Lucent Technologies
Bell Labs Innovations

WaveStar™ DACS 4/4/1, releases 3.0 and 3.1

Provisioning guide

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WaveStar™ DACS 4/4/1, releases 3.0 and 3.1
Provisioning guide

365–367–512   Issue 2   July 2002

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Readability and clarity	☐	☐	☐	☐	☐	☐
Organization	☐	☐	☐	☐	☐	☐
Completeness	☐	☐	☐	☐	☐	☐
Technical accuracy	☐	☐	☐	☐	☐	☐
Quality of translation	☐	☐	☐	☐	☐	☐
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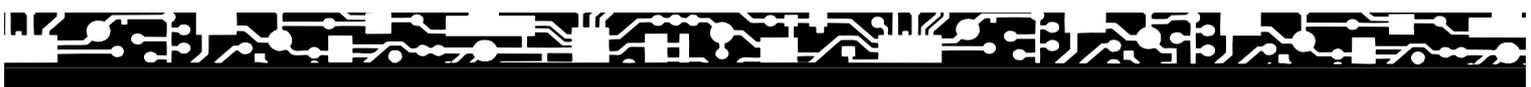
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Available when you needed it?	☐	☐	☐

Please provide any additional comments:

_____

_____

2. Please rate the effectiveness of this information product:

	Excellent	*More than satisfactory*	*Satisfactory*	*Less than satisfactory*	*Unsatisfactory*	*Not applicable*
Ease of use	☐	☐	☐	☐	☐	☐
Level of detail	☐	☐	☐	☐	☐	☐
Readability and clarity	☐	☐	☐	☐	☐	☐
Organization	☐	☐	☐	☐	☐	☐
Completeness	☐	☐	☐	☐	☐	☐
Technical accuracy	☐	☐	☐	☐	☐	☐
Quality of translation	☐	☐	☐	☐	☐	☐
Appearance	☐	☐	☐	☐	☐	☐

If your response to any of the above questions is "*Less than satisfactory*" or "*Unsatisfactory,*" please explain your rating.

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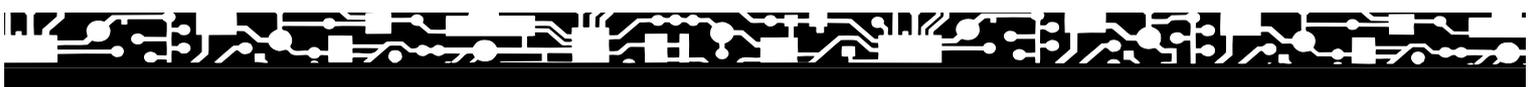
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Contents

About this information product

1 Product description

Equipment description

....

2   About the user interface

....

....

....

....

....

....

....

9 Protection switching

....

10   Performance monitoring

....

11   About alarms

....

....

12   Alarm settings

....

13   Synchronisation and timing

....

....

14   Data Communication Channel

....

....

15   System ID

....

16   Password administration

....

17   Login administration

....

About this information product

Purpose This document contains all *WaveStar*™ DACS 4/4/1 post-installation provisioning procedures.

What you need to know

You should have a basic understanding of Synchronous Digital Hierarchy (SDH) signalling before you attempt to use any of the procedures in this guide.

Reason for reissue The following new features were added in Release 3.0 of *WaveStar* DACS 4/4/1:

- Sub-Network Connection Protection (SNCP)

- Performance monitoring for lower order paths

The following new features were added in Release 3.1 of *WaveStar* DACS 4/4/1:

- Data Communication Network (DCN) and Data Communication Channel (DCC) features. These were not available in Release 3.0, and the new information only applies to Release 3.1.

Safety labels Some tasks contain an admonishment symbol. This symbol is used to draw attention to important information about the task. The symbol appears in the following form:

⚠️ **CAUTION**

Indicates a hazard that will or can cause minor personal injury or property damage if not avoided.

Intended audience   The following is a list of customers who will use this guide:

- Equipment engineers, including outside plant engineers
- Installation, operation, and maintenance personnel
- Switching office personnel
- System administrators
- Technical support personnel
- Training personnel

The following is a list of Lucent Technologies personnel who will use this guide:

- Developers
- System engineers
- System testers
- Sales support personnel
- Installation and engineering personnel
- Technical Support Organization
- Training personnel

Conventions used   The following conventions are used in this guide:

- Keys that you press are shown as **ENTER**.
- Text that is displayed on the screen is shown as `Unit provisioned and initialised`.
- Text that you enter is shown as `pboot 0 0`.
- Punctuation (such as periods and commas) are omitted when the user could mistake them as input. For example; Press **ENTER**
- Braces {} specify a range of possible entries, such as PSA-{4–11, 4–19}.
- Words that require emphasis are shown as *emphasis*.

Related documentation   The *WaveStar* DACS 4/4/1 set of documents includes the following:

Document title	Ordering number
WaveStar DACS 4/4/1 Application and Planning Guide	365-367-500
WaveStar DACS 4/4/1 Maintenance Guide	365-367-513
WaveStar DACS 4/4/1 Quick Reference Card	365-367-503
Integrated Transport Management Sub-network Controller (ITM-SC) Sub-network Provisioning Guide (SPG) for *WaveStar* DACS 4/4/1	190–223–151

Related training   Lucent Technologies provides the following *WaveStar* DACS 4/4/1 training courses:

- DG3404 — Overview
- TR3562 — Administration, Provisioning, and Maintenance

For up-to-date training information, see *http://www.lucent-product-training.com/SabaWeb*.

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1   Product description

Overview

Purpose	"Product description" provides a high-level description of the *WaveStar*™ DACS 4/4/1.
Organisation	"Product description" is organised as follows:

- "System description" (1-2)
- "Equipment description" (1-10)

□

System description

Overview

Purpose   This section provides a high-level description of the system.

Organisation   This section is organised as follows:

- "System description" (1-3)
- "System capacity" (1-5)
- "Control system" (1-6)
- "System interfaces" (1-8)
- "Synchronisation and timing" (1-9)

□

System description

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| **Functional description** | The system is a large-capacity cross-connect system that provides flexible bandwidth management in a Synchronous Digital Hierarchy (SDH) environment. The system can be equipped with various transmission interfaces, and supports cross connections at broadband and wideband rates. |

The system has a nonblocking, full-broadcast cross-connect matrix. The cross-connect matrix is compatible with both American National Standards Institute (ANSI) and International Telecommunications Union (ITU) transmission standards and is capable of cross connecting all tributaries defined by them.

The cross-connect matrix and all internal transmission paths are fully protected by a 2:8 protection architecture. This architecture provides triple protection, resulting in very high availability. High availability is important, because a large cross-connect system carries an immense amount of traffic.

....

365–367–512   **Lucent Technologies**   1 - 3
Issue 2, July 2002

The following illustration shows a block diagram of the system.

```
        External      Line           Network    Work-
        Timing       Timing          Manager   Stations

2048 kHz           STM-16,
   or              STM-4,         TCP/IP   TCP/IP
64 kHz                or
Station Clock      STM-1

              ┌──────────────┐           ┌──────────────┐
              │ Synchronous  │           │ Operations   │
              │  Timing      │           │  Interface   │
              │  Interface   │           └──────────────┘
              └──────────────┘
```

```
┌──────────────┐   ┌──────────────────┐   ┌──────────────┐
│   STM-1      │   │  Control System  │   │   STM-1      │
│  Optical     │   └──────────────────┘   │  Optical     │
│  Interface   │                          │  Interface   │
└──────────────┘                          └──────────────┘

┌──────────────┐   ┌──────────────────┐   ┌──────────────┐
│   STM-1      │   │  Cross-Connect   │   │   STM-1      │
│  Electrical  │   │     Matrix       │   │  Electrical  │
│  Interface   │   │                  │   │  Interface   │
└──────────────┘   └──────────────────┘   └──────────────┘

                   Shaded blocks indicate
                   protected components

┌──────────────┐                          ┌──────────────┐
│   STM-4      │                          │   STM-4      │
│  Optical     │                          │  Optical     │
│  Interface   │                          │  Interface   │
└──────────────┘                          └──────────────┘

┌──────────────┐                          ┌──────────────┐
│   STM-16     │                          │   STM-16     │
│  Optical     │                          │  Optical     │
│  Interface   │                          │  Interface   │
└──────────────┘                          └──────────────┘
```

System capacity

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**Available system
configurations**

The system can be configured for a maximum capacity of either 256 STM-1 equivalents or 512 STM-1 equivalents. The system capacity determines the number of port subracks that can be provisioned.

**Differences between 256
and 512 systems**

The differences between 256 and 512 STM-1 equivalent systems are as follows:

- A 256 STM-1 equivalent system can have a maximum of eight port subracks.

- A 512 STM-1 equivalent system can have a maximum of 16 port subracks.

**Displaying the maximum
system capacity**

To display the maximum system capacity, go to *Help > About....*

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365–367–512   **Lucent Technologies**   1 - 5
Issue 2, July 2002

Control system

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Overview   System coordination and control is carried out by the Main Controller, the subrack controllers, and the board controllers.

