMCIA flash disk(s) for use in the WaveStar BandWidth Manager system.

- 1** Insert the PCMCIA flash disk into a PCMCIA slot of the PC that allows the disk to be accessed as a removable media drive (that is, viewed through Windows NT Explorer as a drive that can be read and written to). Record the drive letter that is assigned to this drive.
-



CAUTION

Formatting a drive removes all data from that drive. Ensure that you are aware of the PC drive letter assignments and format the required flash disk.

- 2** Format the PCMCIA flash disk.

Reference: *SE 246-1 Format PCMCIA Flash Disk*

- 3** Scan the PCMCIA flash disk for errors.

Reference: *SE 246-2 Scan PCMCIA Flash Disk For Errors*

- 4** Remove the PCMCIA flash disk from the PCMCIA slot of the PC.

END OF STEPS



SE 246-1: Format PCMCIA Flash Disk

Procedure Perform the following steps to format a PCMCIA flash disk.

-
1 Double-click on *My Computer*.
.....
- 2** Right click on the PCMCIA drive letter and click on *Format*.
.....
- 3** Ensure that *FAT* is entered into the *File System* field.
.....
- 4** If required, enter the appropriate label (for example PRIM1) into the *Volume Label* field; otherwise, insure that the *Volume Label* field is blank by deleting any characters that are present.
.....
- 5** Click on *Start*.
.....
- 6** Acknowledge that the format command will delete all data from the flash disk by clicking on *OK*.
.....
- 7** Acknowledge the format complete message by clicking on *OK*. Then click on *Close* to close the format window.

.....
E N D O F S T E P S
.....



SE 246-2: Scan PCMCIA Flash Disk for Errors

Procedure Perform the following steps to scan a PCMCIA flash disk for errors.

-
1 Double-click on *My Computer*.
.....
- 2** Right click on the PCMCIA drive letter and click on *Properties*.
.....
- 3** Select the *Tools* tab in the *Properties* Window.
.....
- 4** In the *Error-Checking* frame, click on *Check Now*. A window appears that provides disk error-checking options.
.....
- 5** Select *Scan for and attempt recovery of bad sectors* and click on *Start*.
.....
- 6** Acknowledge the *Disk check complete* message by clicking on *OK*.
.....
- 7** Click on *OK* to close the *Properties* window.

.....
E N D O F S T E P S
.....



Task 249: Download Software

Purpose Use this procedure in conjunction with Task 202, to download software from one of the following sources:

- a directory on the CIT
- an FTP server directly via TCP/IP
- an FTP server via a gateway (NCC or another BandWidth Manager)
- another network element (FTAM)

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap (if handling a PCMCIA card)

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components. See “Electrostatic Discharge (ESD) Considerations” in “About This Information Product”.

Related information For related information, see:

- Task 202, “Install Software (Initial Installation/Upgrade/Change) into WaveStar CIT and Network Element”
- Task 244: Configure TCP/IP Parameters for a Network Element (including FTAM-FTP Gateway)
- “OSI Technical Specifications” (4-32)

Task Complete the following steps to download software to a BandWidth Manager.

1 Login to the BandWidth Manager that you want to download the software to.

2 From the CIT *System View*, select **Configuration > Software > Download Software**.

Result: The *Download Generic* screen appears.

3 Select one of the following addressing schemes:

- **CIT** (the software is on a directory on the CIT)
- **FTTD** (the software is on a directory on an FTP server and you are using the NCC or another BandWidth Manager as a gateway)
- **FTAM** (the software is on a directory on another network element)
- **FTP** (the software is on a directory on an FTP server and the BandWidth Manager you are logged into has a TCP/IP connection)
- **SEC** (the software is on a PCMCIA card in the secondary NVM slot on the BandWidth Manager you are logged into)

4 Fill in any fields that are needed or desired, depending on which addressing scheme you selected.

Reference: See one of the following sections of this task for details:

“CIT fields” (T249-4)

“FTTD fields” (T249-4)

“FTAM fields” (T249-5)

“FTP fields” (T249-5)

5 Click **Download**.

Important! A confirmation dialog box appears that warns you that while the software download is taking place you cannot perform any other operations on this network element.

END OF STEPS



CIT fields In this case you do not fill in any of the fields directly. Instead, click on the “one level up” button (shown below), and click on directories or files to select them. When you do this the fields fill in.



Field	Definition
Name	Directory or file name.
Size	Size of the file.
Type	File type, which can be <i>NE Generic</i> , <i>NE Data</i> , or <i>Directory</i> .
Modified	Date the file was last modified.
Path	Full path to the selected directory or file.

FTTD fields In this case, select the **FTTD** tab and fill in the fields, which are the same as for FTAM, explained below. Then select the **FTP** tab and fill in the fields as explained below.

FTAM fields

Field	Definition
Profile	Drop-down menu of NE profiles stored on the CIT. A user can select a profile to pre-populate the required fields below. A user can also create, modify, and delete these profiles by entering values in the fields and then using the buttons along the right edge of the screen. See Task 715 for details.
Psel	Psel address. This is optional.
Ssel	Ssel address. This is optional.
Tsel	Tsel address. This is optional.
<i>NSAP address frame</i>	Fill in the subfields of the NSAP address from which the software is being downloaded. For a BandWidth Manager this would be the NSAP address for one of the two DCC packs for the System Controller Shelf. This populates the NSAP field, which is required.
Path	Full path to the selected directory or file on the source NE. This is required.

FTP fields

Field	Definition
Profile	Drop-down menu of FTP server profiles stored on the CIT. A user can select a profile to pre-populate the required fields below. A user can also create, modify, and delete these profiles by entering values in the fields and then using the buttons along the right edge of the screen. See Task 715 for details.
IP	IP address. This is required unless the <i>IP name</i> field is populated.
name (<i>Server frame</i>)	IP name. This is required unless the <i>IP</i> (IP address) field is populated.
port	IP port. This is optional. The default is 21.

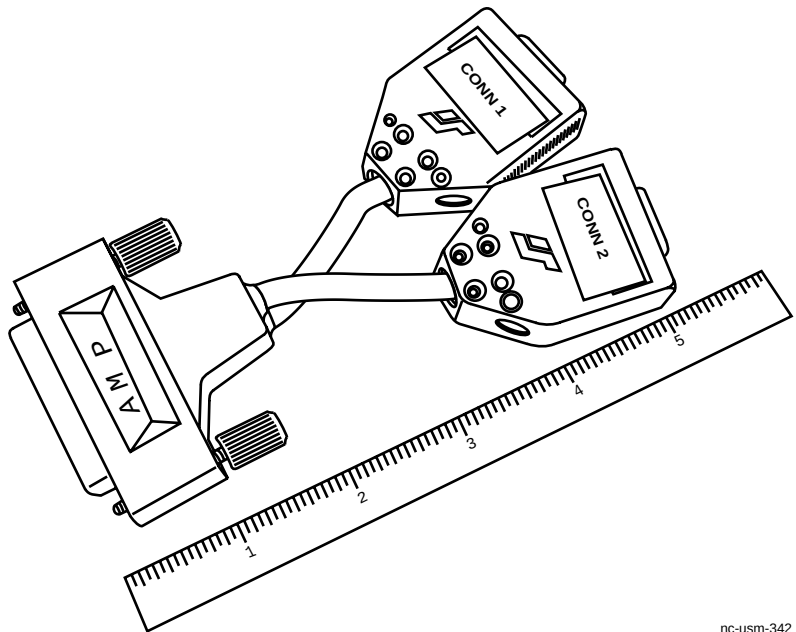
Field	Definition
name (<i>User</i> frame)	User name. This is optional. Fill in this field if you want the user to have to log into the FTP server with a user name and password.
password	User password. This is only valid if a user name is entered.
Path	Full path to the selected directory or file on the FTP server. This is required.

Task 250: Access and Provision Serial (RS-232) Ports

Purpose Starting with Release 4.1, WaveStar BandWidth Manager provides two RS-232 serial ports on the main shelf. These ports terminate on the ADJCTL/DCC packs (one port per pack). A user can connect to one of these ports either directly or through a modem to a dumb terminal or a PC running an application such as HyperTerminal to enter raw TL1 commands. Use this procedure to access and provision the serial ports.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT), if you are changing the baud rate from the default of 9600
- Y-cable, similar to the one shown below (Comcode 848815718), if you have not already connected one to the serial ports



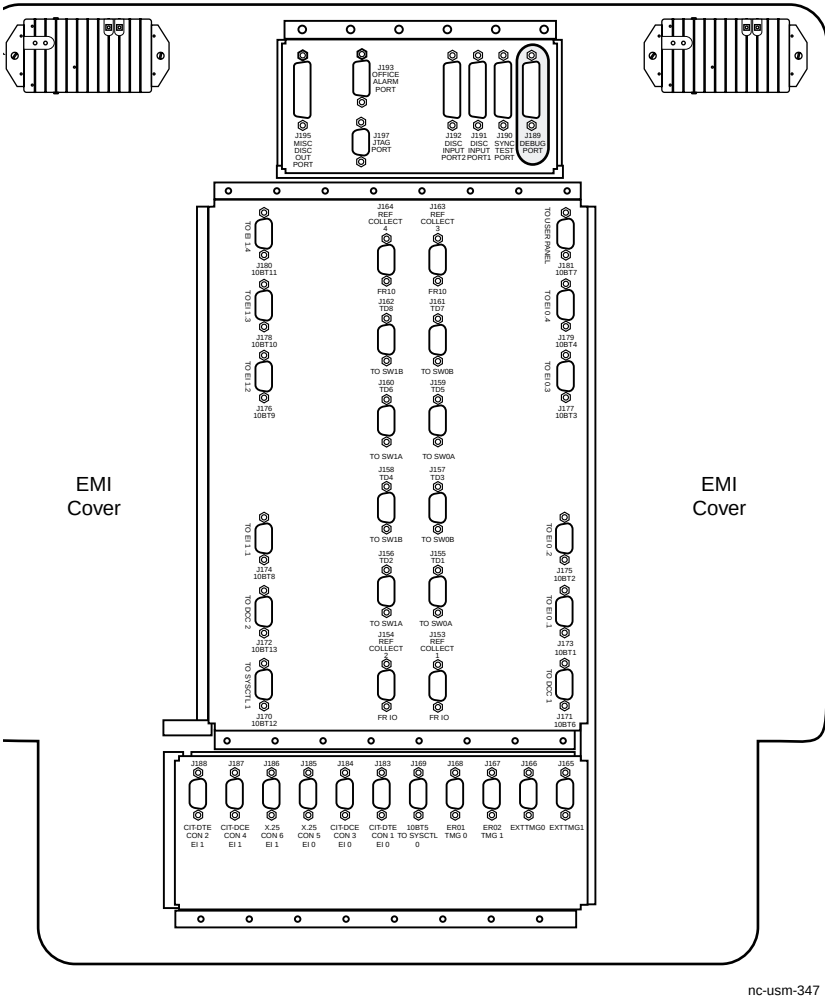
nc-usm-342

Related information For related information, see the following sections in this document:

- “Serial Access” (4-11)

Task Complete the following steps to access or provision the serial ports.

- 1** If there is not one already installed, connect the 25-pin end of the Y-cable to the J189 connector on the back panel of the System Controller Shelf, shown in the shaded oval below.



nc-usm-347

2

If...	Then...
you want to change the baud rate of the ports	continue with Step 3.
you are satisfied with the default baud of 9600	continue with Step 13.

3 At the CIT, login to the BandWidth Manager.

4 At the CIT System View, select **Administration > Data Communications**.

Result: The *Data Communications* screen appears with the Equipment Explorer on the left.

5 Use the Equipment Explorer to expand the system controller bay and shelf.

Result: The DCC circuit pack(s) appear.

6 Highlight a DCC circuit pack.

7 Click on the **Select** button.

Result: The data communications options for that circuit pack appear on the right.

8 Select the **Serial Port** tab.

Result: The *Serial Port* screen appears with a drop-down menu labeled *TL1 Message Baud Rate*.

9 Click on the drop-down and select the desired rate from the following options:

- 1200
- 2400
- 4800
- 9600
- 192000
- 38400
- 57600
- 115200

.....

10 Click on the **OK** button.

.....

11 Repeat steps 2-10 for the second DCC, if desired.

.....

12 Click on the **Close** button.

.....

13 Configure the COM port for the PC or terminal that you are using to connect to the NE. Use the settings below.

- Bits per second (baud) = *9600 (default)* or the rate you configured the DCC for in the CIT
- Data bits = *8*
- Parity = *None*
- Stop bits = *1*
- Flow control = *None*

.....

E N D O F S T E P S

.....



Task 251: Create/Modify/Delete a Download Profile

Purpose	Use this procedure to create a profile for use during a software download via FTAM, FTTD, or FTP. A summary of the procedure appears under “Task summary” and the details are broken up into “Details for creating”, “Details for modifying”, and “Details for deleting”.
Required privilege code	You must have a security privilege code of at least P3 to perform this task.
Required equipment	A WaveStar Craft Interface Terminal (CIT) is required to perform this task.
Related Information	For related information, see the following sections in this document: • Chapter 4, “Operations Interfaces” • Task 249: Download Software
Task summary	The steps below summarize this task: 1. Select Configure > Software > Download Software. 2. Select FTAM, FTTD, or FTP from the <i>Download From / Via</i> drop-down menu. 3. Do one of the following: • To create a profile, enter a value for the <i>Profile</i> field and for the <i>IP</i> or <i>NSAP Address</i> fields. All other fields are optional. Click Add and then Save. • To modify a profile, select the profile from the <i>Profile</i> drop-down, then modify the desired fields, then click Apply, then click Save. • To delete a profile, select the profile from the <i>Profile</i> drop-down, then click Delete, then click Yes to confirm.
Details for creating	Complete the following steps to create a profile.

-
- 1** Select **Configure** > **Software** > **Download Software** from the *System View* toolbar.

Result: The *Download Generic* window opens.

-
- 2 Select **FTAM**, **FTTD**, or **FTP** from the *Download From / Via* drop-down menu. If you selected **FTTD**, then you also have to select either the **FTTD** tab or the **FTP** tab.

Important! Profiles saved in the *FTAM* screen will also appear in the *FTTD* screen, and vice-versa, though you may have to exit and reenter the *Download Generic* window before they all appear.

-
- 3 If any of the fields appear already populated, click on the **Clear** button.

-
- 4 Click into the *Profile* box and type a profile name. For *FTAM* or *FTTD* you may want to use the TID of the network element. For *FTD* you may want to use the server name.

-
- 5 Enter values into the IP or NSAP Address field. All other fields are optional.

Important! To populate the *NSAP Address* field you must populate the separate fields (*AFI*, *IDI*, and so on).

-
- 6 Click **Add**.

-
- 7 Click **Save**.

Result: The profile you just created now appears under the *Profile* drop-down.

END OF STEPS



Details for modifying

Complete the following steps to modify a profile.

- 1 Select **Configure** > **Software** > **Download Software** from the *System View* toolbar.

Result: The *Download Generic* window opens.

- 2 Select **FTAM**, **FTTD**, or **FTP** from the *Download From / Via* drop-down menu. If you selected **FTTD**, then you also have to select either the **FTTD** tab or the **FTP** tab.

Important! Profiles saved in the *FTAM* screen will also appear in the *FTTD* screen, and vice-versa, though you may have to exit and reenter the *Download Generic* window before they all appear.

- 3 Select a profile from the *Profile* drop-down.

- 4 Click **Modify**.

- 5 Modify any fields you want.

- 6 Click **Apply**.

- 7 Click **Save** to save the changes.

Details for deleting Complete the following steps to delete a profile.

-
- 1** Select **Configure > Software > Download Software** from the *System View* toolbar.

Result: The *Download Generic* window opens.

-
- 2** Select **FTAM**, **FTTD**, or **FTP** from the *Download From / Via* drop-down menu. If you selected **FTTD**, then you also have to select either the **FTTD** tab or the **FTP** tab.

Important! Profiles saved in the *FTAM* screen will also appear in the *FTTD* screen, and vice-versa, though you may have to exit and reenter the *Download Generic* window before they all appear.

-
- 3** Select a profile from the *Profile* drop-down.

-
- 4** Click **Delete**.

Result: A confirmation dialog appears.

-
- 5** Click **Yes** to confirm.

Result: The profile no longer appears under the *Profile* drop-down.

Part III

Circuit Order / Provisioning Tasks



Circuit Order/Provisioning Task List

Activate Manual Ring Map - - - - -	T348
Add DS1 Timing Reference - - - - -	T300
Add Node to In-Service 2-Fiber BLSR - - - - -	T325
Alarm Severity Assignment Profile (ASAP)---Create/Modify - - - - -	T315
Change an NE's TID- - - - -	T329
Change System Timing Configuration - - - - -	T301
Change System Timing Reference Priority - - - - -	T340
Configure Manual Ring Map - - - - -	T347
Create 1XN Electrical Equipment Protection Group - - - - -	T313
Create 1XN STM1EA Electrical Equipment Protection Group - - - - -	T342
Create, Modify, or Delete Threshold Crossing Alert (TCA) Profile - - - - -	T320
Create New BWM I/O Bay Entity - - - - -	T316
Create New Cross Connection - - - - -	T303
Create New Optical Port Protection Group - - - - -	T302
Create NonReporting Alarm Severity Assignment Profiles (ASAPs) - - - - -	T336
Create, Modify, or Delete Threshold Crossing Alert (TCA) Profile - - - - -	T320
Create/Install New BWM 2.5G I/O Shelf - - - - -	T317
Delete a Node from an In-Service 2-Fiber BLSR/MS-SPRing - - - - -	T326
Delete Optical Port Protection Group- - - - -	T308
Deprovision WBM 2.5G I/O Shelf - - - - -	T327
Deprovision WBM 2.5G-STM1E I/O Shelf - - - - -	T343
Deprovision WBM 10G I/O Shelf - - - - -	T335
Display and Save Performance Monitoring (PM) Register Values - - - - -	T324

Enable or Disable Performance Monitoring (PM) Data Collection - - - - -	T323
Enable/Disable DCC Terminations- - - - -	T305
Example of Bridging and Rolling an Existing Cross-Connection to a Different Tributary- - - - -	T344
Initialize Performance Monitoring (PM) Registers - - - - -	T321
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Modify/Delete/Roll/Convert Cross Connection - - - - -	T304
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Overview of Adding a Intermediate Node to an In-Service 4-Fiber Open Ring (BLSR/MS-SPRing) - - - - -	T330
Provision Alarm Configurations - - - - -	T339
Provision Basic AU-3/AU-4 Adaptation - - - - -	T345
Provision Generalized AU-3/AU-4 Adaptation - - - - -	T346
Provision Path Trace- - - - -	T314
Provision Performance Monitoring (PM) Functions - - - - -	T318
Provision Ports or Tributaries with Performance Monitoring (PM) Threshold Crossing Alert (TCA) Profiles - - - - -	T322
Provision Time Interval for Automatic Backup of Database to Secondary Memory - - - - -	T311
Provision Traffic on a BLSR/MS-SPRing with Time Slot Interchange - - -	T351
Provision Traffic on a UPSR or SNCP - - - - -	T353
Provision Traffic on Multiple BLSRs/MS-SPRings- - - - -	T350
Provision Traffic on a Single BLSR/MS-SPRing - - - - -	T349
Provision Transmission Circuit Pack Ports - - - - -	T307
Set NonReporting Alarm Severity Assignment Profiles (ASAPs) - - - - -	T338

Turn Up a BLSR or MS-SPRing - - - - -	T328
Turn Up a UPSR or SNCP Ring - - - - -	T352
View Alarm Severity Assignment Profiles (ASAPs)- - - - -	T337
View Intershelf Bandwidth Utilization- - - - -	T355
View Performance Monitoring (PM) Parameters for Selected Ports or Tributaries - - - - -	T341
View Performance Monitoring (PM) Threshold Crossing Alert (TCA) Profiles - - - - -	T319

Task 300: Add DS1 Timing Reference

Purpose	Use this procedure to add a DS1 timing reference to a WaveStar BandWidth Manager system.
Required Privilege Code(s)	A privilege code of at least P3 is required to access the provisioning screens associated with this task. A privilege code of at least P1+M1 is required to access the display screens associated with this task.
Required equipment	The following are required in order to complete this task: • WaveStar Craft Interface Terminal (WaveStar CIT) • Wrist strap
Safety precautions	To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Perform this task only during periods of light service traffic because of the risk of service traffic interruptions.



CAUTION

In Releases 2 and later releases, wait 3 minutes after performing this task before making any other changes to the WaveStar BandWidth Manager system. In Release 1.3, wait 7 minutes after performing this task before making any other changes to the WaveStar BandWidth Manager system.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system, to prevent electrostatic discharge damage to sensitive components.

Related Information

For related information, see the following sections in this document:

- *Chapter 6, Control, Transmission, and Synchronization Interfaces*
- *Appendix A, CIT Tutorial*

Before you begin

Before you begin this task:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the timing parameters that must be provisioned.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following steps to add a DS1 timing reference(s) to a WaveStar BandWidth Manager system

-
- 1 At the WaveStar CIT, select **View>Timing/Sync ...**.

Result: The View Timing/Sync screen appears.

- 2 Click on the **External Timing Input Ports, Timing Reference, and System Timing** tabs, and compare the information with the work instructions. Then click on **Close**.
-

- 3 If required, connect the external timing cable(s) to the Control Shelf and the office building integrated timing supply (BITS) clock.

Reference: SE 300-1

Important! The LLY2 TMG/STRAT3 (S1:6 and later) and LLY2B TMG/STRAT3 circuit packs support the ESF and SF timing input formats. The LLY2 TMG/STRAT3 (S1:1,2,3,4,5) circuit pack supports the ESF timing input format only.

- 4 If required, select **Configuration>Timing/Sync**, click on the **External Timing Input Ports** tab, and provision the DS1 port parameters based on the work instructions. Then click on **Apply**.

-
- 5 If required, select **Configuration>Timing/Sync**, click on the **Timing Reference** tab, and provision the timing reference parameters based on the work instructions. Then click on **Apply**.

-
- 6 If required, select **Configuration>Timing/Sync**, click on the **System Timing** tab, and provision the system timing parameters based on the work instructions. Then click on **OK**.

-
- 7 Select **View>Timing/Sync...**

Result: The View Timing/Sync screen appears.

-
- 8 Click on the **External Timing Input Ports**, **Timing Reference**, and **System Timing** tabs, and verify that the DS1 port parameters, timing reference parameters, and system timing parameters are provisioned correctly.

END OF STEPS



SE 300-1: Connect the External Timing Cable(s)

Procedure Perform the following steps to connect the timing cable(s) to the Control Shelf and the office BITS clock.

- 1

If required, label the Primary Timing cable on both ends as **Primary J165** and the Secondary Timing cable on both ends as **Secondary J166**.
- 2

If required, connect the Primary Timing cable (labeled **Primary J165**) to the **PERI (1)** connector (labeled **J165**) on the Control Shelf backplane.
- 3

If required, connect the Secondary Timing cable (labeled **Secondary J166**) to the **SERI (2)** connector (labeled **J166**) on the Control Shelf backplane.
- 4

Connect the unterminated end of the Primary Timing cable and Secondary Timing cable to the office BITS clock as required.

END OF STEPS



Task 301: Change System Timing Configuration

- Purpose** Use this procedure to:
- Change the Provisioned Clock Mode parameter from Free Running to Locked
 - Change the Provisioned Clock Mode parameter from Locked to Free Running
 - Enable or disable System SSM (synchronization status message) mode (Release 3.1 and later)
 - Change the Timing Reference Wait to Restore parameter
 - Change the Cable - 1 Timing Collection Source parameter (Release 3.0 and earlier)

Required privilege code(s) A privilege code of at least P1 is required to access the System Timing provisioning screen. A privilege code of at least P1+M1 is required to access the System Timing display screen.

- Required equipment** The following equipment is required to perform this task:
- WaveStar Craft Interface Terminal (WaveStar CIT)
 - Wrist strap

Safety precautions

To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.

**CAUTION**

Perform this task only during periods of light service traffic because of the risk of service traffic interruptions.

**CAUTION**

In Releases 2 and later releases, wait 3 minutes after performing this task before making any other changes to the WaveStar BandWidth Manager system. In Release 1.3, wait 7 minutes after performing this task before making any other changes to the WaveStar BandWidth Manager system.

**CAUTION**

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system, to prevent electrostatic discharge damage to sensitive components.

Related Information

For related information, see the following sections in this document:

- “Provisioning options” and “Status acronyms” in this Task
- *Chapter 6, Control, Transmission, and Synchronization Interfaces*
- *Chapter 7, Provisioning, Security, and Administration*
- *Appendix A, CIT Tutorial*

Before you begin

Before you begin this task:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the timing parameters that must be provisioned.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task

Complete the following steps to change the provisioned system timing configuration parameters of the WaveStar BandWidth Manager system.

1

If changing the ...	Then go to ...
Provisioned Clock Mode from Free Running to Locked,	Step 2.
Provisioned Clock Mode from Locked to Free Running,	Step 8.
Timing Reference Wait to Restore parameter,	Step 8.
System Synchronization Status Message (SSM) Mode parameter,	Step 8.
Cable - 1 Timing Collection Source parameter,	Step 8.

Important! Before changing the Provisioned Clock Mode from Free Running to Locked, the DS1 or E1 external timing input port(s) must be provisioned, and the timing references (EXTREF1, EXTREF2, LINE1, LINE2) must be assigned and provisioned.

2

At the WaveStar CIT, select **View>Timing/Sync...**, click on the **External Timing Input Ports** tab, and verify that the port Timing Input Format parameter is provisioned correctly.

3

IF the port Timing Input Format parameter is...	THEN...
provisioned correctly,	click on the Timing Reference tab, and verify that the timing references are connected to ports, the system timing reference priority is assigned, and the signal status is Normal. Then go to Step 6.
not provisioned correctly,	click on Close and go to Step 4.

- 4 Select **Configuration>Timing/Sync**, click on the **External Timing Input Ports** tab, provision the Timing Input Format parameter based on the work instructions, and click on **OK**.

- 5 Select **View>Timing/Sync...**, click on the **Timing Reference** tab, and verify that the timing references are connected to ports and the system timing reference priority is assigned.

6

IF the timing reference parameters are...	THEN...
provisioned correctly,	click on Close and go to Step 8.
not provisioned correctly,	click on Close and go to Step 7.

- 7 Select **Configuration>Timing/Sync**, click on the **Timing Reference** tab, provision the timing reference parameters based on the work instructions, and click on **OK**.

- 8 Select **Configuration>Timing/Sync**, click on the **System Timing** tab, provision the parameters based on the work instructions, and click on **OK**.

- 9 Select **View>Timing/Sync**, click on the **System Timing** tab, and verify that the system timing parameters are provisioned correctly.

Provisioning options

Item	Options	Comments
Timing generator circuit packs	Active or Standby	
Synchronization mode	Free-running or locked	
Locked mode	Reference signals sources	
Free-running mode	none	
Holdover mode	none	
Reference Selection Priority	Disable 1 2 3 4	If Disable, the signal is not used for synchronization reference. Priority 1 is highest priority.
SSM	Enable or Disable	If enable, SSM is stored in S1 byte in the section overhead of the outgoing port of all OC-192 and OC-48 circuit packs If disable, status of STU is sent
QL for incoming reference signal (SONET)	AUTO DUS PRS SIC ST2 ST3 STU	See the table on the next page for definitions. If AUTO, the incoming quality level is taken. If not AUTO, then the provisioned value is assigned to the signal. Incoming DS1 reference signals provisioned for SSM must be provisioned with a QL level other than AUTO.
QL for incoming reference signal (SDH)	AUTO DNU PRC SEC SSU-L SSU-T	See the table on the next page for definitions. If AUTO, the incoming quality level is taken. If not AUTO, then the provisioned value is assigned to the signal. Incoming E1 reference signals provisioned for SSM must be provisioned with a QL level other than AUTO.
Wait-to-Restore timer	Time to restore	When the signal fails and is restored, the signal status will become WtR for a certain time before it becomes Normal again. That time can be provisioned.

Status acronyms

Status	Meaning
DNU	Don't use for synchronization
DUS	Don't use for synchronization
PRC	primary reference clock
PRS	Stratum-1
RES	Reserved for network synchronization use
SEC	SDH equipment clock
SIC	SONET internal clock
SSU-L	synchronization supply unit—local node
SSU-T	synchronization supply unit—transfer node
ST2	Stratum-2
ST3	Stratum-3
ST4	Stratum-4
STU	Synchronized—traceability unknown

Task 302: Create New Optical Port Protection Group

Purpose	Use this procedure to create a new 2-Fiber BLSR/MS-SPRing, 4-Fiber BLSR/MS-SPRing, or 1+1 optical port protection group.
Required privilege code(s)	You must have a security privilege code of at least M4 to provision port protection groups and a security privilege code of at least P3 to provision circuit packs.
Required equipment	WaveStar Craft Interface Terminal (WaveStar CIT)
Related Information	For related information, see the following sections in this document: • Chapter 6, Control, Transmission, and Synchronization Interfaces • Chapter 7, Provisioning, Security, and Administration • Appendix A, WaveStar CIT Tutorial
Before you begin	Prior to performing this task, you must: • Obtain the work instructions for this task. • Identify the type of protection group being created. • Identify the slots, circuit packs, and ports that are being used for this task. • Be able to log in to an NE with the CIT and be familiar with the functions of the CIT.
Task	Perform the following steps to create a new port protection group.

-
- 1** Use the WaveStar CIT to log in to the WaveStar BandWidth Manager.
-

- 2** On the *System View* toolbar, select **View > Cross-Connections** or **View > Reservations** to verify that no cross-connections or reservations have been made on any port to be included in the port protection group

Note: When the View Cross Connections window opens, select the shelf, then click **Select** at bottom of window to view cross-connections.

3

IF...	THEN...
cross-connections or reservations have already been made on any port in the new protection group,	port protection group cannot be created. Refer trouble to your provisioning group. <i>Stop! End of Task.</i>
no cross-connections or reservations have been made on any port in the new protection group,	continue with the next step.

4 Determine if all required circuit packs are installed and ports are provisioned for the new port protection group.

Reference: SE 302-1

5

If the ...	Then ...
required Slot or slots are empty and have not been provisioned for circuit packs,	install and/or provision the required circuit pack(s). Reference: T-306
required Slot or slots are empty but are preprovisioned for the required circuit packs,	install and/or provision the required circuit pack(s). T 306 Reference: T 306
required Slot or slots are empty but preprovisioned for circuit packs that do not support the port protection group,	refer trouble to your provisioning group. You may have to use the Configuration > Delete command to delete the existing circuit pack. <i>Stop! End of Task</i>
circuit pack (CP) types installed do not support the port protection group,	refer trouble to your provisioning group. You may have to use the Configuration > Delete command to delete the existing circuit pack. <i>Stop! End of Task</i>

If the ...	Then ...
required circuit packs (CP) have been installed, but the ports have not been provisioned,	select Configuration > Provision on the System View toolbar to provision the required circuit pack ports. Reference: T 307
required circuit packs (CP) have been installed and the ports have been provisioned,	continue with the next step.

-
- 6** On the *System View* toolbar, select **Configuration > Create New > Protection Group**.

Result: The Create New Protection Group window opens.

-
- 7** In the **Create New Protection Group** window:

1. Select the **Ptn Grp** at bottom of window.
2. Select the required bay.
3. Select the required shelf.
4. Click the Select I/O Shelf button at bottom of window.

Result: Provisionable parameter area displays on right side of window.

-
- 8** Choose the desired port **Protection Type** from the drop-down menu box.

-
- 9** Provision the required parameters for the selected port protection group.

Note: For help in creating the protection group and provisioning the required parameters, see “Optical Port Provisioning Parameters” (7-71).

-
- 10** Verify all parameters are correct. Click **Apply** to make the changes.

Result: Verification window opens stating creation of a new protection group may affect the NE and asks if you want to execute the command.

11 Click **Yes**.

Result: DCC Terminations Provisioning message appears indicating the LAPD role of User Side (default).

12 Click **OK**, then click **Close**.

13 Enable DCC channel terminations, as required.

Reference: Task 305

END OF STEPS



SE 302-1: Determine Provisioning Status of Optical Transmission Circuit Packs and Ports

Procedure Perform the following steps to determine if the required circuit packs are installed and the required optical ports are provisioned.

-
- 1** On the *System View* toolbar, select **View > View Equipment Details**

Result: **View Equipment Details** window opens

- 2** Open the bay, then open the shelf details by clicking on the plus (+) sign next to the required shelf.
-

- 3** Find the required slots in the shelf equipment list. Select a required slot, then click **Select**.

Result: **View Slot/Circuit Pack Details** window opens.

4

If ...	Then ...
only Slot is listed and no circuit pack is listed for the required slot,	no circuit pack has been installed and the slot has not been preprovisioned for a circuit pack (Holder Status: Empty). Return to the main task.
the required CP is listed for a required slot but the circuit pack is not installed (Holder Status: Empty),	the slot has been preprovisioned for the correct type of circuit pack. Return to the main task.
a CP is listed and uninstalled for a required slot, but the circuit pack type does not support the port protection group being created,	the slot has been preprovisioned for the type of circuit pack listed (Holder Status: Empty). Return to the main task.
a CP type is listed and installed for a required slot, but the circuit pack type does not support the port protection group being created,	the slot is already equipped and provisioned with the listed circuit pack (Holder Status: Valid). Return to the main task.

If ...	Then ...
the correct CP type is listed and installed for the type of port protection group being created,	the required circuit pack has been installed in the required slot (Holder Status: Valid). Continue with the next step.

-
- 5** Perform the following to see if the required port on the circuit pack has been provisioned:
1. Click on the plus (+) sign next to the required circuit pack.
 2. Select the port.
 3. Click **Select** at bottom of window.
 4. Verify that all the required port parameters are correct.
-
- 6** Repeat this procedure for each of the required slots, circuit packs, and ports.

END OF STEPS



Task 303: Create New Cross-Connection

Purpose	Use this procedure to create a new cross-connection.
Required privilege code	You must have a security privilege code of at least P3 to perform this task.
Required equipment	WaveStar Craft Interface Terminal (CIT) is required to perform this task.
Related information	For related information, see the following sections in this document: • Chapter 7, “Provisioning, Security, and Administration” • Appendix A, “WaveStar CIT Tutorial”.
Before you begin	Before you begin this task, you must: • Obtain the work instructions for this task. • Determine the cross-connection(s) to be made. • Identify the tributaries for the cross-connections. • Log in to the NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.
Task	Complete the following steps to create a new cross-connection. 1 From the <i>System View</i> toolbar, select View > Rings > Ring Map to select and view all the nodes in a selected ring, if required. 2 From the <i>System View</i> toolbar, select View > View Equipment Details and verify that all slots, circuit packs, ports, protection groups, and required tributaries have been provisioned.

Reference: SE 303-1

3

If...	Then...
circuit packs, ports, protection groups, and/or required tributaries have not been provisioned,	refer trouble to your provisioning group. Equipment entities must be provisioned before you make cross-connections. <i>Stop! End of Task</i>
circuit packs, ports, protection groups, and required tributaries have been provisioned,	on the <i>System View</i> toolbar, select View > Cross Connections . Result: The <i>View Cross Connections</i> window opens.

4 Enter the AID of the tributary being connected or expand the equipment list to the required tributary. Click **Select**.

Result: The **View Cross Connections for ...** window opens.

5

If...	Then...
the required tributary has already been cross-connected,	click Close and refer trouble to your provisioning group. <i>Stop! End of Task</i>
the required tributary has not been cross-connected,	click Close and select Configuration > Cross-Connection on the <i>System View</i> toolbar. Result: The <i>Cross Connection Wizard</i> window opens.

6 Select **Create a new cross-connection**, then click **Next**.

7 Follow the directions in the remaining windows to create the new cross-connection.

-
- 8** Verify cross-connection parameters, then click **Finish** at the end of the wizard windows.

If...	Then...
other cross-connections are being made at this NE,	repeat this procedure for all cross-connections to be made at this node.
no other cross-connections are being made at this NE,	click Close , then click Yes to confirm your exit from the Cross Connection Wizard.

-
- 9** On the *System View* toolbar, use the **View > Cross Connection** menu to verify the correct cross connection was made.

-
- 10** Log off the NE and log in to the next NE requiring a cross-connection. Repeat this procedure for all NEs requiring a cross-connection from your work instruction.

END OF STEPS



SE 303-1: View Equipment Details for Provisioned Status

Purpose Perform the following steps to view the provisioned status for any of the following:

- Shelf
- Slot or circuit pack
- Port
- Port Protection Group
- Tributary.

Task

1 On the *System View* toolbar, select **View > View Equipment Details**, if not already performed.

Result: **View Equipment Details** window opens.

2 Open the bay, then open the shelf details by clicking on the plus (+) sign next to the required shelf.

3 View the required slots in the shelf equipment list.

4

If...	Then...
only Slot is listed and a circuit pack is not listed for the required slot,	a circuit pack has not been installed and the slot has not been preprovisioned for a circuit pack (Holder Status: Empty). Return to the main task.
the required CP is listed for a required slot but the circuit pack is not installed (Holder Status: Empty),	the slot has been preprovisioned for the correct type of circuit pack. Return to the main task.
a CP is listed and uninstalled for a required slot, but the circuit pack type is not the correct type,	the slot has been preprovisioned for the type of circuit pack listed (Holder Status: Empty). Return to the main task.

If...	Then...
a CP type is listed and installed for a required slot, but the circuit pack type is not the correct type,	the slot is already equipped and provisioned with the listed circuit pack (Holder Status: Valid). Return to the main task.
the CP type listed and installed is the same type circuit pack you are provisioning,	the required circuit pack is installed in the required slot (Holder Status: Valid).

-
- 5** Continue to expand the equipment list. Highlight the required circuit pack, port, or tributary and click **Select** to view the provisioning details.
-

- 6** Click **Close** at bottom of window.
-

END OF STEPS



Task 304: Modify/Delete/Roll/Convert Cross-Connection

Purpose Use this procedure to do one of the following with an existing cross-connection: modify, delete, or roll an existing cross-connection or to convert it to or from a path-protected cross-connection.

- modify it
- delete it
- roll it
- convert it to a different type

Use Task 303 to create a new cross-connection.



CAUTION

Modifying, deleting, or rolling a cross-connection can cause service interruption. Rolling a cross-connection disconnects a circuit input tributary from an output tributary and then connects the input tributary to another output tributary. To prevent an interruption of transmission, all the required paths in the new path must be set up before rolling a cross-connection.

Required privilege code You must have a security privilege code of at least P3 to perform this task.

Required equipment A WaveStar Craft Interface Terminal (CIT) is required to perform this task.

Related Information For related information, see the following sections in this document:

- Chapter 7, “Provisioning, Security, and Administration”
- Appendix A, “WaveStar CIT Tutorial”.

Before you begin Before you begin this task, you must:

- Obtain the work instructions for this task.
- Determine the cross-connection(s) to be modified, deleted, or rolled.
- Identify the tributaries for the cross-connections.
- Log in to the NE with the WaveStar CIT, and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to modify, delete, roll, or convert an existing cross-connection.

- 1 Select **View > Cross Connections** from the System View toolbar.

Result: The **View Cross Connections** window opens.

- 2 Select the **Equipment** or **Ptn Grp** tab and then expand and highlight the shelf, circuit pack, port, or tributary you want to view.

- 3 Click **Select** to view existing cross-connections.

Result: The **View Cross-Connections for ...** window opens.

- 4 Select (highlight) the connection to view properties of the cross-connection.

Result: Properties display at bottom of screen.

5

If...	Then...
the tributary has an existing cross-connection loopback or test access connection,	determine reason for the condition before performing cross-connection requests. <i>Stop! End of Task</i>

- 6 Click **Close**, then select **Configuration > Cross-Connection** from the System View toolbar.

Result: The **Cross Connection Wizard** window opens.

- 7 Select your task from one of the following:
 - Modify an existing cross-connection
 - Delete leg(s) from an existing cross-connection
 - Roll a cross-connection leg from one tributary to another.

-
- 8** Click **Next** and read and follow all directions in the remaining windows to modify, delete, roll, or convert the cross-connection.
-

- 9** Verify cross-connection parameters, then click **Finish** at the end of the wizard windows.

If...	Then...
other cross-connection requests are being made at this NE,	repeat this procedure for other cross-connection requests.
no other cross-connection requests are required at this NE,	click Close to exit the cross-connection wizard.

-
- 10** On the *System View* toolbar, use the **View > Cross Connections** menu to verify the correct cross-connection request was made.
-

- 11** Log off the NE and log in to the next NE requiring a cross-connection request. Repeat this procedure for all NEs required on your work instruction.

END OF STEPS



Task 305: Enable/Disable DCC Terminations

Purpose	Use this procedure to enable or disable optical interface DCC terminations.
Required privilege code	You must have a security privilege code of at least S3 to perform this task.
Required equipment	The WaveStar Craft Interface Terminal (CIT) is required to perform this task.
Related information	For related information, see the following sections in this document: • Chapter 6, “Control, Transmission, and Synchronization Interfaces” • Chapter 7, “Provisioning, Security, and Administration” • Appendix A, “WaveStar CIT Tutorial”.
Before you begin	Prior to performing this task, you must: • Obtain the work instructions for this task. • Identify the circuit packs and ports for DCC terminations. • Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.
Task	Complete the following steps to provision DCC terminations. 1 Use the WaveStar CIT to log in to the WaveStar BandWidth Manager NE. 2 On the <i>System View</i> menu, select View > DCC Terminations. Result: The View DCC Terminations window opens. 3 Select the required bay, shelf, and CP dccei (ADJCTL/DCCEI) circuit pack, then click Select DCC Pack. Result: The View DCC Terminations detail window opens.

-
- 4 Select the **Section DCC** or **Line DCC** tab at top of window to view the number of remaining Section or Line DCC channels.
-

- 5 Verify that enough **Remaining Channels** are available for the ports being terminated.

If...	Then...
not enough DCC channels are available,	refer trouble to your provisioning group. You may have to disable other DCC channels before completing this task. <i>Stop! End of Task.</i>
enough DCC channels are available,	Click Close .

-
- 6 On the *System View* menu, select **Configuration > DCC Terminations**.

Result: Configure DCC Terminations window opens.

- 7 Select the required bay, shelf and **CP dccei (ADJCTL/DCCEI)** circuit pack, then click **Select** at bottom of window.

Result: Provisionable parameters area displays on right side of window.

- 8 Select the **Section DCC** or **Line DCC** tab at top of window depending on the type of DCC termination you are provisioning.
-

- 9 Select **Current Terminations** to provision an existing DCC termination, or select **New Termination** to provision a new DCC termination.
-

- 10 Select a port for Current/New Termination. For help on any parameter, use the **Help** function of the WaveStar CIT.
-

- 11 Verify port and protection group AID.
-

12 Select **DCC Terminations** as **Enabled** or **Disabled**.

Important! One end of line should be set to User Side, and the other end of the line should be set to Network Side.

13 Select **LAPD Role** as **USER-SIDE** or **NETWORK-SIDE**, as required. Provision other parameters, as required.

Important! If you disable a DCC channel at one NE, then you may have to disable the DCC channel at the other end to prevent alarms.

14 Click **Apply** to make changes.

Result: Verification window opens stating execution of the command may affect NE service and asks if you want to execute the command.

15 Click **Yes**, then click **Close** to exit.

END OF STEPS



Task 306: Install and Provision Transmission Circuit Packs/Port Units

Purpose Use this procedure to install and provision transmission circuit packs/port units.

Required privilege code You must have a security privilege code of at least P3 to perform this task.

Required equipment The following are required in order to complete this task

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap.

Related information For related information, see the following sections in this document:

- Chapter 6, “Control, Transmission, and Synchronization Interfaces”
- Chapter 7, “Provisioning, Security, and Administration”
- Appendix A, “WaveStar CIT Tutorial”.

Before you begin Prior to performing this task, you must:

- Obtain the work instructions for this task.
- Identify the slots and circuit packs being installed or provisioned.
- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to install and provision transmission port units.

1 Use the WaveStar CIT to log in to the WaveStar BandWidth Manager.

2 On the *System View* menu, select **View > View Equipment Details** to view the equipment details for the slot and circuit pack you are installing and provisioning.

Reference: SE 306-1

3

If the...	Then...
Slot is empty and has not been preprovisioned for a circuit pack,	continue with Step 4.
slot is empty but is preprovisioned for the required circuit pack,	continue with Step 4.
slot is empty but preprovisioned for a circuit pack different from the circuit pack you are installing,	refer trouble to your provisioning group. You may have to use the Configuration > Delete command to delete the circuit pack before you continue. <i>Stop! End of Task</i>
slot is already equipped with a circuit pack (CP) different from the circuit pack you are installing,	refer trouble to your provisioning group. You may have to use the Configuration > Delete command to delete the circuit pack before you continue. <i>Stop! End of Task</i>
required circuit pack (CP) has been installed, but the circuit pack has not been provisioned,	continue with Step 6.
required circuit pack (CP) has already been installed and the circuit pack has been provisioned,	<i>Stop! End of Task</i>

-
- 4 Install required circuit pack into the required slot. Wait until the green LED lights steadily.

Result: Green LED blinks for several minutes, then lights steadily.

- 5 On the *System View* menu, select **View** > **View Equipment Details** to verify circuit pack is listed correctly.
-

- 6 Provision or verify circuit pack parameters.

Reference: SE 306-2

7

If...	Then...
circuit pack ports are being provisioned now,	provision circuit pack ports. Reference: T 307
circuit pack ports are not being provisioned now,	<i>Stop! End of Task</i>

END OF STEPS



SE 306-1: View Equipment Details for Slot and Circuit Pack Provisioning

Procedure Perform the following steps to view the equipment details for the shelf, slots, and circuit pack provisioned status.

- 1** On the *System View* toolbar, select **View > View Equipment Details**.

Result: **View Equipment Details** window opens.

- 2** Open the bay, then open the shelf details by clicking on the plus (+) sign next to the required shelf.
-

- 3** View the required slots in the shelf equipment list. Select the required slot, then click **Select**.

Result: **View Slot Details...** or **Circuit Pack Details...** window opens.

4

If...	Then...
only Slot is listed and a circuit pack is not listed for the required slot,	a circuit pack has not been installed and the slot has not been preprovisioned for a circuit pack (Holder Status: Empty).
the required circuit pack (CP) type is displayed but not installed in the required slot,	the slot has been preprovisioned for the type of circuit pack listed, but a circuit pack is not installed (Holder Status: Empty).
a circuit pack (CP) type is displayed but not installed, and the circuit pack is not the same type as the one you are installing,	the slot has been preprovisioned for the type of circuit pack listed, but a circuit pack is not installed (Holder Status: Empty).
a circuit pack (CP) type is displayed and installed, but the circuit pack is not the same type as the one you are installing,	the slot is already equipped and provisioned with the listed circuit pack (Holder Status: Valid).
the circuit pack (CP) type listed is installed and is the same type circuit pack you required,	the required circuit pack has already been installed in the required slot (Holder Status: Valid).

END OF STEPS



SE 306-2: Provision Circuit Pack Parameters

Task Perform the following steps to provision a circuit pack.

-
- 1** On the *System View* toolbar, select **Configuration > Provision**.

Result: **Provision Parameters...** window opens.

.....

- 2** Open the bay, then open the shelf details by clicking on the plus (+) sign next to the required shelf.
-

- 3** Select the required circuit pack, then click **Provision**.

Result: Provisionable parameter area displays on right side of window.

.....

- 4** Provision parameters as required.
-

- 5** Verify parameters are correct.
-

- 6** Click **Apply** to apply any changes, then click **Close**.

.....

END OF STEPS

.....



Task 307: Provision Transmission Circuit Pack Ports

Purpose	Use this procedure to provision optical port unit and DS3/EC1 circuit pack ports after circuit packs are installed and provisioned.
Required privilege code	You must have a security privilege code of at least P3 to perform this task.
Required equipment	The WaveStar Craft Interface Terminal (CIT) is required to perform this task.
Related information	For related information, see the following sections in this document: • Chapter 6, “Control, Transmission, and Synchronization Interfaces” • Chapter 7, “Provisioning, Security, and Administration” • Appendix A, “WaveStar CIT Tutorial”.
Before you begin	Prior to performing this task, you must: • Obtain the work instructions for this task. • Identify the circuit packs and ports being provisioned. • Be able to log in to an NE with the WaveStar CIT, and be familiar with the functions of the WaveStar CIT.
Task	Complete the following steps to provision ports of transmission port units. 1 Use the WaveStar CIT to log in to the WaveStar BandWidth Manager NE. 2 On the <i>System View</i> menu, select View > View Equipment Details to view the equipment details for the slot and circuit pack with the ports you are provisioning. Result: View Equipment Details window opens. Reference: SE 307-1

3

If...	Then...
the Slot is empty,	refer trouble to your provisioning group. This task assumes the correct circuit pack is installed. <i>Stop! End of Task</i>
the slot is equipped with a circuit pack (CP) different from the circuit pack you expect to provision,	refer trouble to your provisioning group. This task assumes the correct circuit pack is installed. <i>Stop! End of Task</i>
the CP type is listed with the same type circuit pack you expect to provision,	highlight the circuit pack and click Select at bottom of window. View circuit pack details for proper provisioning, then click Close .

4 If the circuit pack has not been provisioned, you must provision the circuit pack before you provision the ports.

Reference: T 306

5 On the *System View* menu, select **Configuration > Provision**.

Result: The **Provision Parameters ...** window opens.

6 Open the bay, shelf, and circuit pack details by clicking on the plus (+) sign next to each entity.

7 Highlight the required port, then click **Provision**.

Result: Provisionable parameter area displays on right side of window.

8 Provision parameters as required.

9 Verify parameters are correct.

10 Click **Apply** to make changes.

Result: Verification window opens stating execution of the command may affect NE service and asks if you want to execute the command.

11 Click **Yes**, then click **Close** to exit.

END OF STEPS



SE 307-1: View Equipment Details for Slot and Circuit Pack Provisioning

Task Perform the following steps to view the equipment details for the shelf, slots, and circuit pack provisioned status.

- 1 On the *System View* toolbar, select **View > View Equipment Details**, if not already performed.

Result: **View Equipment Details** window opens.

- 2 Open the bay, then open the shelf details by clicking on the plus (+) sign next to the required shelf.

- 3 View the required slots in the shelf equipment list.

4

If...	Then...
only Slot is listed and no circuit pack is listed for the required slot,	no circuit pack has been installed and the slot has not been preprovisioned for a circuit pack (Holder Status: Empty). Return to the main task.
the required circuit pack (CP) type is displayed but not installed in the required slot,	the slot has been preprovisioned for the type of circuit pack listed, but a circuit pack is not installed (Holder Status: Empty). Return to the main task.
a circuit pack (CP) type is displayed but not installed, but the circuit pack listed is not the same type as the one you expect to provision,	the slot has been preprovisioned for the type of circuit pack listed, but a circuit pack is not installed (Holder Status: Empty). Return to the main task.
a circuit pack (CP) type is displayed and installed, but the circuit pack is not the same type as the one you expect to provision,	the slot is equipped and provisioned with the listed circuit pack (Holder Status: Valid). Return to the main task.

If...	Then...
the circuit pack (CP) type listed is installed and is the same type circuit pack you expect to provision,	the required circuit pack is installed in the required slot (Holder Status: Valid). Continue with the next step.

5 Click **Close** at bottom of window.

END OF STEPS



Task 308: Delete Optical Port Protection Group

Purpose	Use this procedure to delete an existing optical port protection group.
Required privilege code	You must have a security privilege code of at least M4 to perform this task.
Required equipment	WaveStar Craft Interface Terminal (CIT)
Related information	For related information, see the following sections in this document: • Chapter 6, “Control, Transmission, and Synchronization Interfaces” • Chapter 7, “Provisioning, Security, and Administration” • Appendix A, “WaveStar CIT Tutorial”.
Before you begin	Prior to performing this task, you must: • Obtain the work instructions for this task. • Identify the protection group AID, slots, circuit packs, and ports that are associated with the port protection group being deleted. • Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.
Task	Perform the following steps to delete an existing port protection group. 1 Use the WaveStar CIT to log in to the WaveStar BandWidth Manager NE. 2 Remove service, then delete any existing cross-connections on any port associated with the port protection group being deleted. Reference: T 304 3 On the <i>System View</i> toolbar, select View > Protection. Result: The View Protection window opens.

-
- 4** Select the **Ptn Grp** tab, then select the bay, shelf, and protection group you want to view.
-

- 5** Click **Select**.

Result: The **Protection Group** parameters displays.

- 6** Verify no protection switches exist on any port of the port protection group, then click **Close**.
-

- 7** On the *System View* toolbar, select **Configuration > Delete**

Result: The **Delete** window opens.

- 8** Select the **Ptn Grp** tab, then open the Bay and Shelf details and select (highlight) the port protection group being deleted.
-

- 9** Click **Select** at bottom of window.

Result: A deletion confirmation window opens to display the parameters of the selected group.

- 10** Verify you have selected the correct port protection group to be deleted, then click **Yes**.

Result: A warning window opens asking if you want to execute the command.

- 11** Click **Yes** to delete the port protection group.

END OF STEPS



Task 309: Modify Existing Optical Port Protection Group

Purpose	Use this procedure to modify an existing optical port protection group.
Required privilege code	You must have a security privilege code of at least M4 to perform this task.
Required equipment	WaveStar Craft Interface Terminal (CIT) is required to perform this task.
Related information	For related information, see the following sections in this document: • Chapter 6, “Control, Transmission, and Synchronization Interfaces” • Chapter 7, “Provisioning, Security, and Administration” • Appendix A, “WaveStar CIT Tutorial”.
Before you begin	Prior to performing this task, you must: • Obtain the work instructions for this task. • Identify the slots, circuit packs, and ports that are associated with the port protection group being modified. • Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.
Task	Perform the following steps to modify an existing port protection group. 1 Use the WaveStar CIT to log in to the WaveStar BandWidth Manager NE. 2 On the <i>System View</i> toolbar, select Configuration > Provision. Result: The Provision Parameters for Protection Group... window opens. 3 Select the Ptn Grp tab and open the required bay and shelf configurations.

-
- 4 Select the port protection group being modified, then click the **Provision** button.

Result: Provisionable parameters area displays on right side of window.

- 5 Verify the AID of the port protection group being modified.
-

- 6 Modify parameters as required.
-

- 7 Verify that all parameters are correct.
-

- 8 Click **Apply**.

Result: A warning window opens asking if you want to execute the command.

- 9 Click **Yes** to execute, then click **Close** to exit.

END OF STEPS



Task 311: Provision Time Interval for Automatic Back Up of Database to Secondary Memory

Purpose Use this procedure to provision the time interval for automatically backing up the network element database (in primary memory) to secondary memory.

Required privilege code(s) A privilege code of at least S3 is required to perform this task.

Required equipment The WaveStar Craft Interface Terminal (CIT) is required to perform this task.

Related information For related information, see the following sections in this document:

- *Chapter 6, Control, Transmission, and Synchronization Interfaces*
- *Chapter 7, Provisioning, Security, and Administration*
- *Appendix A, WaveStar CIT Tutorial*

Before you begin Before you begin this task:

- Obtain the work instructions for this task.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to provision the time interval for automatically backing up the network element database (in primary memory) to secondary memory.

-
- 1** At the WaveStar CIT, select **Configuration > Software > Configure Auto Backup Interval**.

Result: The Configure Auto Backup Interval screen opens.

Important! In Release 3.1 and later releases, the backup interval is entered in hours (1 to 24), days (1 to 30), weeks (1 to 52), or months (1 to 12). In Release 3 and earlier releases, the backup interval Value is entered in one-hour increments from 1 to 24.

- 2 Enter or select the required backup interval and click on **OK**.

Result: A dialog box appears asking you to confirm changing the auto backup interval.

END OF STEPS



Task 312: Install A New Low Voltage Protection Unit or Remove an Existing Low Voltage Protection Unit

Purpose The LVPU is very reliable and rarely needs replacing. Currently, the LVPU is not an orderable item, and thus no sparing policy exists.

What to do Follow these instructions to replace a failed LVPU.

If...	Then...
an LVPU fails,	contact a Lucent Technologies Customer Service Representative, and work out arrangements for obtaining a replacement.

Task 313: Create 1XN Electrical Equipment Protection Group

Purpose	Use this procedure to create/verify a 1XN DS3/EC1 electrical equipment protection group.
Required privilege code	You must have a security privilege code of at least M4 to perform this task.
Required equipment	A WaveStar Craft Interface Terminal (CIT) is required to perform this task.
Related information	For related information, see the following sections in this document: • Chapter 7, “Provisioning, Security, and Administration” • Appendix A, “WaveStar CIT Tutorial”.
Before you begin	Prior to performing this task, you must: • Obtain the work instructions for this task. • Verify no alarms exist, especially alarms indicating illegal circuit pack types. • Log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.
Task	Complete the following steps to create a 1XN DS3/EC1 electrical equipment protection group.

-
- 1** On the *System View* toolbar, select **View > View Equipment Details**.

Result: **View Equipment Details** window opens.

- 2** Expand the required bay and shelf details by clicking on the plus (+) symbol next to the shelf.
-

- 3** View the **eprn (DS3EC1/8)** and **eprotsw (SWITCH/DS3EC1)** slots in the shelf details.

4

If...	Then...
the eprn and eprtsw slots are equipped with the proper circuit packs,	the 1XN electrical equipment protection group is already established. Continue with Step 7.
either of the required slots is empty,	continue with Step 5.

5 View slot 16 in the required shelf details

If...	Then...
slot 16 is equipped with an optical port unit,	the electrical protection group cannot be established. Slot 16 must be empty (not provisioned) or contain only a DS3/EC1 port unit if 1XN electrical protection is required. Refer trouble to your provisioning group. <i>Stop! End of Task.</i>
slot 16 is unequipped or equipped with a DS3EC1/8 circuit pack,	continue with Step 6.

6 Install and provision a DS3EC1/8 protection circuit pack and SWITCH/DS3EC1 circuit pack into the eprn and eprtsw slots, respectively. Install other DS3EC1/8 circuit packs at this time, if required.

Reference: T 306

7 On the *System View* toolbar, select the **Configuration > Provision** command.

Result: The **Provision Parameters for Protection Group...** window opens.

8 Select the **Ptn Grp** tab at bottom of window, then open the bay and shelf details as required.

-
- 9** Select the **1XN Equipment eds3ec1grp** protection group, then click **Provision** at bottom of window.

Result: The provisionable parameters area displays on right side of window.

- 10** Verify the protection group AID. Provision the parameters as required.
-

- 11** Click **Apply** if you made any changes.

Result: A warning window opens asking if you want to execute the command.

- 12** Click **Yes**, then click **Close** to exit.

END OF STEPS



Task 314: Provision Path Trace

Purpose	Use this procedure to provision the transmit path trace fields of one or more 1-way STS-1/VC-3 signals. Path trace is only applicable to a DS3EC1/8 port unit because it is an STS-1/VC-3 terminating device, whereas OC3/STM1, OC12/STM4, OC48/STM16 port units are not STS-1/VC-3 terminating devices. This procedure can be performed from any system in the network.
Required privilege code(s)	You must have a security privilege code of at least P2 or greater to perform this task.
Required equipment	A WaveStar Craft Interface Terminal (CIT) is required to perform this task.
Safety precautions	To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a system to prevent electrostatic discharge damage to sensitive components.

Related information	For related information, see the following sections in this document: • Chapter 4, “Operations Interfaces” • Chapter 7, “Provisioning, Security, and Administration” • Operations Task T 208, “Verify Receive Path Trace” • Appendix A, “WaveStar CIT Tutorial”. For related information in <i>Alarm Messages and Trouble Clearing Guide</i>, 365-370-110, see Chapter 2, “Maintenance/Trouble Clearing”.
Before you begin	Prior to performing this task, you must: • Obtain the work instructions for this task.

- Note the assigned addresses (AIDs).
- Determine which systems are the source network element and the destination network element for the STS-1/VC-3 path(s) to be provisioned.
- Determine the write format (Release 3 and later) and path trace character string for each STS-1/VC-3 path to be provisioned (path is between the source and destination network elements).
- Verify that a WaveStar CIT is connected and logged into the source network element for the first STS-1/VC-3 path to be provisioned.

Task Complete the following steps to provision the STS-1/VC-3 path trace fields of one or more 1-way STS-1/VC-3 signals:

.....

1 Provision path trace at the source network element.

Reference: SE 314-1

.....

2 Terminate the login session at the source network element.

.....

3 Log in to the destination network element for the first STS-1/VC-3 path to be provisioned.

.....

4 Provision path trace at the destination network element.

Reference: SE 314-1

.....

5 Terminate the log in session at the destination network element.

.....

6 Check the provisioning just done by verifying the STS-1/VC-3 receive path trace signal.

Reference: Operations Task T 208

.....

END OF STEPS



SE 314-1: Provision Path Trace at a Network Element

Procedure Perform the following steps to provision path trace at the source or destination network element.

-
- 1** At the WaveStar CIT, select **Configuration>Provision...**

Result: The **Provision Parameters for Protection Group or Equipment Screen** appears.

- 2** Open the bay, shelf, circuit pack, and port details by clicking on the plus (+) sign next to each entity.
-

- 3** Highlight the required DS3 port and click on **Provision**.

Result: The DS3 port parameters appear.

- 4** Provision the STS-1/VC-3 Path Trace parameter(s) according to the work instructions and click on **Apply**.

Result: In Release 3, a Dialog box appears asking you to confirm executing this command. In Release 2 and earlier releases, a Dialog box appears asking to pad the path trace with blanks. Click on Yes and another Dialog box appears asking you to confirm executing this command.

- 5** Repeat Step 2 through Step 4 for any additional STS-1/VC-3 paths to be provisioned.

END OF STEPS



Task 315: Alarm Severity Assignment Profile (ASAP) — Create/Provision

Purpose The system software contains one default profile for each of the different profile types. Depending on previous provisioning, the system may already contain other defined profile types.

Use this procedure to do the following:

- Create a new ASAP profile.
- Provision or modify an existing ASAP profile.

Required privilege codes You must have a privilege code of at least M3 to provision ASAP profiles. You must have a privilege code of at least M1 to view ASAP profiles.

Required equipment A WaveStar Craft Interface Terminal (CIT) is required to perform this task.

Related information For related information, see the following sections in this document:

- Chapter 7, “Provisioning, Security, and Administration”
- Appendix A, “WaveStar CIT Tutorial”.

Before you begin Prior to performing this task, you must:

- Obtain the work instructions for this task that detail the following:
 - The type and name of the ASAP profile to be provisioned or created
 - The alarm severity parameter(s) to be changed or entered in the existing or new profile

Note: You may want to keep the same ASAP profile type definitions for all the NEs. It is recommended that the name/ acronym of the network provider for the connected service be used as the ASAP name (for example, ATT or MCI). The WaveStar CIT ASAP Name: screen field supports name lengths up to a maximum of 24 ASCII characters.

Note: You cannot change the name of a default profile or an active profile. A profile is active if it has been assigned to any network entity, for example to an OC-n port.

If you want to change the name of an active profile:

1. Create a new profile with the proper name.
 2. Change the parameter values as necessary.
 3. Provision the required entities with the new profile.
 4. Delete the previous profile, if supported by the software release.
- If this approach is not possible because the allowable number of profiles would be exceeded, then:
 5. Temporarily assign the “Default” profile to the entities that are using the existing active profile.
 6. Provision the existing profile in order to change the profile name.
 7. Provision the required entities with the new profile name.
 - Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to create or modify/provision an ASAP profile.

1 Use the WaveStar CIT to log in to the system.

2 Select **Configuration > Alarms > Alarms Severity Assignment Profile** on the *System View* toolbar.

Result: The **Provision Alarm Severity Profile** window opens.

3

If...	Then...
you want to create a new ASAP profile,	1. Select New ASAP at top of window. 2. Click on (highlight) the ASAP Type to be created. 3. Click New ASAP at bottom of window. 4. Enter name of the new ASAP profile type in the ASAP Name: box. 5. Continue with Step 5. Result: Default profile type parameters display on right side of window.
you want to modify or provision an existing ASAP profile,	1. Select Provision ASAP at top of window. 2. Click on the plus (+) sign next to the ASAP Type to open the list of ASAP profiles. 3. Select (highlight) the ASAP profile name to be modified. 4. Click on Provision at bottom of window. 5. Continue with Step 4. Result: Profile type parameters display on right side of window.

-
- 4** If you want to enter a new name for the selected profile, enter the new name of the profile in the **New Name** box at top of window.
- You cannot change the name of the **Default** profile for any profile type.
-
- 5** For each of the **Probable Causes**, click on each of the **Alarm Level** boxes and choose your required alarm severity for the Probable Cause.

-
- 6** Click **Apply** at bottom of window.

Result: A warning window opens asking if you want to execute the command.

- 7** Click **Yes**, then click **Close** to exit

E N D O F S T E P S



Task 316: Create New BWM I/O Bay Entity

Purpose	Use this procedure to create a new I/O bay entity icon in the system.
Required privilege code	You must have a security privilege code of at least P3 to perform this task.
Required equipment	A WaveStar Craft Interface Terminal (CIT) is required to perform this task.
Related information	For related information, see the following sections in this document: • Chapter 3, “Platform Descriptions” • Chapter 7, “Provisioning, Security, and Administration” • Appendix A, “WaveStar CIT Tutorial”.
Before you begin	Prior to performing this task, you must: • Ensure you have the work instruction for this task that identifies the Bay Access Identifier (AID) parameter that must be set. • Identify the system associated with the new I/O bay. Verify the minimum system Controller Shelf Assembly and Switch Shelf Assemblies have been installed and are working properly with no alarms. • Verify the new I/O bay AID does not already exist within the system. Verify the maximum number of system I/O bays has not already been established. • Verify the new I/O bay has been physically installed and all bay wiring is complete unless this bay icon is being created for future bay installation. • Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.
Task	Complete the following steps to create a new I/O bay entity.

-
- 1** Use the WaveStar CIT to log in to the WaveStar BandWidth Manager system having the new I/O bay installed.

-
- 2** Select **Configuration > Create New > Bay** on the *System View* menu.

Result: **Create New Bay** window opens.

- 3** Enter **Bay Access Identifier (AID)** and click **OK**.
-

- 4** Verify new bay icon appears in the *System View* window.
-

END OF STEPS



Task 317: Create/Install New BWM 2.5G I/O Shelf

Purpose	Use this procedure to establish a new BWM 2.5G I/O shelf in the system.
Required privilege code	You must have a security privilege code of at least P3 to perform this task.
Required equipment	A WaveStar Craft Interface Terminal (CIT) is required to perform this task.
Related information	For related information, see the following sections in this document: • Chapter 3, “Platform Descriptions” • Chapter 7, “Provisioning, Security, and Administration” • Appendix A, “WaveStar CIT Tutorial”.
Before you begin	Prior to performing this task, you must: • Ensure you have the work instructions and related installation wiring instructions that identify the shelf access identifier (AID), ON Cable Identifier, and BSW Port Identifier parameters that must be set. • Identify the WaveStar BandWidth Manager system and I/O bay that is associated with the new I/O shelf. • Verify that the minimum system Controller Shelf Assembly and Switch Shelf Assemblies have been installed and are working properly with no alarms. • Verify the new I/O shelf has been physically installed in the I/O bay and all shelf interface and power wiring is complete if the new shelf is going to be equipped. • Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.
Task	Complete the following steps to create or install a new I/O shelf entity.

-
- 1** Use the WaveStar CIT to log in to the system having the new I/O shelf created or installed.

2

If...	Then...
you are only creating a new shelf entity icon without circuit packs already installed in the I/O shelf,	create new shelf icon in the <i>System View</i> window. Reference: SE 317-1
you are installing circuit packs in a new shelf that already has a shelf icon in the <i>System View</i> window,	install I/O shelf circuit packs for minimum shelf equipage without alarms. Reference: SE 317-2
you are creating a new shelf icon and the I/O shelf has already been equipped with circuit packs,	create new shelf icon in the <i>System View</i> window for the equipped shelf. Reference: SE 317-3

END OF STEPS



SE 317-1: Create New I/O Shelf Entity Icon

Purpose This procedure is used only to create a new shelf entity icon in the *System View* display. This procedure assumes that no circuit packs have been installed in the shelf being created.

Task Perform the following steps to create a new BWM 2.5G I/O shelf icon in the *System View* window.

-
- 1 Select **Configuration > Create New > Shelf** on the *System View* toolbar.

Result: **Create New Shelf** window opens.

-
- 2 Select the bay to contain the new shelf and then click the **Select I/O Bay** button.

Result: Parameter values display on right side of window.

-
- 3 Select the following fields one at a time and enter the required information from the work instruction or related installation wiring information.

Field	Value
Shelf AID	1 or 2
ON Cable Identifier	1-48
BSW Port Identifier	1-12 (1152 switch) 1-48 (4608 switch)

-
- 4 Click **Apply**, then click **Yes** to confirm your action.

-
- 5 Click **Close** at bottom of window after the confirmation box closes.

-
- 6 Verify new shelf icon appears in the correct I/O bay icon on the *System View* window.

7 Select **View > View Equipment Details** on the *System View* toolbar.

Result: The **View Equipment Details** window opens.

8 Open bay details, then select the shelf that was created. Click **Select** at bottom of window.

Result: The **View Shelf Details for ...** window opens.

9 Verify shelf details are correct.

10 Click **Close** at bottom of window.

END OF STEPS



SE 317-2: Install I/O Shelf Common Circuit Packs

Safety precautions To assure both personal safety and the proper functioning of the system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a system, to prevent electrostatic discharge damage to sensitive components.

Before you begin Note that this procedure is used to equip an I/O shelf with the minimum number of circuit packs without alarms. This procedure assumes the shelf icon has already been created in the correct bay as shown in the *System View* window.

Task Perform the following steps to equip a BWM 2.5G I/O shelf with the minimum number of circuit packs without alarms.

1 In the *System View* window, verify that the new I/O shelf icon has been created. If the shelf icon has not been created, refer to procedure “Create New I/O Shelf Entity Icon” (-3).

2 Select **View > View Equipment Details** on the *System View* toolbar.

Result: The **View Equipment Details** window opens.

3 Open bay details, then select the shelf being installed. Click **Select** at bottom of window.

Result: The **View Shelf Details for ...** window opens.

4 Verify shelf details are correct, then click **Close** at bottom of window.

-
- 5 Install circuit packs listed in Table 317-1 in any order, except install the CTL/SYS50DM circuit packs last.

Result: The green LED blinks on the CTL/SYS50DM controllers and other circuit packs during start up. The green LEDs stop blinking and light steadily on the active CTL/SYS50DM controller and other active circuit packs after start up is complete.

-
- 6 In the WaveStar CIT *System View* window, click (select) on the shelf just established.

-
- 7 On the *System View* toolbar, select **View > View Equipment Details**.

-
- 8 Open the shelf details for the shelf just installed by clicking on the plus (+) sign next to the shelf.

-
- 9 Verify that all installed circuit packs are listed for the shelf just installed.

END OF STEPS

Table 317-1 I/O shelf minimum circuit pack equipage without alarms

Bay	Shelf	Number of Circuit Packs	Circuit Pack Name	Access Identifier (AID)	Shelf Slot(s)
I/O Bay	1 or 2	2	TMG/STRAT3	tmg0 tmg1	TMG-0 TMG-1
		1	ADJCTL/DCCEI	dccei	DCCEI
		2	SWITCH/STS576	switch0 switch1	SWITCH 0 SWITCH1
		2	SWIF	swif10 swif11	SWIF 1,0 SWIF 1,1
I/O Bay	1 or 2	2	CTL/SYS50DM	ctlmem0 ctlmem1	CTLSYSDM0 CTLSYSDM1

SE 317-3: Create New I/O Shelf Entity - Shelf
Already Equipped

Purpose This procedure assumes the I/O shelf has already been equipped to operate without alarms with the minimum number of circuit packs installed.

Task Perform the following steps to create a new I/O shelf entity icon in BandWidth Manager System.

.....

1 Verify that the new I/O shelf has been equipped with the minimum number of circuit packs. See Table 317-1, I/O shelf minimum circuit pack equipage without alarms for a list of circuit packs.

.....

2 Select **Configuration > Create New > Shelf** on the *System View* toolbar.

Result: Create New Shelf window opens.

.....

3 Select the bay that contains the new I/O shelf, then click the **Select I/O Bay** button.

Result: Parameter values display on right side of window.

.....

4 Select the following fields one at a time and enter the required information from the work instruction and related installation wiring information.

Field	Value
Shelf AID	1 or 2
ON Cable Identifier	1-48
BSW Port Identifier	1–12 (1152 Switch) 1–48 (4608 switch)

-
- 5** Click **Apply**, then click **Yes** to confirm your action.

Result: The green LEDs blink on the circuit packs during start-up. The green LEDs on all circuit packs stop blinking and light steadily on the active CTL/SYS50DM controller and other active circuit packs after start up is complete.

-
- 6** Click **Close** at bottom of window.

-
- 7** Verify the new I/O shelf icon appears in the correct I/O bay icon in the *System View* window.

-
- 8** In the WaveStar CIT *System View* window, click (select) on the shelf just established.

-
- 9** On the *System View* toolbar, select **View > View Equipment Details**.

-
- 10** Open up the shelf details for the shelf just installed by clicking on the plus (+) sign next to the shelf.

-
- 11** Verify that the shelf has been created and all installed circuit packs are listed.

END OF STEPS



Task 318: Provision Performance Monitoring (PM) Functions

Purpose This procedure is provided as a reference for all the performance monitoring tasks provided in this manual. Use this procedure to access all the following performance monitoring tasks:

- View PM threshold crossing alert (TCA) profiles
- Modify TCA profiles
- Initialize PM registers
- Provision ports with PM TCA profile information
- Enable or disable PM data collection.

Required privilege code(s) You must have the following security privilege codes to perform the listed function:

- PM1 — View PM threshold crossing alert (TCA) profiles
- PM3 — Modify TCA profiles
- PM3 — Initialize PM registers
- P3 — Provision ports with PM TCA profile information
- P3 — Enable or disable PM data collection.

Required equipment WaveStar Craft Interface Terminal (CIT)

Related information For related information, see the following sections in this document:

- Chapter 7, Provisioning, Security, and Administration
- Chapter 8, Performance Monitoring
- Appendix A, WaveStar CIT Tutorial

Task Choose the task you want to perform from the tasks listed

-
- 1** View PM threshold crossing alert (TCA) profiles.

Use this task to view the TCA profiles that are already available.

Reference: T319

-
- 2** Create/Modify/Delete TCA profiles.

Use this task if you are required to:

- Create any new profiles which may later be assigned to selected ports or tributaries. You may decide to use the default profiles already in the system.
- Modify existing profiles to your new requirements.
- Delete any existing profiles no longer needed.

Reference: T320

3 Initialize PM registers.

Use this task with Caution. This task is used to reset all selected registers to zero for selected ports or tributaries.

Reference: T321

4 Provision ports with PM TCA profile information.

Use this task to assign a TCA profile to selected ports or tributaries, if required.

Reference: T322

5 Enable or disable PM data collection.

Use this task to either enable or disable PM data collection for selected ports or tributaries.

Reference: T323

6 Display and save PM register values.

Use this task to display and save TCA register values that have been accumulated.

Reference: T324

7 View performance monitoring (PM) parameters for ports or tributaries.

Use this task to display PM parameters for selected ports or tributaries.

Reference: T341

END OF STEPS



Task 319: View Performance Monitoring (PM) Threshold Crossing Alert (TCA) Profiles

Purpose Use this procedure to view all the current TCA profiles associated with the following PM parameter groups:

- Physical layer
- SONET Section/Line layer
- SONET Path
- DS3 Line and intermediate path
- SDH Regenerator-Multiplex
- SDH HOVC intermediate path

Required privilege code You must have a security privilege code of at least PM1 to perform this task.

**Required equipment/
personnel** WaveStar Craft Interface Terminal (CIT).

Related information For related information, see the following sections in this document:

- Chapter 8, Performance Monitoring
- Appendix A, WaveStar CIT Tutorial

Task Complete the following steps to view an existing TCA profile.

1 Log in to the system using the WaveStar CIT.

2 Select one of the following from the *System View* toolbar to view a profile associated with the listed parameter group.

1. Physical layer — **Performance > View TCA Profile > Physical**
2. SONET Section/line layer — **Performance > View TCA Profile > SONET Section Line**
3. SONET Path layer — **Performance > View TCA Profile > SONET Path**
4. DS3 Line/Path — **Performance > View TCA Profile > DS3**

5. SDH Regenerator-Multiplex — **Performance > View TCA Profile > SDH Regenerator-Multiplex**
6. SDH HOVC Path — **Performance > View TCA Profile > SDH HOVC Path**

Result: The **Select a TCA Profile Name** window for the selected parameter group opens.

Important! Physical threshold parameter values set to “0” display as **Reporting Disabled**. Physical threshold parameter values set to “1” display as **Reporting Enabled**.

- 3 Select the name of the profile to be displayed from the drop-down block, then click **OK**.

Result: The **View TCA Profile Details** window opens displaying the threshold values for each of the monitored parameters.

-
- 4 Click **Close** to exit.

END OF STEPS



Task 320: Create, Modify, or Delete Threshold Crossing Alert (TCA) Profile

Purpose Use this procedure to perform the following:

- Create a new TCA profile
- Modify an existing TCA profile
- Delete an existing TCA profile

Required privilege code(s) You must have a security privilege code of at least PM3 to perform this task.

Required equipment WaveStar Craft Interface Terminal (CIT)

Related information For related information, see the following sections in this document:

- Chapter 9, Performance Monitoring
- Appendix A, WaveStar CIT Tutorial

Before you begin Prior to performing this task, you must:

- Obtain the work instructions for this task.
- Identify the ports, tributaries, and TCA profiles related to the task.
- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to create, modify, or delete a TCA profile.

- 1** From the *System View* toolbar, select the menu command required from one of the following:
 - SONET Physical profile — **Performance > Provision TCA Profile > Physical**
 - SONET Section/line profile — **Performance > Provision TCA Profile > SONET Section Line**
 - SONET Path profile — **Performance > Provision TCA Profile > SONET Path**
 - DS3 Line/Path profile — **Performance > Provision TCA Profile > DS3**

- SDH Regenerator-Multiplex profile — **Performance > Provision TCA Profile > SDH Regenerator-Multiplex**
- SDH HOVC Path profile — **Performance > Provision TCA Profile > SDH HOVC Path**

Result: The **Provision TCA Profile** window opens for the selected profile group.

2 Verify that the **Profile Type** listed is the type you selected.

3

If you are...	Then...
creating a new TCA profile,	continue with Step 14.
deleting an existing profile,	continue with Step 4
modifying an existing profile,	continue with Step 8.

4 Select **Existing Profile**, then choose the profile name to delete.

5 Select the **Delete** option.

Result: A warning window opens stating that the selected profile will be deleted and asks if you want to continue.

6 Verify the correct profile is being deleted, then click **Yes** to delete the profile.

Result: A confirmation window opens informing you that the profile has been deleted.

7 Click **OK**, then click **Close** to exit.

STOP! End of Task

8 *Modifying TCA profiles.* Select **Existing Profile**, then choose the profile name to modify.

9 Click **Modify** at bottom of window.

Result: The **Edit TCA Profile** window opens

10 Verify the correct **Profile Type** is displayed.

11 Change the parameters as required. Setting a parameter value to “0” will disable thresholding for that parameter.

12 Click **Apply** to make changes when all the necessary parameters are entered.

Result: A warning box opens asking if you want to execute the command.

13 Click **Yes**, then click **Close** to exit.

STOP! End of Task

14 *Creating new TCA profiles.* Select **New Profile**.

15 Enter a name for the new profile in the space provided. The name may be up to 24 alphanumeric characters maximum.

16 Select **Create** at bottom of window.

Result: A warning box opens asking if you wish to continue.

17 Click **Yes**.

Result: A box opens informing you that the profile has been created using default values with the name you selected.

18 Click **OK** to return to Provision TCA Profile window.

19

If you want to ...	Then...
accept the default values for the new profile,	Click Close . <i>STOP! End of Task.</i>
enter different values than the default values for the profile,	proceed to Step 8 to modify the default values.

END OF STEPS



Task 321: Initialize Performance Monitoring (PM) Registers

Purpose Use this procedure to set to zero (initialize) all current 15-minute or current day section, line, path, or DS3 PM registers.

PM must be enabled before registers can be initialized. You cannot initialize port PM registers if PM is disabled on the port for the selected register location (NEND, FEND, or ALL). You cannot initialize PM registers for tributaries if Path PM is disabled for the selected tributary. Reference task T 323, Enable or Disable Performance Monitoring (PM) Data Collection.

Required privilege code(s) You must have a security privilege code of at least PM3 to perform this task.

Required equipment WaveStar Craft Interface Terminal (CIT)

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

This procedure will reset selected register counts to zero. Ensure that you want to do this before continuing.

Related information For related information, see the following sections in this document:

- Chapter 8, Performance Monitoring
- Appendix A, WaveStar CIT Tutorial

Before you begin Prior to performing this task, you must:

- Obtain the work instructions for this task.
- Identify the ports or tributaries related to the task.
- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to initialize selected PM threshold registers.

- 1** On the *System View* toolbar, select **Performance > Initialize Registers**.

Result: The **Initialize Registers for a Performance Monitoring Port** window opens.

- 2** Select the required bay, shelf, port or tributary, then click **Select**.

Select trib if you are initializing Path PM registers. Select a port if you are initializing other PM register types.

Result: Parameters display on right side of window for the port or tributary selected.

- 3** Verify the correct port or tributary AID and port rate are displayed for the selected port or tributary.
-

- 4** Make the required selections for the displayed parameters to initialize the required register type.

Reference: “PM Register Initialization Parameters” (-3)

- 5** Click **Apply** to make changes.

Result: A warning box opens asking if you want to execute the command.

- 6** Click **Yes** to execute the command, then click **Close** to exit.

This command will fail if PM is not enabled for the selected register type.

END OF STEPS



SE 321-1: PM Register Initialization Parameters

Parameter selections The following table explains some of the input parameters for the initialization of PM registers.

Parameter	Description
PM Register Type	For DS3 ports, the PM Register Type is DS3. For all other port types, choose the type of register to initialize: • SECTION-LINE (SDH Regenerator-Multiplex) may be chosen if you selected a port. Parameter is not available for tributaries. • PATH (SDH HOVC Path) may be chosen if you selected a tributary. Parameter is not available for ports. • ALL selects both of the above registers.
Location	You may choose to initialize just the near-end registers or the far-end registers, or both. • NEND — Near-end PM data only is initialized. • FEND — Far-end PM data only is initialized. Not applicable to SONET physical and section layers and non-C-bit DS3 line layer PM. • ALL — Both near-end and far-end (if applicable) PM data are initialized.

Direction (For DS3 Only)	• IN — Only PM data to the DS3 facility will be reset. DS3 Incoming PM has to be enabled in order to reset registers. • OUT — Only PM data from the DS3 facility will be reset. DS3 Outgoing PM has to be enabled in order to reset registers. • PTF — Path Terminating Function • ALL — Both directions will be reset.
Time Period	• 15-MIN — Choose to initialize the 15-minute registers. • 1-DAY — Choose to initialize the 1-Day registers. • ALL — Choose this option to initialize both types of registers.
Apply to	• This Port/Trib Only — Choose to initialize registers for only the port or trib selected. • All Tribs, This Port — Initializes PM registers for all the tributaries on the port that contains the tributary you selected. • All Ports/Trib This Pack — This selection allows you to initialize registers for all the ports/tribs on the circuit pack containing the selected port. • All Ports/Trib This Type, This Shelf — This selection allows you to initialize the registers for all the ports/tribs on the shelf that are the same type as the selected port.



Task 322: Provision Ports or Tributaries with Performance Monitoring (PM) Threshold Crossing Alert (TCA) Profiles

Purpose	Use this procedure to provision ports or tributaries with TCA profile information for selected PM parameter groups.
Required privilege code(s)	You must have a security privilege code of at least P3 to perform this task.
Required equipment	WaveStar Craft Interface Terminal (CIT)
Related information	For related information, see the following sections in this document: • Chapter 8, Performance Monitoring • Appendix A, WaveStar CIT Tutorial
Before you begin	Prior to performing this task, you must: • Obtain the work instructions for this task. • Identify the ports or tributaries related to the task. • Identify the name of the TCA profile to apply to the required ports or tributaries. • Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.
Task	Complete the following steps to provision ports or tributaries with PM TCA profile information. 1 On the <i>System View</i> toolbar, select Performance > Provision Ports. Result: The Provision Parameters for a Performance Monitoring Port window opens. 2 Open up the required bay, shelf, and port details. Select the required port or tributary, then click Provision at bottom of window. Result: The provisioning parameters display on right side of window for the port or tributary selected. The type of window depends on your selection.

-
- 3** Select the required **PM TCA Profile** group.

Result: A list of profiles is displayed for the PM TCA Profile group you selected.

-
- 4**

If...	Then...
the correct profile is already assigned to the selected port or tributary,	continue with the next step.
the correct profile is not assigned,	select the correct profile to apply to the selected port or tributary. Continue with the next step.

-
- 5** For **PM Activation**, select **Enable** to enable performance monitoring or **Disable** to disable performance monitoring.

This option enables or disables *all* profile group performance monitoring parameters. See Task 320 for procedures to modify a profile to disable monitoring of *individual* selected parameters.

-
- 6** From the *Apply to* list, select the required application.

Reference: “Provision PM Ports Screen Field Selections” (-4)

-
- 7** Click **Apply**.

Result: A warning box opens stating that execution of this command may affect service and asks if you want to execute the command.

-
- 8** Click **Yes**, then click **Close** to exit.

-
- 9** Verify the correct profile has been applied to the required port or tributary.

Reference: T341

END OF STEPS



SE 322-1: Provision PM Ports Screen Field Selections

Provision PM port screen selection information

The following is supporting information for some of the available selections in the Provision PM Ports screens

Apply to	Description/Behavior
this port (trib) only	Enables or disables selected PM profile parameters to only the port/trib you selected.
all tribes, this port	Enables or disables selected PM profile parameters to all the tribes on the port that contains the trib you selected.
all ports (tribs) this pack	Enables or disables selected PM profile parameters to all the ports/tribs on the circuit pack that contains the port/trib you selected.
all ports (tribs) this type, this shelf	Enables or disables selected PM profile parameters to all the ports/tribs on all the circuit packs on a shelf that have the same type port/trib as the one you selected.



Task 323: Enable or Disable Performance Monitoring (PM) Data Collection

Purpose	Use this procedure to enable or disable all PM data collection for selected ports or tributaries.
Required privilege code(s)	You must have a security privilege code of at least P3 to perform this task.
Required equipment	WaveStar Craft Interface Terminal (CIT)
Related information	For related information, see the following sections in this document: • Chapter 8, Performance Monitoring • Appendix A, WaveStar CIT Tutorial
Before you begin	Prior to performing this task, you must: • Obtain the work instructions for this task. • Identify the ports or tributaries related to the task. • Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.
Task	Complete the following steps to enable or disable PM data collection for selected ports or tributaries.

-
- 1** On the *System View* toolbar, select **Performance > Provision Ports**.

Result: The **Provision Parameters for a Performance Monitoring Port** window opens.

- 2** Open the required bay, shelf, and circuit pack details, then select the required port or SONET optical port tributary. Click **Provision** at bottom of window.

Result: The provisioning parameters display on right side of window for the port or tributary selected. The type of window depends on your selection.

-
- 3** Locate your required ...PM TCA Profile group.
-
- 4** Select the required TCA profile for the profile type and direction of PM.
- If profiles other than the Default profile have been created, the list of profiles may be displayed for the ...PM TCA Profile group you located.
- If the Default0 PM TCA Profile is selected, then all TCA reporting will be disabled (reporting disabled) for the selected profile group. PM registers continue to accumulate and may be displayed if PM is enabled.
-
- 5** For ... PM Activation, select **Enable** to enable performance monitoring or **Disable** to disable performance monitoring for each profile type and direction.
- This option enables or disables all profile group performance monitoring threshold parameters for the selected port or tributary. See Task 320 to modify a profile to disable monitoring of individually selected PM parameters.
-
- 6** From the **Apply to** list, select the required application.
- Reference:** "Provision PM Screen Field Selections" (-5)
-
- 7** Click **Apply**.
- Result:** A warning box opens stating this command may affect service and asks if you want to continue.
-
- 8** Click **Yes**, then click **Close** to exit.

9

If...	Then...
you are enabling or disabling Physical or Section-Line PM on a SONET port,	<i>STOP! End of Task</i>
you are enabling PM on a DS3 port,	continue with the next step.
you are disabling PM on a DS3/EC1 port or OCn port tributary,	<i>STOP! End of Task</i>
you are enabling path PM on a SONET port tributary,	continue with Step 15.

- 10** *Enable PM on a DS3 port.* On the *System View* toolbar, select **Configuration > Provision**.

Result: The **Provision Parameters for Protection Group or Equipment** window opens.

- 11** Open the required bay, shelf, and DS3 circuit pack details, then select the required port. Click **Provision**.

Result: The provisioning parameters display on right side of window for the port selected. The type of window depends on your selection.

- 12** For the **Violation Monitoring Mode** parameter, located at bottom of window, select **Violation Monitoring** in the drop-down menu box.
-

- 13** Click **Apply**.

Result: A warning box opens asking if you want to execute the command.

- 14** Click **Yes** to execute the command, then click **Close** to exit.

STOP! End of Task.

-
- 15** *Enable path PM on an OCn port tributary.* On the *System View* toolbar, select **Configuration > Provision**.

Result: The **Provision Parameters for Protection Group or Equipment** window opens.

- 16** Open the required bay, shelf, SONET circuit pack, and port details, then select the required tributary. Click **Provision**.

Result: The provisioning parameters display on the right side of the window for the tributary selected. The type of window depends on your selection.

- 17** Find the **Tributary Monitoring Mode** parameter in the Fault Management section located at the top of the window, then select **Monitored** in the drop-down menu box.
-

- 18** Click **Apply**.

Result: A warning box opens asking if you want to execute the command.

- 19** Click **Yes** to execute the command, then click **Close** to exit.

END OF STEPS



SE 323-1: Provision PM Screen Field Selections

Provision PM screen selection information

The following is supporting information for some of the available selections in the Provision PM screens:

Apply to	Description/Behavior
this port (trib) only	Enables or disables selected PM profile parameters to only the port/trib you selected.
all tribs, this port	Enables or disables selected PM profile parameters to all the tributaries on the port that contains the trib you selected.
all ports (tribs) this pack	Enables or disables selected PM profile parameters to all the ports/tribs on the circuit pack that contains the port/trib you selected.
all ports (tribs) this type, this shelf	Enables or disables selected PM profile parameters to all the ports/tribs on all the circuit packs on a shelf that have the same type port/trib as the one you selected.



Task 324: Display and Save Performance Monitoring (PM) Register Values

Purpose Use this procedure to display the PM register values for the following PM parameter groups when available:

- Physical
- SONET Section
- SONET Line
- SONET Path
- DS3 Line/Path
- SDH Regenerator Section
- SDH Multiplex Section
- SDH Path Near End

Required privilege code(s) You must have a security privilege code of at least PM1 to perform this task.

Required equipment WaveStar Craft Interface Terminal (CIT)

Related information For related information, see the following sections in this document:

- Chapter 8, Performance Monitoring
- Appendix A, WaveStar CIT Tutorial

Before you begin Prior to performing this task, you must:

- Ensure Performance Monitoring is activated (T 323)
- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to retrieve, display, and/or save PM register values.

1 From the *System View* toolbar, select the menu command required from one of the following to display the PM register values associated with the listed parameter group:

- SONET Physical layer — **Performance > Reports > SONET Physical**

- SONET Section layer — **Performance > Reports > SONET Section**
- SONET Line layer — **Performance > Reports > SONET Line**
- SONET Path layer — **Performance > Reports > SONET Path**
- DS3 Line — **Performance > Reports > DS3 Line**
- SDH Regenerator — **Performance > Reports > SDH Regenerator Section**
- SDH Multiplex — **Performance > Reports > SDH Multiplex Section**
- SDH Path — **Performance > Reports > SDH Path**

Result: The **Equipment PM Parameters Selection** window opens

- 2 Open the bay, shelf, and circuit pack details, then select the port or tributary from which you want to receive a report. Click **Select**.

Result: The selection parameters display for the PM parameter group selected.

- 3 Select the **Time Period**, **Monitored Date**, and **Monitor Time** you want to display or save to file.

4

If you want to...	Then...
display all counts, including zeros (0s),	select Monitor Level: 0-UP
display only parameters that have counts,	select Monitor Level: 1-UP

- 5 Select an available tab such as Near End or Far End and highlight the parameters in the **Available Parameters** box that you want to display. Click **Select** to move the highlighted parameters to the **Selected Parameters** box.

If you click **Select All**, all parameters will move to the **Selected Parameters** box.

6 Click **Apply**.

If you selected **Monitor Level: 0-UP** and there is a “no data available” response, then PM is disabled. If you selected **Monitor Level: 1-UP** and there is a “no data available” response, then there are either no counts or PM is disabled.

Result: The parameter group **PM Report** displays for the selected parameters.

7 View the report, then ...

If you want to...	Then...
save the results to a file,	click Save As , enter the filename, then click Save . The file is saved in the WaveStar Directory.
exit,	click Close .
recheck count, up to the minute,	click Refresh .
print the results,	click Print , select printer, then click OK .

END OF STEPS



Task 325: Add a Node to an In-Service 2-Fiber BLSR/MS-SPRing

Purpose Use this procedure to develop a detailed Method of Procedure (MOP), per local operating instructions, for adding a node to an existing **in-service** 2-fiber BLSR/MS-SPRing. The “Node To Be Added” can be either a WaveStar 2.5G, WaveStar 10G2F, or a WaveStar 10G4F. For WaveStar BandWidth Manager, a node is simply a Port Protection Group. Port Protection Groups can be provisioned per I/O shelf.

Required equipment/personnel The following equipment and personnel are required in order to complete this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap
- Optical power meter, to measure the level of received power
- Appropriate optical LBOs
- Technical assistance at the two (East and West) adjacent nodes.

Assumptions This procedure assumes that the following activities have already been completed.

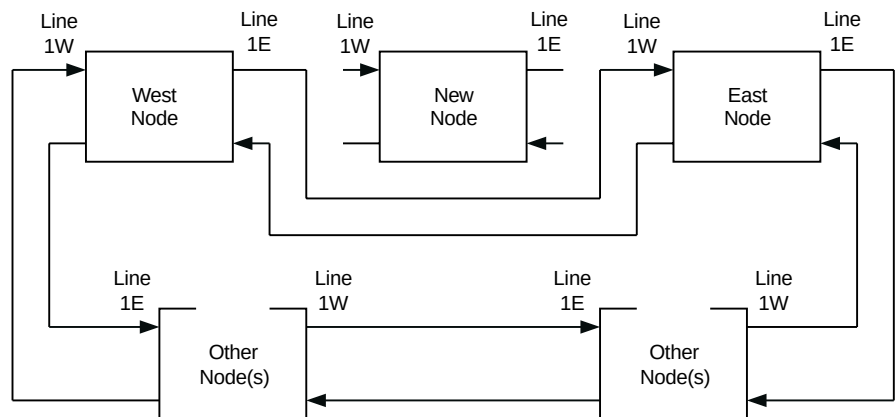
1. That the new node is currently powered-up.
2. That the new node has been installed correctly per the specified engineering configuration.
3. That the new node has been installed with the correct complement of circuit packs.
4. That all new fibers have been tested and known to be correct.
5. That office records have been checked to make certain the TID for the new node is indeed unique for the subject BLSR.
6. That office records have been checked to make certain that a synchronization plan exists for the new node TID and a copy is available during this task.