Illustration   The following illustration shows a block diagram of the control structure.

```
                        ┌──────────────────┐
                        │   Operation,     │
                        │ Administration,  │
                        │  Maintenance,    │
                        │ & Provisioning   │
                        │   Interface      │
                        └──────────────────┘
                                 ↕
                        ┌──────────────────┐
                        │                  │
                        │ Main Controller  │
                        │                  │
                        └──────────────────┘
                                 ↕
        ┌──────────────────── Main Control LAN ────────────────────┐
             ↕           ↕              ↕              ↕
       ┌──────────┐ ┌──────────┐ ┌──────────┐ ┌──────────┐
       │ Subrack  │ │ Subrack  │ │ Subrack  │ │ Subrack  │
       │Controller│ │Controller│ │Controller│ │Controller│
       ├──────────┤ ├──────────┤ ├──────────┤ ├──────────┤
       │  Matrix  │ │          │ │          │ │          │
       │   and    │ │  Port    │ │  Port    │ │  Port    │
       │  Sync.   │ │ Subrack  │ │ Subrack  │ │ Subrack  │
       │ Subrack  │ │          │ │          │ │          │
       └──────────┘ └──────────┘ └──────────┘ └──────────┘
```
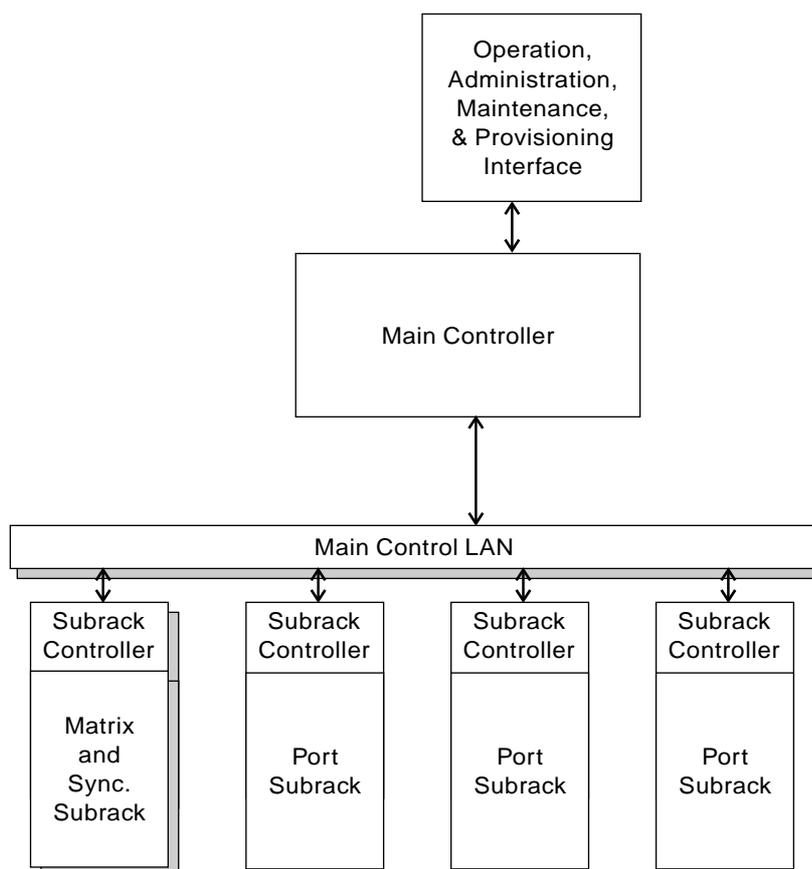
Main Controller   The Main Controller (MC) provides local and remote interfaces for operations, administration, maintenance, and provisioning. The MC accepts commands from these interfaces and translates them into equipment level instructions that are sent to the subrack controllers.

New software releases can be loaded onto the MC without interrupting service.

A duplicated MC is available. The primary purpose of a duplicated MC is to increase system availability. The second (standby) MC takes control of the system if the active MC fails.

Subrack controllers   Subrack controllers route messages to and from the Main Controller and the board controllers.

....

Board controllers   Board controllers perform control processing for most types of units. Functions performed by board controllers include executing commands received from subrack controllers and sending maintenance or performance data to subrack controllers.

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System interfaces

Network interfaces

This release provides the following Synchronous Digital Hierarchy (SDH) network interfaces:

- STM-16 long-haul optical designed to ITU specifications
- STM-4 short-haul optical designed to ITU specifications
- STM-1 long-haul optical designed to ITU specifications
- STM-1 short-haul optical designed to ITU specifications
- STM-1 short-haul optical designed to Nippon Telegraph and Telephone (NTT) specifications
- STM-1 electrical

1:8 equipment protection is available for STM-1 electrical interfaces. 1+1 Multiplex Section Protection (MSP) and Sub-Network Connection Protection (SNCP) are available for all transmission interfaces.

OAM&P interfaces

Operations, Administration, Maintenance, and Provisioning (OAM&P) activities can be performed locally from a PC with XC-CIT application software, from a remote V.28 dial-up connection, or from a remote network or element management system. All OAM&P connections use Transmission Control Protocol/Internet Protocol (TCP/IP).

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Synchronisation and timing

Synchronisation and timing capabilities

The system has duplicated synchronisation and timing hardware that provides the following capabilities:

- The System Timing Unit (STU) has an ITU G.812 Type I clock with holdover mode.

- System clock input references can be derived from transmission ports, including ports that are provisioned for MSP or SNCP, or from external references (station clock inputs).

- External references can be derived from 2048 kHz inputs or from 64 kHz composite clock inputs.

- Reference source and timing mode selection are based on user-assigned priorities.

- System timing is distributed to transmission hardware within the system.

- Each STU has a 2048 kHz station clock output port that can be used as a timing source for other equipment.

- When no faults are present, user-initiated protection switching of the synchronisation and timing hardware is glitchless.

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Equipment description

Overview

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Purpose This section describes the system racks, subracks, and units.

Organisation This section is organised as follows:

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-
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Equipment terms

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List of terms   **Rack** A rack is a mechanical assembly that houses the system equipment. A rack can be equipped with one or two subracks. All racks conform to European Telecommunications Standards Institute (ETSI) equipment practices for transmission products.

Subrack A subrack is a mechanical assembly that houses plug-in units, also referred to as circuit packs. All subracks conform to ETSI equipment practices for transmission products. All subracks have a midplane that interconnects the units in the subrack and partitions the subrack into front and rear sections. A unit plugs into either the front or the back of a subrack.

Unit A unit contains the circuitry for the system. It plugs into either the front or the back of a subrack. A unit is also called a plug-in, a circuit pack, or a pack.

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Matrix and Synchronisation rack

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Description   The Matrix and Synchronisation rack is an ETSI standard rack that
houses the Matrix and Synchronisation subrack and five Bit Slice
Switch Units (cross-connect matrix components).

Illustration   The following illustration shows a front view of the Matrix and
Synchronisation rack with the doors removed.
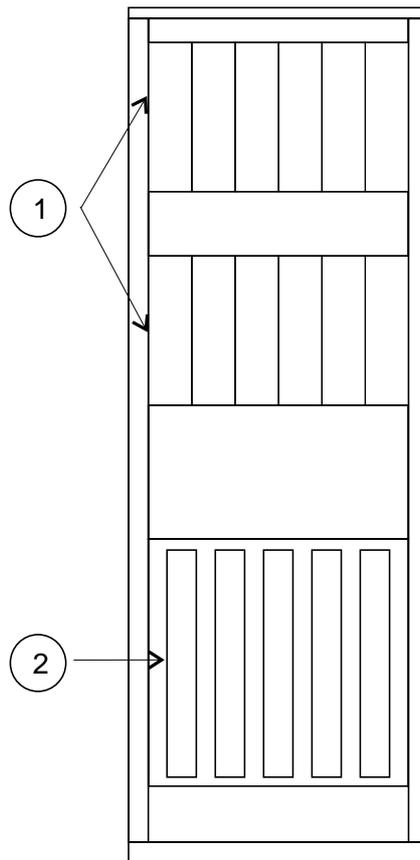
Legend:

1.   Matrix and Synchronisation subrack with duplicated Matrix
Control and Synchronisation hardware

2.   Bit Slice Switch Units (BSSUs)

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Matrix and Synchronisation subrack

Description The Matrix and Synchronisation subrack has two shelves with front and rear sections that are partitioned for plug-in units (circuit packs). Each shelf is equipped with the same set of matrix control and synchronisation and timing hardware. The units plug into a midplane that separates the front and rear sections and provides the interconnections between units.

Illustration, front view The following illustration shows a front view of the Matrix and Synchronisation subrack.

STU	BSC	Blank	Blank	Blank	SRC
STU	BSC	Blank	Blank	Blank	SRC

Units, front of subrack The following units plug into the front of the Matrix and Synchronisation subrack:

- The System Timing Unit (STU) provides system timing and synchronisation.

- The Bit Slice Controller (BSC) works with the STU to provide timing signals for internal transmission paths. The BSC also provides control information for the Bit Slice Switch Units (BSSUs).

- The Subrack Controller (SRC) routes messages back and forth from the Main Controller to the units in the Matrix and Synchronisation subrack.

Illustration, rear view   The following illustration shows a rear view of the Matrix and Synchronisation subrack.

| PTM | PTM | Blank | Blank | Blank | Blank | Blank | Blank | OLU | OLU |

| PTM | PTM | Blank | Blank | Blank | Blank | Blank | Blank | OLU | OLU |
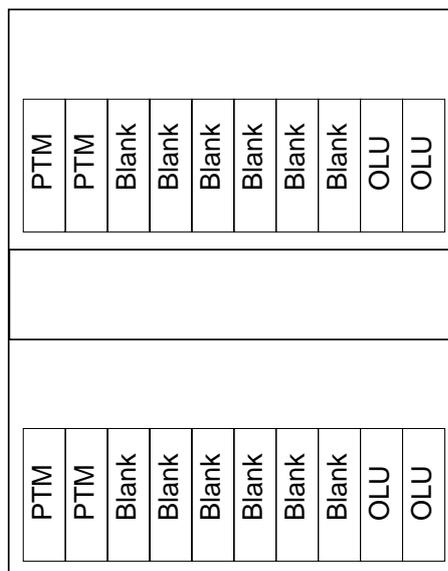
Units, back of subrack   The following units plug into the back of the Matrix and Synchronisation subrack:

- The Power Terminal Module (PTM) filters incoming station power from two separate power sources and distributes it across the midplane.