Before you begin This task is written from the “Node To Be Added” perspective, although action is required at two other nodes. The “Node To Be Added” is located between two operational nodes. One operational node will be called the *West Node* and the other will be called the *East Node*.

Task Complete the following steps to add a new node to an existing in-service ring.

Important! Refer to the figure below and observe that the node to be connected to Line 1W of the new node is referred to, in this task, as the West node. And, that the node to be connected to Line 1E of the new node is referred to, in this task, as the East node.

- 1 Verify that office records match the existing ring map. From office records, determine which nodes in the ring network will be called the West node and the East node for this procedure.



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- 2 Verify that the existing ring topology matches office records:
 1. Instruct a technician at either the East node or the West node to log in to the local node.
 2. From the *System View* screen, select menu items **View-Rings-Ring Map**.
 3. Compare the office records report with the list/display from the ring map.

Important! Confirmation is when the two nodes, that are identified from office records as the West node and the East node, are in agreement with the ring map. Any discrepancies must be resolved before continuing with Step 3.

3 *Provisioning actions to be performed on the new node.* Instruct the technician at the new node to:

1. Connect the WaveStar CIT to the local node.
2. Log in to the WaveStar CIT application.
3. Log in to the local node.

Important! If the node installation crew was provided with the end user's desired TID, then you may assume that the TID has already been set. Otherwise, it may be necessary to check with the installers.



CAUTION

Incorrectly provisioned source node TID and/or destination node TID can result in a service outage under certain multiple failure conditions.

4 As appropriate, change the new node TID to correspond with office records.

Reference: Task 329

5 Instruct the technician at the new node to:

1. Obtain the synchronization records for this new node TID.
2. As necessary, change/provision synchronization for this new node.

Reference: Task 301

6 Enable the DCC Termination for the AID corresponding to Line 1W.

Reference: Task 305

7 Enable the DCC Termination for the AID corresponding to Line 1E.

Reference: Task 305

-
- 8 For the new node, create a new 2-fiber BLSR Port Protection Group.

Important! Refer to office records and the current work order for all required information (for example, the East Port AID, the West Port AID, and so forth).

Reference: Task 302



CAUTION

This step will require manual input of Source and Destination TIDs. This information can be obtained from office records.

- 9 At the new node, make any necessary tributary-to-tributary (through) cross-connections, and verify that there are no unnecessary cross-connections.

Reference: Task 303



CAUTION

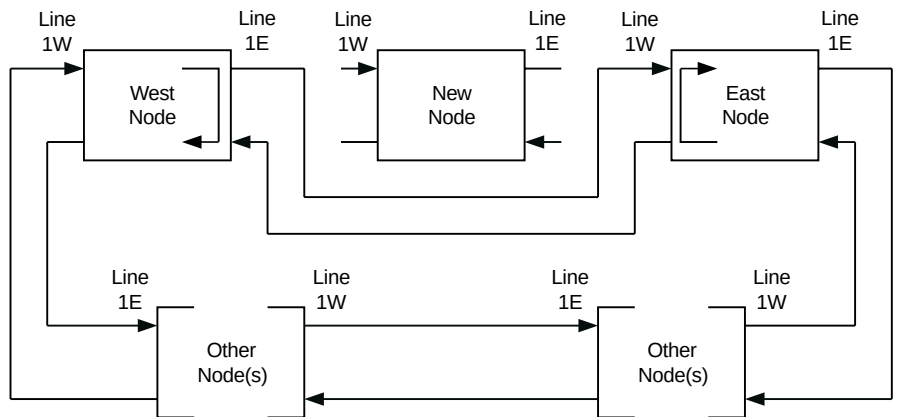
A line-forced switch will preempt extra traffic, if any, on the protection tributaries.

Important! For this step and Step 4, refer to the following figure. The service tributaries to be connected (add/drop/through) to the new node will now be looped back in the opposite direction at the West node and at the East node.

- 10 Instruct the technician at the West node (or travel to that location) to display the WaveStar CIT *System View* screen, and enter/select the following:

1. **Fault-Protection Switch.**
2. **Bay** (which contains the shelf that supports the subject ring).
3. **Shelf** (which supports the subject ring).
4. Protection Group (for example, **2F BLSR t_ _**).
5. Desired port (which in this case is **East Port _ _ - _**)

6. Click on the button labeled **Select**.
7. In the right-hand window, verify that the displayed information is correct.
8. In the field labeled *Direction*, select/highlight **East**.
9. In the field labeled *Switch Type*, left-click on the drop-down arrow and select **Force To Protection**.
10. Click on the button labeled **Apply**.



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Important! This completes a forced switch on Line 1E and may have caused traffic hits.

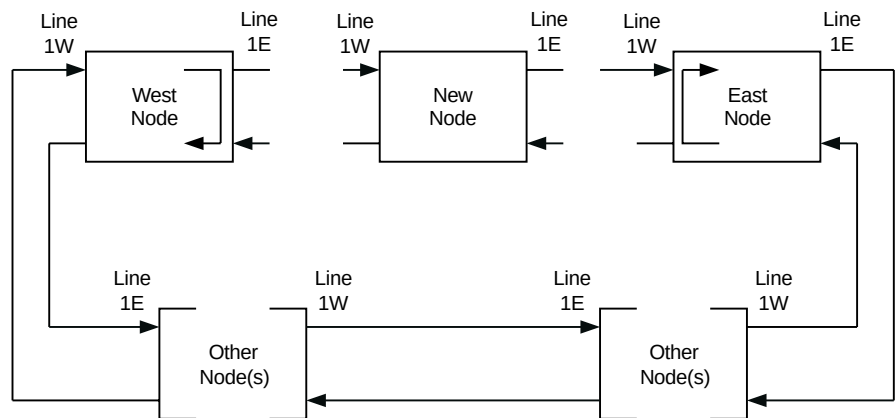
-
- 11** Instruct the technician at the East node (or travel to that location) to display the WaveStar CIT *System View*, and enter/select the following:
1. **Fault-Protection Switch.**
 2. **Bay** (which contains the shelf that supports the subject ring).
 3. **Shelf** (which supports the subject ring).
 4. Protection Group (for example, **2F BLSR t_ _**).
 5. Desired port (which in this case is **West Port _ _ - _**).
 6. Click on the button labeled **Select**.
 7. In the right-hand window, verify that the displayed information is correct.
 8. In the field labeled *Direction*, select/highlight **West**.
 9. In the field labeled *Switch Type*, left-click on the drop-down arrow and select **Force To Protection, Ring**.

10. Click on the button labeled **Apply**.

Important! This completes a forced switch on Line 1W and may have caused traffic hits.

Important! Refer to the following figure inorder to help locate the optical fibers that can now be removed from the West node (fibers connected to East node).

12 Instruct the technician at the West node to remove the optical fibers (Lines 1E) connected to the East node.



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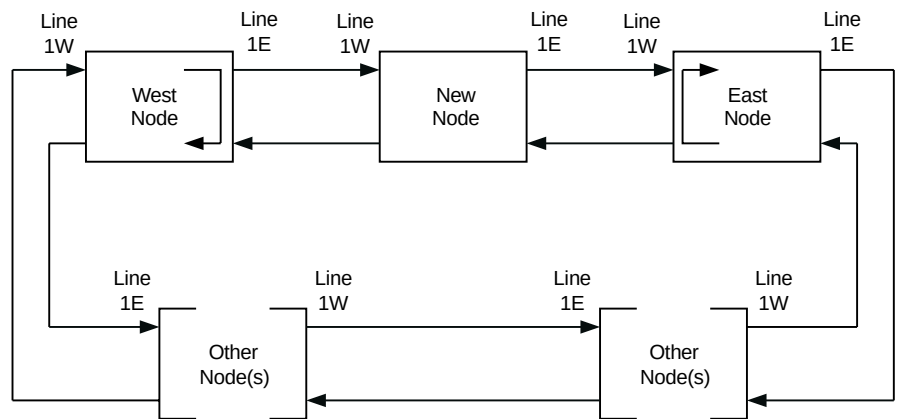
Important! Refer to the previous figure inorder to help locate the optical fibers that can now be removed from the East node (fibers connected to West node).

13 Instruct the technician at the East node to remove the optical fibers (Lines 1W) connected to the West node.

Important! Refer to the following figure and observe that new optical connections can now be made to the new node.

Important! Lightguide buildouts (if required) are installed on the receive fibers of the new node as well as the West node and East node.

- 14** At the new node, clean and connect the 1W transmit fiber to the **OUT** connector.



Reference: Task 703

-
- 15** Instruct the technician at the West node to:
1. Select the receive fiber.
 2. Obtain the optical power meter:
 - Connect the power meter to the receive fiber.
 - Measure the level of received power.
 3. Depending on the measured level of power, change the lightguide buildout to the appropriate value.
 4. Clean and connect the fiber to the West node **IN**.

Reference: Task 707

Reference: Task 703

-
- 16** Instruct the technician at the West node to:
1. Use the WaveStar CIT, and log in to the West node.

2. Bring up the *System View* screen, and left-click on the **Alarm List** button.
3. Verify that an incoming OC-48 LOS does not exist for the 1E receive fiber; or if adding an OC-192 node, verify that an incoming OC-192 LOS does not exist for the 1E receive fiber.

Important! Steady/permanent alarms should be cleared using the appropriate trouble-clearing task. Transient alarms generally do not require any customer intervention.

17 Instruct the technician at the West node to:

1. Select the 1E transmit fiber.
2. Clean and connect the fiber to the West node **OUT**.

Reference: "Task 703"

18 At the new node:

1. Select the 1W receive fiber (from the West node).
2. Obtain the optical power meter:
 - Connect the power meter to the receive fiber.
 - Measure the level received power.
3. Depending on the measured level of power, change the lightguide buildout to the appropriate value.
4. Clean and connect the fiber to the new node 1W **IN**.

Reference: Task 707

Reference: Task 703

19 At the new node and from the *System View* screen:

1. Click on the **Update Alarms** button.
2. Verify that an incoming OC-48 LOS does not exist for the 1W receiver; or if adding an OC-192 node, verify that an incoming OC-192 LOS does not exist for the 1W receiver.

-
- 20** At the new node, clean and connect the 1E transmit fiber to the **OUT** connector.

Reference: Task 707

- 21** Instruct the technician at the East node to:

1. Select the 1W receive fiber.
2. Obtain the optical power meter:
 - Connect the power meter to the **IN** fiber.
 - Measure the power level.
3. Depending on the measured level of power, change the lightguide buildout to the appropriate value.
4. Clean and connect the fiber to the East node 1W **IN** connector.

Reference: Task 707

Reference: Task 703

- 22** Instruct the technician at the East node to:

1. Use the WaveStar CIT, and log in to the East node.
 2. Bring up the *System View* screen, and click on the **Alarm List** button.
 3. Verify that an incoming OC-48 LOS does not exist for the 1W receive fiber; or if adding an OC-192 node, verify that an incoming OC-192 LOS does not exist for the 1W receive fiber.
-

- 23** Instruct the technician at the East node to:

1. Select the 1W transmit fiber.
 2. Clean and connect the fiber to the East node **OUT** connector.
-

- 24** At the new node:

1. Select the 1E receive fiber (from the East node).
2. Obtain the optical power meter:

- Connect the power meter to the receive fiber.
 - Measure the power and visually observe the displayed measurement/value.
3. Depending on the measured value, change the lightguide buildout to the appropriate value.
 4. Clean and connect the fiber to the new node 1E IN connector.

Reference: Task 707

Reference: Task 703

25 At the new node and from the *System View* screen:

1. Click on the **Update Alarms** button.
2. Verify that an incoming OC-48 LOS does not exist for the 1E receiver; or if adding an OC-192 node, verify that an incoming OC-192 LOS does not exist for the 1E receiver.

Important! At this point in time, it is normal for Alarm List to display several alarms. These alarms include Ring Incomplete. The East and West nodes will also each list BLSR Protection Default K-byte alarms.

The *Ring Auto Discovery* software will automatically start, following clearing of the LOS and DCC Section Failure alarms. It may take from 2 to 10 minutes for *Ring Auto Discovery* to complete. During this time interval, the new node Alarm List will continue to show the *Ring Incomplete* alarm. When *Ring Auto Discovery* has successfully completed, the alarm *Ring Incomplete* will clear and the ring has successfully been built.

26 At the new node and from the *System View* screen, enter/select the following:

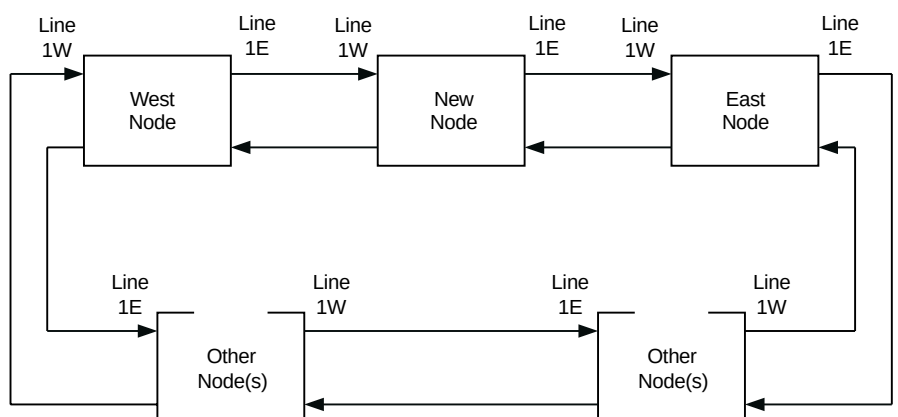
1. **View-Rings-Ring Map.**
2. Expand down the directory and highlight the appropriate Ring ID (for example, **2F BLSR t_-_**).
3. Left-click on the **Select** button.
4. Verify that the ring is complete and that it does indeed include the new node.

Important! Refer to the following figure. The forced switch at the West node can now be cleared.

- 27** Instruct the technician at the West node to display the WaveStar CIT *System View* screen, and enter/select the following:
1. **Fault-Protection Switch.**
 2. **Bay** (which contains the shelf that supports the subject ring).
 3. **Shelf** (which supports the subject ring).
 4. Protection Group (for example, **2F BLSR t_ _**).
 5. Desired port (which in this case is **East Port _ _ - _**).
 6. Click on the button labeled **Select**.
 7. In the right-hand window, verify that the displayed information is correct.
 8. In the field labeled *Direction*, select/highlight **East**.
 9. In the field labeled *Switch Type*, click on the drop-down arrow and select **Clear**.
 10. Click on the button labeled **Apply**.

Important! As an alternative, now that the ring is up and if the login at the new node has login privileges at the West node, remotely log in to the West node and execute the command.

The line switch may cause traffic hits.



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Important! Refer to the previous figure. The forced switch at the East node can be cleared now.

- 28** Instruct the technician at the East node to display the WaveStar CIT *System View* screen, and enter/select the following:
1. **Fault-Protection Switch.**
 2. **Bay** (which contains the shelf that supports the subject ring).
 3. **Shelf** (which supports the subject ring).
 4. Protection Group (for example, **2F BLSR t_ _**).
 5. Desired port (which in this case is **West Port _ _ - _**).
 6. Click on the button labeled **Select**.
 7. In the right-hand window, verify that the displayed information is correct.
 8. In the field labeled *Direction*, select/highlight **West**.
 9. In the field labeled *Switch Type*, left-click on the drop-down arrow and select **Clear**.
 10. Click on the button labeled **Apply**.

Important! As an alternative, now that the ring is up and if the login at the new node has login privileges at the East node, remotely log in to the East node and execute the command.

Important! The new node has NOW been added to the ring network.

- 29** At the new node, verify that the ring map is correct. From the *System View* screen, enter/select the following:
1. **View-Rings-Ring Map.**
 2. Expand down the directory and highlight the appropriate Ring ID (for example, **2F BLSR t_ - _**).
 3. Click on the **Select** button.
 4. Verify that the ring is complete and that it does indeed include the new node.

.....
30 Instruct the technician at the new node to verify that there are no standing alarms associated with this work activity.

.....
31 Instruct the technician at the West node to verify that there are no standing alarms associated with this work activity.

.....
32 Instruct the technician at the East node to verify that there are no standing alarms associated with this work activity.

.....
E N D O F S T E P S



Task 326: Delete a Node from an In-Service 2-Fiber BLSR/MS-SPRing

Purpose	Use this procedure to develop a detailed Method of Procedure (MOP), per local operating instructions, for deleting a node from an existing in-service 2-fiber BLSR/MS-SPRing. The (Node To Be Deleted) can be either a WaveStar 2.5G or a WaveStar 10G. A node in a WaveStar BandWidth Manager is a Port Protection group. Several can be provisioned on a shelf.
Required privilege code(s)	You must have a security privilege code of at least P2 or greater to perform this task.
Required equipment	The following equipment is required to perform this task: • WaveStar Craft Interface Terminal (CIT) • Wrist strap • Optical power meter, to measure the level of received power • Appropriate optical LBOs • Technical assistance at the two (East and West) adjacent nodes.
Safety precautions	To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.
Safety precautions	To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

A line forced switch will preempt extra traffic, if any, on the protection tributaries.

Related information For related information, see the following sections in this document:

- Appendix A, WaveStar CIT Tutorial

Before you begin. This task is written from the “Node To Be Deleted” perspective, although action is required at two other nodes. The Node To Be Deleted is located between two operational nodes. One operational node will be called the *West Node*, and the other will be called the *East Node*.

Prior to performing this task, you must:

- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to delete a node from an existing in-service BLSR/MS-SPRing.

Important! Alarms will be active at different times during this procedure

- 1** Log in to the “Node To Be Deleted”.

Important! Add and drop cross-connections, if they exist, could be carrying traffic. So follow local operating procedures to reroute or terminate the traffic.

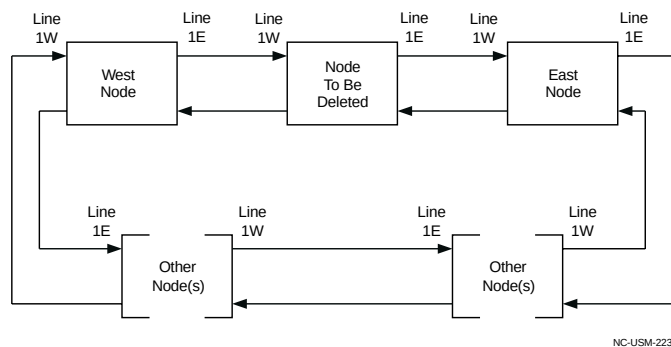
- 2** *Verify that the Node To Be Deleted does not have any add/drop traffic.*
At the WaveStar CIT and from the *System View* screen:
 1. select **View-Cross Connections**
 2. verify that there are no tributary-to-port (drop) or port-to-tributary (add) cross-connections.

-
- 3 Refer to Figure 326-1, and observe that the node connected to line 1W of the Node To Be Deleted is referred to, in this procedure, as the West Node and that the node connected to line 1E of the Node To Be Deleted is referred to, in this procedure, as the East Node.

Identify the name of the West Node and of the East Node. At the WaveStar CIT and from the System View screen:

1. select **View-Rings-Ring Map**
2. highlight the AID of the desired BLSR/MS-SPRing, for example, **2 BLSR t_-**
3. click on the **SELECT** button.

Figure 326-1 Identify the East Node and the West Node



-
- 4 Determine, from the Ring Map, the name of the West Node and the name of the East Node.

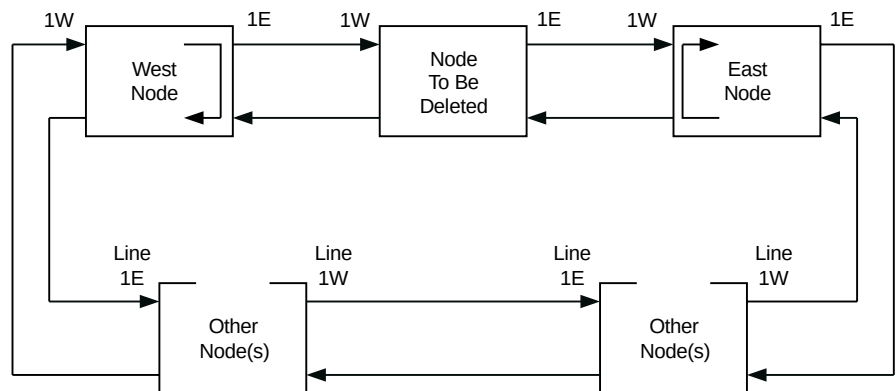
The East and West node names are easily determined from the two column headers labeled *Node Port Direction* and *Node Neighbor NE Name*.

-
- 5 *Perform a forced switch on the West Node and then the East Node.* The service tributaries that connect the Node To Be Deleted will now be looped back in the opposite direction by performing a Forced Switch (on the BLSR/MS-SPRing) at the West node and then the East node. Refer to Figure 326-2.

Instruct the technician at the West node (or travel to that location) to display the WaveStar CIT *System View* screen and enter/select the following:

1. **FAULT-Protection Switch**
2. **Bay** (which contains the shelf that supports the subject ring)
3. **Shelf** (which supports the subject ring)
4. **Protection Group** (for example, 2F BLSR t_ _ _)
5. Click on the button labeled **Select**
6. In the right-hand window, select the **Desired Direction** (which in this case is **East Port** _ _ - _ at the West node)
7. **Switch Type** (which, in this case, is **Forced to Protection, Ring**)
8. Click on the button labeled **Apply**
9. Read the information message and, if OK, click on the **YES** button.

Figure 326-2 Forced Protection Switch at the West Node and the East Node



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Important! This makes a forced switch on line 1E, and may cause traffic hits.

- 6 Instruct the technician at the East node (or travel to that location) to display the WaveStar CIT *System View* screen and to enter/select the following:
 1. **FAULT-Protection Switch**
 2. **Bay** (which contains the shelf that supports the subject ring)
 3. **Shelf** (which supports the subject ring)

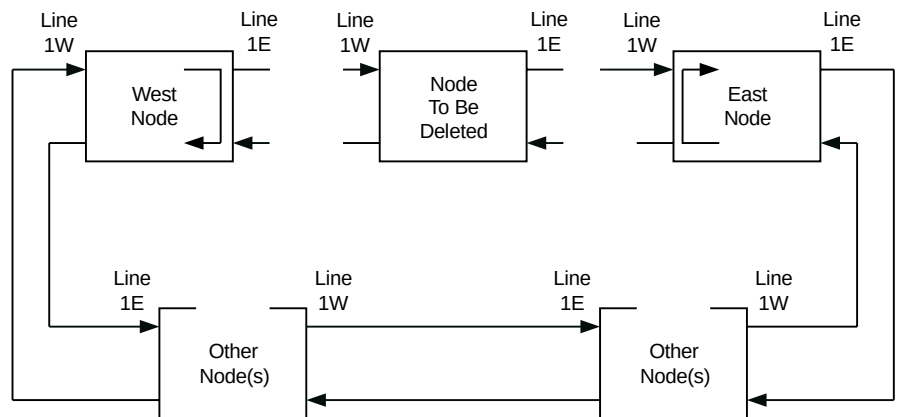
4. Protection Group (for example, **2F BLSR t_ _-**)
5. Click on the button labeled **Select**
6. In the right-hand window select the Desired Direction (which in this case is **West Port _ _ - _** at the East node)
7. Switch Type (which, in this case, is **Forced to Protection, Ring**)
8. Click on the button labeled **Apply**
9. Read the information message and, if OK, click on the **YES** button.

Important! This makes a forced switch on line 1W, and may cause traffic hits.

- 7 *Disconnect the 1W Fibers and then the 1E Fibers. Refer to Figure 326-3 in order to help locate the optical fibers that now can be removed at the Node To Be Deleted (fibers connected to the West Node).*

Disconnect the optical fibers, both OUT and IN, at the Node To Be Deleted (line 1W) that is connected to the West Node.

Figure 326-3 Optical Fibers Removed



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- 8 Refer to Figure 326-3 in order to help locate the optical fibers that can now be removed at the Node To Be Deleted (fibers connected to the East Node).

Disconnect the optical fibers, both OUT and IN, at the *Node To Be Deleted* (line 1E) that connects to the East Node.

The node is now completely isolated from the ring.

-
- 9** At the node deleted, deprovision all tributary-to-tributary (through) cross-connections.

Reference: T 303

- 10** For the “deleted node” delete the 2-Fiber BLSR Port Protection Group.

Result: T 302

- 11** Disable the DCC Termination for the AID corresponding to “Line 1E”.

Result: T 305

- 12** Disable the DCC Termination for the AID corresponding to “Line 1W”.

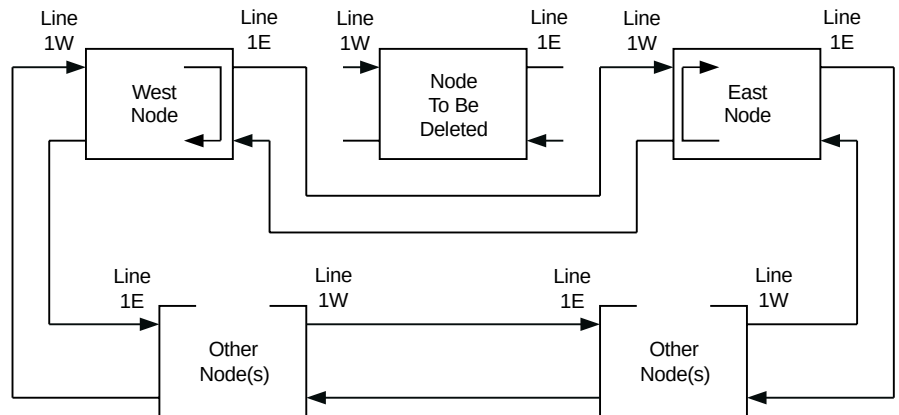
Result: T 305

- 13** Refer to Figure 326-4 and notice that new optical connections now can be made at the West Node and at the East Node (bypass the Node To Be Deleted).

At the Node To Be Deleted, splice the 1W and 1E optical fibers per local procedures.

Lightguide buildouts (if required) are installed only on the receive fibers at the East and West Nodes.

Figure 326-4 Optical Fibers Connected to the East Node and the West Node



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- 14 Instruct the technician at the East Node to connect fiber 1W (OUT).
- 15 Instruct the technician at the West Node to measure the receive power level on fiber 1E (IN) and to change the lightguide buildout as necessary.
Reference: T 707
- 16 Instruct the technician at the West Node to connect fiber 1W (OUT).
- 17 Instruct the technician at the East Node to measure the receive power level on fiber 1W (IN) and to change the lightguide buildout as necessary.
Reference: T 707
- 18 Instruct the technicians, at both the West Node and East Node, to wait one minute for the LEDs on each node's circuit pack to stop flashing.
If the LEDs do not stop flashing after about one minute, troubleshoot the incoming signal failure.
Reference: T 700

Important! Whenever the receiver's LEDs stop blinking, the ring is then re-connected, and transient alarms will exist. Protection Switching is suspended during Ring Auto Discovery. Until the Ring Auto Discovery software completes, there may be multiple alarms, for example, *Ring Incomplete*, *BLSR Protection Default K-byte*, and so forth. Depending on how many nodes are in the ring, it may take several minutes for this alarm to clear.

- 19** *Verify correct operation of the reconfigured ring.* After a sufficient wait (2 to 10 minutes), instruct the technician at either the East or West Node to click on the **Alarm List** button and to verify that the alarm *Protection Switch Suspended* has cleared.

-
- 20** At the East or West node, verify that the new ring map is correct. From the *System View* screen, enter/select the following:

1. **View-Rings-Ring Map.**
2. Expand down the directory and highlight the appropriate Ring ID (for example, **2F BLSR t_-_-**)
3. Click on the **Select** button
4. Verify that the ring is complete and that it does, indeed, include the new node.

Reference: T 528

-
- 21** *Take-down the Forced Switch at the East Node and then at the West Node.* The Forced Switch at the East Node now can be cleared. Refer to Figure 326-5.

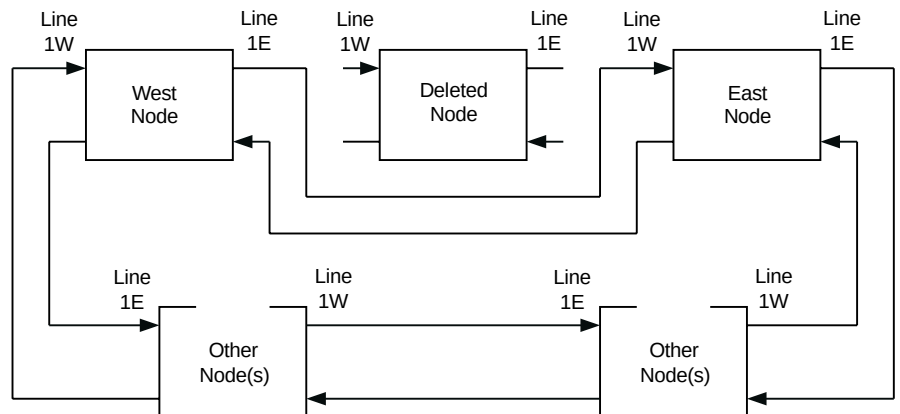
Instruct the technician at the East node (or travel to that location) to display the WaveStar CIT *System View* screen and to enter/select the following:

1. **FAULT-Protection Switch**
2. **Bay** (which contains the shelf that supports the subject ring)
3. **Shelf** (which supports the subject ring)
4. Protection Group (for example, **2F BLSR t_-_-**)
5. Click on the button labeled **Select**

6. In the right-hand window, select the Desired Direction (which in this case is **West Port __ - __**)
7. Switch Type (which, in this case, is **Clear**)
8. Click on the button labeled **Apply**.
The line switch may cause traffic hits.
9. Read the information message and, if OK, click on the **YES** button.

22 The forced switch at the West Node now can be cleared. Refer to Figure 326-5.

Figure 326-5 Clear of the Forced Switch at both the East Node and West Node



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Instruct the technician at the West node (or travel to that location) to display the WaveStar CIT *System View* screen and to enter/select the following:

1. **FAULT-Protection Switch**
2. **Bay** (which contains the shelf that supports the subject ring)
3. **Shelf** (which supports the subject ring)
4. Protection Group (for example, **2F BLSR t_ - _**)
5. Click on the button labeled **Select**
6. In the right-hand window, select the Desired Direction (which, in this case, is **East Port __ - __**)
7. Switch Type (which, in this case, is **Clear**)
8. Click on the button labeled **Apply**.
The line switch may cause traffic hits.

9. Read the information message and, if OK, click on the **YES** button.

-
- 23** The Node To Be Deleted has been deleted from the BLSR/MS-SPRing.
Verify that all work associated with this activity is complete.

END OF STEPS



Task 327: Deprovision WBM 2.5G I/O Shelf

Purpose Use this procedure to deprovision an existing WaveStar 2.5G I/O shelf in the WaveStar BandWidth Manager system. Deprovisioning an existing shelf requires that a minimal set of mandatory circuit packs remain in the system to retain communications between the WaveStar CIT and system controller.

When a new shelf is created and transmission cannot be established, it may be necessary to use this procedure to deprovision the shelf and create a new shelf. When the new shelf is created again, verify that the correct ON cable identifier and BSW port identifier is used in provisioning the new shelf.

Required privilege code You must have a security privilege code of at least P3 to perform this task.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap

Related information For related information, see the following sections in this document:

- Chapter 3, Platform Descriptions
- Chapter 7, Provisioning, Security, and Administration
- Appendix A, WaveStar CIT Tutorial

Before you begin Prior to performing this task, you must:

- Obtain the work instructions for this task.
- Identify the WaveStar BandWidth Manager system and I/O bay that is associated with the 2.5G I/O shelf being deprovisioned.
- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to deprovision a 2.5G I/O shelf entity.

-
- 1** Use the WaveStar CIT to log in to the WaveStar BandWidth Manager system containing the shelf being deprovisioned.

-
- 2 Verify that all service/traffic has been removed from the shelf per local procedures.
-

- 3 *Verifying no cross connections exist.* On the *System View* menu, select **View > Cross Connections**.

Result: The *View Cross Connections* window opens.

- 4 In the *View Cross Connections* window, open the Bay details then highlight the shelf being deprovisioned. Click **Select** at bottom of window.

Result: The *View Cross Connections for wbm* window opens.

- 5 Verify that no cross-connections exist for the shelf.
-

6

If...	Then...
no cross-connections exist,	click Close to exit, then continue with the next step.
cross-connections exist,	click Close to exit, then delete all cross-connections. Reference: T 304

- 7 *Verifying no loopbacks exist.* On the *System View* menu, select **View > Loopback**.

Result: The *View Loopbacks* window opens.

- 8 In the *View Loopbacks* window, open the Bay details then highlight the shelf being deprovisioned. Click **Select** at bottom of window.

Result: The *View Loopback* window opens.

- 9 Verify that no loopbacks exist for the shelf.
-

10

If...	Then...
no loopbacks exist,	click Close to exit, then continue with the next step.
loopbacks exist,	click Close to exit, then release all loopbacks. Reference: T 209

11 *Verifying No Test Access Sessions Exist.* On the *System View* menu, use the **Fault > Analysis > Test Access** command to check for test access sessions.

Result: The *Test Access Wizard* screen opens.

Reference: T 222

12 Select **View existing test access sessions**, then click **Next**.

13 Use the **Browse** button to select the shelf being deleted and to verify no test access sessions exist for this shelf.

14

If...	Then...
no test access sessions exist,	click Close to exit, then continue with the next step.
test access sessions exist,	click Close to exit, then delete all test access sessions. Reference: T 213

15 *Verifying no optical port protection groups exist.* On the *System View* menu, select **View > Protection**.

Result: The *View Protection* window opens.

16 In the *View Protection* window, open the Bay and Shelf details for the shelf being deprovisioned.

17 Verify no optical port protection groups exist on the shelf.

18

If...	Then...
no optical port protection groups exist,	click Close to exit, then continue with the next step.
optical port protection groups exist,	click Close to exit, then delete all optical port protection groups. Reference: T 308

19 *Verifying line timing references are not connected.* On the *System View* menu, select **View > Timing/Sync**.

Result: The *View Timing/Sync* window opens.

20 Click on the **Timing References** tab.

Result: Timing reference parameters display.

21 Under the *Timing Reference* column, find **line1**. Then, under the *Port AID* column, check to see if a port AID is listed that is associated with the shelf you are deleting.

22

If...	Then...
a port AID associated with this shelf is listed,	click Close to exit, then continue with the next step.
a port AID associated with this shelf is NOT listed,	click Close to exit, then continue with Step 32.

23 On the *System View* menu, select **Configuration > Timing/Sync**.

Result: The *Provision Timing/Sync* window opens.

24 Click on the **Timing Reference** tab.

Result: Timing reference parameters display.

25 In the *Timing Reference* box, select **LINE1**.

26 In the *Port AID* box, select **NOT-CONNECTED** to disconnect the timing reference from the shelf you are deleting.

27 Click **Apply** to make changes. Then, click **OK** to exit.



CAUTION

Do not remove any of the following circuit packs: CTLSYS50DM in CTLMEM 0 slot, the TMG/STRAT3 timing packs in TMG 0 and TMG 1 slots, the SWITCH/STS576 circuit packs in SWITCH 0 and SWITCH 1 slots, and the SWIF circuit pack in the SWIF 10 slot.

28 At the I/O shelf being deprovisioned, unlatch and remove the following circuit packs:

- Port units in slots 1 through 8 and slots 9 through 16
 - DS3EC1/8 circuit pack in EPRN slot
 - SWITCH/DS3EC1 circuit pack in EPROTSW slot
 - CTLSYS50DM circuit pack in CTLMEM1 slot (may be removed, but not required)
 - All SWIF circuit packs *except* SWIF pack in slot SWIF 10
-

29 On the *System View* menu, select **Configuration > Delete**.

Important! An alternate way to delete the circuit packs is from the *Shelf View*. Right click on the circuit pack being deleted and select **Delete Circuit Pack**. See Appendix A, “WaveStar CIT Tutorial” for details on the Shelf View procedures.

Result: The *Delete* window opens

30 In the *Delete* window, open up the required bay and shelf details.

31 Highlight/select one of the circuit packs removed in Step 32, then click on **Select**.

Result: A warning window opens to ask you if you want to continue. Select **Yes**.

32 Repeat Step 35 until all the circuit packs removed in Step 32 are deleted from the system.

33 Highlight/select the shelf being deleted, then click on **Select**.

Result: A warning window opens to ask you if you want to continue. Select **Yes**.

34 Verify the shelf is deleted in the *System View* display.

35 Remove all circuit packs from the shelf, if required.

END OF STEPS



Task 328: Turn Up a BLSR or MS-SPRing

Purpose Use this procedure to develop local procedures to turn-up a 2-fiber closed, 4-fiber closed, and a 4-fiber open Bidirectional Line-Switched Ring (BLSR). In high-level and very general terms, turn-up is defined as the sum of the following:

1. Connecting the fibers sequentially from node-to-node
2. Provisioning protection groups and verifying
 - Port
 - DCC (channel enabled/disabled, User/Network side)
3. Checking and verifying that the open/closed ring actually does Auto Discovery, and lastly
4. Determining that the ring is fully functional and without any alarms.

Required privilege code(s) You must have a security privilege code of at least P2 or greater to perform this task.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap
- Optical power meter
- Appropriate optical LBOs.

Related information Refer to the appropriate 4-Fiber Ring WorkSheet and/or 2-Fiber Ring Work Sheet on the accompanying pages. It is strongly suggested that you familiarize yourself with the diagram on the appropriate WorkSheet. The steps of this procedure use the same terminology as depicted in these diagrams. Thus, if you are familiar with these diagrams, then you should better be able to keep your perspective when performing the steps. Extra copies of each WorkSheet are included at the end of this procedure.

A node's existing provisioning plays an important role in determining successful functioning of Auto Discovery. Before starting this task, verify that the node's existing provisioning is correct.

For related information, see the following section in this document:

- Appendix A, WaveStar CIT Tutorial

- “Overview of a 2-Fiber BLSR/MS-SPRing Protection Group” (7-114)
- “2-Fiber BLSR/MS-SPRing Protection Group Parameters” (7-116)
- “Overview of a 4-Fiber BLSR/MS-SPRing Protection Group” (7-118)
- “4-Fiber BLSR/MS-SPRing Protection Group Parameters” (7-121)

Before you begin

Prior to performing this task, you must:

- Obtain the work instructions for this task.
- Identify the circuit packs and ports being provisioned.
- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

This procedure is written from the perspective that two or more people are needed to perform all the steps necessary to complete this task. The number of people will impact the amount of time and the risks associated in completing these activities. The strategy will be that one section/span (node-to-node) will be completed before moving to the next section/span.

For a 2-fiber closed-ring and a 4-fiber closed-ring, the node that you start with will be the node that you end with. For a 4-fiber open-ring, the node that you complete this task on will be the far-end node.

The starting node is referred to with the letter N and the next adjacent node as N+1. Subsequent nodes are similarly referred to as N+2, N+3, and so forth.

Verify that both nodes already have (a) the circuit packs (OC-48 or OC-192) installed, and (b) those circuit packs provisioned.

Figure 328-1 4-Fiber Ring WorkSheet

4-FIBER RING WORKSHEET _____		SPAN NAME/ID _____	
<u>N</u>		<u>N+1</u>	
TID= _____		TID= _____	
West Working AID _____		East Working AID _____	
OUT Fiber Color/ID _____		IN Fiber Color/ID _____	
IN Color/ID _____		Received Power Level _____	
Received Power Level _____		Required IN PAD _____	
Required IN PAD _____		OUT Fiber Color _____	
.....			
West Protection AID _____		East Protection AID _____	
OUT Fiber Color/ID _____		IN Fiber Color/ID _____	
IN Fiber Color/ID _____		Received Power Level _____	
Received Power Level _____		IN PAD _____	
Required IN PAD _____		OUT Fiber Color/ID _____	

NC-USM-214

Diagram illustrating the Spanning Tree Protocol (STP) process for a network topology. The diagram shows three nodes: Node N (Starting Node), Node N+1, and Node N+2 (and other nodes). Node N is connected to Node N+1 via a link labeled "Example AID 1-1-u-#-08-1". Node N+1 is connected to Node N+2 via a link labeled "Example AID 1-1-u-#-10-1". Node N+2 is connected back to Node N via a link labeled "Example AID 1-1-u-#-08-1". The diagram also shows the "Ending Span Direction" and "Starting Span Direction" for each link. Node N has an "East Port" and a "West Port". Node N+1 has an "East Port" and a "West Port". Node N+2 has an "East Port" and a "West Port". The diagram illustrates the process of determining the root node (Node N) and the spanning tree structure.

NC-USM-216

- 1 The starting point for these activities will be the TID identified in your work order. For illustration purposes, we will identify this node with the letter N. Additionally, we will identify the neighbor node with the letter N+1.

T 3 2 8 - 4

The OUT port (or ports) of the OC48/OC192 port unit will be specified in your work order.

Reference: T 703

- 2** Instruct the person at the N+1 node to connect their power meter to the IN fiber (or fibers) and measure their received power level.

Instruct the person at the N+1 node to record these measured values.

- 3** Instruct the person at the N+1 node to select the appropriate LBO for each fiber (or fibers).

Reference: T 711

- 4** Instruct the person at the N+1 node to install the LBO (or LBOs).

Reference: T 707

- 5** Instruct the person at the N+1 node to clean and connect the fiber to the IN port of the OC48/OC192 port unit per their work order.

Reference: T 703

- 6** Clean and connect the OUT fiber (or fibers) at the N+1 node.

The OUT port (or ports) of the OC48/OC192 port unit will be specified in the work order.

Reference: T 703

- 7** Instruct the person at the N+1 node to:

1. Provision an Optical Port Protection group for this subject ring
2. Provision the DCC termination, for that node's span, per specifications detailed within the work order.

Important! Refer to the work order for specific AID information.

Reference: T 302, T 305

8 Instruct the person at the N node to connect their power meter to the IN fiber (or fibers) and measure their received power level.

9 Instruct the person at the N node to select the appropriate LBO for each fiber (or fibers).

Reference: T 711

10 Instruct the person at the N node to install the LBO (or LBOs).

Reference: T 707

11 Instruct the person at the N node to clean and connect the fiber to the IN port of the OC48/OC192 port unit per the work order.

Reference: T 703

12 Instruct the person at the N node to:

1. Provision an Optical Port Protection group for this subject ring
2. Provision the DCC termination, for that node's span, per specifications detailed within the work order.

Important! Refer to the work order for specific AID information.

Reference: T 302, T 305

13

If...	Then...
there are additional nodes to be connected (any fiber spans remaining)	go to Step 1 and (for Steps 1-16) change all existing occurrences of N to N+1 and all existing occurrences of N+1 to N+2.
there are no additional nodes to be connected (no fiber spans remaining)	continue with next step.

Important! The nodes will automatically attempt to communicate via the DCC as Node-to-Node sections are reprovisioned with each other and the Ring Auto Discovery software will attempt to build a Ring Map. If these system/network activities are successful, then the ring is established and there will not be any alarms. Otherwise, the ring will NOT be established (NOT be up) and there will be one or more alarms at one or more of the NEs.

14 Instruct the person at the starting point node to select, from the *System View* screen:

1. **View-Rings-Ring Map**
2. Double-click on the system node type (WaveStar BandWidth Manager)
3. Double-click on the subject **Ring ID**
4. Click on the appropriate ring type (for example, **2F BLSR t...** or, **4F BLSR f...**)
5. Click on the **Select** button
6. Click on the **Display Ring Map Graph** button.

15 From Step 17, is the ring map complete (a full circle)?

IF...	THEN...
Yes	<i>Stop! End of Task</i>
No,	Continue.

16 Determine the node ID of where the ring is incomplete.

Important! You can select the various nodes to identify their node ID and determine their neighbor(s) and port connecting to their neighbor(s).

17 Log in to the identified node ID and click on the **Alarm List** button.

.....
18 Identify the alarm and refer the issue to trouble-clearing personnel.

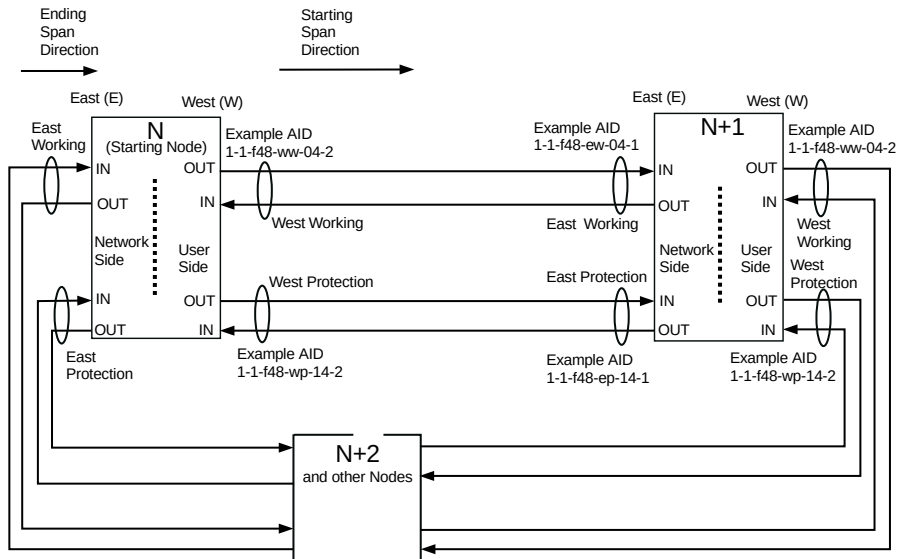
STOP! End of Task.

.....
19 For the existing span, instruct the person at the N+1 node to remain in place while the person from N node to travel to the N+1 node of the new span.

.....
20 Continue with Step 1.

.....
E N D O F S T E P S
.....

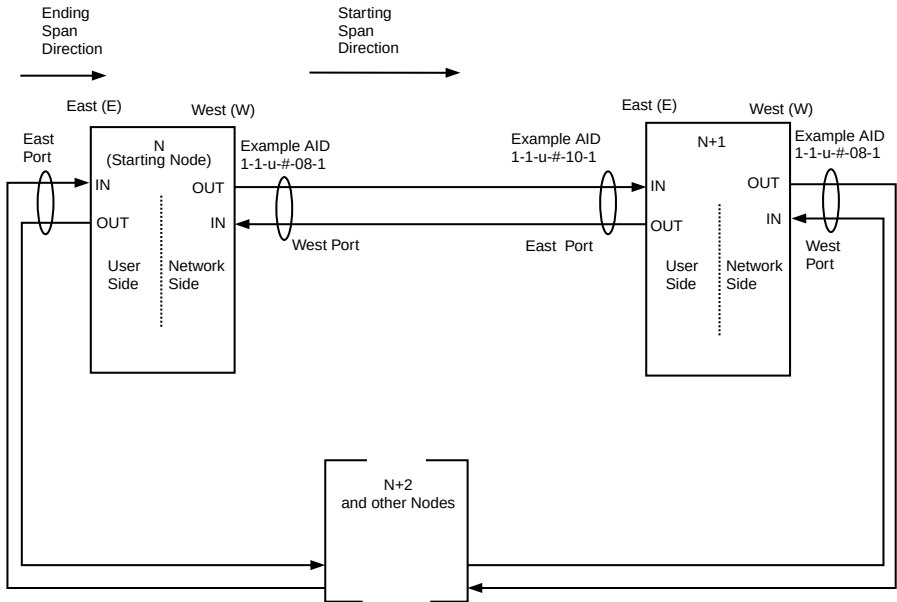
4-Fiber Ring Worksheet (Make Additional Copies as Needed)



NC-USM-213

4-FIBER RING WORKSHEET _____		SPAN NAME/ID _____
<u>N</u> TID= _____ West Working AID _____ OUT Fiber Color/ID _____ IN Color/ID _____ Received Power Level _____ Required IN PAD _____ West Protection AID _____ OUT Fiber Color/ID _____ IN Fiber Color/ID _____ Received Power Level _____ Required IN PAD _____		<u>N+1</u> TID= _____ East Working AID _____ IN Fiber Color/ID _____ Received Power Level _____ Required IN PAD _____ OUT Fiber Color _____ East Protection AID _____ IN Fiber Color/ID _____ Received Power Level _____ IN PAD _____ OUT Fiber Color/ID _____

2-Fiber Ring Worksheet (Make Additional Copies as Needed)



nc-usm-215

2-FIBER RING WORKSHEET _____		SPAN NAME/ID _____	
<u>N</u> TID= _____ Ring ID: _____ Protection Group AID _____ OUT Fiber Color/ID _____ IN Color/ID _____ Received Power Level _____ Required PAD _____		<u>N+1</u> TID= _____ Protection Group AID _____ IN Fiber Color/ID _____ Received Power Level _____ Required IN PAD _____ OUT Fiber Color _____	

NC-USM-216

Task 329: Change an NE's TID

Purpose Use this procedure to change an NE's TID. The more common time to change a TID will be prior to placing that NE in-service. However, this procedure can also be used to change the TID of an in-service NE.

Required privilege codes You must have at least an S4 and an M4 privilege code in order to complete this task.

Required equipment WaveStar Craft Interface Terminal (CIT)

Related information For related information, see the following sections in this document:

- Appendix A, "WaveStar CIT Tutorial"

Before you begin Prior to performing this task, you must:

- Obtain the work instructions for this task, specifying the new TID.
- Be able to log in to an NE with the WaveStar CIT, and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to change an NE's TID.

1 As appropriate, connect your WaveStar CIT to the subject NE.

2 As appropriate, log in to the WaveStar CIT application.

3 As appropriate, log in to the subject WaveStar NE.

Important! The TID can only be changed whenever the NE is in its Maintenance Condition. From the *System View* screen, observe the warning box, which is located in the bottom right-hand part of this screen.

- 4 Is the box lighted (red background and displaying the word Maintenance)?

If...	Then...
YES,	go to Step 7.
NO,	continue with Step 5.

Important! Before changing the NE's **Maintenance Condition** to ON, you should understand that upon exiting from Maintenance Condition, the NE will perform a reset, and your log-in session to the NE will be dropped. Following this NE's reset, you can (as needed) log in again.

- 5 From the *System View* screen, click on **Fault-Enter/Exit Maintenance Condition-Enter Maintenance Condition**.

Result: The following information message is displayed.
Execution of Enter Maintenance Condition may affect the NE service. Do you want to execute this command?

-
- 6 Click the **YES** button.

-
- 7 From the *System View* screen, click on **Administration-Set TID**.

Important! The TID must be unique for the ring. Permitted syntax is (a) 1 to 20 characters – where a character is either a letter, a digit, or a hyphen, (b) the initial (first) character must be a letter, and (c) the character immediately following a hyphen must be a letter. And, the WaveStar CIT will convert lowercase letters to upper case before they are stored in the NE's NVM.

- 8 From the work order:
1. obtain the desired TID and enter it into the field labeled *New TID/NE Name*:
 2. confirm your entry in the field labeled *Confirm TID/NE Name*:
 3. click on the **OK** button.

4. read the information message and click on the **YES** button.

Important! Upon exiting from Maintenance Condition, the NE will perform a reset and your log-in session to the NE will be dropped. Following this NE's reset, you can (as needed) login again.

- 9 From the *System View* screen:

1. click on **Fault-Enter/Exit Maintenance Condition-Exit Maintenance Condition**
2. read the information message and click on **YES** to execute.

-
- 10 Login to the subject WaveStar NE with the new/changed TID.

If...	Then...
the login using the new TID was successful,	the TID was successfully changed on this NE. Continue with Step 11.
the login using the new TID was not successful,	the TID was not successfully changed on this NE. Escalate to your next higher level of technical support.

-
- 11 Verify that the ring maps for all nodes associated with this NE are correct by logging into each NE and checking its individual ring map.

END OF STEPS



Task 330: Overview of Adding a Intermediate Node to an In-Service 4-Fiber Open Ring (BLSR/MS-SPRing)

Purpose Use this procedure to develop a detailed method of procedure (MOP), per local operating instructions, for adding a new node to an existing and **in-service** 4-fiber BLSR/MS-SPRing. This procedure applies to both OC-48 BLSRs/MS-SPRings and OC-192 BLSRs/MS-SPRings. Thus, this procedure applies to all situations where the node to be added is either (a) WaveStar BandWidth Manager R2.0, or later release, or (b) WaveStar 4F 10G (OC-192) R1.0, or later release.

Important! The new node must always be the same rate as the in-service BLSR/MS-SPRing. This procedure does not cover detailed procedures pertaining to other technologies that may interwork with this WaveStar product.

Required equipment/ personnel Use the following minimum equipment and personnel requirements to successfully complete this procedure:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap
- Optical power meter, to measure the level of received power
- Appropriate optical LBOs
- Technical assistance at the two (East and West) adjacent nodes.

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager (WBM) system, it is imperative to review and understand these warnings and precautions prior to performing this task.

**CAUTION**

*It is imperative that **ONLY** the correct DCC terminations be disabled. Refer to the work order for specific AID information.*

**CAUTION**

A line forced switch will preempt extra traffic, if any, on the protection tributaries.

Assumptions

This procedure assumes that the following activities have already been completed:

1. The new node is currently powered-up.
2. The new node has been installed correctly per the specified engineering configuration.
3. The new node has been installed with the correct complement of circuit packs.
4. The office records have been checked to make certain the TID for the new node is indeed unique for the subject BLSR/MS-SPRing.
5. That all new fibers have been tested and are known to be correct.

Important! A given WBM network element (NE) can serve as a single node on a single ring, or as multiple nodes on multiple rings. No ring can have more than one node on a given WBM NE. All nodes that are supported from a single WBM NE will always have the same TID. However, for a given ring, each node must have a unique TID.

Important! Fiber rearrangements will differ depending on local engineering requirements. Existing fibers may or may not be reused.

Before you begin

This procedure is written from the new node perspective although action is required at two other nodes. The new node will be connected between two operational nodes (called the *West node* and *East node*).

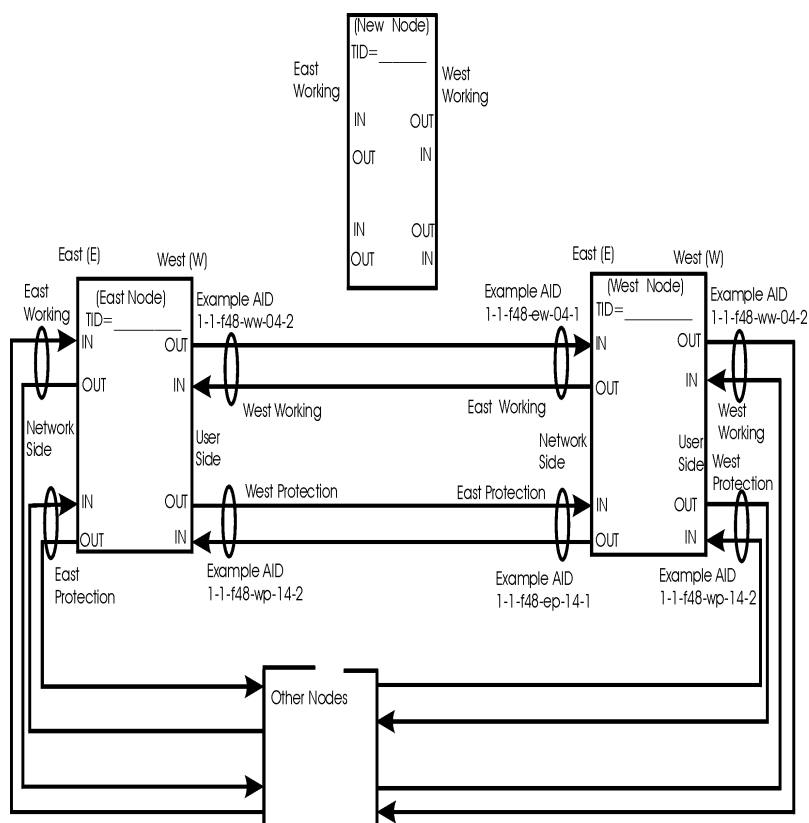
Task Complete the following steps to add a new node to an existing in-service ring.

Important! Refer to Figure 330-1, “Identify the East node and the West node” (-3). Take note of the following:

- The node to be connected to Line East Working of the new node is referred to, in this procedure, as the East node.
- The node to be connected to Line West Working of the new node is referred to, in this procedure, as the West node.

- 1** *Verify that office records match the existing ring map.* From office records determine:
 1. Which nodes in the ring network will be called the East node and the West node for this procedure.
 2. User-side/network-side for the existing East node and West node in order to provision the new node.

Figure 0-1 Identify the East node and the West node



2 Verify that the existing ring topology matches office records.

1. Instruct a technician at either the East node or the West node to log in to the local node.
2. If the adjacent node is a WaveStar BandWidth Manager, then from the *System View* screen, select menu item **View-Rings-Ring Map**. If the adjacent node is not a WBM, then issue the same functional command for that product.
3. Compare the office records report with the list/display from the Ring Map.

Important! Confirmation is when the two nodes that are identified from office records as the West node and the East node are in agreement with the ring map. Any discrepancies must be resolved before continuing with Step 3.

Important! If the node installation crew was provided with the desired TID - then you may assume that the TID has already been set. Otherwise, it may be necessary to check with the installers.

3 *Provisioning actions to be performed on the new node.* Instruct the technician to:

1. Connect the WaveStar CIT to the local node.
2. Log in to the WaveStar CIT application.
3. Log in to the local node.

Important! The Source Node TID and Destination Node TID data is provisioned as part of a cross-connection.

4 As appropriate, change the TID to correspond with office records.

Reference: T 329

5 Instruct the technician at the new node to:

1. Obtain the synchronization records for this new node TID.

2. As necessary, change/provision synchronization for this new node.

Reference: T 301

- 6 Instruct the technician to *Create a New 4-Fiber BLSR Port Protection Group*.

Important! Refer to office records and the current work order for all required information; for example, the East Working port AID, the East Protection port AID, the West Working port AID, the West Protection port AID, and so forth.

Reference: T 302



CAUTION

It is imperative that ONLY the correct DCC terminations be disabled. Refer to the Work Order for specific AID information.

- 7 Instruct the technician to disable the DCC terminations for the following:

1. East node working/protection port AID
2. West node working/protection port AID.

Reference: T 305



CAUTION

Incorrectly provisioned cross-connections can result in a service interruption.

Important! At this point, the new node has not communicated with the adjacent nodes via the DCCs. Thus, the adjacent nodes TID will not appear in the pull-down menu listing. Therefore, screen 4 of the Cross-Connect Wizard requires that you manually enter the TID of the respective East node (Src NE Name: _____) and the respective West node (Dest NE

Name: _____). As necessary, refer to the work order for specific TID information.

8 Instruct the technician to:

1. Make any necessary tributary-to-tributary (2-way through) cross-connections.
2. Check/verify these tributary-to-tributary cross-connections for correctness.
3. Verify that there are no unnecessary cross-connections.

Reference: T 303



CAUTION

A line forced switch will preempt extra traffic, if any, on the protection tributaries.

Important! For this step, refer to Figure 330-2, “Forced span switch on line West Working at the East node” (-7). The working tributaries soon to be connected (OUT on West Working span) to the new node will now be switched to the protection tributaries at the East node. This is known as a span switch. The span switch is bidirectional, which means that when you place a switch from working to protection at the East node, it (almost simultaneously) does the same action at the West node. Thus, a protection switch is depicted as being in place at both the East node and the West node.

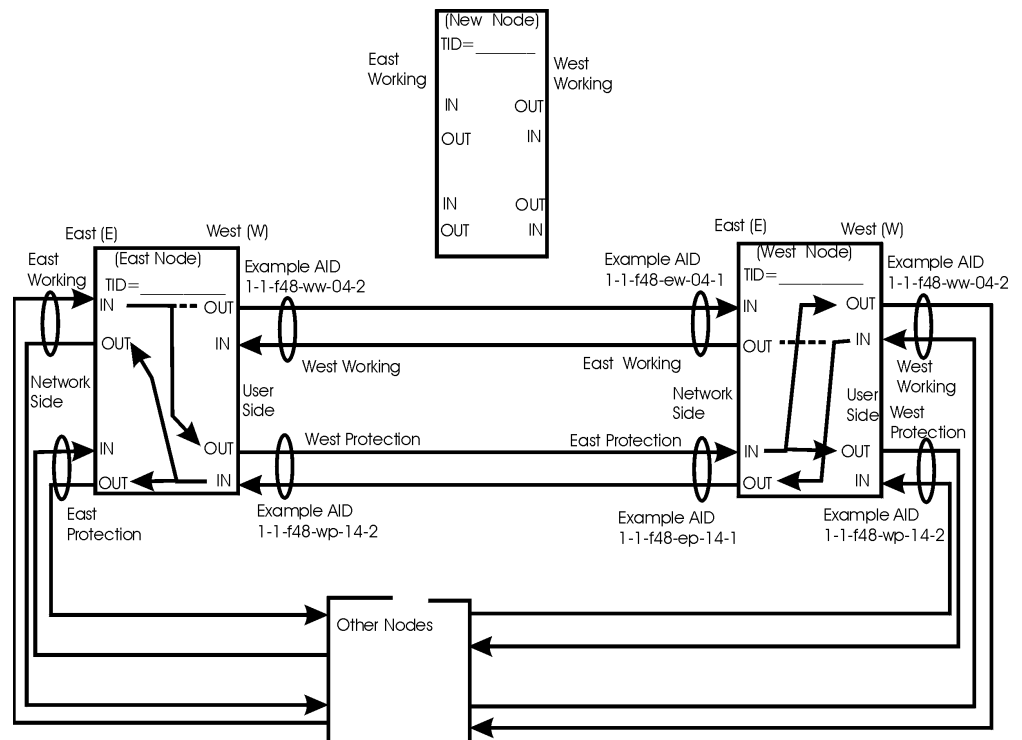
Important! The span switch not only includes the through traffic, but also the add and drop traffic in the span that is being protected. Add and drop traffic is not depicted, so as to not further complicate this series of figures.

9 *Provisioning actions to be performed on the East node.* Instruct the technician at the East node to perform the necessary command to operate a forced span switch on the West protection group port. If the East node is a WaveStar BandWidth Manager, instruct the technician at that node (or travel to that location) to display the WaveStar CIT System View screen and enter/select the following:

1. **Fault-Protection Switch.**
2. Bay (which contains the shelf that supports the subject ring).

3. Shelf (which supports the subject ring).
4. Protection Group (for example, **4F BLSR f192**).
5. In the right-hand window, verify that the displayed information is correct.
6. In the field labeled *Direction*, select/highlight **West**.
7. In the field labeled *Switch Type*, click on the drop-down arrow, and select **Force To Protection, Span**.
8. Click on the button labeled **Apply**.

Figure 0-2 Forced span switch on line West Working at the East node



Important! This completes a *Force To Protection Span* switch at the East Node of line West Working and may have caused traffic hits..

Important! Even though a span switch is already in effect on the West node, it will be necessary to log in to the West node and execute a *Force to Protection* command. If this command is not

executed on the West node, that node could prematurely release whenever the new node is inserted.

- 10** *Provisioning actions to be performed on the West node.* Instruct the technician at the West node to perform the necessary command to operate a span switch on the East protection group port. If the West node is a WaveStar BandWidth Manager, instruct the technician at that node (or travel to that location) to display the WaveStar CIT *System View* screen and enter/select the following:

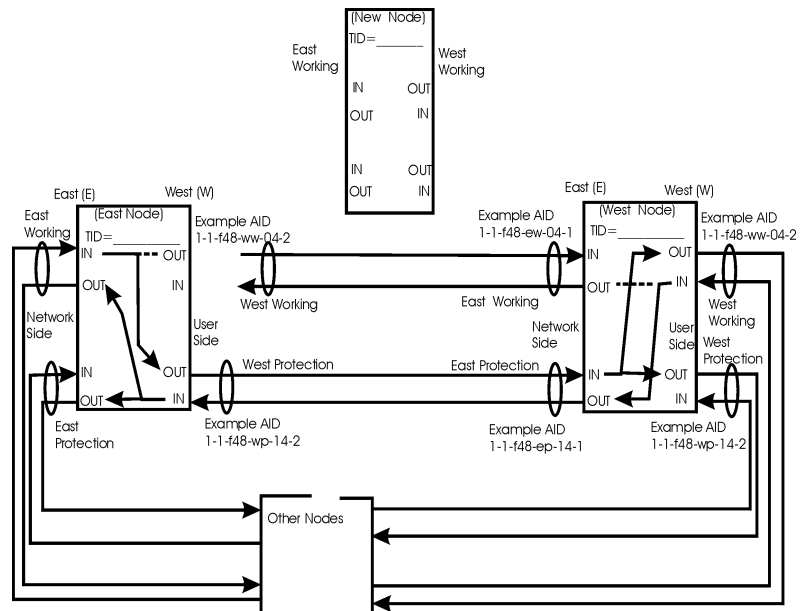
1. **Fault-Protection Switch.**
2. Bay (which contains the shelf that supports the subject ring).
3. Shelf (which supports the subject ring).
4. Protection Group (for example, **4F BLSR f192**).
5. In the right-hand window verify that the displayed information is correct.
6. In the field labeled *Direction*, select/highlight **East**.
7. In the field labeled *Switch Type*, click on the drop-down arrow and select **Force To Protection, Span**.
8. Click on the button labeled **Apply**.

Important! This completes a *Force To Protection Span* switch at the West node of the East Working line.

Important! Refer to Figure 330-3 to help locate the West Working optical fibers that can now be disconnected from the East node (fibers connected to West node).

- 11** *Disconnect the West Working fibers at the East node.* Instruct the technician at the East node to disconnect the optical fibers (OUT – West Working and IN – West Working), which connect to the far-end West node.

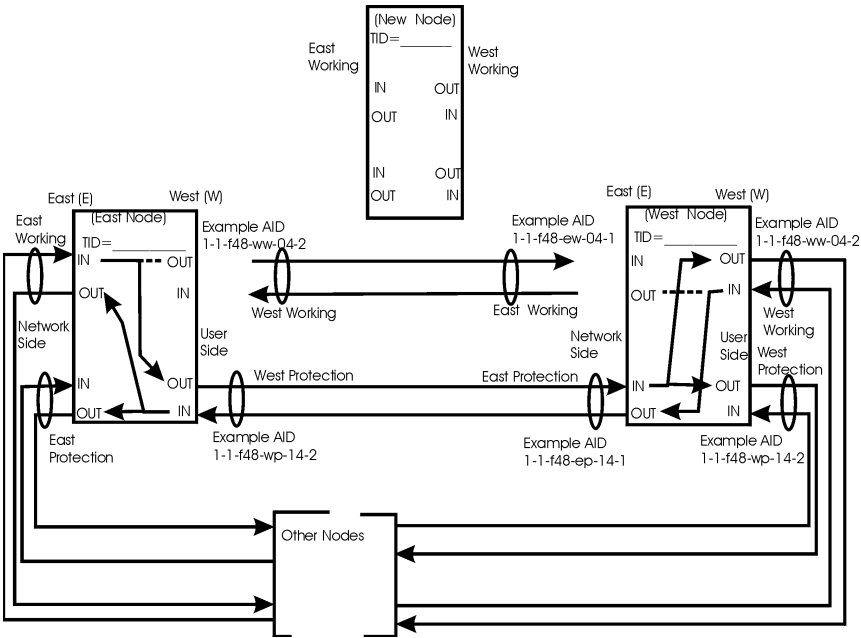
Figure 0-3 East node West Working optical fibers disconnected



Important! Refer to Figure 330-4, “West node East Working optical fibers disconnected” (-10) to help locate the East Working optical fibers that can now be disconnected from the West node (fibers which previously connected to East node).

- 12** *Disconnect the East Working fibers at the West node.* Instruct the technician at the West node to disconnect the optical fibers (OUT – East Working and IN – East Working), which previously connected to the far-end East node.

Figure 0-4 West node East Working optical fibers disconnected



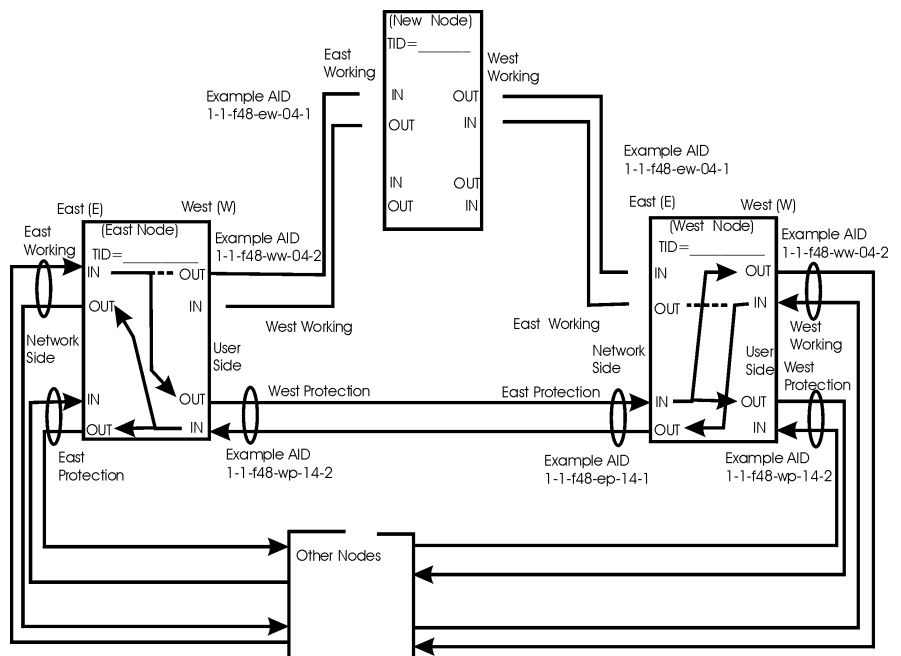
Important! To minimize confusion and to aid clarity, the two fibers that have been completely disconnected will now be removed from all subsequent figure references. Additionally, new fibers running from the East node to the new node are depicted, and new fibers running from the new node to the West Node are depicted.

Important! Refer to Figure 330-5 to help locate the optical fibers that can now be connected to the East node.

13 *East node OUT direction connection activities.* Instruct the technician to:

1. Locate the **OUT** West Working fiber, and determine the color of its sheath (or label) _____.
2. Clean the **OUT** West Working fiber.
3. Connect the **OUT** West Working fiber to the **OUT** connector.

Figure 0-5 East node OUT direction connection activities



Important! Refer to the work order for specific AID details.

Reference: Task 703

14 *New node IN direction East Working activities.* Instruct the technician to:

1. Locate the East Working **IN** fiber, and determine the color of its sheath (or label) _____.
2. Clean the East Working **IN** fiber.
3. Connect the cleaned fiber to the power meter.
4. Take a measurement, and record the measured value.

15 Instruct the technician to select the appropriate LBO for the East Working **IN** fiber.

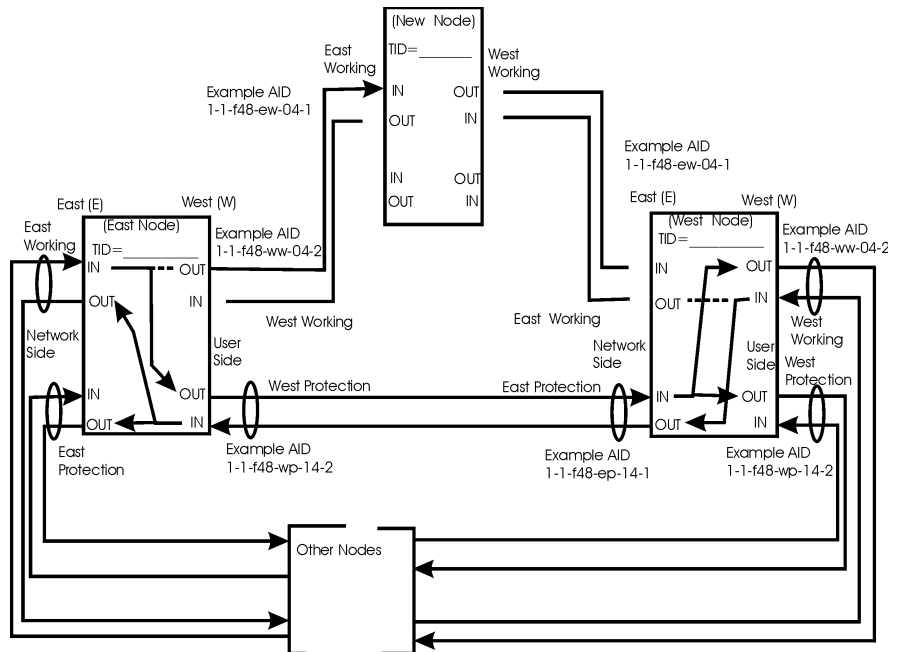
Reference: T 711

Important! Refer to the current work order for specific AID details, and refer to Figure 330-6 to determine how the current configuration should look.

16 Instruct the technician to:

1. Install the LBO on the **IN** connector of the circuit pack.
2. Connect the East Working **IN** fiber to the **IN** connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous green).

Figure 0-6 New node IN direction connection activities



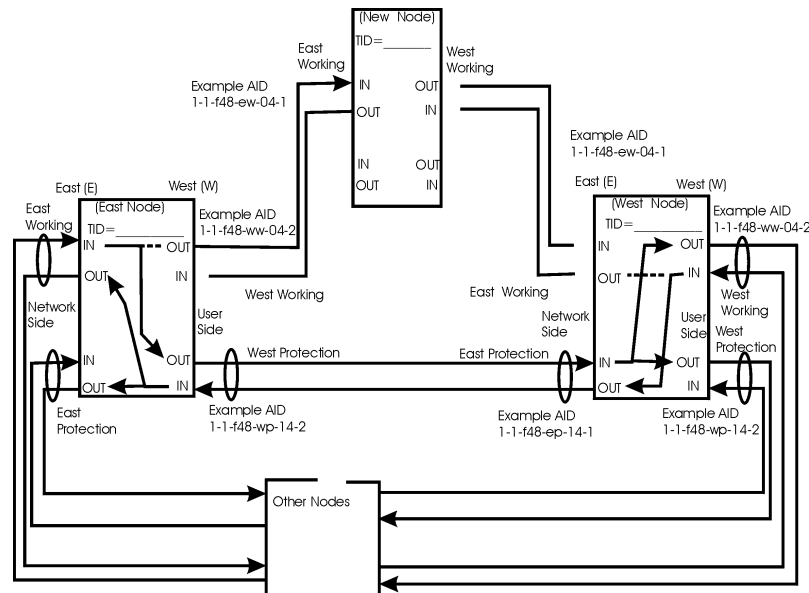
Reference: T 703

Important! Refer to Figure 330-7 to help locate the optical fiber that can now be connected.

17 *New node OUT direction East Working activities.* Instruct the technician to:

1. Locate/identify the East Working **OUT** fiber's color sheath (or label) _____.
2. Clean the East Working **OUT** fiber.
3. Connect the East Working **OUT** fiber to the **OUT** connector on the circuit pack.

Figure 0-7 New node OUT direction East Working connection completed



Important! Refer to the work order for specific AID details.

Reference: T 703

18 *East node IN direction West Working connection activities.* Instruct the technician to:

1. Locate the West Working **IN** fiber, and determine the color of its sheath (or label) _____.
2. Clean the West Working **IN** fiber.
3. Connect the cleaned fiber to the power meter.
4. Take a measurement, and record the measured value.

19 Instruct the technician to select the appropriate LBO for the West Working **IN** fiber.

Reference: T 711

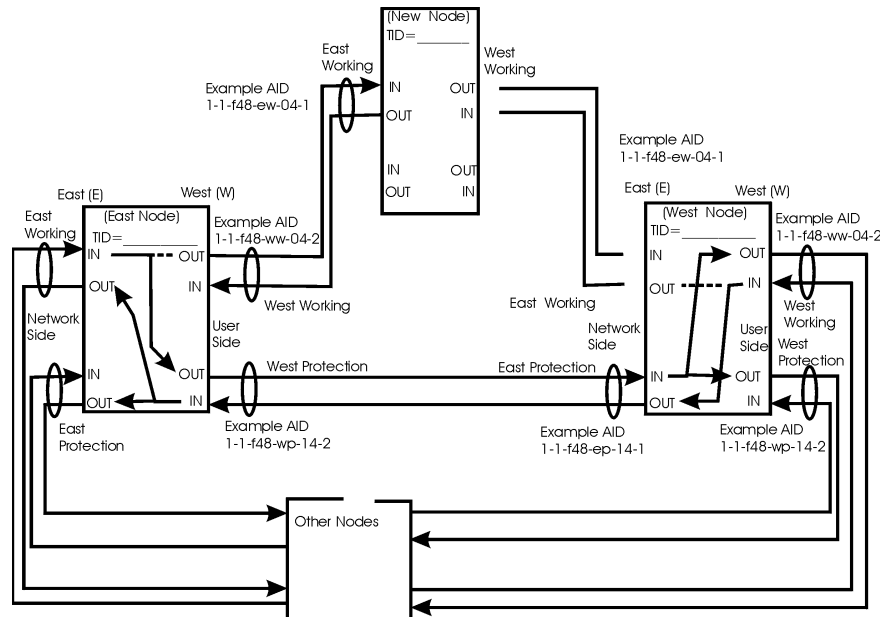
20 Instruct the technician to:

1. Install the LBO.

2. Connect the West Working **IN** fiber to the **IN** connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous green).

Refer to Figure 330-8 to determine how the current configuration should look.

Figure 0-8 East node with West Working IN fiber connected

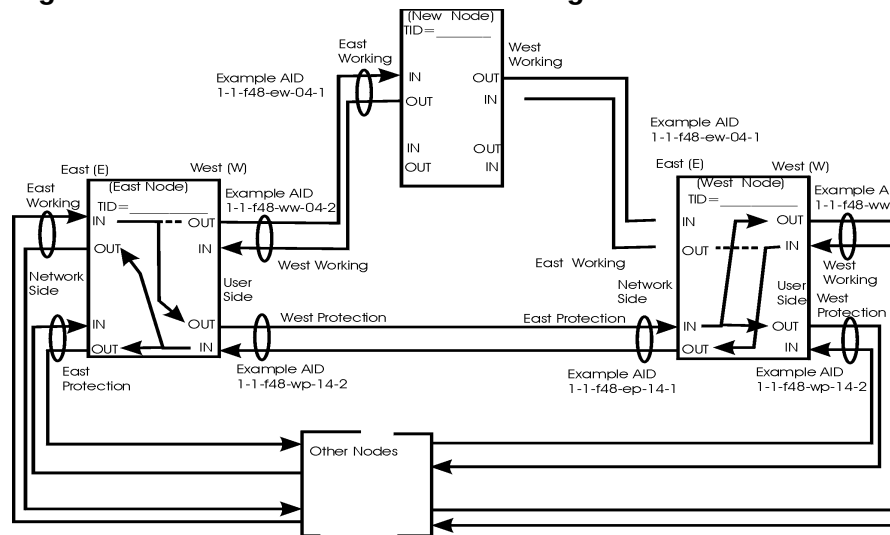


Reference: T 703

Important! Refer to Figure 330-9 to determine how the current configuration should look

- 21** *New node OUT direction West Working connection activities.* Instruct the technician at the new node to:
1. Locate/identify the West Working **OUT** fiber's color sheath (or label) _____.
 2. Clean the West Working **OUT** fiber.
 3. Connect the West Working **OUT** fiber to the **OUT** connector on the circuit pack.

Figure 0-9 New node with West Working OUT fiber connection



Important! Refer to the work order for specific AID details.

Reference: T 703

22 *West node East Working IN direction connection activities.* Instruct the person at the West node to:

1. Locate the East Working **IN** fiber, and determine the color of its sheath (or label) _____.
2. Clean the East Working **IN** fiber.
3. Connect the cleaned fiber to the power meter.
4. Take a measurement, and record the measured value.

23 Instruct the person at the West node to select the appropriate LBO for the East Working fiber.

Reference: T 711

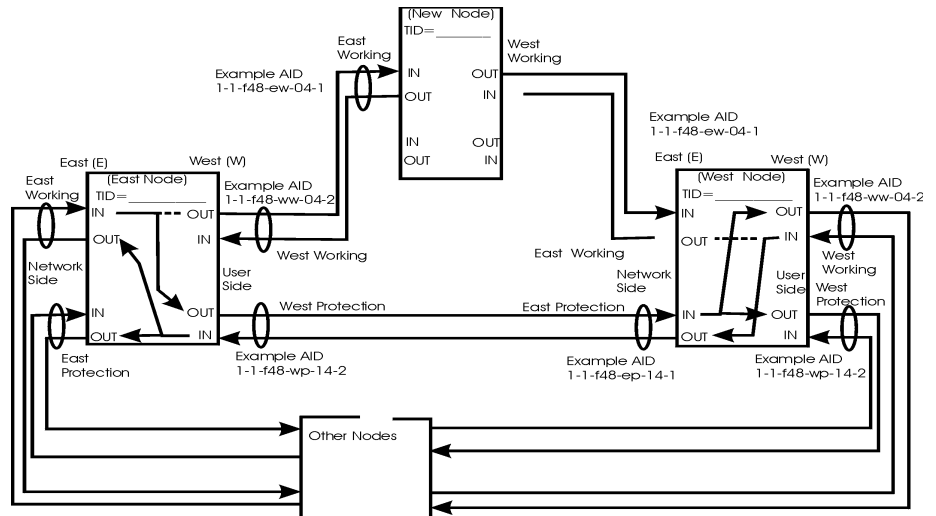
Important! Refer to Figure 330-10 to determine how the current configuration should look.

24 Instruct the technician to:

1. Install the LBO.

2. Connect the East Working **IN** fiber to the **IN** connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous green).

Figure 0-10 West node East Working fiber connected

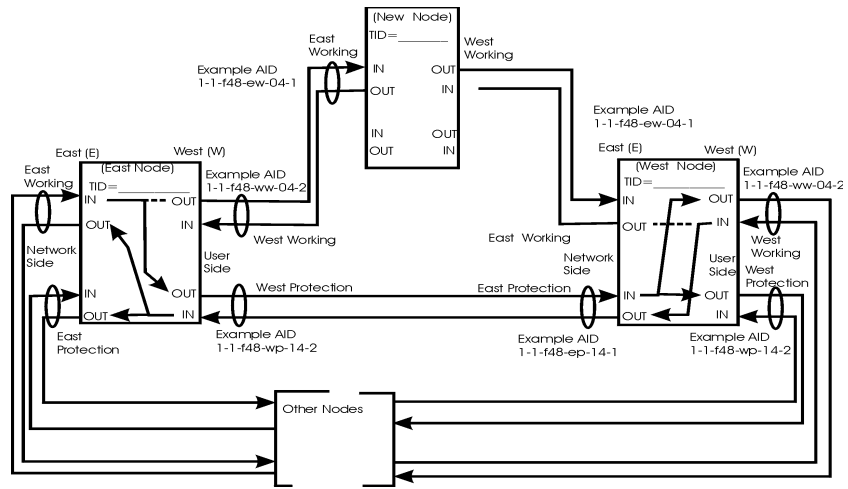


Important! Refer to Figure 330-11 to determine how the current configuration should look.

25 *West node OUT direction East Working fiber connected.* Instruct the technician at the West node to:

1. Locate/identify the East Working **OUT** fiber's color sheath (or label) _____.
2. Clean the East Working **OUT** fiber.
3. Connect the East Working **OUT** fiber to the **OUT** connector on the circuit pack.

Figure 0-11 West node East Working OUT direction fiber connected



Reference: T 703

26 *New node IN direction West Working fiber connected.* Instruct the person at the New node to:

1. Locate the West Working **IN** fiber, and determine the color of its sheath (or label) _____.
2. Clean the West Working **IN** fiber.
3. Connect the cleaned fiber to the power meter.
4. Take a measurement, and record the measured value.

Important! Refer to the work order for specific AID details.

27 Instruct the person at the new node to select the appropriate LBO for the West Working **IN** fiber.

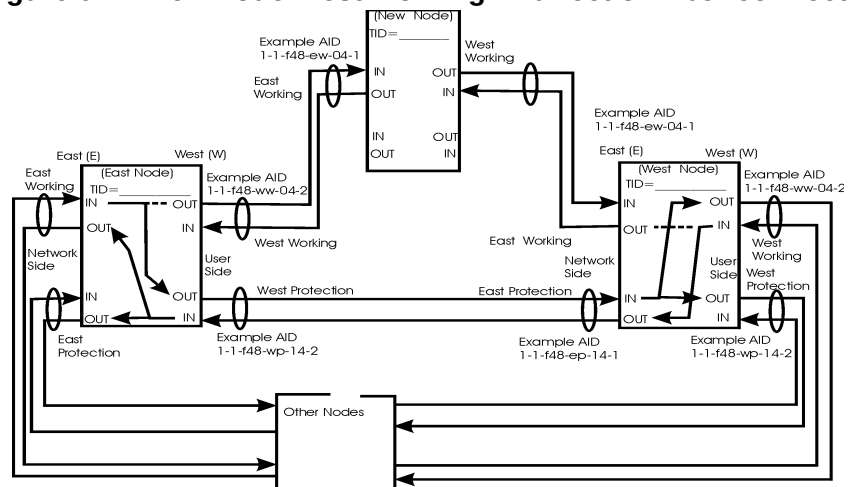
Reference: T 711

Important! Refer to Figure 330-12 to determine how the current configuration should look.

28 Instruct the technician to:

1. Install the LBO.
2. Connect the West Working **IN** fiber to the **IN** connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous green).

Figure 0-12 New node West Working IN direction fiber connected



Reference: T 703

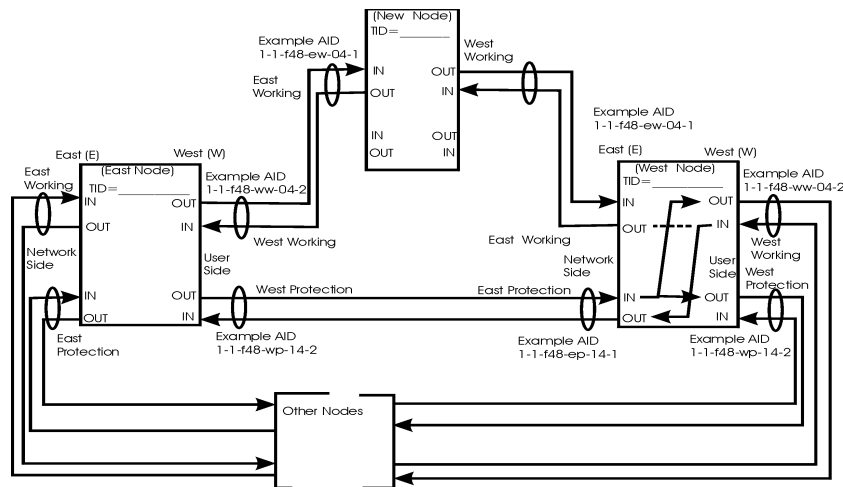
Important! Refer to Figure 330-13, “East node with the protection switch cleared” (-20) to determine how the current configuration should look.

29 *Clear the Force To Protection Span Switch on East node.* Instruct the technician at the East node (or travel to that location) to perform the necessary commands to *Clear* the span switch. If this is a WaveStar BandWidth Manager node, instruct the technician to display the WaveStar CIT *System View* and enter/select the following:

1. **Fault-Protection Switch.**
2. Bay (which contains the shelf that supports the subject ring).
3. Shelf (which supports the subject ring).
4. Protection Group (for example, **4F BLSR f192**).
5. **Select** button.
6. In the right-hand window, verify that the displayed information is correct.

7. In the field labeled *Direction*, select/highlight **West**.
8. In the field labeled *Switch Type*, click on the drop-down arrow, and select **Clear**.
9. Click on the button labeled **Apply**.

Figure 0-13 East node with the protection switch cleared



Important! This removes/clears the Force To Protection Span Switch at the East node. There will be a service hit during this *Clear* operation. The *Force To Protection Span Switch* still remains in place between the new node and the West node.

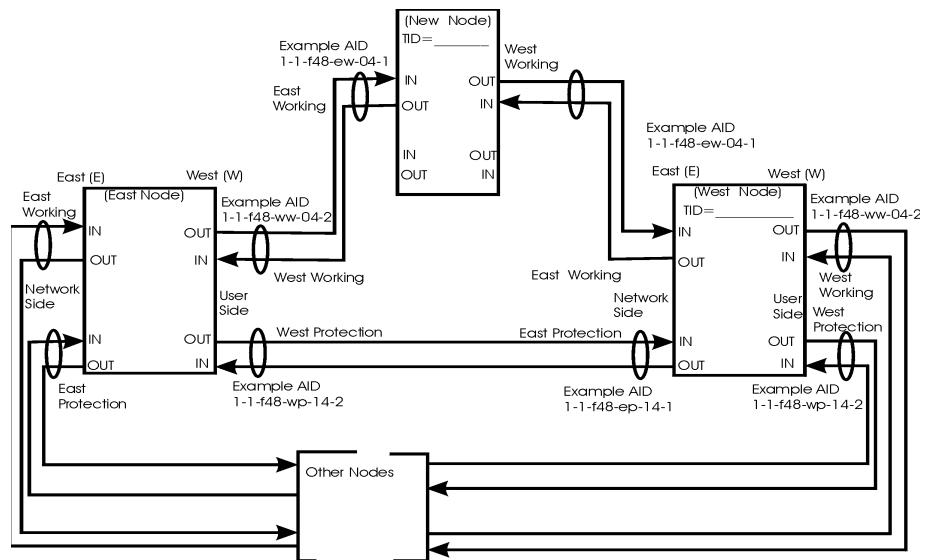
Important! Refer to Figure 330-14 to determine how the current configuration should look.

30 *Clear Force To Protection Span Switch on West Node.* Instruct the technician at the West node (or travel to that location) to perform the necessary commands to *Clear* the span switch. If this is a WaveStar BandWidth Manager node, instruct the technician to display the WaveStar CIT System View and enter/select the following:

1. **Fault-Protection Switch.**
2. Bay (which contains the shelf that supports the subject ring).
3. Shelf (which supports the subject ring).
4. Protection Group (for example, **4F BLSR f192**).
5. **Select** button.

6. In the right-hand window verify that the displayed information is correct.
7. In the field labeled *Direction*, select/highlight **East**.
8. In the field labeled *Switch Type*, click on the drop-down arrow and select **Clear**.
9. Click on the button labeled **Apply**.

Figure 0-14 West node with the protection switch cleared



Important! This removes/clears the Force To Protection Span Switch on the span connecting the West node to the new node. There will be a service hit during this *Clear* operation.

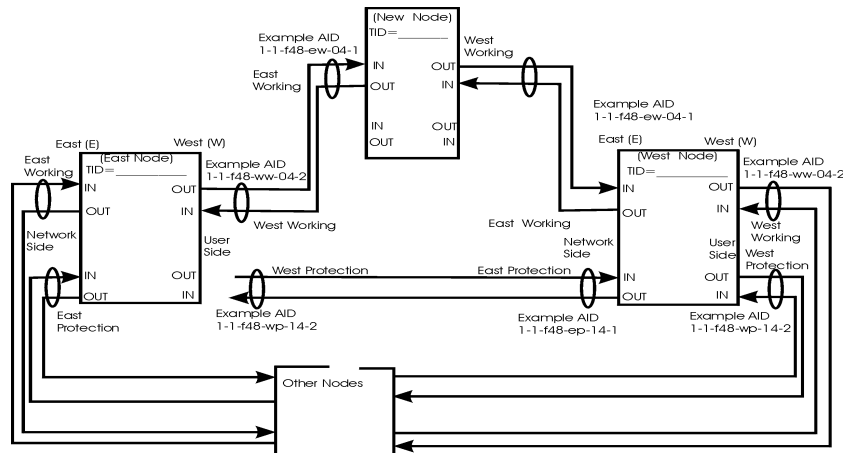
Important! Service has just been returned to the Working span.

Important! Refer to Figure 330-15 to help locate the West Protection optical fibers that can now be removed from the East node (fibers connected to West node).

- 31** *East node disconnect the West Protection fibers.* Instruct the technician at the East node to:
1. Disconnect the optical fiber (**OUT – West Protection**).
 2. Disconnect the optical fiber (**IN – West Protection**).

3. Verify that an LOS is being reported (circuit pack LED goes continuous red).

Figure 0-15 East node West Protection optical fibers disconnected



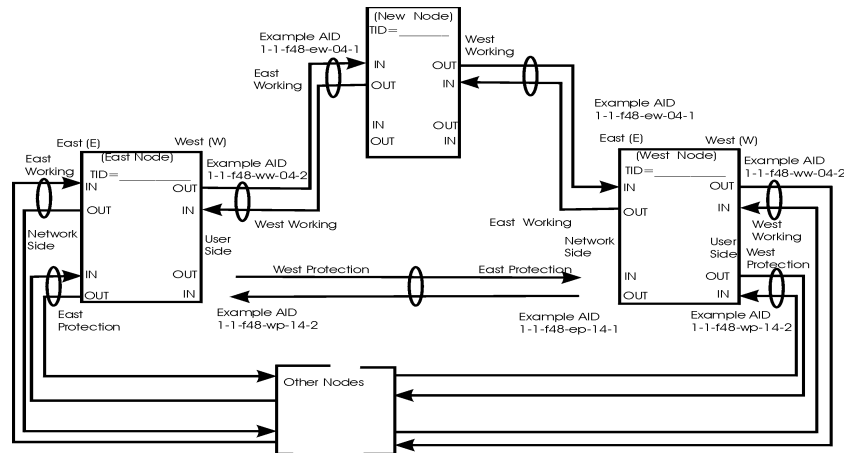
Important! DCC alarms will exist at both the East node and West node until Steps 48 and 49 have been completed.

Important! Refer to Figure 330-16 to help locate the West Protection optical fibers that can now be removed from the West node (fibers which previously connected to East node).

32 *West node disconnect the East Protection fibers.* Instruct the technician at the West node to:

1. Disconnect the optical fiber (**OUT** – East Protection).
2. Disconnect the optical fiber (**IN** – East Protection).
3. Verify that an LOS is being reported (circuit pack LED goes continuous red).

Figure 0-16 West node East Protection optical fibers disconnected



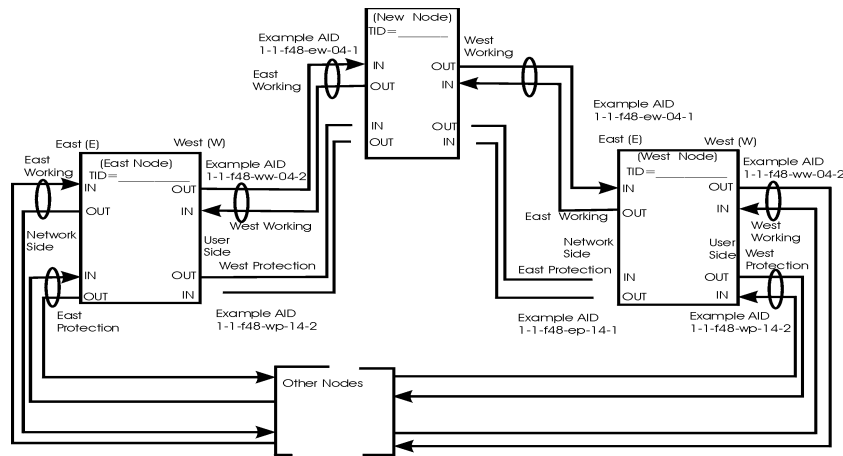
Important! To minimize confusion and to aid clarity, the two fibers that have been completely disconnected will now be removed from all subsequent figure references. Additionally, new fibers running from the East node to the new node are depicted, and new fibers running from the new node to the West node are depicted.

Important! Refer to Figure 330-17 to help locate the Protection optical fibers that can now be connected to the East node.

33 *East node West Protection OUT direction connection activities.* Instruct the technician at the East node to:

1. Locate/identify the West Protection **OUT** fiber's color sheath _____.
2. Clean the West Protection **OUT** fiber.
3. Connect the West Protection **OUT** fiber to the **OUT** connector on the circuit pack.

Figure 0-17 East node West Protection OUT direction connected



Reference: T 703

34 *New node East Protection IN direction connection activities.* Instruct the person at the new node to:

1. Locate the East Protection **IN** fiber, and determine the color of its sheath (or label) _____.
2. Clean the East Protection **IN** fiber.
3. Connect the cleaned fiber to the power meter.
4. Take a measurement, and record the measured value.

Important! Refer to the work order for specific AID details.

Reference: T 703

35 Instruct the person at the new node to select the appropriate LBO for the East Protection fiber.

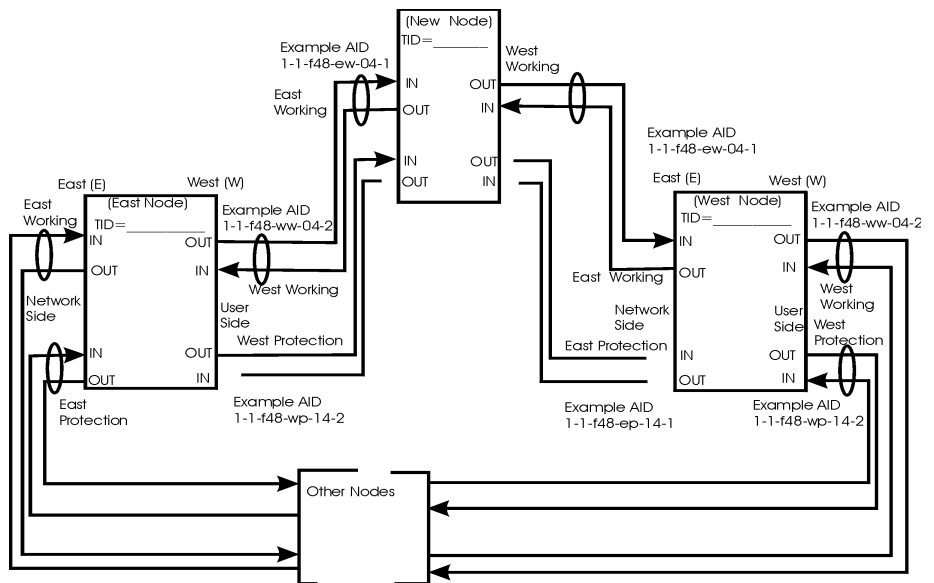
Reference: T 711

Important! Refer to the current work order for specific AID details and refer to Figure 330-18 to determine how the current configuration should look.

36 Instruct the technician to:

1. Install the LBO.
2. Connect the East Protection **IN** fiber to the **IN** connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous green).

Figure 0-18 New node with East Protection fiber connected



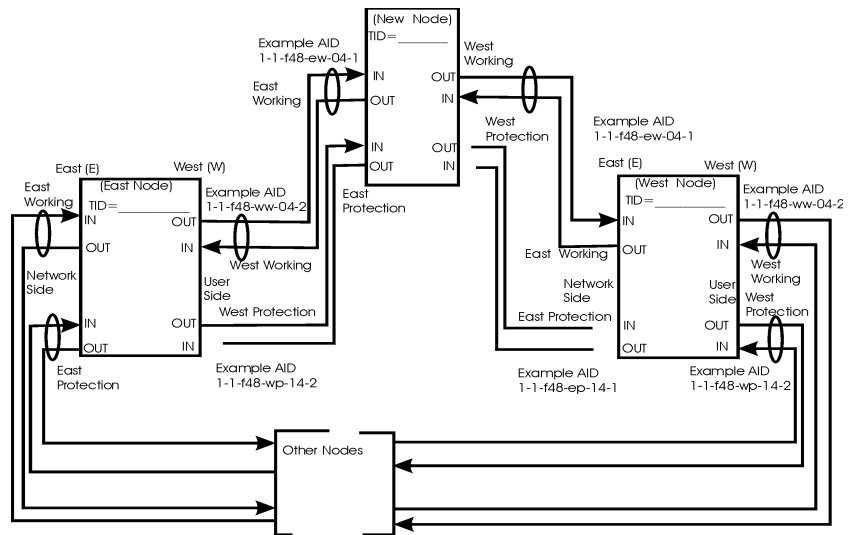
Reference: T 703

Important! Refer to Figure 330-19 to determine how the current configuration should look.

37 *New node East Protection OUT direction fiber connection.* Instruct the technician at the new node to:

1. Locate/identify the East Protection **OUT** fiber's color sheath _____.
2. Clean the East Protection **OUT** fiber.
3. Connect the East Protection **OUT** fiber to the **OUT** connector on the circuit pack.

Figure 0-19 New node East Protection OUT direction fiber connected



Reference: T 703

38 *East node West Protection IN direction fiber connection.* Instruct the technician, at the East node to:

1. Locate the West Protection **IN** fiber, and determine the color of its sheath (or label) _____.
2. Clean the West Protection **IN** fiber.
3. Connect the cleaned fiber to the power meter.
4. Take a measurement, and record the measured value.

Important! Refer to the work order for specific AID details.

Reference: T 703

39 Instruct the technician at the East node to select the appropriate LBO for the West Protection fiber.

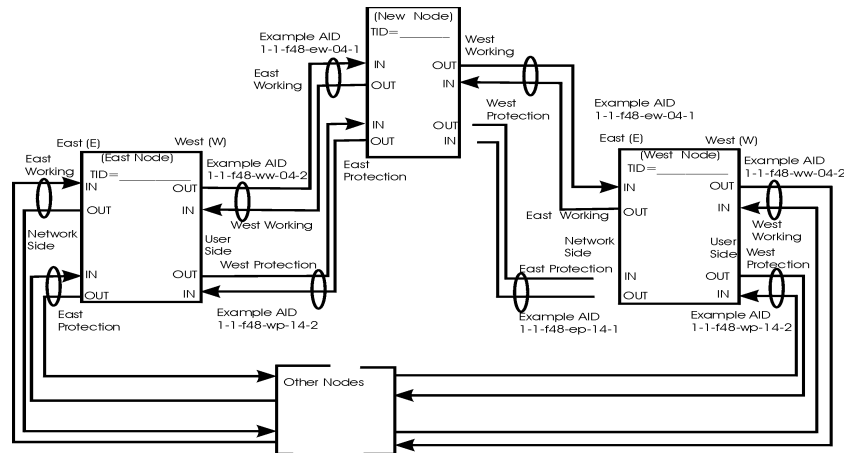
Reference: T 711

Important! Refer to Figure 330-20 to determine how the current configuration should look.

40 Instruct the technician to:

1. Install the LBO.
2. Connect the West Protection **IN** fiber to the **IN** connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous green).

Figure 0-20 East node with West Protection IN direction fiber connected

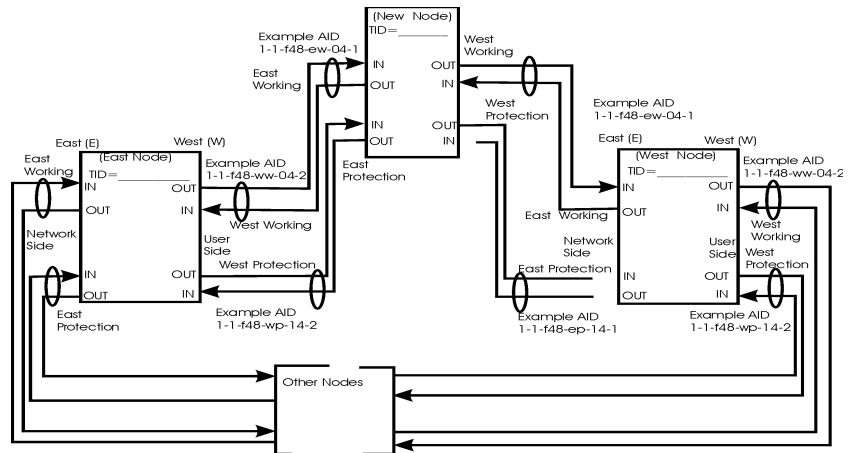


Important! Refer to Figure 330-21 to determine how the current configuration should look.

41 *New node West Protection OUT direction connection activities.* Instruct the technician at the new node to:

1. Locate/identify the West Protection **OUT** fiber's color sheath _____.
2. Clean the West Protection **OUT** fiber.
3. Connect the West Protection **OUT** fiber to the **OUT** connector on the circuit pack.

Figure 0-21 New node West Protection OUT direction fiber connected



Reference: T 703

42 *West node East Protection IN direction fiber connection.* Instruct the technician at the West node to:

1. Locate the East Protection IN fiber, and determine the color of its sheath (or label) _____.
2. Clean the East Protection IN fiber.
3. Connect the cleaned fiber to the power meter.
4. Take a measurement, and record the measured value.

Reference: T 703

43 Instruct the person at the West node to select the appropriate LBO for the East Protection IN fiber.

Reference: T 711

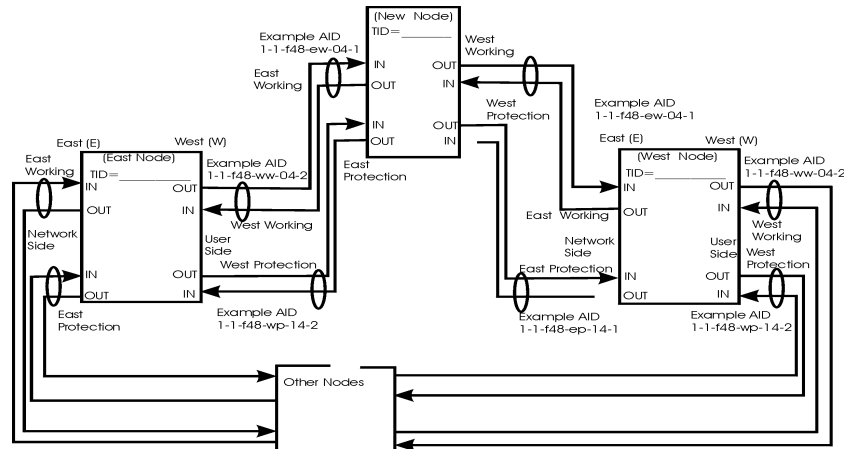
Important! Refer to Figure 330-22 to determine how the current configuration should look.

44 Instruct the technician to:

1. Install the LBO.

2. Connect the East Protection **IN** fiber to the **IN** connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous green).

Figure 0-22 West node East Protection IN direction connected

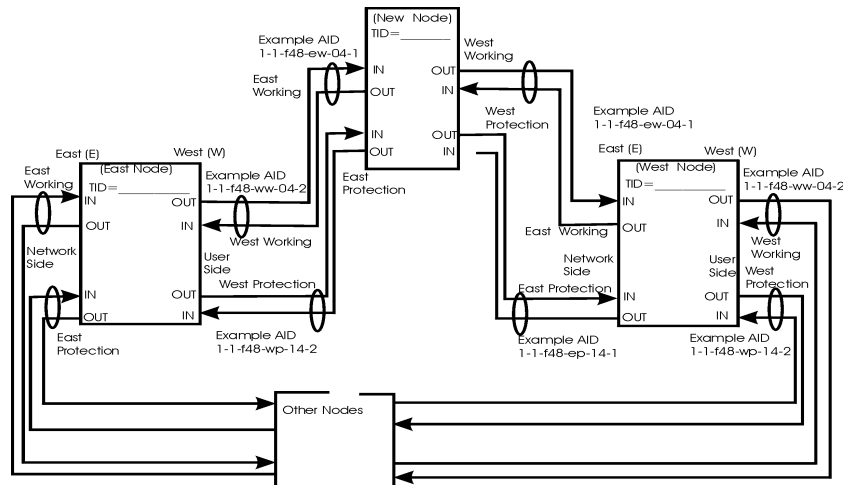


Important! Refer to Figure 330-23 to determine how the current configuration should look.

45 Instruct the technician at the West node to:

1. Locate/identify the East Protection **OUT** fiber's color sheath (ID) _____.
2. Clean the East Protection **OUT** fiber.
3. Connect the East Protection **OUT** fiber to the **OUT** connector on the circuit pack.

Figure 0-23 West node East Protection OUT direction fiber connected



46 *New node West Protection IN direction fiber connection.* Instruct the technician to:

1. Locate the West Protection **IN** fiber, and determine the color of its sheath (or label) _____.
2. Clean the West Protection **IN** fiber.
3. Connect the cleaned fiber to the power meter.
4. Take a measurement, and record the measured value.

Reference: T 703

47 Instruct the person at the new node to select the appropriate LBO for the West Protection **IN** fiber.

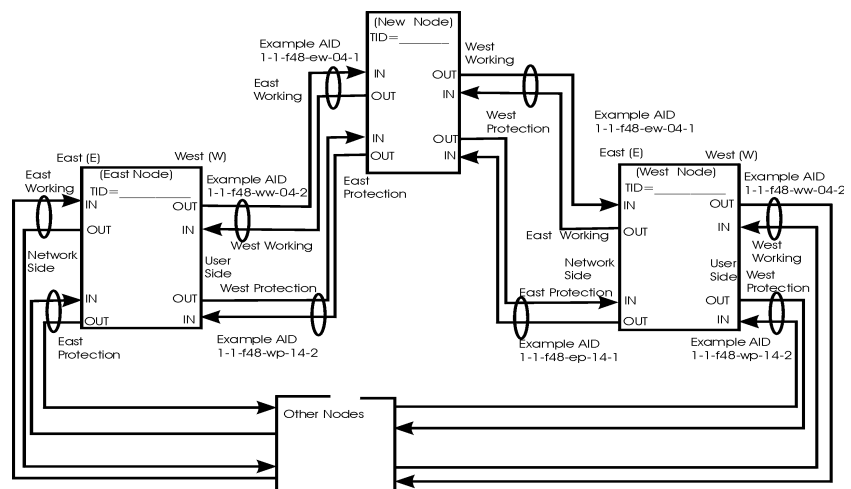
Reference: T 711

Important! Refer to Figure 330-24 to determine how the current configuration should look.

48 Instruct the technician to:

1. Install the LBO.
2. Connect the West Protection **IN** fiber to the **IN** connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous green).

Figure 0-24 New node connected/added to the in-service ring



49 *New node enable DCC East Working port and West Working port.*
Instruct the technician at the new node to bring up the *System View* screen and click (select) the following:

1. **Configuration-DCC Terminations.**
2. Bay that contains the I/O shelf for the subject ring (for example, **Bay 1**).
3. Shelf that provides the Port Protection group for the subject ring (for example, **Shelf 1**).
4. **CP dccei** circuit pack (which provides the subject DCC channels).
5. **SELECT** button.
6. In the right-half of the *DCC parameters* screen, select the appropriate information:

- Section DCCtab.
- Terminations (in this case, **New Termination**).
- Working/Protection Port AID: click on the drop-down arrow and highlight the AID of the East Working/Protection Port (for example, **1-1-f192-ew-04-1**).
- Change the DCC Termination from Disabled to **Enabled**
- Provision the new node for **Network Side** since the East node, on this subject span, is provisioned for *User Side*.
- Click on the **Apply** button.

50 Instruct the technician at the new node to bring-up the *System View* screen and click (select) the following:

1. **Configuration-DCC Terminations.**
2. Bay that contains the I/O shelf for the subject ring (for example, **Bay 1**).
3. Shelf that provides the Port Protection group for the subject ring (for example, **Shelf 1**).
4. **CP dccei** circuit pack (which provides the subject DCC channels).
5. **SELECT** button.
6. In the right-half of the *DCC parameters* screen, select the appropriate information:
 - Section DCCtab.
 - Terminations (in this case, **New Termination**)
 - Working/Protection Port AID: click on the drop-down arrow and highlight the AID of the West Working/Protection Port (for example, **1-1-f192-ww-02-1**).
 - Change the DCC Termination from Disabled to **Enabled**.
 - Provision the new node for **User Side** since the West node on this subject span is provisioned for *Network Side*. (This decision applies to this example only. You will need to check and set the new node to the other appropriate value.)
 - Click on the **Apply** button.

Important! Once all DCCs have been enabled, the *Ring Auto-Discovery* software automatically executes, and within 2 to 10 minutes or less, if everything is connected correctly and provisioned properly, a new ring map should be established.

Important! During the time when *Ring Auto Discovery* is running, the new node Alarm List will show the *Ring Incomplete* alarm and *BLSR Protection Switch Suspended* alarm until ring discovery completes. Simultaneously, the East node and West node Alarm List will continue to show the *BLSR Protection Switch Suspended* alarm.

51 Wait 2 to 10 minutes for the Ring Discovery to complete, and clear the active alarms. Then verify that a new and correct ring map has been established. From the *System View* screen, select the following:

1. **View-Rings-Ring Map.**
2. In the *View Ring Map* window, expand down the directory structure until the subject *RingID* is displayed.
3. Select (click) on the subject **RingID**.
4. Click on the **Select** button.
5. Click on the button labeled **Display Ring Map Graph**.
6. Verify (visually) that the new ring map:
 - Lists the adjacent East node.
 - Lists the adjacent West node.
 - Is a complete ring map.

52 Did the new node establish a correct ring map?

If...	Then...
YES,	go to Step 52.
NO,	the problem must be corrected before you can continue. Refer to the <i>WaveStar BandWidth Manager Alarm Messages and Trouble-Clearing Guide</i> , 365-370-110.

53 Instruct the technician at the East node to perform the necessary commands to verify that a new and correct ring map has been established. If the East node is a WaveStar BandWidth Manager, then from the *System View*, perform the following:

1. **View-Rings-Ring Map.**

2. In the *View Ring Map* window, expand down the directory structure until the subject *RingID* is displayed.
3. Select (click) on the subject **RingID**.
4. Click on the **Select** button.
5. Click on the button labeled **Display Ring Map Graph**.
6. Verify (visually) that the new ring map:
 - Lists the adjacent new West node.
 - Is a complete ring map.

54 Did the East node establish a correct ring map?

If...	Then...
YES,	go to Step 54.
NO,	the problem must be corrected before you can continue. Refer to the product's Trouble-Clearing Guide.

55 Instruct the technician at the West node to perform the necessary commands to verify that a new and correct ring map has been established. If the West node is a WaveStar BandWidth Manager, then from the *System View* screen, perform the following:

1. **View-Rings-Ring Map.**
2. In the *View Ring Map* window, expand down the directory structure until the subject *RingID* is displayed.
3. Select (click) on the subject **RingID**.
4. Click on the **Select** button.
5. Click on the button labeled **Display Ring Map Graph**.
6. Verify (visually) that the new ring map:
 - Lists the adjacent new East node (the subject new node).
 - Is a complete ring map.

56 Did the West node establish a correct ring map?

If...	Then...
YES,	go to Step 56.

If...	Then...
NO,	the problem must be corrected before you can continue. Refer to the product's Trouble-Clearing Guide.

.....

57 Instruct the technician at the new node to verify that there are no standing alarms associated with this work activity.

.....

58 Instruct the technician at the West node to verify that there are no standing alarms associated with this work activity.

.....

59 Instruct the technician at the East node to verify that there are no standing alarms associated with this work activity.

.....

END OF STEPS



Task 332: Overview for Converting an In-Service 4-Fiber Open Ring to a Closed Ring

Purpose Use this procedure to develop a detailed Method of Procedure (MOP), per local operating instructions, for converting a single in-service 4-fiber open ring to a 4-fiber closed ring (BLSR/MS-SPRing). This procedure applies to both OC-48 BLSRs/MS-SPRings and OC-192 BLSRs/MS-SPRings. The port unit types must always be the same rate as the in-service BLSR/MS-SPRing. This procedure does not cover detailed procedures pertaining to other technologies that may interwork with this .

Required privilege code(s) You must have a security privilege code of at least P2 or greater to perform this task.

Required equipment The following equipment is required in order to complete this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap
- Optical power meter, to measure the level of received power
- Appropriate optical LBOs
- On-site assistance at the two (East and West) adjacent nodes.

Related information For related information, see the following section in this document:

- Appendix A, “WaveStar CIT Tutorial”

Assumptions This procedure is based on the following assumptions:

1. That the new fibers, which will connect the two end nodes, have already been installed and tested.
2. That the East node and West node both have available unequipped slots to receive the new/additional port unit circuit packs.
3. That a work order, which identifies the unequipped slots on both the East node and the West node, is available.

Before you begin Prior to performing this task, you must:

- Obtain the work instructions for this task.
- For purposes related to this procedure one end-node is referred to as the *East Node* and the other end-node is referred to as the *West Node*.

4 Log in to the East node and:

1. From the *System View* screen select **View-Change Equipment Display**
2. Select (highlight) the appropriate Bay and Shelf
3. Verify that the available/unequipped slots are the same as indicated with office records and are consistent with the work order

Important! If discrepancies are identified, then they must be resolved before continuing.

5 Log in to the West node and:

1. From the *System View* screen select **View-Change Equipment Display**
2. Select (highlight) the appropriate Bay and Shelf
3. Verify that the available/unequipped slots are the same as indicated with office records and are consistent with the work order

Important! If discrepancies are identified, then they must be resolved before continuing.

6 Instruct the on-site technician to obtain one of the appropriate type port-unit circuit packs (for example OC48/STM16, or OC192/STM64) and insert it into the shelf slot position that is identified as *West Working*. Refer to Step 2 as needed.

7 Instruct the on-site technician to obtain one of the appropriate type port-unit circuit packs (for example OC48/STM16, or OC192/STM64) and insert it into the shelf slot position that is identified as *West Protection*. Refer to Step 2 as needed.

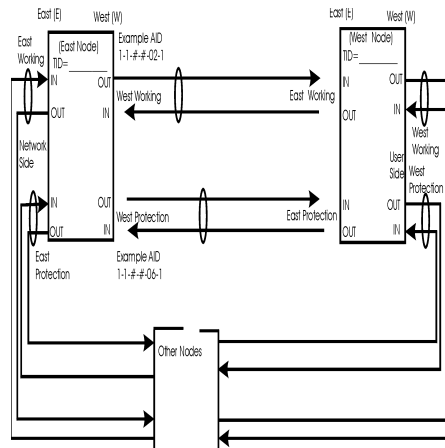
8 Instruct the on-site technician to obtain one of the appropriate type port-unit circuit packs (for example OC48/STM16, or OC192/STM64) and

insert it into the shelf slot position that is identified as *East Working*. Refer to Step 3 as needed.

-
- 9 Instruct the on-site technician to obtain one of the appropriate type port-unit circuit packs (for example OC48/STM16, or OC192/STM64) and insert it into the shelf slot position that is identified as *East Protection*. Refer to Step 3 as needed.
-

- 10 Refer to Figure 332-2 to help locate the optical fibers that can now be connected to the East node.

Figure 332-2 East Node OUT Direction Connection Activities



Instruct the technician to:

1. Locate the OUT West Working fiber and determine the color of its sheath (or label) _____
2. Clean the OUT West Working fiber
3. Connect the OUT West Working fiber to the OUT connector.

Refer to Step 2 for specific AID details.

Reference: T 703

-
- 11 Instruct the technician to:
1. Locate the East Working IN fiber and determine the color of its sheath (or label) _____
 2. Clean the East Working IN fiber
 3. Connect the cleaned fiber to the power meter

4. Take a measurement and record the measured value.

Reference: T 703

-
- 12 Instruct the technician to select the appropriate LBO for their East Working IN fiber.

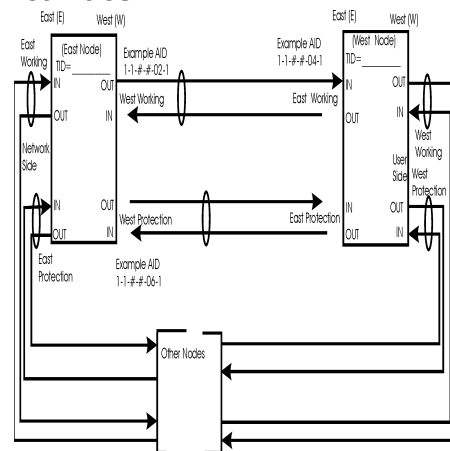
Reference: T 711

-
- 13 Instruct the technician to:

1. Install the LBO on the IN connector of the circuit pack
2. Connect the East Working IN fiber to the IN connector on the circuit pack
3. Verify that the LOS clears (circuit pack LED goes continuous Green).

Refer to Step 3 for Specific AID details and to Figure 332-3 to determine how the current configuration should look.

Figure 332-3 West Node East Working IN Direction Connection Activities



Reference: T 703

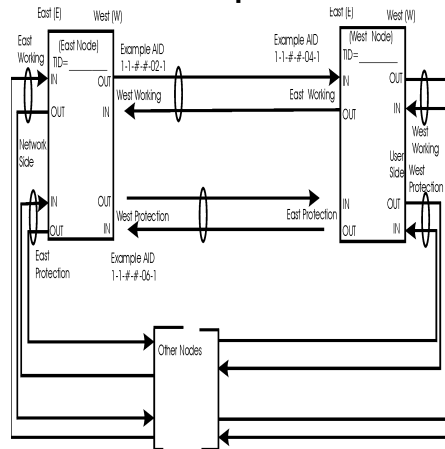
-
- 14 Instruct the technician to:

1. Locate/identify the East Working OUT fiber's color sheath (or label) _____
2. Clean the East Working OUT fiber

3. Connect the East Working OUT fiber to the OUT connector on the circuit pack.

Refer to Figure 332-4 to help locate the East Working OUT optical fiber and to determine how the current configuration should look upon completion of this step.

Figure 332-4 West Node OUT Direction, East Working, Connection Completed



Reference: T 703

15 Instruct the technician to:

1. Locate the West Working IN fiber and determine the color of its sheath (or label) _____
2. Clean the West Working IN fiber
3. Connect the cleaned fiber to the power meter
4. Take a measurement and record the measured value.

Reference: T 703

16 Instruct the technician to select the appropriate LBO for their West Working IN fiber.

Reference: T 711

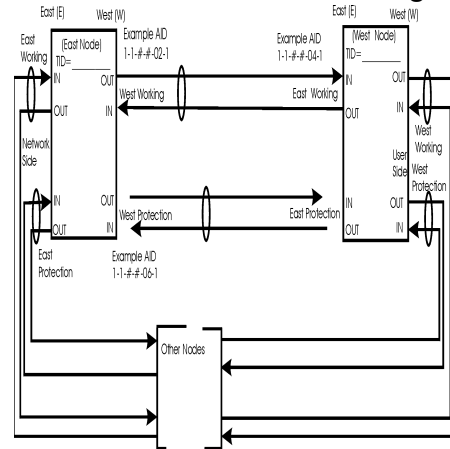
17 Instruct the technician to:

1. Install the LBO

2. Connect the West Working IN fiber to the IN connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous Green).

Refer to Figure 332-5 to determine how the current configuration should look.

Figure 332-5 East Node with West Working IN Fiber Connected



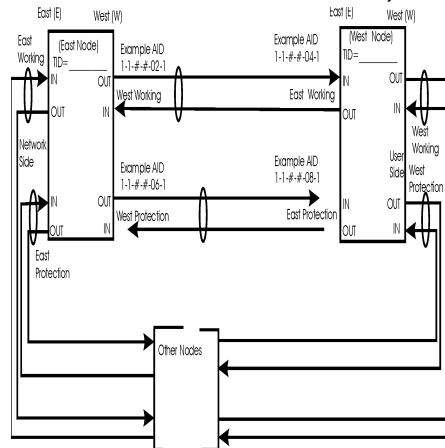
Reference: T 703

18 Instruct the technician at the East node to:

1. Locate/identify the West Protection OUT fiber's color sheath
2. Clean the West Protection OUT fiber
3. Connect the West Protection OUT fiber to the OUT connector on the circuit pack.

Refer to Figure 332-6 to help locate the Protection optical fibers that can now be connected to the East node.

Figure 332-6 East Node West Protection, OUT Fiber Connected



Reference: T 703

19 Instruct the technician at the West node to:

1. Locate their East Protection IN fiber and determine the color of its sheath (or label) _____
2. Clean the East Protection IN fiber
3. Connect the cleaned fiber to the power meter
4. Take a measurement and record the measured value.

Refer to the work order for specific AID details.

Reference: T 703

20 Instruct the technician at the West node to select the appropriate LBO for their East Protection fiber.

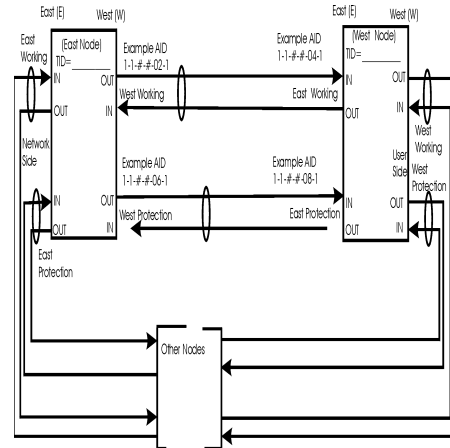
Reference: T 711

21 Instruct the technician to:

1. Install the LBO
2. Connect the East Protection IN fiber to the IN connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous Green).

Refer to the current work order for specific AID details, and refer to Figure 332-7 to determine how the current configuration should look.

Figure 332-7 West Node with East Protection Fiber Connected



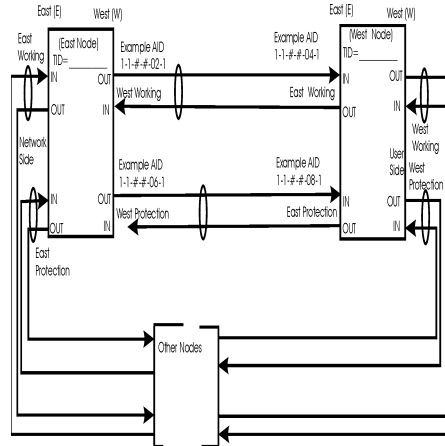
Reference: T 703

22 Instruct the technician at the West node to:

1. Locate/identify the East Protection OUT fiber's color sheath
2. Clean the East Protection OUT fiber
3. Connect the East Protection OUT fiber to the OUT connector on the circuit pack.

Refer to Figure 332-8 to determine how the current configuration should look.

Figure 332-8 West Node East Protection, OUT Direction - Fiber Connected



Reference: T 703

23 Instruct the technician, at the East Node to:

1. Locate their West Protection IN fiber and determine the color of its sheath (or label) _____
2. Clean the West Protection IN fiber
3. Connect the cleaned fiber to the power meter
4. Take a measurement and record the measured value.

Refer to the work order for specific AID details.

Reference: T 703

24 Instruct the technician at the East node to select the appropriate LBO for their West Protection fiber.

Reference: T 711

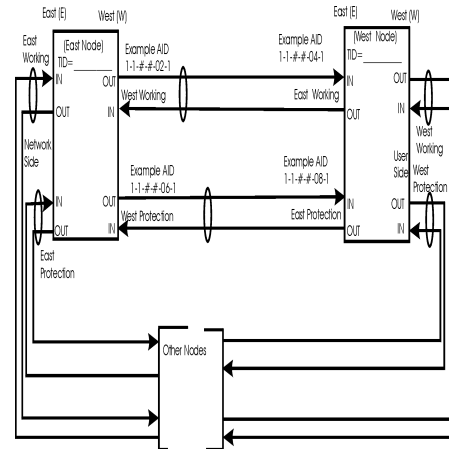
25 Instruct the technician to:

1. Install the LBO
2. Connect the West Protection IN fiber to the IN connector on the circuit pack.

3. Verify that the LOS clears (circuit pack LED goes continuous Green).

Refer to the current work order for specific AID details and refer to Figure 332-9 to determine how the current configuration should look.

Figure 332-9 East Node with West Protection, IN Direction - Fiber Connected



Reference: T 703

- 26 Log in to the East node and bring up the *System View* screen and click (select) the following:
 1. **Configuration-DCC Terminations**
 2. Bay that contains the I/O shelf for the subject ring (for example, Bay 1)
 3. Shelf that provides the Port Protection group for the subject ring (for example, Shelf 1)
 4. **CP dccei** circuit pack (which provides the subject DCC channels)
 5. **SELECT** button
 6. In the right-half of the DCC parameters screen select the appropriate information for the West Working span
 - Section DCC or Line DCC tab (for example **Section DCC**)
 - Terminations (in this case **Current Terminations**)
 - **Port AID**: click on the drop-down arrow and high-light the AID of the West Working Port (for example, 1-1-u-#-02-1)

- Refer to the work order and determine the **LAPD Role**: for this West Working span. Select as appropriate, either User-Side or Network-Side
 - Click on the **Apply** button.
7. In the right-half of the DCC parameters screen select the appropriate information for the West Protection span
- Section DCC or Line DCC tab (for example **Section DCC**)
 - Terminations (in this case **Current Terminations**)
 - **Port AID**: click on the drop-down arrow and high-light the AID of the West Protection Port (for example, 1-1-u-#-06-1)
 - Refer to the work order and determine the **LAPD Role**: for this West Protection span. Select as appropriate, either User-Side or Network-Side
 - Click on the **Apply** button
 - Click on the **Close** button.

27 Log in to the West node and bring up the *System View* screen and click (select) the following:

1. **Configuration-DCC Terminations**
2. Bay that contains the I/O shelf for the subject ring (for example, Bay 1)
3. Shelf that provides the Port Protection group for the subject ring (for example, Shelf 1)
4. **CP dccei** circuit pack (which provides the subject DCC channels)
5. **SELECT** button
6. In the right-half of the DCC parameters screen select the appropriate information for the East Working span
 - Section DCC or Line DCC tab (for example **Section DCC**)
 - Terminations (in this case **Current Termination**)
 - **Port AID**: Click on the drop-down arrow and high-light the AID of the East Working Port (for example, 1-1-#-#-04-1)
 - Refer to the work order and determine the **LAPD Role**: for this East Working span. Select as appropriate, either User-Side or Network-Side
 - Click on the **Apply** button.

7. In the right-half of the DCC parameters screen select the appropriate information for the East Protection span
 - Section DCC or Line DCC tab (for example **Section DCC**)
 - Terminations (in this case **Current Termination**)
 - **Port AID:** Click on the drop-down arrow and high-light the AID of the East Working Port (for example, 1-1-u-#-08-1)
 - Refer to the work order and determine the **LAPD Role:** for this East Protection span. Select as appropriate, either User-Side or Network-Side
 - Click on the **Apply** button.
 - Click on the **Close** button.

28 While still logged into the West node and from the *System View* screen click on the **Alarm List** button.

29 Verify that there are no DCC alarms on either the East Working or East Protection spans/AIDs.

Important! Any/all DCC alarms for the subject AIDs must be resolved. Refer to Trouble Clearing procedures as necessary.

30 Log in to the East node and bring up the *System View* screen and click on the **Alarm List** button.

31 Verify that there are no DCC alarms on either the West Working or West Protection spans/AIDs.

Important! Any/all DCC alarms for the subject AIDs must be resolved. Refer to Trouble Clearing procedures as necessary.

32 As an option, you may choose to connect a transmission test set and verify transmission over the newly connected fibers.

33 The existing BLSR/MS-SPRing port protection group will be modified to include the East Working protection ports.

Log in to the East Node and provision the West side of the existing BLSR/MS-SPRing port protection group via the following:

1. From the *System View* screen, select **Configuration-Provision**
2. Click on the tab that is labeled **Ptn Grp**
3. Scroll down the directory structure and select the appropriate Bay, Shelf, and Port Protection group
4. Click on the button labeled **Provision**
5. Click on the button labeled **Add**
6. Click on the drop-down arrow to the right of the field labeled **West Working Port:** and select the appropriate circuit pack from the list
7. Click on the drop-down arrow to the right of the field labeled **West Protection Port:** and select the appropriate circuit pack from the list
8. Click on the button that is labeled **Apply**.

-
- 34** The existing BLSR/MS-SPRing port protection group will be modified to include the West Working protection ports.

Log in to the West Node and provision the East side of the existing BLSR/MS-SPRing port protection group via the following:

1. From the *System View* screen select **Configuration-Provision**
2. Click on the tab that is labeled **Ptn Grp**
3. Scroll down the directory structure and select the appropriate Bay, Shelf, and Port Protection group
4. Click on the button labeled **Provision**
5. Click on the button labeled **Add**
6. Click on the drop-down arrow to the right of the field labeled **East Working Port:** and select the appropriate circuit pack from the list
7. Click on the drop-down arrow to the right of the field labeled **East Protection Port:** and select the appropriate circuit pack from the list
8. Click on the button that is labeled **Apply**.

Once an END NODE port protection group has been modified the *Ring Auto-Discovery* software automatically executes and, if every thing is connected correctly and provisioned properly, within 2-to-10 minutes or less a new ring-map should be established at each node within the entire ring.

-
- 35** During the time when *Ring Auto-Discovery* is running all nodes in the existing ring Alarm will show the **Protection Switch Suspended** alarm.

While still logged into the West node, wait from 2-to-10 minutes for Ring Discovery to complete and clear the active alarms. Then verify that a new and correct ring-map has been established. From the *System View* screen select the following:

1. **View-Rings-Ring Map**
2. In the **View Ring Map** window expand down the directory structure until the subject **RingID** is displayed
3. Select (click) on the subject RingID
4. Click on the **Select** button
5. Click on the button labeled **Display Ring Map Graph**
6. Verify (visually) that the new ring-map:
 - lists the adjacent East node
 - and is a complete ring-map.

36

If...	Then...
the West node established a correct Ring Map,	go to Step 37.
the West node did not establish a correct Ring Map,	the problem must be corrected before you can continue. Reference: the AMTG 365-370-110.

-
- 37** Log in to the East Node and verify that a correct ring-map has been established. From the *System View* screen select the following:

1. **View-Rings-Ring Map**
2. In the **View Ring Map** window expand down the directory structure until the subject **RingID** is displayed
3. Select (click) on the subject RingID
4. Click on the **Select** button
5. Click on the button labeled **Display Ring Map Graph**

6. Verify (visually) that the new ring-map:
- lists the adjacent West node
 - and is a complete ring-map.

38

If...	Then...
the East node established a correct Ring Map	go to Step 39.
the East node did not establish a correct Ring Map	the problem must be corrected before you can continue. Reference: the product's Trouble Clearing Guide.

-
- 39** After verifying that both the West node and the East node have correct ring maps it will be necessary to (a) pick a direction, say East, (b) sequentially go around the ring and log into each node and verify that the respective node also has a correct ring map.

Proceed sequentially around the ring (say in the East direction). Log in to the adjacent node and verify that a correct ring-map has been established. From the *System View* screen, select the following:

1. **View-Rings-Ring Map**
2. In the **View Ring Map** window expand down the directory structure until the subject **RingID** is displayed
3. Select (click) on the subject RingID
4. Click on the **Select** button
5. Click on the button labeled **Display Ring Map Graph**
6. Verify (visually) that the new ring-map:
 - lists the adjacent West node
 - and is a complete ring-map.

40

If...	Then...
the adjacent node established a correct Ring Map,	go to Step 41.

If...	Then...
the adjacent node did not establish a correct Ring Map,	the problem must be corrected before you can continue. Reference: the product's Trouble-Clearing Guide.

41

If...	Then...
there are additional adjacent nodes to be checked,	continue with Step 39.
there are no additional adjacent nodes to be checked,	continue.

42 Click on the **Alarm List** button and verify that there are no standing alarms associated with this work activity.

43 Log in to the West node, and from the *System View* screen, click on the **Alarm List** button. Verify that there are no standing alarms associated with this work activity.

END OF STEPS



Task 333: Overview for adding an END node to an In-Service 4-Fiber Open Ring

Purpose Use this procedure to develop a detailed method of procedure (MOP), per local operating instructions, for adding a new end-node to an **in-service** 4-fiber open ring (BLSR/MS-SPRing). This procedure applies to both OC-48 BLSRs/MS-SPRings and OC-192 BLSRs/MS-SPRings. The port unit types must always be the same rate as the in-service BLSR/MS-SPRing. This procedure does not cover detailed procedures pertaining to other technologies that may interwork with this WaveStar BandWidth Manager.

Required equipment/personnel The following equipment and personnel are required in order to complete this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap
- Optical power meter to measure the level of received power
- Appropriate optical LBOs
- On-site assistance at the *West node* and the *East node*.

Assumptions This procedure is based on the following assumptions:

1. That the new fibers, which will connect the West node to the East node, have already been installed and tested.
2. That the West node has available unequipped slots to receive the new/additional port unit circuit packs.
3. That a work order, which identifies the unequipped slots for both the West Working link and the West Protection link, is available.

Before you begin For purposes related to this procedure, the current IN-Service END-Node will be referred to as the *West node*, and the new node that is to be added to the end will be referred to as the *East node*.

Task Complete the following steps to add a new node to the end of an **in-service** linear chain (open ring).

Important! Two distinct network orientations are possible. One orientation would be where the East node has its East side

unequipped. Refer to Figure 333-1, “East unequipped orientation” (-2). The second orientation would be where the West node has its West side unequipped. Refer to Figure 333-2, “West unequipped orientation” (-2). *This procedure assumes the orientation depicted in Figure 333-2.* If your configuration is as depicted in Figure 333-1, the italicized East and West terms must be reversed, including those in Figure 333-3 through Figure 333-10.

- 1 Verify that the West node’s equipment configuration matches office records. From the work order, determine the TID of the:
 - West node
 - East node.

Figure 0-1 East unequipped orientation

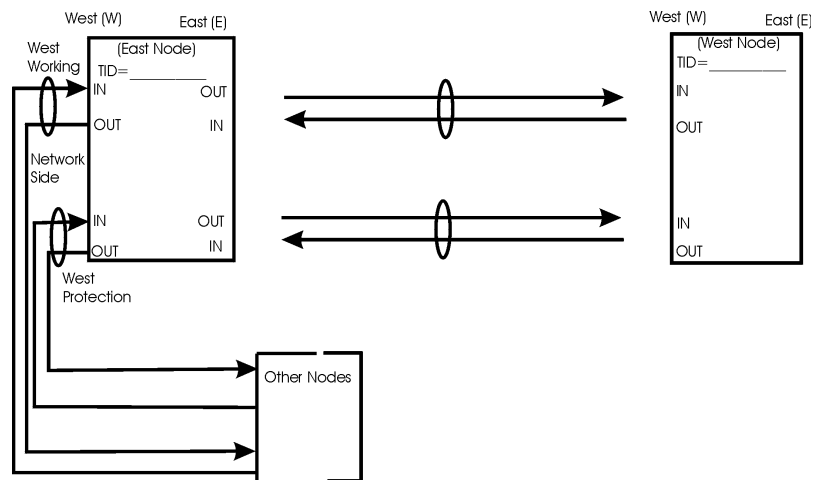
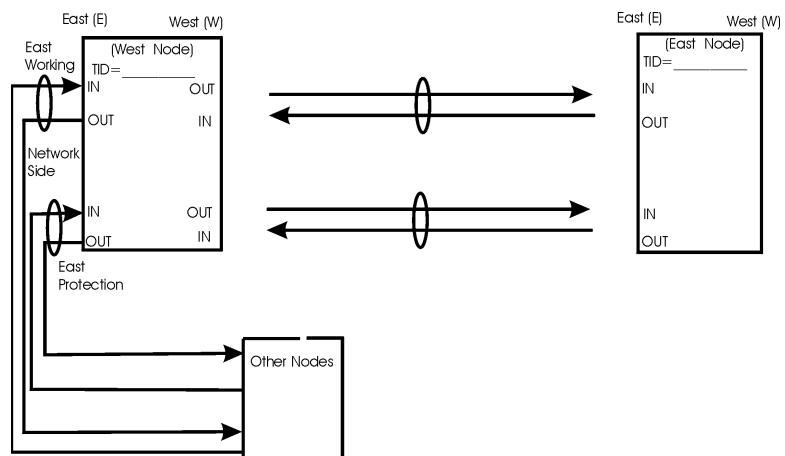


Figure 0-2 West unequipped orientation



2 Refer to the work order, and for the *West* node, determine which slot is to function as:

- *West Working* (for example, Slot 02), and
 - *West Protection* (for example, Slot 06).
-

3 Refer to the work order, and for the *East* node, determine which slot is to function as:

- *East Working* (for example, Slot 04), and
 - *East Protection* (for example, Slot 08).
-

4 Log in to the *East* node and:

1. From the *System View* screen, select **View>Change Equipment Display**.
2. Select (highlight) the appropriate bay and shelf.
3. Verify that the available/unequipped slots are the same as indicated with office records and are consistent with the work order.

Important! If discrepancies are identified, they must be resolved before continuing.

5 At the *West* node, instruct the on-site technician to verify that the available/unequipped slots are the same as indicated on the work order. Refer to Step 3 as required.

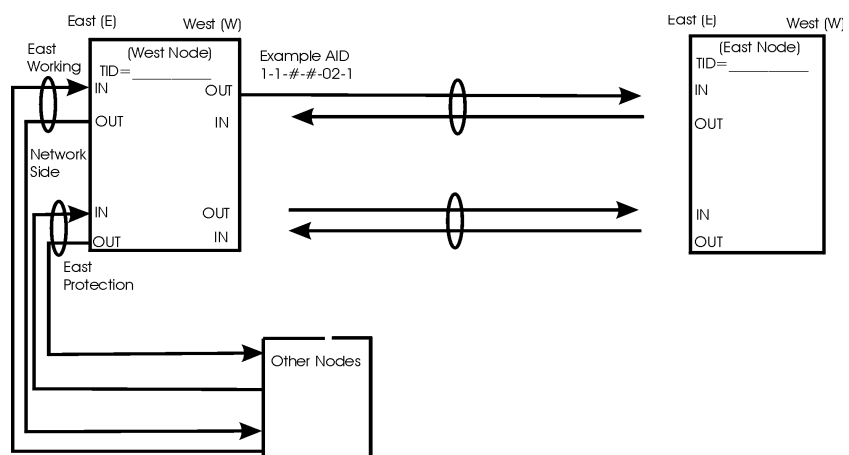
Important! If discrepancies exist between the work order and the *East* node's equipment configuration, they must be resolved before continuing.

6 *West node – insert appropriate port unit circuit packs.* Instruct the on-site technician to obtain one of the appropriate types of port-unit circuit packs (for example, OC48/STM16 or OC192/STM64) and insert it into the shelf slot position that is identified as *West Working*. Refer to Step 2 as needed.

-
- 7 Instruct the on-site technician to obtain one of the appropriate types of port-unit circuit packs (for example, OC48/STM16 or OC192/STM64) and insert it into the shelf slot position that is identified as *West Protection*. Refer to Step 2 as needed.
-
- 8 *East node — insert appropriate port unit circuit packs.* Instruct the on-site technician to obtain one of the appropriate types of port-unit circuit packs (for example, OC48/STM16 or OC192/STM64) and insert it into the shelf slot position that is identified as *East Working*. Refer to Step 3 as needed.
-
- 9 Instruct the on-site technician to obtain one of the appropriate types of port-unit circuit packs (for example, OC48/STM16 or OC192/STM64) and insert it into the shelf slot position that is identified as *East Protection*. Refer to Step 3 as needed.
-

Important! Refer to Figure 333-3, “West node, OUT direction connection activities” (-4) to help locate the optical fibers that can now be connected to the *West* node.

Figure 0-3 West node, OUT direction connection activities



10 *West node OUT direction connection activities.* Instruct the technician to:

1. Locate the **OUT** *West* Working fiber, and determine the color of its sheath (or label) _____ .
2. Clean the **OUT** *West* Working fiber.
3. Connect the **OUT** *West* Working fiber to the OUT connector.

Important! Refer to Step 2 for specific AID details.

Reference: Task 703

11 *East node, IN direction, East working activities.* Instruct the technician to:

1. Locate the *East* Working **IN** fiber, and determine the color of its sheath (or label) _____ .
2. Clean the *East* Working **IN** fiber.
3. Connect the cleaned fiber to the power meter.
4. Take a measurement, and record the measured value.

Reference: Task 703

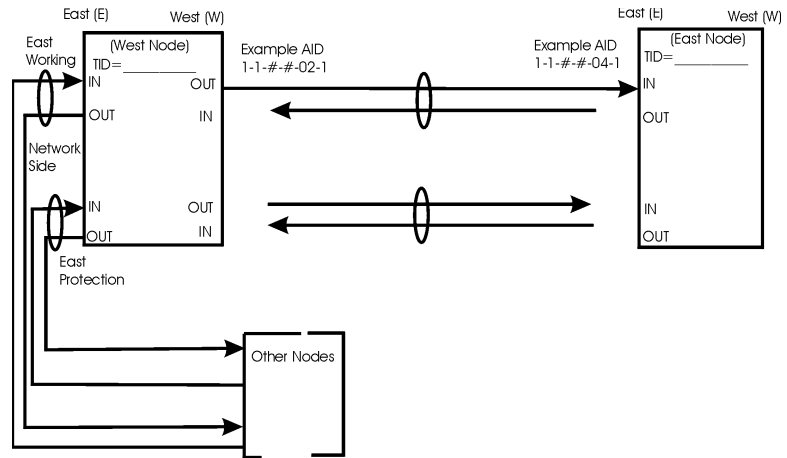
12 Instruct the technician to select the appropriate LBO for the *East* Working **IN** fiber.

Reference: Task 711

13 Instruct the technician to:

1. Install the LBO on the **IN** connector of the circuit pack.
2. Connect the *East* Working **IN** fiber to the **IN** connector on the circuit pack
3. Verify that the LOS clears (circuit pack LED goes continuous green).

Figure 0-4 East node, East Working, IN direction connection activities



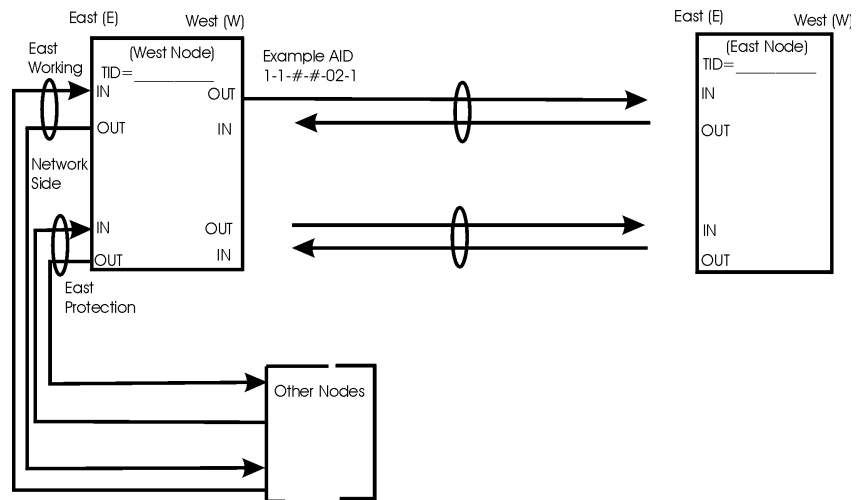
Important! Refer to Step 3 for specific AID details and to Figure 333-4, “East node, East Working, IN direction connection activities” (-6) to determine how the current configuration should look.

Reference: Task 703

14 *East node, East Working, OUT direction connection activities.* Instruct the technician to:

1. Locate/identify the *East Working* **OUT** fiber’s color sheath (or label) _____ .
2. Clean the *East Working* **OUT** fiber.
3. Connect the *East Working* **OUT** fiber to the **OUT** connector on the circuit pack.

Figure 0-5 East node, OUT direction, East Working connection completed



Important! Refer to Figure 333-5, “East node, OUT direction, East Working connection completed” (-7) to help locate the East Working **OUT** optical fiber and to determine how the current configuration should look upon completion of this step.

Reference: Task 703

15 *West node IN direction West Working connection activities.* Instruct the technician to:

1. Locate the *West Working IN* fiber, and determine the color of its sheath (or label) _____ .
2. Clean the *West Working IN* fiber.
3. Connect the cleaned fiber to the power meter.
4. Take a measurement, and record the measured value.

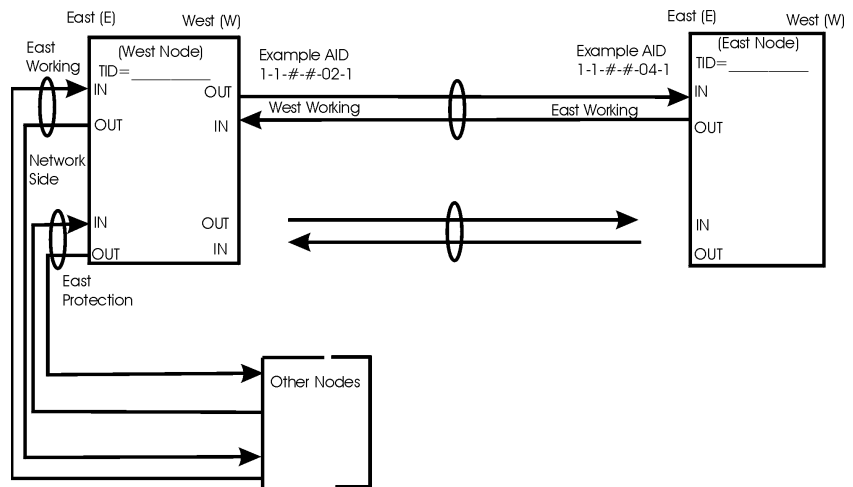
Reference: Task 703

16 Instruct the technician to select the appropriate LBO for the *West Working IN* fiber.

Reference: Task 711

-
- 17** Instruct the technician to:
1. Install the LBO.
 2. Connect the *West Working IN* fiber to the **IN** connector on the circuit pack.
 3. Verify that the LOS clears (circuit pack LED goes continuous green).

Figure 0-6 West node with West Working IN fiber connected

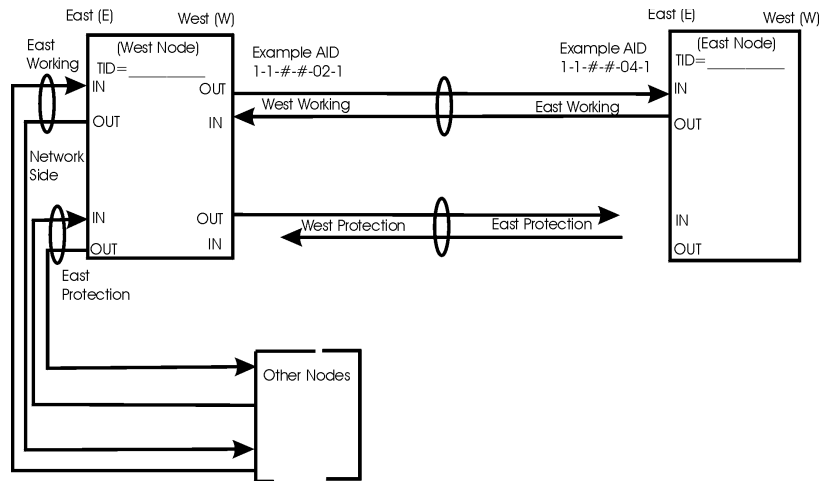


Important! Refer to Figure 333-6, “West node with West Working IN fiber connected” (-8) to determine how the current configuration should look.

Reference: Task 703

-
- 18** *West node West Protection OUT direction connection activities.* Instruct the technician at the *West* node to:
1. Locate/identify the *West Protection OUT* fiber’s color sheath
_____ .
 2. Clean the *West Protection OUT* fiber.
 3. Connect the *West Protection OUT* fiber to the **OUT** connector on the circuit pack.

Figure 0-7 West node, West protection OUT fiber connected



Important! Refer to Figure 333-7, “West node, West protection OUT fiber connected” (-9) to help locate the Protection optical fibers that can now be connected to the East node.

Reference: Task 703

19 Instruct the technician at the *West* node to:

1. Locate the *East* Protection **IN** fiber, and determine the color of its sheath (or label) _____ .
2. Clean the *East* Protection **IN** fiber.
3. Connect the cleaned fiber to the power meter.
4. Take a measurement, and record the measured value.

Refer to the work order for specific AID details.

Reference: Task 703

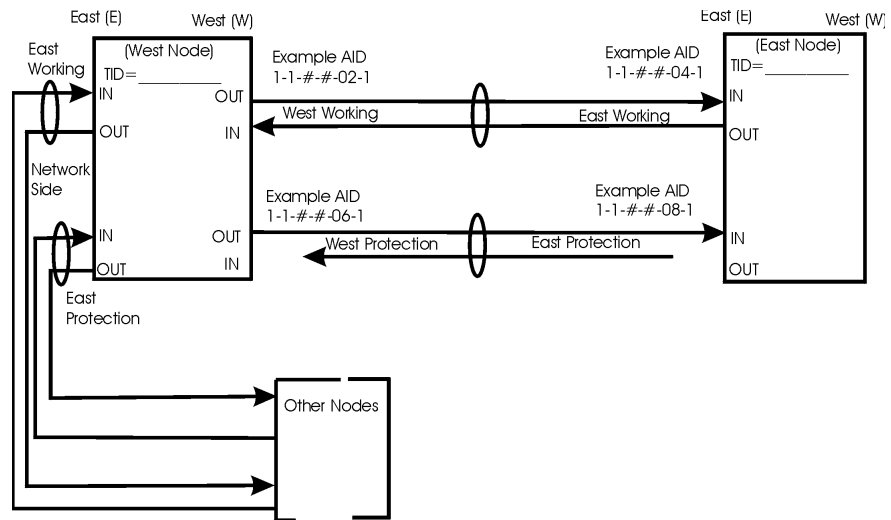
20 Instruct the technician at the *West* node to select the appropriate LBO for the *East* Protection fiber.

Reference: Task 711

21 Instruct the technician to:

1. Install the LBO.
2. Connect the *East* Protection **IN** fiber to the **IN** connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous green).

Figure 0-8 East node with East Protection fiber connected



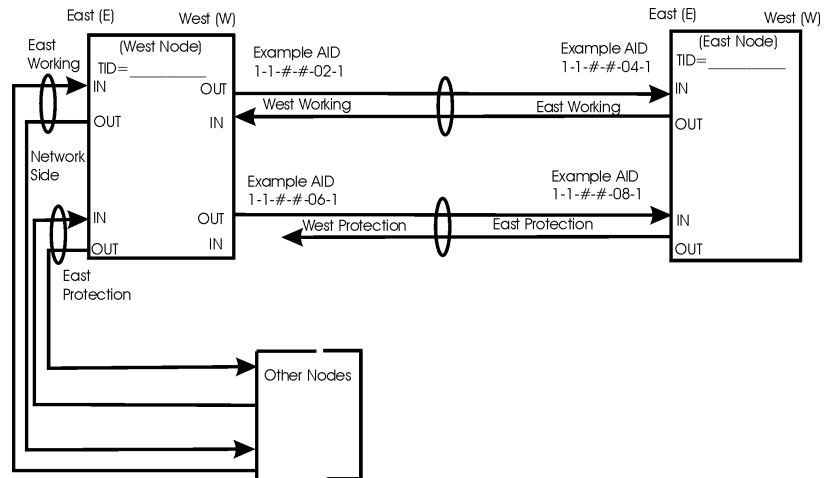
Important! Refer to the current work order for specific AID details, and refer to Figure 333-8, “East node with East Protection fiber connected” (-10) to determine how the current configuration should look.

Reference: Task 703

22 *East node East Protection OUT direction fiber connected.* Instruct the technician at the *East* node to:

1. Locate/identify the *East* Protection **OUT** fiber’s color sheath _____ .
2. Clean the *East* Protection **OUT** fiber.
3. Connect the *East* Protection **OUT** fiber to the **OUT** connector on the circuit pack.

Figure 0-9 East node, East Protection, OUT Direction Fiber Connected



Important! Refer to Figure 333-9, “East node, East Protection, OUT Direction Fiber Connected” (-11) to determine how the current configuration should look.

Reference: Task 703

23 *West node West Protection IN direction fiber connection.* Instruct the technician at the “West node” to:

1. Locate the *West Protection IN* fiber, and determine the color of its sheath (or label) _____ .
2. Clean the *West Protection IN* fiber.
3. Connect the cleaned fiber to the power meter.
4. Take a measurement, and record the measured value.

Important! Refer to the work order for specific AID details.

Reference: Task 703

24 Instruct the technician at the *West node* to select the appropriate LBO for the *West Protection* fiber.

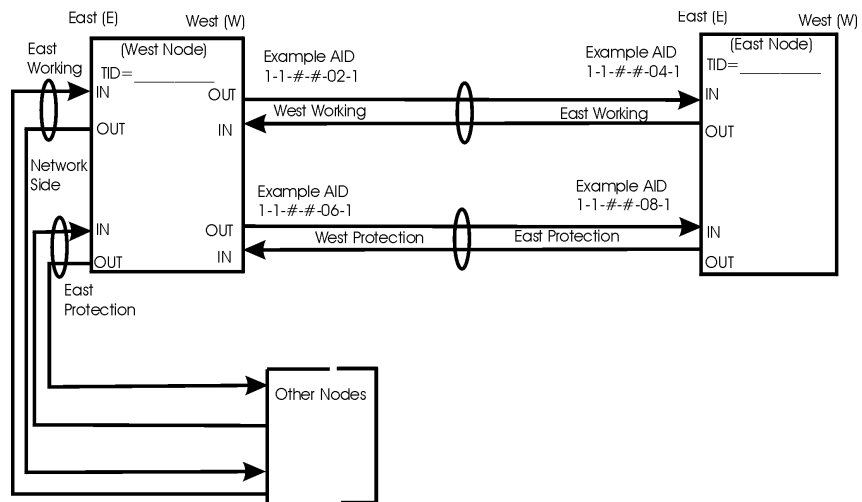
Reference: Task 711

25 Instruct the technician to:

1. Install the LBO.
2. Connect the *West* Protection **IN** fiber to the **IN** connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous green).

Refer to the current work order for specific AID details, and refer to Figure 333-10, “West node with West Protection, IN Direction Fiber Connected” (-12) to determine how the current configuration should look.

Figure 0-10 West node with West Protection, IN Direction Fiber Connected



Reference: Task 703

26 *West node configure/enable new dcc terminations.* Log in to the *West* node, bring up the *System View* screen, and click (select) the following:

1. **Configuration-DCC Terminations.**
2. Bay that contains the I/O shelf for the subject ring (for example, Bay 1).
3. Shelf that provides the Port Protection group for the subject ring (for example, Shelf 1).
4. **CP dccei** circuit pack (which provides the subject DCC channels).

5. **SELECT** button.
6. In the right half of the *DCC parameters* screen, select the appropriate information for the *West Working* span:
 - Section DCC or Line DCC tab (for example, **Section DCC**).
 - Terminations (in this case **Current Termination**).
 - **Port AID:** – Click on the drop-down arrow, and highlight the AID of the **West Working** port (for example, 1-1-#-#-02-1).
 - Change the DCC Termination from Disabled to **Enabled**.
 - Refer to the work order, and determine the **LAPD Role:** for this *West Working* span. Select, as appropriate, either User-Side or Network-Side.
 - Click on the **Apply** button.
7. In the right half of the *DCC parameters* screen, select the appropriate information for the *West Protection* span:
 - Section DCC or Line DCC tab (for example, **Section DCC**).
 - Terminations (in this case **Current Termination**).
 - **Port AID:** – Click on the drop-down arrow, and highlight the AID of the **West Protection** port (for example, 1-1-#-#-06-1).
 - Change the DCC Termination from Disabled to **Enabled**.
 - Refer to the work order, and determine the **LAPD Role:** for this *West Protection* span. Select as appropriate, either User-Side or Network-Side.
 - Click on the **Apply** button.
 - Click on the **Close** button.

-
- 27** *East node configure/provision synchronization.* Instruct the technician at the “new node” to:
1. Obtain the synchronization records for this “new node” TID.
 2. As necessary, change/provision synchronization for this “new node”.

Reference: Task 301

-
- 28** *East node configure/enable new DCC terminations.* Log in to the *East* node, bring up the *System View* screen, and click (select) the following:

1. **Configuration-DCC Terminations.**
2. Bay that contains the I/O shelf for the subject ring (for example, Bay 1).
3. Shelf that provides the Port Protection group for the subject ring (for example, Shelf 1).
4. **CP dccei** circuit pack (which provides the subject DCC channels).
5. **SELECT** button.
6. In the right half of the *DCC parameters* screen, select the appropriate information for the *East Working* span:
 - Section DCC or Line DCC tab (for example, **Section DCC**).
 - Terminations (in this case **New Termination**).
 - **Port AID:** – Left-click on the drop-down arrow, and highlight the AID of the *East Working* Port (for example, 1-1-#-#-04-1).
 - Change the DCC Termination from Disabled to **Enabled**.
 - Refer to the work order, and determine the **LAPD Role:** for this *East Working* span. Select, as appropriate, either User-Side or Network-Side.
 - Left-click on the **Apply** button.
7. In the right half of the *DCC parameters* screen, select the appropriate information for the *East Protection* span:
 - Section DCC or Line DCC tab (for example **Section DCC**).
 - Terminations (in this case **New Termination**).
 - **Port AID:** – Left-click on the drop-down arrow, and highlight the AID of the **East Protection** Port (for example, 1-1-#-#-08-1)
 - Change the DCC Termination from Disabled to **Enabled**.
 - Refer to the work order, and determine the **LAPD Role:** for this *East Protection* span. Select, as appropriate, either User-Side or Network-Side.
 - Left-click on the **Apply** button.
 - Click on the **Close** button.

29 Verify that there are *NO DCC alarms*. While still logged in to the *East* node, and from the *System View* screen, click on the **Alarm List** button.

-
- 30** Verify that there are no DCC alarms on either the *East Working* or *East Protection* spans/AIDs.

Important! Any/all DCC alarms for the subject AIDs must be resolved. Refer to trouble-clearing procedures as necessary.

- 31** Log in to the *West* node, bring up the *System View* screen, and click on the **Alarm List** button.
-

- 32** Verify that there are not any DCC alarms on either the *West Working* or *West Protection* spans/AIDs.

Important! Any/all DCC alarms for the subject AIDs must be resolved. Refer to trouble-clearing procedures as necessary.

- 33** *Optional step – check transmission.* As an option, you may choose to connect a transmission test set and to verify transmission over the newly connected fibers.
-

Important! The existing BLSR/MS-SPRing port protection group will currently be equipped/provisioned with only the *East Working* and *East Protection* circuit packs. Thus, it will be necessary to add the newly equipped *West Working* and *West Protection* circuit packs to this port protection group.

- 34** *West node provision port protection group.* Log in to the *West* node, and provision the *West* side of the existing BLSR/MS-SPRing port protection group via the following:

1. From the *System View* screen, select **Configuration-Provision**.
2. Click on the tab that is labeled **Ptn Grp**.
3. Scroll down the directory structure. Select the appropriate Bay, Shelf, and Port Protection group.
4. Click on the button labeled **Provision**.
5. Click on the button labeled **Add**.

6. Click on the drop-down arrow to the right of the field labeled *West Working Port:* and select the appropriate circuit pack from the list.
 7. Click on the drop-down arrow to the right of the field labeled *West Protection Port:* and select the appropriate circuit pack from the list.
 8. Click on the button that is labeled **Apply**.
-

35 *East node provision port protection group.* Log in to the *East* node, and provision the *East* side of the existing BLSR/MS-SPRing port protection group via the following:

1. From the *System View* screen, select **Configuration-Provision**.
2. Click on the tab that is labeled **Ptn Grp**.
3. Scroll down the directory structure. Select the appropriate Bay, Shelf, and Port Protection group.
4. Click on the button labeled **Provision**.
5. Click on the button labeled **Add**.
6. Click on the drop-down arrow to the right of the field labeled *East Working Port:* and select the appropriate circuit pack from the list.
7. Click on the drop-down arrow to the right of the field labeled *East Protection Port:* and select the appropriate circuit pack from the list.
8. Click on the button that is labeled **Apply**.

Important! Once a node's port protection group has been provisioned, the *Ring Auto-Discovery* software automatically executes, and if everything is connected correctly and provisioned properly, within 2 to 10 minutes or less, a new ring-map should be established.

Important! During the time when *Ring Auto-Discovery* is running, all nodes will show the **Protection Switch Suspended** alarm.

36 While still logged into the *East* node, wait from 2 to 10 minutes for ring discovery to complete, and clear the active alarms. Then verify that a new and correct ring-map has been established. From the *System View* screen, select the following:

1. **View-Rings-Ring Map.**
2. In the *View Ring Map* window, expand down the directory structure until the subject *RingID* is displayed.
3. Select (left-click) the subject **RingID**.
4. Click on the **Select** button.
5. Click on the button labeled **Display Ring Map Graph**.
6. Verify (visually) that the new ring-map:
 - Lists the adjacent *East* node.
 - Is a complete ring-map.

37 Did the *East* node establish a correct ring map?

If...	Then...
YES,	continue.
NO,	the problem must be corrected before you can continue. Refer to the <i>WaveStar BandWidth Manager Alarm Messages and Trouble-Clearing Guide</i> , 365-370-110.

38 Log in to the *West* node, and verify that a correct ring map has been established. From the *System View* screen, select the following:

1. **View-Rings-Ring Map.**
2. In the *View Ring Map* window, expand down the directory structure until the subject *RingID* is displayed.
3. Select (left-click) on the subject **RingID**.
4. Click on the **Select** button.
5. Click on the button labeled **Display Ring Map Graph**.
6. Verify (visually) that the new ring-map:
 - Lists the adjacent *West* node.
 - Is a complete ring-map.

39 Did the *West* node establish a correct ring map?

If...	Then...
YES,	continue.
NO,	the problem must be corrected before you can continue. Refer to the product's Trouble-Clearing Guide.

Important! After verifying that both the *West* node and the *East* node have correct ring maps, it will be necessary to check all other nodes within this open ring. Sequentially go around the ring, log in to each node, and verify that the respective node also has a correct ring map.

40 Proceed sequentially around the ring (for instance, in the *East* direction). Log in to the adjacent node, and verify that a correct ring-map has been established. From the *System View* screen, select the following:

1. **View-Rings-Ring Map.**
2. In the *View Ring Map* window, expand down the directory structure until the subject *RingID* is displayed.
3. Select (left-click) on the subject **RingID**.
4. Left-click on the **Select** button.
5. Left-click on the button labeled **Display Ring Map Graph**.
6. Verify (visually) that the new ring-map:
 - Lists the adjacent *West* node.
 - Is a complete ring-map.

41 Did the “adjacent node” establish a correct ring map?

If...	Then...
YES,	continue.
NO,	the problem must be corrected before you can continue. Refer to the product's Trouble-Clearing Guide.

.....

42 Are there additional adjacent nodes to be checked?

If...	Then...
YES,	go to Step 40.
NO,	continue.

.....

43 Click on the **Alarm List** button, and verify that there are no standing alarms associated with this work activity.

.....

44 Log in to the *East* node. From the *System View* screen, click on the **Alarm List** button. Verify that there are no standing alarms associated with this work activity.

.....

END OF STEPS

.....



Task 334: Overview for Merging one In-Service 4-Fiber Open Ring with a second In-Service 4-Fiber Open Ring

Purpose	Use this procedure to develop a detailed Method of Procedure (MOP), per local operating instructions, for converting two separate in-service 4-fiber open rings into a single in-service 4-fiber open ring (BLSR/MS-SPRing). This procedure applies to both OC-48 BLSRs/MS-SPRings and OC-192 BLSRs/MS-SPRings. The port unit types must always be the same rate as the in-service BLSR/MS-SPRing. This procedure does not cover detailed procedures pertaining to other technologies that may interwork with this .
Required privilege code(s)	You must have a security privilege code of at least P2 or greater to perform this task.
Required equipment/ personnel	The following are required in order to complete this task: • WaveStar Craft Interface Terminal (CIT) • Wrist strap • Optical power meter, to measure the level of received power • Appropriate optical LBOs • On-site assistance at the two adjacent nodes (where the merge is to occur).
Related information	For related information, see the following sections in this document: • Appendix A, “WaveStar CIT Tutorial”
Assumptions	This procedure is based on the following assumptions: 1. That the new fibers, which will connect the two end nodes, have already been installed and tested. 2. That a work order exists and that it: a. refers to the two separate open-rings as ring-1 and ring-2 b. identifies the end-node (node to be merged) of ring-1 c. identifies the available/unequipped slots for the end-node of ring-1 d. identifies the end-node (node to be merged) of ring-2

- e. identifies the available/unequipped slots for the end-node or ring-2
- f. identifies USER-SIDE and NETWORK-SIDE LAPD role.

Before you begin

For purposes related to this procedure each node has an *East side* and a *West side*. Within an existing open-ring, nodes are either labeled as E-W-E-W repeatedly or as W-E-W-E repeatedly. A merged ring will be simpler if nodes are labeled consecutively (from one end to the other end) as E-W-E-W or as W-E-W-E repeatedly. However, there does not exist any requirement for such labeling. For example, one open-ring could already be labeled as (E-W-E-W) and the other open-ring already be labeled as (W-E-W-E). And, if the goal was to merge one open-ring's end-node W side with the other open-ring's end-node W side, the result would be (E-W-E-W-W-E-W-E.....). This may be confusing; however, it does not affect proper operations.

Also related to this procedure is provisioning of the DCC LAPD Role. Specifically, one side (one of the to be connected nodes) must be provisioned as USER-SIDE while the other side (the other to be connected node) must be provisioned as NETWORK-SIDE. If the to be connected nodes were both provisioned the same (for example both as USER-SIDE or both as NETWORK-SIDE), then transmission over the link will occur but the DCC channel will not work.

Three or more open-rings can be merged into a single open-ring by first combining two and then subsequently repeating this procedure for the third and so forth.

A ring cannot contain more than 16 nodes. Thus, if one open-ring already contains 9 nodes, then it cannot be merged with another open-ring that already contains 8 or more nodes. Any combination that would add-up to more than 16 will not work.

The combined open ring cannot contain duplicate TIDs. Verify that whenever the two open rings are combined there will not be any duplicate TIDs.

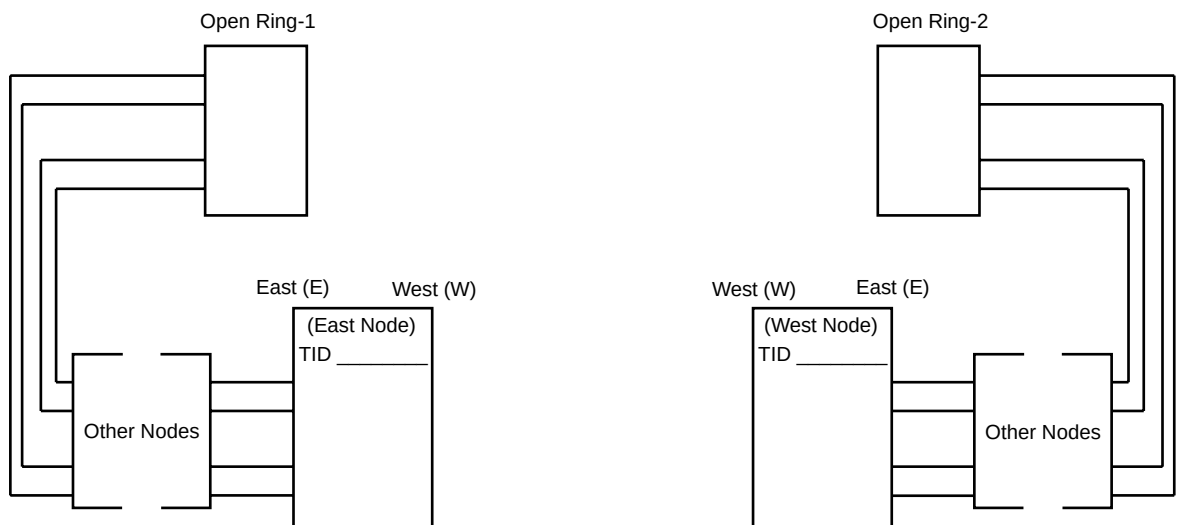
Prior to performing this task, you must:

- Obtain the work instructions for this task.
- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to merge two in-service open-rings into a single in-service open-ring.

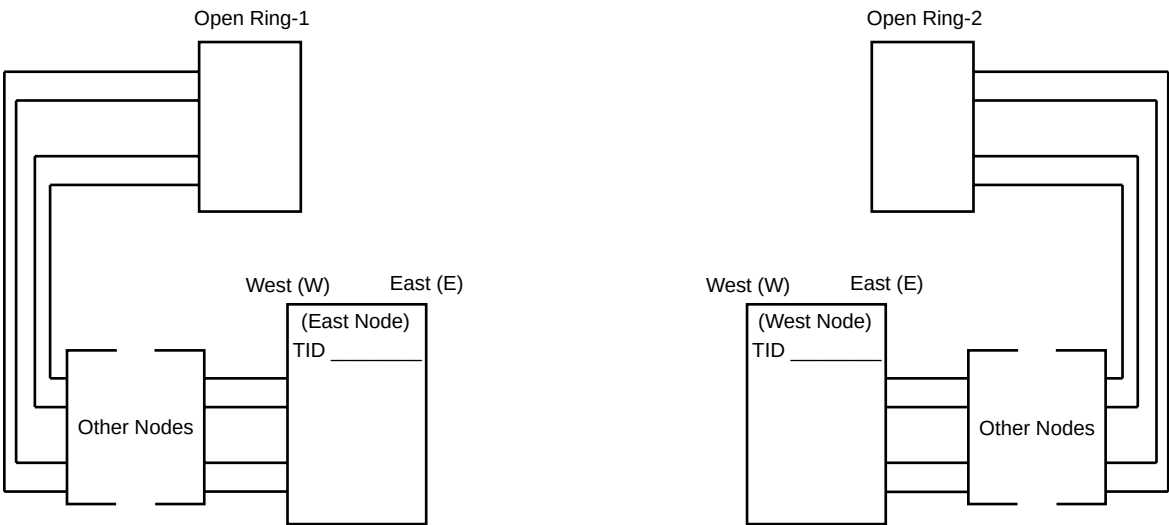
- 1** Verify that the end node's Equipment configuration matches Office Records. Four distinct network orientations are possible. These are:
 1. Open Ring-1 West Unequipped and to be merged with Open Ring-2 West Unequipped, Refer to Figure 334-1.
 2. Open Ring-1 East Unequipped and to be merged with Open Ring-2 West Unequipped, refer to Figure 334-2.
 3. Open Ring-1 East Unequipped and to be merged with Open Ring-2 East Unequipped, refer to Figure 334-3.
 4. Open Ring-1 West Unequipped and to be merged with Open Ring-2 East Unequipped, refer to Figure 334-4.

Figure 334-1 Ring-1 West Unequipped and Ring-2 West Unequipped



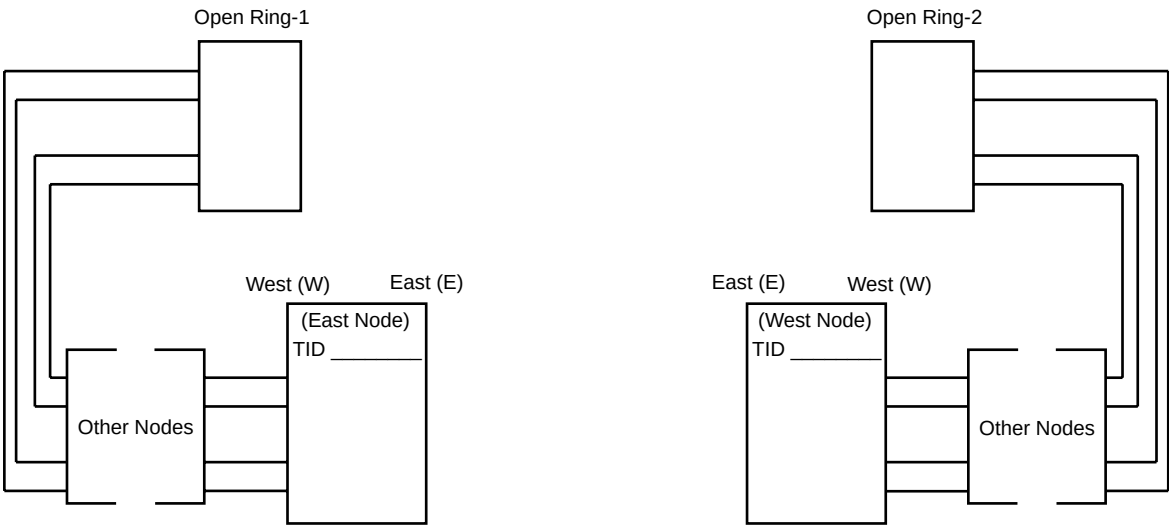
nc-usm-316

Figure 334-2 Ring-1 East Unequipped and Ring-2 West Unequipped



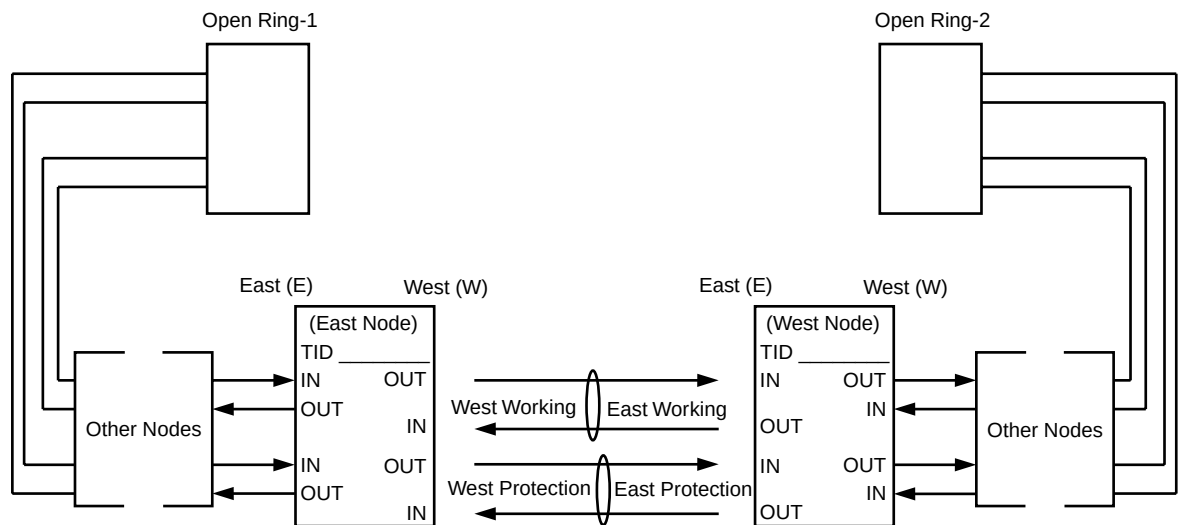
nc-usm-310

Figure 334-3 Ring-1 East Unequipped and Ring-2 East Unequipped



nc-usm-315

Figure 334-4 Ring-1 West Unequipped and Ring-2 East Unequipped



nc-usm-314

The remainder of this procedure assumes the orientation depicted in Figure 334-4. If your configuration is as depicted in Figure 334-1, Figure 334-2, or Figure 334-3, then the italicized *East* and/or *West* terms must be changed - including those in Figures 333-5 through Figure 333-12.

From the work order, determine the TID of the node that is to be the:

1. Ring-1 East node
2. Ring-2 West node.

2 Refer to the work order and, for the Ring-1 East node, determine which slot is to function as:

1. Ring-1 *West Working* (for example Slot 02), and
2. Ring-1 *West Protection* (for example Slot 06).

3 Refer to the work order and, for the Ring-2 West node, determine which slot is to function as:

1. Ring-2 *East Working* (for example Slot 04), and
2. Ring-2 *East Protection* (for example Slot 08).

4 Log in to the Ring-1 East node and:

1. From the *System View* screen select **View-Change Equipment Display**
2. Select (highlight) the appropriate Bay and Shelf
3. Verify that the available/unequipped slots are the same as indicated with office records and are consistent with the work order

If discrepancies are identified – then they must be resolved before continuing.

4. From the *System View* screen click on the **Alarm List** button
5. Verify that there are NO alarms.

Important! If the Alarm List includes any alarm/alarms – then each and every alarm must be cleared before continuing.

5 Log in to the Ring-2 West node and:

1. From the *System View* screen select **View-Change Equipment Display**
2. Select (highlight) the appropriate Bay and Shelf
3. Verify that the available/unequipped slots are the same as indicated with office records and are consistent with the work order.

If discrepancies are identified, then they must be resolved before continuing.

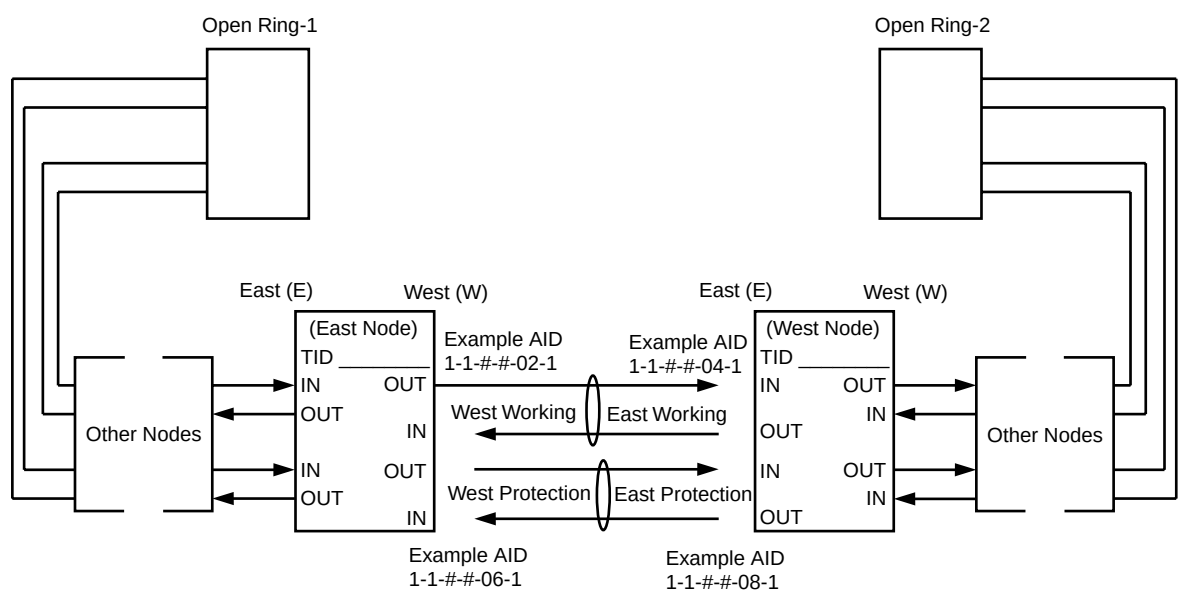
4. From the *System View* screen click on the **Alarm List** button
5. Verify that there are NO alarms.

Important! If the Alarm List includes any alarm/alarms, then each and every alarm must be cleared before continuing.

6 Instruct the on-site technician to obtain one, of the appropriate type port-unit circuit packs (for example OC48/STM16, or OC192/STM64) and insert it into the shelf slot position that is identified as *West Working*. Refer to Step 2 as needed.

- 7 Instruct the on-site technician to obtain one, of the appropriate type port-unit circuit packs (for example OC48/STM16, or OC192/STM64) and insert it into the shelf slot position that is identified as *West Protection*. Refer to Step 2 as needed.
- 8 Instruct the on-site technician to obtain one, of the appropriate type port-unit circuit packs (for example OC48/STM16, or OC192/STM64) and insert it into the shelf slot position that is identified as *East Working*. Refer to Step 3 as needed.
- 9 Instruct the on-site technician to obtain one of the appropriate type port-unit circuit packs (for example OC48/STM16, or OC192/STM64) and insert it into the shelf slot position that is identified as *East Protection*. Refer to Step 3 as needed.
- 10 Refer to Figure 334-5 to help locate the optical fibers that can now be connected to the East node.

Figure 334-5 Ring-1, East Node, West Working, OUT Connection Activities



nc-usm-317

Instruct the technician to:

1. Locate the OUT *West Working* fiber and determine the color of its sheath (or label) _____
2. Clean the OUT *West Working* fiber
3. Connect the OUT *West Working* fiber to the OUT connector.

Refer to Step 2 for specific AID details.

Reference: T 703

11 Instruct the technician to:

1. Locate the *East Working* IN fiber and determine the color of its sheath (or label) _____
2. Clean the *East Working* IN fiber
3. Connect the cleaned fiber to the power meter
4. Take a measurement and record the measured value.

Reference: T 703

12 Instruct the technician to select the appropriate LBO for their Ring-2 *East Working* IN fiber.

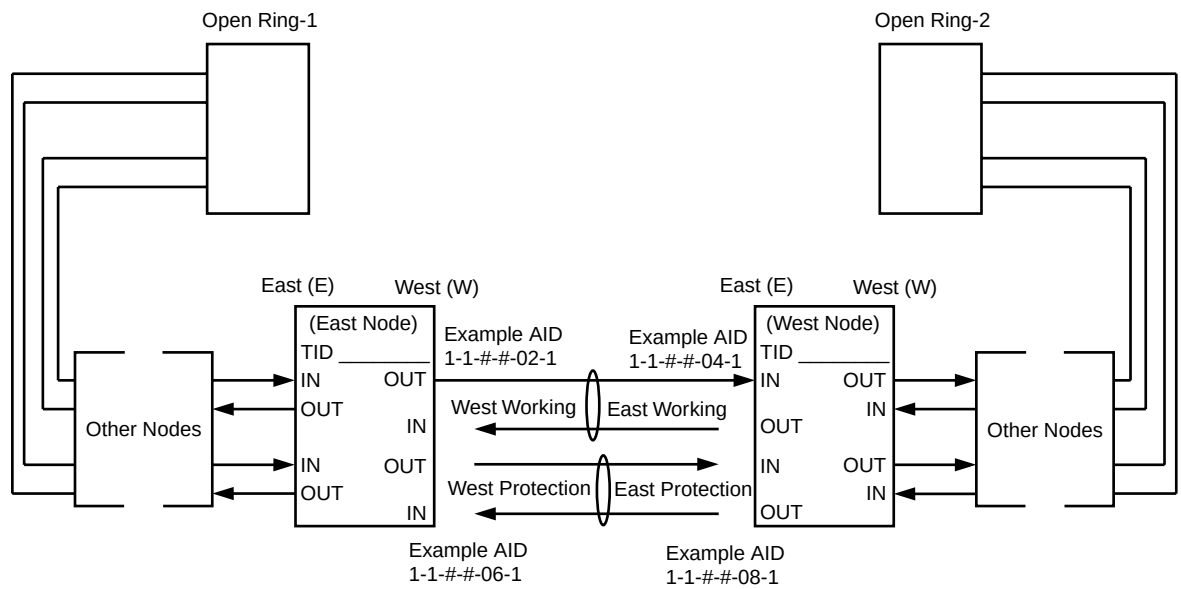
Reference: T 711

13 Instruct the technician to:

1. Install the LBO on the IN connector of the circuit pack
2. Connect the Ring-2 *East Working* IN fiber to the IN connector on the circuit pack
3. Verify that the LOS clears (circuit pack LED goes continuous Green).

Refer to Step 3 for Specific AID details and to Figure 334-6 to determine how the current configuration should look.

Figure 334-6 Ring-2, West Node, East Working, IN Connection Activities



nc-usm-318

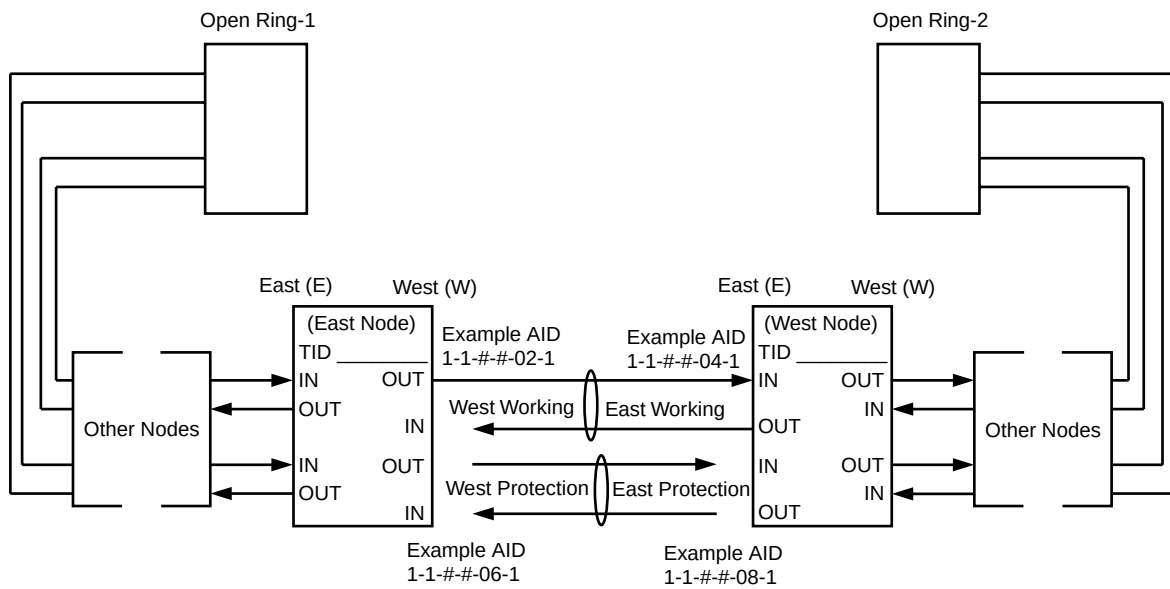
Reference: T 703

14 Instruct the technician to:

1. Locate/identify the *East Working* OUT fiber's color sheath (or label) _____
2. Clean the *East Working* OUT fiber
3. Connect the *East Working* OUT fiber to the OUT connector on the circuit pack.

Refer to Figure 334-7 to help locate the *East Working* OUT optical fiber and to determine how the current configuration should look upon completion of this step.

Figure 334-7 Ring-2, West Node, East Working, OUT Connection Completed



nc-usm-319

Reference: T 703

15 Instruct the technician to:

1. Locate the *West Working* IN fiber and determine the color of its sheath (or label) _____
2. Clean the *West Working* IN fiber
3. Connect the cleaned fiber to the power meter
4. Take a measurement and record the measured value.