- The Optical Link Unit (OLU) is part of the internal transmission path. It provides interfaces for the optical-fibre cables that carry transmission data between the BSCs and the BSSUs. The OLU also provides interfaces for the optical-fibre cables that carry timing information between the duplicated BSCs in the Matrix and Synchronisation subrack.

□

Bit Slice Switch Unit (BSSU)

Description   The Bit Slice Switch Units (BSSUs) are cross-connect matrix components. The system has ten BSSUs. Five BSSUs are located in the bottom of the Matrix and Synchronisation rack, and five BSSUs are located in the bottom of the Matrix and Control rack.

□

Matrix and Control rack

Description   The Matrix and Control rack is an ETSI standard rack that houses the Main Controller subrack, User Panel, and five BSSUs (cross-connect matrix components).

Illustration   The following illustration shows a front view of the Matrix and Control rack with the doors removed.
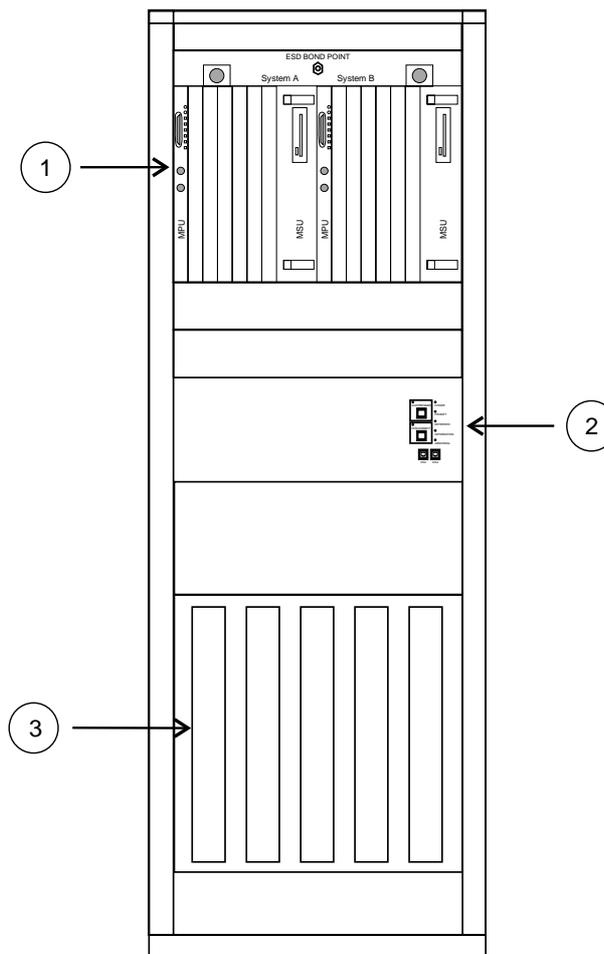
Legend:

1.   Main Controller (MC) subrack with a duplicated Main Controller

2.   User Panel

3.   Bit Slice Switch Units (BSSUs)

Main Controller subrack

....

Description   The Main Controller (MC) subrack has a card cage, a fan tray, and a power supply. The card cage has front and rear sections that are partitioned for plug-in units and transition modules. The units and transition modules plug into a midplane that separates the front and rear sections of the card cage and provides the interconnections between units and transition modules.

A duplicated MC is available. When the MC is duplicated, the system automatically switches to the standby MC if the active MC fails.

Illustration, front view   The following illustration shows a front view of the Main Controller subrack with a duplicated MC.

Legend:

1.   Power button for the working MC

2.   Working MC

3.   Power button for the protection MC

4.   Magneto Optical (MO) disk drive

5.   Protection MC (shaded area)

6.   Fan tray

7.   Power supply

....

Units, front of subrack   The following units plug into the front of the Main Controller
subrack:

- The Main Processor Unit (MPU) provides the central processing
  function, which includes control of the ARU, LHU, and MSU.

- The Mass Storage Unit (MSU) contains a fixed-medium hard
  disk drive and a removable-medium optical disk drive.

Illustration, rear view   The following illustration shows a rear view of the Main Controller
subrack with a duplicated MC.
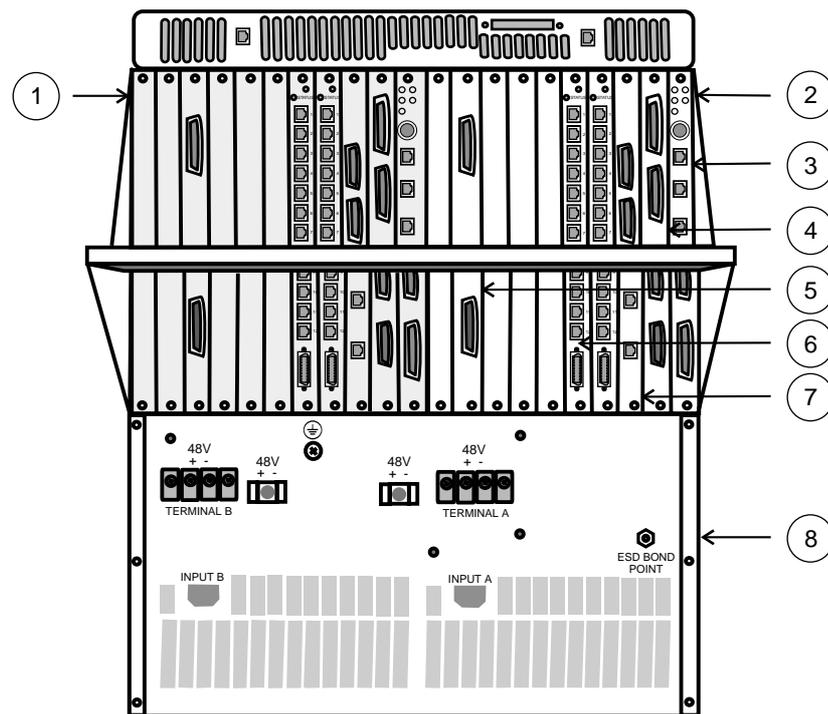
Legend:

1. Protection MC (shaded area)

2. Working MC

3. ARU

4. Serial TM

5. SCSI TM

6. LHU

7. NIC TM

8. Fans and power supply

Units, back of subrack The following units and transition modules (TMs) plug into the back of the Main Controller subrack:

- The Alarm Relay Unit (ARU) provides interfaces to system alarm indicators, a network interface to the LHU, and a narrow Small Computer System Interface-2 (SCSI-2) to the MSU.

- The LHUs provide the hub ports for system LAN connections.

- The Network Interface Chip (NIC) Transition Module provides LAN access to the MPU.

- The Small Computer System Interface (SCSI) Transition Module provides a narrow SCSI-2 interface between the MPU and the MSU.

- The Serial Transition Module provides serial I/O access to the MPU.

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User Panel

....

Description   The User Panel is located below the Main Controller subrack. The User Panel provides general system status and alarm information.

Illustration   The following illustration shows a front view of the User Panel.
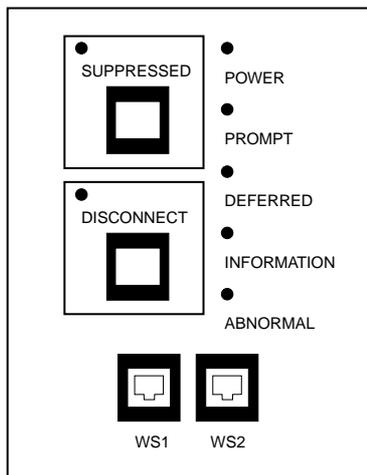
Components   The User Panel has the following alarm indicators, switches, and connectors:

- The POWER LED is not used in this release.

- PROMPT is a red LED that indicates that an alarm classified as prompt exists in the system.

- DEFERRED is a red LED that indicates that an alarm classified as deferred exists in the system.

- INFORMATION is a yellow LED that indicates that an alarm classified as information exists in the system.

- The ABNORMAL LED is not used in this release.

....

- SUPPRESSED and DISCONNECT are push-button switches that enable users to suppress or disconnect alarm indications. The yellow LED next to the SUPPRESSED switch indicates that alarm indications are suppressed. The yellow LED next to the DISCONNECT switch indicates that alarm indications are disconnected.

- WS1 and WS2 are V.28 DCE 8-pin modular connectors. WS1 is used to connect a terminal or a modem to the working Main Controller for local or remote operations, administration, maintenance, and provisioning activities. WS2 is used to connect a terminal or a modem to the protection Main Controller for local or remote operations, administration, maintenance, and provisioning activities. WS2 can be used only if the system has a duplicated Main Controller.

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365–367–512
Issue 2, July 2002

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1 - 2 1

Alarm Connector Panel (ACP)

Description   The Alarm Connector Panel (ACP) is located on the back of the User Panel. The ACP has connectors for alarm-related cables.