Reference: T 703

16 Instruct the technician to select the appropriate LBO for their *West Working* IN fiber.

Reference: T 711

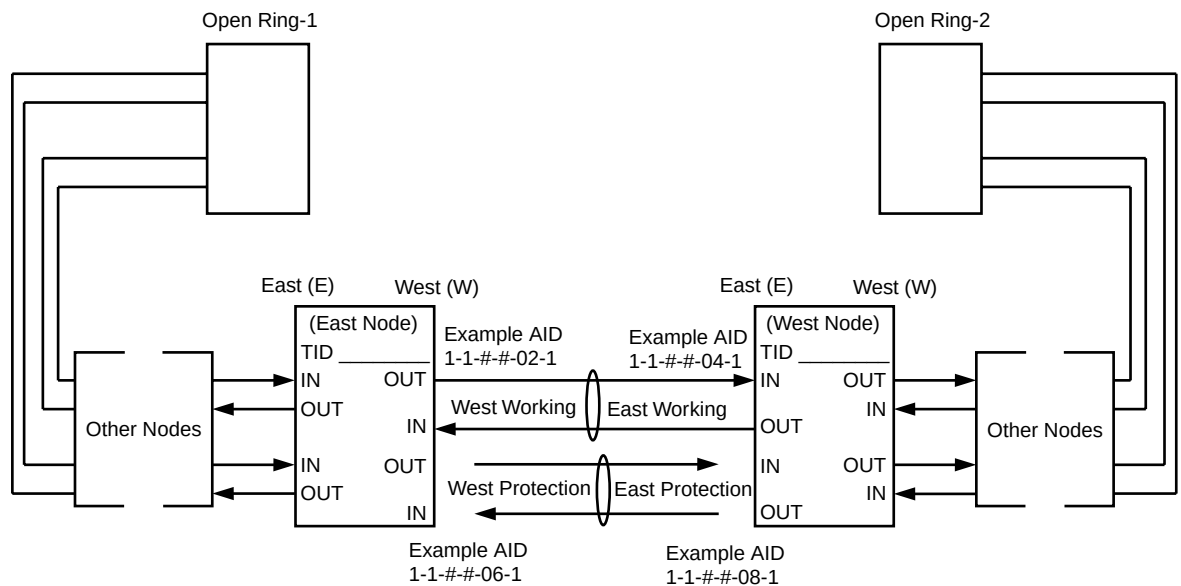
17 Instruct the technician to:

1. Install the LBO

2. Connect the *West Working* IN fiber to the IN connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous Green).

Refer to Figure 334-8 to determine how the current configuration should look upon completion of this step.

Figure 334-8 Ring-1, East Node with West Working IN Fiber Connected



nc-usm-320

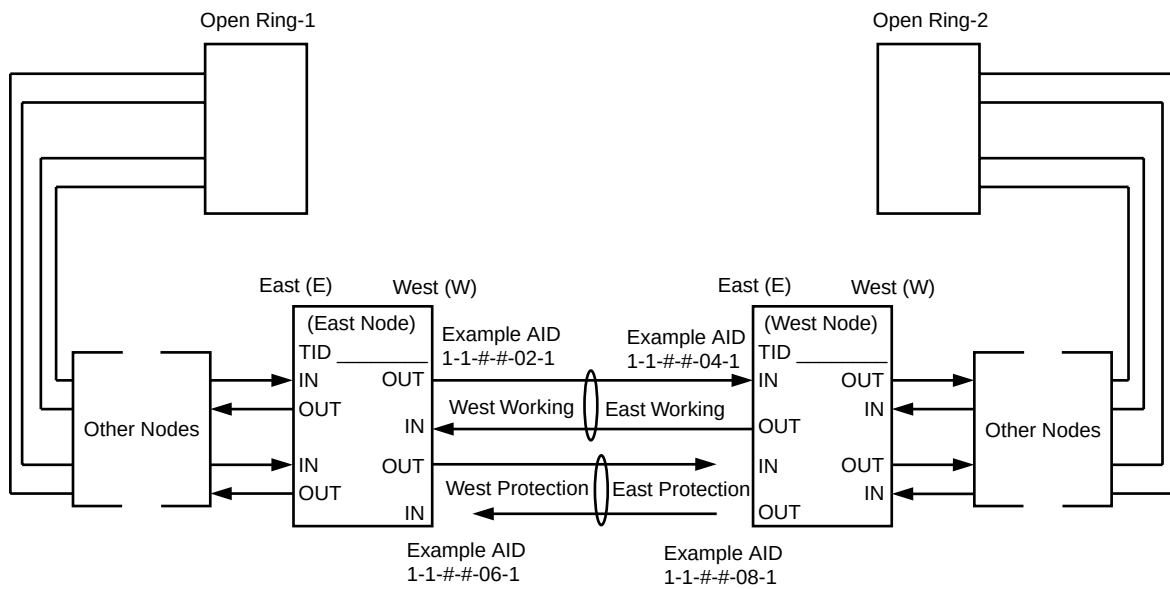
Reference: T 703

18 Instruct the technician to:

1. Locate/identify the *West Protection* OUT fiber's color sheath
2. Clean the *West Protection* OUT fiber
3. Connect the *West Protection* OUT fiber to the OUT connector on the circuit pack.

Refer to Figure 334-9 to help locate the Protection optical fibers that can now be connected to the East node.

Figure 334-9 Ring-1, East Node, West Protection, OUT Fiber Connected



nc-usm-321

Reference: T 703

19 Instruct the technician at the West Node to:

1. Locate their *East Protection* IN fiber and determine the color of its sheath (or label) _____
2. Clean the *East Protection* IN fiber
3. Connect the cleaned fiber to the power meter
4. Take a measurement and record the measured value.

Refer to the work order for specific AID details.

Reference: T 703

20 Instruct the technician at the West node to select the appropriate LBO for their **East Protection** fiber.

Reference: T 711

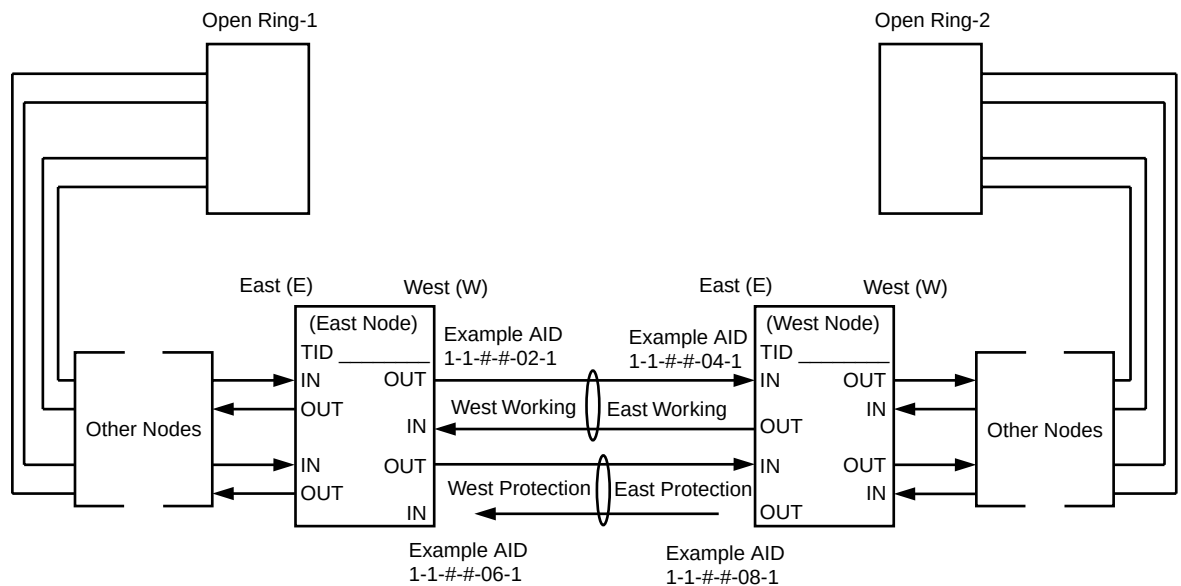
21 Instruct the technician to:

1. Install the LBO

2. Connect the *East Protection* IN fiber to the IN connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous Green).

Refer to the current work order for specific AID details and refer to Figure 334-10 to determine how the current configuration should look.

Figure 334-10 Ring-2, West Node with East Protection IN Fiber Connected



nc-usm-311

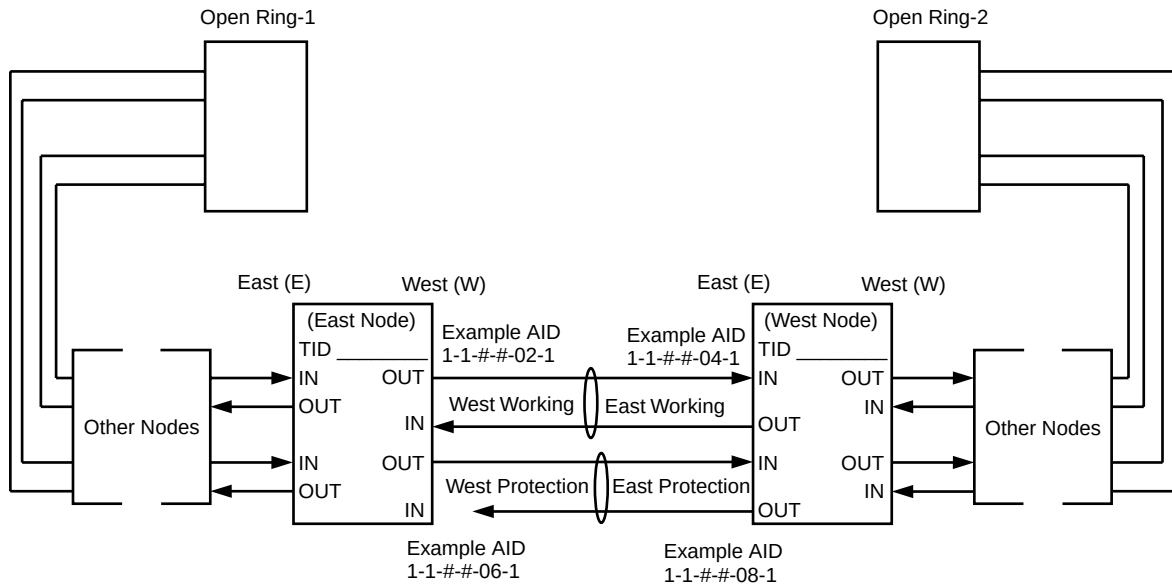
Reference: T 703

22 Instruct the technician, at the West Node to:

1. Locate/identify the *East Protection* OUT fiber's color sheath
2. Clean the *East Protection* OUT fiber
3. Connect the *East Protection* OUT fiber to the OUT connector on the circuit pack.

Refer to Figure 334-11 to determine how the current configuration should look.

Figure 334-11 Ring-2, West Node with East Protection, OUT Fiber Connected



nc-usm-312

Reference: T 703

23 Instruct the technician at the East Node to:

1. Locate their *West Protection* IN fiber and determine the color of its sheath (or label) _____
2. Clean the *West Protection* IN fiber
3. Connect the cleaned fiber to the power meter
4. Take a measurement and record the measured value.

Refer to the work order for specific AID details.

Reference: T 703

24 Instruct the technician at the East Node to select the appropriate LBO for their *West Protection* fiber.

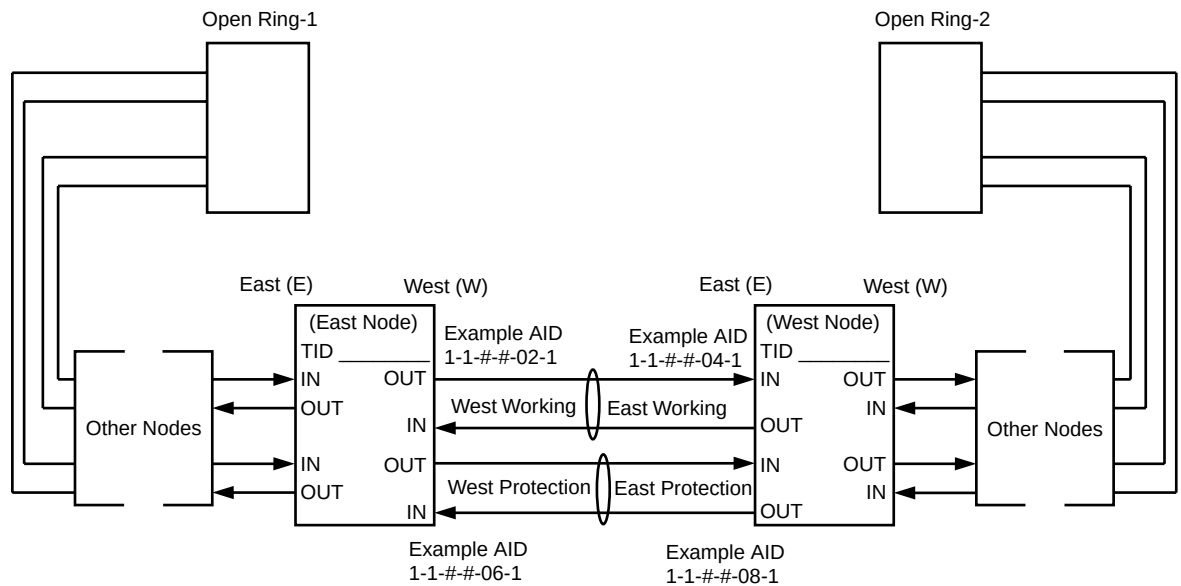
Reference: T 711

25 Instruct the technician to:

1. Install the LBO
2. Connect the *West Protection* IN fiber to the IN connector on the circuit pack.
3. Verify that the LOS clears (circuit pack LED goes continuous Green).

Refer to the current work order for specific AID details and refer to Figure 334-12 to determine how the current configuration should look.

Figure 334-12 Ring-1, East Node with West Protection IN Direction - Fiber Connected



nc-usm-313

Reference: T 703

26 Log in to the East node and bring up the *System View* screen and click (select) the following:

1. **Configuration-DCC Terminations**
2. Bay that contains the I/O shelf for the subject ring (for example, Bay 1)
3. Shelf that provides the Port Protection group for the subject ring (for example, Shelf 1)

4. **CP dccei** circuit pack (which provides the subject DCC channels)
5. **SELECT** button
6. In the right-half of the DCC parameters screen select the appropriate information for the *West Working* span
 - Section DCC or Line DCC tab (for example **Section DCC**)
 - Terminations (in this case **Current Terminations**)
 - **Port AID:** click on the drop-down arrow and high-light the AID of the *West Working* Port (for example, 1-1-u-#-02-1)
 - Refer to the work order and determine the **LAPD Role:** for this *West Working* span. Select as appropriate, either User-Side or Network-Side
 - Click on the **Apply** button.
7. In the right-half of the DCC parameters screen select the appropriate information for the *West Protection* span
 - Section DCC or Line DCC tab (for example **Section DCC**)
 - Terminations (in this case **Current Terminations**)
 - **Port AID:** click on the drop-down arrow and high-light the AID of the *West Protection* Port (for example, 1-1-u-#-06-1)
 - Refer to the work order and determine the **LAPD Role:** for this *West Protection* span. Select as appropriate, either User-Side or Network-Side
 - Click on the **Apply** button
 - Click on the **Close** button.

27 Log in to the West node and bring up the *System View* screen and click (select) the following:

1. **Configuration-DCC Terminations**
2. Bay that contains the I/O shelf for the subject ring (for example, Bay 1)
3. Shelf that provides the Port Protection group for the subject ring (for example, Shelf 1)
4. **CP dccei** circuit pack (which provides the subject DCC channels)
5. **SELECT** button
6. In the right-half of the DCC parameters screen select the appropriate information for the *East Working* span

- Section DCC or Line DCC tab (for example **Section DCC**)
 - Terminations (in this case **Current Termination**)
 - **Port AID:** Click on the drop-down arrow and high-light the AID of the *East Working* Port (for example, 1-1-#-#-04-1)
 - Refer to the work order and determine the **LAPD Role:** for this *East Working* span. Select as appropriate, either User-Side or Network-Side
 - Click on the **Apply** button.
7. In the right-half of the DCC parameters screen select the appropriate information for the *East Protection* span
- Section DCC or Line DCC tab (for example **Section DCC**)
 - Terminations (in this case **Current Termination**)
 - **Port AID:** Click on the drop-down arrow and high-light the AID of the *East Protection* Port (for example, 1-1-u-#-08-1)
 - Refer to the work order and determine the **LAPD Role:** for this *East Protection* span. Select as appropriate, either User-Side or Network-Side
 - Click on the **Apply** button
 - Click on the **Close** button.

28 While still logged into the West node and from the *System View* screen click on the **Alarm List** button.

29 Verify that there are no DCC alarms on either the *East Working* or *East Protection* spans/AIDs.

Important! Any and all DCC alarms for the subject AIDs must be cleared. Refer to Trouble Clearing procedures as necessary.

30 Log in to the Ring-1 East node and bring up the **System View** screen and click on the **Alarm List** button.

31 Verify that there are no DCC alarms on either the *West Working* or *West Protection* spans/AIDs.

Important! Any and all DCC alarms for the subject AIDs must be cleared. Refer to Trouble Clearing procedures as necessary.

- 32** As an option, you may choose to connect a transmission test set and verify transmission over the newly connected fibers.
-

Important! The existing BLSR/MS-SPRing port protection group must be modified to include the *West Working* protection ports.

- 33** Log in to the East Node and provision the West side of the existing BLSR/MS-SPRing port protection group via the following:
1. From the *System View* screen select **Configuration-Provision**
 2. Click on the tab that is labeled **Ptn Grp**
 3. Scroll down the directory structure and select the appropriate Bay, Shelf, and Port Protection group
 4. Click on the button labeled **Provision**
 5. Click on the button labeled **Add**
 6. Click on the drop-down arrow to the right of the field labeled **West Working Port:** and select the appropriate circuit pack from the list
 7. Click on the drop-down arrow to the right of the field labeled **West Protection Port:** and select the appropriate circuit pack from the list
 8. Click on the button that is labeled **Apply**.
-

Important! The existing BLSR/MS-SPRing port protection group will be modified to include the *West Working* protection ports.

- 34** Log in to the West Node and provision the *East* side of the existing BLSR/MS-SPRing port protection group via the following:
1. From the *System View* screen select **Configuration-Provision**
 2. Click on the tab that is labeled **Ptn Grp**
 3. Scroll down the directory structure and select the appropriate Bay, Shelf, and Port Protection group
-

4. Click on the button labeled **Provision**
5. Click on the button labeled **Modify**
6. Click on the drop-down arrow to the right of the field labeled **East Working Port:** and select the appropriate circuit pack from the list
7. Click on the drop-down arrow to the right of the field labeled **East Protection Port:** and select the appropriate circuit pack from the list
8. Click on the button that is labeled **Apply**.

Important! Once an END NODE has been changed to an Intermediate node the *Ring Auto-Discovery* software automatically executes and, if every thing is connected and provisioned properly, within 2-to-10 minutes or less, a new ring-map should be established at each node within the entire ring.

Important! During the time when *Ring Auto-Discovery* is running all nodes in the existing ring will show the **Protection Switch Suspended** alarm.

- 35** While still logged into the West Node, wait 2 to 10 minutes for Ring Discovery to complete and clear the active alarms. Then verify that a new and correct ring-map has been established. From the **System View** screen select the following:
1. **View-Rings-Ring Map**
 2. In the **View Ring Map** window expand down the directory structure until the subject **RingID** is displayed
 3. Select (click) on the subject **RingID**
 4. Click on the **Select** button
 5. Click on the button labeled **Display Ring Map Graph**
 6. Verify (visually) that the new ring-map:
 - lists the adjacent East Node, and
 - is a complete map for this open-ring.

36

IF...	THEN...
the West Node established a correct open-ring map	go to Step 37.
the West Node did not establish a correct open-ring map	the problem must be corrected before you can continue. Refer to the AMTG 365-370-110.

37 Click on the **Alarm List** button and verify that there are NO alarms associated with this work activity

Important! Any associated alarms must be corrected before you continue. Refer to the AMTG 365-370-110.

38 Log in to the East Node and verify that a new and correct open-ring map has been established. From the *System View* screen select the following:

1. **View-Rings-Ring Map**
2. In the **View Ring Map** window expand down the directory structure until the subject **RingID** is displayed
3. Select (click) on the subject **RingID**
4. Click on the **Select** button
5. Click on the button labeled **Display Ring Map Graph**
6. Verify (visually) that the new ring-map:
 - lists the adjacent West node, and
 - is a complete map for this open-ring.

39

If...	Then...
the East Node established a correct open-ring map,	go to Step 40.
the East Node did not establish a correct open-ring map,	the problem must be corrected before you can continue. Refer to the product's Trouble Clearing Guide.

-
- 40** Click on the **Alarm List** button and verify that there are NO alarms associated with this work activity.

Important! Any associated alarms must be corrected before you continue. Refer to the AMTG 365-370-110.

Important! After verifying that both the West Node and the East Node have correct ring maps it will be necessary to (a) pick a direction, say East, (b) sequentially go around the open-ring and log into each node and verify that the respective node also has a correct ring map.

- 41** Proceed sequentially around the open-ring (say in the East direction). Log in to the adjacent node and verify that a correct open-ring map has been established. From the *System View* screen select the following:

1. **View-Rings-Ring Map**
2. In the **View Ring Map** window expand down the directory structure until the subject **RingID** is displayed
3. Select (click) on the subject **RingID**
4. Click on the **Select** button
5. Click on the button labeled **Display Ring Map Graph**
6. Verify (visually) that the new ring-map:
 - lists the adjacent East node (except for the end node), and
 - is a complete map for this open-ring.

42

If...	Then...
the adjacent node established a correct open-ring map,	go to Step 43.
the adjacent node did not establish a correct open-ring map,	the problem must be corrected before you can continue. Refer to the product's Trouble Clearing Guide.

-
- 43** Click on the **Alarm List** button and verify that there are NO alarms associated with this work activity.

Important! Any associated alarms must be corrected before you continue. Refer to the product's Trouble-Clearing Guide.

44

If...	Then...
there are additional adjacent nodes on this side of the open-ring that remain to be checked,	continue with Step 41.
there are no additional adjacent nodes on this side of the open-ring that remain to be checked	continue.

Important! After verifying that all nodes in the East direction are correct, it will be necessary to do the same for the West direction.

45 Proceed sequentially around the open-ring (say in the West direction beginning from the West Node). Log in to the adjacent node and verify that a correct open-ring map has been established. From the **System View** screen select the following:

1. **View-Rings-Ring Map**
2. In the **View Ring Map** window expand down the directory structure until the subject **RingID** is displayed
3. Select (click) on the subject **RingID**
4. Click on the **Select** button
5. Click on the button labeled **Display Ring Map Graph**
6. Verify (visually) that the new ring-map:
 - lists the adjacent West node (except for the end node), and
 - is a complete map for this open-ring.

46

If...	Then...
the adjacent node established a correct open-ring map,	go to Step 47.

If...	Then...
the adjacent node did not establish a correct open-ring map,	the problem must be corrected before you can continue. Refer to the product's Trouble-Clearing Guide.

-
- 47** Click on the **Alarm List** button and verify that there are NO alarms associated with this work activity.

Important! Any associated alarms must be corrected before you continue. Refer to the product's Trouble-Clearing Guide.

.....

48

If...	Then...
there are additional adjacent nodes on this side of the open-ring that remain to be checked,	continue with Step 45.
there are no additional adjacent nodes on this side of the open-ring that remain to be checked,	continue.

.....

END OF STEPS



Task 335: Deprovision WBM 10G I/O Shelf

Purpose Use this procedure to deprovision an existing WaveStar 10G I/O shelf in the system. Deprovisioning an existing shelf requires that a minimal set of mandatory circuit packs remain in the system to retain communications between the WaveStar CIT and system controller.

When a new shelf is created and transmission cannot be established, it may be necessary to use this procedure to deprovision the shelf and create a new shelf. When the new shelf is created again, verify that you use the correct ON cable identifier and BSW port identifier in provisioning the new shelf.

Required privilege code You must have a security privilege code of at least P3 to perform this task.

Required equipment The following equipment is required in order to complete this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist Strap

Related information For related information, see the following sections in this document:

- Chapter 3, “Platform Descriptions”
- Chapter 7, “Provisioning, Security, and Administration”
- Appendix A, “WaveStar CIT Tutorial”

Before you begin Prior to performing this task, you must:

- Obtain the work instructions for this task.
- Identify the WaveStar BandWidth Manager system and I/O bay that is associated with the 10G I/O shelf being deprovisioned.
- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to deprovision a 10G I/O shelf entity.

-
- 1** Use the WaveStar CIT to login to the system containing the shelf being deprovisioned.

-
- 2 Verify that all service/traffic has been removed from the shelf per local procedures.
-

- 3 On the *System View* menu, select **View > Cross Connections**.

Result: The **View Cross Connections** window opens.

- 4 In the **View Cross Connections** window, open the Bay details then highlight the shelf being deprovisioned. Click **Select** at bottom of window.

Result: The **View Cross Connections for wbm** window opens.

- 5 Verify no cross-connections exist for the shelf.
-

6

If...	Then...
no cross-connections exist,	click Close to exit, then continue with the next step.
cross-connections exist,	click Close to exit, then delete all cross-connections. Reference: T 304

- 7 On the *System View* menu, select **View > Loopback**.

Result: The **View Loopbacks** window opens.

- 8 In the **View Loopbacks** window, open the Bay details then highlight the shelf being deprovisioned. Click **Select** at bottom of window.

Result: The **View Loopback** window opens.

- 9 Verify no loopbacks exist for the shelf.

10

If...	Then...
no loopbacks exist,	click Close to exit, then continue with the next step.
loopbacks exist,	click Close to exit, then release all loopbacks. Reference: T 209

11 On the *System View* menu, use the **Fault > Analysis > Test Access** command to check for test access sessions.

Result: The **Test Access Wizard** screen opens.

Reference: T 222

12 Select **View existing test access sessions**, then click **Next**.

13 Use the **Browse** button to select the shelf being deleted and verify no test access sessions exist for this shelf.

14

If...	Then...
no test access sessions exist,	click Close to exit, then continue with the next step.
test access sessions exist,	click Close to exit, then delete all test access sessions. Reference: T 213

15 On the *System View* menu, select **View > Protection**.

Result: The **View Protection** window opens.

16 In the **View Protection** window, open the Bay and Shelf details for the shelf being deprovisioned.

.....

17 Verify no optical port protection groups exist on the shelf.

.....

18

If...	Then...
no optical port protection groups exist,	click Close to exit, then continue with the next step.
optical port protection groups exist,	click Close to exit, then delete all optical port protection groups. Reference: T 308

.....

19 On the *System View* menu, select **View > Timing/Sync**

Result: The **View Timing/Sync** window opens.

.....

20 Click on the **Timing References** tab.

Result: Timing reference parameters display.

.....

21 Under the **Timing Reference** column, find **line1**. Then, under the **Port AID** column, check if a port AID is listed that is associated with the shelf you are deleting.

.....

22

If...	Then...
a port AID, associated with this shelf, is listed,	click Close to exit, then continue with the next step.
a port AID, associated with this shelf, is NOT listed,	click Close to exit, then continue with Step 32.

.....

23 On the *System View* menu, select **Configuration > Timing/Sync**.

Result: The **Provision Timing/Sync** window opens.

24 Click on the **Timing Reference** tab.

Result: Timing reference parameters display.

25 In the **Timing Reference** box, select **LINE1**.

26 In the **Port AID** box, select **NOT-CONNECTED** to disconnect the timing reference from the shelf you are deleting.

27 Click **Apply** to make changes. Then, click **OK** to exit.

28 At the I/O shelf being deprovisioned, unlatch and remove the following circuit packs *ONLY*:

- OC192 port units in slots TR1, TR2, TR3, and TR4.
- PP192 circuit packs in slots PPROC1, PPROC2, PPROC3, PPROC4,
- SWIF circuit packs in SWIF slots 20, 21, 30, 31, 40, 41.

Important! Do not remove the SWIF circuit packs in slots 10 and 11.

Do not remove any of the remaining circuit packs.

29 On the *System View* menu, select **Configuration > Delete**.

Result: The **Delete** window opens.

An alternate way to delete the circuit packs is from the Shelf View. Right click on the circuit pack being deleted and select Delete Circuit Pack. See *Appendix A, WaveStar CIT Tutorial*, for details on the Shelf View procedures.

30 In the **Delete** window, open up the required bay and shelf details.

-
- 31** Highlight/select one of the circuit packs removed in Step 32, then click on **Select**.

Result: A warning window opens to ask you if you want to continue. Select **Yes**..

-
- 32** Repeat Step 35 until all the circuit packs removed in step 32 are deleted from the system.

-
- 33** Highlight/select the shelf being deleted, then click on **Select**.

Result: A warning window opens to ask you if you want to continue. Select **Yes**.

-
- 34** Verify the shelf is deleted in the *System View* display.

-
- 35** Remove all circuit packs from the shelf, if required.

END OF STEPS



Task 336: Create NonReporting Alarm Severity Assignment Profiles (ASAPs)

Purpose Use this procedure to create NonReporting ASAPs. NonReporting ASAPs are Alarm Severity Assignment Profiles assigned to specific profile types or equipment groups to filter out alarms. NonReporting ASAPs may be created for any or all of the port or tributary profile types you select. The NonReporting profile sets the SA Alarm Level and NSA Alarm Level to "Not Reported" for each of the probable causes for that profile. Profiles of this type might be used to filter alarms from the system during new shelf installation or addition of equipment groups.

Required privilege code(s) You must have a privilege code of at least M3 to create NonReporting ASAP profiles. You must have a privilege code of at least M1 to view ASAP profiles.

Required equipment WaveStar Craft Interface Terminal (CIT)

Related information For related information, see the following sections in this document:

- Chapter 7, "Provisioning, Security, and Administration"
- Appendix A, "WaveStar CIT Tutorial"

Before you begin Prior to performing this task, you must:

- Obtain the work instructions for this task that detail the port, tributary, and equipment profiles for which you want to create NonReporting ASAPs.
- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to create NonReporting ASAPs.

1 Use the WaveStar CIT to log in to the system.

2 Select **Configuration > Alarms > Create NonReporting ASAPs** on the *System View* toolbar.

Result: The **Create NonReporting ASAP Profiles** window opens.

-
- 3** Under **Available ASAP Types**, select the equipment type(s) for which you want to create a NonReporting ASAP

Important! If no ASAP types are listed, then NonReporting ASAPs have already been created for each of the profiles.

- 4** Use the buttons in the middle of the screen to add the selected types to the **Selected ASAP Types** box.
-

- 5** When all your required selections are in the **Selected ASAP Types** box, click **OK**.

Result: A warning box opens informing you that your selection may affect the NE and asks if you want to execute the command.

- 6** Click **Yes**, then click **Close** to exit if the window did not automatically close.
-

- 7** Use the **View > View Alarms > View Alarm Severity Assignment Profiles** to verify the selected NonReporting ASAP has been created.

Reference: T 337

- 8** Set NonReporting ASAPs, if required.

Reference: T 338

END OF STEPS



Task 337: View Alarm Severity Assignment Profiles (ASAPs)

Purpose Use this procedure to view details on existing ASAPs.

Required privilege code(s) You must have a privilege code of at least M1 to view ASAP profiles.

Required equipment WaveStar Craft Interface Terminal (CIT)

Related information For related information, see the following sections in this document:

- Chapter 7, “Provisioning, Security, and Administration”
- Appendix A, “WaveStar CIT Tutorial”

Before you begin Prior to performing this task, you must:

- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to view existing ASAP profiles.

1 Use the WaveStar CIT to log in to the system.

2 Select **Fault > View Alarm Assignment Profile** on the *System View* toolbar.

Result: The **View Alarm Severity Profile** window opens.

3

If...	Then...
you want to view details for all the profile names for a specific ASAP Type,	Do the following: 1. select the ASAP Type 2. click View ASAP at bottom of window. Result: Details of all the profile names for the selected ASAP type display on right side of window.

If...	Then...
you want to view details for an individual profile name for a selected ASAP Type,	Do the following: 1. click on the plus (+) sign next to the ASAP Type to open the list of profile names for this type. 2. Select the profile name to display 3. click View ASAP at bottom of window. Result: Details of the selected profile name display on right side of window.

4 Click **Close** to exit.

END OF STEPS



Task 338: Set NonReporting Alarm Severity Assignment Profiles (ASAPs)

Purpose Use this procedure to set or assign NonReporting ASAPs to selected ports, tributaries, circuit packs, or an entire shelf. Setting NonReporting ASAPs allows you to prevent the reporting of alarms on all existing or preprovisioned equipment of the same type on the shelf selected.

Required privilege code(s) You must have a privilege code of at least M3 to set NonReporting ASAP profiles. You must have a privilege code of at least M1 to view ASAP profiles.

Required equipment WaveStar Craft Interface Terminal (CIT)

Related information For related information, see the following sections in this document:

- Chapter 7, “Provisioning, Security, and Administration”
- Appendix A, “WaveStar CIT Tutorial”

Before you begin Prior to performing this task, you must:

- Obtain the work instructions for this task.
- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to assign NonReporting ASAP profiles to selected entities.

1 Use the WaveStar CIT to log in to the system.

2 Select **Configuration > Alarms > Set NonReporting ASAPs** on the *System View* toolbar.

Result: The **Set NonReporting ASAPs** window opens.

3 Open the correct bay details, then select the required shelf.

-
- 4 Click **Select** at bottom of window.

Result: All shelf equipment types that have had a NonReporting ASAP created are displayed on right side of window.

Equipment types that have not had NonReporting ASAPs created will not be displayed.

-
- 5 Click on the required **Port** or **Tributary Selection** tab.

-
- 6 Select the required available port or tributary types from the **Available Port/Tributary Types** box.

-
- 7 Use the **Add**, **Remove**, **AddAll**, and **Clear** buttons to add selected available types to the **Selected Port/Tributary Types** box.

-
- 8 When all selections are made, click **Apply** at bottom of window.

Result: A warning box opens stating that the NE may be affected by this command and asks if you want to execute the command. In addition, a list of ASAPs which do not have an associated NonReporting profile are listed for the selected equipment types.

-
- 9

If...	Then...
you need to create additional NonReporting profiles,	do the following: 1. click No to abort the command, 2. click Close to exit from the Set NonReporting ASAP window. 3. Continue with the next step.
no additional profiles need to be created and you still want to execute the command,	do the following: 1. click Yes to execute the command 2. click Close to exit from the Set NonReporting ASAP window. 3. <i>Stop! End of Task.</i>

10 Create NonReporting ASAPs as required and repeat this procedure.

Reference: T 336

END OF STEPS



Task 339: Provision Alarm Configurations

- Purpose** Use this procedure to perform the following:
- Enable or disable office alarms
 - Set facility alarm delay times for generating and clearing of alarms
 - Set equipment alarm delay times for generating and clearing of alarms.

Required privilege code You must have a privilege code of at least M3 to provision alarm configurations.

Required equipment WaveStar Craft Interface Terminal (CIT)

Related information For related information, see the following sections in this document:

- Chapter 7, “Provisioning, Security, and Administration”
- Appendix A, “WaveStar CIT Tutorial”

Before you begin Prior to performing this task, you must:

- Obtain the work instructions for this task.
- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to provision alarm configurations.

1 Use the WaveStar CIT to log in to the system.

2 Select **Configuration > Alarms > Alarm Configuration** on the *System View* toolbar.

Result: The *Alarm Configuration Provisioning* window opens.

3 Provision the following parameters, as required:

- Office Alarm
Select Enabled or Disabled

- Facility Alarm-Clear Delay
Select zero (0), default, for no delay or select a value from 10 to 60 seconds.
- Facility Alarm-Generate Delay
Select zero (0), default, for no delay or select a value from 10 to 60 seconds. This value must be less than or equal to the Facility Alarm-Clear Delay value.
- Equipment Alarm-Clear Delay
Select zero (0), default, for no delay or select a value from 10 to 60 seconds.
- Equipment Alarm-Generate Delay
Select zero (0), default, for no delay or select a value from 10 to 60 seconds. This value must be less than or equal to the Facility Alarm-Clear Delay value and less than or equal to the Equipment Alarm-Clear Delay value.

4 Click **OK**.

Result: A warning window opens stating that NE service might be affecting and asks if you want to execute the command.

5 Click **Yes** to execute the command.

END OF STEPS



Task 340: Change System Timing Reference Priority

Purpose Use this procedure to change the System Timing Reference Priority of the following timing references:

- External DS1 reference 1 (EXTREF1)
- External DS1 reference 2 (EXTREF2)
- OC-48 line reference (LINE1)

For nonrevertive operation, the System Timing Reference Priority parameter of each timing reference should be provisioned with the same value. For revertive operation, the System Timing Reference Priority parameter of each timing reference should be provisioned with different values.

Required privilege code(s) You must have a security privilege code of at least P2 or greater to perform this task.

Required equipment WaveStar Craft Interface Terminal (CIT)

Safety precautions To assure both personal safety and the proper functioning of the system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Perform this task only during periods of light service traffic because of the risk of service traffic interruptions.



CAUTION

In Releases 2 and later releases, wait 3 minutes after performing this task before making any other changes to the system. In

Release 1.3, wait 7 minutes after performing this task before making any other changes to the system.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a system, to prevent electrostatic discharge damage to sensitive components.

Related information For related information, see the following sections in this document:

- Chapter 6, “Control, Transmission, and Synchronization Interfaces”
- Chapter 7, “Provisioning, Security, and Administration”
- Appendix A, “WaveStar CIT Tutorial”
- For related information, see Chapter 2, “Maintenance/Trouble-Clearing” in *Alarm Messages and Troubleclearing Guide*, 365-370-110.

Before you begin Prior to performing this task, you must:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the timing reference(s) and the System Timing Reference Priority to be provisioned.
- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to change the System Timing Reference Priority of a timing reference(s).

-
- 1** At the WaveStar CIT, select **Configuration>Timing/Sync**.

Result: The **Provision Timing/Sync** screen appears.

-
- 2** Click on the **Timing Reference** tab.

-
- 3** Select the desired timing reference and provision the System Timing Reference Priority parameter based on the work instructions.

4

If you ...	Then...
want to change the System Timing Reference Priority of another timing reference,	click on Apply and return to Step 3.
do not want to change the System Timing Reference Priority of another timing reference,	click on OK and go to Step 5.

5 Do the following:

1. Select **View>Timing/Sync...**
2. click on the **Timing Reference** tab, and verify that the System Timing Reference Priority parameter of the desired timing reference(s) is provisioned correctly.

END OF STEPS



Task 341: View Performance Monitoring (PM) Parameters for Selected Ports or Tributaries

Purpose	Use this procedure to view the performance monitoring (PM) parameters assigned to selected ports or tributaries.
Required privilege code(s)	You must have a security privilege code of at least P3 to perform this task.
Required equipment	WaveStar Craft Interface Terminal (CIT)
Related information	For related information, see the following sections in this document: • Chapter 8, “Performance Monitoring” • Appendix A, “WaveStar CIT Tutorial”
Before you begin	Prior to performing this task, you must: • Obtain the work instructions for this task. • Identify the ports or tributaries related to the task. • Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.
Task	Complete the following steps to view the assigned PM parameters for selected ports or tributaries.

-
- 1** On the *System View* toolbar, select **Performance > View PM Ports**.

Result: The *View Parameters for Port Performance Monitoring* window opens.

- 2** Open up the required bay, shelf, and port details. Select the required port or tributary to view, then click **Select** at bottom of window.

Result: The assigned PM profiles and parameters display on right side of window for the port or tributary selected. The type of window depends on your selection.

- 3** Note the PM TCA Profile assignments and PM Activation status.

4

IF you...	THEN...
want to view the details of a TCA profile,	under Control Options, <i>View Details</i> , click on the profile you wish to view. Result: The <i>View TCA Profile Details</i> window opens. Continue with the next step.
are finished,	click Close to exit.

5 Note the parameters and settings for the profile you selected.

6

If you ...	Then...
want to view the shelf AIDs that have been assigned the selected TCA profile,	click View Assigned AIDs at bottom of window. Result: The <i>View Assigned AIDs</i> window opens. Continue with the next step.
are finished,	click Close in each window to exit.

7 Open up the bay details and highlight the required shelf. Then, click **Select Shelf** at bottom of window.

Result: Parameters display on right side of window with the profile type, profile name, and the associated assigned AIDs for the selected shelf.

8 Click **Close** in each window to exit.

END OF STEPS



Task 342: Create 1XN STM1EA Electrical Equipment Protection Group

Purpose	Use this procedure to create/verify a 1XN STM1EA electrical equipment protection group in the WaveStar 2.5G-STM1EE4 shelf.
Required privilege code(s)	You must have a security privilege code of at least M4 to perform this task.
Required equipment	WaveStar Craft Interface Terminal (CIT)
Related information	For related information, see the following sections in this document: • Chapter 7, “Provisioning, Security, and Administration” • Appendix A, “WaveStar CIT Tutorial”
Before you begin	Prior to performing this task, you must: • Obtain the work instructions for this task. • Verify no alarms exist, especially alarms indicating illegal circuit pack types. • Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.
Task	Complete the following steps to create a 1XN (maximum 1X8) STM1EA electrical equipment protection group. 1 On the <i>System View</i> toolbar, select View > View Equipment Details. Result: The <i>View Equipment Details</i> window opens. 2 Expand the required bay and shelf details by clicking on the plus (+) symbol next to the shelf. 3 View the eprn (STM1EA) and eprotsw (SWITCH/STM1EA) slots in the shelf details.

4

If...	Then...
the eprn and eprotsw slots are equipped with the proper circuit packs,	the 1XN electrical equipment protection group is already established. Continue with Step 7.
either of the required slots is empty,	continue with Step 6.

5 View slot 16 in the required shelf details.

If...	Then...
slot 16 is equipped with an optical port unit,	the electrical protection group cannot be established. Slot 16 must be empty (not provisioned) or contain only a STM1EA port unit if 1XN electrical protection is required. Refer trouble to your provisioning group. <i>STOP! End of Task.</i>
slot 16 is unequipped or equipped with a STM1EA circuit pack,	continue with Step 6.

6 Install and provision a STM1EA protection circuit pack and SWITCH/STM1EA circuit pack into the eprn and eprotsw slots, respectively. Install other STM1EA working circuit packs at this time, if required.

Important! STM1EA working circuit packs may be installed only in slots 1-4 and slots 13-16.

Reference: T 306

7 On the *System View* toolbar, select the **Configuration > Provision** command.

Result: The *Provision Parameters for Protection Group...* window opens.

8 Select the **Ptn Grp** tab at bottom of window, then open the bay and shelf details as required.

9 Select the **1XN Equipment estm1egrp** protection group, then click **Provision** at bottom of window.

Result: The provisionable parameters area displays on right side of window.

10 Verify the protection group AID. Provision the parameters as required.

11 Click **Apply** if you made any changes.

Result: A warning window opens asking if you want to execute the command.

12 Click **Yes**, then click **Close** to exit.

END OF STEPS



Task 343: Deprovision WBM 2.5G-STM1E I/O Shelf

Purpose Use this procedure to deprovision an existing WaveStar 2.5G-STM1E I/O shelf in the system. Deprovisioning an existing shelf requires that a minimal set of mandatory circuit packs remain in the system to retain communications between the WaveStar CIT and system controller.

When a new shelf is created and transmission cannot be established, it may be necessary to use this procedure to deprovision the shelf and create a new shelf. When the new shelf is created again, verify that you use the correct ON cable identifier and BSW port identifier in provisioning the new shelf.

Required privilege code You must have a security privilege code of at least P3 to perform this task.

Required equipment The following equipment is required in order to complete this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist Strap

Related information For related information, see the following sections in this document:

- Chapter 3, “Platform Descriptions”
- Chapter 7, “Provisioning, Security, and Administration”
- Appendix A, “WaveStar CIT Tutorial”

Before you begin Prior to performing this task, you must:

- Obtain the work instructions for this task.
- Identify the system and I/O bay that is associated with the 2.5G-STM1E I/O shelf being deprovisioned.
- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Task Complete the following steps to deprovision a 2.5G-STM1E I/O shelf entity.

-
- 1** Use the WaveStar CIT to log in to the WaveStar BandWidth Manager system containing the shelf being deprovisioned.

2 Verify that all service/traffic has been removed from the shelf per local procedures.

3 On the *System View* menu, select **View > Cross Connections**.

Result: The *View Cross Connections* window opens.

4 In the *View Cross Connections* window, open the Bay details then highlight the shelf being deprovisioned. Click **Select** at bottom of window.

Result: The *View Cross Connections for wbm* window opens.

5 Verify no cross-connections exist for the shelf.

6

If...	Then...
no cross-connections exist,	click Close to exit, then continue with the next step.
cross-connections exist,	click Close to exit, then delete all cross-connections. Reference: T 304

7 On the *System View* menu, select **View > Loopback**.

Result: The *View Loopbacks* window opens.

8 In the *View Loopbacks* window, open the Bay details then highlight the shelf being deprovisioned. Click **Select** at bottom of window.

Result: The *View Loopbacks* window opens.

9 Verify no loopbacks exist for the shelf.

10

If...	Then...
no loopbacks exist,	click Close to exit, then continue with the next step.
loopbacks exist,	click Close to exit, then release all loopbacks. Reference: T 209

11 On the *System View* menu, use the **Fault > Analysis > Test Access** command to check for test access sessions.

Result: The *Test Access Wizard* screen opens.

Reference: T 222

12 Select **View existing test access sessions**, then click **Next**.

13 Use the **Browse** button to select the shelf being deleted and verify no test access sessions exist for this shelf.

14

If...	Then...
no test access sessions exist,	click Close to exit, then continue with the next step.
test access sessions exist,	click Close to exit, then delete all test access sessions. Reference: T 213

15 On the *System View* menu, select **View > Protection**.

Result: The *View Protection* window opens.

16 In the *View Protection* window, open the Bay and Shelf details for the shelf being deprovisioned.

17 Verify no optical port protection groups exist on the shelf.

18

If...	Then...
no optical port protection groups exist,	click Close to exit, then continue with the next step.
optical port protection groups exist,	click Close to exit, then delete all optical port protection groups. Reference: T 308

19 On the *System View* menu, select **View > Timing/Sync**.

Result: The *View Timing/Sync* window opens.

20 Click on the **Timing References** tab.

Result: Timing reference parameters display.

21 Under the *Timing Reference* column, find **LINE1**. Then, under the *Port AID* column, check if a port AID is listed that is associated with the shelf you are deleting.

22

If...	Then...
a port AID, associated with this shelf, is listed,	click Close to exit, then continue with the next step.
a port AID, associated with this shelf, is NOT listed,	click Close to exit, then continue with Step 32.

23 On the *System View* menu, select **Configuration > Timing/Sync**.

Result: The *Provision Timing/Sync* window opens.

24 Click on the **Timing Reference** tab.

Result: Timing reference parameters display.

25 In the *Timing Reference* box, select **LINE1**.

26 In the *Port AID* box, select **NOT-CONNECTED** to disconnect the timing reference from the shelf you are deleting.

27 Click **Apply** to make changes. Then, click **OK** to exit.

28 At the I/O shelf being deprovisioned, unlatch and remove the following circuit packs *only*:

1. Port units in slots 1 through 8 and slots 9 through 16
2. STM1EA circuit pack in EPRN slot
3. SWITCH/STM1EA circuit pack in EPROTSW slot
4. CTLSYS50DM circuit pack in CTLMEM1 slot (may be removed, but not required)
5. All SWIF circuit packs *except* SWIF pack in slot SWIF 10

Important! Do not remove any of the following circuit packs: CTLSYS50DM in CTLMEM 0 slot, the TMG/STRAT3 timing packs in TMG 0 and TMG 1 slots, the SWITCH/STS576 circuit packs in SWITCH 0 and SWITCH 1 slots, and the SWIF circuit pack in the SWIF 10 slot.

29 On the *System View* menu, select **Configuration > Delete**.

Result: The *Delete* window opens.

An alternate way to delete the circuit packs is from the Shelf View. Right click on the circuit pack being deleted, and select Delete Circuit Pack. See Appendix A, “WaveStar CIT Tutorial”, for details on the Shelf View procedures.

.....

30 In the *Delete* window, open up the required bay and shelf details.

.....

31 Highlight/select one of the circuit packs removed in Step 32, then click on **Select**.

.....

Result: A warning window opens to ask you if you want to continue. Select **Yes**..

.....

32 Repeat Step 35 until all the circuit packs removed in Step 32 are deleted from the system.

.....

33 Highlight/select the shelf being deleted, then click on **Select**.

.....

Result: A warning window opens to ask you if you want to continue. Select **Yes**.

.....

34 Verify the shelf is deleted in the *System View* display.

.....

35 Remove all circuit packs from the shelf, if required.

.....

.....

END OF STEPS

.....



Task 344: Example of Bridging and Rolling an Existing Cross-Connection to a Different Tributary

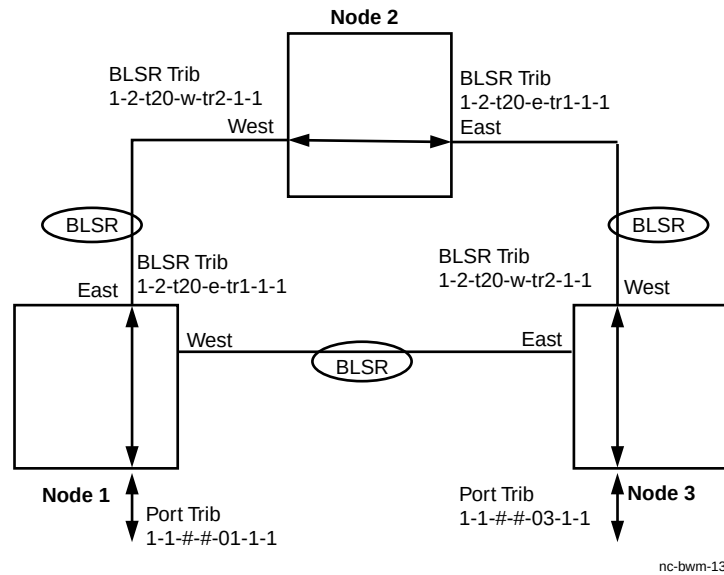
Purpose	Use this procedure to roll an existing cross-connection from one source to another source.
Required privilege code	You must have a security privilege code of at least P3 to perform this task.
Required equipment	WaveStar Craft Interface Terminal (CIT)
Related information	For related information, see the following sections in this document: • Chapter 7, Provisioning, Security, and Administration • Appendix A, WaveStar CIT Tutorial
Before you begin	Before you begin this task, you must: • Obtain the work instructions for this task. • Determine the cross-connection(s) to be rolled. • Identify the tributaries for the new cross-connections. • Log in to the NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

Important! The following procedure is based on a hypothetical example. It assumes a two-fiber BLSR with OC-192 adjacent slot equippage. The same methodology will apply for an MSpring. Always be careful to use the appropriate AIDs (adjacent slot or symmetric). You can use this example procedure to apply the basic concepts to the task you want to perform.

Task	Complete the following steps to bridge and roll an existing cross-connection.

-
- 1 From the *System View* screen, select **View > Rings > Ring Map** to select and simultaneously view all nodes (the ringmap) for this ring.

The following figure is an example of a ring map. It also contains cross-connect information. This information must be obtained separately at each node.



In this example, a two-way STS-1 cross-connection exists from a port tributary at Node 1 to a port tributary at Node 3 using tributary 1 on the east port of the OC-192 2-Fiber BLSR at Node 1. We want to free tributary 1 of the BLSR to be used for another cross-connection. This means we have to roll the existing cross-connection to another free tributary on the BLSR. For this example, we will roll to tributary 4 on the BLSR.



CAUTION

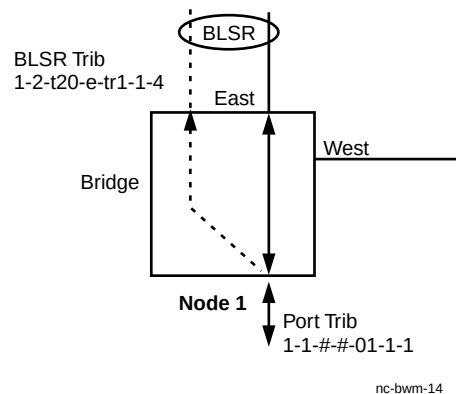
Before rolling the existing cross-connection to a new BLSR tributary, you must establish the new cross-connections at intermediate nodes, and bridge the existing circuit at the end nodes.

- 2 From the *System View* screen, select **View > View Equipment Details** and verify that all slots, circuit packs, ports, protection groups, and required tributaries have been provisioned at each node.
- 3 Remotely login to the adjacent node (Node 2) going East and establish a new two-way STS-1 tributary-to-tributary (1-2-t20-e-tr1-1-4 to 1-2-

t20-w-tr2-1-4) cross-connection using the **Configuration > Cross-Connection** command.

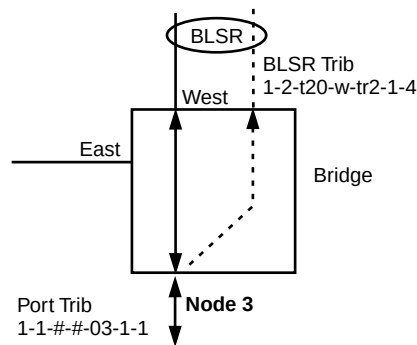
Important! While using the WaveStar CIT you will only be able to remotely login in to another WaveStar BandWidth Manager or a WaveStar 2.5G/10G. If the adjacent node is NOT one of these two products, then you must use an alternative to the WaveStar CIT.

-
- 4 Repeat Step 3 for all intermediate nodes until you reach the destination node.
-
- 5 At Node 1, use the **Configuration > Cross-Connection** command to establish a one-way STS-1 cross-connect bridge from port tributary 1-1-##-01-1-1 to the new BLSR tributary 1-2-t20-e-tr1-1-4. See Figure below.



Important! When performing the bridge at Node 1 using the Cross Connection Wizard, note that the Source tributary is the port tributary 1-1-##-01-1-1, the Existing Destination tributary is 1-2-t20-e-tr1-1-1, and the New Destination tributary is 1-2-t20-e-tr1-1-4. The Destination NE Name is Node 3 in the final screen of the wizard.

-
- 6 At Node 3, use the **Configuration > Cross-Connection** command to establish a one-way STS-1 cross-connect bridge from port 1-1-##-03-1-1 to the new BLSR tributary 1-2-t20-w-tr2-1-4 using the **Configuration > Cross-Connection** command. See Figure below.



nc-bwm-15

Important! When performing the bridge at Node 3 using the Cross Connection Wizard, note that the Source tributary is the port tributary 1-1-##-03-1-1, the Existing Destination tributary is 1-2-t20-w-tr2-1-1, and the new Destination tributary is 1-2-t20-w-tr2-1-4. The Destination NE Name is Node 1 in the final screen of the wizard.



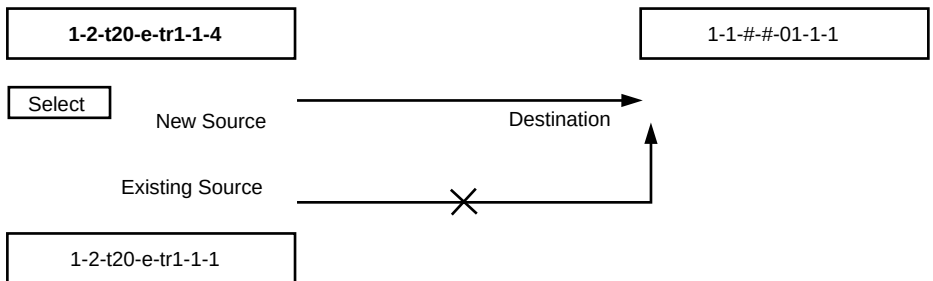
CAUTION

Service interruption will occur if all new cross-connections are not properly made before performing the following roll procedures.

- 7 Use the **View > Cross-Connection** command to verify that you have made all the new required cross-connections.
- 8 Use the **Configuration > Cross-Connection** command to perform the following roll procedures at each end node.
- 9 At Node 1, select the Roll option in the Cross Connection Wizard.
- 10 In Cross Connection Wizard screen 1, select the 2-Way cross-connection type between port tributary 1-1-##-01-1-1 and the original BLSR port tributary 1-2-t20-e-tr1-1-1. Click **Next**.

-
- 11** In Cross Connection Wizard screen 2, select the original Source port BLSR tributary 1-2-t20-e-tr1-1-1 as the leg you want to roll. Click **Next**.
-

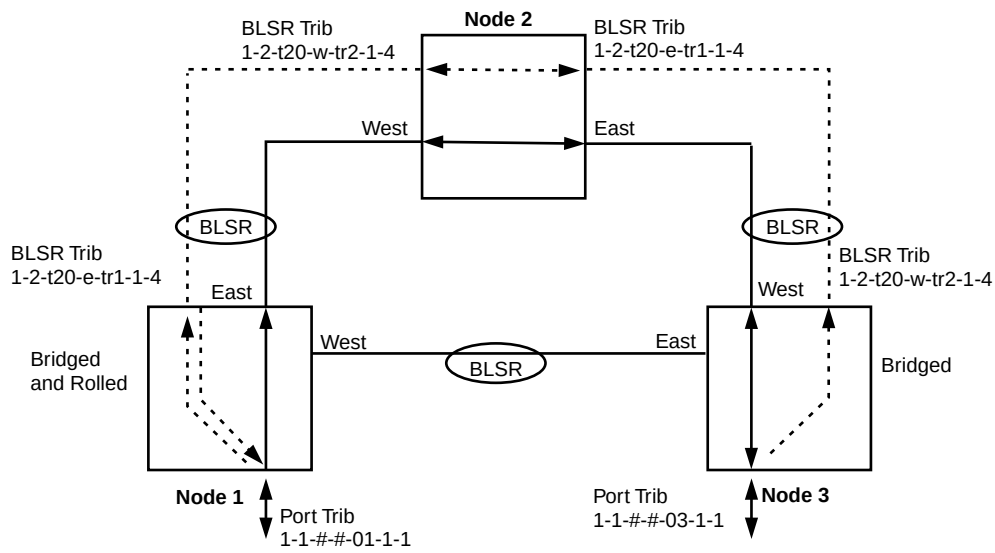
- 12** In Cross Connection Wizard screen 3, select the New Source tributary as 1-2-t20-e-tr1-1-4. Click **Next**.



nc-bwm-19

-
- 13** In Cross Connection Wizard screen 4, verify the information is correct, then click **Finish**.

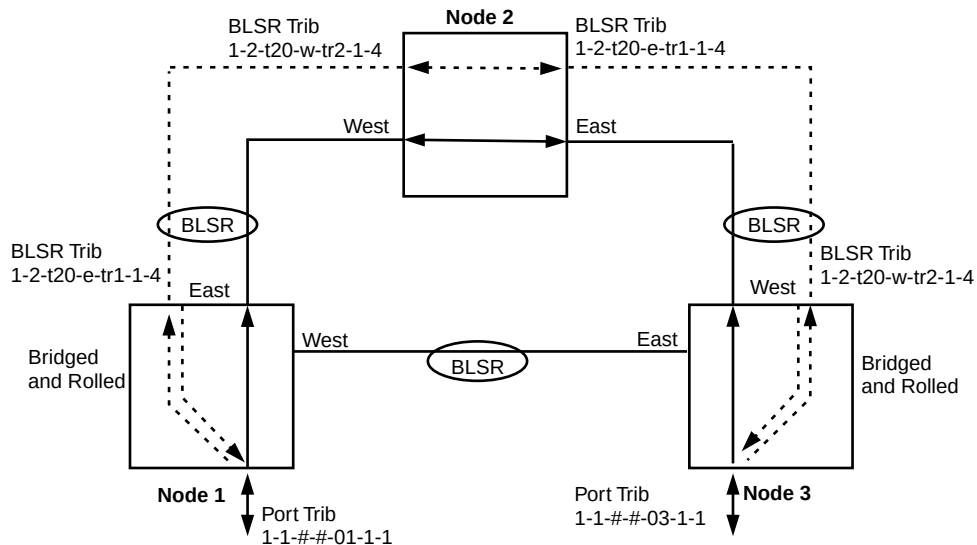
The cross-connections at this point should look like the following. Note that the new cross-connection at Node 1 is now a 2-way cross-connection and the original cross-connection is now a 1-way cross-connection.



nc-bwm-16

- 14 Repeat Steps 8 through 13 at Node 3 for cross-connections between port tributary 1-1-##-03-1-1 and the original BLSR port tributary 1-2-t20-w-tr2-1-1.

After the cross-connections are rolled at Node 3, the cross-connections should look like the following:



nc-bwm-17

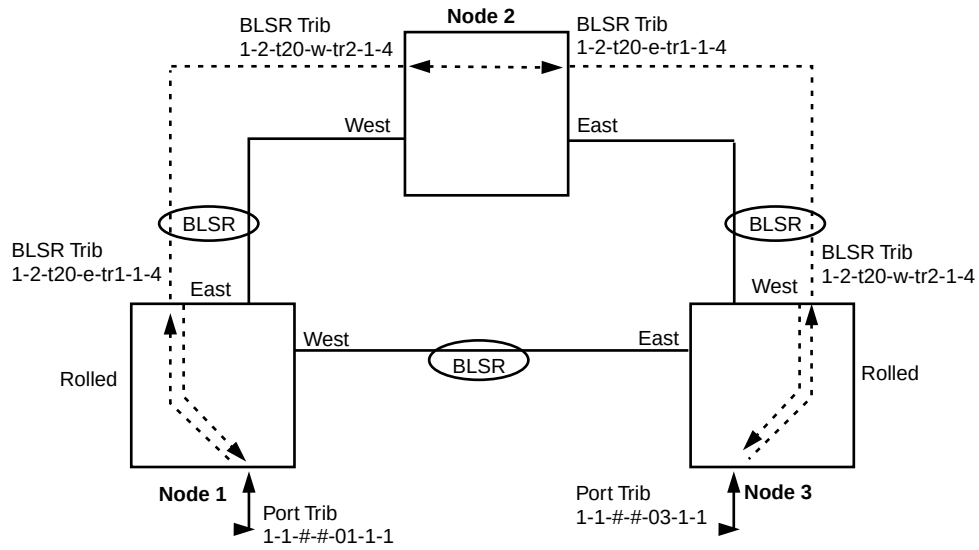


CAUTION

Service interruption will occur if all new cross-connections and roll procedures are not properly made before deleting the original cross-connections.

- 15** Use the **View > Cross-Connection** command to verify that you have made all the new required cross-connections.
- 16** At Node 1, use the **Configuration > Cross-Connection** delete command to delete the original, now 1-way, cross-connection between port tributary 1-1-#-#-01-1-1 and the original BLSR port tributary 1-2-t20-e-tr1-1-1.
- 17** At Node 3, use the **Configuration > Cross-Connection** delete command to delete the original, now one-way, cross-connection between port tributary 1-1-#-#-03-1-1 and the original BLSR port tributary 1-2-t20-w-tr2-1-1.
- 18** At all intermediate nodes, use the **Configuration > Cross-Connection** delete command to delete the original tributary-to-tributary cross-connections. For example at Node 2, delete the through cross-connection between tributary 1-2-t20-w-tr2-1-1 and tributary 1-2-t20-e-tr1-1-1.

The final configuration should look like the following:



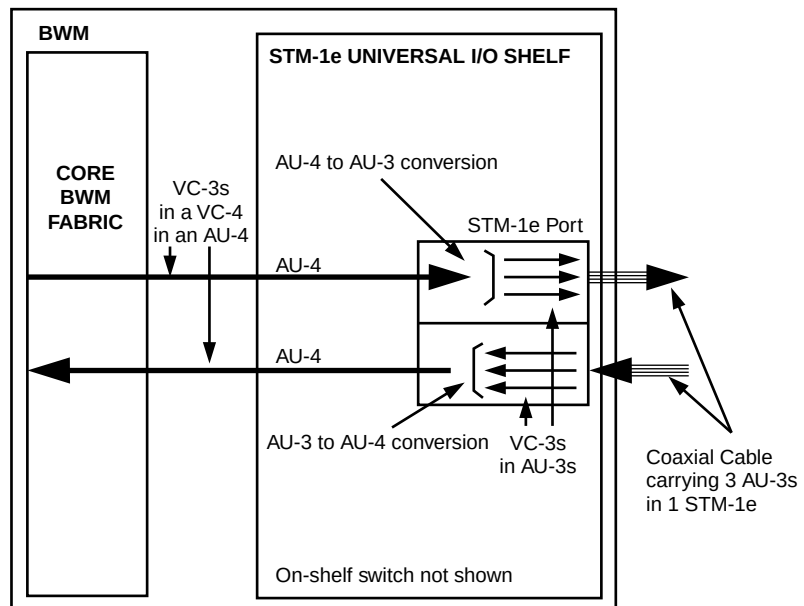
END OF STEPS



Task 345: Provision Basic AU-3/AU-4 Adaptation

Purpose Basic AU-3/AU-4 adaptation allows an STM1e port to communicate over cables with equipment that uses SONET mode mapping and at the same time communicate via cross-connections with equipment that uses SDH mode mapping.

Transmission flow



nc-usm-336

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap
- STM1e I/O Universal Shelf
- Coaxial cable jumpers

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

Related information For related information, see the following sections in this document:

- Circuit Order/Provisioning Task T307, “Provision Transmission Circuit Pack Port(s)”
- Chapter 7, “AU-3/AU-4 Adaptation” (7-87)

Before you begin Before you begin this task:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the assigned address(es) (AIDs) of the STM1e port(s) to be used for adaptation.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to provision an STM1e port for AU-3/AU-4 adaptation.

-
- 1** At the WaveStar CIT, select **Configuration>Provision**.

Result: The *Provision Parameters for Protection Group or Equipment* screen appears.

- 2** Make sure the **Equip** tab is selected.

Result: An equipment tree structure appears.

- 3** Use the tree structure to select the circuit pack and port that you want to use for adaptation.

Result: The port appears highlighted.

4 Click on the **Provision** button.

Result: The provisioning options for the selected port appear.

5 Select one of the following options for AU-3/AU-4 adaptation:

- *None* means to disable the AU-3/AU-4 adaptation function. The input/output tributary rate will remain unchanged if **None** is selected.
- *Input* means to convert the incoming signal from AU-3 to AU-4, but leave the outgoing signal in its original form. When **Input** is selected, the input tributary rate of the port will automatically be provisioned as 3xVC-3. Note that cross-connections from this port can only be at the VC-4 level.
- *Output* means to convert the outgoing signal from AU-4 to AU-3 but leave the incoming signal in its original form. When **Output** is selected, the output tributary rate of the port will automatically be provisioned as 1xVC-4. Note that cross-connections from this port can only be at the VC-4 level.
- *Both* means to convert the incoming signal from AU-3 to AU-4 and convert the outgoing signal from AU-4 to AU-3. When **Both** is selected, the input tributary rate of the port will automatically be provisioned as 3.VC-3. The output tributary rate of the port will automatically be provisioned as 1xVC-4. Note that cross-connections from this port can only be at the VC-4 level.

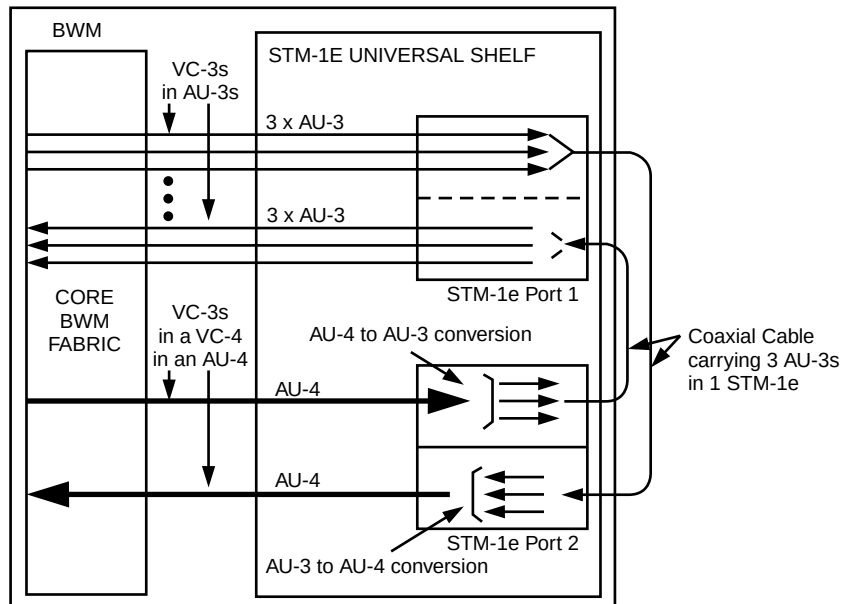
END OF STEPS



Task 346: Provision Generalized AU-3/AU-4 Adaptation

Purpose Generalized AU-3/AU-4 adaptation uses jumpers to allow an STM1e port to cross-connect between equipment that uses SONET mode mapping and equipment that uses SDH mode mapping.

Transmission flow



NC-USM-304

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap
- STM1e I/O Universal Shelf
- Coaxial cable jumpers

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager system to prevent electrostatic discharge damage to sensitive components.

Related information For related information, see the following sections in this document:

- Circuit Order/Provisioning Task T307, “Provision Transmission Circuit Pack Port(s)”
- Chapter 7, “AU-3/AU-4 Adaptation” (7-87)

Before you begin Before you begin this task:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the assigned address(es) (AIDs) of the STM1e port(s) to be used for adaptation.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to provision an STM1e port for AU-3/AU-4 adaptation.

1 Connect coaxial jumper cables as shown in the figure on page T345-1.

2 At the WaveStar CIT, select **Configuration>Provision**.

Result: The *Provision Parameters for Protection Group or Equipment* screen appears.

3 Make sure the **Equip** tab is selected.

Result: An equipment tree structure appears.

-
- 4 Use the tree structure to select the circuit pack and port that you want to use as Port 1 as shown in the figure on page T346-1.

Result: The port appears highlighted.

- 5 Click on the **Provision** button.

Result: The provisioning options for the selected port appear.

- 6 Select the option **None** for AU-3/AU-4 adaptation to disable adaptation on Port 1.
-

- 7 If the *Input Tributary Signal Rate List* does not already appear as 33, then set it to 3xVC-3 by clicking on the **Use Form** button and then selecting **VC3**.
-

- 8 If the *Unequipped Output Signal* does not already appear as 33, then set it to 3xVC-3 by clicking on the **Use Form** button and then selecting **VC3**.
-

- 9 Click on the **Apply** button if you made changes to Port 1. Otherwise click on the **Close** button.
-

- 10 Use the tree structure to select the circuit pack and port that you want to use as Port 2 as shown in the figure on page T346-1.
-

- 11 Select one of the following options for AU-3/AU-4 adaptation, depending on whether you want the adaptation to occur in just one or in both directions:

- *Input* means to convert the incoming signal from AU-3 to AU-4, but leave the outgoing signal in its original form. When **Input** is selected, the input tributary rate of the port will automatically be provisioned as 3xVC-3. Note that cross-connections from this port can only be at the VC-4 level.

- *Output* means to convert the outgoing signal from AU-4 to AU-3 but leave the incoming signal in its original form. When **Output** is selected, the output tributary rate of the port will automatically be provisioned as 1xVC-4. Note that cross-connections from this port can only be at the VC-4 level.
- *Both* means to convert the incoming signal from AU-3 to AU-4 and convert the outgoing signal from AU-4 to AU-3. When **Both** is selected, the input tributary rate of the port will automatically be provisioned as 3.VC-3. The output tributary rate of the port will automatically be provisioned as 1xVC-4. Note that cross-connections from this port can only be at the VC-4 level.

END OF STEPS



Task 347: Configure a Manual Ring Map

Purpose Use this procedure to configure a manual ring map for a selected ring. A ring map for a Bidirectional Line Switched Ring (BLSR) is a list of nodes in order around the ring. By default a network element (NE) uses automatic ring discovery (ARD) to configure the ring map. A user can also configure a manual ring map. The NE continues to use the ARD ring map until the user disables ARD and activates the manual ring map.

If changes are made to the manual ring map after it has been activated, they are applied to what is called the inactive map, meaning that they do not take effect until the map is activated again.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)

Related information For related information, see the following sections in this document:

- Circuit Order/Provisioning Task T348, “Activate a Manual Ring Map”
- Chapter 7, “Manual Ring Maps” (7-124)

Before you begin Before you begin this task:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the ring for which you are configuring the map, and the node IDs (NIDs) and NE names (TIDs) for any nodes that you are adding or deleting.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to configure a manual ring map.

-
- 1 At the WaveStar CIT System View, select **Configuration > Configure Manual Ring Map**.

Result: An explorer window appears showing the rings that are currently provisioned for the BandWidth Manager that you are logged into.

-
- 2 From the explorer window select the ring for which you want to configure a manual ring map.

-
- 3 Click on the **Select** button.

Result: The manual ring map appears.

-
- 4 Click on a node in the manual ring map and then do one of the following:

- Remove a node by selecting it and clicking the **Remove Node** button.
- Add a node in the clockwise direction from an existing node by selecting the existing node, clicking the **Add Node** button, then entering the new node ID and new NE name (TID).

Note that a node ID can be any integer between 0 and 15, inclusive. For the rules for NE names (TIDs) see “Characters allowed in the TID” (7-43).

-
- 5 Click on the **Apply** button to apply the changes you made to the inactive manual ring map. To make the NE use this map you must activate it by making sure that ARD is disabled and selecting **Configure > Activate Ring Map**. For details see Task 348.

END OF STEPS



Task 348: Activate a Manual Ring Map

Purpose Use this procedure to activate a manual ring map for a selected ring. A ring map for a Bidirectional Line Switched Ring (BLSR) is a list of nodes in order around the ring. By default a network element (NE) uses automatic ring discovery (ARD) to configure the ring map. A user can also configure a manual ring map. The NE continues to use the ARD ring map until the user disables ARD and activates the manual ring map.

If changes are made to the manual ring map after it has been activated, they are applied to what is called the inactive map, meaning that they do not take effect until the map is activated again.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Activating a manual ring map affects service on the ring.

Related information For related information, see the following sections in this document:

- Operations Task T347, “Configure a Manual Ring Map”
- Chapter 7, “Manual Ring Maps” (7-124)

Before you begin Before you begin this task:

- Obtain the work instructions for this task.
- Verify that the work instructions identify the ring for which you are activating the map.
- Verify that a WaveStar CIT is connected and logged in to the WaveStar BandWidth Manager system.

Task Complete the following steps to activate a manual ring map.

1 Disable automatic ring discovery (ARD) as follows:

1. At the WaveStar CIT System View, select **Configuration > Provision**. A window appears with the Equipment Explorer on the left.
 2. Select the **Ptn Grp** tab.
 3. Expand the bay and shelf to display the ring you want.
 4. Select the ring for which you want to disable ARD.
 5. Click on the **Provision** button. The ring parameters appear on the right.
 6. Select the **Disabled** option next to **Automatic Ring Discovery**.
 7. Click on the **Apply** button. A Service Affecting warning appears.
 8. Select **Yes** to go ahead and disable ARD.
-

2 At the WaveStar CIT System View, select **Configuration > Activate Manual Ring Map**.

Result: An explorer window appears showing the rings that are currently provisioned for the BandWidth Manager that you are logged into.

3 From the explorer window select the ring for which you want to activate a manual ring map.

4 Click on the **Select** button.

Result: A Service Affecting warning appears.

5 Click on the **Yes** button to go ahead and activate the manual ring map.

END OF STEPS



Task 349: Provision Traffic on a Single BLSR/MS-SPRing

Purpose This task explains how to provision traffic that traverses a single ring, staying on the same time slot. To provision traffic that traverses multiple rings, see Task 350. To provision traffic that uses time slot interchange, see Task 351.

Required equipment The following equipment is required to perform this task:

- Craft Interface Terminal (CIT) or another interface that can send TL1 commands to the BandWidth Manager

Related information For related information, see the following:

- “Source and Destination NEs for Single BLSR/MS-SPRing Traffic” (7-153) in this manual for guidelines on selecting source and destination NEs (known as *locA* and *locZ* in TL1)
- “ENT-CRS” in the *TL1 Message Details* manual if you want to use TL1 commands instead of the CIT graphical interface

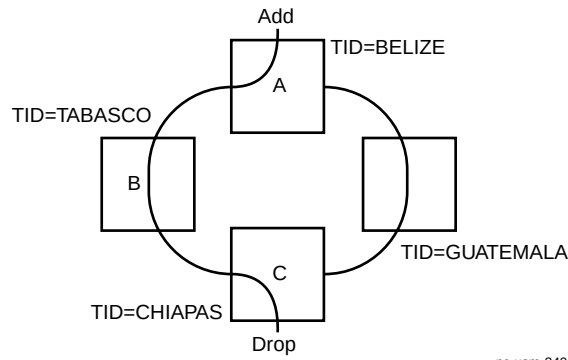
Task summary The steps below summarize this task:

1. Draw a map and table of your traffic. Refer to the “Related information” section(s) above, if necessary. Use your map and table as a guide for the rest of this task.
2. Create your “add” cross-connection.
3. Create your “through” cross-connections.
4. Create your “drop” cross-connection.

Task details Complete the following steps to provision traffic on a single BLSR or MS-SPRing:

-
- 1** Draw a map and table similar to the example on the following page for the traffic you intend to provision. It may help to view the ring map from the CIT *System View* by selecting **View > Rings > Ring Map**. Highlight the ring to be provisioned, click the **Select** button, then click the **Display Ring Map Graph** button.

Example:



nc-usm-340

XConn	Type	Source NE	Dest NE
A	Add	none	CHIAPAS
B	Through	BELIZE	CHIAPAS
C	Drop	BELIZE	none

2 Create your “add” cross-connection, as follows:

1. Login to the network element where the traffic should be added.
2. From the *System View* select **Configuration > Cross-Connection**. The *Cross Connection Wizard* appears.
3. Select the **Create a new cross-connection** option, then click the **Next** button.
4. At *Screen 1*, select a rate from the drop-down menu, then select the **2-Way Point-to-Point** option, then click the **Next** button.
5. At *Screen 2 of 3*, select and record your source and destination tributaries. The source tributary is not part of the ring; the destination tributary is part of the ring. For a 2-fiber ring, select either **East Port** or **West Port** depending on which direction you are going. (For a 4-fiber ring, select **East Working Port** or **West Working Port**.) Click the **Next** button.
6. At *Screen 3 of 3*, select your **Destination NE Name** based on your sketch, which is the NE where the traffic exits the ring, then click the **Finish** button.
7. If a **Confirm** window with an *unprotected* warning appears, click **Yes** to confirm.

8. Click **Close** to exit the *Cross Connection Wizard*. A **Confirm** window appears, click **Yes** to confirm.
-

3 Create your “through” cross-connection, as follows:

1. Login to the network element where the traffic is passing through (staying on the ring).
2. From the *System View* select **Configuration > Cross-Connection**. The *Cross Connection Wizard* appears.
3. Select the **Create a new cross-connection** option, then click the **Next** button.
4. At *Screen 1*, select a rate from the drop-down menu, then select the **2-Way Point-to-Point** option, then click the **Next** button.
5. At *Screen 2 of 3*, select and record your source and destination tributaries. The source tributary is part of the ring and opposite to the destination of your previous cross-connection. The destination tributary is opposite to the source.

Examples: For a 2-fiber ring, if the destination of the previous cross-connection is on the **West Port** then for the NE with the “through” cross-connection, the source is on the **East Port** and the destination is on the **West Port**. For a 4-fiber ring, if the destination of the previous cross-connection is on the **West Working Port** then for the NE with the “through” connection, the source is on the **East Working Port** and the destination is on the **West Working Port**.

Click the **Next** button.

6. At *Screen 3 of 3*, select your **Source NE Name** and **Destination NE Name** based on your sketch. The Source NE is where the traffic enters the ring and the Destination NE is where the traffic exits the ring. Then click the **Finish** button.
-

4 Repeat step 3, if necessary, for each “through” cross-connection. When done, click **Close** to exit the *Cross Connection Wizard*. A **Confirm** window appears, click **Yes** to confirm.

5 Create your “drop” cross-connection, as follows:

1. Login to the network element where the traffic should be dropped.

2. From the *System View* select **Configuration > Cross-Connection**. The *Cross Connection Wizard* appears.
3. Select the **Create a new cross-connection** option, then click the **Next** button.
4. At *Screen 1*, select a rate from the drop-down menu, then select the **2-Way Point-to-Point** option, then click the **Next** button.
5. At *Screen 2 of 3*, select and record your source and destination tributaries. The source tributary is part of the ring and opposite to the destination of the last “through” connection; the destination tributary is not part of the ring. For a 2-fiber ring, select **East Port** or **West Port** depending on which direction you are going. (For a 4-fiber ring select **East Working Port** or **West Working Port**.) Click the **Next** button.
6. At *Screen 3 of 3*, select your **Source NE Name** based on your sketch, which is the NE where the traffic enters the ring, then click the **Finish** button.
7. If a **Confirm** window with an *unprotected* warning appears, click **Yes** to confirm.
8. Click **Close** to exit the *Cross Connection Wizard*. A **Confirm** window appears, click **Yes** to confirm.

END OF STEPS



Task 350: Provision Traffic on Multiple BLSRs/MS-SPRings

Purpose This task explains how to provision traffic that traverses more than one ring, staying on the same time slot, and where the rings are connected at a single node. To provision traffic that uses time slot interchange, see Task 351.

Required equipment The following equipment is required to perform this task:

- Craft Interface Terminal (CIT) or another interface that can send TL1 commands to the BandWidth Manager

Related information For related information, see the following:

- “Source and Destination NEs for Multiple BLSR/MS-SPRing Traffic” (7-154) in this manual – guidelines on selecting source and destination NEs (known as *locA* and *locZ* in TL1)
- “ENT-CRS” in the *TL1 Message Details* manual – if you want to use TL1 commands instead of the CIT graphical interface

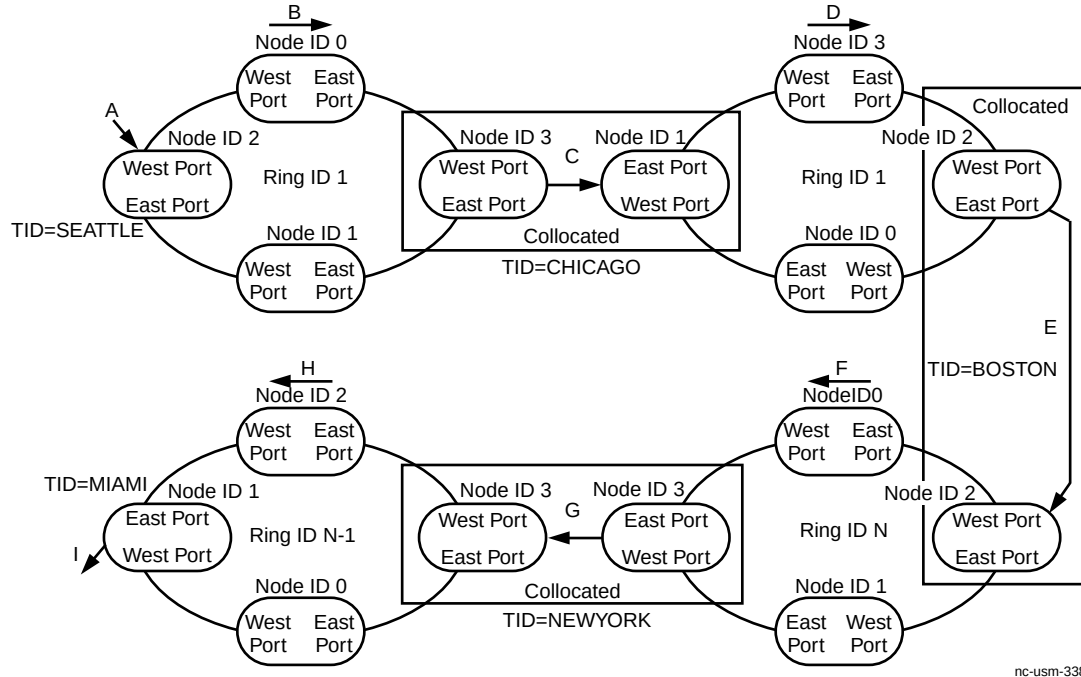
Task summary The steps below summarize this task:

1. Draw a map and table of your traffic. Refer to the “Related information” section(s) above, if necessary. Use your map and table as a guide for the rest of this task.
2. Create your “add” cross-connection.
3. Create your “through” cross-connections.
4. Create your “ring-to-ring” cross-connections.
5. Create your “drop” cross-connection.

Task details Complete the following steps to provision traffic on multiple BLSRs or MS-SPRings:

-
- 1** Draw a map and table similar to the example on the following page for the traffic you intend to provision. If you have doubts about which NEs to select as sources or destinations, see “Source and Destination NEs for Multiple BLSR/MS-SPRing Traffic” (7-154). It may help to view the ring map from the CIT *System View* by selecting **View > Rings > Ring Map**. Highlight the ring to be provisioned, click the **Select** button, then click the **Display Ring Map Graph** button.

Example:



nc-usm-338

XConn	Type	Source NE	Dest NE
A	Add	none	CHICAGO
B	Through	SEATTLE	CHICAGO
C	Ring-to-Ring	SEATTLE	BOSTON
D	Through	CHICAGO	BOSTON
E	Ring-to-Ring	CHICAGO	NEWYORK
F	Through	BOSTON	NEWYORK
G	Ring-to-Ring	BOSTON	MIAMI
H	Through	NEWYORK	MIAMI
I	Drop	NEWYORK	none

2 Create your “add” cross-connection, as follows:

1. Login to the network element where the traffic should be added.
2. From the *System View* select **Configuration > Cross-Connection**. The *Cross Connection Wizard* appears.

3. Select the **Create a new cross-connection** option, then click the **Next** button.
4. At *Screen 1*, select a rate from the drop-down menu, then select the **2-Way Point-to-Point** option, then click the **Next** button.
5. At *Screen 2 of 3*, select and record your source and destination tributaries. The source tributary is not part of the ring; the destination tributary is part of the ring. For a 2-fiber ring, select either **East Port** or **West Port** depending on which direction you are going. (For a 4-fiber ring, select **East Working Port** or **West Working Port**.) Click the **Next** button.
6. At *Screen 3 of 3*, select your **Destination NE Name** based on your sketch, which is the NE where the traffic exits the ring, then click the **Finish** button.
7. If a **Confirm** window with an *unprotected* warning appears, click **Yes** to confirm.
8. Click **Close** to exit the *Cross Connection Wizard*. A **Confirm** window appears, click **Yes** to confirm.

3 Create your “through” cross-connection, as follows:

1. Login to the network element where the traffic is passing through (staying on the ring).
2. From the *System View* select **Configuration > Cross-Connection**. The *Cross Connection Wizard* appears.
3. Select the **Create a new cross-connection** option, then click the **Next** button.
4. At *Screen 1*, select a rate from the drop-down menu, then select the **2-Way Point-to-Point** option, then click the **Next** button.
5. At *Screen 2 of 3*, select and record your source and destination tributaries. The source tributary is part of the ring and opposite to the destination of your previous cross-connection. The destination tributary is opposite to the source.

Examples: For a 2-fiber ring, if the destination of the previous cross-connection is on the **West Port** then for the NE with the “through” cross-connection, the source is on the **East Port** and the destination is on the **West Port**. For a 4-fiber ring, if the destination of the previous cross-connection is on the **West Working Port** then for the NE with the “through” connection, the source is on the **East Working Port** and the destination is on the **West Working Port**.

Click the **Next** button.

6. At *Screen 3 of 3*, select your **Source NE Name** and **Destination NE Name** based on your sketch. The Source NE is where the traffic enters the ring and the Destination NE is where the traffic exits the ring. Then click the **Finish** button.

-
- 4 Repeat step 3, if necessary, for each “through” cross-connection on the first ring. When done, click **Close** to exit the *Cross Connection Wizard*. A **Confirm** window appears, click **Yes** to confirm.

-
- 5 Create your “ring-to-ring” cross-connection, as follows:

1. Login to the network element where the traffic is passing through (staying on the ring).
2. From the *System View* select **Configuration > Cross-Connection**. The *Cross Connection Wizard* appears.
3. Select the **Create a new cross-connection** option, then click the **Next** button.
4. At *Screen 1*, select a rate from the drop-down menu, then select the **2-Way Point-to-Point** option, then click the **Next** button.
5. At *Screen 2 of 3*, select and record your source tributary. This is the tributary that is the destination of your previous cross-connection. Then select and record your destination tributary. This is the tributary on the port on the ring that is opposite to the source. For example, for a 2-fiber ring, if the source is on the **West Port** then the destination is on the **East Port**, or for a 4-fiber ring if the source is on the **West Working Port** then the destination is on the **East Working Port**. Click the **Next** button.
6. At *Screen 3 of 3*, select your **Source NE Name** and **Destination NE Name** based on your sketch. The Source NE is where the traffic enters the ring associated with the source tributary and the Destination NE is where the traffic exits the ring associated with the destination tributary. Then click the **Finish** button.

-
- 6 Repeat steps 3-5 until you have provisioned all of your through and ring-to-ring cross-connections.

7 Create your “drop” cross-connection, as follows:

1. Login to the network element where the traffic should be dropped.
2. From the *System View* select **Configuration > Cross-Connection**. The *Cross Connection Wizard* appears.
3. Select the **Create a new cross-connection** option, then click the **Next** button.
4. At *Screen 1*, select a rate from the drop-down menu, then select the **2-Way Point-to-Point** option, then click the **Next** button.
5. At *Screen 2 of 3*, select and record your source and destination tributaries. The source tributary is part of the ring and opposite to the destination of the previous cross-connection; the destination tributary is not part of the ring. For a 2-fiber ring, select **East Port** or **West Port** depending on which direction you are going. (For a 4-fiber ring select **East Working Port** or **West Working Port**.) Click the **Next** button.
6. At *Screen 3 of 3*, select your **Source NE Name** based on your sketch, which is the NE where the traffic enters the ring, then click the **Finish** button.
7. If a **Confirm** window with an *unprotected* warning appears, click **Yes** to confirm.
8. Click **Close** to exit the *Cross Connection Wizard*. A **Confirm** window appears, click **Yes** to confirm.

END OF STEPS



Task 351: Provision Traffic on a BLSR/MS-SPRing with Time Slot Interchange

Purpose This task explains how to provision traffic that traverses a single ring and switches time slots at least once. Use this task in conjunction with Task 349. This time slot switching is known as *time slot interchange* or *TSI*. If you want to provision traffic that uses TSI and traverses more than one ring, use this task in conjunction with Task 350.

Required equipment The following equipment is required to perform this task:

- Craft Interface Terminal (CIT) or another interface that can send TL1 commands to the BandWidth Manager

Related information For related information, see the following:

- “Source and Destination NEs for BLSR/MS-SPRing TSI Traffic” (7-156) in this manual – guidelines on selecting source and destination NEs (known as *locA* and *locZ* in TL1)
- “ENT-CRS” in the *TL1 Message Details* manual – if you want to use TL1 commands instead of the CIT graphical interface

Task summary The steps below summarize this task:

1. Draw a map and table of your traffic. Refer to the “Related information” section(s) above, if necessary. Use your map and table as a guide for the rest of this task.
2. Create your “add” cross-connection.
3. Create your “through” cross-connections.
4. Create your “TSI” cross-connections.
5. Create your “drop” cross-connection.

Task details **Important!** The procedure below does not necessarily lead you to create cross-connection in order around the ring. But the order in which you create the cross-connections is not important.

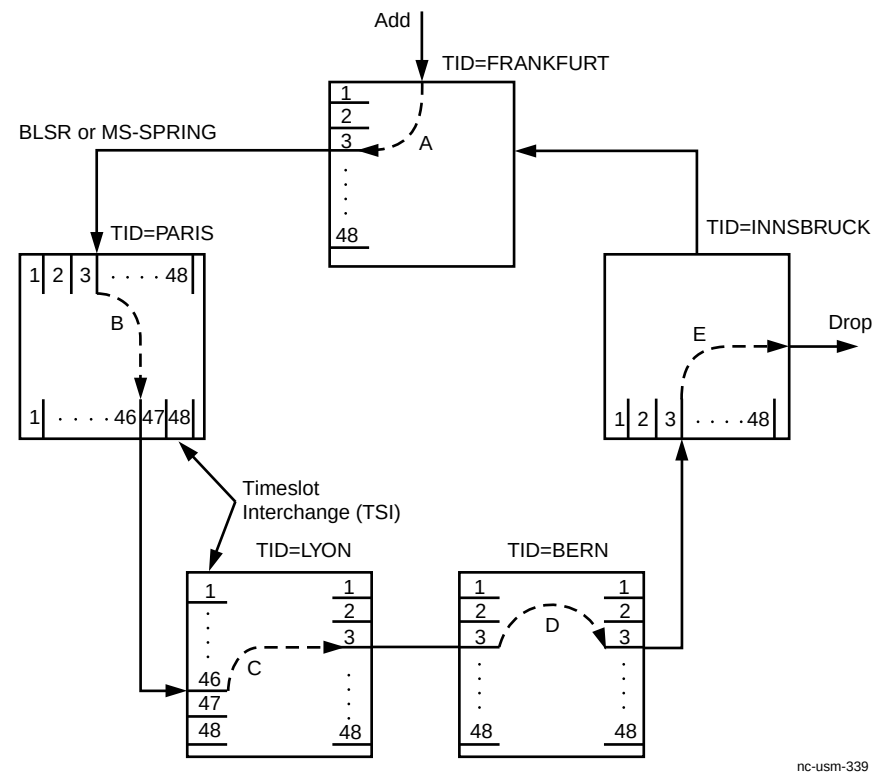
Complete the following steps to provision traffic on a single BLSR or MS-SPRing using TSI:

-
- 1 Draw a map and table similar to the example on the following page for the traffic you intend to provision. If you have doubts about which NEs

to select as sources or destinations, see “Source and Destination NEs for BLSR/MS-SPRing TSI Traffic” (7-156). It may help to view the ring map from the CIT System View by selecting **View > Rings > Ring Map**. Highlight the ring to be provisioned, click the **Select** button, then click the **Display Ring Map Graph** button.

Example: The figure below shows a 4-fiber OC-48 ring with two TSI cross-connections.

For a 2-fiber OC-48 ring, the working tributaries are 1-24 and protection tributaries 25-48, the TimeSlot Interchange must occur within the working tributaries.



XConn	Type	Source NE	Dest NE
A	Add	none	PARIS
B	TSI	FRANKFURT	LYON
C	TSI	PARIS	INNSBRUCK
D	Through	LYON	INNSBRUCK
E	Drop	LYON	none

2 Create your “add” cross-connection, as follows:

1. Login to the network element where the traffic should be added.
2. From the *System View* select **Configuration > Cross-Connection**. The *Cross Connection Wizard* appears.
3. Select the **Create a new cross-connection** option, then click the **Next** button.
4. At *Screen 1*, select a rate from the drop-down menu, then select the **2-Way Point-to-Point** option, then click the **Next** button.
5. At *Screen 2 of 3*, select and record your source and destination tributaries. The source tributary is not part of the ring; the destination tributary is part of the ring. For a 2-fiber ring, select **East Port** or **West Port** depending on which direction you are going. (For a 4-fiber ring select **East Working Port** or **West Working Port**.) Click the **Next** button.
6. At *Screen 3 of 3*, select your **Destination NE Name** based on your sketch, which is the first NE where the traffic either switches time slots or exits the ring, then click the **Finish** button.
7. If a **Confirm** window with an *unprotected* warning appears, click **Yes** to confirm.
8. Click **Close** to exit the *Cross Connection Wizard*. A confirm window appears, click **Yes** to confirm.

3 Create your “through” cross-connection, as follows:

1. Login to the network element where the traffic is passing through (staying on the ring).
2. From the *System View* select **Configuration > Cross-Connection**. The *Cross Connection Wizard* appears.
3. Select the **Create a new cross-connection** option, then click the **Next** button.
4. At *Screen 1*, select a rate from the drop-down menu, then select the **2-Way Point-to-Point** option, then click the **Next** button.
5. At *Screen 2 of 3*, select and record your source and destination tributaries. The source tributary is part of the ring and opposite to the destination of your previous cross-connection. The destination tributary is opposite to the source.

Examples: For a 2-fiber ring, if the destination of the previous cross-connection is on the **West Port** then for the NE with the “through” cross-connection, the source is on the **East Port** and the destination is on the **West Port**. For a 4-fiber ring, if the destination of the previous cross-connection is on the **West Working Port** then for the NE with the “through” connection, the source is on the **East Working Port** and the destination is on the **West Working Port**.