The ACP provides alarm signal routing from the ARU to the following:

- User Panel

- Other system and customer-provided and designed alarm panels

Illustration   The following illustration shows a front view of the Alarm Connector Panel.
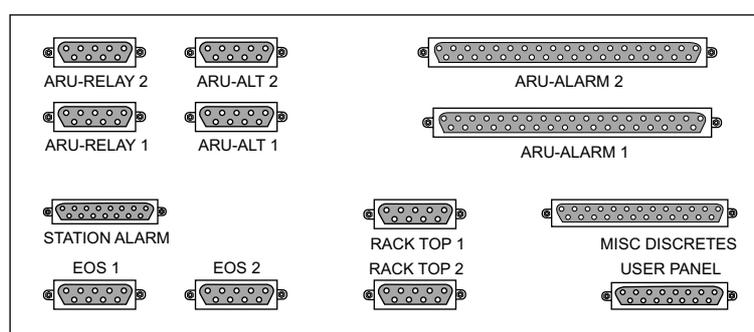
Components   The Alarm Connector Panel has the following components:

- ARU-RELAY 1 is a DB-9 female connector. The other end of the cable that attaches to this connector attaches to the connector labeled ALM RMT on the ARU in Main Controller 1 (MC-1). This interface carries station alarm signals from the ARU to the ACP.

- ARU-RELAY 2 is a DB-9 female connector. The other end of the cable that attaches to this connector attaches to the connector labeled ALM RMT on the ARU in MC-2. This interface carries station alarm signals from the ARU to the ACP. The ARU-RELAY 2 connector is used only if the system has a duplicated MC.

- ARU-ALT 1 is a DB-9 female connector. The other end of the cable that attaches to this connector attaches to the connector labeled ALM/IO on the ARU in MC-1. This interface carries User Panel alarm signals, for example, system-level Prompt, Deferred, and Information alarm signals, from the ARU to the ACP.

- The ARU-ALT 2 is a DB-9 female connector. The other end of the cable that attaches to this connector attaches to the connector labeled ALM/IO on the ARU in MC-2. This interface carries User Panel alarm signals, for example, system-level Prompt, Deferred, and Information alarm signals, from the ARU to the ACP. The ARU-ALT 2 connector is used only if the system has a duplicated MC.

- ARU-ALARM 1 is a DB-37 female connector. The other end of the cable that attaches to this connector attaches to the connector labeled ALARM/IO on the ARU in MC-1. This interface carries Rack Top, End-Of-Suite, and Miscellaneous Discrete alarm signals from the ARU to the ACP.

- ARU-ALARM 2 is a DB-37 female connector. The other end of the cable that attaches to this connector attaches to the connector labeled ALARM/IO on the ARU in MC-2. This interface carries Rack Top, End-Of-Suite, and Miscellaneous Discrete alarm signals from the ARU to the ACP. The ARU-ALARM 2 connector is used only if the system has a duplicated MC.

- STATION ALARM is a DB-15 female connector. This connector provides an interface for customer–provided and designed station alarm indicators.

- EOS 1 is a DB-9 female connector. This connector provides an interface for customer-provided and designed End-of-Suite alarm indicators.

- EOS 2 is a DB-9 female connector. This connector provides an interface for customer-provided and designed End-of-Suite alarm indicators. The EOS 2 connector is used only if the system has a duplicated MC.

- RACK TOP 1 is a DB-9 female connector. This connector provides an interface for the rack-top alarm indicators on the Matrix and Control rack, and a power sense lead that indicates loss of input power to the MC.

- RACK TOP 2 is a DB-9 female connector. This connector provides an interface for the rack-top alarm indicators on the Matrix and Control rack, and a power sense lead that indicates loss of input power to the MC. The RACK TOP 2 connector is used only if the system has a duplicated MC.

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365–367–512
Issue 2, July 2002

Lucent Technologies

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- MISC DISCRETES is a DB-25 female connector. The other end of the cable that attaches to this connector attaches to the connector labeled MD OUT on the FCP. This connector provides an interface for miscellaneous customer-provided and designed alarm indicators or other applications.

- USER PANEL is a DB-15 female connector. The other end of the cable that attaches to this connector is permanently connected to the User Panel.

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Fan Connector Panel (FCP)

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**Description**   The Fan Connector Panel (FCP) is located on the back of the User
                    Panel. The FCP has connectors for alarm-related cables, and routes
                    alarm signals from fan trays in port racks equipped with PSC subracks
                    and from customer-provided and designed alarm panels to the ACP.

Illustration   The following illustration shows a front view of the Fan Connector
                    Panel.
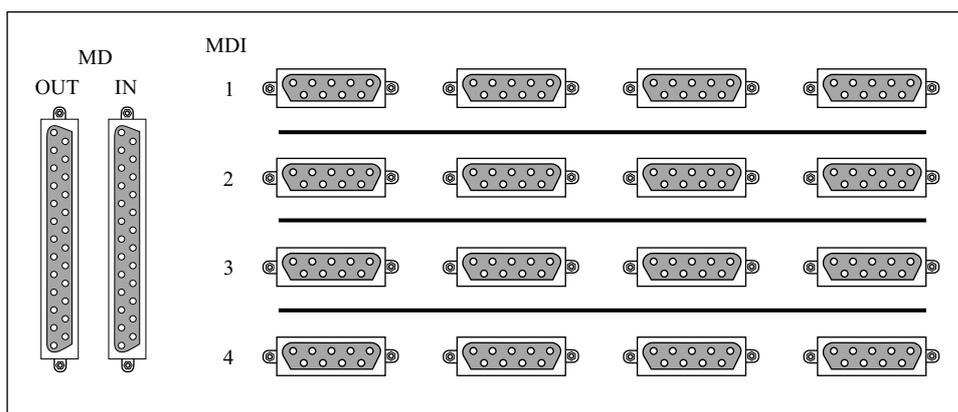
Components   The Fan Connector Panel has the following components:

• MD OUT is a DB-25 female connector. The other end of the
  cable that attaches to this connector attaches to the connector
  labeled MISC DISCRETES on the ACP. This connector provides
  an interface from miscellaneous customer-provided and designed
  alarm indicators or other applications to the ACP.

• MD IN is a DB-25 female connector. The other end of the cable
  that attaches to this connector attaches to customer-provided and
  designed alarm indicators or other applications. This connector
  provides an interface for miscellaneous customer-provided and
  designed alarm indicators or other applications.

• MDI 1 through 4 are DB-9 female connectors. The other end of
  the cable that attaches to each of these connectors attaches to the
  connector labeled ALM on the fan tray connector panel in each
  port rack that is equipped with a PSC subrack. This interface
  carries alarm signals from the port rack fan tray to the FCP.

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Bit Slice Switch Unit (BSSU)

Description The Bit Slice Switch Units (BSSUs) are cross-connect matrix components. The system has ten BSSUs. Five BSSUs are located in the bottom of the Matrix and Synchronisation rack, and five BSSUs are located in the bottom of the Matrix and Control rack.

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Port rack

....

Description   The port rack is an ETSI standard rack. It can be equipped with one
or two PSA subracks, one or two PSC subracks, or one PSA subrack
and one PSC subrack. The PSB subrack, for STM-0 interfaces, has
been discontinued.

Port racks that are equipped with one or two PSC subracks are also
equipped with a fan tray, heat duct, and bottom filter tray. The fan
tray is located in the middle of the port rack and contains six fans, fan
filters, and a connector panel. Refer to "Port rack fan tray connector
panel" (1-32) for a description of the fan tray connector panel.

When a port rack is equipped with only one PSC subrack, the subrack
must be located in the bottom of the port rack.

Illustration   The following illustration shows a front view of a port rack with the
doors removed. The port rack is equipped with two PSC subracks.
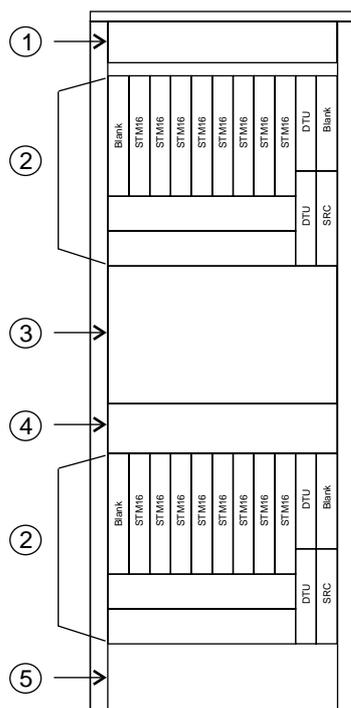
Legend:

1. Power and fuse panel

2. PSC subrack

3. Heat duct

4. Fan tray and filters

5. Bottom filter tray

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Port Subrack A (PSA)

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Description   The Port Subrack A (PSA) has front and rear sections that are partitioned for plug-in units. The PSA can be equipped with any combination of STM-1 port units and interface units. The units plug into a midplane that separates the front and rear sections and provides the interconnections between units.

Illustration, front view   The following illustration shows a front view of the PSA subrack.

STM1	STM1	STM1	STM1	STM1	STM1	STM1	STM1	STM1 P	DTU	Blank
STM1	STM1	STM1	STM1	STM1	STM1	STM1	STM1	STM1 P	DTU	SRC

Units, front of subrack   The following units plug into the front of the PSA subrack:

- STM-1 Port Unit (STM-1) — The STM-1 port unit provides four STM-1 (155.52 Mbps) ports. The STM-1 P is the protection unit for a shelf that is configured for 1:8 equipment protection.

- Digital Timing Unit (DTU) — The DTU provides timing for the transmission units in the subrack. The DTU is always duplicated.

- Subrack Controller (SRC) — The SRC routes messages back and forth from the Main Controller to the units in the port subrack.

....

Illustration, rear view   The following illustration shows a rear view of the PSA subrack.

```
PTM    | IU | IU | IU | IU | IU | IU | IU | IU |

BSIU BSIU BSIU BSIU BSIU BSIU BSIU BSIU BSIU BSIU

PTM    | IU | IU | IU | IU | IU | IU | IU | IU |
```

Units, back of subrack   The following units plug into the back of the PSA subrack:

- Power Terminal Module (PTM) — The PTM filters incoming station power from two separate power sources and distributes it across the midplane.

- Bit Slice Interface Unit (BSIU) — The BSIU is part of the transmission path. It transports data between the BSSUs (cross-connect matrix components) and the port units. The BSIU also monitors the transmission data and provides automatic protection switching for hardware failures.

- STM-1 Interface Unit (IU) — The STM-1 interface unit provides the SDH Physical Interface (SPI) function for STM-1 electrical and optical signals. All STM-1 interface units work with the STM-1 port unit.
  The following STM-1 IUs are available:

  - STM-1 electrical interface unit

  - STM-1 short-haul optical interface unit designed to ITU specifications

  - STM-1 long-haul optical interface unit designed to ITU specifications

  - STM-1 short-haul optical interface unit designed to Nippon Telegraph and Telephone (NTT) specifications

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Port Subrack C (PSC)

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Description   The Port Subrack C (PSC) has front and rear sections that are
partitioned for plug-in units. The PSC can be equipped with STM-16
or STM-4 port units. For this release, a PSC cannot be equipped with
a combination of STM-16 and STM-4 port units. The units plug into a
midplane that separates the front and rear sections and provides the
interconnections between units.

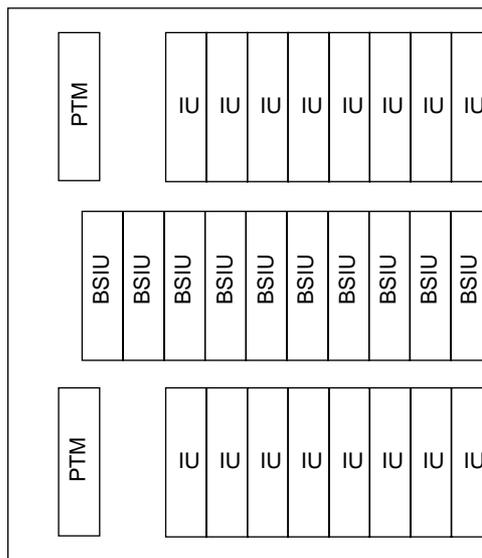**Illustration, front view**   The following illustration shows a front view of the PSC subrack.
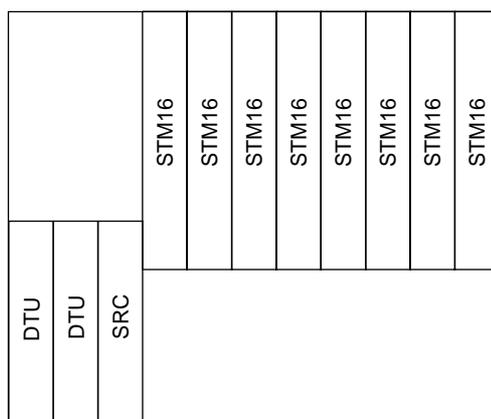
Units, front of subrack   The following units plug into the front of the PSC subrack:

- STM-16 Port Unit (STM-16) — The STM-16 port unit has one
  STM-16 port. The STM-16 port provides 2.5 Gbit/s transmission.

- STM-4 Port Unit (STM-4) — The STM-4 port unit has four
  STM-4 ports. Each STM-4 port provides 622 Mbit/s
  transmission.

- Digital Timing Unit (DTU) — The DTU provides timing for the
  transmission units in the subrack. The DTU is always duplicated.

- Subrack Controller (SRC) — The SRC routes messages back and
  forth from the Main Controller to the units in the port subrack.

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Illustration, rear view The following illustration shows a rear view of the PSC subrack.

```
BSIU128  BSIU128  BSIU128  BSIU128  BSIU128  BSIU128  BSIU128  BSIU128  BSIU128  BSIU128

                                    PTM   PTM
```
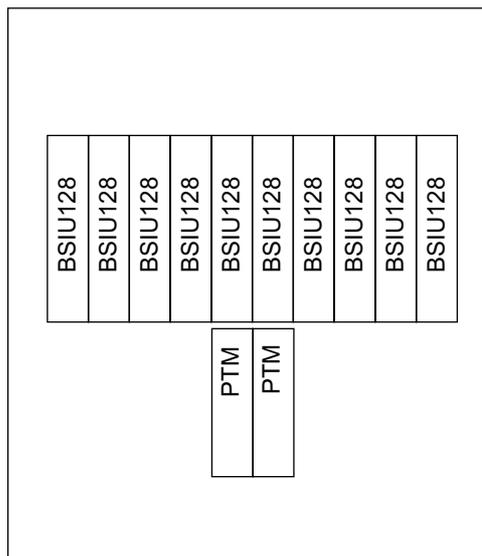
Units, back of subrack The following units plug into the back of the PSC subrack:

- Power Terminal Module (PTM) — The PTM filters incoming station power from two separate power sources and distributes it across the midplane.

- Bit Slice Interface Unit (BSIU) 128 — The BSIU128 is part of the internal transmission path. It transports data between the BSSUs (cross-connect matrix components) and the port units. The BSIU128 also monitors the transmission data and provides Automatic Protection Switching for hardware failures. The BSIU128s in the PSC subrack can transport twice the bandwidth, up to 128 STM-1 equivalents, compared to the BSIUs in the PSA subrack, which can transport up to 64 STM-1 equivalents.

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Port rack fan tray connector panel

Description   The fan tray connector panel is located on the back of the fan tray in port racks that are equipped with a PSC subrack.

Components   The port rack fan tray connector panel has the following components:

- ALM is a DB-9 female connector. The other end of the cable that attaches to this connector attaches to one of the Miscellaneous Discrete Input (MDI) connectors on the Fan Connector Panel (FCP). This interface carries alarm signals from the port rack fan tray to the FCP.

- PWR is a DB-3 male connector. The PWR connector terminates the cable that provides duplicated –48 volt power to the port rack fan tray.

- The FAIL LED is a red LED that lights when one or more fans in the port rack fan tray fail.

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2   About the user interface

Overview

Purpose	"About the user interface" describes the user interface. The user interface is used to perform operations, administration, maintenance, and provisioning tasks on the Digital Access and Cross-connect System (DACS).
What you need to know	A basic knowledge of *Microsoft Windows NT*® is assumed.
Getting started	To log on to the network element (DACS), you will need a valid user ID and password for both the PC and the DACS.
Organisation	"About the user interface" is organised as follows:

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About the user-interface PC

General information about the PC

A Personal Computer (PC) running the user interface application software is required to perform operations, administration, maintenance, or provisioning tasks on the system. The PC is also called a Craft Interface Terminal (CIT). The user interface application software, called XC-CIT, provides a point-and-click graphical user interface. You point and click to select values or options, then point and click to apply them.

XC-CIT works best when the PC does *not* have other software installed.

Booting the PC

You can boot the PC with or without a link to the system. If you boot a PC with an active link to the system, it will not affect service. However, booting will cause the link to the system to be dropped. You must log back on to the system to reestablish the link.

Number of user interface sessions

Up to six user interface sessions can be connected to one DACS system at the same time. All six user interface sessions can be running on one PC, or there can be up to six local and/or remote PCs.

Other users logging on to the system

PCs already logged on to the system will not be affected by a new user logging on to the system.

About connecting a PC to more than one DACS

If the PCs are on a LAN that has more than one DACS, each PC can connect to more than one DACS. To connect to more than one DACS, a PC must have XC-CIT application software for each DACS.

Link failure message

The system displays a failure message if the link between a PC and a DACS fails. You must log back on to the system to reestablish the link.

Socket failure message

The system displays a failure message if a communication error is detected. If the socket failure message displays, check the TCP/IP connection and parameters.

**Date and time
synchronisation warning**

The system displays the following warning if the PC date and time is more than 10 seconds different from the system (Main Controller) date and time.
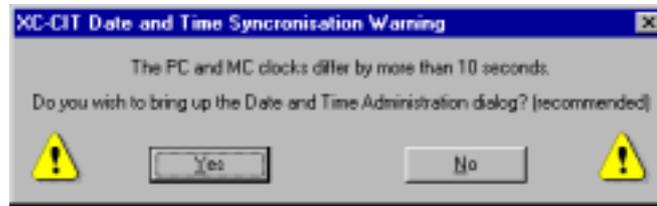
If you click Yes, the Date and Time Administration window appears, and you can change the PC date and time or the system date and time.

If you click No, the warning window closes, and the PC and system date and time remain unchanged.

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Logging on

Login window

Field descriptions

The Login window has the following fields.

Field	Description
Login ID	The Login ID is a unique user login identification that must have from two to eight letters or numbers. The first character must be a letter, and at least one character must be a lowercase letter. A default login ID is provided for the system administrator. Only the system administrator can add or remove a login ID.
Password	The password must have from four to eight characters. There are no restrictions on what characters you can use in the password.
Network Element	The Network Element field must contain a network element name or an IP address. • If a network element name has been provisioned, use the name of the network element. • If a network element name has not been provisioned, use the IP address.

Procedure

1   Enter your login ID.

2   Enter your password.

3   Enter the appropriate network element.

4 Click Connect.

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Logging off

Log off the system There are two ways to log off the system:

- Click the X in the upper right-hand corner of the user-interface window.

- Go to *File > Exit.*

The system will display a confirmation window.

Respond to the confirmation by clicking the appropriate button.