Click the **Next** button.

6. At *Screen 3 of 3*, select your **Source NE Name** and **Destination NE Name** based on your sketch. The Source NE is where the traffic either switches time slots or enters the ring and the Destination NE is where the traffic either switches time slots or exits the ring. Then click the **Finish** button.

-
- 4 Repeat step 3, if necessary, for each “through” cross-connection on the first ring. When done, click **Close** to exit the *Cross Connection Wizard*. A **Confirm** window appears. Click **Yes** to confirm.

-
- 5 Create your “TSI” cross-connection, as follows:

1. Login to the network element where the traffic is passing through (staying on the ring).
2. From the *System View* select **Configuration > Cross-Connection**. The *Cross Connection Wizard* appears.
3. Select the **Create a new cross-connection** option, then click the **Next** button.
4. At *Screen 1*, select a rate from the drop-down menu, then select the **2-Way Point-to-Point** option, then click the **Next** button.
5. At *Screen 2 of 3*, select and record your source and destination tributaries. The source tributary is part of the ring and opposite to the destination of your previous cross-connection. The destination tributary is on the port on the ring that is opposite to the source but has a different tributary value. Since this is a TSI cross-connection, the source and destination tributaries have different values.

Examples: For a 2-fiber ring if the destination of the previous cross-connection is on the **West Port**, then for the NE with the TSI cross-connection, the source is on the **East Port** and the destination is on the **West Port** on a different tributary. For a 4-fiber ring, if the

destination is on the **West Working Port** then for the NE with the TSI cross-connection, the source is on the **East Working Port** and the destination is on the **West Working Port** on a different tributary.

A **Confirm** window appears stating that the tributary selected is part of a time slot interchange. Click **Yes** to confirm, then click the **Next** button.

6. At *Screen 3 of 3*, select your **Source NE Name** and **Destination NE Name** based on your sketch. The Source NE is where the traffic either switches time slots or enters the ring and the Destination NE is where the traffic either switches time slots or exits the ring.

-
- 6 Repeat steps 3-5 until you have provisioned all of your “through” and “TSI” cross-connections.

-
- 7 Create your “drop” cross-connection, as follows:

1. Login to the network element where the traffic should be dropped.
2. From the *System View* select **Configuration > Cross-Connection**. The *Cross Connection Wizard* appears.
3. Select the **Create a new cross-connection** option, then click the **Next** button.
4. At *Screen 1*, select a rate from the drop-down menu, then select the **2-Way Point-to-Point** option, then click the **Next** button.
5. At *Screen 2 of 3*, select and record your source and destination tributaries. The source tributary is part of the ring and opposite to the destination of your previous cross-connection; the destination tributary is not part of the ring.

Examples: For a 2-fiber ring, if the destination of the previous cross-connection is on the **West Port** then for NE with the “drop” cross-connection, the source is on the **East Port** and the destination is off the ring. For a 4-fiber ring, if the destination of the previous cross-connection is on the **West Working Port** then for the NE with the “drop” cross-connection, the source is on the **East Working Port** and the destination is off the ring.

6. At *Screen 3 of 3*, select your **Source NE Name** based on your sketch, which is the NE where the traffic either switches time slots or enters the ring, then click the **Finish** button.

7. If a **Confirm** window with an *unprotected* warning appears, click **Yes** to confirm.
8. Click **Close** to exit the *Cross Connection Wizard*. A **Confirm** window appears. Click **Yes** to confirm.

.....
E N D O F S T E P S



Task 352: Turn Up a UPSR or SNCP Ring

Purpose Use this task to develop local procedures to create a unidirectional path-switched ring (UPSR) or subnetwork connection protection (SNCP) ring. Unlike a BLSR or MS-SPRing, a UPSR or SNCP ring as a whole is not a protection group. The protection comes from the fact that each drop cross-connection is path-protected. The following is a summary of this task:

1. Determine which network elements (NEs) will contain nodes for the ring.
2. Determine which circuit packs and ports to use for the ring.
3. Install LBOs and connect fibers between nodes.
4. Verify that each connection can carry an acceptable signal.

Required privilege code(s) You must have a security privilege code of at least P2 or greater to perform this task.

Required equipment The following equipment is required to perform this task:

- WaveStar Craft Interface Terminal (CIT)
- Wrist strap
- Optical power meter
- Appropriate optical LBOs.

Related information For related information, see the following section in this document:

- Appendix A, WaveStar CIT Tutorial
- “Overview of a UPSR or SNCP” (7-129)

Before you begin Prior to performing this task, you must:

- Obtain the work instructions for this task.
- Identify the circuit packs and ports to be used for the ring.
- Be able to log in to an NE with the WaveStar CIT and be familiar with the functions of the WaveStar CIT.

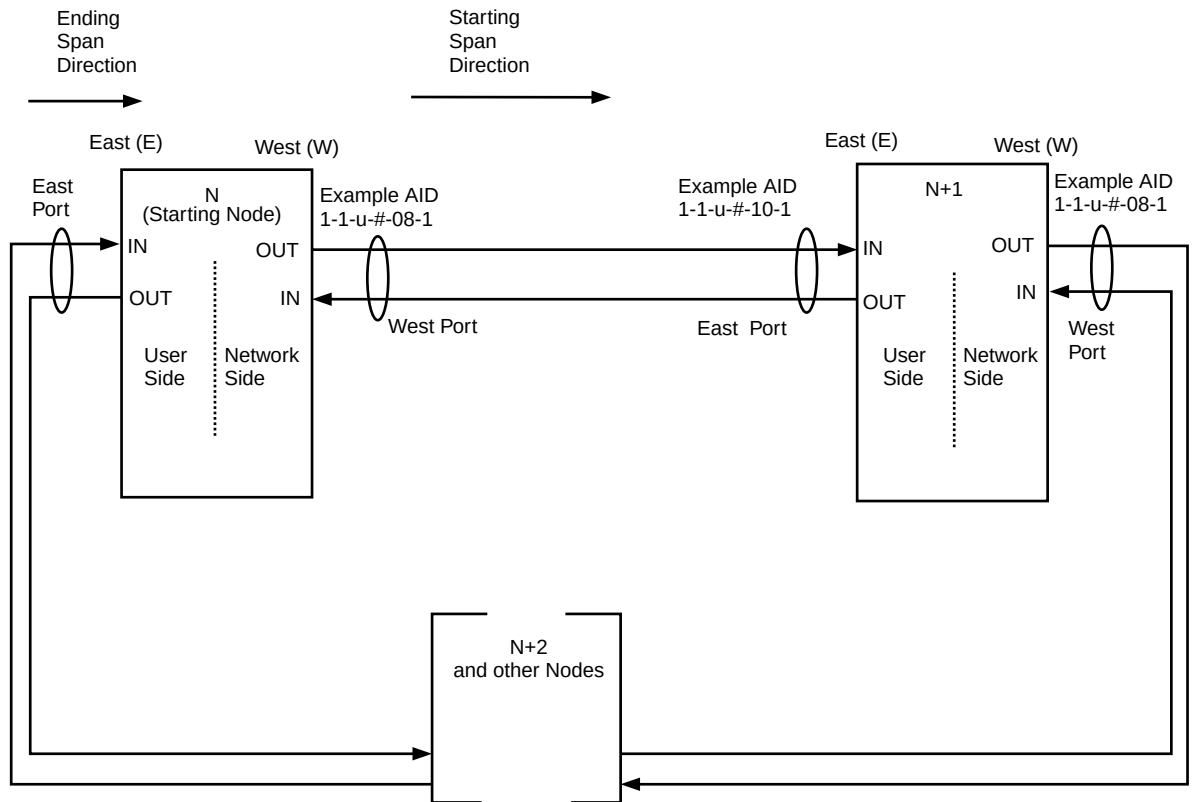
This procedure is written from the perspective that two or more people are needed to perform all the steps necessary to complete this task. The number of people will impact the amount of time and the risks associated in completing these activities. The strategy will be that one

section/span (node-to-node) will be completed before moving to the next section/span.

The starting node is referred to with the letter N and the next adjacent node as N+1. Subsequent nodes are similarly referred to as N+2, N+3, and so forth.

Verify that both nodes already have (a) the circuit packs (OC-12 or OC-48) installed, and (b) those circuit packs provisioned.

UPSR or SNCP Ring Worksheet



nc-usm-215

UPSR/SNCP RING WORKSHEET _____		SPAN NAME/ID _____
<u>N</u> TID= _____ OUT Fiber Color/ID _____ IN Color/ID _____ Received Power Level _____ Required PAD _____	<u>N+1</u> TID= _____ IN Fiber Color/ID _____ Received Power Level _____ Required IN PAD _____ OUT Fiber Color _____	

nc-usm-346

Task details Complete the following steps to turn-up a UPSR or SNCP ring.

-
- 1** The starting point for these activities will be the TID identified in your work order. For illustration purposes, we will identify this node with the letter N. Additionally, we will identify the neighbor node with the letter N+1.

Clean and connect the OUT fiber (or fibers) at the N node.

The OUT port (or ports) of the OC12/OC48 port unit will be specified in your work order.

Reference: Task 703

-
- 2** Instruct the person at the N+1 node to connect their power meter to the IN fiber (or fibers) and measure their received power level.

Instruct the person at the N+1 node to record these measured values.

-
- 3** Instruct the person at the N+1 node to select the appropriate LBO for each fiber (or fibers).

Reference: Task 711

-
- 4** Instruct the person at the N+1 node to install the LBO (or LBOs).

Reference: Task 707

-
- 5** Instruct the person at the N+1 node to clean and connect the fiber to the appropriate IN port of the OC12/OC48 port unit per their work order.

Reference: Task 703

-
- 6** Instruct the person at the N+1 node to clean and connect the OUT fiber (or fibers) at the N+1 node.

The OUT port (or ports) of the OC12/OC48 port unit will be specified in the work order.

Reference: Task 703

-
- 7** Instruct the person at the N node to connect their power meter to the IN fiber (or fibers) and measure their received power level.
-

- 8** At the N node, select the appropriate LBO for each fiber (or fibers).

Reference: Task 711

- 9** At the N node, install the LBO (or LBOs).

Reference: Task 707

- 10** At the N node, clean and connect the fiber to the appropriate IN port of the OC12/OC48 port unit per the work order.

Reference: Task 703

11

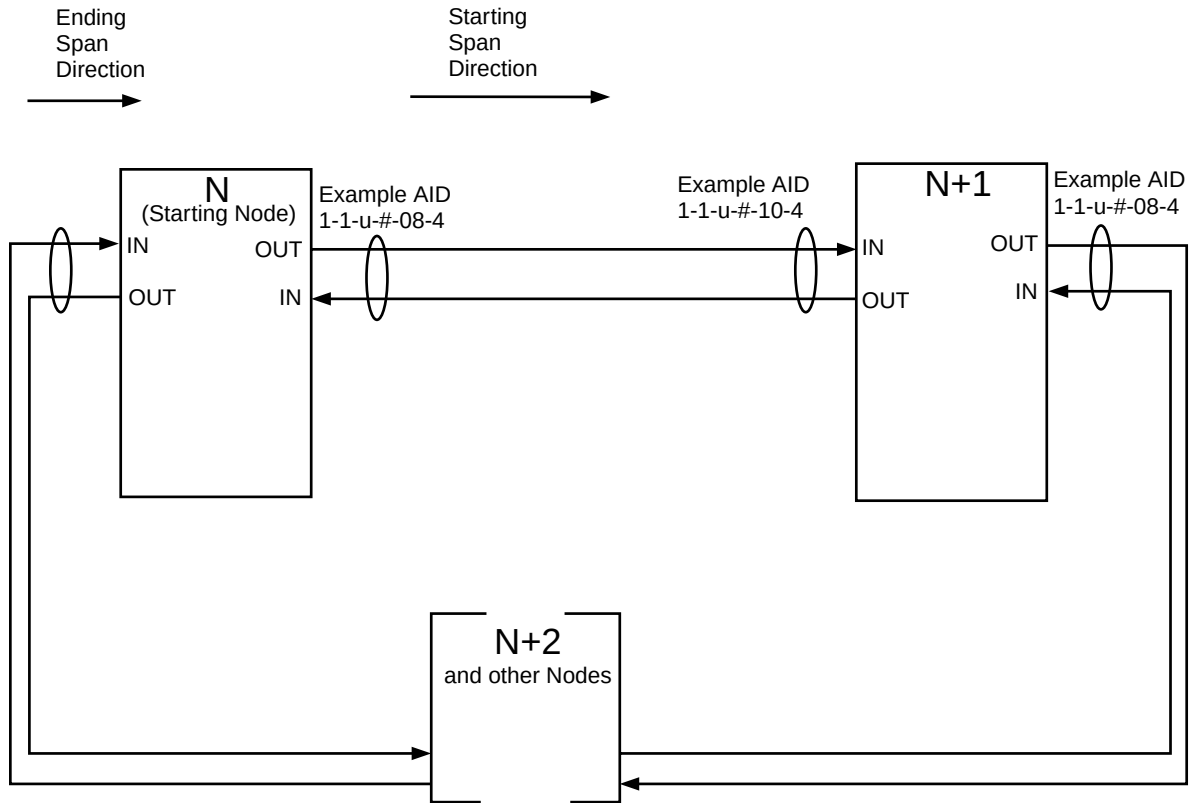
If...	Then...
there are additional nodes to be connected (any fiber spans remaining),	continue with the next step.
there are no additional nodes to be connected (no fiber spans remaining),	<i>STOP! End of Task.</i>

- 12** Instruct the person at the N+1 node of the existing span to remain in place. This becomes the N node for the new span. Instruct the person from the N node of the existing span to move around two nodes so that he/she is at the N+1 node of the new span.
-

- 13** Continue with Step 1.
-

END OF STEPS

**UPSR/SNCP Ring
Worksheet (Make
Additional Copies as
Needed)**



nc-usm-345

UPSR/SNCP RING WORKSHEET _____ SPAN NAME/ID _____	
<u>N</u> TID= _____ OUT Fiber Color/ID _____ IN Color/ID _____ Received Power Level _____ Required PAD _____	<u>N+1</u> TID= _____ IN Fiber Color/ID _____ Received Power Level _____ Required IN PAD _____ OUT Fiber Color _____

nc-usm-346

Task 353: Provision Traffic on a UPSR or SNCP

Purpose This task explains how to provision traffic on a unidirectional path-switched ring (UPSR), a subnetwork connection protection (SNCP) ring or SNCP in its general form (no physical ring). A UPSR or SNCP is not a protection group – the protection comes from the fact that the drop of traffic off of the ring or subnetwork is path-protected.

Required equipment The following equipment is required to perform this task:

- Craft Interface Terminal (CIT)

Related information For related information, see the following:

- “Overview of a UPSR or SNCP” (7-129)

Task summary The steps below summarize this task:

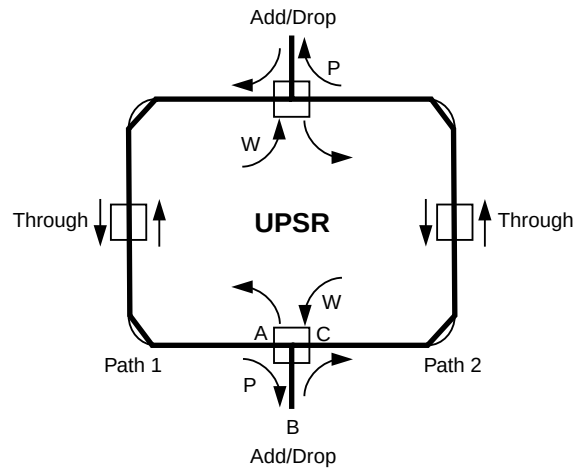
1. Draw a map of your traffic.
2. Create your “add” cross-connection.
3. Create your “through” cross-connections.
4. Create your drop cross-connection.

Task details **Important!** Your traffic may flow through several types of network elements (NEs). The instructions below apply to NE types that the CIT supports. For a list of these NE types, select **Help > Supported NEs**. For other NE types, you must use a different interface to create the cross-connections.

Complete the following steps to provision traffic on a UPSR or SNCP:

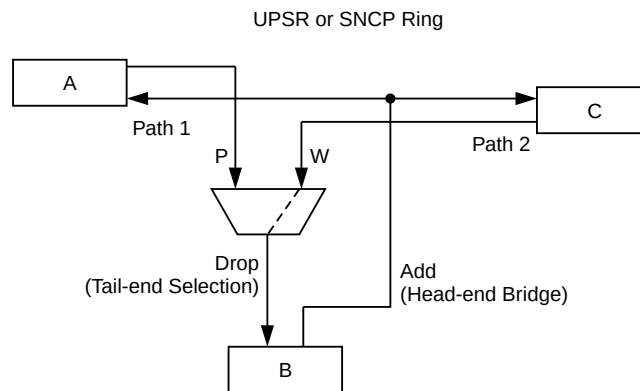
-
- 1** Draw a map similar to the example below for the traffic you intend to provision. If your traffic is on a UPSR, determine which direction is working and which is protection by viewing cross-connections of existing traffic. If there is no existing traffic, then decide which direction will be the working direction.

Example:



NC-USM-300

- 2 Notice the relationship between the traffic and the anatomy of a *UPSR/SNCP Ring Add, Drop* cross-connection, shown below.



NC-USM-301

- 3 Create your “add” cross-connection, as follows:
1. Login to the network element where the traffic should be added.
 2. From the *System View* select **Configuration > Cross-Connection**. The *Cross Connection Wizard* appears.
 3. Select the **Create a new cross-connection** option, then click the **Next** button.

4. At *Screen 1*, select a rate from the drop-down menu, then select the **UPSR/SNCP Ring Add, Drop** option, then click the **Next** button.
 5. At *Screen 2*, select your *Path 1* tributary. This is one of the tributaries going into the ring or subnetwork. By default this is the protection tributary.
 6. Still at *Screen 2*, select your *Add/Drop* tributary. This is the tributary that is outside the ring or subnetwork.
 7. Still at *Screen 2*, select your *Path 2* tributary. This is the other tributary going into the ring or subnetwork. By default this is the working tributary.
 8. If you want *Path 2* to be your protection side, then uncheck the *Wkg* checkbox next to the tributary. Click the **Next** button.
 9. At *Screen 3*, click the **Finish** button.
 10. If an *One of the ports you have selected is unprotected. Are you sure?* warning appears, click **Yes** to confirm.
-

4 Create your “through” cross-connection, as follows:

1. Login to the network element where the traffic is passing through (staying on the ring or subnetwork).
 2. From the *System View* select **Configuration > Cross-Connection**. The *Cross Connection Wizard* appears.
 3. Select the **Create a new cross-connection** option, then click the **Next** button.
 4. At *Screen 1*, select a rate from the drop-down menu, then select the **2-Way Point-to-Point** option, then click the **Next** button.
 5. At *Screen 2*, select your source tributary. This is the tributary that is the destination of your previous cross-connection.
 6. Still at *Screen 2*, select your destination tributary. This is the tributary on the other high-speed port on this NE that is part of the ring or subnetwork. Click the **Next** button. Then click the **Finish** button.
 7. If a *One of the ports you have selected is unprotected. Are you sure?* warning appears, click **Yes** to confirm.
-

5 Repeat step 4, if necessary, for each through cross-connection.

6 Create your “drop” cross-connection, as follows:

1. Login to the network element where the traffic should be dropped.
2. From the *System View* select **Configuration > Cross-Connection**. The *Cross Connection Wizard* appears.
3. Select the **Create a new cross-connection** option, then click the **Next** button.
4. At *Screen 1*, select a rate from the drop-down menu, then select the **UPSR/SNCP Ring Add, Drop** option, then click the **Next** button.
5. At *Screen 2*, select your *Path 1* tributary. This is one of the tributaries going into the ring or subnetwork.
6. Still at *Screen 2*, select your *Add/Drop* tributary. This is the tributary that is outside the ring or subnetwork.
7. Still at *Screen 2*, select your *Path 2* tributary. This is the other tributary going into the ring or subnetwork.
8. If you want *Path 2* to be your protection side, then uncheck the *Wkg* checkbox next to the tributary. Click the **Next** button.
9. At *Screen 3*, click the **Finish** button.
10. If an *One of the ports you have selected is unprotected. Are you sure?* warning appears, click **Yes** to confirm.

END OF STEPS



Task 354: Move an Eligible Pre-Release 4.0 Cross-Connection On-Shelf

Purpose All 1-way point-to-point cross-connection legs between two tributaries on the same shelf created before BandWidth Manager Release 4.0 had to go through the main switch fabric. Use this task to make those cross-connection legs *on-shelf*, which frees up main switch capacity.

Important! Because the move involves a roll, a short service interruption occurs on each leg that is moved.

Required equipment The following equipment is required to perform this task:

- Craft Interface Terminal (CIT)

Task summary The steps below summarize this task:

1. View Intershelf Bandwidth Utilization before doing the move. Record the statistics, if desired.
2. Determine which cross-connection you want to move on-shelf.
3. Roll the input of one leg of the cross-connection to its current source tributary.
4. If this is a 2-way cross-connection, also roll the other leg to its current source tributary.
5. View Intershelf Bandwidth Utilization after doing the move. Compare the statistics to those before doing the move.

Task details Complete the following steps to move an eligible cross-connection on-shelf:

-
- 1** Log into the network element where you want to move the cross-connection.
-
- 2** View Intershelf Bandwidth Utilization as follows:
 1. Select **View > Intershelf Bandwidth Utilization** from the *System View*.
 2. Select the bay and shelf, then click the **Select** button.

3. If desired, record the statistics that are displayed so that you can compare them to the statistics after the move.
4. Click the **Close** button.

-
- 3 Determine which cross-connection you want to move on-shelf. You may have a list, or you may want to use **View > Cross-Connections**.

-
- 4 From the CIT *System View*, select **Configuration > Cross-Connection**.

Result: The *Cross-Connection Wizard* appears.

-
- 5 Select **Roll a cross-connection leg from one tributary to another**, then click **Next**.

Result: *Screen 1* for the roll operation appears.

-
- 6 From the left side of *Screen 1*, select one of the ports of the cross-connection, then from the right side, select the cross-connection, then click **Next**.

Result: *Screen 2* for the roll operation appears. If this is a 2-way cross-connection then each leg appears on a separate line.

-
- 7 If this is a two-way cross-connection, select a leg of the cross-connection, make a note of which leg you selected, then click **Next**.

Result: *Screen 3* for the roll operation appears.

-
- 8 Click the **Select** button near *New Source*, then select the same port and tributary that appears near *Existing Source*.

Result: A message appears, indicating that this will create a bridge.

-
- 9 Click **Select**.

Result: The selected tributary appears in the *New Source* box.

.....

10 Click **Next**.

Result: The final screen for the roll operation appears.

.....

11 Click **Finish**.

Important! If you click **Yes** to go ahead with the roll, a short service interruption will occur.

.....

12 If you are sure you want to go ahead with the roll, click **Yes**.

Result: The roll executes.

.....

13 If this is a 2-way cross-connection, repeat the roll operation described above for the other leg.

.....

14 Close the *Cross-Connection Wizard*, then use **View > Cross-Connections** to verify that the **On Shelf** field for this cross-connection says *Yes*.

.....

15 View Intershelf Bandwidth Utilization as follows:

1. Select **View > Intershelf Bandwidth Utilization** from the *System View*.
2. Select the bay and shelf, then click the **Select** button.
3. Compare the statistics displayed to those displayed before the move.
4. Click the **Close** button.

.....

END OF STEPS

.....



Task 355: View Intershef Bandwidth Utilization

Purpose Viewing intershef bandwidth utilization can help you provision traffic more efficiently. In particular, intershef bandwidth can be conserved by using on-shelf cross-connections where possible. Cross-connections eligible to be on-shelf that were made before Release 4.0 can be moved on-shelf by using Task 354.

Required equipment The following equipment is required to perform this task:

- Craft Interface Terminal (CIT)

Task summary The following steps summarize this task:

1. Log into the network element.
2. Select **View > Intershef Bandwidth Utilization** from the *System View*.
3. Select the Bay and Shelf, then click the **Select** button.
4. If desired, record the statistics that are displayed.
5. Click the **Close** button.

Task details Complete the following steps to move an eligible cross-connection on-shelf:

1 Log into the network element where you want to intershef bandwidth utilization.

2 Select **View > Intershef Bandwidth Utilization** from the *System View*.

Result: The *View Intershef Bandwidth Utilization* screen appears

-
- 3** Select the bay and shelf, then click the **Select** button.

Result: The *View Intershelf Bandwidth Utilization for {TID} {shelfAID}* screen appears, showing the following statistics:

- Used Intershelf Bandwidth, Ingress
- Used Intershelf Bandwidth, Egress
- In-use SWIF List
- On-Shelf Utilization

-
- 4** If desired, record the statistics that are displayed.

-
- 5** Click the **Close** button.

END OF STEPS



Part IV

Supporting Tasks



Supporting Task List

Clean Optical Fibers and Connectors-	T703
Inspect (Repair) Optical and/or Electrical Cable(s) -	T704
Install/Remove Lightguide Buildout (LBO) -	T707
Make a Manual Optical Loopback-	T708
Measure Received Optical Power -	T712
Remove/Insert a PCMCIA (NVM) Card -	T702
Remove/Replace Shelf Cover -	T705
Replace a Defective Low Voltage Power Unit (LPVU) -	T710
Replace a Defective Power Filter -	T706
Replace a Fan Unit -	T709
Select Lightguide Buildout (LBO)-	T711

Task 702: Remove/Insert a PCMCIA (NVM) Card

Purpose Use this procedure to:

1. Remove an NVM card from the CTLSYS50DM circuit pack, and/or
2. Insert an NVM card into the CTLSYS50DM circuit pack.

Important! You can use this procedure to remove an NVM card regardless of the operational state of the CTL/SYS50DM circuit pack.

As long as the CTL/SYS50DM circuit pack is not equipped with an NVM card, the user can insert an NVM card conditional that the circuit pack's LED is not red.

Conventions used in this task

PCMCIA is an interface standard. There is a variety of different I/O cards that are built with a PCMCIA interface; for example, modem cards, local area network (LAN) cards, and Non-Volatile Memory (NVM) cards. Within this task, the term NVM is used exclusively to mean the 220-megabyte card memory that provides a PCMCIA interface.

Important! Another possible point of confusion is that the craft may, at times, encounter the term flash memory. The term flash memory is synonymous with NVM.

Related information

For related information see Chapter 2, *Maintenance and Trouble-Clearing* in the *WaveStar BandWidth Manager Alarm Messages and Troubleclearing Guide*, 365-370-110 R4.1.

Safety precautions



CAUTION

Do not ever remove an NVM card when the CTL/SYS50DM circuit pack's green LED is ON (either steady ON or blinking). Improper removal of an NVM card can result in damaged files and the generation of information messages such as "lost

clusters” and/or “missing/damaged sectors”.



CAUTION

Do not ever remove the NVM card by applying manual force. The mechanical eject mechanism, be it under hardware control or software control, should always (after pressing the “Eject Button”) eject the NVM card.



CAUTION

Under normal circumstances, the only time to remove an NVM card is whenever the circuit pack is physically inserted in a shelf and the shelf is powered up. If a circuit pack will boot up and give a green LED, then, and under those circumstances, the craft should not make any attempt but to remove the NVM card using the “Eject Button”.

Before you begin

Before beginning this task you should understand how the procedure *Remove an NVM Card* works during normal operations and how it should work during most types of failures.

Normal operations are defined as (a) whenever the CTL/SYS50DM circuit pack’s LED is steady or flashing green, plus (b) the MEM Active is green. Not normal operations are defined as whenever the green LED is steady or is NOT flashing green (for example, the green LED is not lighted but the red LED is lighted).

Whenever you first insert an NVM card, the “Eject Button” is under hardware control. After NVM card insertion and following a time interval of less than 5 seconds, the “Eject Button” comes under software control. Thus, during normal operations, the NVM “Eject Button” is under software control. If the CTL/SYS50DM should determine that the NVM has failed, then immediately after enabling its red LED the “Eject Button” will be returned to hardware control. If the CTL/SYS50DM is booting, then the recommendation on removing an NVM card is to wait until the boot sequence has completed and normal operations have been restored. If the CTL/SYS50DM has failed (its FAULT LED displays red), then the circuit pack should be replaced and the existing NVM, which contains the node’s generic and data, should

be removed and inserted into the new SYS50DM circuit pack. Normal operations should be restored whenever the circuit pack reboots.

Important! The craft at the WaveStar CIT must have a *Maintenance Privilege Code* of at least M4, a *Security Privilege Code* of at least S4, and a *Provisioning Privilege Code* of at least P1 in order to access the WaveStar CIT command **Enter/Exit Maintenance Condition**.

Task Complete the following steps to insert and/or remove an NVM card.

.....

1 Select an action from the following table:

If you wish to...	Then you must...
Remove an NVM card,	have a Work Instruction (WI) and purpose in mind for the remove operation (for example, to create a backup NVM, to clear an alarm, and so forth). Reference: SE 702-1: "Remove an NVM Card" (-4)
Insert an NVM card,	have, in-hand, an NVM card of known origin and known condition and physically insert it into the identified CTL/SYS50DM circuit pack. Reference: SE 702-2: "Insert an NVM Card" (-6)

.....
E N D O F S T E P S



SE 702-1: Remove an NVM Card

Task Perform the following steps to remove an NVM card.

Important! The NE must be in MCOND before removing an NVM card

- 1 At the WaveStar CIT, select **Fault-Enter/Exit Maintenance Condition** and left-click.

Important! After clicking on the **YES** button, the following information message is displayed: “Execution of Enter Maintenance Condition may affect the NE Service. Do you want to execute this command?” As appropriate, left-click on the **YES** button.

If you executed the command (left-click on the **YES** button), then the System View window command list box should display Enter/“Exit Maintenance Condition (system) Successful”.

Result: The dialog box **Enter/Exit Maintenance Condition** and the current Maintenance Condition (ON or OFF) are displayed. As appropriate, select the button labeled **Enter Maintenance Condition**, and left-click on the **YES** button.

-
- 2 Located on the front and near the middle of the CTL/SYS50DM circuit pack is an “Eject Button”. With your finger, press the “Eject Button”. Refer to Figure 702-1, “Front/faceplate view of the SYS50DM circuit pack” (-5).

Important! If the associated CTL/SYS50DM is rebooting while the “Eject Button” is being pressed, then it will be necessary to: (a) wait until the reboot completes, (b) place the node in Maintenance Condition, and (c) subsequently press the “Eject Button” again.

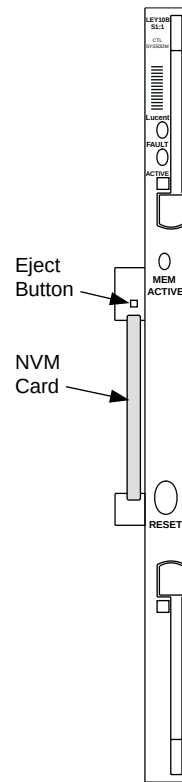
Result: After a few seconds, the CTL/SYS50DM circuit pack’s green LED should go off, and the mechanical eject mechanism should eject the NVM card.

-
- 3** Place your fingers on the card, and gently pull the NVM card from its slot.

Result: Disposition of the NVM card is determined by the WI, local operating procedures, and/or actual condition of the NVM card.

END OF STEPS

Figure 702-1 Front/faceplate view of the SYS50DM circuit pack



NC-USM-032

SE 702-2: Insert an NVM Card

Task Perform the steps below to insert an NVM card.

Important! All PCMCIA NVM cards have the same physical size and will fit into any PCMCIA slot. However, not all NVM cards have the same capacity. Different WaveStar products require different capacity NVM cards. Be sure to obtain the correct capacity NVM card for the application. Also, be sure that the card is correct for the subject NE.

- 1** Per the WI, or otherwise, obtain an NVM card and verify that it is appropriate (for example, correct generic/database and most recent backup) for the subject NE.

-
- 2** Orient the NVM card so that the writing on the card is left-side up, and the PCMCIA connector is the end that is to be inserted into the slot.

Important! The PCMCIA card should also have an arrow indicating the direction of movement for sliding into the slot.

-
- 3** Insert the NVM card into the slot, and operate the locking latch.

-
- 4** At the WaveStar CIT, select **Fault-Enter/Exit Maintenance Condition** and click.

Important! If you executed the command (left-click on the **YES** button), the System View window command list box should display “Enter/Exit Maintenance Condition (system) Successful”.

Result: The information message “Execution Exit Maintenance Condition may affect the NE service. Do you want to execute this command?”

END OF STEPS



Task 703: Clean Optical Fibers and Connectors

Purpose Use this procedure to clean optical fibers and connectors.

Important! All optical fiber connectors (ST[®], SC, and FC types) should be cleaned before making initial connections or reconnections per the following instructions. Only the connectors being assembled at this particular time should be cleaned.

To prevent contamination, keep all dust caps and plugs in place until you are instructed to remove them.

Required equipment Use the following items to clean optical fibers and connectors:

- CLETOP reel type A or B
- CLETOP stick
- Optical quality tissue (TEXWIPE, ABSORBOND[™] - TX404 or equivalent)
- Isopropyl alcohol (greater than 91% 2-propanol+water)
- Compressed gas (TX2510 AccuDuster III or equivalent)
- 300B microscope (comcode 104412077 — used for ST, SC, and FC type connectors)
- Optical power meter with appropriate connectors; for example, the HP8140A equipped with HP81401A (ITE#6550) or equivalent

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager, it is imperative to review and understand these warnings and precautions prior to performing this task.



WARNING

Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if beam is viewed directly or with improper optical instruments. Avoid direct exposure to beam.

**WARNING**

Eye damage may occur if energized fibers and connectors are viewed using the 300B microscope. Verify that fibers and connectors are de-energized using an optical power meter.

**WARNING**

Alcohol is flammable and is harmful if swallowed, inhaled, or absorbed through the skin. Keep alcohol away from heat, sparks, or flames. Avoid contact with eyes, skin, and clothing.

**CAUTION**

Do not shake or tilt the compressed gas container. Use short quick blasts.

Related information For related information, see Chapter 5, *Circuit Pack/Port Unit Descriptions* in this manual.

Before you begin Proper cleaning will eliminate exposure to dirt that may cause permanent damage to the connector. Once a connector has been permanently damaged, cleaning will not repair the damage. A damaged connector is suspected when, despite rigorous cleaning, power remains low in the system. Therefore, proper cleaning is critical.

If a connector is damaged it must be replaced by installing a new jumper cable and/or port unit, depending on where the damage has occurred. Typically both mating ends of the connector become damaged. This damage may be caused when connectors are engaged or disengaged while significant optical power (greater than 3.0 dBm) is present in the connection. Do not attempt to clean optically powered connectors.

Task Complete the following steps to clean optical fibers and connectors.

1

If cleaning connector on...	Then...
optical jumpers and pigtails,	go to Step 2.
port unit faceplates,	go to Step 13.

2 Remove the optical connector from the lightguide buildout/optical port or remove the dust cap from the optical connector.

3 *Cleaning Connectors on Optical Jumpers and Pigtails*

Using an optical power meter, verify that the connector and fiber to be cleaned has been deenergized/deactivated.

4 Using a microscope (for example, a 300B microscope), verify that the connector is clean.

Reference: SE 703-1: “Verify Connector Is Clean Using 300B Microscope” (-7)

5

If the connector is...	Then...
clean,	<i>STOP! End of Task.</i>
not clean,	go to Step 6.

6 Using the CLETOP reel type A or B cleaner, clean the connector.

Reference: SE 703-2: “Clean Fiber Using CLETOP Reel Type A or B Cleaner” (-8)

7 Blow dry the connector ferrule with compressed gas. Hold the compressed gas can in an upright position while blow drying.

-
- 8** Using a microscope (for example, a 300B microscope), verify that the connector is clean.

Reference: SE 703-1: “Verify Connector Is Clean Using 300B Microscope” (-7)

9

If the connector is...	Then...
clean,	<i>STOP! End of Task.</i>
not clean,	go to Step 10.

Important! Do not use tissue types other than the type specified in this procedure.

- 10** Clean (if necessary) the cylindrical surface and the endface of the connector ferrule with a tissue dampened with isopropyl alcohol. Wipe the tip of the ferrule several times in orthogonal (90 degree) directions with a sufficient amount of alcohol present on the tissue. Make sure that the tissue is resting on an unyielding surface while wiping the ferrule tip. Any unused areas of the same tissue can be used for subsequent cleanings. Discard tissue in an appropriate manner when finished.
-

- 11** Repeat Step 6 through Step 8.
-

12

If the connector is...	Then...
clean,	<i>STOP! End of Task.</i>
not clean,	repeat Step 10. If the connector remains dirty after performing Step 10 twice, discard the jumper.

Important! To prevent contamination, keep the optical ports covered with a dust cap or plug when not in use.

13 *Cleaning Connectors on Port Unit Faceplates*

14 Remove (if necessary) the lightguide buildout from its base (buildout block).

Reference: “Task 707: Install/Remove Lightguide Buildout (LBO)” (-1)

15

If the optical port on the faceplate is...	Then...
removable,	go to Step 15
not removable,	go to Step 19. Important! The optical port is not removable when no lightguide buildout is used.

16

If the connector inside the faceplate is...	Then...
accessible,	go to Step 16.
not accessible,	go to Step 19.

17 Using the the cleaning cloth that is present on the tip of CLETOP stick, carefully wipe the ferrule endface.

18 Remove the protector caps and plugs (if equipped) from the buildout and buildout block, and store them in a clean container.

19 Place the lightguide buildout into its base (buildout block).

Reference: “Task 707: Install/Remove Lightguide Buildout (LBO)” (-1)

-
- 20** Use compressed gas to blow off any loose dirt on the tip of the ferrule or inside the sleeve. Hold the compressed gas nozzle one inch away from the tip of the ferrule or sleeve. Hold the compressed gas can in an upright position while blow drying.

END OF STEPS

SE 703-1: Verify Connector Is Clean Using 300B Microscope

Task Perform the following steps using the 300B microscope to verify the connector is clean.

- 1 Make sure that the viewing area of the microscope itself is free of any spots that might be confused with the spots from a contaminated connector. To verify, look into the microscope eyepiece from a distance of 1 inch without a connector attached to it. The white background displayed by the eyepiece of a clean microscope will be free of black spots and/or rings around the periphery.
- 2 Attach the connector to the microscope.
- 3 Look for a clean, white ferrule tip with a dark circle in the center (fiber cladding and core) by adjusting the focus setting on the microscope. The image on the microscope for a clean connector will be free of spots, streaks, and fiber particles. To confirm that the observed spots are on the connector, slowly disconnect the connector while viewing it through the microscope, and verify that the black spots fade away as the connector is removed from the microscope.

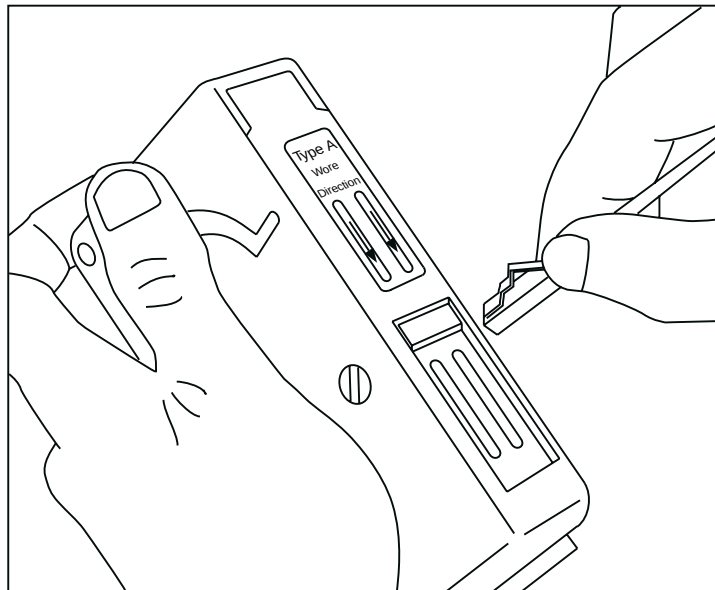
END OF STEPS

SE 703-2: Clean Fiber Using CLETOP Reel Type A or B Cleaner

Task **Important!** The CLETOP reel type A cleaner has two slots, and the CLETOP reel type B cleaner has only one slot.

To clean the connector, perform the following steps using the CLETOP reel type A or B cleaner.

- 1 Hold the CLETOP reel type A or B cleaner in the palm of one hand with the cleaning side facing you.



NC-USM2

- 2 Using the thumb of the same hand that is holding the cleaner, press the lever all the way down and hold. Do not release the lever.
- 3 While holding the lever down with one hand, use the other hand to press the optical ferrule endface against the cleaning cloth in any one slot and uniformly drag it in the direction indicated by the arrows on the cleaner. Make sure that the endface is in contact with the cleaning cloth at all times, and that uniform force is used while dragging it.

.....

4 Rotate the connector 90 degrees.

.....

5

If using the CLETOP reel...	Then...
type A cleaner,	go to Step 6.
type B cleaner,	go to Step 8.

.....

6 Press the ferrule endface against the cleaning cloth in the other slot of the CLETOP reel type A cleaner and uniformly drag it in the direction shown by the arrows on the cleaner. Make sure that the endface is in contact with the cleaning cloth at all times, and that uniform force is used while dragging it.

.....

7 Release the lever and allow it to return to its initial position.

STOP! End of Supporting Element.

.....

8 Release the lever of the CLETOP reel type B cleaner (allowing it to return to its initial position), and press the lever all the way down again and hold (advancing the cleaning cloth). Do not release the lever.

.....

9 Press the ferrule endface against the cleaning cloth in the slot of the CLETOP reel type B cleaner and uniformly drag it in the direction shown by the arrows on the cleaner. Make sure that the endface is in contact with the cleaning cloth at all times, and that uniform force is used while dragging it.

.....

10 Release the lever and allow it to return to its initial position.

.....

END OF STEPS

.....



Task 704: Inspect (Repair) Optical and/or Electrical Cable(s)

Purpose Use this procedure to correct an input or output cable problem such as a damaged or disconnected cable.

Important! This procedure uses the word *cable* in a general sense to refer to either the electrical coax cable or to the optical fibers.

Related information For related information, see Chapter 2, *Maintenance and Trouble-Clearing* in the *WaveStar BandWidth Manager Alarm Messages and Troubleclearing Guide*, 365-370-110 R4.1.

Task Complete the following steps to identify and repair any local cable problems.

-
- 1** As appropriate, remove the shelf front cover.
 -
 - 2** Verify that the cable(s) are properly connected.
 -
 - 3** Visually inspect each cable, starting at the connector on the local NE and going as far as practical (usually to an interconnection bay or to a cross-connect panel).
 -
 - 4** Follow local procedures to correct any problem(s) with the cable.
 -
 - 5** As appropriate, replace the front cover that was removed in .

END OF STEPS



Task 705: Remove/Replace Shelf Cover

Purpose Use this procedure to remove or replace a shelf cover.

Required equipment Use a wrist strap to remove or replace a shelf cover.

Safety precautions To assure both personal safety and the proper functioning of WaveStar BandWidth Manager, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager to prevent electrostatic discharge damage to sensitive components. See “Electrostatic Discharge (ESD) Considerations” in “About this Information Product.”

Related information For related information, see Chapter 3, *Product Description* in this manual.

Task Complete the following steps to remove or replace the shelf cover.

1

If the cover is being...	Then...
removed,	go to Step 2.
replaced,	go to Step 6.

2 At the bottom of the shelf cover, locate the two ¼-turn fasteners.

3 Use the appropriate size slotted screwdriver (or a dime) to rotate the ¼-turn fasteners counterclockwise 90 degrees so the slots are positioned vertically (unlocked position).

-
- 4** Grasp the cover and pull it forward until it is horizontal (rotated 90 degrees from the closed position).
-

- 5** Lift the pivot pins located at the top of the cover, push back, and lift up on the pins again to remove the cover from the shelf, then lift the cover up until it is free from the shelf framing.

Stop! End of Task.

- 6** Position the pivot pins located at the top of the cover under the flange on the shelf framing.
-

- 7** Close the cover and rotate the two ¼-turn fasteners 90 degrees clockwise using the screwdriver (or dime) until the fastener slots are horizontal (locked position).

END OF STEPS



Task 706: Replace a Defective Power Filter or PFVP

Purpose The power filter, whether it is a simple power filter or Power Filter with Voltage Protection (PFVP) is very reliable and rarely needs replacing. Currently, the power filter is not an orderable item, and thus no sparing policy exists.

What to do Follow these instructions to replace a failed power filter.

If...	Then...
a power filter fails,	contact a Lucent Technologies Customer Service Representative, and work out arrangements for obtaining a replacement.

Task 707: Install/Remove Lightguide Buildout (LBO)

- Purpose** Use this procedure to install or remove a lightguide buildout (LBO).
- Required equipment** Use a wrist strap to install or remove an LBO.
- Safety precautions** To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager, it is imperative to review and understand these warnings and precautions prior to performing this task.



WARNING

Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if beam is viewed directly or with improper optical instruments. Avoid direct exposure to beam.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager to prevent electrostatic discharge damage to sensitive components. See “Electrostatic Discharge (ESD) Considerations” in “About this Information Product”.



CAUTION

A locking beam must only be pushed along a line perpendicular to the buildout body in the direction towards the buildout in order to avoid damage to the locking beam.

- Related information** For related information, see Task 711: Select Lightguide Build-Out following sections in this manual:
- Chapter 3, *Product Description*
 - Chapter 5, *Circuit Pack/Port Unit Descriptions*
 - “Task 711: Select Lightguide Buildout (LBO)” (-1)

Task Complete the following steps to install or remove an LBO.

1

If the lightguide buildout is being...	Then go to...
installed,	Step 2.
removed,	Step 4.

2 Remove the protector caps and plugs (if equipped) from the buildout and buildout block, and store them in a clean container.

3 Align the buildout with the slot in the buildout block, push in, and rotate clockwise until locked into position.

Stop! End of Task.

Reference: SE 707-1: “Examples of Lightguide Buildouts and Buildout Blocks” (-3)

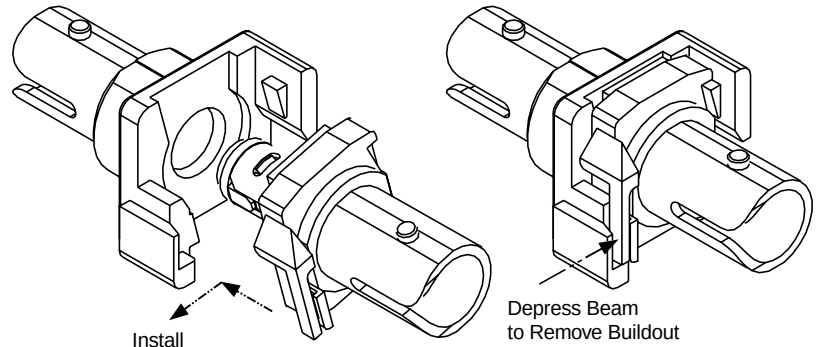
4 Depress the locking beam on the buildout, rotate counterclockwise, and separate from the buildout block by sliding apart.

Reference: SE 707-1: “Examples of Lightguide Buildouts and Buildout Blocks” (-3)

END OF STEPS

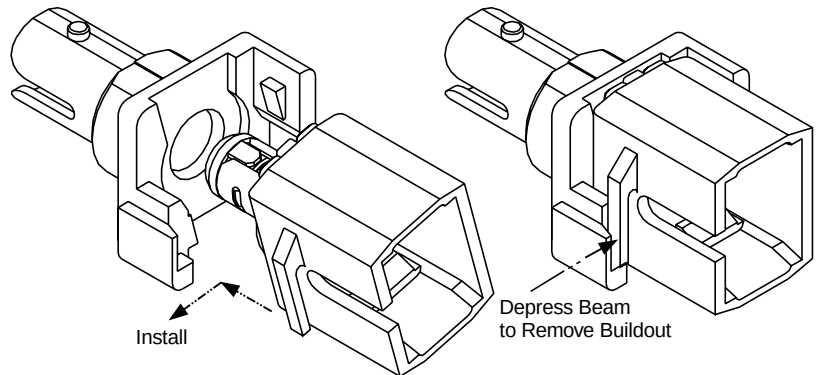
SE 707-1: Examples of Lightguide Buildouts and Buildout Blocks

Figure 707-1 ST Buildout and Buildout Block



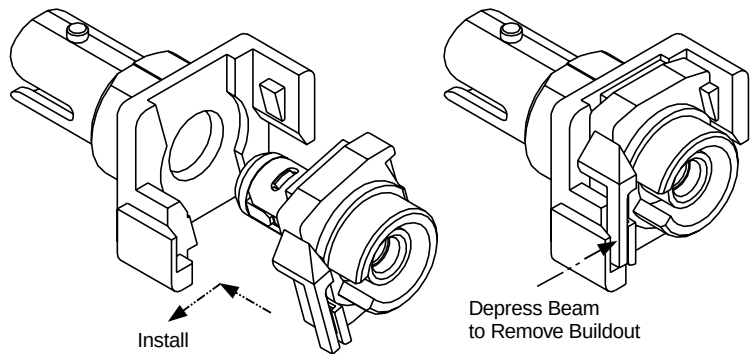
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Figure 707-2 SC Buildout and Buildout Block



NC-USM-137

Figure 707-3 FC Buildout and Buildout Block



NC-USM-136

Task 708: Make a Manual Optical Loopback

Purpose Use this procedure to loop back an *out-of-service* optical line at the faceplate connectors of the port unit.

Required equipment Use the following equipment to make a manual optical loopback:

- Wrist strap
- One lightguide jumper (package label FS1E-E-02) for each optical line to be looped back
- One 20-dB loss lightguide buildout (LBO) (code ASTM20 – part number 108053042 for *ST*[®] connectors) (single mode – multimode) for each OC-3 or OC-12 line to be looped back
- One 20-dB loss lightguide buildout (LBO) (code ASTS20 – part number 108053273 for ST connectors) (single mode – single mode) for each OC-48 optical line to be looped back
- One 15-dB loss lightguide buildout (LBO) (code ASTS15 – part number 108053240 for ST connectors) (single mode – single mode) for each OC-192 optical line to be looped back

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager, it is imperative to review and understand these warnings and precautions prior to performing this task.



WARNING

Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if beam is viewed directly or with improper optical instruments. Avoid direct exposure to beam.

**CAUTION**

Traffic and service interruption can occur to other optical lines if they are accidentally looped back. Recheck the address (AID) of the optical line being looped back.

**CAUTION**

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager to prevent electrostatic discharge damage to sensitive components. See “Electrostatic Discharge (ESD) Considerations” in “About this Information Product.”

Related information

For related information see the following sections in this manual:

- Chapter 3, *Product Description*
- Chapter 5, *Circuit Pack/Port Unit Descriptions*

Task

Complete the following steps to manually loop back an *out-of-service* optical line at the faceplate of a port unit.

.....

1

If the port unit is...	Then...
LEY14 OC12/STM4/1.3SR2 LEY16 OC3/STM1/1.3SR4	obtain a lightguide jumper (package label FS1E-E-02). These port units are equipped with a 0-dB loss lightguide buildout (LBO). No attenuation is required.
LEY13 OC12/STM4/1.3LR2 LEY15 OC3/STM1/1.3LR4	obtain a lightguide jumper (package label FS1E-E-02) and a 20-dB LBO (code ASTM20 – part number 108053042 for ST [®] connectors).
OC48/STM16	obtain a lightguide jumper (package label FS1E-E-02) and a 20-dB loss LBO (code ASTS20 – part number 108053273 for ST connectors).

If the port unit is...	Then...
OC192/STM64	obtain a lightguide jumper (package label FS1E-E-02) and a 15-dB loss LBO (code ASTS15 – part number 108053240 for ST connectors).

- 2 At the faceplate connectors of the port unit, remove the optical line connections. Make a record of these disconnections so they can be replaced after the test.

Reference: SE 708: “Remove the Optical Line Connections” (-5)

- 3 Remove the LBO from the *IN* connector of the port unit (if equipped).

Reference: Supporting “Task 707: Install/Remove Lightguide Buildout (LBO)” (-1)

- 4 Remove the protector caps from the ends of the lightguide jumper (loopback cable).

- 5 Clean the LBOs, fiber, and connectors.

Reference: Supporting “Task 703: Clean Optical Fibers and Connectors” (-1)

6

If the port unit is...	Then...
LEY14 OC12/STM4/1.3SR2 LEY16 OC3/STM1/1.3SR4	replace the 0-dB loss LBO (removed in Step 3 into the <i>IN</i> connector of the port unit. Reference: See Supporting “Task 707: Install/Remove Lightguide Buildout (LBO)” (-1)
LEY13 OC12/STM4/1.3LR2 LEY15 OC3/STM1/1.3LR4	install the 20-dB loss (code ASTM20) into the <i>IN</i> connector of the port unit. Reference: See Supporting “Task 707: Install/Remove Lightguide Buildout (LBO)” (-1)

If the port unit is...	Then...
OC48/STM16	install the 20-dB loss (code ASTS20) into the <i>IN</i> connector of the port unit. Reference: See Supporting “Task 707: Install/Remove Lightguide Buildout (LBO)” (-1)
OC192/STM64	install the 15-dB loss (code ASTS15) into the <i>IN</i> connector of the port unit. Reference: See Supporting “Task 707: Install/Remove Lightguide Buildout (LBO)” (-1)

-
- 7** Connect the lightguide jumper between the LBO on the *IN* connector and the corresponding *OUT* connector on the same port unit.
-
- 8** If required, repeat Step 2 through Step 7 to loop back another optical line.

END OF STEPS

SE 708-1: Remove the Optical Line Connections

Task Complete the following steps to remove the optical line connections at the faceplate connectors of the port unit.

Important! A wrong connection can be avoided by marking or recording all disconnections.

- 1** Remove the optical line connection from the *OUT* connector of the port unit and slide the protector cap over the end of the fiber.

-
- 2** Remove the optical line connection from the *IN* connector of the port unit and slide the protector cap over the end of the fiber.

END OF STEPS



Task 709: Replace Fan Unit

Purpose Perform this task *ONLY* when instructed to do so as part of a trouble-clearing task.

Required equipment The following equipment is required to complete this procedure:

- Replacement fan unit
- WaveStar Craft Interface Terminal (CIT) that is connected to the subject network element (NE)
- Wrist strap.

Safety precautions To assure both your personal safety and the proper functioning of the WaveStar BandWidth Manager product, it is imperative for you to review and understand these warnings and precautions prior to performing this task.



CAUTION

Never remove the fan unit unless you already have a replacement fan unit in hand and immediately perform the replacement, as instructed in this procedure. Leaving the fan unit out for more than 15 minutes can cause the associated network element to fail.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on an NE to prevent electrostatic discharge damage to sensitive components.



CAUTION

Leaving the fan unit out of the shelf for more than 15 minutes can cause the associated network element to fail. It is critical that you complete this procedure — as well as the referencing trouble-clearing procedure — soon after performing this step.

Related information For related information see Chapter 2, *Maintenance and Trouble-Clearing* in the *WaveStar BandWidth Manager Alarm Messages and Troubleclearing Guide*, 365-370-110 R4.1.

Task Complete the following steps to replace a fan unit.

- 1 Physically locate the replacement fan unit near to and within easy reach of the subject NE/shelf.
- 2 If applicable, remove the front cover of the subject NE/shelf.
- 3 With your fingers, unscrew (turn counter-clockwise) the two captive type thumbscrews that are located on the front (one right and one left) of the fan unit.
- 4 Gently and by applying an even force to both the left and right sides, pull the fan unit forward with the center mounted handle in order to remove it from the shelf.
- 5 Carefully insert the replacement new fan unit into the shelf. Again, use the center-mounted handle to push the “self-aligning” fan unit into the shelf.
- 6 Tighten (turn clockwise) the two thumbscrews in order to secure the fan unit into the shelf.
- 7 Return to the trouble-clearing task that referred you to this task.

END OF STEPS



Task 710: Replace a Defective Low Voltage Protection Unit (LVPU)

Purpose The LVPU is very reliable and rarely needs replacing. Currently, the LVPU is not an orderable item, and thus no sparing policy exists.

What to do Follow these instructions to replace a failed LVPU.

If...	Then...
an LVPU fails,	contact a Lucent Technologies Customer Service Representative, and work out arrangements for obtaining a replacement.

Task 711: Select Lightguide Buildout (LBO)

Purpose Use this procedure to select a lightguide build-out (LBO) based on the following:

- Type of port unit
- Measured received optical power (dBm) at the *IN* connector
- Type of optical connector

Important! Use this procedure to adjust the received optical power levels at the **IN** connector of the port unit. If connecting to a different system, refer to the appropriate procedure for that system.

Important! All WaveStar BandWidth Manager system port units require single-mode fiber.

Safety precautions To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager system, it is imperative to review and understand these warnings and precautions prior to performing this task.



CAUTION

The LBO must be placed on the IN connector of the port unit faceplate to prevent equipment damage.



CAUTION

Do not substitute single-mode to single-mode (SM-SM) LBOs for single-mode to multimode (SM-MM) LBOs. Substituting SM-SM LBOs for SM-MM LBOs could cause transmission errors and/or equipment damage.

Related information For related information, see the following sections in this manual:

- Supporting “Task 707: Install/Remove Lightguide Buildout (LBO)” (-1)
- Supporting “Task 712: Measure Received Optical Power” (-1)
- Chapter 5, *Circuit Pack/Port Unit Descriptions*

Before you begin Before you begin this task do the following:

- Verify the type of port unit used.
- Obtain the received optical power measurement for the port unit using an optical power meter (for example, the HP8140A equipped with HP81401A ITE#6550 or equivalent). Refer to Supporting “Task 712: Measure Received Optical Power” (-1).
- Verify the type of optical connector (ST[®], FC, or SC) used.

Task Complete the following steps to select an LBO based on the type of port unit, received optical power, and type of optical connector.

1

If...	Then go to...
OC3/STM1 port unit,	Step 2.
OC12/STM4 port unit,	Step 2.
OC48/STM16 port unit,	Step 4.
OC192/STM64 port unit,	Step 6.

2 Based on the measured received optical power at the **IN** connector of the OC3/STM1 or OC12/STM4 port unit, determine the LBO value that is required.

Reference: SE 711-1: “LBO Values for OC3/STM1 and OC12/STM4 Port Units” (-4)

3 Based on the required optical connection (ST, FC, or SC), and the LBO value (determined in Step 2), select the required LBO.

STOP! End of Task.

Reference: SE 711-2: “Single-Mode to Multimode (SM-MM) LBOs” (-5)

-
- 4** Based on the measured received optical power at the **IN** connector of the OC48/STM16 port unit, determine the LBO value that is required.

Reference: SE 711-3: “LBO Values for OC48/STM16 Port Units” (-6)

-
- 5** Based on the required optical connection ($ST^{\circledR}$, FC, or SC) and the LBO value (determined in Step 4), select the required LBO.

STOP! End of Task.

Reference: SE 711-4: “Single-Mode to Single-Mode (SM-SM) LBOs” (-7)

-
- 6** Based on the measured received optical power at the **IN** connector of the OC192/STM64 port unit, determine the LBO value that is required.

Reference: SE 711-5: “LBO Values for OC192/STM64 Port Units” (-9)

-
- 7** Based on the required optical connection (ST, FC, or SC) and the LBO value (determined in Step 6), select the required LBO.

Reference: SE 711-4: “Single-Mode to Single-Mode (SM-SM) LBOs” (-7)

END OF STEPS



SE 711-1: LBO Values for OC3/STM1 and OC12/STM4 Port Units

Purpose The table below shows the port units, measured received optical power range, and the recommended LBO value.

Table 711-1 Received Optical Power and LBO Values for OC3/STM1 and OC12/STM4 Port Units

Port unit	Measured received optical power (dBm)	Recommended LBO value (dB)
LEY13 OC12/STM4/1.3LR2	0.0 to -4.9	15
	-5.0 to -9.9	10
	-10.0 to -14.9	5
	-15.0 and lower	0
LEY14 OC12/STM4/1.3SR2	2.0 to -2.9	15 ¹
	-3.0 to -7.9	10 ¹
	-8.0 and lower	0
LEY15 OC3/STM1/1.3LR4	0.0 to -4.9	15
	-5.0 to -9.9	10
	-10.0 to -14.9	5
	-15.0 and lower	0
LEY16 OC3/STM1/1.3SR4	0.0 to -3.9	15
	-4.0 to -7.9	10
	-8.0 and lower	0

Notes:

1. Used only when the opposite end of the optical span is equipped with a long-reach port unit.

SE 711-2: Single-Mode to Multimode (SM-MM) LBOs

Purpose The table below shows the SM-MM LBOs.

Table 711-2 SM-MM LBOs

Type of optical connection	LBO value (dB)	Product code	Comcode	Color
ST	0	A3070	106 795 354	White
	5	ASTM5	108 052 960	Gray or Beige
	10	ASTM10	108 052 994	Gray or Beige
	15	ASTM15	108 053 018	Gray or Beige
	20	ASTM20	108 053 042	Gray or Beige
FC	0	A3080	106 795 404	White
	5	AFCM5	108 107 285	Gray or Beige
	10	AFCM10	108 107 301	Gray or Beige
	15	AFCM15	108 107 327	Gray or Beige
	20	AFCM20	108 107 343	Gray or Beige
SC	0	A3060	106 708 951	White or Blue
	5	ASCM5	108 440 579	Gray or Beige
	10	ASCM10	108 440 595	Gray or Beige
	15	ASCM15	108 440 611	Gray or Beige
	20	ASCM20	108 440 637	Gray or Beige



SE 711-3: LBO Values for OC48/STM16 Port Units

Purpose The table below shows the measured received optical power ranges and the recommended LBO values for OC48/STM16 port units.

Table 711-3 Receive optical power and LBO values for OC48/STM16 port units

Measured received optical power (dBm)	Recommended LBO value (dB)
0.0 to -4.9	15
-5.0 to -9.9	10
-10.0 to -14.9	5
-15.0 and lower	0



SE 711-4: Single-Mode to Single-Mode (SM-SM) LBOs

Purpose The following tables provide details for the SM-SM LBO kits available.

ST-type SM-SM LBOs The table below shows the ST-type SM-SM LBOs. These LBOs are available in the ST-type LBO Kit Comcode: 108 812 231.

Table 711-4 ST-type SM-SM LBOs

LBO value (dB)	Product code	Comcode	Color
0	A3070	106 795 354	White or Blue
5	ASTS5	108 053 091	Green or Yellow
10	ASTS10	108 053 190	Green or Yellow
15	ASTS15	108 053 240	Green or Yellow
20	ASTS20	108 053 273	Green or Yellow

FC-type SM-SM LBOs The table below shows the FC-type SM-SM LBOs. These LBOs are available in the FC-type LBO Kit Comcode: 108 812 249.

Table 711-5 FC-type SM-SM LBOs

LBO value (dB)	Product code	Comcode	Color
0	A3080	106 795 404	White or Blue
5	AFCS5	108 107 095	Green or Yellow
10	AFCS10	108 107 194	Green or Yellow
15	AFCS15	108 107 244	Green or Yellow
20	AFCS20	108 107 277	Green or Yellow

SC-type SM-SM LBOs

The table below shows the SC-type SM-SM LBOs. These LBOs are available in the SC-type LBO Kit Comcode: 108 812 256.

Table 711-6 SC-type SM-SM LBOs

Loss value (dB)	Product code	Comcode	Color
0	A3060	106 708 951	White or Blue
5	ASCS5	108 314 501	Green or Yellow
10	ASCS10	108 314 600	Green or Yellow
15	ASCS15	108 440 538	Green or Yellow
20	ASCS20	108 440 561	Green or Yellow



SE 711-5: LBO Values for OC192/STM64 Port Units

Recommended LBO values The table below shows the measured received optical power range and the recommended LBO value.

Table 711-7 Receive optical power and LBO values for OC192/STM64 port units

Port unit	Measured receive optical power (dBm)	Recommended LBO value (dB)
LEY69 OC192/STM64/1.5IR1 LEY284-LEY299 OC192/STM64/POU	0.0 to -3.9	15
	-4.0 to -8.9	10
	-9.0 to -13.9	5
	-14.0 and lower	0
LEY97 OC192/STM64/1.5IRS1	0.0 to -1.9	10
	-2.0 to -5.9	5
	-6.0 and lower	0



Task 712: Measure Received Optical Power

Purpose	Use this procedure to connect an optical power meter and measure the received optical power at the <i>IN</i> connector of a port unit.
Required equipment	Use the following equipment to measure received optical power: • Wrist strap • Optical power meter with appropriate connectors; for example, the HP8140A equipped with HP81401A (ITE#6550) or equivalent
Safety precautions	To assure both personal safety and the proper functioning of the WaveStar BandWidth Manager, it is imperative to review and understand these warnings and precautions prior to performing this task.



WARNING

Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if beam is viewed directly or with improper optical instruments. Avoid direct exposure to beam.



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a WaveStar BandWidth Manager to prevent electrostatic discharge damage to sensitive components. See “Electrostatic Discharge (ESD) Considerations” in “About this Information Product.”

Related information	For related information, see the following sections in this document: • Supporting “Task 711: Select Lightguide Buildout (LBO)” (-1) • Supporting “Task 707: Install/Remove Lightguide Buildout (LBO)” (-1) • Chapter 5, <i>Circuit Pack/Port Unit Descriptions</i>

Before you begin Before you begin this task, do the following:

- Verify the type of port unit used.
- Verify the location of the port unit and **IN** connector.

Task Complete the following steps to connect an optical power meter and measure the received optical power at the **IN** connector of a port unit.

-
- 1** Remove the optical fiber from the **IN** connector of the port unit faceplate.

.....

Important! Ensure that the optical power meter is set for the wavelength being measured (for example, 1310 nm or 1550 nm).

- 2** Connect the optical power meter to the optical fiber removed in Step 1, and obtain an optical power measurement. (Record the measurement for office records.)

-
- 3** Using the optical power measurement obtained in Step 2, determine if the optical power level is correct.

Reference: SE 712-1: “Received Optical Power” (-3)

.....

4

If the optical power level is...	Then...
correct (in range),	<i>STOP! End of Task.</i>
not correct (optical loss out of range),	check the upstream port unit and outside plant fiber.

.....

END OF STEPS



SE 712-1: Received Optical Power

Port Units and Received Optical Power Levels

The table below shows port units and the correct (in range) received optical power levels.

Table 712-1 Port Units and Correct (In Range) Received Optical Power Levels

Port unit	Maximum Received Power (PRmax) (dBm)	Receiver Sensitivity (PRmin) (dBm)	Recommended Minimum Receive Power Level at Installation (dBm)
LEY13 OC12/STM4/1.3LR2	−8.0	−30.5	−25.0
LEY14 OC12/STM4/1.3SR2	−8.0	−28.0	−27.0
LEY15 OC3/STM1/1.3LR4	−10.0	−34.0	−29.0
LEY16 OC3/STM1/1.3SR4	−8.0	−28.0	−27.0
LEY7 OC48/STM16/1.3LR1	−9.0	−27.0	−21.5
LEY8 OC48/STM16/1.5LR1	−9.0	−28.0	−21.5
LEY50–LEY65 OC48/STM16/DWDMxx	Refer to 365-575-380/365-370-370, WaveStar OLS 40G/80G, Applications, Planning, and Ordering Guide.		
LEY80–LEY95 OC48/STM16/POUxxxx	−9.0	−28.0	−21.5
LEY101–LEY180 OC48/STM16/WDMxxxx	Refer to 365-575-736, WaveStar Optical Line System (OLS) 400G Applications, Planning, and Ordering Guide.		
LEY69 OC192/STM64/1.5SR1	−8.0	−21.0	−17.0
LEY97 OC192/STM64/1.5IRS1	−3.0	−14.0	−10.0
LEY201–LEY240 OC192/STM64/WDMxxxx	Refer to 365-575-736, WaveStar Optical Line System (OLS) 400G Applications, Planning, and Ordering Guide.		
LEY284–LEY299 OC192/STM64/POUxxxx	−8.0	−21.0	−17.0



Appendix A: WaveStar® Craft Interface Terminal (WaveStar CIT) Tutorial

Overview

Objectives Through a series of exercises, this tutorial provides a practical introduction to the primary functions of the WaveStar CIT.

Important! It is strongly recommended that this tutorial only be run in conjunction with a WaveStar BandWidth Manager network/subnetwork that is out of service.

This tutorial provides introductory information that should prove useful when training new personnel about user operations on the WaveStar CIT.

How to use this tutorial Because many of the tasks in this tutorial build upon preceding tasks, this tutorial is designed to be completed in the sequence provided. For example, before you can provision cross-connections or ports, you must be able to log into the WaveStar CIT. Therefore, it is strongly recommended (especially for those users who are unfamiliar with the WaveStar CIT) that you start from the beginning and work through all tasks provided in this tutorial.

Related information

For additional information about the Wavestar CIT and TL1 commands refer to the following documents:

- *WaveStar BandWidth Manager Software Release Description (SRD)* - ships with each software release
- WaveStar BandWidth Manager TL1 Message Details, 365-370-133

Contents

This tutorial includes the following tasks:

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Install the WaveStar CIT Software

Overview This section explains how to install the WaveStar CIT software from the CD-ROM. This tutorial assumes that the WaveStar Network Element (NE) software is already loaded on all NEs within the subnetwork.

For more information about installing the WaveStar NE software, refer to Task 202.

Uninstall an existing WaveStar CIT release You must uninstall an existing release before installing a new release. Follow these steps to uninstall an existing WaveStar CIT release.

1 Double-click the **My Computer** icon on the desktop.

2 Double-click the **Control Panel** item in the resulting window.

3 Double-click the **Add/Remove Programs** item in the resulting window.

4

If "WaveStar CIT"...	Then...
does not appear,	there is no previous version installed. <i>STOP! End of Task.</i>
does appear	continue with Step 5

5 Click the **WaveStar CIT** entry in the resulting dialog box.

6 Click the **Change/Remove** button in the resulting dialog box and follow the InstallShield® Wizard as it guides you through the unistall process.

END OF STEPS

Install the WaveStar CIT software

Follow the steps in this section to install the WaveStar CIT software.

-
- 1** Insert the WaveStar CIT CD-ROM into the PC CD-ROM drive and the installation process starts automatically.
If the process does not start automatically, go to the Start-Run menu and type the name of the CD-ROM drive (often D:).
 - 2** After the installation process is complete, a dialog box appears asking you to reboot your computer. Select the reboot now option.
 - 3** If the installation was succesfull, you will see a **WaveStar CIT** icon on the desktop after rebooting. To open the WaveStar CIT software, double-click the **WaveStar CIT** icon to launch the software.

END OF STEPS

Login to the WaveStar CIT Application

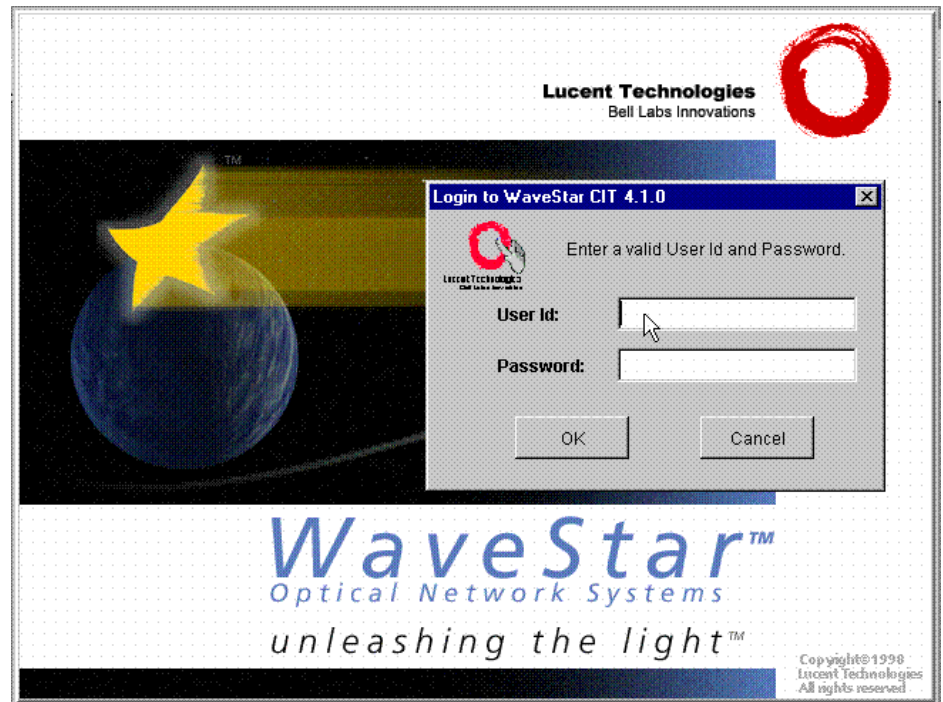
Overview This section explains how to login to the WaveStar CIT.

Login window Follow these steps to login to the WaveStar CIT.

- 1 Double-click on the **WaveStar CIT** icon that is visible on the desktop.

Result: The login screen appears, similar to Figure 1.

Figure A-1 WaveStar CIT Login Screen



- 2 Place the cursor in the **User Id** field and enter one of the default user Ids from the table below.

The User Ids and Password are case-sensitive: they must be typed exactly as they appear below.

User Id	Password
LUC01	LUC+01
LUC02	LUC+02

-
- 3 Place the cursor in the **Password** field. Enter the correct password for the User Id you entered.

User Id	Password
LUC01	LUC+01
LUC02	LUC+02

- 4 Click **OK** button to continue.

Result: The Lucent Proprietary notice appears, similar to Figure 2.

Figure A-2 WaveStar CIT Screen with Lucent Technologies Proprietary Notice



-
- 5 Read the Legal Notice and click the **OK** button to continue.

Result: The WaveStar CIT screen appears, similar to Figure 3.

Figure A-3 WaveStar CIT View



Identify the Components of the WaveStar CIT Network View Screen

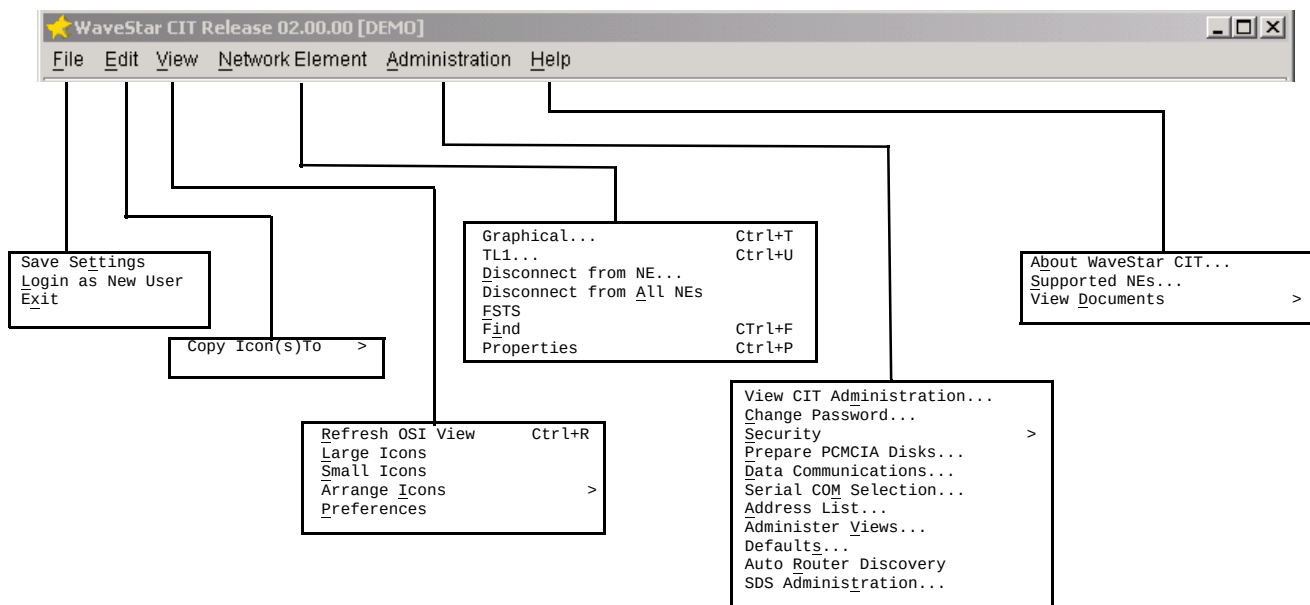
Overview Similar to other Windows applications, the WaveStar CIT has a menu bar across the top of the screen, a toolbar immediately below the menu bar, and status indicators across the bottom of the screen. Each menu bar item has a pull-down menu, and some menu options lead to submenus.

Use the menu bar Figure 4 is a functional illustration of the WaveStar CIT Network View menu bar with the pull-down menus.

- 1 Click on each menu item on your screen to see the pull-down menus for yourself.

Observe that the menu items have an associated short-cut key. For example, the shortcut key for the **F**ile menu item is **A**lt+F. The short-cut keys for a pull-down menu item is simply the underlined letter of that item; you do not need to hold down the Alt key also.

Figure A-4 WaveStar CIT Network View Menu Bar



-
- 2 Repeat **Step 1** for each menu item on the menu bar.

END OF STEPS

Use the tool tips The WaveStar CIT applications software supports tool tips. Follow the steps below to see tool tips.

-
- 1 To determine the meaning of a particular toolbar item, place the cursor over that item, hold for two seconds, and its name/function is displayed.

Important! In Figure 3, the time and date shown at the lower right-hand corner is the time and date of the PC. This point is emphasized to make it clear that the CIT time/date is separate from an NE time/date. Changing an NE time/date is distinct from changing it on the PC.

-
- 2 Repeat **Step 1** for each item on the toolbar.

END OF STEPS

Identify the WaveStar CIT software release Follow the steps below to identify the release of CIT software running on your PC.

-
- 1 From the menu bar, select **Help > About WaveStar CIT** to display the release and build number (BLD####) of the WaveStar CIT software currently running on the PC.

Your PC may be running a later (higher build number) than indicated in the Figure 5, in which case your screens may look slightly different.

Figure A-5 WaveStar CIT Screen with Software Release Displayed



- 2 Click the **OK** button.

END OF STEPS

Login to an NE

Overview This section explains how to login to an NE.

Display the System View of an NE Follow the steps below to display the System View of an NE.

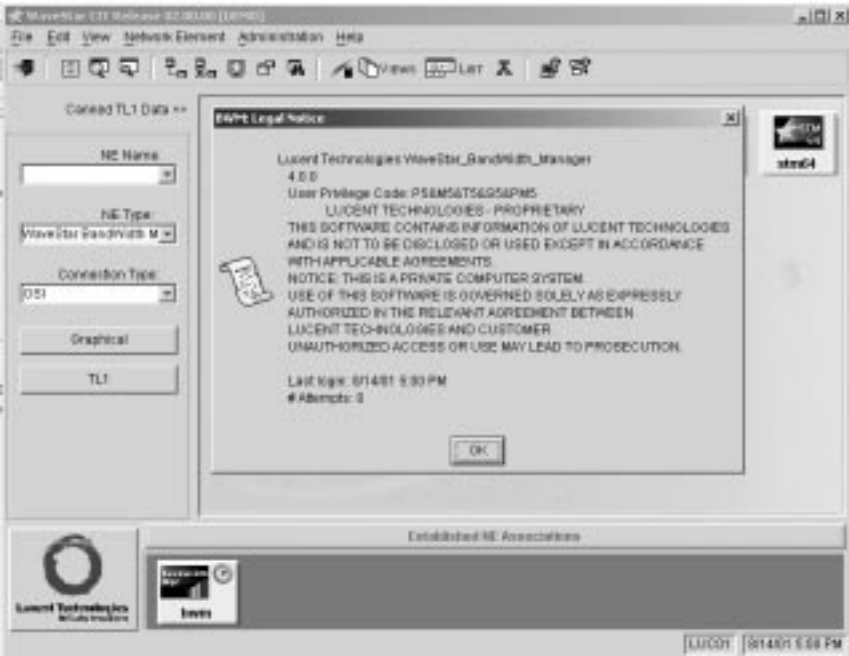
- 1 Select the **Connection Type**, select the **NE Type**, and select or enter the **NE Name** and then click on the **Graphical** button.

Result: The Legal Notice for the NE software appears, similar to Figure 6.

Observe the following:

- The first line indicates the type of product.
- The second line indicates the release number of the NE software.
- The third line lists the user privilege codes (P5&M5&T5&S5&PM5) for login LUC01. A detailed explanation of User Privilege Codes is contained in the chapter called “Provisioning, Security, and Administration.
- Near the bottom appears the date and time of last login.
- The bottom line indicates the number of previous/failed login attempts. A user is denied login access after 3 failed login attempts. The login denied counter will reset after a 10-minute time-out.

Figure A-6 WaveStar BandWidth Manager Software Legal Notice



- 2 Read the notice and click **OK** to continue.

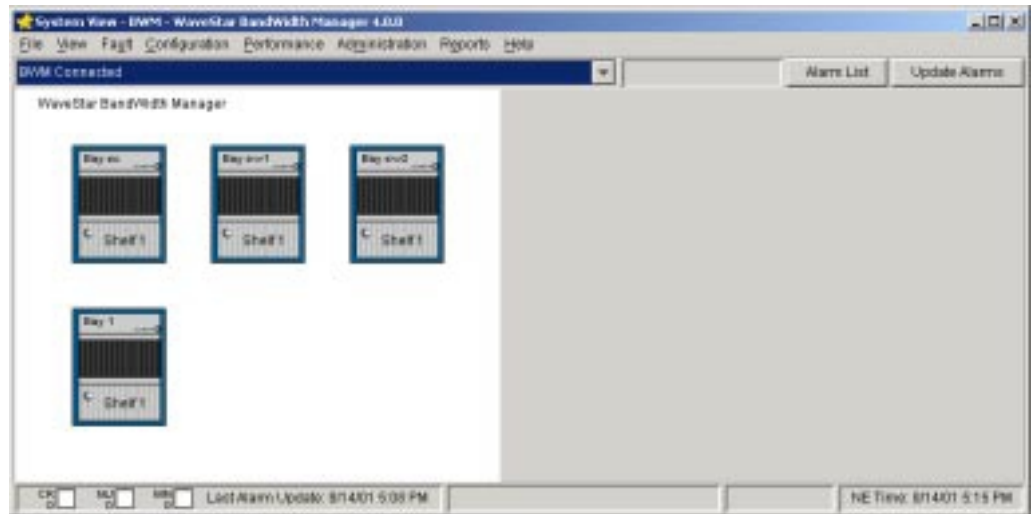
Result: The creating view screen appears, similar to Figure 7.

Figure A-7 Creating System View Screen



- 3 When the system finishes loading an additional WaveStar CIT screen appears, similar to Figure 8. Select this system view screen and confirm that you are connected to the correct NE.

Figure A-8 System View Screen



END OF STEPS

Identify the Components of the WaveStar CIT System View Screen

Overview The System View consists of a graphical representation of the bays, shelves, and alarms. You can interact with these components by using your cursor. The number of bays, shelf equipage, alarms, and so forth, may be different for your displayed NE.

In the System View, each shelf is functionally depicted with a shelf-level alarm LED. This LED serves to indicate the highest level of alarm for that shelf. Similarly, each bay is functionally depicted with a bay level alarm LED. This LED serves to indicate the highest level of alarm for all shelves within that bay. Also, the System View includes (in the lower left corner of the display) three alarm indicators. When alarms are present anywhere within the NE, these alarm indicators serve to indicate the alarm level and number of occurrences.

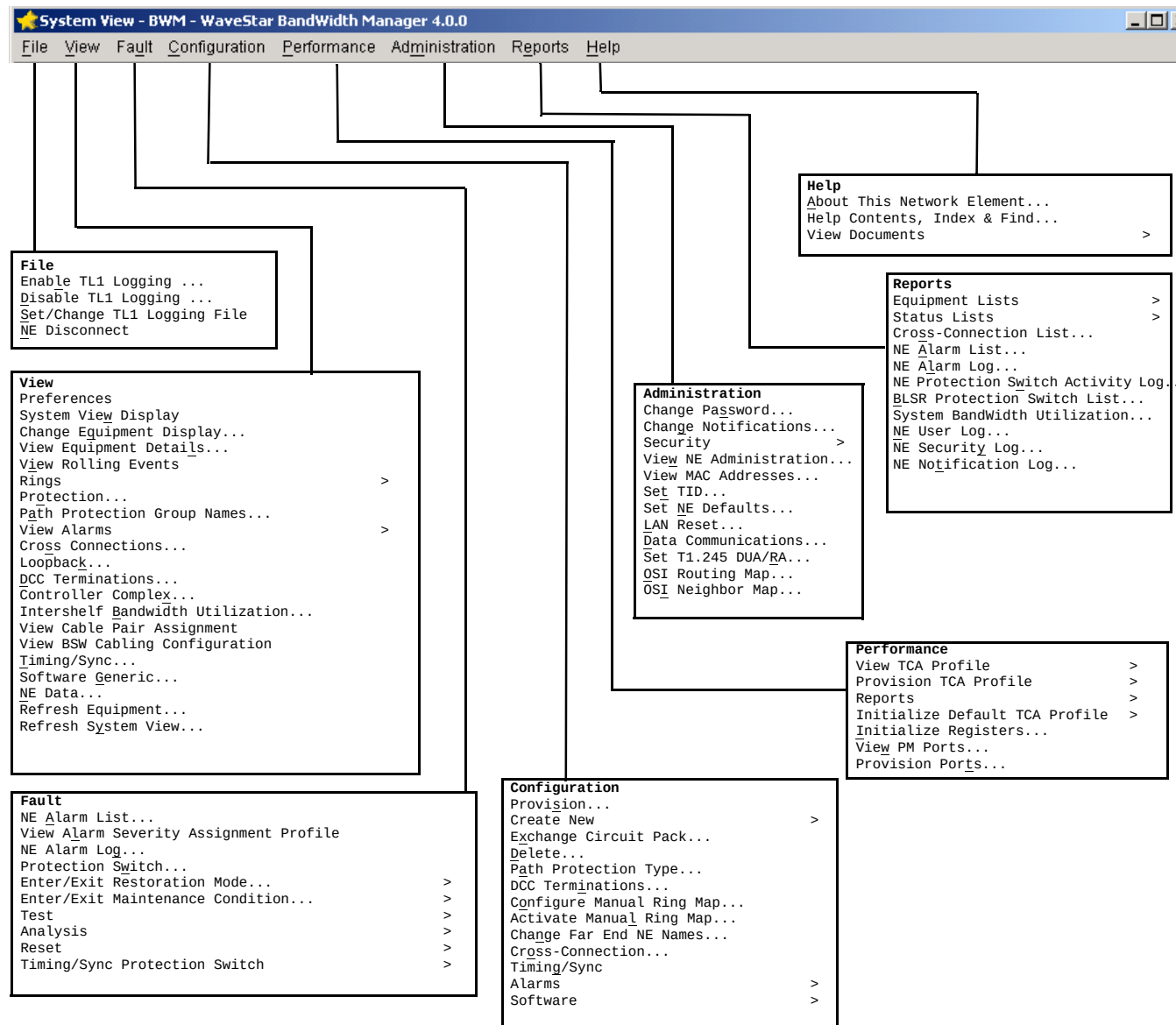
Use the menu bar Figure 9 is a functional illustration of the WaveStar CIT System View menu bar with its pull-down menus.

-
- 1 Click on each menu item on your screen to see the pull-down menus for yourself.

Depending on the particular software release/BLD#### that you are using, there may be some variations in the contents of some menus. If a menu option is visible but “lighted-out” – then (a) that option is not selectable from the current environment, or (b) the lighted-out option may not be selectable at anytime from this particular WaveStar product.

Figure 9 is a functional illustration of the System View menu items for the WaveStar BandWidth Manager.

Figure A-9 WaveStar BandWidth Manager – System View Menus



2 Repeat Step 1 for each menu item on the menu bar.

END OF STEPS

Use the tool tips The WaveStar CIT applications software supports tool tips. Follow the steps below to see tool tips.

- 1** To determine the meaning of a particular toolbar item, place the cursor over that item, hold for two seconds, and its name/function is displayed.
 - 2** Repeat **Step 1** for each item on the toolbar.
-

END OF STEPS

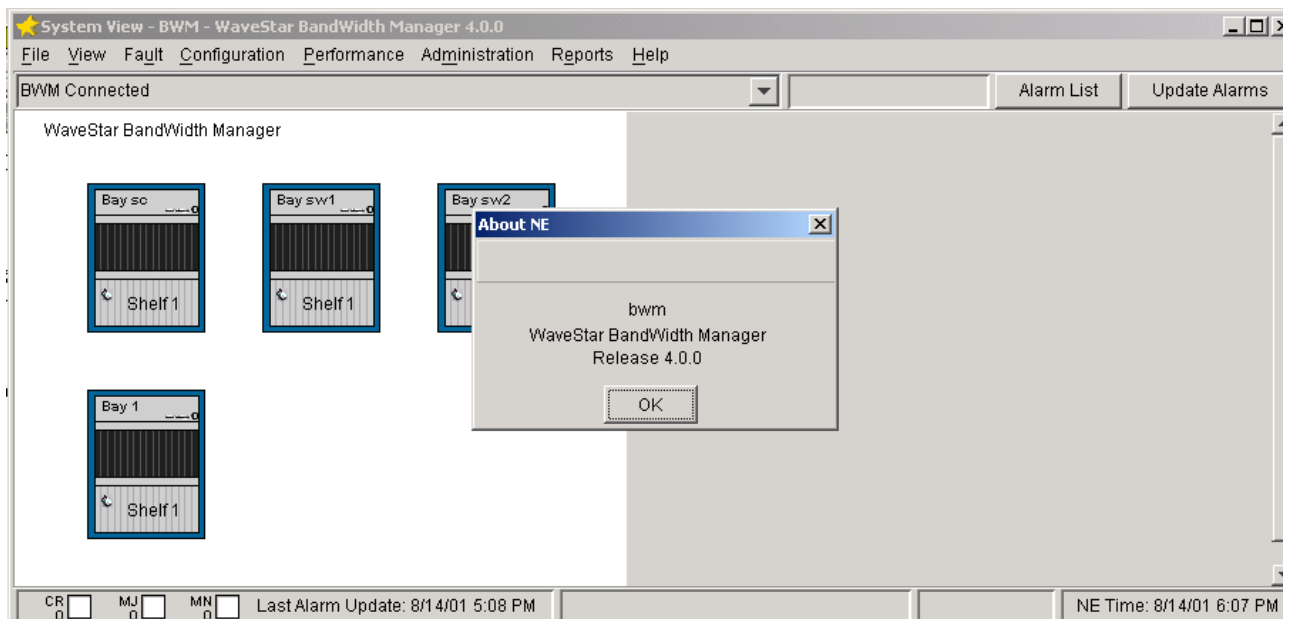
Identify the Software Releases from the System View Screen

Identify the NE software release currently running

Follow the steps below to identify the NE software release currently running on WaveStar BandWidth Manager

- 1 From the menu bar, select **Help > About This Network Element**. This command generates a screen similar to Figure 10.

Figure A-10 WaveStar BandWidth Manager Screen with NE Software Release Displayed



- 2 Click the **OK** button to continue.

END OF STEPS

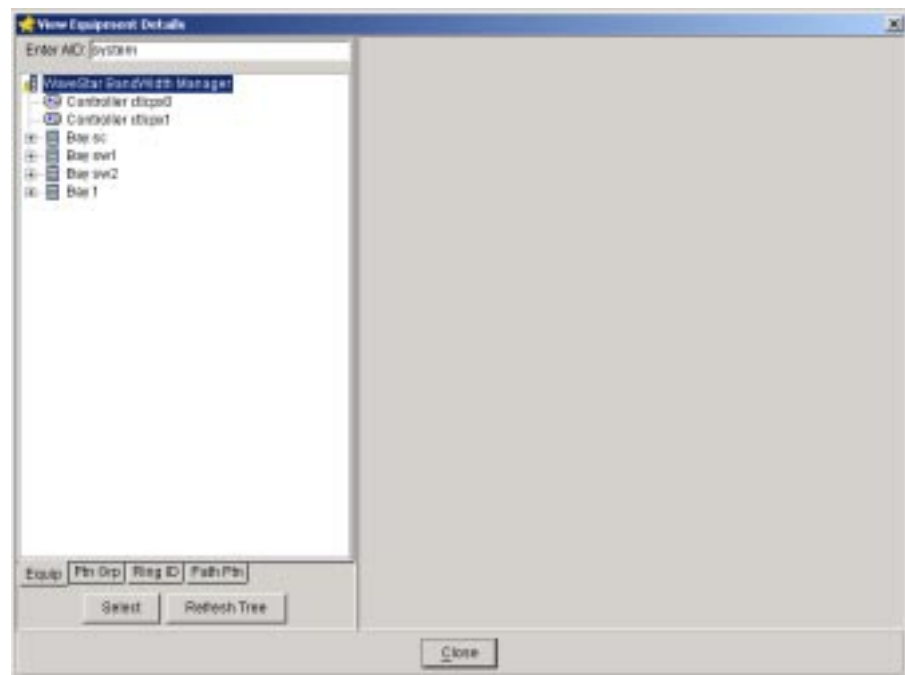
View Equipment Details

Overview This section explains how to view the equipment details and understand the AIDs.

View the equipment details Follow the steps in this section to view the equipment details.

- 1 From the System View menu bar, select **View > View Equipment Details...** This command generates a screen similar to Figure 11.

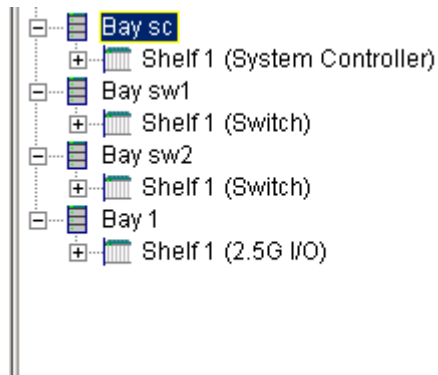
Figure A-11 View Equipment Details Screen



-
- 2 Click each + sign that precedes each of the bays.

Result: The + sign changes to a - sign and list expands to include the shelves in each bay, similar to Figure 12.

Figure A-12 List Expansion to include the Shelves



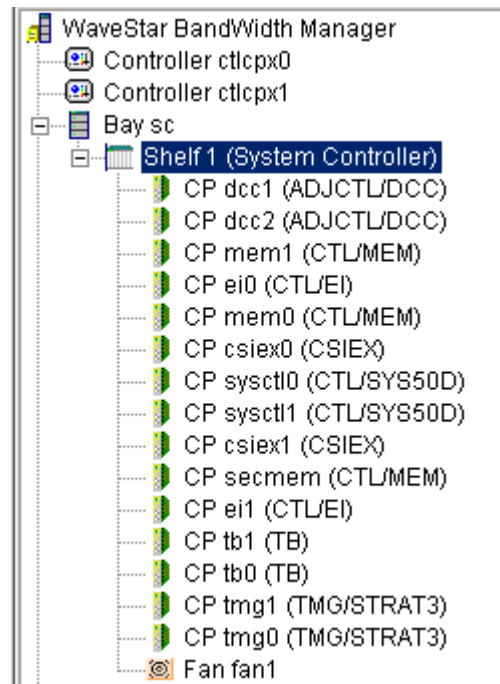
-
- 3 Click the title of each shelf, and notice the AID that appears in **Enter AID** box at the top of the screen. Refer to the table below for a sample list of the AIDs.