Are you sure you want to exit ?	Yes - Exit
	No - Do Not Exit

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Displaying the name of the system that the PC is connected to

Display PC connected to name
To display the name of the system that the PC is connected to, go to *Help > About....*

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Structure of the user interface

File, Provision, and Alarms menus

The following graphic shows the arrangement of the File, Provision, and Alarms menus.

```
File  ──────►  Exit
```

```
Provision ──►  Cross Connects...              ──►  Cross Connect
               Monitoring Control...          ──►  Connect Roll
               Equipment...                   ──►  Insert AIS
               Transmission...
               Protection Switching...         ──►  Port Monitoring
               Performance Monitoring...       ──►  Signal Monitoring
               Alarm Settings...
               Synchronization and Timing...   ──►  Rack
               Data Communication Channel..    ──►  Subrack
               System ID...                    ──►  Unit
                                               ──►  EOW / User Channel

                                               ──►  Port
                                               ──►  Signal Type
                                               ──►  High Order Path
                                               ──►  Low Order Path

                                               ──►  MSP Group
                                               ──►  SNCP Group
                                               ──►  Wait To Restore Timer

                                               ──►  Count Control
                                               ──►  TCA Control
                                               ──►  TCA Thresholds

                                               ──►  Severity Levels
                                               ──►  Timers
                                               ──►  Alarm Suppress Control

                                               ──►  System Clock
                                               ──►  Station Clock

                                               ──►  DCC In MSP Mode Provision
                                               ──►  DCN Neighbor Nodes
                                               ──►  QLAN Link
                                               ──►  Data Communication Channel
                                               ──►  Data Communication Network

                                               ──►  System ID
```

```
Alarms ──►  View Current Alarms...  ──────►  View Current Alarms
            Station Alarm Control...  ────►  Station Alarm Control
            Display Alarm Panel
```

Reports, Protection, Maintenance, Utilities, and Help menus

The following graphic shows the arrangement of the Reports, Protection, Maintenance, Utilities, and Help menus.
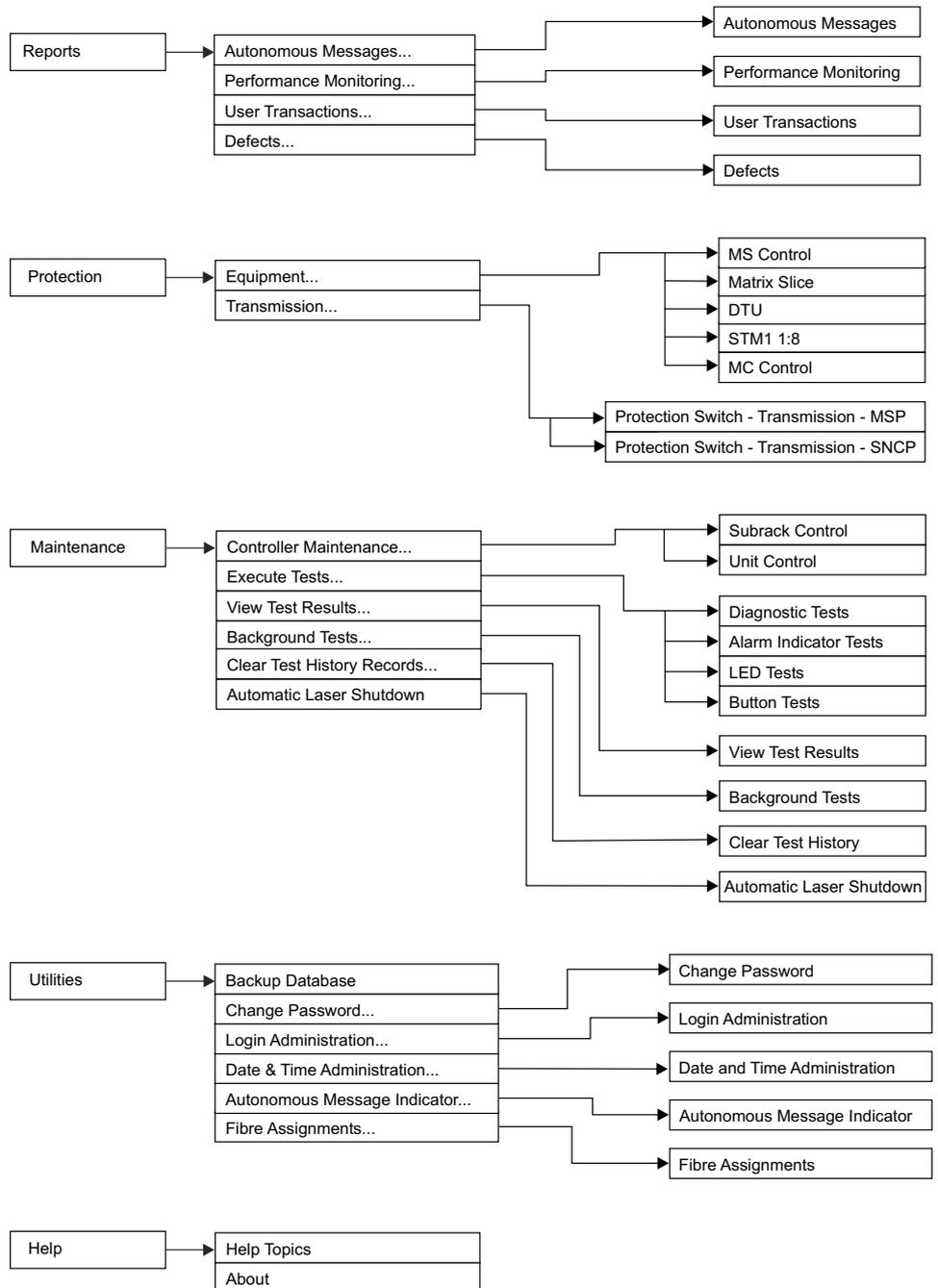
About the main application window

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Description   The main application window contains a title bar, a menu bar, and a
toolbar.

Menu bar

File   Provision   Alarms   Reports   Protection   Maintenance   Utilities   Help

The menu bar contains the menus that open the windows that you use
for provisioning and maintaining the system. The menu bar appears at
the top of the application window directly below the title bar.

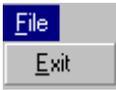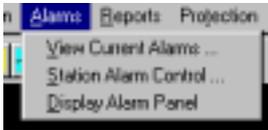| Item	Function
File	The File menu provides access to the Exit function. File Exit
Provision	The Provision menu provides access to the parts of the system that require provisioning. File **Provision** Alarms Reports Protection Cross Connects ... Monitoring Control ... Equipment ... Transmission ... Protection Switching ... Performance Monitoring ... Alarm Settings ... Synchronization and Timing ... System ID ...
Alarms	The Alarms menu provides access to the windows from which you can perform alarm-related tasks other than alarm provisioning. **Alarms** Reports Protection View Current Alarms ... Station Alarm Control ... Display Alarm Panel

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Item	Function
Reports	The Reports menu provides access to the windows from which you can display or print various reports. The following reports are located elsewhere in the user interface: • To display and print current alarms, go to *Alarms > View Current Alarms.* • To display and print diagnostic test results, go to *Maintenance > View Test Results.*
Protection	The Protection menu provides access to the windows from which you can perform protection switch requests and display protection switch-related information. To provision protection switching groups and Wait-To-Restore timers, go to *Provision > Protection Switching.*
Maintenance	The Maintenance menu provides access to the windows from which you can perform maintenance-related tasks.
Utilities	The Utilities menu provides access to the windows from which you can perform general system-related tasks.
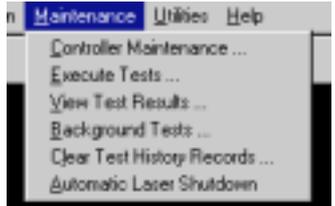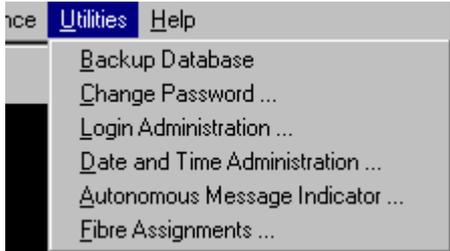
Item	Function
Help	The Help menu provides access to Help Topics and the About… window.

The Help menu image:

Utilities	Help
	Help Topics
	About …

Toolbar

The toolbar is located directly beneath the menu bar. It provides quick access to frequently-used windows.

Button	Function
Cross-connect provisioning button	The Cross-connect provisioning button opens to the Cross Connect window.
Monitoring control provisioning button	The Monitoring control provisioning button opens to the Port Monitoring window.
Equipment provisioning button	The Equipment provisioning button opens to the Rack window.
Transmission provisioning button	The Transmission provisioning button opens to the Port window.
Performance monitoring provisioning button	The Performance monitoring provisioning button opens to the Count Control window.
View current alarms button	The View current alarms button opens to the View Current Alarms window.
Autonomous messages report button	The Autonomous messages report button opens to the Reports — Autonomous Messages window.

Button	Function
Performance monitoring report button	The Performance monitoring report button opens to the Reports — Performance Monitoring window.