Equipment	AID
Bay sc (System Controller Bay)	sc
Shelf 1 (System Controller Bay)	sc-1
Bay sw1 (Switch Bay)	sw1
Shelf 1 (Switch Shelf)	sw1-1
Bay sw2 (Switch Bay)	sw2
Shelf 1 (Switch Shelf)	sw2-1
Bay 1 (I/O Bay)	1
Shelf 1 (I/O Shelf)	1-1

-
- 4 Click each + sign that precedes **Shelf 1 (System Controller)**.

Result: The + sign changes to a - sign and list expands to include the circuit packs and equipment in that shelf, similar to Figure 13.

Figure A-13 List Expansion to include the Circuit Packs



END OF STEPS

View port an trib details

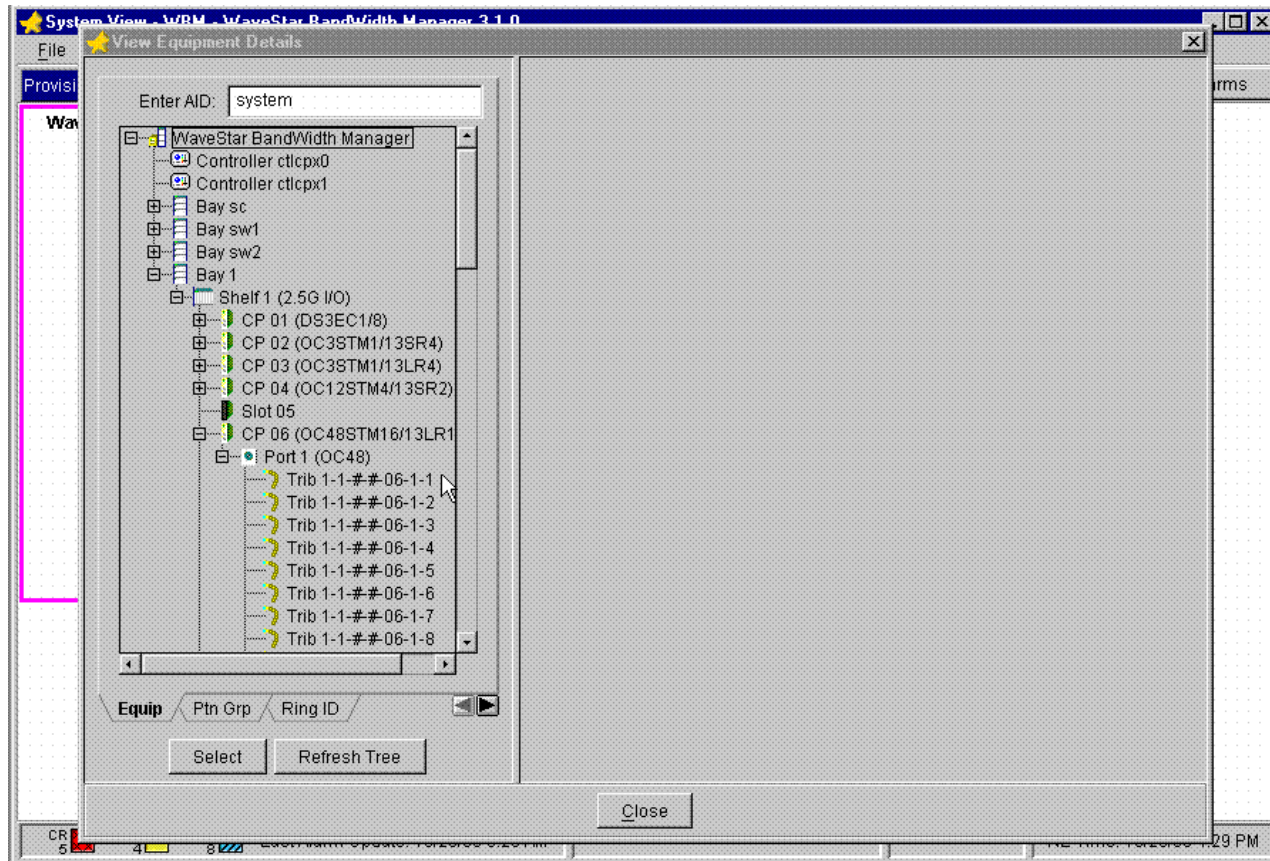
The View Equipment Details window is similar to the Windows Explorer screen. The equipment hierarchy, from the top down, is as follows:

system,
bay,
shelf,
circuit pack,
port,
Trib

-
- 1 Click on the  sign to the left of Bay 1 – to expand to the Bay 1 Shelf 1 level.
-
- 2 Click on the  sign to the left of CP __ (OC48STM16.....) – to expand to the Port level.

- Click on the  sign to the left of Port 1 – to expand to the Trib level. Your screen should look similar to the following figure.

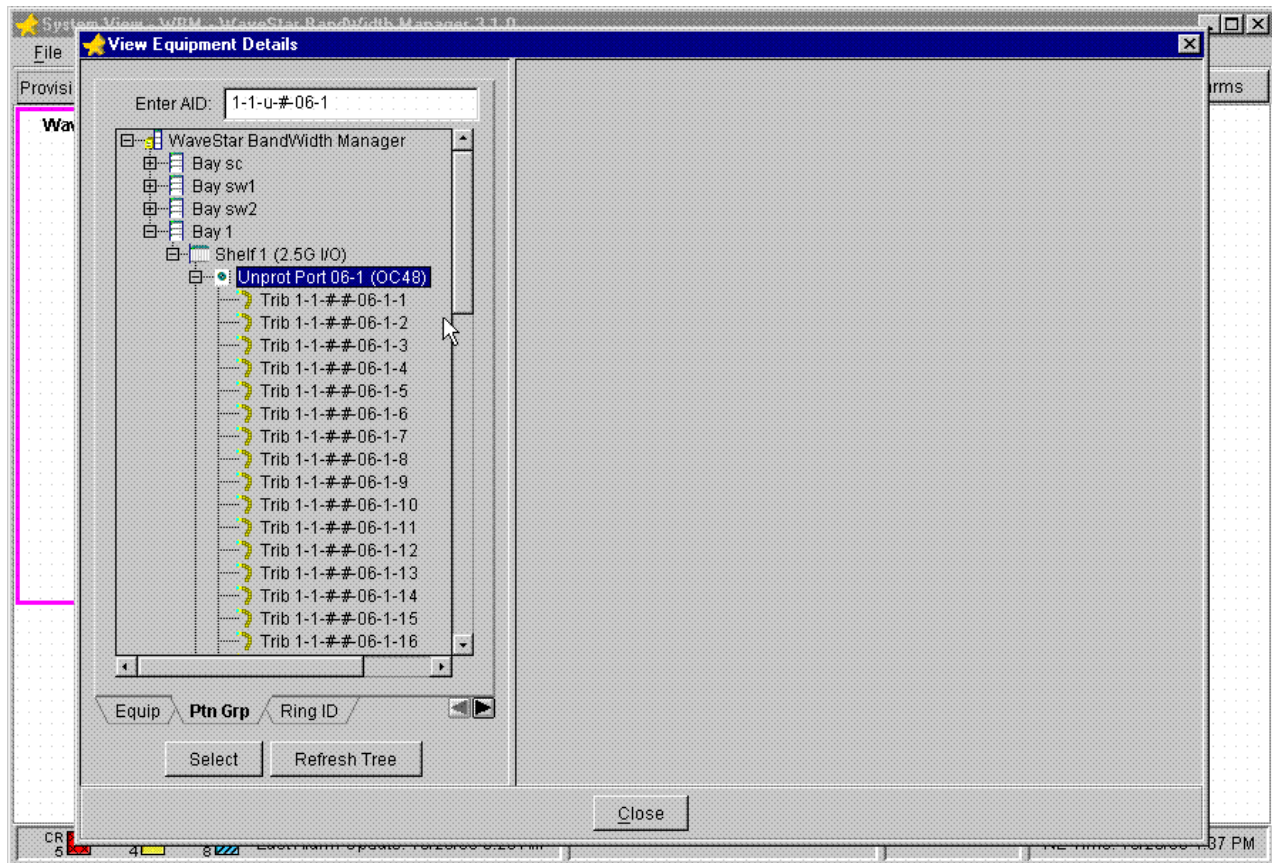
Figure A-14 Screen to view the equipment details – trib level depicted



- 4 Located at the bottom of the View Equipment Details window are three tabs. Click on the tab labeled **Ptn Grp**.

Result: Your screen should look somewhat like the following figure.

Figure A-15 Screen to view the equipment details – protection groups depicted



The WaveStar BandWidth Manager supports the following types of Port Protection Groups: Unprotected (0x1), Protected (1+1), Equipment Protected (1xN), 2F-BLSR, and 4F-BLSR. Depending on how your node is equipped with circuit packs and what provisioning already exists will determine what Protection Groups are displayed.

.....

5 Click on the tab **Ring ID**. If any 2F-BLSRs or 4F-BLSRs have been provisioned they appear here.

.....

6 Click on the **Cancel** button.

.....

E N D O F S T E P S

.....

Display Bays and Shelves

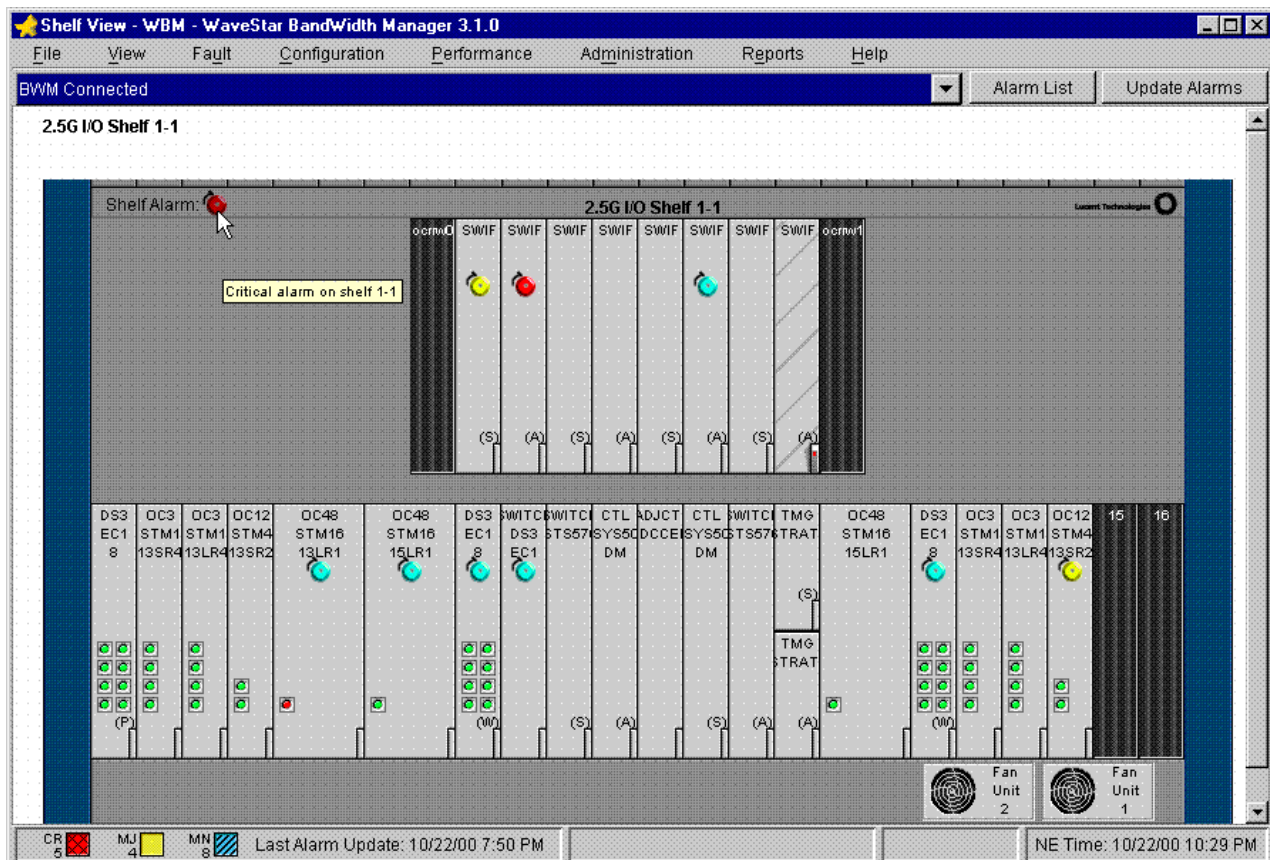
Overview This section explains how to display the detailed components of the individual bays and shelves.

Display Bay 1, Shelf 2 Follow the steps below to display Bay 1, Shelf 2.

- 1 Double-click on Shelf 2 within Bay 1, which is identified as Shelf 1-2.

- 2 Place your cursor on the shelf panel and observe that tool tips displays Shelf 1-2. Your screen should look similar to the following figure.

Figure A-16 System View Screen for Bay 1, Shelf 2 (I/O Shelf 1-2)

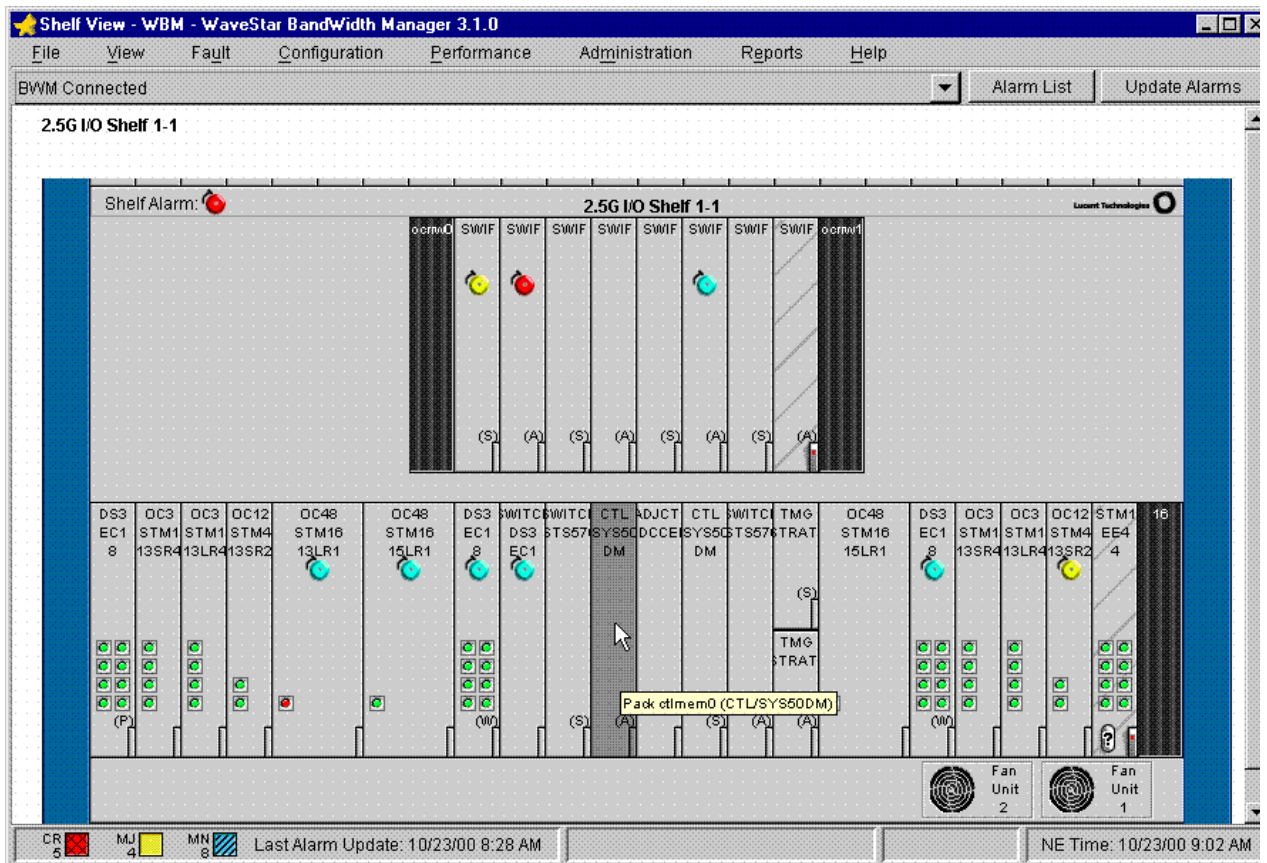


3 Observe the following:

- The type of shelf, bay number, and shelf number appear above the shelf on the left side.
- Circuit pack slot positions appear on the shelf.
- Empty slots (for example, slot 15 and slot 16) which have NOT been provisioned appear black.
- Equipped slots are shown with the label of the occupying circuit pack (DS3/EC1, OC3, and so forth).
- Empty slots which have already been provisioned (or pre-provisioned) appear similar to equipped slots except they show dark gray diagonal stripes. Also the latch mechanism, which is located in the lower right-hand corner of the slot, shows a red dot to indicate that it is open and a question mark appears to the left of the latch to indicate that the slot is not operational.

- 4 Place your cursor over the left-most circuit pack faceplate that is labeled CTL/SYS50DM. Hold until “Pack ctlmem0 (CTL/SYS50DM)” is displayed. Your display should look similar to the following figure.

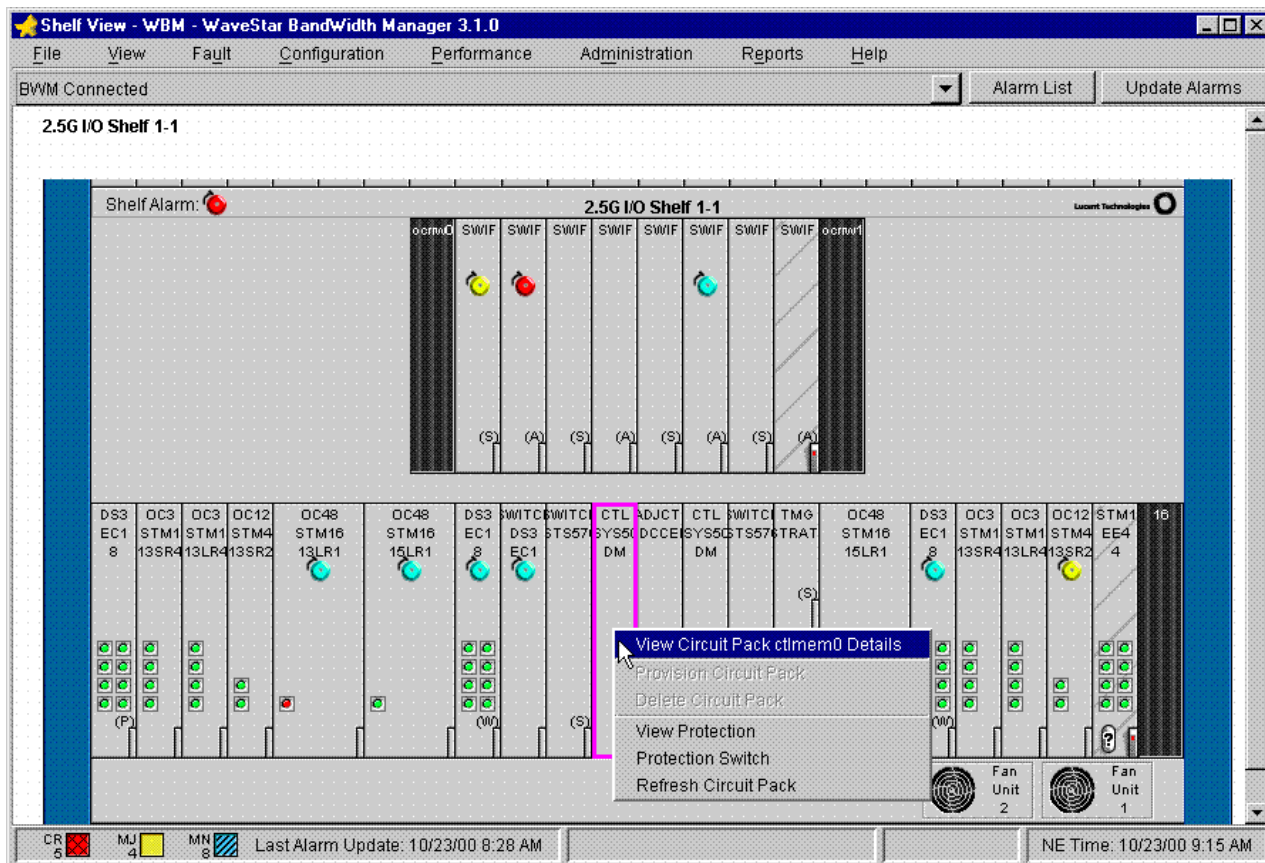
Figure A-17 Screen to Select Circuit Pack ctlmem0



5 Right-click on this slot and bring-up the pop-up menu which provides the following menu options:

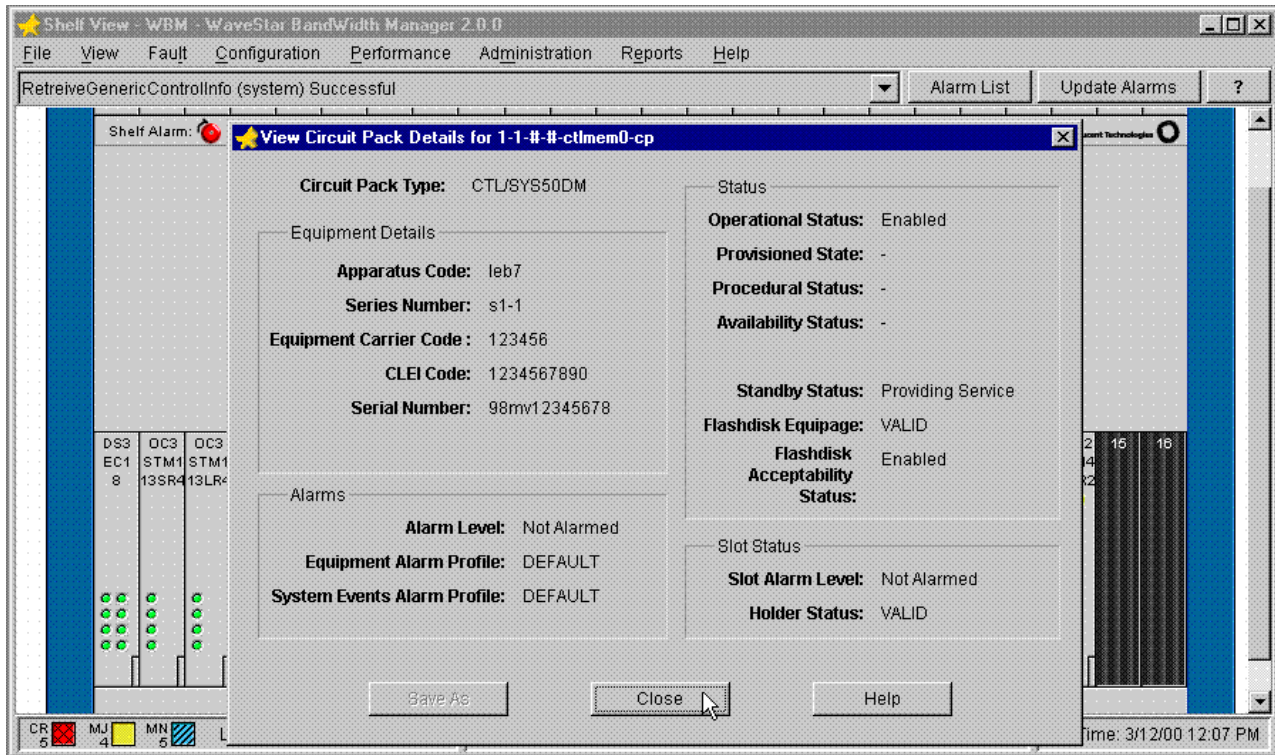
- View Circuit Pack _____ Details
- Provision Circuit Pack
- Delete Circuit Pack
- View Protection
- Protection Switch
- Refresh Circuit Pack

Figure A-18 Screen to select and view details of circuit pack ctlmem0



- 6 Click on menu option **View Circuit Pack ctlmem0 Details**. Your display should look similar to the following figure.

Figure A-19 Details of “pack ctlmem0 (CTL/SYS50DM)”



- 7 Observe that the information (circuit pack details) is layered under the two tabs as follows:
 - Pack Data (which has the following three sub-categories)
 - Circuit Pack Information
 - Equipment Details
 - Alarms.
 - Status (which has the following two sub-categories)
 - Slot Status
 - Pack Status.

-
- 8** Click on the **Status** tab and observe the displayed information.

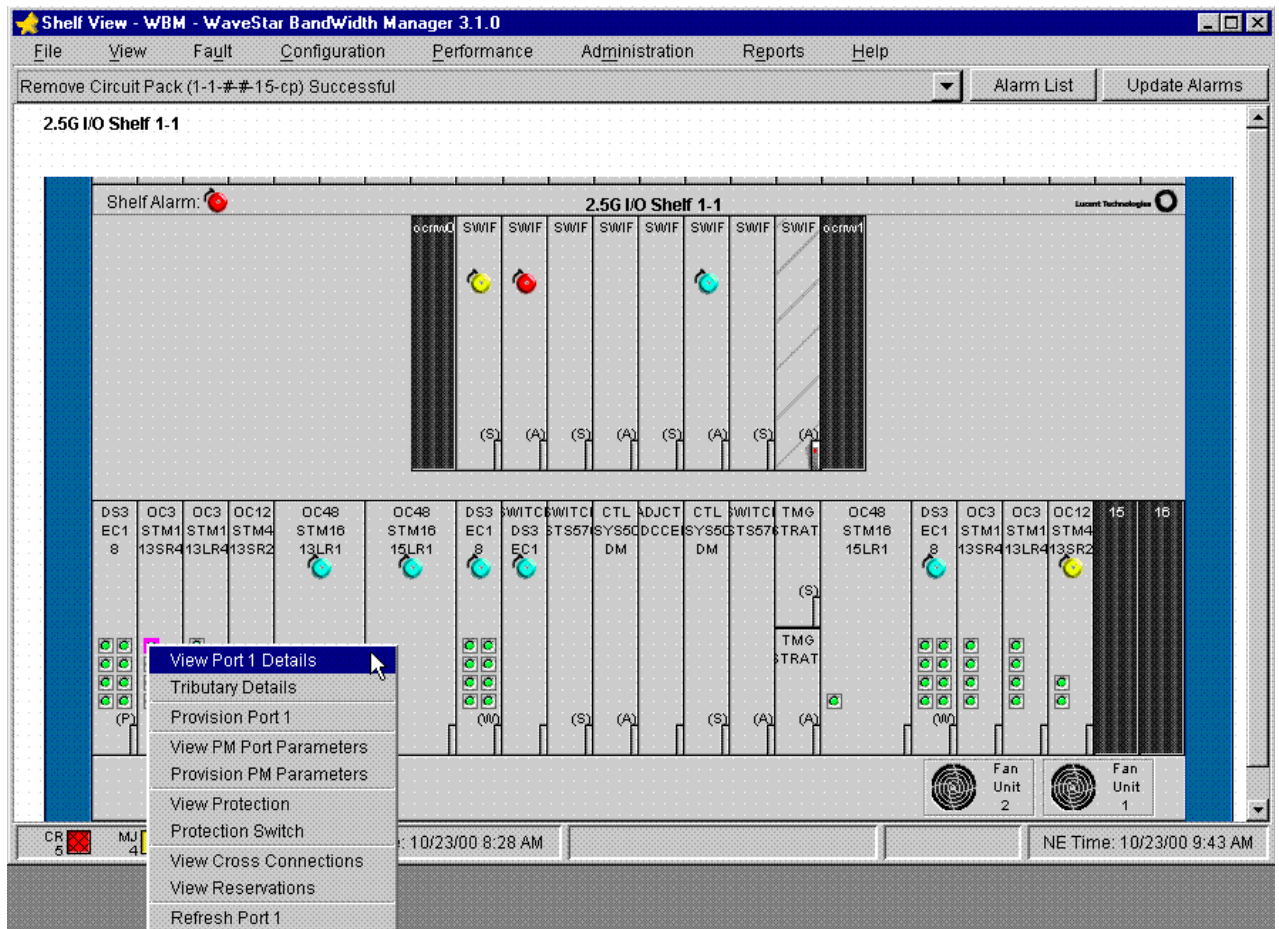
Result: This operational status of the circuit pack is Enabled its Flashdisk Equipage is Valid, and its Flashdisk Acceptability Status is Enabled.

- 9** Click the **Close** button.
-

- 10** Observe that circuit packs with ports display an individual faceplate LED for each port on that circuit pack. A port ID (for example, Port 1) and alarm status is indicated by the color of the LED (Green = no alarm, Red = critical alarm, Yellow = major alarm, or Cyan = no alarm).

- 11 For your displayed shelf, locate an optical circuit pack (for example, choose the first OC3), place your cursor over the top LED (which is Port 1), and right-click. Your screen should look similar to the following figure.

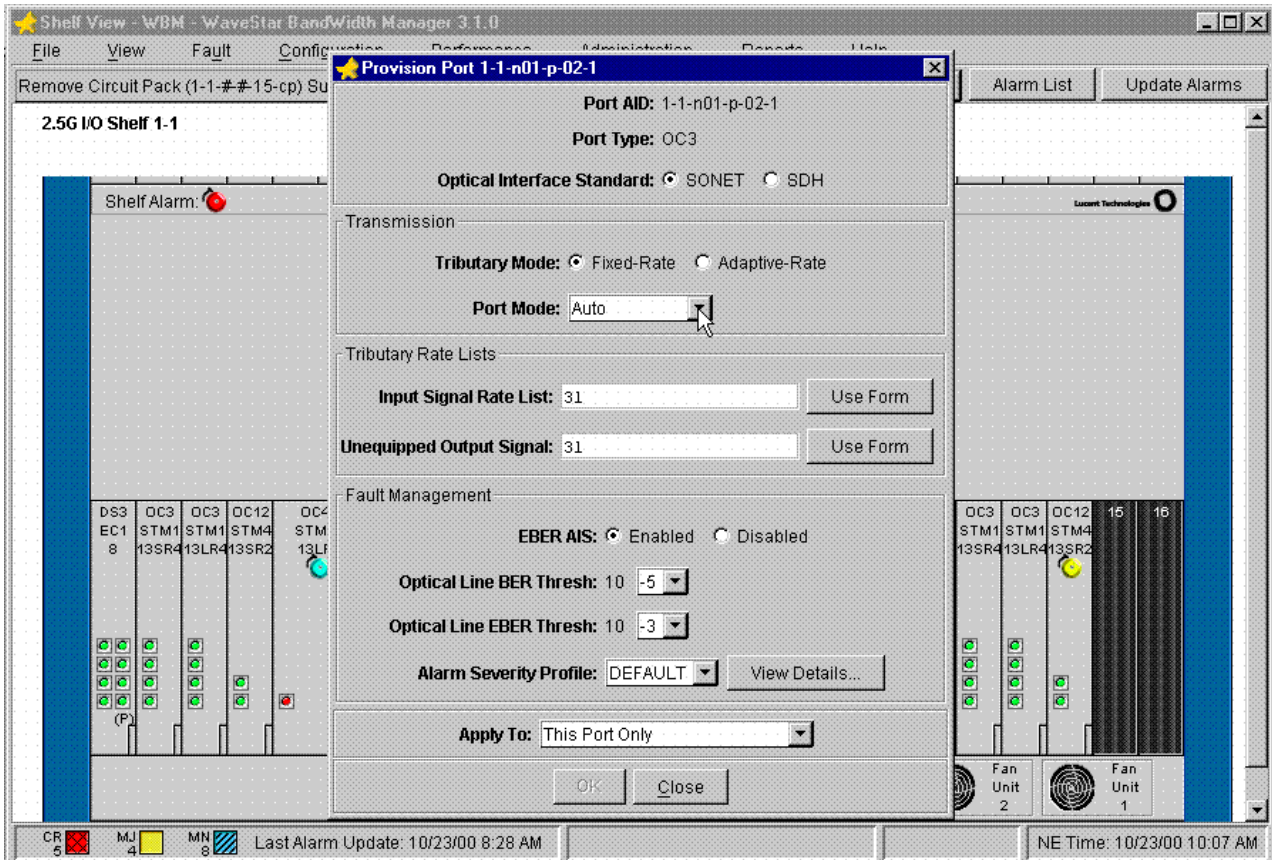
Figure A-20 Screen of view details of circuit pack OC3 port 1



Result: With this pop-up menu, you can: (a) view details – a list for this port, (b) view tributary details, (c) view and provision PM parameters, (d) view protection and protection switching status, (e) view cross-connections for the identified port, and (f) refresh circuit pack port 1 – which will result in updating the CIT information with that contained in the NE's NVM.

- 12 Click on pop-up menu option **Provision Port 1**. Your display should look similar to the following figure.

Figure A-21 Provision Port 1 for the circuit pack in slot 01

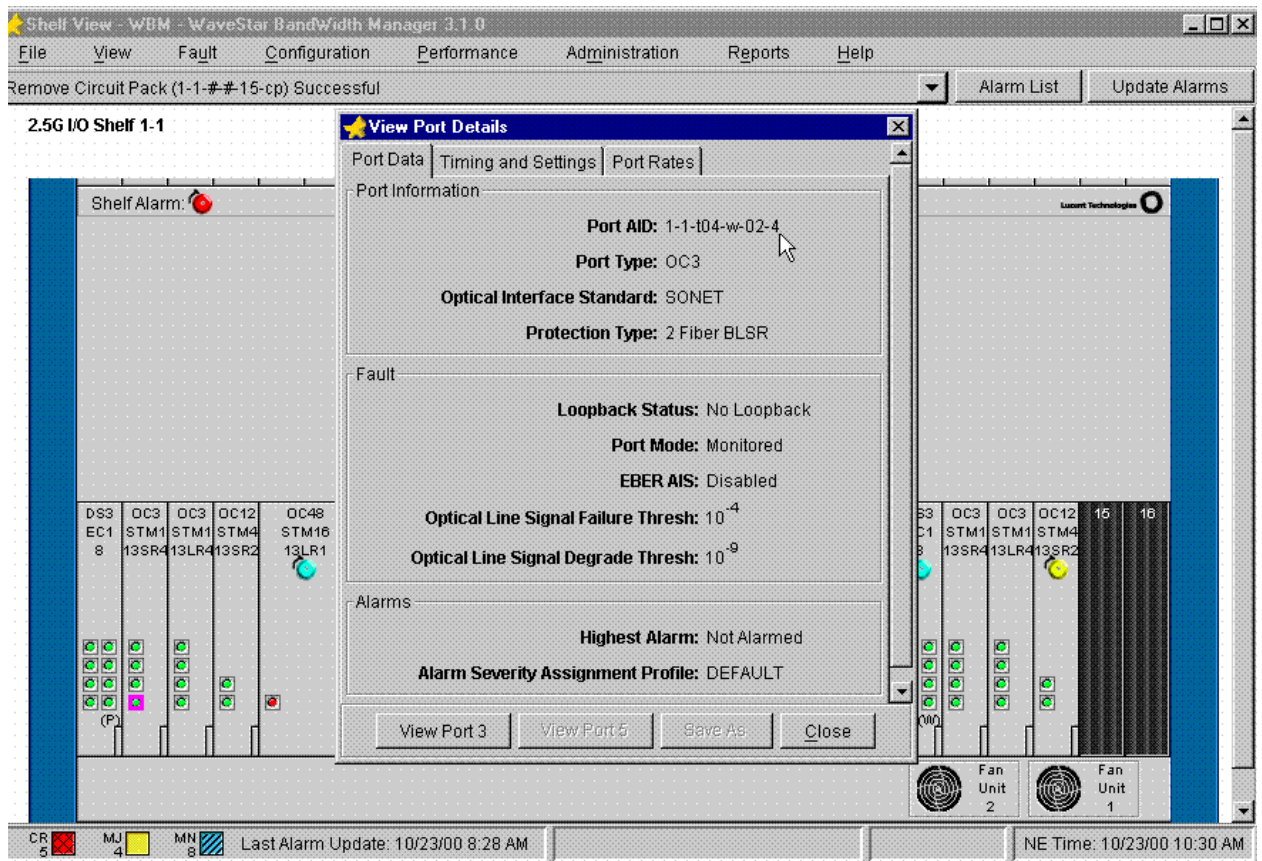


The point of showing this screen is to show that you can use this method to provision a port or to display its provisionable parameters and their default values.

- 13 Click on the **Close** button (or on the boxed “X” at upper right-hand corner of screen).
- 14 For this same OC3/STM1 circuit pack port, right-click on the bottom LED to bring up the pop-up menu.

- 15 Click on the **View Port 4 Details** menu option. Your screen should look similar to the following figure.

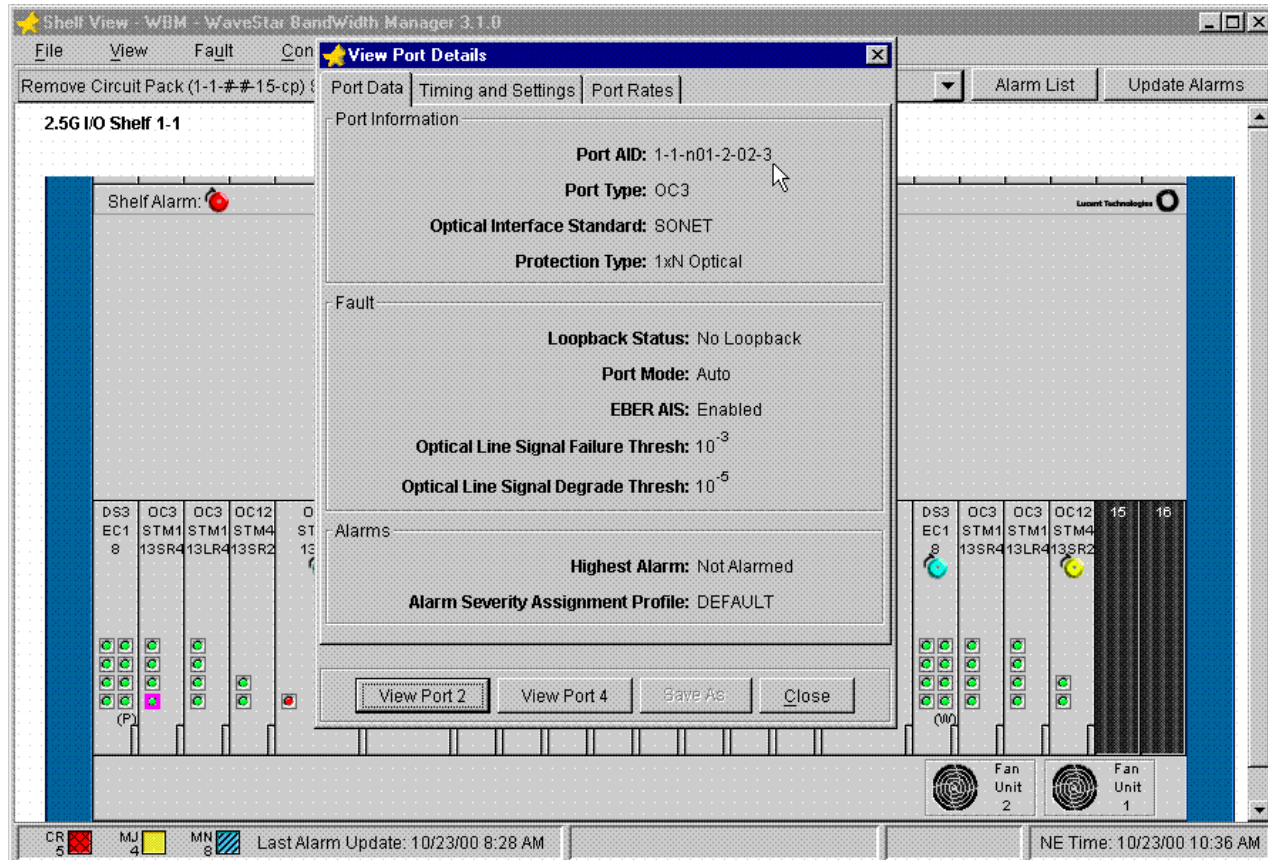
Figure A-22 Optical port “view details” for AID = 1-2-##-01-4



- 16 Note that the last three digits (01-4) refer to Slot 01 and Port 4. Also, observe that the information is layered under three separate tabs.

- 17 Click on the button **View Port 3** to view the details for Port 3. Your screen should look similar to the following figure.

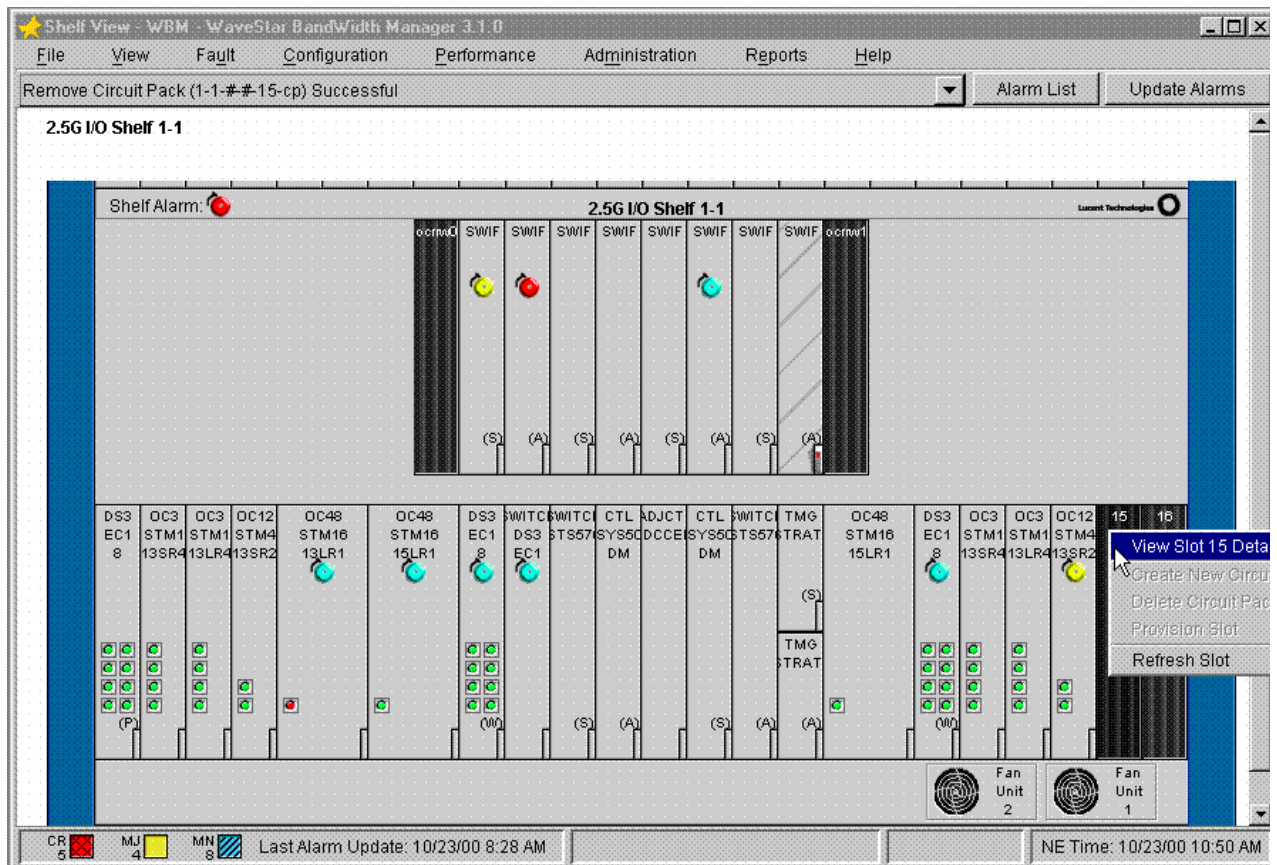
Figure A-23 Optical port “view details” for AID = 1-2-#-#-01-3



- 18 Observe the changes between Port 4 and Port 3.
- 19 Click on the **Close** button.

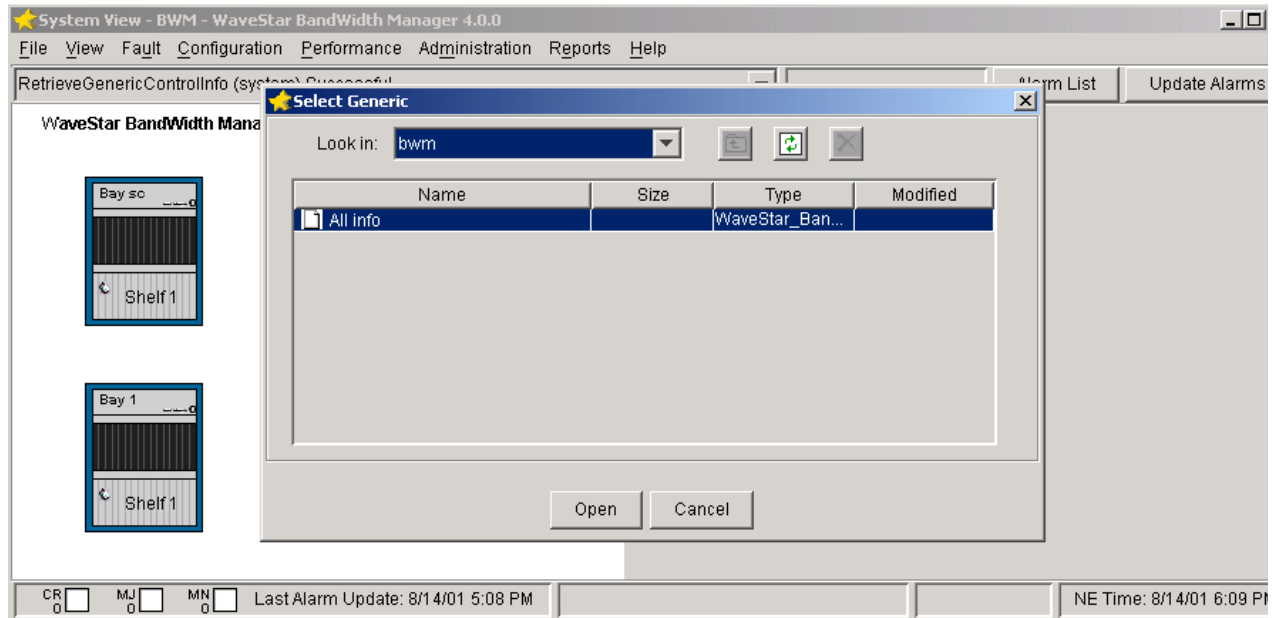
- 20 Right-click on an empty slot (for example, slot 15) and bring up a pop-up menu which will allow you to view/display details for that slot (see the following figure).

Figure A-24 View slot 15 details (AID = 1-2-#-#-15)



- 21 Click on the **View Slot 15 Details** option. Your screen should look similar to the following figure.

Figure A-25 View details for “empty slot 1-2-#-15”



- 22 Observe that in the field **Acceptable Pack Types** for this slot you can establish any one of the following circuit pack types:
- DS3EC1/8
 - OC3STM1/13LR4
 - OC3STM1/13SR4
 - OC12STM4/13SR2.

- 23 Click on the **Close** button.

END OF STEPS

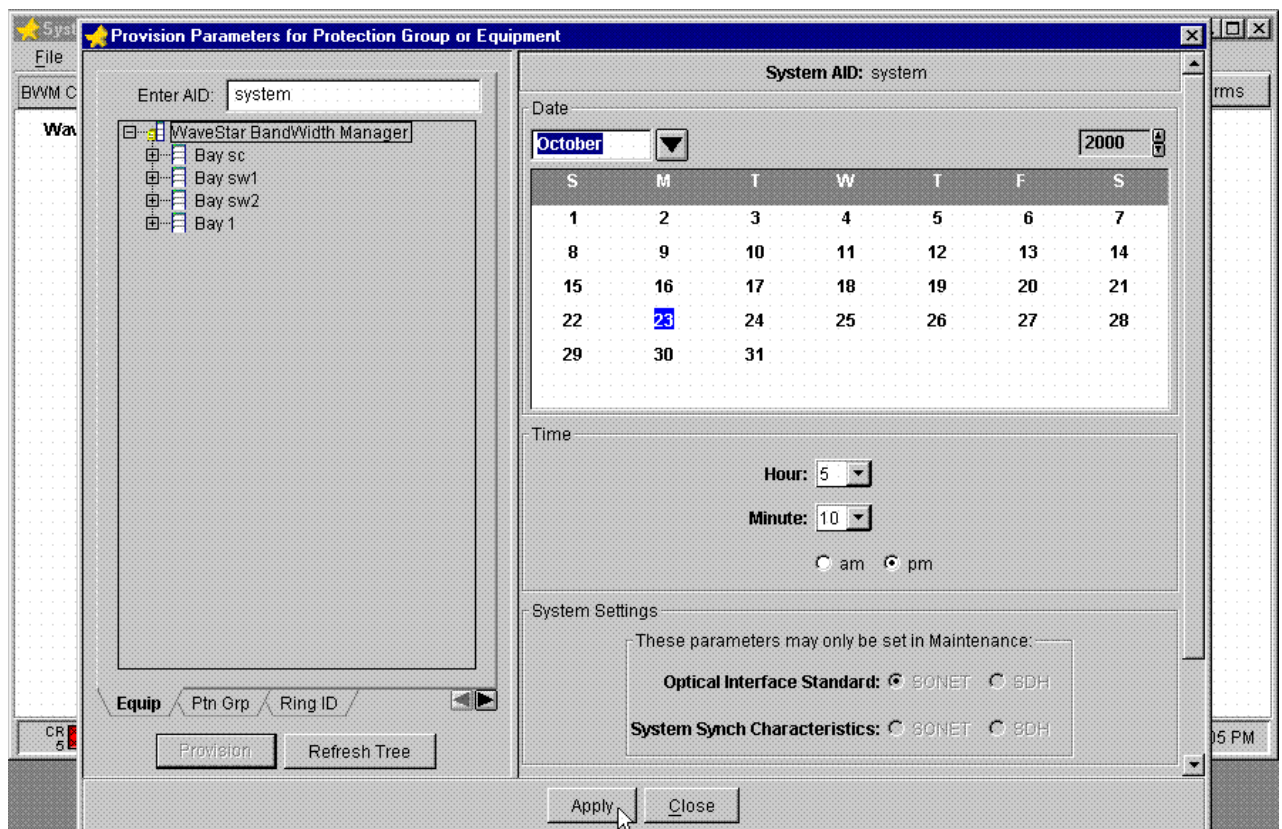
Provision the Date/Day/Time of an NE

Provision the date/day/time of an NE

You can provision the NE's system clock from the System View screen.

- 1 From the menu bar, select **Configuration > Provision**.
- 2 Click on the field **Enter AID**. Type the word `system` and click **Provision**. Your screen should look similar to the following figure.

Figure A-26 Screen to Provision the Date/Time and ASAP of the NE



You could achieve this same result by clicking on the directory label **WaveStar BandWidth Manager** instead of typing `system`.

.....

3 Observe the fields **Year**, **Month**, **Hour**, **Minute**, **am** and **pm**, as well as the calendar for the selected month and year. Click on the drop-down arrows, radio buttons, and calendar dates, as necessary, to make them correct.

.....

4 Click on the **Apply** button.

Result: You see the message: Execution of Provision may affect the NE service. Do you want to execute this command?

.....

5 Click on **Yes**.

.....

6 Click on **Close**.

.....

.....

END OF STEPS

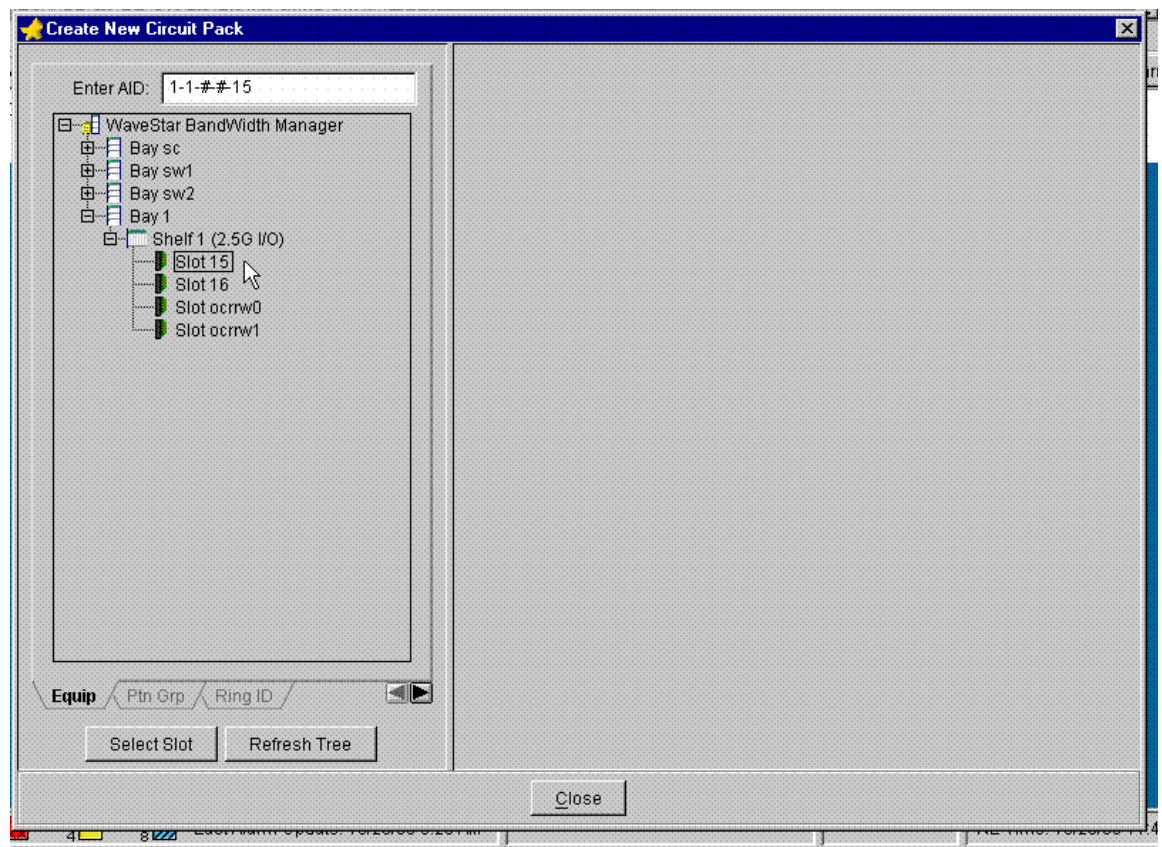
.....

Pre-Provision and Provision a Circuit Pack

Pre-provision a circuit pack Follow the steps below to pre-provision a circuit pack.

- 1 Create (add) a DS3EC1/8 circuit pack in Bay 1, Shelf 2, Slot 15 (AID = 1-2-#-#-15) by selecting the menu sequence **Configuration > Create New > Circuit Pack** and click. Your screen should look similar to the following figure.

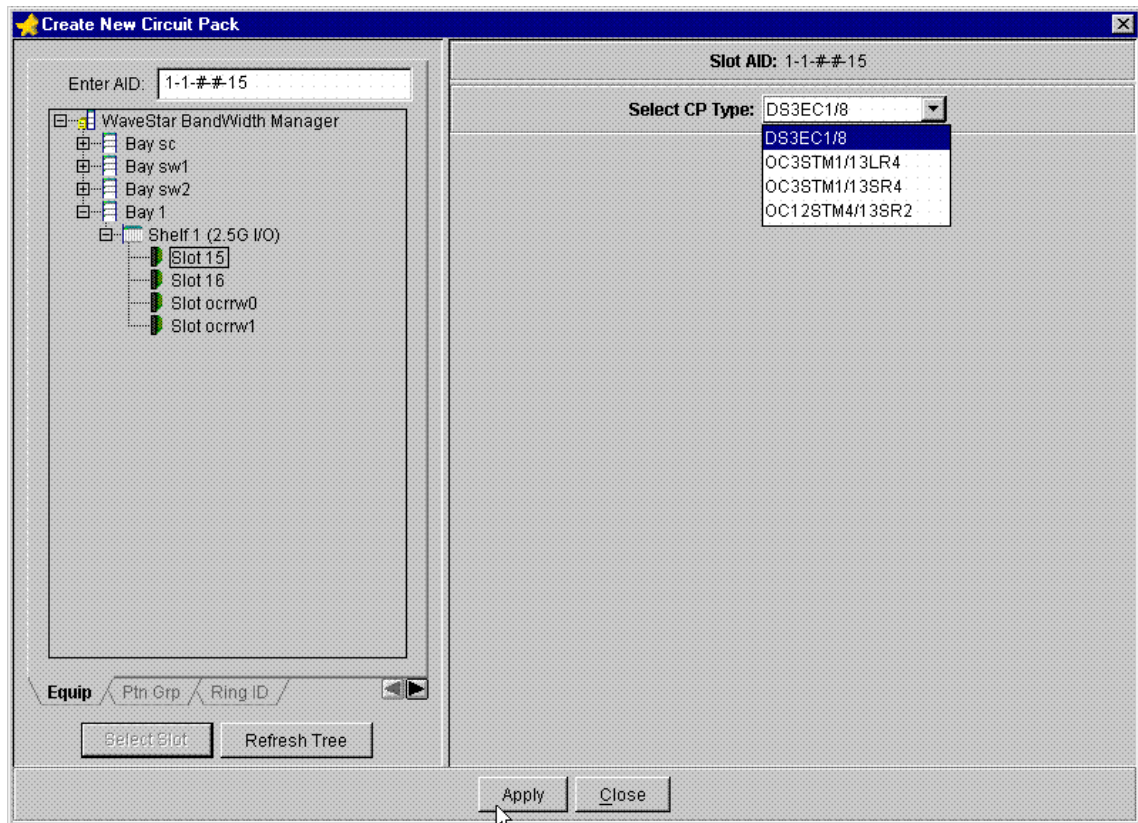
Figure A-27 Screen to select slot 15



- 2 Expand Bay 1 and Shelf 2 and select slot 15.

- 3 Click on the **Select Slot** button to continue. Your screen should be similar to the following figure.

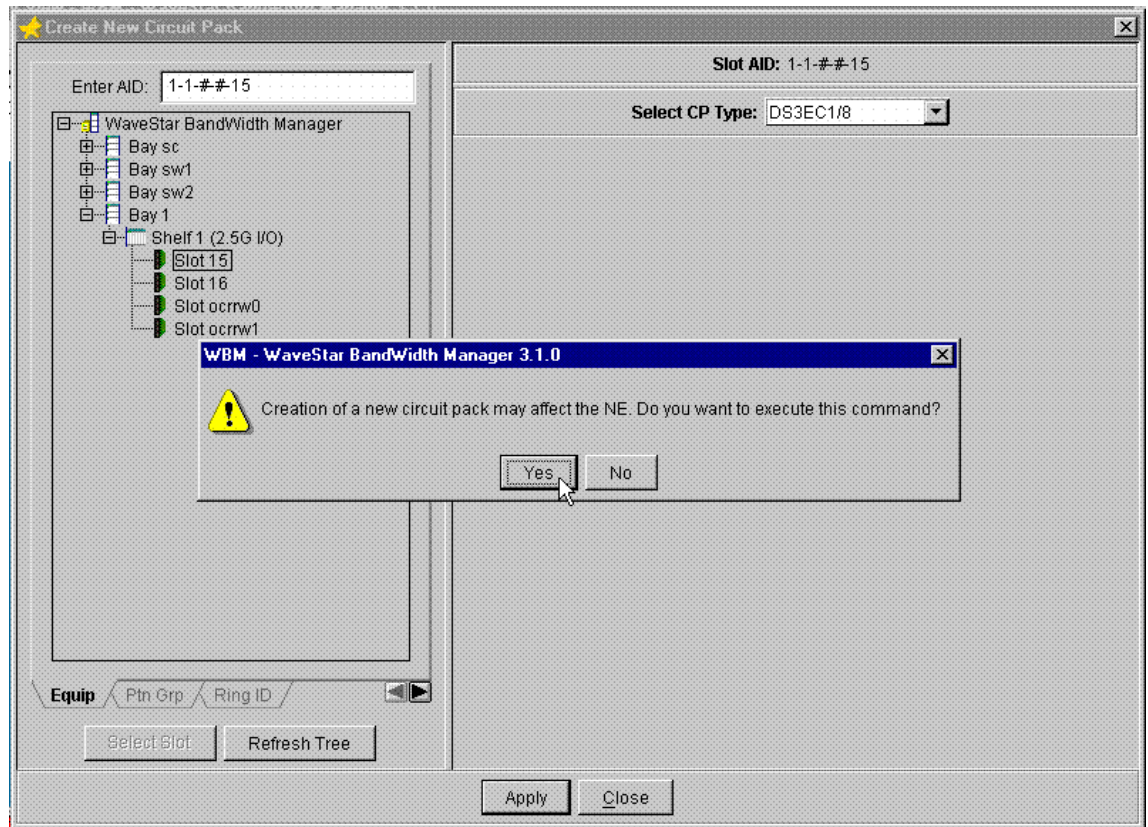
Figure A-28 Screen to select the DS3EC1/8 type circuit pack



- 4 From the list labeled **Select CP Type**, select option **DS3EC1/8** (if it is not already selected).

- 5 Click on the **Apply** button. Your screen should look similar to the following figure.

Figure A-29 Screen to add a DS3/EC1 circuit pack to slot 15

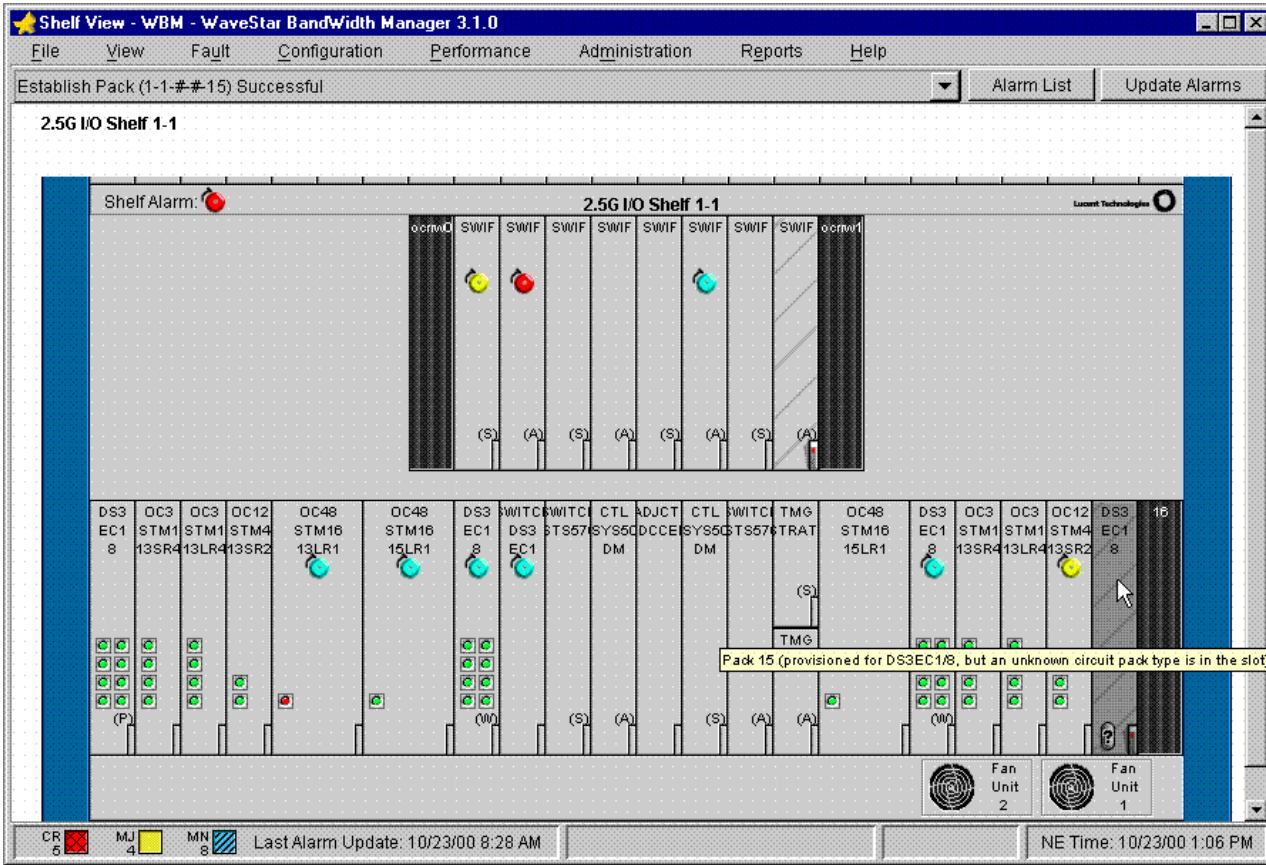


- 6 Click on the **Yes** button.

- 7 Click **Close**.

8 Your screen should look similar to the following figure.

Figure A-30 Pre-provisioned circuit pack DS3/EC1 in slot (1-2-#-15) successful



END OF STEPS

Provision an I/O port without viewing the shelf

One method to provision an I/O port involves displaying the shelf, which may take a couple of minutes. The method below allows you to provision an I/O port without viewing the shelf.

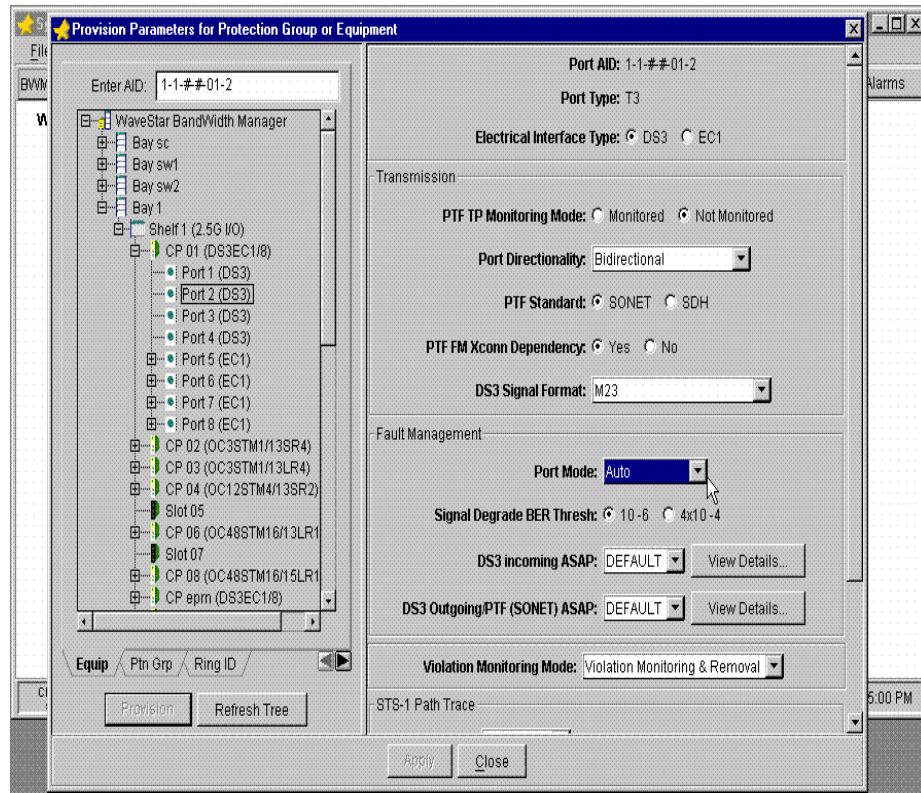
- 1 In the System View, go to the menu bar and click on **Configuration > Provision**.

Important! There are two methods to select a particular circuit pack. First, you can make multiple selections following down the directory tree until finally selecting the desired circuit pack. Secondly, if you know the AID of the circuit pack, then you can enter it directly into the field labeled **Enter Aid**. As you make each selection, the directory tree will display that entry.

Assume, for purposes of this tutorial, that you will provision a DS3/EC1 circuit pack in the following equipment location: Bay 1, Shelf 1, Slot 1 and Port 2. The AID for this location is 1-1-#-#-01-2.

- 2 Go to the field labeled **Enter AID** and type 1-1-#-#-01-2 and click on the **Provision** button. Your screen should look similar to the following figure.

Figure A-31 Screen to Provision Port 2 of Bay 1, Shelf 1, Slot 1



The whole point of this step was to demonstrate a second way to provision a circuit pack.

3 Click on the **Close** button.

END OF STEPS

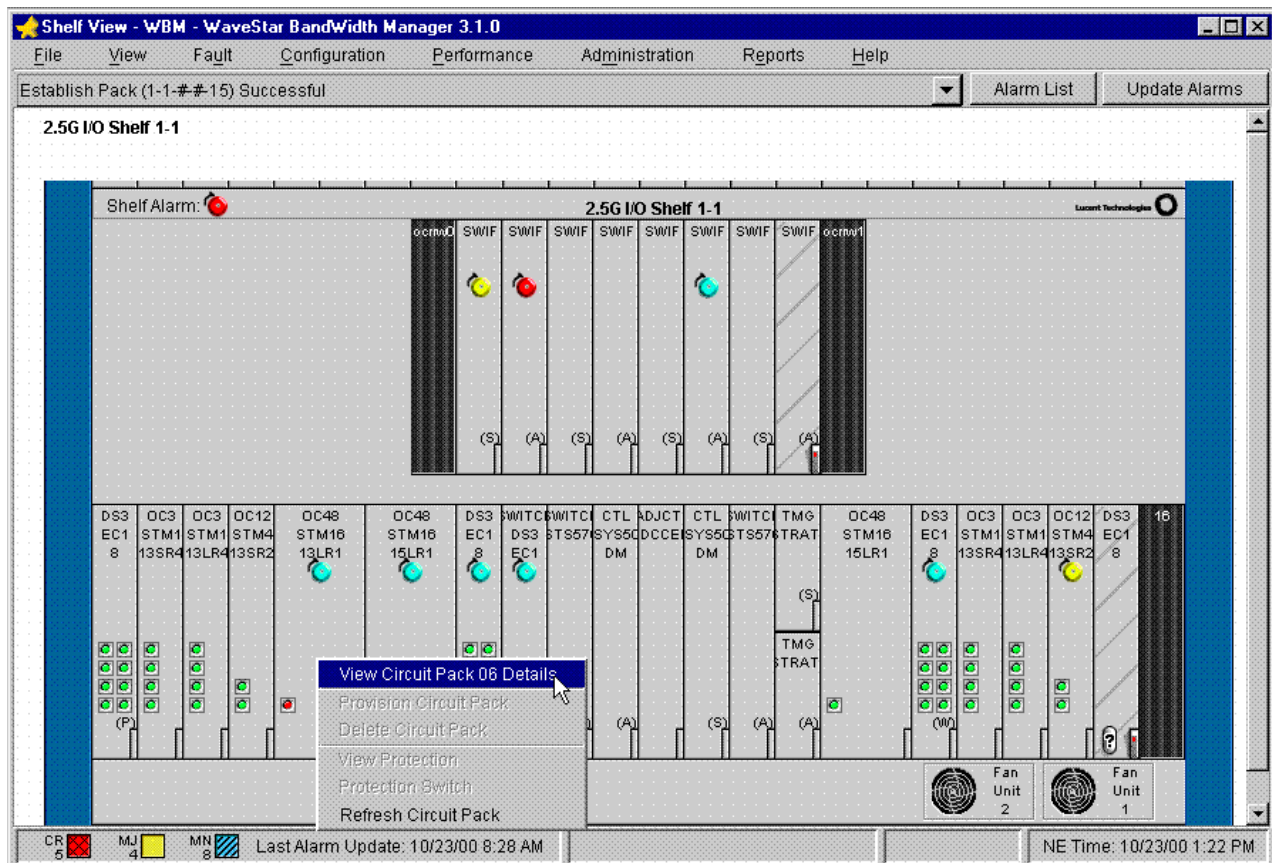
Understand the Difference Between View of Circuit Pack Versus View of Ports

Details view of a circuit pack versus details view of that circuit pack's port(s)

You should understand the difference between circuit pack details and a circuit pack's ports details.

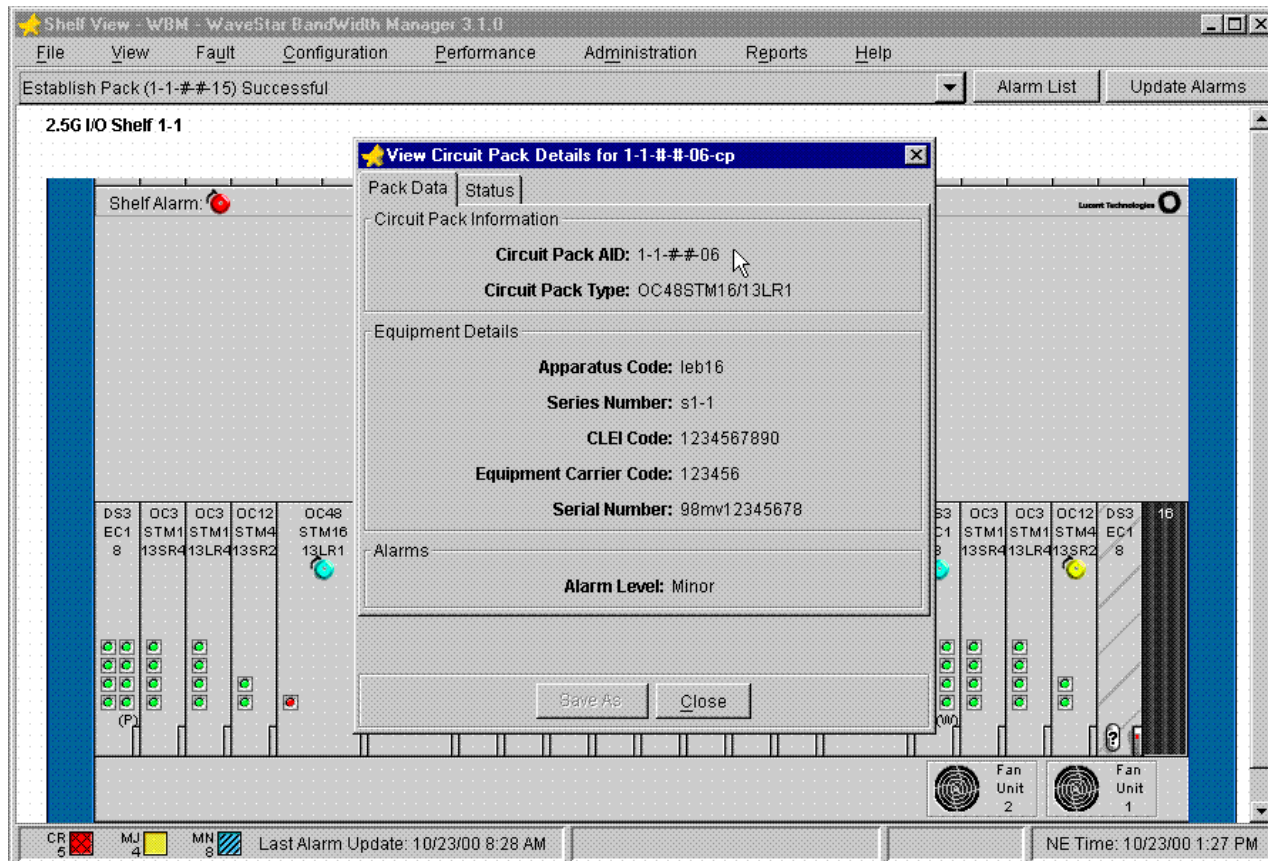
- 1 Place your cursor on one of the slots which already contains an OC48 circuit pack and right-click. Your screen should look similar to the following figure.

Figure A-32 Screen to view circuit pack details



- 2 Click on the **View Circuit Pack 12 Details** option. Your screen should look similar to the following figure.

Figure A-33 Details view of the OC48STM16/13LR1 circuit pack

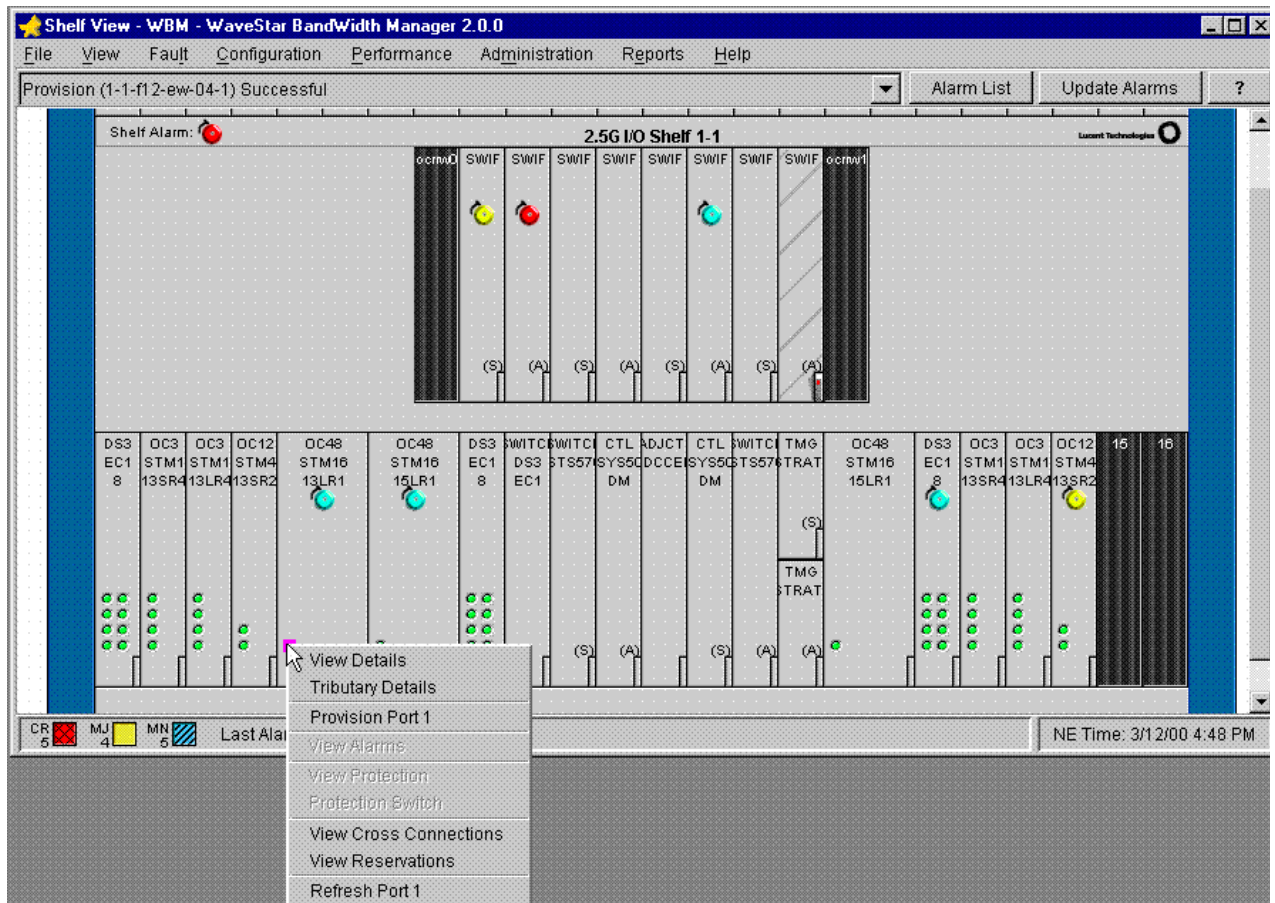


Important! The main things to observe in are (a) that the information is layered under two separate tabs, (b) that this information is strictly about the circuit pack and not about the port.

- 3 Click on the **Close** button.

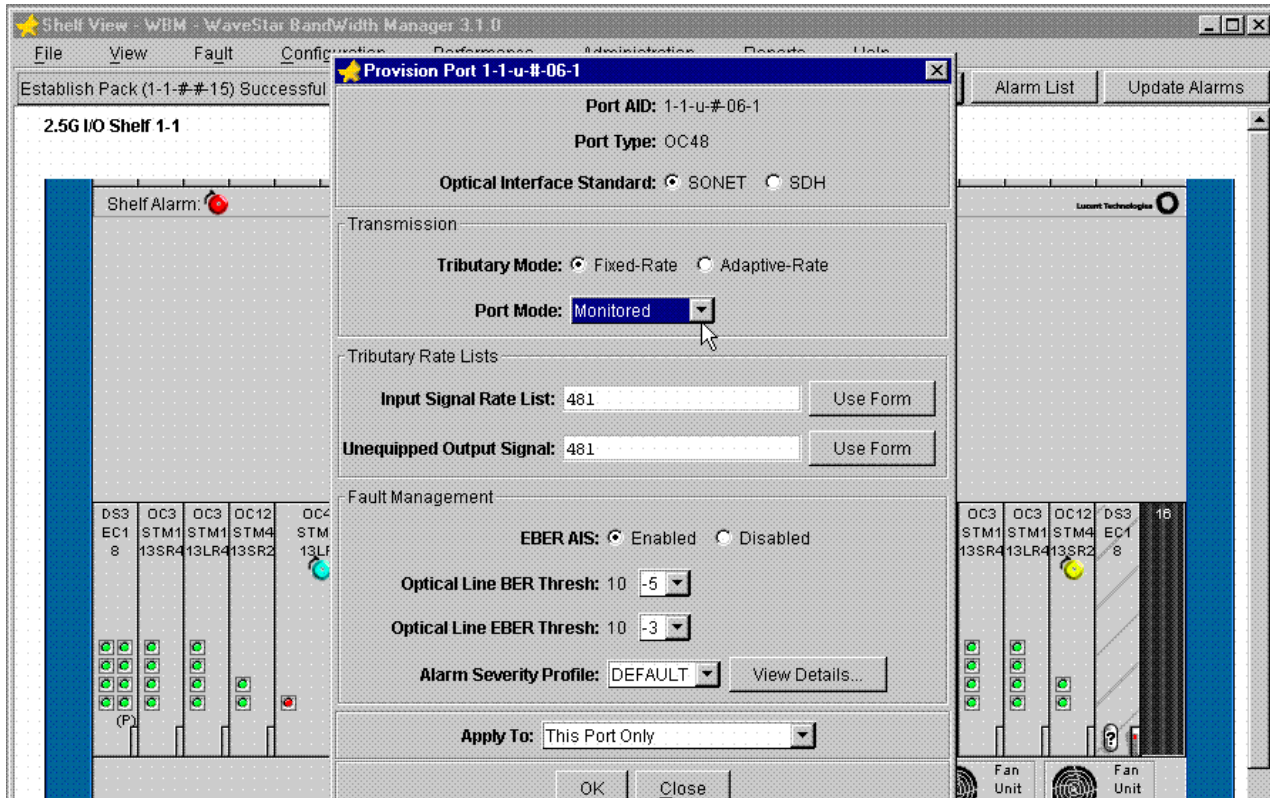
- 4 Place your cursor over the LED indicator for the OC48 circuit pack port and right-click. Your screen should look similar to the following figure.

Figure A-34 Right-click menu for a circuit pack port



- 5 Select option **Provision Port 1**. Your screen should look similar to the following figure.

Figure A-35 Provision Port screen for an optical port

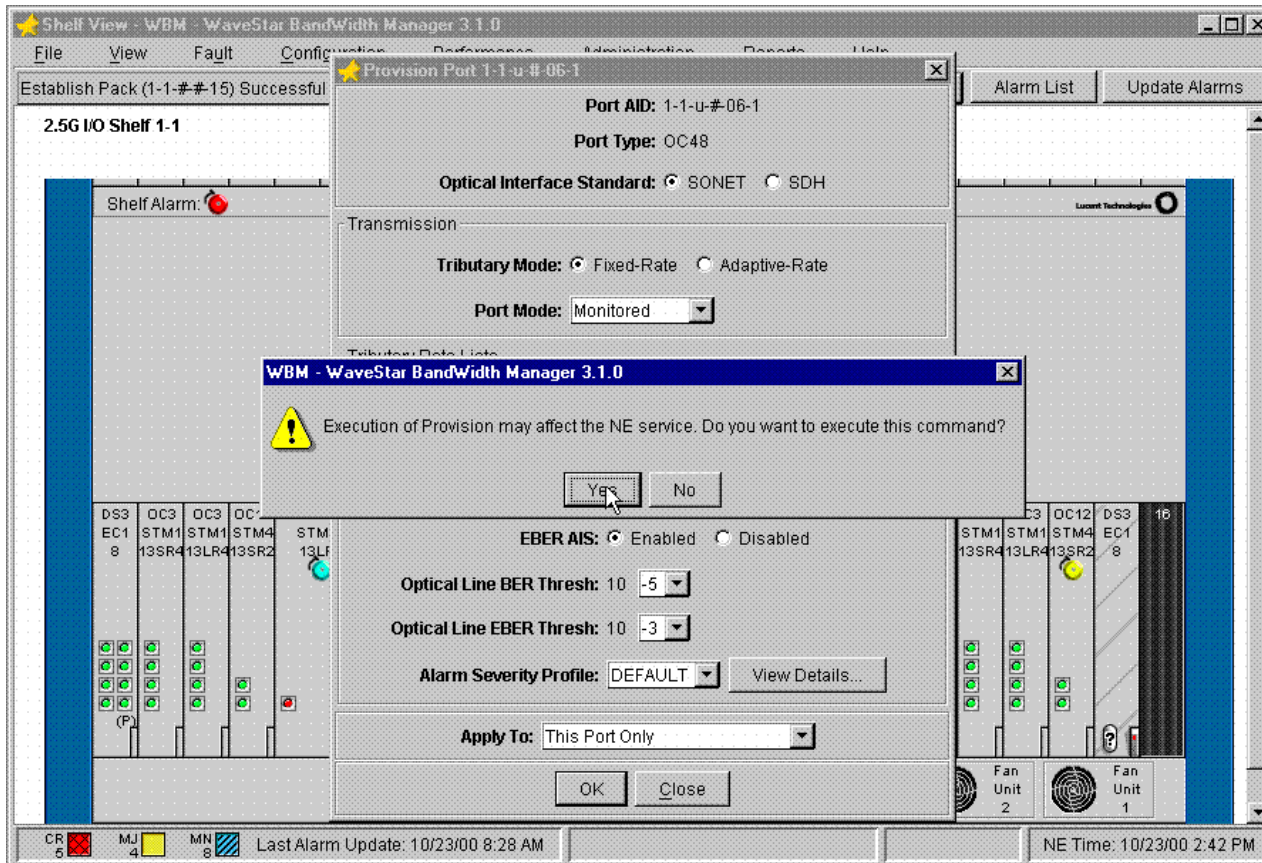


- 6 Place your cursor on the drop-down arrow for the **Port Mode** field and click on option **Monitored**. Your screen should look similar to the following figure.

- 7 Click OK.

Result: Your screen should now display the confirmation dialog box similar to the following figure.

Figure A-36 Verify and confirm screen

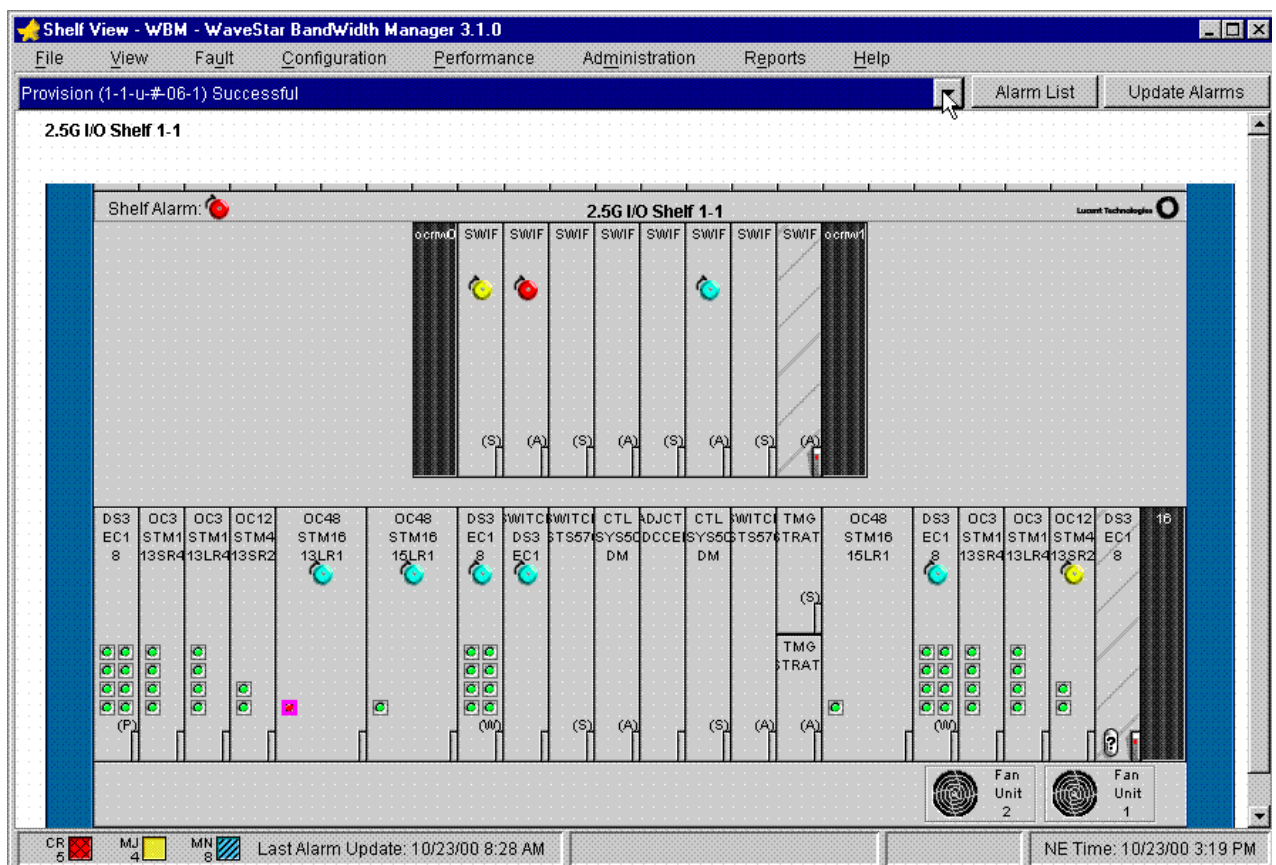


- 8 Verify that all provisioned changes are appropriate and then click on the Yes button.
- 9 Again, place your cursor on the same OC48 circuit pack LED indicator and right-click.

Display the command list Follow the steps below to display the command list.

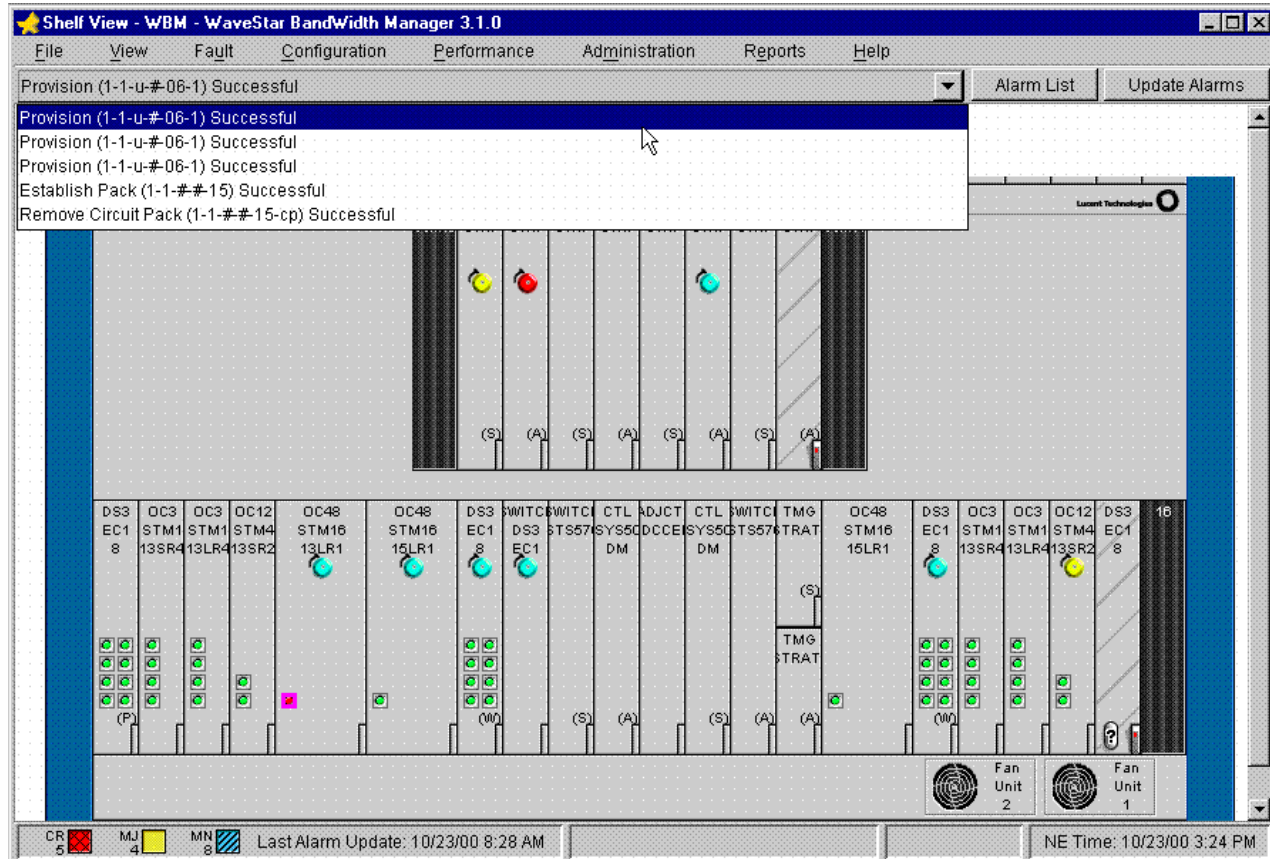
- 1 In the figure below and on your own screen, observe that the most recently executed command appears on a command line near the top of the System View screen.

Figure A-38 Screen view to display the last NE command



- 2** Click on the “drop-down” arrow to display a list of the last attempted commands, both those that were executed successfully and unsuccessfully. Your screen should look similar to the following figure.

Figure A-39 Screen view to display the drop-down list of NE commands



END OF STEPS

Display the Alarms List and Update Alarms

Display the alarm list The Alarm List accessible via a single click from the System View screen.

- 1 Click on this same drop-down arrow to collapse the command list.
- 2 To the right of this same drop-down arrow is the **Alarm List** button. Click on this button to display a list of all currently active alarms.

Result: Your screen should look similar to the following figure, but your list of alarms will be different.

Figure A-40 Screen view of the NE alarm list

Shelf View - WBM - WaveStar BandWidth Manager 3.1.0

File View Fault Configuration Performance Administration Reports Help

Provision (1-1-u-#06-1) Successful

Alarm List Update Alarms

2.5G I/O Shelf 1-1

NE Alarm List - WBM - WaveStar BandWidth Manager 3.1.0

Alarm Level	AID	Date	Time	Affect on Service	Probable Cause	Signal Level Affected	Alarm Type	
CR	sc	01/01/00	07-29-13	SA	LOS	EQPT	Communications	OC48
CR	1-1	01/01/00	07-29-13	SA	LOS	EQPT	Communications	OC12
CR	1-1-t01-w-06-1	01/01/00	07-29-13	NSA	LOS	EQPT	Communications	OC48
CR	1-1-#-swif11-cp	01/01/00	07-29-13	NSA	LOS	EQPT	Communications	OC48
CR	sc-1-#-trng1-cp	01/01/00	07-29-13	SA	LOS	EQPT	Communications	OC48
MJ	1	01/01/00	07-29-13	NSA	LOS	EQPT	Communications	OC48
MJ	sc-1	01/01/00	07-29-13	SA	LOS	EQPT	Communications	OC48
MJ	1-1-#-14	01/01/00	07-29-13	SA	LOS	EQPT	Communications	OC48
MJ	1-1-#-swif10-cp	01/01/00	07-29-13	NSA	LOS	EQPT	Communications	OC48
MN	1-1-#-swif31	01/01/00	07-29-13	SA	LOS	EQPT	Communications	OC48
MN	1-1-#-11	01/01/00	07-29-13	SA	LOS	EQPT	Communications	OC48

Save As Print Close Refresh

DS3 EC1 8 1: (P) (W) (S) (A) (S) (A) (A) (W) Fan Unit 2 Fan Unit 1

CR 5 MJ 4 MN 8 Last Alarm Update: 10/23/00 8:28 AM NE Time: 10/23/00 3:56 PM

The Alarm List column headings are selectable. This permits the data to be sorted (top-to-bottom) according to the selected column heading (that is, by alarm level, effect on service, and so forth). Also, the individual columns may be re-sized (expanded or contracted) and rearranged according to your preference.

- 3 Arrange the column headers (click, hold, drag-and-drop) so that they appear in the same order as in the following figure.

Figure A-41 Re-ordered alarm list

Alarm Level	Probable Cause	AID	Date	Time	Signal Level Affected	Alarm Type	Description	Affect on Service
CR	LOS	sc	01/01/00	07-29-13	EQPT	Communications	OC48 port, Loss Of Signal	SA
CR	LOS	1-1	01/01/00	07-29-13	EQPT	Communications	OC12 port, Loss Of Signal	SA
CR	LOS	1-1-t01-w-06-1	01/01/00	07-29-13	EQPT	Communications	OC48 port, Loss Of Signal	NSA
CR	LOS	1-1-##-swif11-cp	01/01/00	07-29-13	EQPT	Communications	OC48 port, Loss Of Signal	NSA
CR	LOS	sc-1-##-tmg1-cp	01/01/00	07-29-13	EQPT	Communications	OC48 port, Loss Of Signal	SA
MJ	LOS	1	01/01/00	07-29-13	EQPT	Communications	OC48 port, Loss Of Signal	NSA
MJ	LOS	sc-1	01/01/00	07-29-13	EQPT	Communications	OC48 port, Loss Of Signal	SA
MJ	LOS	1-1-##-14	01/01/00	07-29-13	EQPT	Communications	OC48 port, Loss Of Signal	SA
MJ	LOS	1-1-##-swif10-cp	01/01/00	07-29-13	EQPT	Communications	OC48 port, Loss Of Signal	NSA
MN	LOS	1-1-##-swif31	01/01/00	07-29-13	EQPT	Communications	OC48 port, Loss Of Signal	SA
MN	LOS	1-1-##-11	01/01/00	07-29-13	EQPT	Communications	OC48 port, Loss Of Signal	SA
MN	LOS	1-1-##-06-cp	01/01/00	07-29-13	EQPT	Communications	OC48 port, Loss Of Signal	SA
MN	LOS	1-1-##-08-cp	01/01/00	07-29-13	EQPT	Communications	OC48 port, Loss Of Signal	NSA
MN	LOS	sc-1-##-tb1-cp	01/01/00	07-29-13	EQPT	Communications	OC48 port, Loss Of Signal	SA
MN	REPLUNITMISS	1-1-##-eprotsw...	03/04/00	15-12-04	EQPT	Equipment	SWITCH/EP896, Circuit Pack Une...	NSA

Important! You can save the displayed alarm list to a file by clicking on the **Save** button and specifying the file name. Or, you can obtain a paper copy of the alarm list by clicking on the **Print** button.

-
- 4** Click on the **Close** button or on the **Cancel** button (or the boxed “X” at top right corner of menu bar).

END OF STEPS

Update alarms now

Whenever an activity has occurred that would result in clearing or generating an alarm, you may want to manually update the alarms. Otherwise, there may be a number of minutes before the alarm list is automatically updated.

- 1** Click on the **Update Alarms** button immediately to the right of the Alarm List.

END OF STEPS

Test the LEDs

Test LED(s) feature

You can, from the CIT, issue a command that will result in flashing all LEDs for all circuit packs within a particular shelf. One reason to do this is that you suspect that one of the LEDs on a circuit pack is defective. Another reason is that with a BandWidth Manager that consists of many shelves, flashing the LEDs may help you locate a particular shelf.

- 1 Identify the AID of the circuit pack or shelf whose LEDs you wish to test.

Important! The current software implementation of this feature limits the AID selection to the shelf level. Thus, when you flash the LEDs you will be flashing the LEDs for *all* equipped circuit packs within the selected shelf.

- 2 On the System View screen menu bar, select **Fault > Test > LED**.
-

- 3 In the Test LED window expand on the desired Bay [click on the  sign – which is located to the left of the desired bay]. For this exercise select **Bay 1**.
-

- 4 Click to highlight the desired shelf. For this exercise select **Shelf 1**.
-

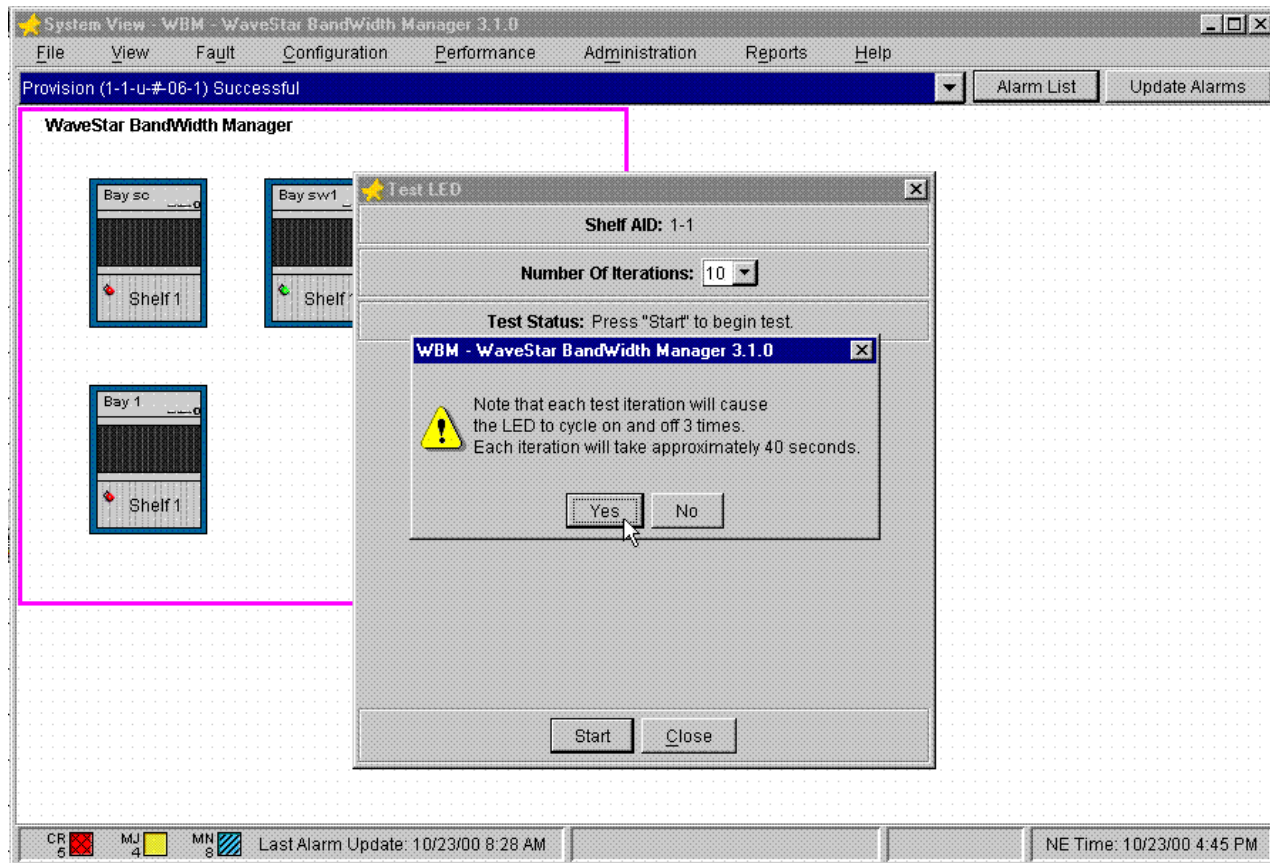
- 5 Click on the **Select** button.
-

- 6 For the field **Number of Iterations** click on the drop-down arrow and select a number from 1-to-60. For this exercise, select the number 2.

Important! Each iteration will cycle the LEDs ON and OFF three times and will take approximately 40 seconds to complete. Thus, if the number of iterations is 2, then the test will take 80 seconds.

- 7 Click on the **Start** button. Your screen should look similar to the following figure.

Figure A-42 Test LED selection screen



- 8 Click on the **Yes** button.

END OF STEPS

Delete a Circuit Pack

Delete the DS3EC1/8 circuit pack that was added earlier

You should return the NE to its original equipment configuration by deleting all equipment that has been added during this tutorial. Follow the steps below to delete the DS3EC1/8 circuit pack via the Shelf View. Note that this can also be accomplished via the System View by selecting **Configuration > Delete**.

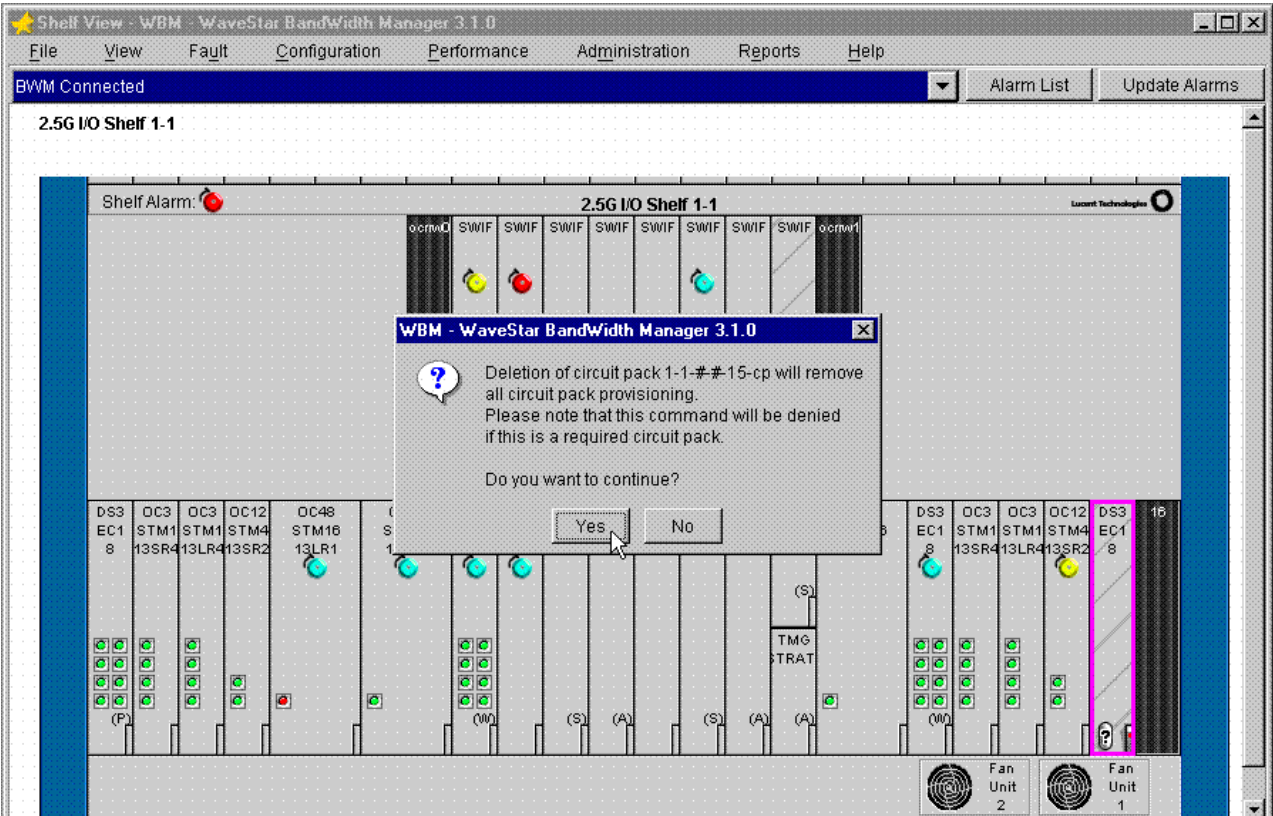
- 1 Display Bay 1, Shelf 1 by double-clicking on its graphical representation in the System View.

Result: The Shelf View for Bay 1, Shelf 1 appears.

- 2 From the Shelf View display:
 1. Right-click on **CP 15 (DS3EC1/8)**.
 2. Select **Delete Circuit Pack** from the menu that appears.

Result: A confirmation dialog box appears similar to the following figure.

Figure A-43 Screen to Delete the Circuit Pack in Slot 15 of Shelf 1 and Bay 1



- 3 Click **Yes** to confirm that you want to delete the circuit pack.

END OF STEPS

Disconnect from the NE

Disconnect from the NE This concludes the series of activities for the “Graphical” System View. Disconnect now from this NE.

- 1** Go to the menu bar and click on **File > NE Disconnect**.

Result: A confirmation dialog box appears.

- 2** Click on **Yes** to confirm that you want to disconnect.

END OF STEPS



Working with TL1 Commands

Cut Through view As an alternative to using the graphical user interface (GUI) based System View, the WaveStar BandWidth Manager provides a Cut Through to TL1 capability. With Cut Through the user can execute TL1 commands on a one-at-a-time basis or in a series/script.

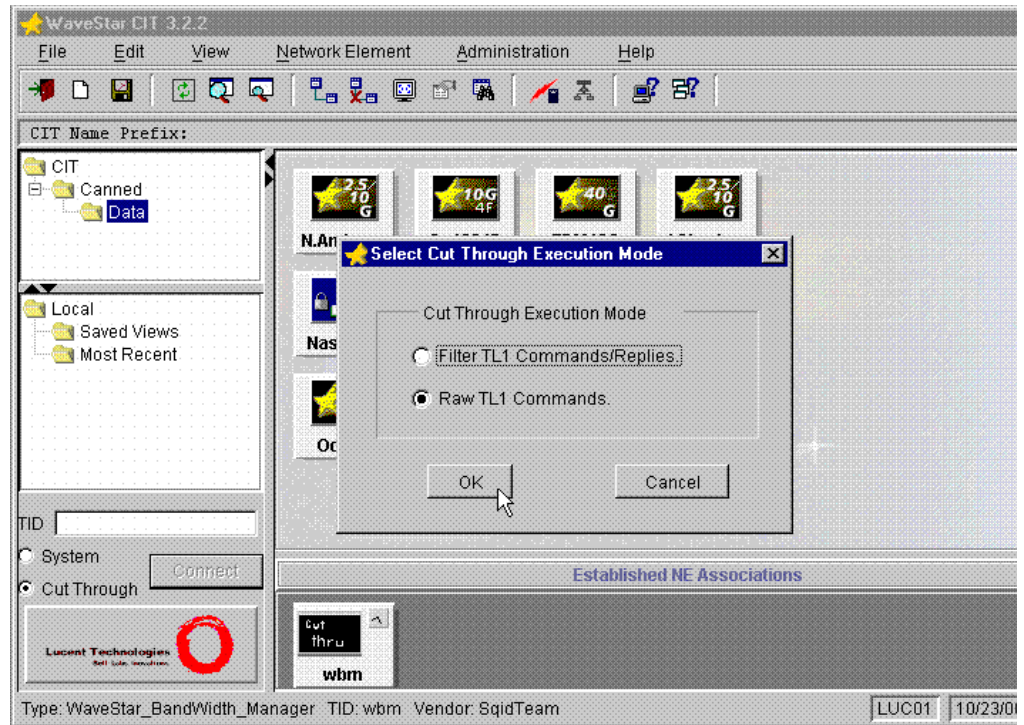


CAUTION

While in System View, users are alerted with a warning message to inform them that if they follow through with their command, it could impact service. As a contrast, Cut Through mode does not provide any warning message and thus the user does not get a second opportunity to consider the consequences of his/her command.

- 1** From the WaveStar CIT View screen:
 1. Enter the TID of the NE that you wish to establish a Cut Through session (for this example, enter w25g, wbm, or OC192 as appropriate).
 2. Click the **Cut Through** option.
 3. Click on the **Connect** button. Your screen should now look like the following figure.

Figure A-44 Screen for Selecting the Cut Through Execution Mode



END OF STEPS

Select Cut Through Execution Mode

As an option you may select either the: (a) Raw mode, or (b) Filtered mode to execute your TL1 commands.

- 1 Click on the **Filter TL1 Commands/Replies** option, then click on the **OK** button.

END OF STEPS

Filtered Mode

The Filtered Mode provides separation between the user's input commands and the NE's responses/outputs. Some pre-processing (for example, syntax parsing) is performed on the user's inputs.

Raw Mode

The Raw Mode is somewhat equivalent to a "de-bug" mode. Exactly what the user enters in the form of a TL1 command is sent to the

subject NE. Inputs and outputs are grouped together – there is no separation between a user's commands and the NE's responses.

Interactive – execute TL1 commands one-at-a-time

Follow the steps below to execute TL1 commands one-at-a-time.

- 1 You can execute TL1 commands on an interactive (one-at-a-time) basis. Two methods are available:
 1. If you know the exact TL1 command, enter the command on the command line (shown in the following figure).
 - or
 2. Click on the drop-down arrow, which is located at the end of the command line (shown in the following figure) to see a listing of the commands. Your screen should look similar to the following figure.

Figure A-45 Cut Through Screen for Entering TL1 Commands on the Command Line

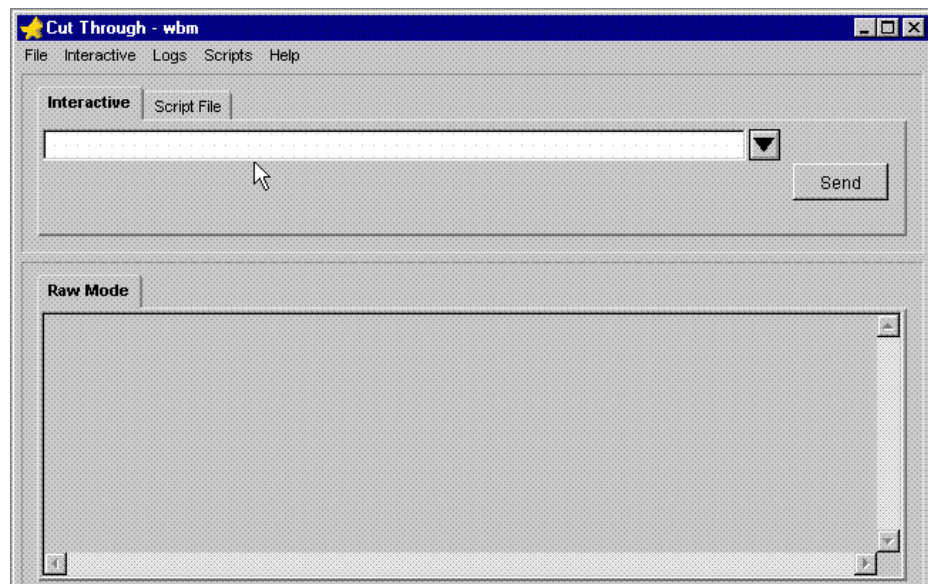
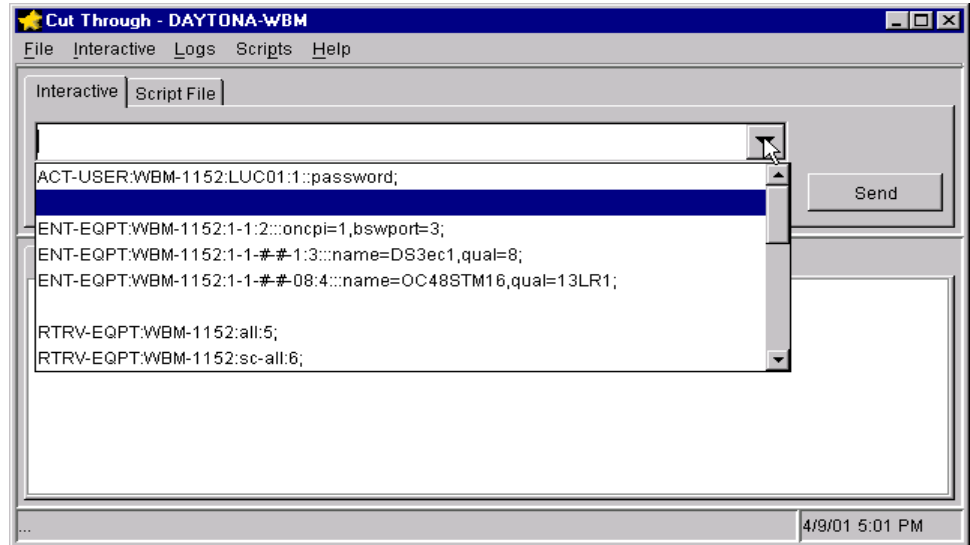


Figure A-46 Cut Through Screen Showing TL1 Command Drop-Down List

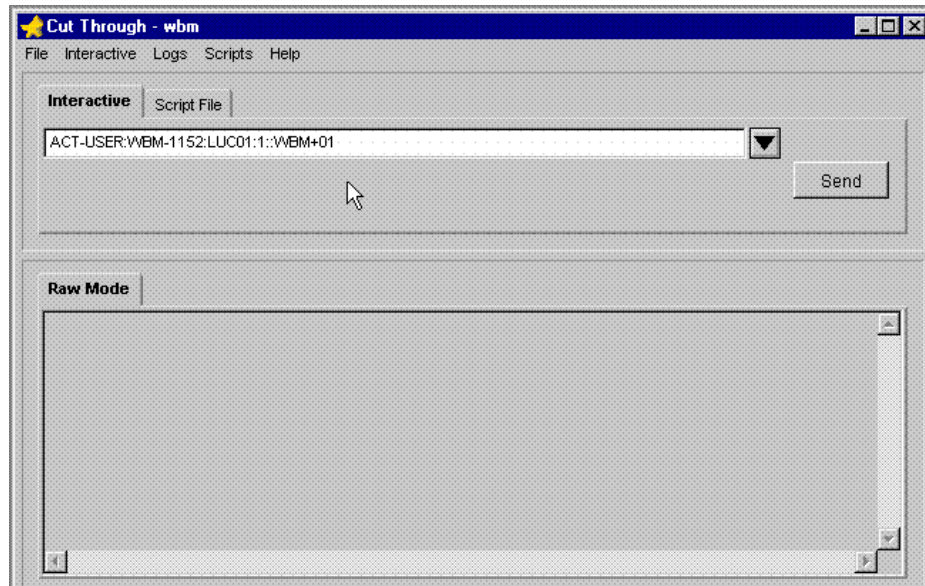


-
- 2** Scroll down the list until you see the command that you want to send to the NE or a command that is similar and which can be easily changed from the command line.

For example, let us assume that login=LUC01 wants to achieve a login session to the NE that has TID = DAYTONA-WBM. This can be accomplished with the very first TL1 command in the drop-down list

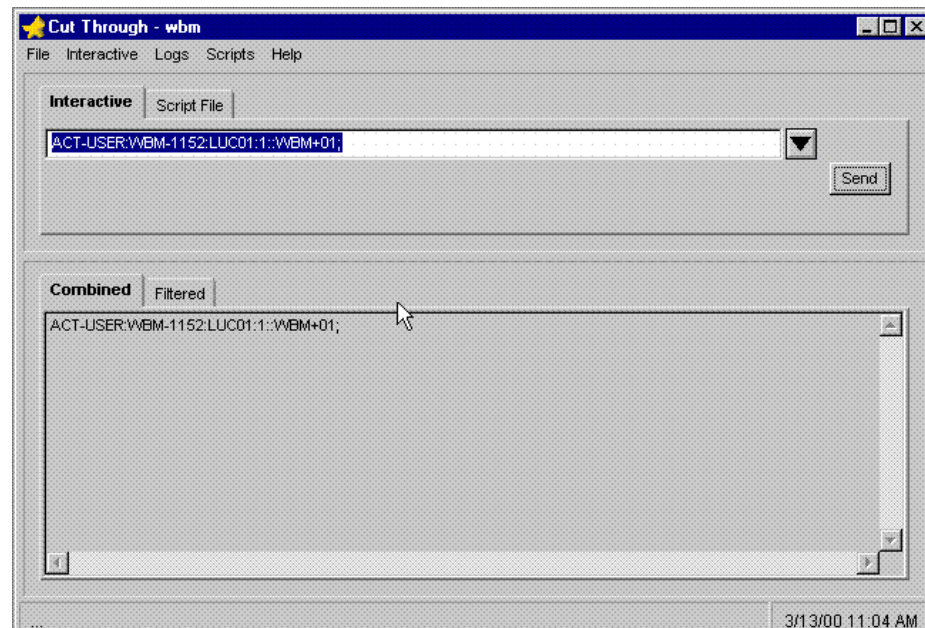
-
- 3** Click on the first command to place it on the command line.
-
- 4** Place the cursor into the command line and edit the command so that the TID, username, and password are correct. Your screen should look similar to the following figure.

Figure A-47 Cut Through Screen for Interactive Command Mode



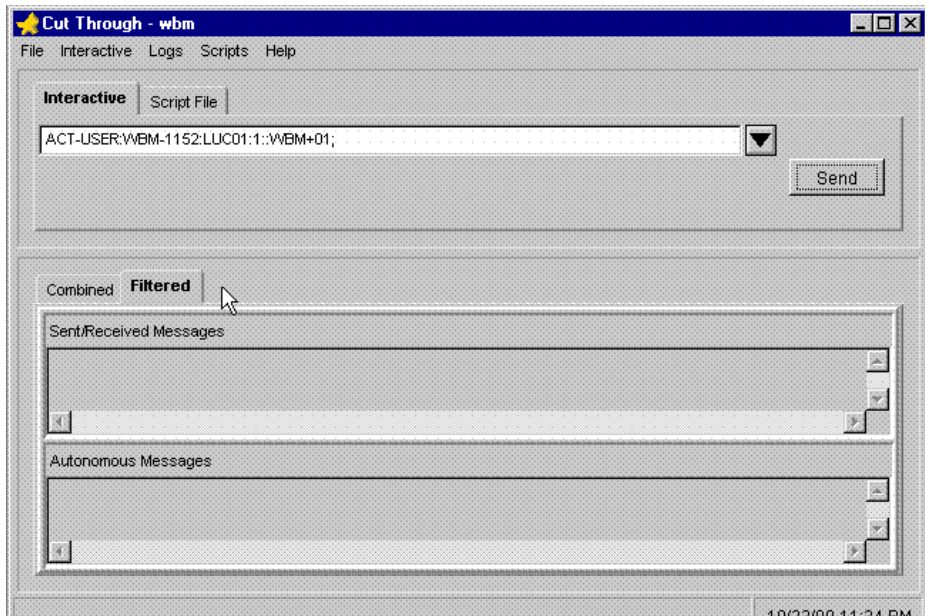
- 5 Click on the **Send** button. Your screen should look like the following figure.

Figure A-48 Cut Through Screen with TL1 Login Command Response



-
- 6 As desired, the user may view the system response in a combined format, as in the previous figure, or a filtered format. Click on the tab labeled **Filtered**. Your screen should look similar to the following figure.

Figure A-49 Cut Through Screen Showing the Filtered Response



Important! The combined format displays commands, in the order that they are sent along, with the received responses. Because of delays, a command and its received response may be separated by other commands and responses from other commands. This is especially true when sending commands from a script file where the commands are sent in rapid succession.

The filtered format separates autonomous messages from the sent commands and their received responses. A sent command will not be displayed until its corresponding response is received. Demarcation banners are added to help distinguish between sent/received messages.

END OF STEPS

Interactive – manage a listbox file

The listbox file is a text file that contains the TL1 commands that you see when you click on the drop-down arrow to the right of the command line.

-
- 1 From the menu bar, select **Interactive**, then select each of the following

options to try them out:

1. Select TL1 Listbox File

Then select a text file from the listbox file directory. (The default directory for listbox files is C:\Program Files\Lucent Technologies\WaveStar CIT\bin\)

The text contained within the newly selected file will replace the previous text displayed in the interactive TL1 listbox.

2. Edit TL1 Listbox File

The Wordpad application opens the file selected above, or defaults to the originally displayed TL1 listbox. The user may also manually overwrite the TL1-listbox.txt file outside of the CIT application so that it becomes the new default.

3. Add last TL1 command TL1 Listbox & File

No NE operations are performed in this step.

The last command sent from the interactive command line will be added to the interactive TL1 listbox.

.....
E N D O F S T E P S
.....

Working with logs

A log is a text file which records all commands and responses from the time it is started until it is stopped.
.....

1 From the menu bar, select **Logs > Start**, then you will be prompted to:

1. Select an existing directory and log file to start or enter a new filename to be created and started.
 2. Select **Open** to start recording all TL1 commands and responses in a filtered format.
-

2 Once TL1 logging is started, the next time that menu **Logs** is selected, the **Start** menu option will toggle to **Stop**. Select **Stop** to stop logging TL1 commands and close the log file.
.....

3 From the menu bar, select **Logs > View**, and enter the name of an existing log file that you wish to view.

The selected log file is displayed using Wordpad. You can view and/or print the log file.
.....

-
- 4 From the menu bar, select **Logs > Time/Date Stamp** to toggle (on/off) the time and date stamp. The time and date stamp, when on, is listed at the beginning of the command head for both the filtered view and the log file.

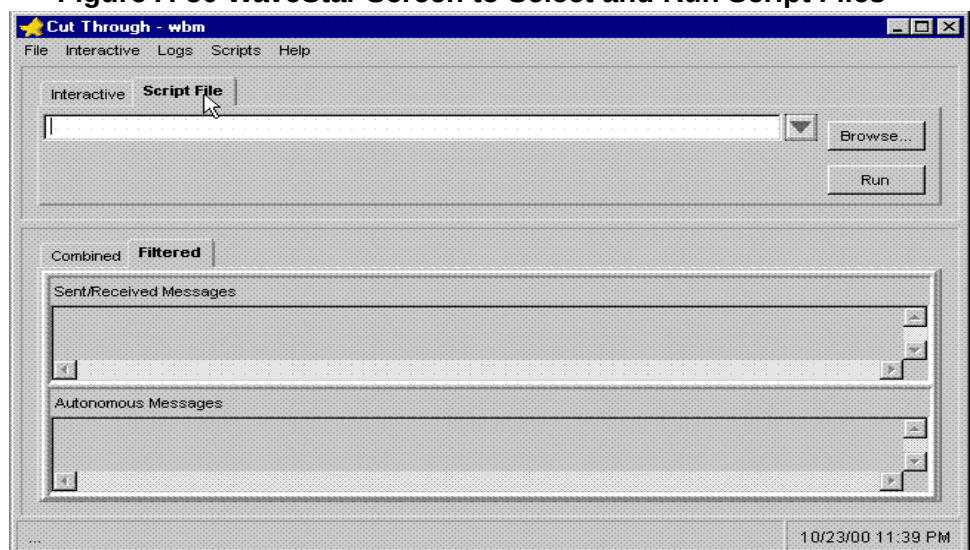
END OF STEPS

Working with script files

A script file is a text file consisting of TL1 commands. The entire script of TL1 commands can then be run with one CIT command.

-
- 1 Select the **Script File** tab. Your screen should look similar to the following figure.

Figure A-50 WaveStar Screen to Select and Run Script Files



At this point you can select the **New**, **Edit**, **Run**, and **Stop** commands from the **Scripts** menu to use scripts, but keep in mind the following:

- A script file can contain any number lines of ASCII text.
- Any line not containing a valid command will be displayed in an Invalid TL1 message box.
- Lines beginning with forward-slash forward-slash // are ignored.

- A log file can be created (automatically) for each script file by inserting `#logfile=on` on any single line. This can be inserted/turned-on at anytime during the script file and can be turned on multiple times. Each time that a new `#logfile=on` command is executed, the previous logfile is closed. The generated log file will have a unique name consisting of the current time/date-stamp plus the name of the current script file.
- A log file can also change the interval at which a command is sent by having `#delayP00` on a single line where 5000, in this case, is 5 seconds. This delay may be increased or decreased as often as desired.
- A script file may be edited from the script menu, and a script may be stopped at any time by selecting **Stop** from the script menu.

When beginning to execute a script file, you are prompted once to select one of the following three execution modes: **Stop on deny from NE**, **Pause and Prompt each command**, and **Send all commands**.

2 Having previously located and selected a script file, you can now execute that file with the **Run** button.

3 Select **File > Exit**.

Result: You see the message: Are you sure you want to exit?

4 Click on **Yes**.

5 From the WaveStar CIT View screen, select **File > Exit**.

Result: You see the message: Are you sure you want to exit?

6 Click on **Yes**.

7 STOP! You have completed this tutorial.

END OF STEPS





Appendix B: Technical Specifications

Overview

Purpose The information included in this appendix is necessary to plan the implementation of WaveStar BandWidth Manager into an existing or new network. The data presented is applicable to a fully-equipped 4608/1536 platform.

Contents The following topics are discussed in this chapter:

General System Specifications	B - 2
Optical Port Unit Specifications	B - 3
Electrical Port Unit Specifications	B - 21
Power Specifications	B - 24
Equipment Dimensions	B - 28
Operations Interface Specifications	B - 31
External Synchronization Specifications	B - 32
Environmental Specifications	B - 35

General System Specifications

Overview This section provides some general system specifications.

Transmission fibers WaveStar BandWidth Manager uses the following transmission fibers:

- Standard single-mode non-dispersion shifted fiber
- TrueWave™ non-zero dispersion shifted fiber

Connectorized cabling Because all connections to transmission interfaces, WaveStar CIT, overhead byte access, and miscellaneous discretes are via connectorized cabling, the need to “wire-wrap” connections is eliminated.

Front access Front access is provided for all circuit pack insertions/removals, all external connections/cabling to transmission interfaces, and a CIT port on each user panel for a WaveStar CIT.

Rear access Because inter-bay cabling occurs at the rear of the bays, rear access is required for system installation and future upgrades.



Optical Port Unit Specifications

Overview The optical specifications provided in this section apply to the optical port units in WaveStar BandWidth Manager, (OC192/STM64 OC48/STM16, OC12/STM4, and OC3/STM1).

Line rate This section provides the line rates for the optical port units.

OC192/STM64

The optical line rate for the OC192/STM64 port units is 9.953 Gb/s.

OC48/STM16

The optical line rate for the OC48/STM16 port units is 2.488 Gb/s.

OC12/STM4

The optical line rate for the OC12/STM4 port units is 622.08 Mb/s.

OC3/STM1

The optical line rate for the OC3/STM1 port units is 155.52 Mb/s.

Line code The optical line code for the optical port units is scrambled nonreturn to zero (NRZ).

Connector interfaces The optical port units may be equipped with either ST-type, FC-type, or SC-type lightguide build-out (LBOs)/optical attenuators for optical attenuation. The LBOs/optical attenuators are order in kits; each kit includes a 0 dB, 5 dB, 10 dB, 15 dB, and a 20 dB attenuator.

Important! The OLS-compatible port units (OC48/STM16/DWDM, OC48/STM16/WDM, and OC192/STM64/WDM) are factory-equipped with LC-type 0 dB optical attenuators. All other optical port units are factory-equipped with SC-type 0 db optical attenuators.

Lightguide jumpers Single-mode optical jumpers are used on all optical interfaces in WaveStar BandWidth Manager. Single-mode to multi-mode LBOs/optical attenuators are used on the receive connectors on the OC12/STM4 and OC3/STM1 port units.

Optical source This sections provides the optical source information for the optical port units.

OC192/STM64

The optical source for the OC192/STM64/1.5IRS1 port units is an electro-absorptive Modulated Laser (EML).

The optical source for the OC192/STM64/1.5IR1, OC192/STM64/WDM, and OC192/STM64/POU port units is a Continuous Wave (CW) laser with a Mach-Zender modulator.

OC48/STM16

The optical source for the OC48/STM16/1.3LR1 and OC48/STM16/1.5LR1 port units is a distributed feedback (DFB) laser.

The optical source for the and OC48/STM16/DWDM01-16, OC48/STM16/WDM, OC48/STM16/POU port units is an electro-absorptive Modulated Laser (EML).

OC12/STM4

The optical source for the OC12/STM4/1.3SR2 and OC12/STM4/1.3LR2 port units is a DFB laser.

OC3/STM1

The optical source for the OC3/STM1/1.3SR4 port units can be either a DFB laser or a Fabre-Perot laser.

The optical source for the OC3/STM1/1.3LR4 port units is a DFB laser.

Capacity This sections provides the capacity information for the optical port units.

OC192/STM64

Each OC192/STM64 port unit supports either one OC-192 or one STM-64 (user-provisionable) bidirectional (one receive and one transmit) line. The port unit capacity may be translated to 192 STS-1/64 STM-1 equivalents or 129,024 two-way voice circuits.

OC48/STM16

Each OC48/STM16 port unit supports either one OC-48 or one STM-16 (user-provisionable) bidirectional (one receive and one transmit) line. The port unit capacity may be translated to 48 STS-1/16 STM-1 equivalents or 32,256 two-way voice circuits.

OC12/STM4

Each OC12/STM4 port unit supports either two OC-12 or two STM-4 (user-provisionable) bidirectional (one receive and one transmit) lines. The port unit capacity may be translated to 24 STS-1/8 STM-1 equivalents or 16,128 two-way voice circuits.

OC3/STM1

Each OC3/STM1 port unit supports either four OC-3 or four STM-1 (user-provisionable) bidirectional (one receive and one transmit) lines. The port unit capacity may be translated to 12 STS-1/4 STM-1 equivalents or 8,064 two-way voice circuits.

Optical detector The optical detector for the optical port units is an avalanche photodiode (APD).

Optical safety This sections provides the optical safety information for the optical port units.

SONET

The following table lists the optical safety data for the laser-containing port units.

Table B-1 Optical Safety for Optical Port Units

Port Unit	Standard Apparatus Codes	NEBS Level 3 Apparatus Codes	FDA/CDRH Classification System
OC48/STM16/1.3LR1	LEY7	LEY7AE	Class IIIB
OC48/STM16/1.5LR1	LEY8	LEY8AE	Class I
OC12/STM4/1.3LR2	LEY13	LEY13AE	Class IIIB
OC12/STM4/1.3SR2	LEY14	LEY14AE	Class IIIB
OC3/STM1/1.3LR4	LEY15	LEY15AE	Class IIIB
OC3/STM1/1.3SR4	LEY16	LEY16AE	Class IIIB
OC48/STM16/DWDM01-16	LEY50-65	LEY50AE-65AE	Class I
OC192/STM64/1.5IR1	LEY69	LEY69AE	Class I
OC48/STM16/POU (all)	LEY80-95	LEY80AE-95AE	Class I
OC192/STM64/1.5IRS1	LEY97	LEY97AE	Class I
OC48/STM16/WDM (all)	LEY101-180	LEY101AE-180AE	Class I
OC192/STM64/WDM (all)	LEY201-240	LEY201AE-240AE	Class I
OC192/STM64/POU (all)	LEY284-299	LEY284AE-299AE	Class I

SDH

Optical safety data for laser-containing port units is Level 1 in the IEC classification system.

Protection This section provides the provisionable protection modes for the port units.

OC192/STM64

The protection mode for the OC192/STM64 port units in WaveStar BandWidth Manager may be provisioned as

- 2-fiber OC-192 BLSR/STM-64 MS-SPRing
- 4-fiber OC-192 BLSR (open or closed)
- 4-fiber STM-64 MS-SPRing with transoceanic protocol
- STM-64 SNCP
- 1+1 protected (two port units providing OC-192/STM-64 1+1 protection, unidirectional, non-revertive)
- 0x1 protected (unprotected)

OC48/STM16

The protection mode for the OC48/STM16 port units in WaveStar BandWidth Manager may be provisioned as

- 2-fiber OC-48 BLSR/STM-16 MS-SPRing
- 4-fiber OC-48 BLSR/STM-16 MS-SPRing (open or closed)
- 4-fiber STM-16 MS-SPRing with transoceanic protocol
- OC-48 UPSR
- STM-16 SNCP
- 1+1 protected (two port units providing OC-48/STM-16 1+1 protection, which may be
 - unidirectional, non-revertive
 - bidirectional, non-revertive
- 0x1 protected (unprotected)

OC12/STM4

The protection mode for the OC12/STM4 port units in WaveStar BandWidth Manager may be provisioned as

- OC-12 UPSR
- STM-4 SNCP
- 1+1 protected (two port units providing OC-12 1+1 protection, unidirectional, non-revertive)
- 1+1 protected (two port units providing STM-4 1+1 protection, which may be
 - unidirectional, non-revertive
 - bidirectional, non-revertive
 - bidirectional, revertive
- 0x1 protected (unprotected)

OC3/STM1

The protection mode for the OC3/STM1 port units in WaveStar BandWidth Manager may be provisioned as

- STM-1 SNCP
- 1+1 protected (two port units providing OC-3 1+1 protection, unidirectional, non-revertive)
- 1+1 protected (two port units providing STM-1 1+1 protection, which may be
 - unidirectional, non-revertive
 - bidirectional, non-revertive
 - bidirectional, revertive
- 0x1 protected (unprotected)

Dispersion

WaveStar BandWidth Manager can accommodate the following types of dispersion:

Chromatic dispersion

The receiver can accommodate 6500 ps/nm of total chromatic dispersion with an optical path penalty of no more than 2 dB when measured at 1×10^{-12} BER.

Group delay dispersion for PMD

The receiver can accommodate up to 75 ps/nm of group delay dispersion due to polarization mode dispersion (PMD) with an optical path penalty of no more than 2 dB when measured at 1×10^{-12} BER.

Optical port unit dispersion

The following table provides the dispersion information for the optical port units.

Table B-2 Optical Port Unit Dispersion

Port Unit	Standard Apparatus Codes	NEBS Level 3 Apparatus Codes	Dispersion
OC48/STM16/1.3LR1	LEY7	LEY7AE	300 ps/nm
OC48/STM16/1.5LR1	LEY8	LEY8AE	1800 ps/nm
OC12/STM4/1.3LR2	LEY13	LEY13AE	300 ps/nm
OC12/STM4/1.3SR2	LEY14	LEY14AE	300 ps/nm
OC3/STM1/1.3LR4	LEY15	LEY15AE	300 ps/nm
OC3/STM1/1.3SR4	LEY16	LEY16AE	300 ps/nm
OC48/STM16/DWDM01-16	LEY50-65	LEY50AE-65AE	Compatible with WaveStar OLS 40G/80G
OC192/STM64/1.5IR1	LEY69	LEY69AE	1200 ps/nm
OC192/STM64/1.5IRS1	LEY97	LEY97AE	800 ps/nm
OC48/STM16/POU	LEY80-95	LEY80AE-95AE	1200 ps/nm
OC48/STM16/WDM (all)	LEY101-180	LEY101AE-180AE	Compatible with WaveStar OLS 400G
OC192/STM64/WDM (all)	LEY201-240	LEY201AE-240AE	Compatible with WaveStar OLS 400G
OC192/STM64/POU (all)	LEY284-299	LEY284AE-299AE	1200 ps/nm

Operating wavelengths

The following two tables provide the operating wavelength ranges for the optical port units.

The following table provides the operating wavelength ranges for the OC48/STM16, OC12/STM4, and OC3/STM1 port units.

Table B-3 OC48/STM16, OC12/STM4, and OC3/STM1 Port Unit Operating Wavelengths

Port Unit	Wavelength
OC48/STM16/1.3LR1	1280-1335 nm
OC48/STM16/1.5LR1	1530-1565 nm
OC12/STM4/1.3LR2	1298-1325 nm
OC12/STM4/1.3SR2	1298-1325 nm
OC3/STM1/1.3LR4	1298-1325 nm
OC3/STM1/1.3SR4	1261-1360 nm
OC48/STM16/DWDM01	1549.32 nm
OC48/STM16/DWDM02	1550.92 nm
OC48/STM16/DWDM03	1552.52 nm
OC48/STM16/DWDM04	1554.13 nm
OC48/STM16/DWDM05	1555.75 nm
OC48/STM16/DWDM06	1557.36 nm
OC48/STM16/DWDM07	1558.98 nm
OC48/STM16/DWDM08	1560.61 nm
OC48/STM16/DWDM09	1548.52 nm
OC48/STM16/DWDM10	1550.12 nm
OC48/STM16/DWDM11	1551.72 nm
OC48/STM16/DWDM12	1553.33 nm
OC48/STM16/DWDM13	1554.94 nm
OC48/STM16/DWDM14	1556.56 nm
OC48/STM16/DWDM15	1558.17 nm
OC48/STM16/DWDM16	1559.79 nm
OC48/STM16/POU9590	1530.33 nm
OC48/STM16/POU9570	1531.90 nm
OC48/STM16/POU9550	1533.47 nm
OC48/STM16/POU9530	1535.04 nm

Port Unit	Wavelength
OC48/STM16/POU9490	1538.19 nm
OC48/STM16/POU9470	1539.77 nm
OC48/STM16/POU9450	1541.35 nm
OC48/STM16/POU9430	1542.94 nm
OC48/STM16/POU9370	1547.72 nm
OC48/STM16/POU9350	1549.32 nm
OC48/STM16/POU9330	1550.92 nm
OC48/STM16/POU9310	1552.52 nm
OC48/STM16/POU9270	1555.75 nm
OC48/STM16/POU9250	1557.36 nm
OC48/STM16/POU9230	1558.98 nm
OC48/STM16/POU9210	1560.61 nm
OC48/STM16/WDM9585	1530.72 nm
OC48/STM16/WDM9580	1531.11 nm
OC48/STM16/WDM9575	1531.50 nm
OC48/STM16/WDM9570	1531.89 nm
OC48/STM16/WDM9565	1532.28 nm
OC48/STM16/WDM9560	1532.68 nm
OC48/STM16/WDM9555	1533.07 nm
OC48/STM16/WDM9550	1533.46 nm
OC48/STM16/WDM9545	1533.85 nm
OC48/STM16/WDM9540	1534.25 nm
OC48/STM16/WDM9535	1534.64 nm
OC48/STM16/WDM9530	1535.03 nm
OC48/STM16/WDM9525	1535.42 nm
OC48/STM16/WDM9520	1535.82 nm
OC48/STM16/WDM9515	1536.21 nm
OC48/STM16/WDM9510	1536.60 nm
OC48/STM16/WDM9505	1537.00 nm
OC48/STM16/WDM9500	1537.39 nm
OC48/STM16/WDM9495	1537.39 nm
OC48/STM16/WDM9490	1538.18 nm

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Port Unit	Wavelength
OC48/STM16/WDM9485	1538.58 nm
OC48/STM16/WDM9480	1538.97 nm
OC48/STM16/WDM9475	1539.37 nm
OC48/STM16/WDM9470	1539.76 nm
OC48/STM16/WDM9465	1540.16 nm
OC48/STM16/WDM9460	1540.55 nm
OC48/STM16/WDM9455	1540.95 nm
OC48/STM16/WDM9450	1541.34 nm
OC48/STM16/WDM9445	1541.74 nm
OC48/STM16/WDM9440	1542.14 nm
OC48/STM16/WDM9435	1542.53 nm
OC48/STM16/WDM9430	1542.93 nm
OC48/STM16/WDM9425	1543.33 nm
OC48/STM16/WDM9420	1543.73 nm
OC48/STM16/WDM9415	1544.12 nm
OC48/STM16/WDM9410	1544.52 nm
OC48/STM16/WDM9405	1544.92 nm
OC48/STM16/WDM9400	1545.32 nm
OC48/STM16/WDM9395	1545.72 nm
OC48/STM16/WDM9390	1546.11 nm
OC48/STM16/WDM9385	1546.51 nm
OC48/STM16/WDM9380	1546.91 nm
OC48/STM16/WDM9375	1547.31 nm
OC48/STM16/WDM9370	1547.71 nm
OC48/STM16/WDM9365	1548.11 nm
OC48/STM16/WDM9360	1548.51 nm
OC48/STM16/WDM9355	1548.91 nm
OC48/STM16/WDM9350	1549.31 nm
OC48/STM16/WDM9345	1549.71 nm
OC48/STM16/WDM9340	1550.11 nm
OC48/STM16/WDM9335	1550.51 nm
OC48/STM16/WDM9330	1550.91 nm

Port Unit	Wavelength
OC48/STM16/WDM9325	1551.31 nm
OC48/STM16/WDM9320	1551.72 nm
OC48/STM16/WDM9315	1552.12 nm
OC48/STM16/WDM9310	1552.52 nm
OC48/STM16/WDM9305	1552.92 nm
OC48/STM16/WDM9300	1553.32 nm
OC48/STM16/WDM9295	1553.73 nm
OC48/STM16/WDM9290	1554.13 nm
OC48/STM16/WDM9285	1554.53 nm
OC48/STM16/WDM9280	1554.94 nm
OC48/STM16/WDM9275	1555.34 nm
OC48/STM16/WDM9270	1555.74 nm
OC48/STM16/WDM9265	1556.15 nm
OC48/STM16/WDM9260	1556.55 nm
OC48/STM16/WDM9255	1556.95 nm
OC48/STM16/WDM9250	1557.36 nm
OC48/STM16/WDM9245	1557.76 nm
OC48/STM16/WDM9240	1558.17 nm
OC48/STM16/WDM9235	1558.57 nm
OC48/STM16/WDM9230	1558.98 nm
OC48/STM16/WDM9225	1559.38 nm
OC48/STM16/WDM9220	1559.59 nm
OC48/STM16/WDM9215	1560.20 nm
OC48/STM16/WDM9210	1560.60 nm
OC48/STM16/WDM9205	1561.01 nm
OC48/STM16/WDM9200	1561.41 nm
OC48/STM16/WDM9195	1561.82 nm
OC48/STM16/WDM9190	1562.23 nm

The following table provides the operating wavelength ranges for the OC192/STM64 port units.

Table B-4 OC4192/STM64 Port Unit Operating Wavelengths

Port Unit	Wavelength
OC192/STM64/1.5IR1	1530-1565 nm
OC192/STM64/I.5IRS1	1530-1565 nm
OC192/STM64/POU9590	1530.33 nm
OC192/STM64/POU9570	1531.90 nm
OC192/STM64/POU9550	1533.47 nm
OC192/STM64/POU9530	1535.04 nm
OC192/STM64/POU9490	1538.19 nm
OC192/STM64/POU9470	1539.77 nm
OC192/STM64/POU9450	1541.35 nm
OC192/STM64/POU9430	1542.94 nm
OC192/STM64/POU9370	1547.72 nm
OC192/STM64/POU9350	1549.32 nm
OC192/STM64/POU9330	1550.92 nm
OC192/STM64/POU9310	1552.53 nm
OC192/STM64/POU9270	1555.75 nm
OC192/STM64/POU9250	1557.36 nm
OC192/STM64/POU9230	1558.98 nm
OC192/STM64/POU9210	1560.61 nm
OC192/STM64/WDM9580	1531.12 nm
OC192/STM64/WDM9570	1531.90 nm
OC192/STM64/WDM9560	1532.68 nm
OC192/STM64/WDM9550	1533.47 nm
OC192/STM64/WDM9540	1534.25 nm
OC192/STM64/WDM9530	1535.04 nm
OC192/STM64/WDM9520	1535.82 nm
OC192/STM64/WDM9510	1536.61 nm
OC192/STM64/WDM9500	1537.40 nm
OC192/STM64/WDM9490	1538.19 nm

Port Unit	Wavelength
OC192/STM64/WDM9480	1538.98 nm
OC192/STM64/WDM9470	1539.77 nm
OC192/STM64/WDM9460	1540.56 nm
OC192/STM64/WDM9450	1541.35 nm
OC192/STM64/WDM9440	1542.14 nm
OC192/STM64/WDM9430	1542.94 nm
OC192/STM64/WDM9420	1543.73 nm
OC192/STM64/WDM9410	1544.53 nm
OC192/STM64/WDM9400	1545.32 nm
OC192/STM64/WDM9390	1546.12 nm
OC192/STM64/WDM9380	1546.92 nm
OC192/STM64/WDM9370	1547.72 nm
OC192/STM64/WDM9360	1548.52 nm
OC192/STM64/WDM9350	1549.32 nm
OC192/STM64/WDM9340	1550.12 nm
OC192/STM64/WDM9330	1550.92 nm
OC192/STM64/WDM9320	1551.72 nm
OC192/STM64/WDM9310	1552.52 nm
OC192/STM64/WDM9300	1553.33 nm
OC192/STM64/WDM9290	1554.13 nm
OC192/STM64/WDM9280	1554.94 nm
OC192/STM64/WDM9270	1555.75 nm
OC192/STM64/WDM9260	1556.56 nm
OC192/STM64/WDM9250	1557.36 nm
OC192/STM64/WDM9240	1558.17 nm
OC192/STM64/WDM9230	1558.98 nm
OC192/STM64/WDM9220	1559.79 nm
OC192/STM64/WDM9370	1547.72 nm
OC192/STM64/WDM9360	1548.52 nm
OC192/STM64/WDM9350	1549.32 nm
OC192/STM64/WDM9340	1550.12 nm
OC192/STM64/WDM9330	1550.92 nm

I

Port Unit	Wavelength
OC192/STM64/WDM9320	1551.72 nm
OC192/STM64/WDM9310	1552.52 nm
OC192/STM64/WDM9300	1553.33 nm
OC192/STM64/WDM9290	1554.13 nm
OC192/STM64/WDM9280	1554.94 nm
OC192/STM64/WDM9270	1555.75 nm
OC192/STM64/WDM9260	1556.56 nm
OC192/STM64/WDM9250	1557.36 nm
OC192/STM64/WDM9240	1558.17 nm
OC192/STM64/WDM9230	1558.98 nm
OC192/STM64/WDM9220	1559.79 nm
OC192/STM64/WDM9210	1560.61 nm
OC192/STM64/WDM9200	1562.42 nm
OC192/STM64/WDM9190	1562.23 nm

Optical requirements and loss budgets

The following three tables list the optical requirements and loss budgets for optical port units in WaveStar BandWidth Manager.

The following table lists the optical requirements and loss budgets for the OC192/STM64 port units in WaveStar BandWidth Manager.

Table B-5 Loss Budgets for OC192/STM64 Port Units

Parameter	OC192/STM64 ^a			
	1.5IR1	1.5IRS1	POU (all) with	
			8-Mux/ 8-Demux Box	16-Mux + 16-Demux Boxes
Maximum Transmitter Output Power (P_{Tmax})	2.0 dBm	2.0 dBm	2.0 dBm	2.0 dBm
Minimum Transmitter Output Power (P_{Tmin})	-1.0 dBm	-1.0 dBm	-1.0 dBm	-1.0 dBm
Maximum Received Power (P_{Rmax}) ^b	-8.0 dBm	-3.0 dBm	-8.0 dBm	-8.0 dBm
Receiver Sensitivity (P_{Rmin})	-21.0 dBm	-14.0 dBm	-21.0 dBm	-21.0 dBm
Minimum System Gain (S-R)	20.0 dB	13.0 dB	20.0 dB	20.0 dB
Optical Path Penalty (P_O)	2.0 dB	2.0 dB	2.0 dB	2.0 dB
Minimum Loss Budget	10.0 dB	5.0 dB	10.0 dB	10.0 dB
Maximum Loss Budget	18.0 dB	11.0 dB	10.3 dB ^c	11.2 dB ^d

a) The OC192/STM64/WDM port units (40 wavelengths) are compatible with WaveStar OLS 400G. Refer to the WaveStar OLS 400G Applications and Planning Guide (365-575-736) to calculate loss budgets.

b) These values are measured at a BER of 1×10^{-12} with a modulated transmitter.

c) When using the 8-Mux/8-Demux Passive Optics Box with the OC192/STM64/POU port units, you must subtract 7.8 dB from the maximum loss budget to compensate for the mux/demux functions. This loss budget adjustment results in a span of 38 km with standard single-mode fiber. Without the passive optics boxes, the maximum span length of these port units is 60 km.

d) When using the 16-Mux + 16-Demux Passive Optics Boxes with the OC192/STM64/POU port units, you must subtract 6.8 dB from the maximum loss budget to compensate for the mux/demux functions. This loss budget adjustment results in a span of 40 km with standard single-mode fiber. Without the passive optics boxes, the maximum span length of these port units is 60 km.

The following table lists the optical requirements and loss budgets for the OC48/STM16 port units in WaveStar BandWidth Manager.

Table B-6 Loss Budgets for OC48/STM16 Port Units

Parameter	OC48/STM16/ ^a			
	1.3LR1	1.5LR1	POU	
			8-Mux/8-Demux Box	16-Mux + 16-Demux Boxes
Maximum Transmitter Output Power (P_{Tmax})	3.0 dBm	3.0 dBm	2.0 dBm	2.0 dBm
Minimum Transmitter Output Power (P_{Tmin})	-2.0 dBm	-2.0 dBm	-2.8 dBm	-2.8 dBm
Maximum Received Power (P_{Rmax}) ^b	-9.0 dBm	-9.0 dBm	-9.0 dBm	-9.0 dBm
Receiver Sensitivity (P_{Rmin})	-27.0 dBm	-28.0 dBm	-28.0 dBm	-28.0 dBm
Minimum System Gain (S-R)	25.0 dB	26.0 dB	25.2 dB	25.2 dB
Optical Path Penalty (P_O)	1.0 dB	2.0 dB	2.0 dB	2.0 dB
Minimum Loss Budget	10.0 dB	10.0 dB	10.0 dB	10.0 dB
Maximum Loss Budget	24.0 dB	24.0 dB	15.4 dB ^c	16.4 dB ^d

a) The OC48/STM16/DWDM/01-16 port units are compatible with WaveStar OLS 40G/80G. Refer to the WaveStar OLS 40G Applications, Planning, and Ordering Guide (365-575-380) or the WaveStar OLS 80G Applications, Planning, and Ordering Guide (365-575-370) to calculate loss budgets. The OC48/STM16/WDM port units (80 wavelengths) are compatible with WaveStar OLS 400G. Refer to the WaveStar OLS 400G Applications, Planning, and Ordering Guide (365-575-736) to calculate loss budgets.

b) These values are measured at a BER of 1×10^{-12} with a modulated transmitter.

c) When using the 8-Mux/8-Demux Passive Optics Box with the OC48/STM16/POU port units, you must subtract 7.8 dB from the maximum loss budget to compensate for the mux/demux functions. This loss budget adjustment results in a span of 57 km with standard single-mode fiber. Without the passive optics boxes, the maximum span length of these port units is 60 km.

d) When using the 16-Mux + 16-Demux Passive Optics Boxes with the OC48/STM16/POU port units, you must subtract 6.8 dB from the maximum loss budget to compensate for the mux/demux functions. This loss budget adjustment results in a span of 60 km with standard single-mode fiber. Without the passive optics boxes, the maximum span length of these port units is 60 km.

The following table lists the optical requirements and loss budgets for the OC12/STM4 and OC3/STM1 port units in WaveStar BandWidth Manager.

Table B-7 Loss Budgets for OC12/STM4 and OC3/STM1 Port Units

Parameter	OC12/STM4/		OC3/STM1/	
	1.3LR2	1.3SR2	1.3LR4	1.3SR4
Maximum Transmitter Output Power (P_{Tmax})	2.0 dBm	-8.0 dBm	0.0 dBm	-8.0 dBm
Minimum Transmitter Output Power (P_{Tmin})	-2.5 dBm	-15.0 dBm	-5.0 dBm	-15.0 dBm
Maximum Received Power (P_{Rmax}) ^a	-8.0 dBm	-8.0 dBm	-10.0 dBm	-8.0 dBm
Receiver Sensitivity (P_{Rmin})	-30.5 dBm	-28.0 dBm	-34.0 dBm	-28.0 dBm
Minimum System Gain (S-R)	28.0 dB	13.0 dB	29.0 dB	13.0 dB
Optical Path Penalty (P_O)	1.0 dB	1.0 dB	1.0 dB	1.0 dB
Minimum Loss Budget	10.0 dB	0.0 dB	10.0 dB	0.0 dB
Maximum Loss Budget	27.0 dB	12.0 dB	28.0 dB	12.0 dB

a) These values are measured at a BER of 1×10^{-12} with a modulated transmitter.

Electrical Port Unit Specifications

Overview The specifications provided in this section apply to the electrical port units in WaveStar BandWidth Manager, DS3EC1/8 and STM1E/4.

Transmission medium This section provides the transmission medium information for the electrical port units.

DS3EC1/8

One unbalanced coaxial line is used for each direction of transmission. Therefore, two coaxial lines are used for each of the eight bidirectional ports on a DS3EC1/8 port unit.

STM1E/4

One unbalanced coaxial line is used for each direction of transmission. Therefore, two coaxial lines are used for each of the four bidirectional ports on a STM1E/4 port unit.

Capacity This section provides the capacity information for the electrical port units.

DS3EC1/8

Each DS3EC1/8 port unit supports eight DS3- or EC-1-rate bidirectional lines (eight receive and eight transmit).

STM1E/4

Each STM1E/4 port unit supports four STM-1e-rate bidirectional lines (four receive and four transmit).

Line rate This section provides the line rate information for the electrical port units.

DS3EC1/8

Each bidirectional port on the DS3EC1/8 port unit may be provisioned to transmit and receive one of the following:

- One DS3 signal with a nominal rate of 44.736 Mb/s $\pm$ 895 b/s ($\pm$ 20 ppm)
- One EC-1 signal with a nominal rate of 51.840 Mb/s $\pm$ 1037 b/s ($\pm$ 20 ppm)

STM1E/4

Each of the four bidirectional ports on the STM1E/4 port unit may be provisioned to transmit and receive an STM-1e signal with a nominal rate of 155.520 Mb/s (± 20 ppm).

Connectors This section provides the connector information for the electrical port units.

DS3EC1/8

The physical interface for each port, both the transmit and receive directions, of the DS3EC1/8 port unit is a 75-ohm BNC connector. The BNC connectors are located on the DS3EC1/8 Connector Panels on the left, right, or both sides of a Facility Interface Sub-Shelf when the sub-shelf is equipped as either a Electrical or Mixed Module.

STM1E/4

The physical interface for each port, both the transmit and receive directions, of the STM1E/4 port unit is a 75-ohm connector. WaveStar BandWidth Manager provides two versions of the STM1e Connector Panels:

- STM1e Connector Panel with 43-type (SMB) 75-ohm connectors
- STM1e Connector Panel with 1.6/5.6-type 75-ohm connectors

The STM1e Connector Panels may be located on the left, right, or both sides of a Facility Interface Sub-Shelf when the sub-shelf is equipped as either an STM1e Module or a Mixed Module.

Line code This section provides the line code information for the electrical port units.

DS3EC1/8

The line code for the DS3EC1/8 port units is bipolar with 3-zero substitution (B3ZS).

STM1E/4

The line code for the STM1E/4 port units is coded mark inversion (CMI).

Bipolar violation monitoring

This section provides the BVM information for the electrical port units.

DS3EC1/8

Bipolar violation monitoring (BVM) is provided for the incoming B3ZS signal of each bidirectional port in a DS3EC1/8 port unit. The BVM feature can be enabled or disabled on a per port basis.

STM1E/4

Bipolar violation monitoring (BVM) is provided for the incoming B3ZS signal of each bidirectional port in a STM1E/4 port unit. The BVM feature can be enabled or disabled on a per port basis.

Protection

This section provides the provisionable protection modes for the electrical port units.

DS3EC1/8

The protection mode for the DS3EC1/8 port units in WaveStar BandWidth Manager may be provisioned as

- 1xN ($N \leq 12$) protected (one protection port unit providing protection for up to 12 service port units)
- 0x1 protected (unprotected)

Important! A SWITCH/DS3EC1 port unit and an additional DS3EC1/8 port unit are required for 1xN protection.

STM1E/4

The protection mode for the STM1E/4 port units in WaveStar BandWidth Manager may be provisioned as

- 1xN ($N \leq 8$) protected (one protection port unit providing protection for up to eight service port units)
- 0x1 protected (unprotected)

Important! A SWITCH/STM1E4 port unit and an additional STM1E/4 port unit are required for 1xN protection.

Line build-out

Because the electrical port units are designed to accept the entire signal range, external line build-outs are not required.



Power Specifications

Overview This section provides specifications about the power supply, low voltage cut-off feature, heat dissipation, and current drain in WaveStar BandWidth Manager.

Power supply The following table provides requirements for the power supply in WaveStar BandWidth Manager.

Table B-8 Power Supply Requirements

Item	Description
Voltage Range, All Components ^a	-40.0 VDC to -72.0 VDC
Nominal Operation for -48V Power	-40.0 VDC to -57.0 VDC
Nominal Operation for -60V Power	-50.0 VDC to -72.0 VDC
Power Feeders	two -48.0/-60.0 VDC power feeders (A and B)
Circuit Breakers (two per System Controller Shelf)	7.5 amps
Circuit Breakers (two per Switch Shelf)	30.0 amps
Circuit Breakers (two per Universal I/O Shelf)	25.0 amps
Circuit Breakers (two per SDH Universal I/O Shelf)	25.0 amps
Circuit Breakers (two per 10G I/O Shelf)	40.0 amps
Circuit Breakers (two per Fan Unit)	3.0 amps

a) All components in WaveStar BandWidth Manager are designed to operate with -48V (SONET) and -48V/-60V (SDH) power.

Power planning

The following table provides the heat dissipation requirements for WaveStar BandWidth Manager.

Table B-9 Heat Dissipation

Bays	Maximum Heat Dissipated
Control/Switch Bay	1224 watts
System Controller Bay	204 watts
Switch Bay	1020 watts
Universal I/O Bay (with two equipped Universal I/O Shelves)	1740 watts
10G I/O Bay (with one equipped 10G I/O Shelf)	1450 watts
10G I/O Bay (with two equipped 10G I/O Shelves)	2900 watts
10G/Universal I/O Bay (with one equipped Universal I/O Shelf and one equipped 10G I/O Shelf)	2320 watts
10G/SDH I/O Bay (with one equipped SDH Universal I/O Shelf and one equipped 10G I/O Shelf)	2370 watts
SDH I/O Bay (with two equipped SDH Universal I/O Shelves)	1840 watts

Current drains

The following two tables provide the current drain requirements for WaveStar BandWidth Manager.

SONET/SDH

The following table provides the -48V current drain requirements for WaveStar BandWidth Manager.

Table B-10 Current Drains for -48V Platforms (SONET/SDH)

Shelves	Current Drains per Shelf in Amps		
	List 1 @ -48V	List 2	
		@ -42.75V	@ -39.5V
System Controller Shelf	4.3	4.8	5.2
Switch Shelf	21.3	23.9	25.8
Universal I/O Shelf	18.1	20.4	22.0
10G I/O Shelf	30.2	33.9	36.7
SDH Universal I/O Shelf	19.2	21.5	23.3

Important! The current drains presented in and are per shelf.
Each current drain listed is the sum of both power feeds (A and B).

SDH

The following table provides the -60V current drain requirements for WaveStar BandWidth Manager.

Table B-11 Current Drains for -60V Platforms (SDH)

Shelves	Current Drains per Shelf in Amps		
	List 1 @ -60V	List 2	
		@ -40.0V	@ -39.5V
System Controller Shelf	3.4	5.1	5.2
Switch Shelf	17.0	25.5	25.8
Universal I/O Shelf	14.5	21.8	22.0
10G I/O Shelf	24.2	36.3	36.7
SDH Universal I/O Shelf	15.3	23.0	23.3

Important! The current drains presented in and are per shelf.
Each current drain listed is the sum of both power feeds (A and B).

Power filters with voltage protection

The power filters with voltage protection, located on all shelves in WaveStar BandWidth Manager, respond to DC voltage threshold levels. The power filters with voltage protection interrupt and restore power to their associated shelves according to the preset thresholds listed in the following table.

Table B-12 Voltage Protection Thresholds

Status	Voltage
Nominal Operation for -48V Power	-40.0 VDC to -57.0 VDC
Nominal Operation for -48V/-60V Power	-50.0 VDC to -72.0 VDC
Cut-Off ^a	-38.5 VDC $\pm$ 1.0V
Restart	-43.0 VDC $\pm$ 0.5V

a) The stated threshold must persist for ≤ 100 ms in order to activate either the cut-off or restoration response.

Equipment Dimensions

Overview This section provides the height, width, and depth for all major pieces of equipment in WaveStar BandWidth Manager.

Circuit pack dimensions The following table provides the dimensions for all the circuit packs (including faceplates) in WaveStar BandWidth Manager.

Table B-13 Circuit Pack Dimensions

Circuit Pack	Dimensions (mm/inches)		
	Height	Width	Depth
ADJCTL/DCCEI	347/13.66	20/0.79	270/10.63
ADJCTL/DCC	347/13.66	20/0.79	270/10.63
SWITCH/DS3EC1	347/13.66	20/0.79	270/10.63
SWITCH/STM1E4	347/13.66	20/0.79	270/10.63
SWITCH/STS576	347/13.66	30/1.18	270/10.63
SWIF	347/13.66	30/1.18	270/10.63
CTL/SR50DC	347/13.66	30/1.18	270/10.63
PPROC/FO	347/13.66	30/1.18	270/10.63
SWITCH/STS768	347/13.66	30/1.18	270/10.63
CTL/SYS50DM	347/13.66	30/1.18	270/10.63
CTL/SYS50D	347/13.66	35/1.38	270/10.63
CSIEX	347/13.66	40/1.57	270/10.63
CTL/EI	107/4.21	35/1.38	270/10.63
CTL/MEM	107/4.21	35/1.38	270/10.63
TMG/STRAT3	107/4.21	25/0.98	270/10.63
SWIEX	467/18.39	25/0.98	270/10.63
BSW	467/18.39	25/0.98	270/10.63

Port unit dimensions

The following table provides the dimensions for the port units (including faceplates) in WaveStar BandWidth Manager.

Table B-14 Port Unit Dimensions

Circuit Pack	Dimensions (mm/inches)		
	Height	Width	Depth
OC192/STM64 (all)	347/13.66	60/2.36	270/10.63
OC48/STM16 (all)	347/13.66	40/1.57	270/10.63
OC12/STM4 (all)	347/13.66	20/0.79	270/10.63
OC3/STM1 (all)	347/13.66	20/0.79	270/10.63
DS3EC1/8	347/13.66	20/0.79	270/10.63
STM1E/4	347/13.66	20/0.79	270/10.63

Bay dimensions

The following two tables provide the dimensions for all the bays (NEBS and ETSI) in WaveStar BandWidth Manager.

NEBS Bays

The following table provides the dimensions for NEBS bays in WaveStar BandWidth Manager.

Table B-15 NEBS Bay Dimensions

Bay	Dimensions (mm/inches)		
	Height	Width	Depth
System Controller Bay	2133.6/84	660.4/26	482.6/19
Control/Switch Bay	2133.6/84	660.4/26	482.6/19
Switch Bay	2133.6/84	660.4/26	482.6/19
Universal I/O Bay	2133.6/84	660.4/26	482.6/19
10G I/O Bay	2133.6/84	660.4/26	482.6/19
10G/Universal I/O Bay	2133.6/84	660.4/26	482.6/19
10G/SDH I/O Bay	2133.6/84	660.4/26	482.6/19
SDH I/O Bay	2133.6/84	660.4/26	482.6/19
Cable Management Bay (Standard Footprint)	2133.6/84	457.2 /18	482.6/19
Cable Management Bay (Reduced Footprint)	2133.6/84	330.2/13	482.6/19

ETSI Bays

The following table provides the dimensions for NEBS bays in WaveStar BandWidth Manager.

Table B-16 ETSI Bay Dimensions

Bay	Dimensions (mm)		
	Height	Width	Depth
System Controller Bay	2200	600	600
Control/Switch Bay	2200	600	600
Switch Bay	2200	600	600
Universal I/O Bay	2200	600	600
10G I/O Bay	2200	600	600
10G/Universal I/O Bay	2200	600	600
10G/SDH I/O Bay	2200	600	600
SDH I/O Bay	2200	600	600
Cable Management Bays (Original Footprint)	2200	300 and 600	600
Cable Management Bays (Reduced Footprint)	2200	150 and 300	600

Additional equipment

The following table provides the dimensions for all additional equipment in WaveStar BandWidth Manager.

Table B-17 Additional Equipment Dimensions

Equipment	Dimensions (mm/inches)		
	Height	Width	Depth
Fan Unit	48.0/1.89	543.1/21.38	380.0/14.96
Fan Filter	13.5/0.53	543.1/21.38	380.0/14.96
DS3EC1 Connector Panels	546.1/21.5	101.6/4.0	57.2/2.25
STM1e Connector Panels	544.8/21.45	104.4/4.11	52.6/2.07
Heat Baffle	70.1/2.76	543.1/21.38	380.0/14.96



I | Operations Interface Specifications

Overview This section provides the detailed specifications for the operations interfaces in WaveStar BandWidth Manager.

Office alarms This section provides information about office alarms.

Steady state current

The steady state current for office alarm connections should not exceed 0.9A at -48V/-60V or 1.8A at 30V.

Maximum transient current

The maximum transient currents (20ms duration) for office alarm connections should not exceed 9A at -48V/-60V or 18A at 30V.

TL1 The TL1 interface operates at 1200 to 19,200 baud through an EIA-232-D port.



External Synchronization Specifications

Overview This section provides specifications for the DS1 and E1 timing inputs and outputs and the external synchronization cables.

DS1 timing inputs/outputs WaveStar BandWidth Manager is primarily timed from duplicated TMG/STRAT3 circuit packs located in the System Controller Shelf. The TMG/STRAT3 packs tied to an office BITS clock via duplicated DS1 timing inputs.

The following table provides detailed specifications for the DS1 timing inputs/outputs.

Table B-18 DS1 Timing Inputs/Outputs

Characteristic	Description
Source	Two references: must be derived from Stratum 3 or better timing sources (for example, an office BITS clock)
Line Coding	AMI (default) B8ZS
Frame Format	SF ESF (default)
Connectors	DB9
Protection Switching between References	Revertive automatically on LOS, AIS-L, LOF, or BER

**E1 timing
inputs/outputs**

WaveStar BandWidth Manager is primarily timed from duplicated TMG/STRAT3 circuit packs located in the System Controller Shelf. The TMG/STRAT3 packs tied to a SEC via duplicated E1 timing inputs.

The following table provides detailed specifications for the E1 timing inputs/outputs.

Table B-19 E1 Timing Inputs/Outputs

Characteristic	Description
Source	Two references: must be derived from either a Primary Reference Clock (PRC) or Synchronization Supply Unit (SSU) or better timing sources (for example, a SEC)
Line Coding	Time wave signal
Frame Format	2 MHz E1 • 2 Mb/s unframed • 2 Mb/s framed
Connectors	DB9
Cabling Interface	Coax 75 ohm (unbalanced) Twisted-pair 120 ohm (balanced)
Protection Switching between References	Complies with ITU synchronization requirements

Synchronization cables

The following table lists the maximum allowable lengths for the external synchronization timing cables.

Table B-20 External Synchronization Timing Cable

Cable	Maximum Length (mm/ft)
DS1 Cross-Connect	199,644/655
Other Sources	399,288/1310



Environmental Specifications

Overview This section provides the specific environmental conditions that WaveStar BandWidth Manager is designed to endure without detrimentally effecting the system's operation.

Floor loading specifications WaveStar BandWidth Manager complies with the floor loading specifications listed in the following table.

Table B-21 Floor Loading Specifications

Equipment (excluding cables)	Weight lbs/kg	
	NEBS	ETSI
System Controller Bay	304 lbs/138 kg	401 lbs/182 kg
Control/Switch Bay	493 lbs/224 kg	590 lbs/268 kg
Switch Bay	375 lbs/170 kg	472 lbs/215 kg
Universal I/O Bay with two equipped Universal I/O Shelves	625 lbs/284 kg	722 lbs/328 kg
10G I/O Bay with one equipped 10G I/O Shelf	406 lbs/185 kg	503 lbs/229 kg
10G I/O Bay with two equipped 10G I/O Shelves	635 lbs/289 kg	732 lbs/333 kg
10G/Universal I/O Bay with one equipped 10G I/O Shelf and one equipped Universal I/O Shelf	630 lbs/286 kg	727 lbs/330 kg
10G/SDH I/O Bay with one equipped SDH Universal I/O Shelf and one equipped 10G I/O Shelf	610 lbs/277 kg	707 lbs/321 kg
SDH I/O Bay with two equipped SDH Universal I/O Shelves	585 lbs/266 kg	682 lbs/310 kg

Operating conditions WaveStar BandWidth Manager is designed to be operate in a controlled environment that complies with the environmental requirements listed in the following table.

Table B-22 Temperature and Humidity Requirements

Operating Condition	Normal		Short-term	
	Celsius (C)	Fahrenheit (F)	Celsius (C)	Fahrenheit (F)
Ambient temperature	5° to 40°	41° to 104°	-5° to 50°	23° to 122°
Maximum temperature rate of change	30°/hour	54°/hour	30°/hour	54°/hour
Ambient relative humidity	5% to 85%		5% to 90% ^c	
Pressure	70 to 106 kPa		NA	
Altitude	-61m to 1,928m/ -200 ft to 6500 ft		NA	

- a) Short-term refers to a period of time ≤90 consecutive hours and a total of ≤15 days in one year. The time may total 360 hours in any given year, but may not exceed 15 individual occurrences during that one year.
- b) Ambient refers to conditions at the specific location of 1500 mm/59 in. above the floor and 400mm/15.8 in. in front of the equipment.
- c) Not to exceed 0.024 kg of water per kg of dry air.

Storage and transportation conditions

WaveStar BandWidth Manager is designed to be fully operational after being subjected to the environmental conditions listed in the following table during storage and transportation.

Table B-23 Storage and Transportation Requirements

Condition	Range	
	Celsius (C)	Fahrenheit (F)
Temperature	-40°C to 70°C	-40°F to 158°F
Maximum temperature rate of change	30°C/hour	54°F/hour
Relative humidity	5% to 95%	
Maximum absolute humidity	0.024 kg of water/kg of dry air	
Altitude	-61m to 12,195m	-200 ft to 40,000 ft





Appendix C: Task Lists

Overview

Purpose This appendix provides lists of tasks that are included in the *User Operations Guide*, which are tasks associated with provisioning and operations.

Related information For tasks associated with alarm messages and trouble clearing, refer to 365-370-110 *Alarm Messages and Trouble Clearing Guide*.

Contents This appendix provides the following information topics:

Alphabetical Task List	C - 2
Numerical Task List	C - 7

Alphabetical Task List

Number	Category	Name
T103	Acceptance	Accept New Electrical Cables to a Port
T102	Acceptance	Accept New Optical Fibers to a Port
T250	Operation	Access and Provision RS-232 Ports
T348	Circuit Order/Provisioning	Activate Manual Ring Map
T325	Circuit Order/Provisioning	Add a Node to an In-Service 2-Fiber BLSR
T300	Circuit Order/Provisioning	Add DS1 Timing Reference
T315	Circuit Order/Provisioning	Alarm Severity Assignment Profile (ASAP)—Create/Modify
T216	Operation	Change (Your Own) Notification Registration List
T201	Operation	Change (Your Own) Password
T329	Circuit Order/Provisioning	Change an NE's TID
T241	Operation	Change Maximum Number of Backups to WaveStar CIT
T224	Operation	Change Network Element Date/Time
T218	Operation	Change Network Element Security Parameters
T301	Circuit Order/Provisioning	Change System Timing Configuration
T340	Circuit Order/Provisioning	Change System Timing Reference
T703	Supporting Tasks	Clean Optical Fibers and Connectors
T347	Circuit Order/Provisioning	Configure Manual Ring Map
T245	Operation	Configure TCP/IP Gateway Parameters for a Network Element
T244	Operation	Configure TCP/IP Parameters for a Network Element
T313	Circuit Order/Provisioning	Create 1XN Electrical Equipment Protection Group
T342	Circuit Order/Provisioning	Create 1XN STM1EA Electrical Equipment Protection Group
T316	Circuit Order/Provisioning	Create New BWM I/O Bay Entity
T303	Circuit Order/Provisioning	Create New Cross Connection
T302	Circuit Order/Provisioning	Create New Optical Port Protection Group
T210	Operation	Create New Test Access Session in the MON(E, F, EF) Mode

Number	Category	Name
T211	Operation	Create New Test Access Session in the SPLT(E, F, A, B, AB, or EF) Mode
T336	Circuit Order/Provisioning	Create NonReporting Alarm Severity Assignment Profiles (ASAPs)
T320	Circuit Order/Provisioning	Create, Modify, or Delete Threshold Crossing Alert (TCA) Profile
T317	Circuit Order/Provisioning	Create/Install New BWM 2.5G I/O Shelf
T251	Operation	Create/Modify/Delete a Download Profile
T326	Circuit Order/Provisioning	Delete a Node from an In-Service 2-Fiber BLSR
T213	Operation	Delete a Test Access Session
T308	Circuit Order/Provisioning	Delete Optical Port Protection Group
T335	Circuit Order/Provisioning	Deprovision BWM 10G I/O Shelf
T327	Circuit Order/Provisioning	Deprovision BWM 2.5G I/O Shelf
T343	Circuit Order/Provisioning	Deprovision WBM 2.5G-STM1E I/O Shelf
T324	Circuit Order/Provisioning	Display and Save PM Register Values
T249	Operation	Download Software
T323	Circuit Order/Provisioning	Enable or Disable Performance Monitoring (PM) Data Collection
T221	Operation	Enable or Disable User Login(s)
T305	Circuit Order/Provisioning	Enable/Disable DCC Terminations
T344	Circuit Order/Provisioning	Example of Bridging and Rolling an Existing Cross-Connection to a Different Tributary
T321	Circuit Order/Provisioning	Initialize Performance Monitoring (PM) Registers
T704	Supporting Tasks	Inspect (Repair) Optical and/or Electrical Cable(s)
T312	Circuit Order/Provisioning	Install a New Low Voltage Protection Unit or Remove an Existing Low Voltage Protection Unit
T306	Circuit Order/Provisioning	Install and Provision Transmission Circuit Pack/Port Units
T202	Operation	Install Software (Initial Installation/Upgrade/Change) into WaveStar CIT and Network Element
T707	Supporting Tasks	Install/Remove Lightguide Buildout (LBO)
T223	Operation	Log in/Log out of Network Element

Number	Category	Name
T217	Operation	Log Out Other User Session(s)
T203	Operation	Loop Back Circuit(s) for Testing
T226	Operation	Loop Back Line(s) for Testing
T708	Supporting Tasks	Make a Manual Optical Loopback
T214	Operation	Manually Backup Database to Secondary Memory (Release 3.0)
T240	Operation	Manually Backup Database to Secondary Memory (Release 3.1 and Later)
T205	Operation	Manually Backup Database to WaveStar CIT (Release 3.0 and Earlier)
T239	Operation	Manually Backup Database to WaveStar CIT (Release 3.1 and Later)
T215	Operation	Manually Restore Database From Secondary Memory (Release 3.0)
T243	Operation	Manually Restore Database From Secondary Memory (Release 3.1 and Later)
T206	Operation	Manually Restore Database From WaveStar CIT (Release 3.0 and Earlier)
T242	Operation	Manually Restore Database From WaveStar CIT (Release 3.1 and Later)
T712	Supporting Tasks	Measure Received Optical Power
T309	Circuit Order/Provisioning	Modify Existing Optical Port Protection Group
T212	Operation	Modify the Test Access Mode of a Test Access Session
T200	Operation	Modify, Delete, or Add a User's Login Parameters
T304	Circuit Order/Provisioning	Modify/Delete/Roll Cross Connection
T354	Circuit Order/Provisioning	Move Eligible Pre-Release 4.0 Cross-Connections On-Shelf
T333	Circuit Order/Provisioning	Overview for Adding an END-NODE to an In-Service 4-Fiber Open Ring
T332	Circuit Order/Provisioning	Overview for Converting an In-Service 4-Fiber Open Ring to a Closed Ring
T334	Circuit Order/Provisioning	Overview for Merging one In-Service 4-Fiber Open Ring with a second In-Service 4-Fiber Open Ring

Number	Category	Name
T330	Circuit Order/Provisioning	Overview of Adding an Intermediate Node to an In-Service 4-Fiber Open Ring BLSR/MS-SPRing
T246	Operation	Prepare New PCMCIA Flash Disk(s)
T339	Circuit Order/Provisioning	Provision Alarm Configurations
T345	Circuit Order/Provisioning	Provision Basic AU-3/AU-4 Adaptation
T346	Circuit Order/Provisioning	Provision Generalized AU-3/AU-4 Adaptation
T314	Circuit Order/Provisioning	Provision Path Trace
T318	Circuit Order/Provisioning	Provision Performance Monitoring (PM) Function
T322	Circuit Order/Provisioning	Provision Ports or Tributaries with PM TCA Profiles
T311	Circuit Order/Provisioning	Provision Time Interval for Auto Backup of Databases
T351	Circuit Order/Provisioning	Provision Traffic on a BLSR/MS-SPRing with Time Slot Interchange
T353	Circuit Order/Provisioning	Provision Traffic on a UPSR or SNCP
T350	Circuit Order/Provisioning	Provision Traffic on Multiple BLSRs/MS-SPRings
T349	Circuit Order/Provisioning	Provision Traffic on a Single BLSR/MS-SPRing
T307	Circuit Order/Provisioning	Provision Transmission Circuit Pack Ports
T209	Operation	Release Looped Back Circuit(s)
T227	Operation	Release Looped Back Line(s)
T702	Supporting Tasks	Remove/Insert a PCMCIA (NVM) Card
T705	Supporting Tasks	Remove/Replace Shelf Cover
T710	Supporting Tasks	Replace a Defective Low Voltage Power Unit (LPVU)
T706	Supporting Tasks	Replace a Defective Power Filter
T207	Operation	Replace Fan Filter
T709	Supporting Tasks	Replace Fan Unit
T229	Operation	Replace Primary and Secondary PCMCIA Flash Disks
T237	Operation	Replace Primary PCMCIA Flash Disks
T238	Operation	Replace Secondary PCMCIA Flash Disk
T711	Supporting Tasks	Select Lightguide Buildout
T338	Circuit Order/Provisioning	Set NonReporting Alarm Severity Assignment Profiles (ASAPs)

Number	Category	Name
T225	Operation	Test Low Voltage Protection Unit (LVPU) or Power Filter with Voltage Protection (LFVP)
T328	Circuit Order/Provisioning	Turn Up a BLSR or MS-SPRing
T352	Circuit Order/Provisioning	Turn Up a UPSR or SNCP Ring
T208	Operation	Verify Receive Path Trace
T337	Circuit Order/Provisioning	View Alarm Severity Assignment Profiles (ASAPs)
T355	Circuit Order/Provisioning	View Intershef Bandwidth Utilization
T341	Circuit Order/Provisioning	View PM Parameters for Selected Ports or Tributaries
T319	Circuit Order/Provisioning	View PM Threshold Crossing Alert (TCA) Profiles
T222	Operation	View Test Access Session(s)

Numerical Task List

Number	Category	Name
T102	Acceptance	Accept New Optical Fibers to a Port
T103	Acceptance	Accept New Electrical Cables to a Port
T200	Operation	Modify, Delete, or Add a User's Login Parameters
T201	Operation	Change (Your Own) Password
T202	Operation	Install Software (Initial Installation/Upgrade/Change) into WaveStar CIT and Network Element
T203	Operation	Loop Back Circuit(s) for Testing
T205	Operation	Manually Backup Database to WaveStar CIT (Release 3.0 and Earlier)
T206	Operation	Manually Restore Database From WaveStar CIT (Release 3.0 and Earlier)
T207	Operation	Replace Fan Filter
T208	Operation	Verify Receive Path Trace
T209	Operation	Release Looped Back Circuit(s)
T210	Operation	Create New Test Access Session in the MON(E, F, EF) Mode
T211	Operation	Create New Test Access Session in the SPLT(E, F, A, B, AB, or EF) Mode
T212	Operation	Modify the Test Access Mode of a Test Access Session
T213	Operation	Delete a Test Access Session
T214	Operation	Manually Backup Database to Secondary Memory (Release 3.0)
T215	Operation	Manually Restore Database From Secondary Memory (Release 3.0)
T216	Operation	Change (Your Own) Notification Registration List
T217	Operation	Log Out Other User Session(s)
T218	Operation	Change Network Element Security Parameters
T221	Operation	Enable or Disable User Login(s)

Number	Category	Name
T222	Operation	View Test Access Session(s)
T223	Operation	Log in/Log out of Network Element
T224	Operation	Change Network Element Date/Time
T225	Operation	Test Low Voltage Protection Unit (LVPU) or Power Filter with Voltage Protection (LFVP)
T226	Operation	Loop Back Line(s) for Testing
T227	Operation	Release Looped Back Line(s)
T229	Operation	Replace Primary and Secondary PCMCIA Flash Disks
T237	Operation	Replace Primary PCMCIA Flash Disks
T238	Operation	Replace Secondary PCMCIA Flash Disk
T239	Operation	Manually Backup Database to WaveStar CIT (Release 3.1 and Later)
T240	Operation	Manually Backup Database to Secondary Memory (Release 3.1 and Later)
T241	Operation	Change Maximum Number of Backups to WaveStar CIT
T242	Operation	Manually Restore Database From WaveStar CIT (Release 3.1 and Later)
T243	Operation	Manually Restore Database From Secondary Memory (Release 3.1 and Later)
T244	Operation	Configure TCP/IP Parameters for a Network Element
T245	Operation	Configure TCP/IP Gateway Parameters for a Network Element
T246	Operation	Prepare New PCMCIA Flash Disk(s)
T249	Operation	Download Software
T250	Operation	Access and Provision RS-232 Ports
T251	Operation	Create/Modify/Delete a Download Profile
T300	Circuit Order/Provisioning	Add DS1 Timing Reference
T301	Circuit Order/Provisioning	Change System Timing Configuration
T302	Circuit Order/Provisioning	Create New Optical Port Protection Group
T303	Circuit Order/Provisioning	Create New Cross Connection
T304	Circuit Order/Provisioning	Modify/Delete/Roll Cross Connection

Number	Category	Name
T305	Circuit Order/Provisioning	Enable/Disable DCC Terminations
T306	Circuit Order/Provisioning	Install and Provision Transmission Circuit Pack/Port Units
T307	Circuit Order/Provisioning	Provision Transmission Circuit Pack Ports
T308	Circuit Order/Provisioning	Delete Optical Port Protection Group
T309	Circuit Order/Provisioning	Modify Existing Optical Port Protection Group
T311	Circuit Order/Provisioning	Provision Time Interval for Auto Backup of Databases
T312	Circuit Order/Provisioning	Install a New Low Voltage Protection Unit or Remove an Existing Low Voltage Protection Unit
T313	Circuit Order/Provisioning	Create 1XN Electrical Equipment Protection Group
T314	Circuit Order/Provisioning	Provision Path Trace
T315	Circuit Order/Provisioning	Alarm Severity Assignment Profile (ASAP)—Create/Modify
T316	Circuit Order/Provisioning	Create New BWM I/O Bay Entity
T317	Circuit Order/Provisioning	Create/Install New BWM 2.5G I/O Shelf
T318	Circuit Order/Provisioning	Provision Performance Monitoring (PM) Function
T319	Circuit Order/Provisioning	View PM Threshold Crossing Alert (TCA) Profiles
T320	Circuit Order/Provisioning	Create, Modify, or Delete Threshold Crossing Alert (TCA) Profile
T321	Circuit Order/Provisioning	Initialize Performance Monitoring (PM) Registers
T322	Circuit Order/Provisioning	Provision Ports or Tributaries with PM TCA Profiles
T323	Circuit Order/Provisioning	Enable or Disable Performance Monitoring (PM) Data Collection
T324	Circuit Order/Provisioning	Display and Save PM Register Values
T325	Circuit Order/Provisioning	Add a Node to an In-Service 2-Fiber BLSR
T326	Circuit Order/Provisioning	Delete a Node from an In-Service 2-Fiber BLSR
T327	Circuit Order/Provisioning	Deprovision BWM 2.5G I/O Shelf
T328	Circuit Order/Provisioning	Turn Up a BLSR or MS-SPRing
T329	Circuit Order/Provisioning	Change an NE's TID
T330	Circuit Order/Provisioning	Overview of Adding an Intermediate Node to an In-Service 4-Fiber Open Ring BLSR/MS-SPRing

Number	Category	Name
T332	Circuit Order/Provisioning	Overview for Converting an In-Service 4-Fiber Open Ring to a Closed Ring
T333	Circuit Order/Provisioning	Overview for Adding an END-NODE to an In-Service 4-Fiber Open Ring
T334	Circuit Order/Provisioning	Overview for Merging one In-Service 4-Fiber Open Ring with a second In-Service 4-Fiber Open Ring
T335	Circuit Order/Provisioning	Deprovision BWM 10G I/O Shelf
T336	Circuit Order/Provisioning	Create NonReporting Alarm Severity Assignment Profiles (ASAPs)
T337	Circuit Order/Provisioning	View Alarm Severity Assignment Profiles (ASAPs)
T338	Circuit Order/Provisioning	Set NonReporting Alarm Severity Assignment Profiles (ASAPs)
T339	Circuit Order/Provisioning	Provision Alarm Configurations
T340	Circuit Order/Provisioning	Change System Timing Reference
T341	Circuit Order/Provisioning	View PM Parameters for Selected Ports or Tributaries
T342	Circuit Order/Provisioning	Create 1XN STM1EA Electrical Equipment Protection Group
T343	Circuit Order/Provisioning	Deprovision WBM 2.5G-STM1E I/O Shelf
T344	Circuit Order/Provisioning	Example of Bridging and Rolling an Existing Cross-Connection to a Different Tributary
T345	Circuit Order/Provisioning	Provision Basic AU-3/AU-4 Adaptation
T346	Circuit Order/Provisioning	Provision Generalized AU-3/AU-4 Adaptation
T347	Circuit Order/Provisioning	Configure Manual Ring Map
T348	Circuit Order/Provisioning	Activate Manual Ring Map
T349	Circuit Order/Provisioning	Provision Traffic on a Single BLSR/MS-SPRing
T350	Circuit Order/Provisioning	Provision Traffic on Multiple BLSRs/MS-SPRings
T351	Circuit Order/Provisioning	Provision Traffic on a BLSR/MS-SPRing with Time Slot Interchange
T352	Circuit Order/Provisioning	Turn Up a UPSR or SNCP Ring
T353	Circuit Order/Provisioning	Provision Traffic on a UPSR or SNCP
T354	Circuit Order/Provisioning	Move Eligible Pre-Release 4.0 Cross-Connections On-Shelf
T355	Circuit Order/Provisioning	View Intershelf Bandwidth Utilization

Number	Category	Name
T702	Supporting Tasks	Remove/Insert a PCMCIA (NVM) Card
T703	Supporting Tasks	Clean Optical Fibers and Connectors
T704	Supporting Tasks	Inspect (Repair) Optical and/or Electrical Cable(s)
T705	Supporting Tasks	Remove/Replace Shelf Cover
T706	Supporting Tasks	Replace a Defective Power Filter
T707	Supporting Tasks	Install/Remove Lightguide Buildout (LBO)
T708	Supporting Tasks	Make a Manual Optical Loopback
T709	Supporting Tasks	Replace Fan Unit
T710	Supporting Tasks	Replace a Defective Low Voltage Power Unit (LPVU)
T711	Supporting Tasks	Select Lightguide Buildout
T712	Supporting Tasks	Measure Received Optical Power



Appendix D: Power Down/Power Up an Optical Network Element (NE)

Overview

Purpose This procedure is designed to help prepare for a planned loss of power to all or part of a central office. The loss of power to any NE will cause a loss of traffic on that NE, so traffic must be rerouted around the NE. This procedure is general, since it applies to several different products. See the specific product documentation if you need more details for any step.