About query results windows

Illustration   Use the following illustration only as an example of a query results window.
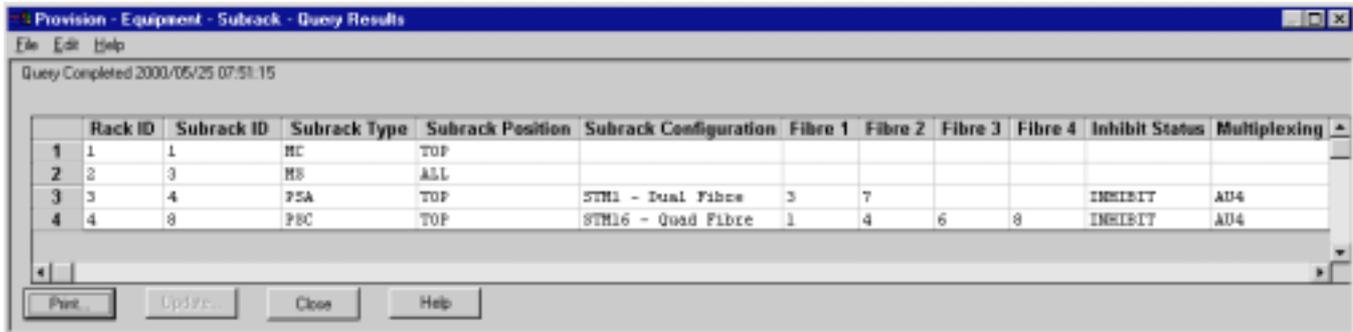
Important! The data displayed on this screen may *not* be typical.

Sorting query records   Double-clicking on a column heading in a query results window sorts the information in that column either numerically or alphabetically.

Query results menu bar
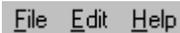
The query results menu bar is displayed across the top of the query results window.

Item	Function
File	The File menu provides access to the menu list items for saving to a file and printing.

Item	Function
Edit	The Edit menu provides access to the menu list items Update and Find. • Use Update to replace the data in the window from which the query was performed with data from a record that you select from the query results window. This is useful when you want to change the query results data without having to enter the information in the original window. For more information, see "Updating data from a query results window" (2-16). • Use Find to locate a specific record in the query results.
Help	The Help menu provides access to help for query results windows.
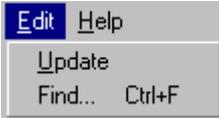
Updating data from a query results window

Procedure Do the following when you want to change the query results data without having to enter the information in the original query results window.

1 Perform a query.

2 Do any of the following:

- Highlight a record and press the update button at the bottom of the window.

- Highlight a record and select Update from *Edit > Update.*

- Double-click on the record.

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Button descriptions

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Button descriptions   The following section describes the buttons that may appear at the bottom of the user interface windows.

Button	Function
Apply	The Apply button changes or creates a database record.
Autonomous Events	The Autonomous Events button opens the Autonomous Messages window.
Cancel Test	The Cancel Test button cancels the selected background test.
Change	The Change button changes a database record.
Clear	The Clear button clears the fields and restores the window to its original state.
Clear AIS	The Clear AIS button removes AIS (Alarm Indication Signal) on an entity.
Clear Records	The Clear Records button clears the records for the specified tests.
Close	The Close button closes the window.
Connect	The Connect button on the Cross Connect window creates a cross connect. The Connect button on the Login window establishes a connection to a local or remote network element.
Connect Station Alarms	The Connect Station Alarms button connects the station alarm indicators so that they will light or sound when a station alarm is active.
Create	The Create button creates a record in the database.
Current Alarms	The Current Alarms button opens the View Current Alarms window.
Delete	The Delete button deletes one or more database records.
Disconnect	The Disconnect button removes a cross connect.
Disconnect Station Alarms	The Disconnect Station Alarms button disconnects station alarm indicators. Pressing the Disconnect Station Alarms button will ***not*** affect LED indicators on units and station alarm indicators that cannot be disconnected.
Execute	The Execute button initiates a test.

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Button	Function
Help	The Help button opens a screen-related help topic window.
Initialise	The Initialise button initialises a unit controller.
Insert AIS	The Insert AIS button inserts AIS (Alarm Indication Signal) on an entity.
Manual Restart	The Manual Restart button restarts a laser that the system has previously shutdown by performing a 2-second transmission test. If there are no problems, the signal is restored.
Manual Restart for Test	The Manual Restart for Test button restarts a laser that the system has previously shutdown by performing a 90-second transmission test. If there are no problems, the signal is restored.
Monitoring Control…	The Monitoring Control… button opens the Monitoring Control window.
Print	The Print button opens the *Microsoft Windows NT*® print dialog box.
Protection Switch Control	The Protection Switch Control button opens the Matrix Control window.
Query	The Query button requests information from the system database.
Query Active	The Query Active button queries the active STU.
Query From ID	The Query From ID button queries the From ID address for the source of the cross-connect data.
Query NE Date/Time	The Query NE Date/Time button queries the network element date and time, and uses it to overwrite the Date and Time fields on the Date and Time Administration window.
Query PC Date/Time	The Query PC Date/Time button queries the personal computer date and time, and uses it to overwrite the Date and Time fields on the Date and Time Administration window.
Query Port	From the Automatic Laser Shutdown window, the Query Port button opens the Port window, which can be used to enable or disable the automatic laser shutdown feature.
Query Standby	The Query Standby button queries the standby STU.
Query To ID	The Query To ID button queries the To ID address for the destination of the cross-connect data.

Button	Function
Remove	The Remove button removes an MPU or SRC from service.
Restore	The Restore button restores an SRC to service.
Restore All	The Restore All button restores all alarm severities to their default values.
Roll	The Roll button rolls a cross connect.
Save Error Message	The Save Error Message button saves the error message to a common file on the PC.
Set NE Date/Time	The Set NE Date/Time button changes the date and time for the network element to the values displayed in the Date and Time fields on the Date and Time Administration window.
Set PC Date/Time	The Set PC Date/Time button changes the date and time on the PC to the values displayed in the Date and Time fields on the Date and Time Administration window.
Subrack Degrade Inhibit	The Subrack Degrade Inhibit button opens the Subrack window, which can be used to enable or disable the Degrade Inhibit feature.
Suppress Station Alarms	The Suppress Station Alarms button causes a system-wide temporary suppression of current station alarm indicators. Pressing the Suppress Station Alarms button will *not* affect LED indicators on units and station alarm indicators that cannot be suppressed, nor will it affect indicators for future alarms.
Update	The Update button replaces the data in the window from which the query was performed with data from a record that you select from the query results window.
View Results	The View Results button displays the requested test results.
WTR Timer	The WTR Timer button opens the Wait To Restore Timer window.

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Key descriptions

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Keys used for shortcuts   Shortcut keys are combinations of keys that you press to perform an action that you would otherwise perform with the mouse. As in other *Microsoft Windows NT*® applications, shortcut keys are a combination of the ALT key and the underlined letter associated with a menu or menu item.

Example

Pressing **ALT** + **P** opens the Provision menu.

Keys used for editing   For windows that permit data entry, an Edit menu with cut, copy, and paste functions is available. You can also perform these editing functions by using the following keys.

Key	Function
CTRL+X	Removes the selected information
CTRL+C	Copies the selected information
CTRL+V	Pastes the cut or copied information into the selected input field

Keys used for navigation   Navigation in the user interface is accomplished primarily by clicking, double-clicking, and scrolling with a mouse. You can also use the following keys for navigation.

Key	Moves the cursor
Left arrow	Left one field or subfield
Right arrow	Right one field or subfield
Up arrow	Up one item in a drop list or field
Down arrow	Down one item in a drop list or field
Home	To the beginning of items in a drop list

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Key	Moves the cursor
End	To the end of items in a drop list
Page Up	Up one screen
Page Down	Down one screen
Tab	To the next field or command button
Shift Tab	To the previous field or command button

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About system messages

General system messages　　A message window may appear when you are performing provisioning and maintenance tasks. You can get help for a system message by clicking the Help button on the system message window. The help associated with a system message explains why this message has occurred and suggests corrective actions.

Time-out message　　The system displays a time-out message if your request cannot be processed in a reasonable amount of time. If you get a time-out message, wait a few minutes, then try the request again.

□

About Help

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Help Topics   Selecting Help Topics from the Help menu opens the help system. The help system and the paper documentation are almost identical because they are derived from the same source. The help system works best if you have *Microsoft Internet Explorer*® 4.0 or later installed on your PC.

About…   Selecting About… from the Help menu opens a window that contains information about the current software version and the maximum system capacity.

Accessing Help   There are two ways to access the help system:

- Click on the Help button from any user interface window to display a help topic that is specific to that window.

- Go to *Help > Help Topics.*

The Help Topics window   The following illustration shows the Help Topics window.
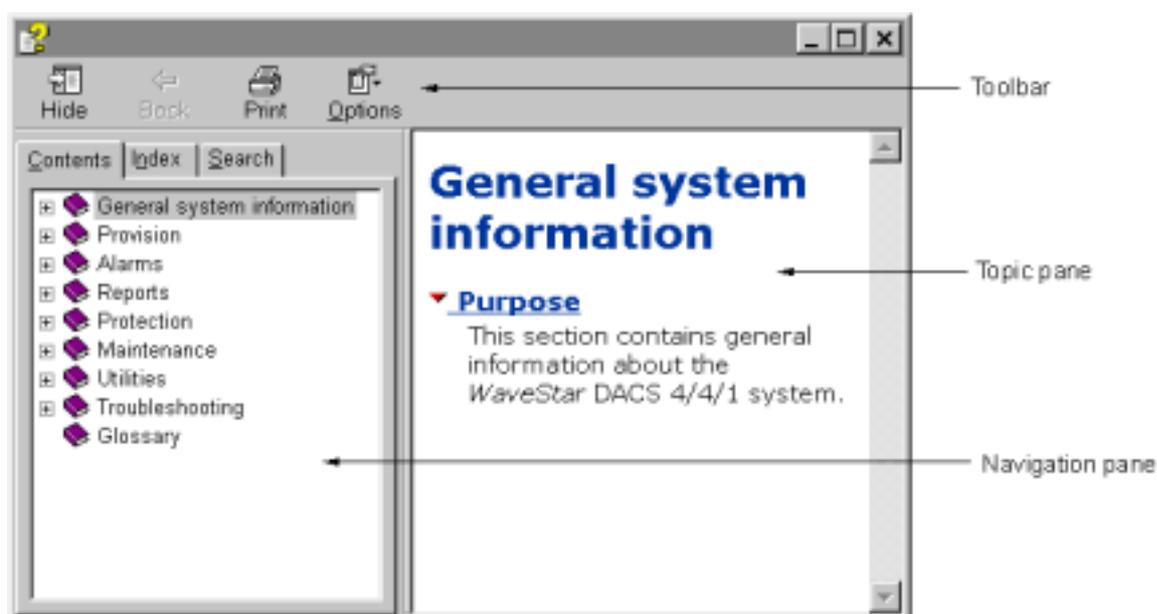
The Help Topics window has a toolbar, navigation pane, and topic pane.