The front of any shelf that receives electrical power has either two (A and B) circuit breakers or two (A and B) fuses. Most NE shelves do receive electrical power.



Power Down an Optical Network Element (NE)



CAUTION

Use a static ground wrist strap whenever handling circuit packs or working on a network element to prevent electrostatic discharge (ESD) damage to sensitive components.

Important! Contact your next level of technical support before performing this procedure.

-
- 1** Reroute traffic around the NE.
-
- 2** Power down each shelf in one of the following ways:
 - Shut off both A and B circuit breakers by inserting an object such as a thin flathead screwdriver into the slot on the "off" side of each circuit breaker.
 - Remove both A and B fuses by lifting the cover, then pressing in and down, then releasing to allow the fuse to spring outward.
-
- 3** Shut off power at the Battery Distribution Feeder Bay (BDFB).

END OF STEPS

Power Up an Optical Network Element (NE)



CAUTION

Electrostatic Discharge

Use a static ground wrist strap whenever handling circuit packs or working on a network element to prevent electrostatic discharge (ESD) damage to sensitive components.

Important! Contact your next level of technical support before performing this procedure.

-
- 1** Verify that power is on at the Battery Distribution Feeder Bay (BDFB).
 - 2** Continue with the next step for the shelf containing the system controller circuit pack.
 - 3** Power up the shelf and verify that both A and B power supplies are good as follows:
 1. Turn on circuit breaker A or insert fuse A and press inward and upward.
If the green power on LED is not lit, check for a reversal on the power feeder and verify there is voltage at the connector.
 2. Turn off circuit breaker A or remove fuse A.
 3. Turn on circuit breaker B or insert fuse B and press inward and upward.
If the green power on LED is not lit, check for a reversal on the power feeder and verify there is voltage at the connector.
 4. Turn on circuit breaker A or insert fuse A and press inward and upward.

Result: You have verified that both A and B power supplies are good and are now turned on.

-
- 4 Wait for all of the circuit packs on this shelf to finish booting, indicated by the following:
 - all red LEDs are off
 - for packs with green LEDs, they are on steadily.
 - 5 Repeat steps 3 and 4 for all other shelves that contain controller circuit packs.
 - 6 Repeat step 3 for all shelves that do not contain any controller circuit packs.
 - 7 Log into the network element with a craft interface terminal and check alarms.
 - 8 If any alarms appear, use the product documentation to clear them. For most products, the appropriate document will be an *Alarm Message and Trouble Clearing Guide* or a *User/Service Manual*.
 - 9 If this NE allows cross-connection, verify that the cross-connections are correct. Refer to the appropriate product documentation, usually a *User Operations Guide* or a *User/Service Manual*.
 - 10 Reroute traffic back onto this NE.

END OF STEPS



Glossary

Abbreviations and Acronyms

A ABN

Abnormal (condition)

ABS

Absent

AC

Alternating Current

ACO

Alarm Cut-Off

ACT

Active

ACU

Alarm Collection Unit (RR)

ADJCTL/DCC

Adjunct Control/32 Data Communication Channels circuit pack

ADJCTL/DCCEI

Adjunct Control/32 Data Communication Channels with External Interface circuit pack

ADM

Add/Drop Multiplexer

ADR

Add/Drop Ring

AGNE

Alarm Gateway Network Element

AID

Access Identifier

AIS

Alarm Indication Signal

AITs

Acknowledged Information Transfer Service: Confirmed mode of operation of the LAPD protocol.

ALS

Automatic Laser Shutdown

AMI

Alternate Mark Inversion

ANSI

American National Standards Institute

APD

Avalanche PhotoDiode

APS

Automatic Protection Switch

APSD

Automatic Power Shutdown

ARM

Adaptive Receiver Module

AS

Alarm Suppression assembly

ASAP

Alarm Severity Assignment Profile

AS&C

Alarm, Status, and Control

ASCII

American Standard Code for Information Interchange

ASN.1

Abstract Syntax Notation 1

ATC

Auxiliary Transmission Channel

ATM

Asynchronous Transfer Mode

ATPC

Automatic Transmit Power Control

AU

Administrative Unit

AU PTR

Administrative Unit Pointer

AU4AD

Administrative Unit 4 Assembler/Disassembler

AUG

Administrative Unit Group

AUTO

Automatic

AVAIL

Available

B**B3ZS**

Bipolar 3-Zero Substitution

B8ZS

Bipolar 8-Zero Substitution

BBTR

Backplane Bus Transceiver

BCLAN

Board Controller Local Area Network

BDFB

Battery Distribution and Fuse Bay

BER

Bit Error Rate

BIN

Binary

BIP-N

Bit Interleaved Parity-N

BISDN

Broadband Integrated Services Digital Network

BITS

Building Integrated Timing Source (clock)

BITS

Building Integrated Timing Supply

BLK

Blank

BLSR

Bidirectional Line-Switched Ring

BOC

Bell Operating Company

BSW

Byte Switch circuit pack

BUSTR

BUS Transmitter and Receiver

C C

Container

CAS

Channel Associated Signalling

CAT

Catastrophic

CC

Cross-Connection

CCITT

Comité Consultatif International Télégraphique & Téléphonique

CCS

Common Channel Signaling

CDRH

Center for Devices and Radiological Health

CEPT

Conférence Européenne des Administrations des Postes et des Télécommunications

CILINK

Communication Interface Link

CIT

Craft Interface Terminal

CL

Clear

CLEI

Common Language Equipment Identifier

CLLI

Common Language Location Identifier

CM

Configuration Management

CMI

Coded Mark Inversion

CMIP

Common Management Information Protocol. OSI standard protocol for OAM&P information exchange.

CMISE

Common Management Information Service Element

CO

Central Office

CP

Circuit Pack

CPE

Customer Premises Equipment

CR

Critical (alarm)

CRC

Cyclical Redundancy Check

CSIE

Controlled System Interface Expander circuit pack

CSMA/CD

Carrier Sense Multiple Access with Collision Detection

CS&O

Lucent Technologies Customer Support and Operations

CSU

Channel Service Unit

CTIP

Customer Training and Information Products; now known as Lucent Learning Organization (LLO)

CTL

Control (circuit pack prefix)

CTL/EI

Control/External Interface circuit pack

CTL/MEM

Control/Memory circuit pack

CTL/SR50DC

Sub-Rack Duplex (MCA 50D) circuit pack

CTL/SYS50D

System Controller Duplex (MCA 50D) circuit pack

CTL/SYS50DM

System Controller Duplex (MCA 50D) with Non-Volatile Memory circuit pack

CTLI-D

Control Interface to Device

CTS

Customer Technical Support; now known as Technical Support Services (TSS)

CV

Coding Violation

CW

Continuous Wave (laser)

D DA

Discontinued Availability

DACS

Digital Access Cross-Connect System

dB

Decibels

DC

Direct Current

DCC

Data Communications Channel

DCE

Data Communications Equipment

DCN

Data Communications Network

DCS

Digital Cross-Connect System

DDF

Digital Distribution Frame

DIL

Dual In Line

DPLL

Digital Phase Locked Loop

DP-RING

Dedicated Protection Ring

DR

Digital Radio

DRI

Dual Ring Interworking

DRAM

Dynamic Random Access Memory

DS0, DS1, DS3

Digital Signal Levels 0, 1, 3

DS3EC1/8

8-port DS3 or EC-1 interface port unit

DS-N

Digital Signal, Level N

DS-NE

Directory Service Network Element

DSX

Digital Cross-Connect Frame

DTE

Data Terminating Equipment

DTMF

Dual Tone Multifrequency

DUS

Do not Use for Synchronization

DWDM

Dense Wavelength Division Multiplexing

E EBER

Equivalent Bit Error Rate

EC

Echo Cancellor

EC-1, EC-N

Electrical Carrier, Levels 1 and N

ECC

Embedded Control Channel

ECI

Equipment Catalog Item

EEPROM

Electrically Erasable Programmable Read-Only Memory

EF

Equipment Fail

EIA

Electronic Industries Association

EM

Event Management

EMC

Electromagnetic Compatibility

EMI

Electromagnetic Interference

EMS

Element Management System

EPROM

Erasable Programmable Read-Only Memory

EQ

Equipped

EQPT

Equipment

ES

Errored Seconds

ES

End System

ESD

Electrostatic Discharge

ESF

Extended Superframe Format

ETSI

European Telecommunications Standards Institute

EVT

Event

F FCC

Federal Communications Commission

FDA

Food and Drug Administration

FDDI

Fiber Distributed Data Interface

FE

Far End

FEBE

Far End Block Error

FEC

Forward Error Correction

FEPROM

Flash EPROM

FIT

Failure in Time

FTAM

File Transfer and Access Management

G **GB**
Gigabytes

Gb/s
Gigabits per second

GHz
Gigahertz

GNE
Gateway Network Element

GR
Geographic Redundancy

GR-XXX
Telcordia (Bellcore) General Requirement-XXX

H **HDB3**
High Density Bipolar 3

HDLC
High-Level Data Link Control

HE
Host Exchange

HMI
Human Machine Interface

HO
High Order

HPA
Higher Order Path Adaptation

HPC
Higher Order Path Connection

HPT
Higher Order Path Termination

HP-UX

Unix Operating System for Hewlett Packard platform

HS

High Speed

HW

Hardware

Hz

Hertz

I IAO LAN

Intraoffice Local Area Network

ID

Identifier

IEC

International Electrotechnical Commission

IEEE

Institute of Electrical and Electronics Engineers

I/O

Input/Output

IMF

Infant Mortality Factor

INTFC

Interface

IR

Intermediate Reach

IS

In Service

ISDN

Integrated Services Digital Network

ISM

Intelligent Synchronous Multiplexer

ITCO

Independent Telephone Company

ITM

Integrated Transport Management

ITM-NM

Integrated Transport Management Network Module

ITM-SC

Integrated Transport Management Subnetwork Controller

ITU

International Telecommunications Union

ITU-R

International Telecommunications Union — Radio standardization sector. Formerly known as CCIR: Comité Consultatif International Radio; International Radio Consultative Committee.

ITU-T

International Telecommunications Union — Telecommunication standardization sector. Formerly known as CCITT: Comité Consultatif International Télégraphique & Téléphonique; International Telegraph and Telephone Consultative Committee.

IXC

Interexchange Carrier

K Kb/s

Kilobits per second

L LA

Limited Availability

LAN

Local Area Network

LATA

Local Access and Transport Area

LBC

Laser Bias Current

LBFC

Laser Backface Currents

LBO

Lightguide Build-Out

LCN

Local Communications Network

LCT

Large Capacity Terminal

LEC

Local Exchange Carrier

LED

Light-Emitting Diode

LEN

Local Exchange Node

LGX

Lightguide Cross-Connect

LH

Long Haul

LLO

Lucent Learning Organization, formerly Customer Training and Information Products (CTIP)

LO

Low Order

LOF

Loss of Frame

LOM

Loss Of Multiframe

LOP

Loss of Pointer

LOS

Loss of Signal

LPA

Lower order Path Adaptation

LPBK

Loopback

LPC

Lower Order Path Connection

LPT

Lower Order Path Termination

LR

Long Reach

LS

Low Speed

LTE

Line Terminating Equipment

M**m**

Microns

mm

Micrometer

MB

Megabytes

Mb/s

Megabits per second

MCOND

Maintenance Condition

MEM

Memory

MIPS

Millions of Instructions Per Second

MJ

Major (alarm)

MMI

Man-Machine Interface

MML

Human-Machine Language

MN

Minor (alarm)

MS

Multiplex Section

ms

Millisecond

MS-SPRing

Multiplex Section Shared Protection Ring

MSOH

Multiplex Section OverHead

MTBF

Mean Time Between Failures

MTBMA

Mean Time Between Maintenance Activities

MTIE

Maximum Time Interval Error

MTPI

Multiplexer Timing Physical Interface

MTS

Multiplex Timing Source

MTTR

Mean Time To Repair

N**NA**

Not Applicable

NARTAC

North American Regional Technical Assistance Center

NCC

Network Communication Controller

NE

Network Element

NEBS

Network Equipment-Building System

NEE

Network Element Equivalent

NEF

Network Element Function

NEM

Network Element Manager

nm

Nanometer (10⁻⁹ meters)

NMA

Network Monitoring and Analysis System

NMON

Not Monitored

NMS

Network Management System

NNE

Non-SDH Network Element

NORM

Normal

NPI

Null Pointer Indication

NPPA

Non-Preemptible Protection Access

NRZ

Nonreturn to Zero

NSA

Non-Service Affecting

NSAP Address

Network Service Access Point Address (used in the OSI network layer 3)

NTF

No Trouble Found

NVM

Non-Volatile Memory

O O&M

Operation and Maintenance

OA

Optical Amplifier

OALAN

Overhead Access Local Area Network

OAM&P

Operations, Administration, Maintenance, and Provisioning

OC, OC-N

Optical Carrier

OC-1

Optical Carrier, Level 1 Signal (51.84 Mb/s)

OC-3

Optical Carrier, Level 3 Signal (155.52 Mb/s)

OC-3c

Optical Carrier, Level 3 Concatenated Signal (155.52 Mb/s)

OC-12

Optical Carrier, Level 12 Signal (622.08 Mb/s)

OC-48

Optical Carrier, Level 48 (2488.32 Mb/s) (2.5 Gb/s)

OC-192

Optical Carrier, Level 192 (9953.28 Mb/s) (10 Gb/s)

OC3/STM1/1.3LR4

Optical Carrier 3/Synchronous Transport Module 1 port unit in the 1.3 mm range with four bidirectional long reach ports.

OC3/STM1/1.3SR4

Optical Carrier 3/Synchronous Transport Module 1 port unit in the 1.3 mm range with four bidirectional short reach ports.

OC12/STM4/1.3LR2

Optical Carrier 12/Synchronous Transport Module 4 port unit in the 1.3 mm range with two bidirectional long reach ports.

OC12/STM4/1.3SR2

Optical Carrier 12/Synchronous Transport Module 4 port unit in the 1.3 mm range with two bidirectional short reach ports.

OC48/STM16

Optical Carrier 48/Synchronous Transport Module 16 port unit (generic reference to all OC48/STM16 port units).

OC48/STM16/1.3LR1

Optical Carrier 48/Synchronous Transport Module 16 port unit in the 1.3 mm range with one bidirectional long reach port.

OC48/STM16/1.5LR1

Optical Carrier 48/Synchronous Transport Module 16 port unit in the 1.5 mm range with one bidirectional long reach port.

OC48/STM16/DWDM01-16

Optical Carrier 48/Synchronous Transport Module 16 port unit in 16 different wavelengths that are compatible with ITU wavelengths and WaveStar OLS 40G/80G without OTUs.

OC48/STM16/POU

Optical Carrier 48/Synchronous Transport Module 16 Passive Optic Unit port unit in 16 different wavelengths that are compatible with passive optical applications with dense wavelength division multiplexing systems. The 16 different codes of OC48/STM16/POU port units are each designated by a 4-digit numeric suffix that corresponds to the frequency of the optical signal.

OC48/STM16/WDM

Optical Carrier 48/Synchronous Transport Module 16 Wavelength Division Multiplexing port unit in the 1.5 mm range with one bidirectional short/intermediate reach port. The 80 different codes of OC48/STM16/WDM port units are each designated by a 4-digit numeric suffix that corresponds to the frequency of the optical signal. The OC48/STM16/WDM port units support 80 wavelengths for applications with WaveStar OLS 400G dense wavelength division multiplexing systems without OTUs.

OC192/STM64/1.5IR1

Optical Carrier 192/Synchronous Transport Module 64 port unit in the 1.5 mm range with one bidirectional extended intermediate reach port.

OC192/STM64/1.5SR1

Optical Carrier 192/Synchronous Transport Module 64 port unit in the 1.5 mm range with one bidirectional short/intermediate reach port.

OC192/STM64/POU

Optical Carrier 192/Synchronous Transport Module 64 Passive Optic Unit port unit in 16 different wavelengths that are compatible with passive optical applications with dense wavelength division multiplexing systems. The 16 different codes of OC192/STM64/POU port units are each designated by a 4-digit numeric suffix that corresponds to the frequency of the optical signal.

OC192/STM64/1.5IRS1

Optical Carrier 192/Synchronous Transport Module 64 port unit in the 1.5 mm range with one bidirectional intermediate reach port with Strong Forward Error Correction.

OC192/STM64/WDM

Optical Carrier 192/Synchronous Transport Module 64 Wavelength Division Multiplexing port unit in the 1.5 mm range with one bidirectional short/intermediate reach port. The 40 different codes of OC192/STM64/WDM port units are each designated by a 4-digit numeric suffix that corresponds to the frequency of the optical signal. The OC192/STM64/WDM port units support 40 wavelengths for applications with WaveStar OLS 400G dense wavelength division multiplexing systems without OTUs.

ODF

Optical Distribution Frame

OI

Operations Interworking

OLS

Optical Line System

OOF

Out-of-Frame

OOS

Out-of-Service

OPS/INE

Operations System for Intelligent Network Elements

OS

Operations System

OSI

Open Systems Interconnection

OSMINE

Operations Systems Modifications for the Integration of Network Elements

OTU

Optical Translator Unit (WaveStar OLS)

P PCB

Printed Circuit Board

PCM

Pulse Code Modulation

PCMCIA

Personal Computer Memory Card International Association

PDH

Plesiochronous Digital Hierarchy

PFVP

Power Filter with Voltage Protection

PI

Physical Interface

PM

Performance Monitoring

PMA

Performance Monitoring Application

PMD

Polarization Mode Dispersion

POH

Path Overhead

POP

Point of Presence

POTS

Plain Old Telephone Service

PP

Pointer Processing

PPROC/FO

Pointer Processor circuit pack for 192 STS-1/64 STM-1 equivalents with fan out

PRC

Primary Reference Clock

PRI

Primary

PROTN

Protection

PROV

Provisioned

PSA

Partially Service Affecting

PSDN

Public Switched Data Network

PSF

Power Supply Filter

PSTN

Public Switched Telephone Network

PTE

Path Terminating Equipment

PTY

Parity

PVC

Permanent Virtual Circuit

PWR

Power

PWR ON

Power On

Q**QAF**

Q Adapter Function (in NE)

QL

Quality Level

QOS

Quality of Service

QRSS

Quasi-Random Signal Source

R**RAM**

Random Access Memory

RCV

Receive

RCVR

Receiver

RDI

Remote Defect Indication

REI

Remote Error Indicator

RF

Radio Frequency

RFI

Remote Failure Indication

RPP

Reliability Prediction Procedure

RSOH

Regenerator Section OverHead; part of SOH

RST

Regenerator Section Termination

RT

Remote Terminal

RTRV

Retrieve

RZ

Return to Zero

S SA

Service Affecting

SAI

Station Alarm Interface

SASE

Stand Alone Synchronization Equipment

SCI

Station Clock Input

SCO

Station Clock Output

SD

Signal Degrade

SDH

Synchronous Digital Hierarchy

SDS

Standard Directory Service based on ANSI recommendation T1.245

SEC

SDH Equipment Slave Clock

SES

Severely Errored Seconds

SF

Superframe format

SFEC

Strong Forward Error Correction

SLC

Subscriber Loop Carrier

SH

Short Haul

SNCP

Sub-Network Connection Protection

SNR

Signal-to-Noise Ratio

SOH

Section Overhead

SONET

Synchronous Optical Network

SPE

Synchronous Payload Envelope

SR

Short Reach

SSM

Synchronization Status Marker

SSU_L

Synchronization Supply Unit — Local

SSU_T

Synchronization Supply Unit — Transit

STBY

Standby

STM-1, STM-N

Synchronous Transport Module, Levels 1 and N (155.52 Mb/s)

STM-4

Synchronous Transport Module Level 4 (622.08 Mb/s)

STM-4c

Synchronous Transport Module Level 4 Concatenated Signal (622.08 Mb/s)

STM-16

Synchronous Transport Module Level 16 (2488.32 Mb/s) (2.5 Gb/s)

STM-64

Synchronous Transport Module Level 64 (9953.28 Mb/s) (10 Gb/s)

STS

Synchronous Transport Signal

STS-1, STS-N

Synchronous Transport Signal, Levels 1 and N

STS-3

Synchronous Transport, Level 3

STS-3c

Synchronous Transport, Level 3 Concatenated Signal

STS-12

Synchronous Transport, Level 12

STS-12c

Synchronous Transport, Level 12Concatenated Signal

SVC

Switched Virtual Circuit

SWC

Switch Center

SWIEX

Switch Interface Expander circuit pack

SWIF

Switch Interface circuit pack

SWITCH/DS3EC1

Switch circuit pack for 1xN DS3EC1/8 port unit protection switching

SWITCH/STM1E4

Switch circuit pack for 1xN STM1E/4 port unit protection switching

SWITCH/DS3EC1

Electrical Protection Switch for up to 96 DS3 or EC-1 signals port unit

SWITCH/STS576

576X576 STS-1/192x192 STM-1 Switch circuit pack

SWITCH/STS768

768X768 STS-1/256x256 STM-1 Switch circuit pack

SYNC

Synchronizer

T TA

Technical Advisory

TABS

Telemetry Asynchronous Byte Serial (Protocol)

TARP

Target Identifiers Address Resolution Protocol

TBD

To Be Determined

TBOS

Telemetry Byte-Oriented Serial (Protocol)

TCA

Threshold-Crossing Alert

TDM

Time Division Multiplexing

THz

Terrahertz (10¹² Hz)

TID

Target Identifier

TIRKS

Trunks Integrated Records Keeping System

TL1

Transaction Language 1

TMG/STRAT3

Stratum 3 Timing circuit pack

TR

Technical Requirement

TSA

Time Slot Assignment

TSI

Time Slot Interchange

TSS

Technical Support Services, formerly Customer Technical Support (CTS)

TU

Tributary Unit

TUG

Tributary Unit Group

U UAS

Unavailable Seconds

UITS

Unacknowledged Information Transfer Service. Unconfirmed mode of LAPD operation.

UNEQ

Path Unequipped

UPSR

Unidirectional Path-Switched Ring

V V

Volts

VAC

Volts Alternating Current

VC

Virtual Container

VDC

Volts Direct Current

VF

Voice frequency

VM

Violation Monitor

VMR

Violation, Monitor, and Removal

VT

Virtual Tributary

VT1.5

Virtual Tributary, Level 1.5

VT-G

Virtual Tributary Group

W WAD

Wavelength Add/Drop

WAN

Wide Area Network

WaveStar OLS 40G/80G/400G

WaveStar Optical Line System 40G/80G/400G

WaveStar SNMS

WaveStar SubNetwork Management System (formerly known as ITM SNC [Integrated Transport Management SubNetwork Controller])

WDCS

Wideband Digital Cross-Connect System

WDM

Wavelength Division Multiplexing

WRT

Wait to Restore Time

X X.25

An ITU standard defining the connection between a terminal and a public packet-switched network

Numerics 0x1 Line Operation

0x1 means unprotected operation. The connection between network elements has one bidirectional line (no protection line).

1+1 Active Unit State

Indicates which unit (working or protection) is active.

1+1 Line Protection

A protection architecture in which the transmitting equipment transmits a valid signal on both the working and protection lines. The receiving equipment monitors both lines. Based on performance criteria and OS control, the receiving equipment chooses one line as the active line and designates the other as the standby line.

10G I/O Bay

A 10G I/O Bay is capable of housing one or two 10G I/O Shelves. Each 10G I/O Shelf is divided into a CTL/Switch Interface Sub-Shelf and a Facility/SWIF Interface Sub-Shelf.

10G I/O Shelf

A 10G I/O Shelf may be housed in a 10G I/O Bay or a 10G/Universal I/O Bay. The 10G I/O Shelf is divided into a CTL/Switch Interface Sub-Shelf and a Facility/SWIF Interface Sub-Shelf.

10G/SDH I/O Bay

A 10G/SDH I/O Bay is capable of housing two shelves. The 10G I/O Shelf (bottom) is divided into a CTL/Switch Interface Sub-Shelf and a Facility/SWIF Interface Sub-Shelf. The SDH Universal I/O Shelf (top) is divided into a Switch Interface Sub-Shelf and a Facility Interface Sub-Shelf.

10G/Universal I/O Bay

A 10G/Universal I/O Bay is capable of housing two shelves. The 10G I/O Shelf (bottom) is divided into a CTL/Switch Interface Sub-Shelf and a Facility/SWIF Interface Sub-Shelf. The Universal I/O Shelf (top) is divided into a Switch Interface Sub-Shelf and a Facility Interface Sub-Shelf.

576x576 STS-1 Switch (SWITCH/STS576)

The SWITCH/STS576 circuit pack provides a 576x576 STS-1 equivalent (192x192 STM-1 equivalent) cross-connect function.

768x768 STS-1 Switch (SWITCH/STS768)

The SWITCH/STS768 circuit pack provides a 768x768 STS-1 equivalent (256x256 STM-1 equivalent) cross-connect function.

4608/1536 Platform

The equipment configuration that supports a 4608 STS-1/1536 STM-1 equivalent non-blocking service cross-connection capacity.

4608/1536 Switch Center

A 4608/1536 Switch Center is one fully-equipped Switch Shelf.

4608/1536 Switch Complex

A 4608/1536 Switch Complex is two Switch Bays or one Control/Switch Bay and one Switch Bay. Each bay is equipped with one fully-equipped Switch Shelf.

A Absent (ABS)

Used to indicate that a given circuit pack is not installed.

Access Identifier (AID)

A technical specification for explicitly naming entities (both physical and logical) of an NE using a grammar comprised of ASCII text, keywords, and grammar rules.

Active (ACT)

Used to indicate that a circuit pack or module is in-service and currently providing service functions.

Active Path

One of two signals entering a constituent path selector, the active path is the path currently being selected.

Add Connection

For the input side, it is any tributary from which the user can provision a cross-connection, in any port or port protection group which is NOT a BLSR/MS-SPRing. For the output side, it is any tributary to which the user can provision a cross-connection, in any port protection group which is a BLSR/MS-SPRing.

Add/Drop Multiplexer (ADM)

The term for a synchronous network element capable of combining signals of different rates and having those signals added to or dropped from the stream.

ADJCTL/DCC

Circuit pack that terminates 32 DCC channels. Two ADJCTL/DCC circuit pack are used in the System Controller Shelf.

ADJCTL/DCCEI

Circuit pack that combines the functionality of the ADJCTL/DCC and CTL/EI circuit packs. The ADJCTL/DCCEI circuit pack is used in the 10G I/O Shelf, the SDH Universal I/O Shelf, and the Universal I/O Shelf.

Alarm

Visible or audible signal indicating that an equipment failure or significant event/condition has occurred.

Alarm Correlation

The search for a directly-reported alarm that can account for a given symptomatic condition.

Alarm Cut-Off (ACO)

A button on the user panel used to silence audible alarms.

Alarm Cut-Off and Test (ACO/TST)

The name of a pushbutton on the user panel used to silence audible alarms.

Alarm Gateway Network Element (AGNE)

A defined Network Element in an alarm group through which members of the alarm group exchange information.

Alarm Indication Signal (AIS)

A code transmitted downstream in a digital network that indicates that an upstream failure has been detected and alarmed, if the upstream alarm has not been suppressed.

Alarm Severity

An attribute defining the priority of the alarm message. The way alarms are processed depends on the severity.

Alarm Severity Assignment Profile (ASAP)

A user provisioned mechanism to control an alarm level.

Alarm Suppression

Selective removal of alarm messages from being forwarded to the GUI or to network management layer OSs.

Alarm Throttling

A feature that automatically or manually suppresses autonomous messages that are not priority alarms.

Alternate Mark Inversion (AMI)

A line code that employs a ternary signal to convert binary digits, in which successive binary ones are represented by signal elements that are normally of alternative positive and negative polarity but equal in amplitude, and in which binary zeros are represented by signal elements that have zero amplitude.

American Standard Code for Information Interchange (ASCII)

A standard 7-bit code that represents letters, numbers, punctuation marks, and special characters in the interchange of data among computing and communications equipment.

APS Channel

The signalling channel carried in the K1 and K2 bytes of the SONET overhead on the protection line. It is used to exchange requests and acknowledgments for protection switch actions.

Association

A logical connection between manager and agent through which management information can be exchanged.

Asynchronous

The essential characteristic of time-scales or signals such that their corresponding significant instants do not necessarily occur at the same average rate.

Asynchronous Transfer Mode (ATM)

A high-speed transmission technology characterized by high bandwidth and low delay. It utilizes a packet switching and multiplexing technique which allocates bandwidth on demand.

Attribute

Alarm indication level: critical, major, minor, or no alarm.

Autolock

Action taken by the system in the event of circuit pack failure/trouble. System switches to protection and prevents a return to the working circuit pack even if the trouble clears. Multiple protection switches on a circuit pack during a short period of time cause the system to autolock the pack.

Autolock State

A state of the 1xN protection switch group with priority above “Automatic Protection Switching”, and below the commands Clear, Lockout, and Forced Switch. The Autolock State supports the following two states: Locked – indicating the existence of an autolock condition, in which traffic from a particular service circuit pack is locked to protection, Unlocked – indicating no autolock condition is present and normal 1xN protection switching is occurring.

Automatic (AUTO)

One possible state of a port or slot. When a port is in the AUTO state and a good signal is detected, the port automatically enters the IS (in-service) state. When a slot is in the AUTO state and a circuit pack is detected, the slot automatically enters the EQ (equipped) state.

Automatic Protection Switch

A protection switch that occurs automatically in response to an automatically detected fault condition.

Autonomous Message

A message transmitted from the controlled Network Element to the ITM-SC which was not a response to an ITM-SC originated command.

Auto-Provisioning

The ability to detect the presence of equipment, validate it, and then assign the original values to the newly created entity’s programmable parameters. These parameters are maintained in NVM and/or hardware registers. If a user has predefined some (or all) of the parameters associated with the entity, the auto-provisioning function validates the request, perhaps using some of the pre-provisioned data, and then assigns the programmable parameter values accordingly.

Avalanche Photodiode (APD)

A diode that increases its electrical conductivity by a multiplication effect when hit by light. APDs are used in lightwave receivers because the APDs have a greater sensitivity to weakened light signals (for example, those which have traveled long distances over fiber).

B Backout to a Previous Generic

The user initiated procedure whereby the system reverts from the current/most recent generic and back-to the previous generic.

Backup

The backup and restoration features provide the capability to recover from loss of NE data because of such factors as human error, power failure, NE design flaws, and software bugs.

Bandwidth

The difference in Hz between the highest and lowest frequencies in a transmission channel. The data rate that can be carried by a given communications circuit.

Baud Rate

Transmission rate of data (bits per second) on a network link.

Bidirectional Line

A transmission path consisting of two fibers that handle traffic in both the transmit and receive directions.

Bidirectional Line-Switched Ring (BLSR)

A bidirectional ring in which protection switching is accomplished by switching working traffic into protection time slots in the line going in the opposite direction around the ring. BLSRs are functionally equivalent to SDH Multiplexer Section Shared Protection Rings (MS-SPRings).

Bidirectional Ring

A ring in which both directions of traffic between any two nodes travel through the same network elements (although in opposite directions).

Bidirectional Switch

Protection switching performed in both the transmit and receive directions.

Bipolar 3-Zero Substitution (B3ZS)

A line coding technique that replaces three consecutive zeros with a bit sequence having special characteristics accomplishing two objectives: first, this bit sequence accommodates the density requirements of the ones for digital T3 carrier, second, the sequence is recognizable at the destination (due to deliberate bipolar violations) and is removed to produce the original signal.

Bipolar 8-Zero Substitution (B8ZS)

A line coding technique that replaces eight consecutive zeros with a bit sequence having special characteristics accomplishing two objectives: First, this bit sequence accommodates the density requirements of the ones for digital T1 carrier; Second, the sequence is recognizable at the destination (due to deliberate bipolar violations) and is removed to produce the original signal.

Bit

The smallest unit of information in a computer, with a value of either 0 or 1.

Bit Error Rate (BER)

The ratio of error bits received to the total number of bits transmitted.

Bit Error Rate Threshold

The point at which an alarm is issued for bit errors.

Bit Interleaved Parity-N(BIP-N)

A method of error monitoring over a specified number of bits (BIP-3 or BIP-8).

BITS clock

A BITS (Building Integrated Timing Source) clock is simply a clock within a central office that distributes

timing to all the equipment in that central office. The BITS clock is tied to an external, stable timing source, such as a GPS (global positioning satellite).

Blank (BLK)

The status of a circuit pack slot that contains a bus extender (blank) circuit pack.

Board Controller Local Area Network (BCLAN)

The internal local area network that provides communications between the line and board controllers on the circuit packs associated with a high-speed line.

Bridge Cross-Connection

The setting up of a cross-connection leg with the same input tributary as that of an existing cross-connection leg. Thus, forming a 1:2 bridge from an input tributary to two output tributaries.

Broadband Communications

Voice, data, and/or video communications at greater than 2 Mb/s rates.

Building Integrated Timing Supply (BITS)

A single clock that provides all the DS1 and/or composite clock timing reference to all other clocks in that building.

Byte

Refers to a group of eight consecutive binary digits.

Byte Switch (BSW)

A BSW (slice) circuit pack serves as a cross-connect at the byte level between STS-1/STM-1 signals for 4608x4608/1536x1536 switching.

C C-Bit

A framing format used for DS3 signals produced by multiplexing 28 DS1s into a DS3. This format provides for enhanced performance monitoring of both near-end and far-end entities.

Cell Relay

Fixed length cells. For example, ATM with 53 octets.

Central Office (CO)

A building where common carriers terminate customer circuits.

Channel

A sub-unit of transmission capacity within a defined higher level of transmission capacity.

Channel State Provisioning

A feature that allows a user to suppress reporting of alarms and events during provisioning by supporting

multiple states (automatic, in-service, and not monitored) for VT1.5 and STS-1 channels.

Circuit

A set of transmission channels through one or more network elements that provides transmission of signals between two points, to support a single communications path.

Clear Channel (CC)

A digital circuit where no framing or control bits are required, thus making the full bandwidth available for communications.

Clear Command

Clears any active WaveStar CIT switch request. Clear can be directed to a single electrical interface (working or protection) or to all electrical interfaces. The clear command is used to clear a Lockout, Forced Switch, or Manual Switch conditions, as well as release a Wait-to-Restore.

Closed 4-Fiber BLSR

When all four ports of the BLSR are selected, then the user can provision one of the four ports as the “East Working Port”, one port as the “East Protection Port”, one port as the “West Working Port” and one port as the “West Protection Port.” This arrangement is sometimes referred to as a two-sided node.

Closed Ring Network

A network formed of a ring-shaped configuration of network elements. Each network element connects to two others, one on each side.

Coding Violation (CV)

A performance monitoring parameter indicating that bipolar violations of the signal have occurred.

Collocated

System elements that are located in the same location.

Command Group

An administrator-defined group that defines commands to which a user has access.

Concatenation

A procedure whereby multiple virtual containers are associated one with each other resulting in a combined capacity that can be used as a single container across which bit sequence integrity is maintained.

Constituent Path Selector

A path-level protection switching function that selects the better of two constituent signals in the two logical input tributaries and operates at the constituent signal rate. A path protection group in a cross-connection with an STS-3 or STS-12/STM-1 or STM-4 “pipe” cross-connection rate provides path-level protection switching for all the constituent signals carried by the cross-connection. There may be one or more constituent path selectors operating independently within each path protection group, one for each constituent signal in the logical output tributary. The path protection group adapts to the current constituent

signal rates.

Constituent Signal

A signal at a constituent signal rate that is carried by a cross-connection leg.

Consultative Committee for the International Telephone and Telegraph (CCITT)

International Telephone and Telegraph Consultative Committee — An international advisory committee under United Nations' sponsorship that has composed and recommended for adoption worldwide standards for international communications. Recently changed to the International Telecommunications Union Telecommunications Standards Sector (ITU-TSS).

Control Complex

A Control Complex includes one equipped System Controller Bay or one Control/Switch Bay, which provides the main control functions for WaveStar BandWidth Manager.

Control/Switch Bay

The Control/Switch Bay is capable of housing a System Controller Shelf and a Switch Shelf.

Control/Switch Complex

A Control/Switch Complex comprises either one equipped System Controller Bay and two Switch Bays or one Control/Switch Bay and one Switch Bay. A Control/Switch Complex provides the main control and switching functions for WaveStar BandWidth Manager.

Control System Interface Expander (CSIEX)

The CSIEX circuit pack expands CTLI-D interfaces that connect to the SWIEX circuit packs and the SEC memory circuit packs. The CSIEX circuit pack also expands ON (Operations Network) interfaces that connect to the Facility Interface Sub-Shelf

Co-Resident

A hardware configuration where two applications can be active at the same time independently on the same hardware and software platform without interfering with each others functioning.

Correlation

A process where related hard failure alarms are identified.

Craft Interface Terminal (CIT)

The user interface terminal used by craft personnel to communicate with a network element.

Critical (CR)

Alarm that indicates a severe, service-affecting condition.

Cross-Connect Capacity

The total bandwidth of cross-connections as measured by the bandwidth of input and output tributaries. A

system with N STS-1/STM-1 equivalent input tributaries and N STS-1/STM-1 equivalent output tributaries (referred to as “NxN”) provides a cross-connection capacity of N STS-1/STM-1 equivalents. This system could provide N one-way point-to-point cross-connections or N^2 two-way point-to-point cross-connections at the equivalent rate of STS-1/STM-1.

Cross-Connect Loopback

A cross-connection from an input tributary to the output of that same tributary via the cross-connect fabric.

Cross-Connect Rate

The attribute of a cross-connection that defines the constituent signal rate(s) it can carry. For a cross-connection with an STS-3/STM-1 “pipe” cross-connection rate, the constituent signals carried by the cross-connection can be either an STS-3c/STM-1c signal or three STS-3/STM-1 signals. Similarly, for a cross-connection with an STS-12/STM-4 “pipe” cross-connection rate, the constituent signals carried by the cross-connection can be either an STS-12c/STM-4c signal or an allowed mix of STS-12c/STM-1c signals and STS-3/STM-1 signals.

Cross-Connect Topologies

The different types of cross-connections, or configurations, that may be provisioned. These include: bridging, path-protected, and point-to-point. The topology of a cross-connection defines the number of legs in the cross-connection, whether the inputs and/or outputs of some legs are the same logical tributary, and whether any path protection groups are included.

Cross-Connection

Path-level connections between input and output tributaries or specific ports within a single NE.

Cross-connections are made in a consistent way even though there are various types of ports and various types of port protection. Cross-Connections are reconfigurable interconnections between tributaries of transmission interfaces.

Cross-Connection Leg

A one-way connection provisioned from one logical input tributary to one logical output tributary. Each leg is identified as an entity by its logical input and output tributaries, its cross-connection rate, and the type of cross-connection topology. The operation of retrieving cross-connections can be done in terms of cross-connection legs between specific logical tributaries.

Cross-Connection Type

A provisionable parameter whereby the user selects the type as 1 Way Point to Point, or 2 Way Point to Point.

Crosstalk

An unwanted signal introduced into one transmission line from another.

CTL/EI

Circuit pack that selects the 10Base-T from an ADJCTL/DCC circuit pack and routes it to the backplane.

CTL/MEM

The CTL/MEM circuit pack stores information for WaveStar BandWidth Manager. A CTL/MEM circuit pack may be designated as either PRI (Primary) or SEC (Secondary).

CTL/SR50DC

The CTL/SR50DC circuit pack is a main controller (without memory) for WaveStar BandWidth Manager. The CTL/SR50DC is part of the 10G I/O Shelf.

CTL/Switch Interface Sub-Shelf

The top portion of a 10G I/O Shelf which is equipped with ten SWITCH/STS768 packs, two TMG/STRAT3 packs, two CTL/SR50DC packs, and four PPROC/FO packs.

CTL/SYS50D

The SYS50D circuit pack is a main controller (without memory) for WaveStar BandWidth Manager. The SYS50D is part of the System Controller Shelf.

CTL/SYS50DM

The SYS50DM circuit pack is a main controller for WaveStar BandWidth Manager. Two SYS50DM circuit packs are included in all modules of the Facility Interface Sub-.

Current Value

The value currently assigned to a provisionable parameter.

Cut-Through

Refers to a simple ASCII interface to an NE. It enables the user to send TL1 messages directly to the NE with no interpretation or assistance provided by the WaveStar CIT.

D Data

A collection of system parameters and their associated values.

Database Administrator

A user who administers the database of the application.

Data Communications Channel (DCC)

The embedded overhead communications channel in the synchronous line, used for end-to-end communications and maintenance. The DCC carries alarm, control, and status information between network elements in a synchronous network.

Data Communications Equipment (DCE)

The equipment that provides signal conversion and coding between the data terminating equipment (DTE) and the line. The DCE may be separate equipment or an integral part of the DTE or of intermediate equipment. A DCE may perform other functions usually performed at the network end of the line.

Data Terminating Equipment (DTE)

The equipment that originates data for transmission and accepts transmitted data.

DDM-1000

Lucent Technologies' Dual DS3 Multiplexer – A digital multiplexer that multiplexes DS1, DS1C, or DS2 signals into a DS3 signal or a 90 Mb/s or 180 Mb/s optical signal.

DDM-2000

Lucent Technologies SONET-ready network multiplexer that can function as a lightwave terminal. It is designed primarily for loop feeder and interoffice applications that work in existing asynchronous as well as the emerging SONET networks. Multiplexers that multiplex DS1, DS3, or EC-1 inputs into EC-1, OC-1, OC-3, or OC-12 outputs.

Default

An operation or value that the system or application assumes, unless a user makes an explicit choice.

Default Provisioning

The parameter values that are preprogrammed as shipped from the factory.

Defect

A limited interruption of the ability of an item to perform a required function. It may or may not lead to maintenance action depending on the results of additional analysis.

Demultiplexer

A device that splits a combined signal into individual signals at the receiver end of transmission.

Demultiplexing

A process applied to a multiplexed signal for recovering signals combined within it and for restoring the distinct individual channels of these signals.

Dense Wavelength Division Multiplexing (DWDM)

Transmitting two or more signals of different wavelengths simultaneously over a single fiber.

Deprovisioning

The inverse order of provisioning. To manually remove/delete a parameter that has (or parameters that have) previously been provisioned.

Digital Cross-Connect Panel (DSX)

A panel designed to interconnect equipment that operates at a designated rate. For example, a DSX-3 interconnects equipment operating at the DS3-rate.

Digital Multiplexer

Equipment that combines several digital signals into a single composite digital signal by time-division multiplexing.

Digital Signal Levels 0, 1, 3 (DS0, DS1, DS3)

An ANSI-defined signal or service level corresponding to the following: DS0 is 64 Kb/s, DS1 is 1.544 Mb/s (equivalent to T1), and DS3 is 44.736 Mb/s (equivalent to 28 T1 channels or T3).

Dimmed

The state of a control whose normal functionality is not currently available to a user (also referred to as grayed or disabled).

Directory Name

An ASCII string that fully specifies the path and the name of the target directory where the generic to be downloaded, the database to be restored, or the database to be backed up is to be found.

Directory Service Network Element (DSNE)

A designated network element that is responsible for administering a database that maps network element names (TIDs) to addresses [NSAPs (network service access points)] in an OSI subnetwork. There can be one DSNE per ring. A DSNE can also be a GNE.

Dispersion

Time-broadening of a transmitted light pulse.

Dispersion Shifted Optical Fiber

1330/1550 nm minimum dispersion wavelength.

Divergence

When there is unequal amplification of incoming wavelengths, the result is a power divergence between wavelengths.

Doping

The addition of impurities to a substance in order to attain desired properties.

Double Click

To click twice rapidly with the left mouse button. This executes the default command in the Right Click Pop-up Menu. If there is no default command, then double-clicking will have no effect.

Downstream

At or towards the destination of the considered transmission stream, for example, looking in the same direction of transmission.

Downstream Pack

Given a pack-to-pack interface, the downstream pack is the receiving pack.

Drop and Continue

A circuit configuration that provides redundant signal appearances at the outputs of two network elements in a ring. Can be used for Dual Ring Interworking (DRI) and for video distribution applications.

Drop-Down Menu

A menu that is displayed from a menu bar.

DS1 Signal

Signal with a data rate of 1.544 Mb/s.

DS3EC1/8

Port unit that provides 8 bidirectional ports at the DS3-rate or EC-1-rate.

DS3EC1 Connector Panel

The two panels on one or both sides of a Facility Interface Sub-Shelf (Universal I/O Shelf) containing DS3EC1/8 port units. The DS3EC1/8 Connector Panels provide an interface between the DS3EC1/8 port units and the backplane via BNC connectors.

DS3 Format

Specifies the line format of a DS3 interface port, such as M23 or C-bit parity.

DS3 Idle Signal

A signal that can be applied to any output port that is not cross-connected to an input port. This signal lets downstream network elements know that the facility is operating normally even though it is not sending a normal DS3 signal.

DS3 Signal

A logical or electrical B3ZS signal with a data rate of 44.736 Mb/s.

DSX-1, 2, 3

Digital cross-connect used to interconnect equipment, provide patch capability, and provide test access at the DS1, DS2, or DS3 level.

Dual Ring Interworking (DRI)

A topology in which two rings are interconnected at two nodes on each ring and operate so that inter-ring traffic is not lost in the event of a node or link failure at an interconnecting point.

E Electrical Carrier, Level 1 (EC-1)

An electrical interface signal at the SONET rate of STS-1.

Electrical Module

One of the ways the bottom portion of a Universal I/O Shelf, the Facility Interface Sub-Shelf, may be populated. DS3EC1/8 port units are used to populate an Electrical Module.

Electromagnetic Compatibility (EMC)

A measure of equipment tolerance to external electromagnetic fields.

Electromagnetic Interference (EMI)

High-energy, electrically induced magnetic fields that cause data corruption in cables passing through the fields.

Electronic Industries Association (EIA)

A trade association of the electronic industry that establishes electrical and functional standards.

Electrostatic Discharge (ESD)

Static electrical energy potentially harmful to circuit packs and humans.

Entire System Start-Up Stage A

The amount of time from power-on reset (including system controller downloads to the individual controllers) until transmission is up. This should normally be less than 5 minutes.

Entire System Start-Up Stage B

The amount of time from power-on reset until the system is completely available for any external commands. This should normally be less than 5 minutes.

Entity

A specific piece of hardware (usually a circuit pack, slot, or module) that has been assigned a name recognized by the system.

Entity Identifier

The name used by the system to refer to a circuit pack, memory device, or communications link.

Equipment Fail (EF) State

The protection group shall enter the EF state when any of its circuit packs are in the EF state, and no higher priority request (for example, Clear, Forced Switch) is present. The protection group leaves the EF state when all EF indications are cleared, or a higher priority request is received.

Equipment Protection

Relates to the DS3 and EC-1 electrical interfaces, which are protected by 1xN equipment protection. This means that protection switching for electrical interfaces is supported at the level of the port unit (circuit pack).

Equipped (EQ)

Status of a circuit pack or interface module that is in the system database and physically in the frame, but not yet provisioned.

Erbium

A soft rare earth element used in metallurgy and nuclear research.

Erbium Doped Fiber Amplifier (EDFA)

An amplifier that performs by having a light signal pass through a section of erbium-doped fiber and using

the laser pump diode to amplify the signal.

Errorred Seconds (ES)

A performance monitoring parameter. ES “type A” is a second with exactly one error; ES “type B” is a second with more than one and less than the number of errors in a severely errored second for the given signal. ES by itself means the sum of the type A and type B ESs.

Establish

A user initiated command, at the WaveStar CIT, to create an entity and its associated attributes in the absence of certain hardware.

Event

A significant change. Events in controlled Network Elements include signal failures, equipment failures, signals exceeding thresholds, and protection switch activity. When an event occurs in a controlled Network Element, the controlled Network Element will generate an alarm or status message and send it to the management system.

Event Driven

A required characteristic of a network element or software system: NEs are reactive systems, primarily viewed as systems that wait for and then handle events. Events are provided by the external interface packages, the hardware resource packages, and also by the software itself.

Exclude

A user initiated command, at the WaveStar CIT, to remove an entity from service.

Extended Superframe Format (ESF)

A T-1 format that uses the framing bit for non-intrusive signaling and control. A T-1 frame is sent 8,000 times a second, with each frame consisting of a payload of 192 bits, and with each frame preceeded by a framing bit. Because ESF only requires 2,000 framing bits for synchronization, the remaining 6,000 framing bits can be used for error detection.

Externally Timed

An operating condition of a clock in which it is locked to an external reference and is using time constants that are altered to quickly bring the local oscillator’s frequency into approximate agreement with the synchronization reference frequency.

Extract

To physically remove a circuit pack from a slot, thus causing a system initiated removal of an entity from service.

Extra traffic

Unprotected traffic that is carried over protection channels when their capacity is not used for the protection of working traffic.

F Facility

A one- or two-way circuit that carries a transmission signal.

Facility Interface Sub-Shelf

The bottom portion of a Universal I/O Shelf or an SDH Universal I/O Shelf which may be equipped, depending on the port units and circuit packs used, as a DS3EC1 Electrical, Optical, or a Mixed Module (Universal I/O Shelf) or an STM1e Electrical or Mixed Module (SDH Universal I/O Shelf).

Facility Loopback

A facility loopback is where an entire line is looped back.

Facility Roll

The disconnection of the circuit cross-connecting input tributary to an output tributary followed, within the required completion time (≤ 2.5 ms), by a cross-connection of an input tributary to an output tributary.

Facility/SWIF Interface Sub-Shelf

The bottom portion of a 10G I/O Shelf which may be equipped with OC192/STM64 port units and one to four pairs of SWIF packs.

Failures in Time (FIT)

Circuit pack failure rates per 109 hours as calculated using the method described in Reliability Prediction Procedure for Electronic Equipment, Telcordia Method I, Issue 5, September 1995.

Far End (FE)

Any other network element in a maintenance subnetwork other than the one the user is at or working on. Also called remote.

Far-End Block Error (FEBE)

An indication returned to the transmitting node that an errored block has been detected at the receiving node. A block is a specified grouping of bits.

Far-End Receive Failure (FERF)

An indication returned to a transmitting Network Element that the receiving Network Element has detected an incoming section failure. Also known as RDI (Remote Detect Indication).

Fault

Term used when a circuit pack has a hard (not temporary) fault and cannot perform its normal function.

Fault Management

Collecting, processing, and forwarding of autonomous messages from network elements.

Fiber Distributed Data Interface (FDDI)

Fiber interface that connects computers and distributes data among them.

File Transfer and Access Management (FTAM)

FTAM is the Open Systems Interconnection (OSI) standard for file transfer, file access, and file management.

Flash EPROM

A technology that combines the nonvolatility of EPROM with the in-circuit reprogrammability of EEPROM (electrically-erasable PROM).

Folded Rings

Folded (collapsed) rings are rings without fiber diversity. The terminology derives from the image of folding a ring into a linear segment.

Forced

Term used when a circuit pack (either working or protection) has been locked into a service-providing state by user command.

Forced Switch to Protection

The WaveStar CIT command that forces the protection group to be the “Active Unit.” The clear command is required to remove the Forced Switch state. While in the Forced Switch state the system may not switch the active unit either automatically, by means of the WaveStar CIT Forced Switch, or Manual Switch command.

Forward Error Correction (FEC)

A technique used by a receiver to correct errors incurred during transmissions over a communications channel without requiring retransmission of any information by the transmitter. FEC typically involves a convolution of the transmitter using a common algorithm and embedding sufficient redundant information in the data block to allow the receiver to correct. While this technique is processor-intensive, it improves the efficiency of the network.

Frame

The smallest block of digital data being transmitted.

Frame Relay (FR)

A form of packet switching that relies on high-quality phone lines to minimize errors. It is very good at handling high-speed, bursty data over wide area networks. The frames are variable lengths and error checking is done at the end points.

Framework

An assembly of equipment units, such as a rack, that is capable of housing shelves.

Free Running

An operating condition of a clock in which its local oscillator is not locked to an internal synchronization reference and is using no storage techniques to sustain its accuracy.

FT-2000 ADR

Lucent Technologies' OC-48 rate Add/Drop Rings lightwave Terminal for 2-fiber BLSRs. It is designed primarily for interoffice applications. It supports adds, drop, and through connections for DS3/EC-1, OC-3, IS-3, and OC-12.

G Gateway Network Element (GNE)

A network element that passes information between other network elements and management systems through a data communication network.

H Hard Failure

An unrecoverable nonsymptomatic (primary) failure that causes signal impairment or interferes with critical network functions, such as DCC operation.

High Level Data Link Control (HDLC)

OSI reference model datalink layer protocol.

Holdover

An operating condition of a clock in which its local oscillator is not locked to an external reference but is using storage techniques to maintain its accuracy with respect to the last known frequency comparison with a synchronization reference.

Host Controller

The NSAP of the subject NE.

Hot Keys

A keyboard key or key combination that invokes a particular command.

Hot Standby

A circuit pack ready for fast, automatic placement into operation to replace an active circuit pack. It has the same signal as the service going through it, so that choice is all that is required.

Human Machine Language (MML)

A standard language developed by the ITU for describing the interaction between humans and dumb terminals.

I Idle

An output port not cross-connected to an input port.

Idle Code

A signal transmitted downstream automatically from an idle output port. It can also be transmitted downstream by a manual command from a cross-connected output port.

Include

A user initiated command, at the WaveStar CIT, to restore an entity to service.

Individual Controller Start-Up Stage A

The amount of time from power-on reset until transmission is established for an individual controller. This should normally be less than 2.5 minutes.

Individual Controller Start-Up Stage B

The amount of time from power-on reset until the individual controller is completely available for any external commands. This should normally be less than 3 minutes.

Insert

To physically insert a circuit pack into a slot, thus causing a system-initiated restoral of an entity into service and/or creation of an entity and associated attributes.

In-Service (IS)

A memory administrative state for ports. IS refers to a port that is fully monitored and alarmed.

Integrated Transport Management Network Module (ITM NM)

Lucent Technologies' integrated network management system that provides a broad end-to-end view of the SONET network.

Integrated Transport Management SubNetwork Controller (ITM SNC)

Lucent Technologies' SONET element management layer system that provides fault, configuration, and security functions through the use of a GUI.

Interface Capacity

The total number of STS-1/STM-1 equivalents (bidirectional) tributaries in all transmission interfaces with which a given I/O Shelf can be equipped at one time. The interface capacity varies with equipage.

I/O Complex

There are two types of I/O Complexes: local and remote (future). A local I/O Complex is one or more collocated Universal I/O Bays that are electrically cabled to an associated Switch Complex. A remote I/O Complex (future) is one or more I/O Bays that are located up to 1000 cable-feet away from and optically connected (using optical remoting) to an associated Switch Complex.

J Jitter

Short term variations of amplitude and frequency components of a digital signal from their ideal position in time.

L Lead Time

The time interval between placement of a product order and receipt of the product.

Lightguide Build-Out (LBO)

An attenuating (signal-reducing) element used to keep an optical output signal strength within desired limits.

Lightguide Cross-Connect (LGX)

A SONET device that contains ports for optical fiber connections to an optical network element (NE). An LGX is used to make and change connections to an NE without changing the cabling on the NE itself.

Line

A transmission medium, together with the associated equipment, required to provide the means of transporting information between two consecutive network elements. One network element originates the line signal; the other terminates it.

Line Build Out (LBO)

An equalizer network that guarantees the proper signal level and shape at the DSX panel.

Line Controller Local Area Network (LCLAN)

The internal local area network that provides communications between the controlled circuit packs.

Line Protection

The optical interfaces can be protected by line protection. Line protection switching protects against failures of line facilities, including the interfaces at both ends of a line, the optical fibers, and any equipment between the two ends. Line protection includes protection of equipment failures.

Line Timing

Refers to a network element that derives its timing from an incoming OC-N/STM-N signal.

Link

The mapping between in-ports and out-ports. It specifies how components are connected to one another.

Literal Character

A letter, digit, or symbol that is entered in a command. The first hyphen in UNIT-{1-64} is a literal character; the braces and the second hyphen are not literal characters.

Local Area Network (LAN)

A communications network that covers a limited geographic area, is privately owned and user administered, is mostly used for internal transfer of information within a business, is normally contained within a single building or adjacent group of buildings, and transmits data at a very rapid speed.

Local I/O Complex

A local I/O Complex is one or more co-located Universal I/O Bays that are electrically cabled to an associated Switch Complex.

Location

An identifier for a specific circuit pack, interface module, interface port, or communications link.

Lockout of Protection

The WaveStar CIT command that prevents the system from switching traffic to the protection line from a working line. If the protection line is active when a “Lockout of Protection” is entered – this command causes the working line to be selected. The protection line is then locked from any Automatic, Manual, or Forced protection switches.

Lockout State

The Lockout State shall be defined for each working or protection circuit pack. The two permitted states are: None – no lockout is set for the circuit pack, Set – the circuit pack has been locked out. The values (None & Set) shall be taken independently for each working or protection circuit pack.

Logical Tributary

With regards to electrical ports and unprotected optical ports – a logical tributary is the same as the port tributary. With regards to port protection groups – a logical tributary is a path-level unit of bandwidth within a port protection group.

Loopback

Type of diagnostic test used to compare an original transmitted signal with the resulting received signal. A loopback is established when the received optical or electrical external transmission signal is sent from a port or tributary input directly back toward the output.

Loop Timing

A special case of line timing. It applies to network elements that have only one OC-N/STM-N interface. For example, terminating nodes in a linear network are loop timed.

Loss Budget

Loss (in dB) of optical power due to the span transmission medium (includes fiber loss and splice losses).

Loss of Frame (LOF)

A failure to synchronize to an incoming signal.

Loss of Pointer (LOP)

A failure to extract good data from a signal payload.

Loss of Signal (LOS)

The complete absence of an incoming signal.

M M23-Format

A standard framing format used for DS3 signals produced by multiplexing 28 DS1s into a DS3 (sometimes referred to as M13-format, without C-bit parity).

Major

Indicates a service-affecting failure, main or unit controller failure, or power supply failure.

Maintenance Condition

An equipment state in which some normal service functions are suspended, either because of a problem or to perform special functions (copy memory) that can not be performed while normal service is being provided.

Manual Switch State

A protection group shall enter the Manual Switch State upon the initiation and successful completion of the Manual Switch command. The protection group leaves the Manual Switch state by means of the Clear or Forced Switch commands. While in the Manual Switch state the system may switch the active unit automatically if required for protection switching.

Mapping

The logical association of one set of values, such as addresses on one network, with quantities or values of another set, such as devices or addresses on another network.

Mediation Device (MD)

Allows for exchange of management information between Operations System and Network Elements.

Mid-Span Meet

The capability to interface between two lightwave network elements of different vendors. This applies to high-speed optical interfaces.

Minor (MN)

Indicates a non-service-affecting failure of equipment or facility.

Miscellaneous Discrete Interface

Allows an operations system to control and monitor equipment collocated within a set of input and output contact closures.

Mixed Module

One of the ways the bottom portion of an SDH Universal I/O Shelf or a Universal I/O Shelf, the Facility Interface Sub-Shelf, may be populated. A combination of OC48/STM16, OC12/STM4, OC3/STM1, and DS3EC1/8 port units is used to populate a Mixed Module (Universal I/O Shelf). A combination of OC48/STM16, OC12/STM4, OC3/STM1, and STM1E/4 port units is used to populate a Mixed Module (an SDH Universal I/O Shelf).

Modify

A user initiated command, at the WaveStar CIT, to modify attributes within an existing entity.

Module

Term used to designate an equipped shelf. For example, a SWIF Module is a Switch Interface Sub-Shelf that

is equipped with SWIF packs.

Multiplexer

A device (circuit pack) that combines two or more transmission signals into a combined signal on a shared medium.

Multiplexer Section Shared Protection Ring (MS-SPRing)

A ring in which protection switching is accomplished by switching working traffic into protection time slots in the line going in the opposite direction around the ring. MS-SPRings are functionally equivalent to SONET Bidirectional Line-Switched Rings (BLSRs).

Multiplexing

The process of combining multiple signals into a larger signal at the transmitter by a multiplexer. The large signal is then split into the original smaller signals at the receiver by a demultiplexer.

N Network Element (NE)

A node in a telecommunication network that supports network transport services and is directly manageable by a management system.

Network Monitoring and Analysis (NMA)

An operations system designed by Telcordia which is used to monitor network facilities.

Network Service Access Point (NSAP) Address

Network Service Access Point Address (used in the OSI network layer 3). An automatically assigned number that uniquely identifies a Network Element for the purposes of routing DCC messages.

Node

A network element in a ring or, more generally, in any type of network. In a network element supporting interfaces to more than one ring, node refers to an interface that is in a particular ring. Node is also defined as all equipment that is controlled by one system controller. A node is not always directly manageable by a management system.

Non-Blocking Service Cross-Connection Capacity

The service cross-connection capacity that is guaranteed to the user to be free from blocking. The system architecture allows for terminating a total transmission capacity on the transmission interfaces that is in excess of the non-blocking service cross-connection capacity of the system. Only the capacity that can be terminated on the main cross-connection fabric without blocking makes up the non-blocking service cross-connection capacity.

Non-Preemptible Protection Access (NPPA)

Non-preemptible protection access increases the available span capacity for traffic which does not require protection by a ring, but which cannot be preempted.

Non-Revertive Switching

In non-revertive switching, an active and standby line exist on the network. When a protection switch occurs, the standby line is selected to support traffic, thereby becoming the active line. The original active line then becomes the standby line. This status remains in effect even when the fault clears. That is, there is no automatic switch back to the original status.

Non-Volatile Memory (NVM)

Memory that retains its stored data after power has been removed. An example of NVM would be a hard disk.

No Request State

This is the routine-operation quiet state in which no external command activities are occurring.

Not Monitored (NMON)

A provisioning state for equipment that is not monitored or alarmed.

O On-Cable Identifier

Also known as the Physical Shelf Identifier. This is a user provisionable parameter.

One-Way Path-Protected Cross-Connection

A two-legged interconnection between two STS-N/STM-N input tributaries and one STS-N/STM-N output tributary. It consists of one path protected group with two legs, a working leg and a protection leg. The path protection group is provisioned to provide path-level protection switching for all the constituent signals carried by the cross-connection. Each leg must be at the same cross-connection rate.

One-Way Point-to-Point Cross-Connection

A one-legged interconnection, that supports one-way transmission, between an input tributary and an output tributary at a particular transmission rate (for example, STS-1/STM-1).

One-Way Roll Cross-Connection

An operation consisting of moving the INPUT of any existing leg of any cross-connection from a given tributary to a second tributary, while leaving the output unchanged. Typically, a roll is used as a tail-end switch in a facility or tributary rolling operation, whereby traffic is moved from the facility to another or from one tributary to another on the facility. The head-end side of a facility or tributary roll usually has a bridge established (in one NE) so that the traffic flows on both the old and new facilities. This serves to minimize the signal interruption time when the roll is carried out to that introduced by the roll itself (in the other NE). A roll is inherently a one-way operation, but because facilities are generally two-way, a head-end bridge/tail-end roll sequence is typically done on both directions.

Open 4-Fiber BLSR/MS-SPRing

When only two ports of the BLSR/MS-SPRing are selected, then the user can provision the two ports in either of two ways, (a) one port as the “West Working Port” and one port as “West Protection Port”, or (b) one port as the “East Working Port” and one port as “East Protection Port.” This arrangement is also

sometimes referred to as a one-sided node.

Open Ring Network

A network formed of a linear chain-shaped configuration of network elements. Each network element connects to two others, one on each side, except for two network elements at the ends which are connected on only one side. A closed ring can be formed by adding a connection between the two end nodes.

Open Systems Interconnection (OSI)

Referring to the OSI reference model, a logical structure for network operations standardized by the International Standards Organization (ISO).

Operations Interface

Any interface providing you with information on the system behavior or control. These include the equipment LEDs, user panel, WaveStar CIT, office alarms, and all telemetry interfaces.

Operations Interworking (OI)

The capability to access, operate, provision, and administer remote systems through craft interface access from any site in a SONET/SDH network or from a centralized operations system.

Operations System (OS)

A central computer-based system used to provide operations, administration, and maintenance functions.

Operations System for Intelligent Network Elements (OPS/INE)

A Telcordia configuration management operations system.

Operator

A user of the system with operator-level user privileges.

Optical Carrier 3/Synchronous Transport Module 1 (OC3/STM1)

The OC3/STM1 port unit provides a bidirectional port which is provisionable at either the OC-3- or STM-1-rate. The OC3/STM1 port unit is used in the OC3/STM1 Optical Modules and the Mixed Modules of the Facility Interface Sub-Shelf.

Optical Carrier 12/Synchronous Transport Module 4 (OC12/STM4)

The OC12/STM4 port unit provides a bidirectional port which is provisionable at either the OC-12- or STM-4-rate. The OC12/STM4 port unit is used in the OC12/STM4 Optical Modules and the Mixed Modules of the Facility Interface Sub-Shelf.

Optical Carrier 48/Synchronous Transport Module 16 (OC48/STM16)

The OC48/STM16 port unit provides a bidirectional port which is provisionable at either the OC-48- or STM-16-rate. The OC48/STM16 port unit is used in the OC48/STM16 Optical Modules and the Mixed Modules of a Facility Interface Sub-Shelf.

Optical Carrier 192/Synchronous Transport Module 64 (OC192/STM64)

The OC192/STM64 port unit provides a bidirectional port which is provisionable at either the OC-192- or STM-64-rate. The OC192/STM64 port unit is used in the OC192/STM64 Optical Module of the Facility/SWIF Interface Sub-Shelf of the 10G I/O Shelf.

Optical Carrier N (OC-N)

An optical carrier signal at the SONET rate of N, where N equals 1, 3, 12, 48, or 192. The basic rate of an OC-1 signal is 51.84 Mb/s, equivalent to an STS-1, with other values of N direct multiples of this basic rate.

Optical Channel

An OC-N/STM-N wavelength within an optical line signal. Multiple channels, differing by 1.5m in wavelength, are multiplexed into one signal.

Optical Line Signal

A multiplexed optical signal containing multiple wavelengths or channels.

Optical Module

One of the three ways the bottom portion of a Universal I/O Shelf, the Facility Interface Sub-Shelf of a Universal I/O Shelf, may be populated. Either OC48/STM16, OC12/STM4, or OC3/STM1 port units are used to populate optical modules. The Facility/SWIF Interface Sub-Shelf of a 10G I/O Shelf may be equipped with OC192/STM64 port units.

Original Value Provisioning

Preprogramming of a system's original values at the factory. These values can be overridden using local or remote provisioning.

Outage

A disruption of service that lasts for more than 1 second.

Out-of-Service

The circuit pack is not providing its normal service function (removed from either the working or protection state) either because of a system problem or because the pack has been removed from service.

P Parameter

A variable that is given a value for a specified application. A constant, variable, or expression that is used to pass values between components.

Parity Check

Tests whether the number of ones (or zeros) in an array of binary bits is odd or even; used to determine that the received signal is the same as the transmitted signal.

Pass-Through

Paths that are cross-connected directly across an intermediate node in a network.

Path

A logical connection between the point at which a standard frame format for the signal at the given rate is assembled, and the point at which the standard frame format for the signal is disassembled.

Path Overhead (POH)

Informational bytes assigned to, and transported with the payload until the payload is demultiplexed. It provides for integrity of communication between the point of assembly of a virtual container and its point of disassembly.

Path Protection Group

The part of a cross-connection topology that is provisioned to provide path-level protection switching for all the constituent signals carried by the cross-connection. A path protection group can be identified as an entity by its logical output tributary and its cross-connection rate. A path protection group consists of one or more constituent path selectors.

Path Terminating Equipment

Network elements in which the path overhead is terminated.

Performance Monitoring (PM)

Measures the quality of service and identifies degrading or marginally operating systems (before an alarm would be generated).

Peripheral Control and Timing Facility Interface (PCTFI)

A proprietary physical link interface supporting the transport of 21x2 Mb/s signals.

Platform

A family of equipment and software configurations designed to support a particular application.

Plesiochronous Network

A network that contains multiple subnetworks, each internally synchronous and all operating at the same nominal frequency, but whose timing may be slightly different at any particular instant.

Polarization Mode Dispersion (PMD)

Output pulse broadening due to random coupling of the two polarization modes in an optical fiber.

Port (also called Line)

The physical interface, consisting of both an input and output, where an electrical or optical transmission interface is connected to the system and may be used to carry traffic between network elements. The words “port” and “line” may often be used synonymously. “Port” emphasizes the physical interface, and “line” emphasizes the interconnection. Either may be used to identify the signal being carried.

Port Protection Group

A user provisioned association of protected optical interface ports. This association is used for line protection. The group of ports represent both a protection switching entity and also a set of lines that carry

services to/from another network element. The port protection groups also determine the set of logical tributaries from and to which cross-connections can be provisioned.

Port State Provisioning

A feature that allows a user to suppress alarm reporting and performance monitoring during provisioning by supporting multiple states (automatic, in-service, and not monitored) for low-speed ports.

Port Tributary

A path-level unit of bandwidth within a port, or the constituent signal/signals being carried in this unit of bandwidth. It may generally be assumed that a port tributary is an STS-1/STM-1 tributary unless specified otherwise. For a port which is NOT in a port protection group (electrical port or unprotected group), a port tributary is the same entity as a logical tributary.

Port Unit

A transmission circuit pack that receives and transmits optical or electrical signals.

PPROC/FO

The PPROC/FO circuit pack, located in the CTL/Switch Interface Sub-Shelf of the 10G I/O Shelf, provides an interface between the OC192/STM64 port units and the SWITCH/STS768 packs.

Preprovisioning

The process by which the user specifies parameter values for an entity in advance of some of the equipment being present. These parameters are maintained only in NVM. These modifications are initiated locally or remotely by either a CIT or an OS. Preprovisioning provides for the decoupling of manual intervention tasks (for example, install circuit packs) from those tasks associated with configuring the node to provide services (for example, specifying the entities to be cross-connected).

Primary (PRI)

Designates a CTL/MEM circuit pack as the primary storage device for WaveStar BandWidth Manager.

Proactive Maintenance

Refers to the process of detecting degrading conditions not severe enough to initiate protection switching or alarming, but indicative of an impending signal failure or signal degrade defect.

Protection

Extra capacity (channels, circuit packs) in transmission equipment that is not intended to be used for service, but rather to serve as backup against equipment failures.

Protection Access

To provision traffic to be carried by protection tributaries when the port tributaries are not being used to carry the protected working traffic.

Protection AID

This shall be the port AID which has been assigned to be the protection port.

Protection Group Configuration

The members of a group and their roles, for example, working protection, line number, etc.

Protection Path

One of two signals entering a path selector used for path protection switching or dual ring interworking. The other is the working path. The designations working and protection are provisioned by the user, whereas the terms active path and standby path indicate the current protection state.

Protection Port Alarm Status

The highest alarm status associated with the protection port. Values shall be: Critical, Major, Minor, or Not Alarmed.

Protection State

When the working unit is currently considered active by the system and that it is carrying traffic. The “active unit state” specifically refers to the receive direction of operation — since protection switching is unidirectional.

Protection Tributary

A port tributary which can be used to protect the traffic carried by a working tributary in a port protection group, or a Logical Tributary that is associated with a Working Tributary within a common port protection group.

Provisioned (PROV)

Indicating that a circuit pack is ready to perform its intended function. A provisioned circuit pack can be active (ACT), in-service (IS), standby (STBY), provisioned out-of-service (POS), or out-of-service (OOS).

Provisioning

The modification of certain programmable parameters that define how the node functions with various installed entities. These modifications are initiated locally or remotely by either a CIT or an OS. They may arrive at the node via the IAO LAN, CIT port, or any DCC channel. The provisioned data is maintained in NVM and/or hardware registers.

R Radio Buttons

A standard Windows control that allows a user to select from a fixed set of mutually exclusive choices (also referred to as option buttons).

Reactive Maintenance

Refers to detecting defects/failures and clearing them.

Rearrangement

An internal roll feature that allows for removing fragmented bandwidths between shelves. The roll is an “errorless roll” between connections. The rearrangement function allows the repositioning of STS-1/STM-1 or STS-3/STM-1 tributaries from the SWITCH/STS576 to the BSW or the HS switch. The reason

for repositioning tributaries is to make STS-1s/STM-1s contiguous, and therefore, prevent blocking situations when cross-connecting concatenated signals.

Receive-Direction

The direction towards the Network Element.

Regeneration

The process of reconstructing a digital signal to eliminate the effects of noise and distortion.

Reliability

The ability of a software system performing its required functions under stated conditions for a stated period of time. The probability for an equipment to fulfill its function. Some of the ways in which reliability is measured are: MTBF (Mean Time Between Failures) expressed in hours; Availability = $(MTBF)/(MTBF+MTTR)(\%)$ [where MTTR = mean time to restore]; outage in minutes per year; failures per hour; percentage of failures per 1,000 hours.

Remote Defect Indication (RDI)

An indication returned to a transmitting terminal that the receiving terminal has detected an incoming section failure. [Previously called far-end-receive failure (FERF).]

Remote Failure Indication (RFI)

A signal that alerts upstream path-terminating equipment that a downstream failure has been alarmed along the path. This action prevents multiple alarms from being activated for the same failure and ensures that a technician is dispatched to correct the failure. (Previously called yellow signals.)

Remote Network Element

Any Network Element that is connected to the referenced Network Element through either an electrical or optical link. It may be the adjacent node on a ring, or N nodes away from the reference. It also may be at the same physical location but is usually at another (remote) site.

Remove

A user initiated command at the WaveStar CIT to delete an entity and its associated attributes from the system.

Reservations

Allows the user the option of “reserving” any tributaries on any transmission interfaces for the following two purposes: first, to enhance cross-connection completion performance and second, to allow an OS that does not have all of the information needed to make such cross-connections. The reservation of a tributary creates a two-way connection for that tributary between the transmission interface (for example, OC48/STM16, etc.) and the interface to the main cross-connection fabric (SWIF circuit pack), but not through the main cross-connect fabric (BSW). If tributaries at both ends of a desired cross-connection have these established connections, then a subsequent request to make a cross-connection between these tributaries needs only to operate on the main cross-connect fabric, not on the main fabric plus two interface shelf fabrics.

Retrieve

A user initiated command at the WaveStar CIT to retrieve an entity state/status from the NE.

Return to Zero

A code form having two information states (termed zero and one) and having a third state or an at-rest condition to which the signal returns during each period.

Revertive

A protection switching mode in which, after a protection switch occurs, the equipment returns to the nominal configuration (that is, the working equipment is active, and the protection equipment is standby) after any failure conditions that caused a protection switch to occur, clear, or after any external switch commands are reset. (See “Non-Revertive.”)

Revertive Switching

In revertive switching, there is a working and protection high-speed line, circuit pack, etc. When a protection switch occurs, the protection line, circuit pack, etc. is selected. When the fault clears, service “reverts” to the working line.

Right Click

To select an object by pressing and releasing the right mouse button which brings up a Right Click Pop-up Menu. The default command may be brought up by double-clicking on an object with the right mouse button.

Right Click Pop-up Menu (RCPM)

A menu which is displayed at the location of a selected object; the commands contained within the RCPM are contextually relevant to that object. Users may configure mouse buttons to their preferences, so that the pop-up menu may in fact be accessed via the left mouse button. The default menu item, if any, is shown in bold.

Ring

A configuration of nodes comprised of network elements connected in a circular fashion. Under normal conditions, each node is interconnected with its neighbor and includes capacity for transmission in either direction between adjacent nodes. Path switched rings use a head-end bridge and tail-end switch. Line switched rings actively reroute traffic over the protection capacity.

Ring Side

When an optical interface is provisioned as a member of a port protection group for a specific type of protection, the port (line) is assigned a ring-side (West or East) and/or line name (working or protection) to identify its role. A 4-fiber BLSR/MS-SPRing has four lines identified by West and East ring-sides and as working and protection lines within each side. With 1+1 line protection there are two lines identified as working and protection lines. With 1xN line protection there are N+1 lines identified as working lines through N and a protection line.

Roll Cross-Connection

A user operation which results in moving the input of any existing leg of any cross-connection from a given tributary to a second tributary, while leaving the output unchanged. Typically, a roll is used as a tail-end switch in a “facility or tributary rolling” operation, whereby traffic is moved from one facility to another or from one tributary to another on a facility. The head-end side of a facility or tributary roll usually has a bridge established (in one NE) so that the traffic flows on both the old and new facilities, minimizing the signal interruption time when the roll is carried out to that introduced by the roll itself (in the other NE). A roll is inherently a one-way operation, but because facilities are generally two-way, a head-end bridge/tail-end roll sequence is typically done on both directions.

Router

An interface between two networks. While routers are like bridges, they work differently. Routers provide more functionality than bridges. For example, they can find the best route between any two networks, even if there are several different networks in between. Routers also provide network management capabilities such as load balancing, partitioning of the network, and trouble-shooting.

S SDH I/O Bay

An SDH I/O Bay is capable of housing two SDH Universal I/O Shelves. The SDH Universal I/O Shelves are each divided into a Switch Interface Sub-Shelf and a Facility Interface Sub-Shelf.

SDH Universal I/O Shelf

An SDH Universal I/O Shelf may be housed in an SDH I/O Bay or a 10G/SDH I/O Bay. The SDH Universal I/O Shelves are each divided into a Switch Interface Sub-Shelf and a Facility Interface Sub-Shelf.

Secondary (SEC)

Designates a secondary CTL/MEM circuit pack as the secondary storage device for WaveStar BandWidth Manager.

Section

The portion of a transmission facility, including terminating points, between a terminal network element and a line-terminating network element, or two line-terminating network elements.

Section Layer

The second of the four levels in a standard SONET signal, used to transport an STS frame across a physical medium. This layer uses the photonic layer to form the physical transport.

Self-Healing

A network’s ability to automatically recover from the failure of one or more of its components.

Server

Computer in a computer network that performs dedicated main tasks which generally require sufficient performance.

Severely Errored Seconds (SES)

This performance monitoring parameter is a second in which a signal failure occurs, or more than a preset amount of coding violations (dependent on the type of signal) occur.

Service

The operational mode of a physical entity that indicates that the entity is providing service. This designation will change with each switch action.

Service Cross-Connection Capacity

The capacity that can be used for carrying service traffic. Any cross-connection capacity that is required for transmission interface protection switching is separate and does not reduce the service cross-connection capacity.

Service Preserving Reset

A reset on a controller that does not cause transmission hardware devices to be reset. Transmission service is preserved in the sense that the devices continue to operate and carry service.

Service Preserving Reset With Database Reload from NVM

A service preserving reset in which the database will be loaded from NVM into RAM and device settings will be rewritten to reflect values stored in NVM. If the values in NVM disagree with current device settings in hardware, then transmission could be impacted when new device settings are written.

Shelf View

A graphical depiction of one shelf. Selectable objects in this view are the shelf, the slots/circuit packs, and the ports.

Shortcut Key

A keyboard key or key combination that invokes a particular command. Also referred to as an accelerator key or a hot key.

Signal-to-Noise Ratio (SNR)

The relative strength of signal compared to noise.

Signal Rate

An attribute that defines the bit-rate and format of the signal. The signal rate is defined by the STS-N path-level signal bit-rate and format including the presence or absence of concatenation.

Single-Ended Operations

Provides operations support from a single location to remote Network Elements in the same SONET subnetwork. With this capability you can perform operations, administration, maintenance, and provisioning on a centralized basis. The remote Network Elements can be those that are specified for the current release.

Single-Mode Fiber (SM)

An 8-m diameter low-loss, long-span optical fiber typically operating at either 1310 nm, 1550 nm, or both.

Site Address

The unique address for a Network Element.

Slot

A physical position in a shelf for holding a circuit pack and connecting it to the backplane. This term is also used loosely to refer to the collection of ports or tributaries connected to a physical circuit pack placed in a slot.

Slot Provisioned

A slot will transition from empty to equipped when the circuit pack insertion is detected, validated, and the hardware registers are loaded. The slot remains so provisioned until the object is deprovisioned.

Software Backup

The process of saving an image of the current network element's databases, which are contained in its NVM, to a remote location. The remote location could be the WaveStar CIT or an OS.

Software Download

The process of transferring a generic (full or partial) or provisioned database from a remote entity to the target network element's memory. The remote entity may be the WaveStar CIT or an OS. The download procedure uses bulk transfer to move an uninterpreted binary file into the network element.

Software ID

Number that provides the software version information for the system.

Software Installation

The process of actually interpreting and unpacking the binary program of data, that was loaded in the NVM by a previous software download operation, and copying the constituent data items to their designated locations within the network element's memory.

Software Restore

The inverse of a Software Backup. The process of simultaneously copying the backed-up database, from the remote location, to the current network element's Primary-0 NVM and Primary-1 NVM.

Software Upgrade

A combination of the (a) software download, (b) install, and (c) commit process. An upgrade is performed when the system software is to be changed to a new release.

Span

An uninterrupted bidirectional fiber section between two network elements.

Span Growth

A type of growth in which one wavelength is added to all lines before the next wavelength is added.

Squelch Map

This map contains information for each cross-connection in a ring and indicates the source and destination nodes for the low-speed circuit that is part of the cross-connection. This information is used to prevent traffic misconnection in rings with isolated nodes or segments.

Standby

The circuit pack is in service but is not providing service functions. It is ready to be used to replace a similar circuit pack either by protection or by duplex switching.

Standby Path

One of two signals entering a constituent path selector, the standby path is the path not currently being selected.

State

The state of a circuit pack indicates whether it is defective or normal (ready for normal use).

Status

The indication of a short-term change in the system.

STM-1 Equivalent

Unit of cross-connection capacity in terms of STM-1 bandwidth units, independent of the actual mix of cross-connection rates.

STM1E/4

Port unit that provides 4 bidirectional ports at the STM-1e-rate.

STM1e Connector Panel

The two panels on one or both sides of a Facility Interface Sub-Shelf (SDH Universal I/O Shelf) containing STM1E/4 port units. The STM1e Connector Panels provide an interface between the STM1E/4 port units and the backplane via 43-type or 1.6/5.6 connectors.

STS-1E

Now referred to as EC-1. A signal typically carried by coaxial cables from one equipment location to another. The term EC-1 refers to the organization and data rate of the signal and also to the voltage template the signal must conform to and the impedances for which the voltage template is valid.

STS-1 Equivalent

Unit of cross-connection capacity in terms of STS-1 bandwidth units, independent of the actual mix of cross-connection rates.

STS-1

The basic building block logical signal in the SONET standard with a data rate of 51.84 Mb/s.

STSX-1

Digital cross-connect used to interconnect equipment, provide patch capability, and provide test access at the STS-1 level.

Subnetwork

A group of interconnected/interrelated Network Elements. The most common connotation is a synchronous network in which the Network Elements have data communications channel (DCC) connectivity.

Superframe Format (SF)

A DS1 framing format in which 24 DS0 timeslots plus a coded framing bit are organized into a frame which is repeated 12 times to form the superframe.

Suppression

A process where service-affecting alarms that have been identified as an “effect” are not displayed to a user.

SWIF Module

A SWIF Module is a Switch Interface Sub-Shelf equipped with either one pair (96 STS-1/32 STM-1 equivalents) or two pairs (192 STS-1/64 STM-1 equivalents) of SWIF packs.

Switch Bay

A Switch Bay is equipped with a fully-equipped Switch Shelf. The spaces above and below the Switch Shelf are reserved for future features.

Switch Center (SWC)

Logical grouping of BSW switch packs, TMG/STRAT3 circuit packs and SWIEX circuit packs in a Switch Shelf. The number of these circuit packs needed for a SWC depends on the size of the switch.

Switch Complex

The 4608/1536 Switch Complex includes two Switch Bays or one Control/Switch Bay and one Switch Bay. The 9216/3072 Switch Complex includes four Switch Bays or one Control/Switch Bay and three Switch Bays. Each bay is equipped with one fully-equipped Switch Shelf.

Switch Interface (SWIF)

The SWIF circuit pack converts TXI data format into the byte-sliced format utilized by the BSW circuit pack.

Switch Interface Capacity

The service-carrying capacity STS-1/in STM-1 equivalent “Inter-Connection Links” between the transmission interface shelves and the main cross-connection fabric. Each STS-1/STM-1 equivalent of switch interface bandwidth interconnects to one STS-1/STM-1 equivalent of main fabric bandwidth (that is to say, one STS-1/STM-1 equivalent inlet and one STS-1/STM-1 equivalent outlet). The sum of all the

switch interface capacity that can be equipped in the system is equal to the non-blocking service cross-connection capacity of the system.

Switch Interface Sub-Shelf

The top portion of a Universal I/O Shelf which may be equipped, depending on the port units and circuit packs used, with either one or two pairs of SWIF circuit packs. The Switch Interface Sub-Shelf provides the interface between the transmission port units in the Facility Interface Sub-Shelf and the main switch fabric provided by the Switch Shelves.

SWITCH/DS3EC1

Port unit responsible for implementing DS3EC1/8 1x12 protection switching for up to 96 DS3 or EC-1 signals.

SWITCH/STM1E4

Port unit responsible for implementing STM1E/4 1x8 protection switching.

Switch Shelf

The Switch Shelf is located in the middle of a Switch Bay or below a System Controller Shelf in a Control/Switch Bay. A fully-equipped Switch Shelf contains 16 BSW circuit packs (for 4608/1536 switching) and two TMG and SWIEX circuit packs.

Synchronization Messaging

Synchronization messaging is used to communicate the quality of network timing, internal timing status, and timing states throughout a subnetwork.

Synchronous

The essential characteristic of time scales or signals such that their corresponding significant instances occur at precisely the same average rate, generally traceable to a single Stratum-1 source.

Synchronous Digital Hierarchy (SDH)

A hierarchical set of digital transport structures, standardized for the transport of suitable adapted payloads over transmission networks.

Synchronous Network

The synchronization of transmission systems with synchronous payloads to a master (network) clock that can be traced to a reference clock.

Synchronous Optical Network (SONET)

The North American standard for the rates and formats that defines optical signals and their constituents.

Synchronous Payload

Payloads that can be derived from a network transmission signal by removing integral numbers of bits from every frame. Therefore, no variable bit-stuffing rate adjustments are required to fit the payload in the transmission signal.

Synchronous Payload Envelope (SPE)

The combined payload and path overhead of an STS-1, STS-3c, STS-12c or STS-48c signal.

Synchronous Transport Signal (STS, STS-N)

The basic logical building block signal for SONET with a rate of 51.84 Mb/s for an STS-1 signal and a rate of N times 51.84 Mb/s for an STS-N signal.

Synchronous Transport Signal, Level N, Concatenated (STS-Nc)

A concatenated SONET payload signal at the STS-N rate, where N equals 3, 12, or 48. For example, an STS-3c signal is constructed by concatenating three STS-1 signals into a signal that uses a single path overhead, rather than three.

System Controller Bay

The bottom shelf is available to house the NCC and the middle shelf is equipped with a System Controller Shelf.

System Controller Shelf

Located in the middle shelf of the System Controller Bay or the top of a Control/Switch Bay, the System Controller Shelf houses the main controllers for WaveStar BandWidth Manager.

System View

A graphical depiction of the entire Network Element. Selectable objects in this view are the bays and shelves.

T T1

A carrier system that transmits at the rate of 1.544 Mb/s (a DS1 signal).

T2

A carrier system that transmits at the rate of 6.312 Mbps (a DS2 signal).

T3

A carrier system that transmits at the rate of 44.736 Mbps (a DS3 signal).

Target Identifier (TID)

A provisionable parameter that is used to identify a particular Network Element within a network. It is a character string of up to 20 characters where the characters are letters, digits, or hyphens (-).

Telcordia Technologies

Telcordia Technologies (formerly Bellcore) is a well-recognized telecommunications' standards organization.

Test Access

A set of cross-connection topologies used in conjunction with a testing system to monitor and "split" signal

paths for purposes of fault isolation.

Through (or Continue) Cross-Connection

A cross-connection within a ring, where the input and output tributaries have the same tributary number but are in lines opposite each other.

Threshold-Crossing Alert (TCA)

A message type sent from a Network Element that indicates that a certain performance monitoring parameter has exceeded a specified threshold.

Through Timing

Refers to a network element that derives its transmit timing in the east direction from a received line signal in the east direction and its transmit timing in the west direction from a received line signal in the west direction.

Time Division Multiplexing (TDM)

A technique for transmitting a number of separate data, voice, and/or video signals simultaneously over one communications medium by interleaving a portion of each signal one after another.

Time Slot Assignment (TSA)

A capability that allows any tributary in a ring to be cross-connected to any tributary in any lower-rate, non-ring interface or to the same-numbered tributary in the opposite side of the ring.

Time Slot Interchange (TSI)

The ability of the user to assign cross-connections between any tributaries of any lines within a Network Element. Three types of TSI can be defined: Hairpin TSI, Interrring TSI (between rings), and Intraring TSI (within rings).

Timing/Stratum 3 (TMG/STRAT3)

TMG/STRAT3 circuit pack provides a Stratum 3 clock for its shelves.

Tooltip

A standard Windows control that provides a small pop-up window that provides descriptive text (such as a label) for a control or graphic object.

Transaction Language One (TL1)

A machine-to-machine communications language that is a subset of ITU's human-machine language.

Transmit-Direction

The direction outwards from the Network Element.

Tributary

A path-level unit of bandwidth within a port, or the constituent signal(s) being carried in this unit of bandwidth, for example, an STS-1 tributary within an OC-N port.

True Wave™ Optical Fiber

Lucent Technologies' fiber generally called non-zero dispersion-shift fiber, with a controlled amount of chromatic dispersion designed for amplified systems in the 1550/1310 nm range.

Two-Way Point-to-Point Cross-Connection

A two-legged interconnection, that supports two-way transmission, between two and only two tributaries.

Two-Way Roll

The operation which moves a two-way cross-connection between tributary i and tributary j to a two-way cross-connection between the same tributary i and a new tributary k with a single user command.

U Unavailable Seconds (UAS)

In performance monitoring, the count of seconds in which a signal is declared failed or in which 10 consecutively severely errored seconds (SES) occurred, until the time when 10 consecutive non-SES occur.

Unidirectional Path-Switched Ring (UPSR)

Path-Switched rings employ redundant fiber optic transmission facilities in a pair configuration, with one fiber transmitting in one direction (for example, East) and the backup fiber transmitting in the other direction (for example, West). If the primary ring fails, then the protection ring takes over.

Universal I/O Bay

A Universal I/O Bay is capable of housing two Universal I/O Shelves. The Universal I/O Shelves are each divided into a Switch Interface Sub-Shelf and a Facility Interface Sub-Shelf.

Universal I/O Shelf

A Universal I/O Shelf may be housed in a Universal I/O Bay or a 10G/Universal I/O Bay. The Universal I/O Shelves are each divided into a Switch Interface Sub-Shelf and a Facility Interface Sub-Shelf.

Upstream

At or towards the source of the considered transmission stream, for example, looking in the opposite direction of transmission.

Upstream Pack

Given a pack-to-pack interface, the upstream pack is the transmitting pack.

User Privilege

Permits a user must perform on the computer system on which the system software runs.

User-to-Network Interface (UNI)

The specifications for the procedures and protocols between a user and the Asynchronous Transfer Mode (ATM) network.

V Value

A number, text string, or other menu selection associated with a parameter.

Variable

An item of data named by an identifier. Each variable has a type, such as Int or Object, and a scope.

Violation Monitor and Removal (VMR)

A provisionable mode for DS3 output that causes parity violations to be monitored and corrected before the DS3 signal is B3ZS encoded.

Virtual

Refers to artificial objects created by a computer to help the system control shared resources.

Virtual Circuit

A logical connection through a data communication (for example, X.25) network.

Virtual Tributary (VT)

A structure designed for transport and switching of sub-STS-1 payloads. There are currently four sizes: VT1.5 (1.728 Mb/s), VT2 (2.304 Mb/s), VT3 (3.456 Mb/s), and VT6 (6.912 Mb/s).

Virtual Tributary Group (VT-G)

A 9-row by 12-column structure (108 bytes) that carries one or more VTs of the same size. Seven VT groups (756 bytes) are byte interleaved with the VT-organized synchronous payload envelope.

Voice Frequency (VF) Circuit

A 64 kilobit per second digitized signal.

Volatile Memory

Type of memory that is lost if electrical power is interrupted.

VT1.5 Tributary

A SONET logical signal with a data rate of 1.728 Mbps. In the 9-row structure of the STS-1 SPE, a VT1.5 occupies three columns. VT-structured STS-1 SPEs are divided into seven VT groups. Each VT group occupies twelve columns of the 9-row structure and, for VT1.5s, contains four VTs per group.

W Wait-to-Restore (WTR)

Applies to revertive switching operation. The protection group enters the WTR state when all Equipment Fail (EF) conditions are cleared, but the system has not yet reverted back to its working line. The protection group remains in the WTR state until the Wait-to-Restore timer completes the WTR time interval.

Wait to Restore Time (WRT)

Corresponds to the time to wait before switching back after a failure has cleared (in a revertive protection

scheme). The WRT can be between 0 and 15 minutes, in increments of one minute.

Wavelength Add/Drop (WAD)

The process of adding and dropping wavelengths to provide more efficient transmission.

Wavelength Division Multiplexing (WDM)

A means of increasing the information-carrying capacity of an optical fiber by simultaneously transmitting signals at different wavelengths.

Wavelength Interchange

The ability to change the wavelength associated with an OC-N signal into another wavelength.

WaveStar Optical Line System

Lucent Technologies' lightwave transmission system. Utilizing DWDM technology, the system combines multiple signals of different wavelengths, transmits the resulting signal over a single fiber, and then demultiplexes the signal at the receive end.

WaveStar SNMS

WaveStar SubNetwork Management System (formerly known as ITM SNC [Integrated Transport Management SubNetwork Controller]).

Wide Area Network (WAN)

A communication network that uses common-carrier provided lines and covers an extended geographical area.

Wideband Communications

Voice, data, and/or video communication at digital rates from 64 kb/s to 2 Mb/s.

Wizard

A form of user assistance that automates a task through a dialog with the user.

Working

Label attached to a physical entity. In case of revertive switching the working line or unit is the entity that is carrying service under normal operation. In case of nonrevertive switching the label has no particular meaning.

Working AID

This shall be the port AID which has been assigned to be the working port.

Working Path

One of two signals entering a constituent path selector, the working path is the path carried by the working cross-connection leg of the path protection group.

Working Port Alarm Status

The highest alarm status associated with the working port. Values are: Critical, Major, Minor, or Not Alarmed.

Working State

A working unit that is currently considered active by the system and is carrying traffic in the working state.

Working Tributary (same as “service tributary”)

A Logical Tributary. A member of a Protection Group. The tributary that is currently carrying traffic, but, which can be protected.

X X.25 Interface/Protocol

The ITU packet-switched interface standard for terminal access that specifies three protocol layers: physical, link, and packet for connection to a packet-switched data network.

X-Terminal

Workstation that can support an X-Windows interface.

Z Zero Code Suppression

A technique used to reduce the number of consecutive zeros in a line-coded signal (B3ZS, B8ZS).



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