The Help toolbar   The Help toolbar has the following buttons.

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Button	Function
Hide	If the navigation pane is open, clicking the Hide button closes the pane. If the navigation pane is closed, clicking the Hide button opens the pane.
Back	Clicking the Back button opens the previously viewed help topic in the topic pane.
Print	Clicking the Print button opens a dialog box from which you choose whether to print the selected topic (the topic currently displayed in the topic panel), or if a heading is selected in the navigation pane, the selected heading and all subtopics.
Options	Clicking the Options button opens a menu that contains the following items: • Hide Tabs — performs the same function as the Hide button. • Back — performs the same function as the Back button. • Stop — stops a web page from opening. This help system does not have links to internet web pages. • Refresh — refreshes the topic that appears in the topic pane. • Internet Options — opens a dialog box from which you can set various options for *Internet Explorer*. • Print — performs the same function as the Print button. • Search Highlight On/Off— turns on or off the Search Highlight function. The Search Highlight function highlights the word or words that you search for using the Search tab.

The navigation pane   The navigation pane has the following tabs that help you find the appropriate help topic.

Tab	Function
Contents	The Contents tab displays an expandable list of help topics. Items in the list that can be expanded have a book icon and a plus sign to the left of the item. To expand an item, click on the plus sign, or double-click on the item. To select a help topic, click on an item in the list. The selected help topic appears in the topic pane.
Index	The Index tab displays a list of index entries. To select a help topic, click on an item in the list, or type a word into the text box above the list and press **ENTER** when the desired index entry is highlighted. The selected help topic appears in the topic pane.
Search	The Search tab lets you search for one or more words that appear in the help topics. To search for a word, type the word to search for and press **ENTER**. A list of help topics that contain the search word appears. To select a help topic, double-click on an item in the list. The selected help topic appears in the topic pane.

The topic pane   The topic pane displays the selected help topic.

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3   About equipment and signal addresses

Overview

Purpose   "About equipment and signal addresses" contains general information about equipment and signal addresses that appear on the user interface.

Organisation   "About equipment and signal addresses" is organised as follows:

- "About entity addresses" (3-2)
- "About physical layer addresses" (3-3)
- "About signal layer addresses" (3-4)
- "Wildcard addresses" (3-9)
- "256 and 512 addressing" (3-10)
- "MC entity addresses" (3-11)
- "MS entity addresses" (3-12)
- "PSA entity addresses" (3-13)
- "PSC entity addresses" (3-14)
- "Equipment protection group addresses" (3-16)
- "MSP addresses" (3-17)
- "RT addresses" (3-18)
- "Fibre addresses" (3-19)

☐

About entity addresses

Description of physical and signal layers

The entity address consists of two parts: a physical layer and a signal layer. In the following example, the physical layer is labelled Port ID, and the signal layer is labelled Signal ID.

	Subrack	Number	Unit	Number	Port
Port ID:	PSA ▼	4 ▼	STM1 ▼	1 ▼	1 ▼
Signal ID:	Select	AUG#1 - AU4 - ALL			

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About physical layer addresses

About the physical layer   The physical layer is part of the entity address; it describes the physical location of the equipment. On most user-interface windows, the physical layer is labelled Port ID, but depending on the context of the window, this field can also be labelled Subrack ID, Unit ID, MSP ID, MSP Group ID, or Protection Group ID.

The physical layer consists of up to five fields:

- subrack
- (subrack) number
- unit
- (unit) number
- port

□

About signal layer addresses

About the signal layer
The signal layer is part of the entity address; it describes the structure of a Synchronous Digital Hierarchy (SDH) signal. The signal layer is always labelled Signal ID on the user interface.

The signal layer consists of the following fields:

- AUG4 number
- AUG1 number
- AU type
- TUG3 value
- TUG2 value
- TU12 value

Table of signal layer addresses
The following table shows the valid signal type and entity ID combinations for specifying multiplexing.

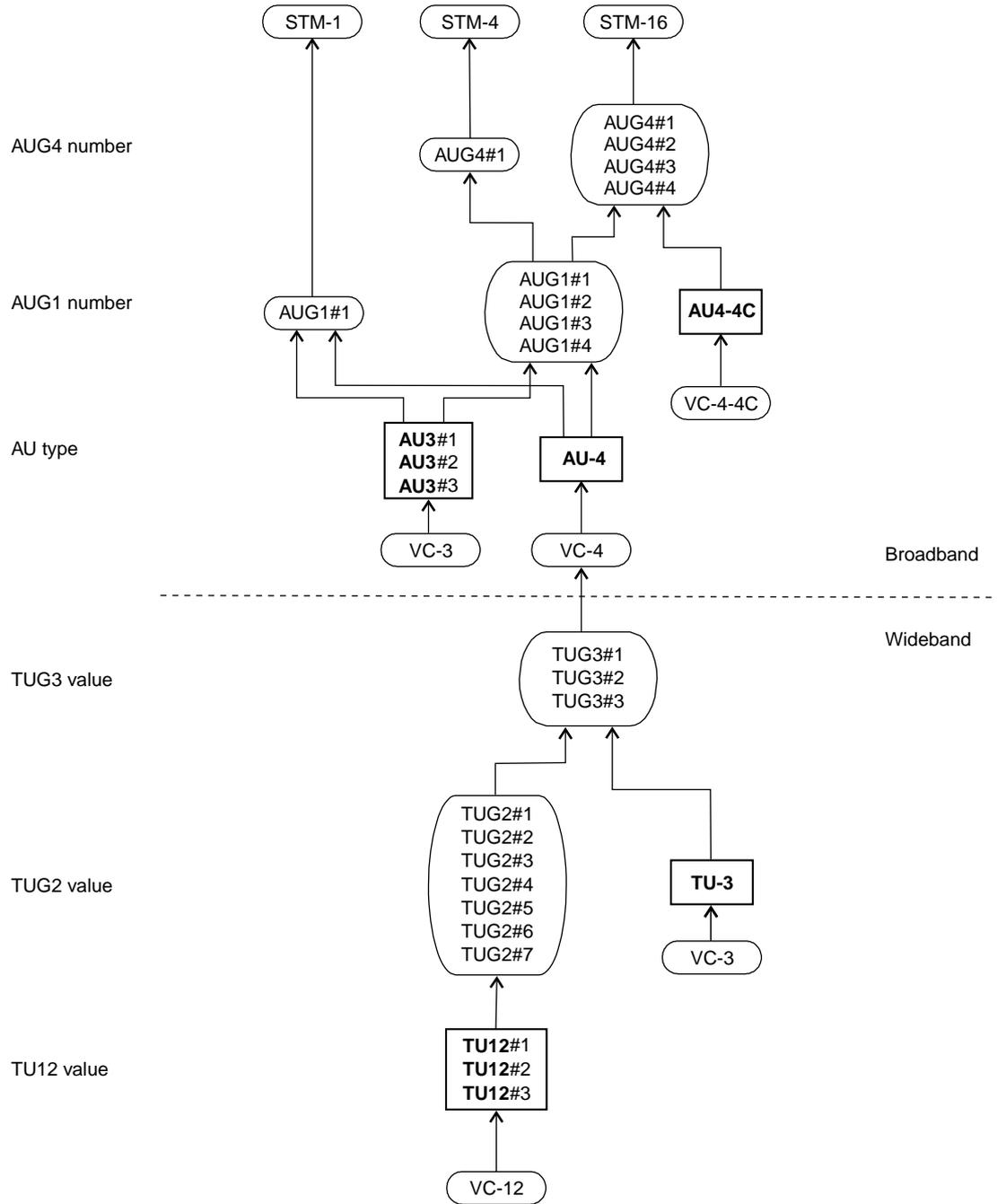| Signal Type	Entity ID
AU-4-4c	PSC-s-STM16-u-p-ALL [1]
	PSC-s-STM16-u-p-AUG4#{1-4}-AU4_4c
	PSC-s-STM4-u-p-AUG4#1-AU4_4c
AU-4	PSA-s-STM1-u-p-AUG1#1-AU4
	PSC-s-STM16-u-p-ALL
	PSC-s-STM16-u-p-AUG4#{1-4}-ALL
	PSC-s-STM16-u-p-AUG4#{1-4}-AUG1#{1-4}-AU4
	PSC-s-STM4-u-p-AUG4#1-ALL
	PSC-s-STM4-u-p-AUG4#1-AUG1#{1-4}-ALL
	PSC-s-STM4-u-p-AUG4#1-AUG1#{1-4}-AU4
AU-3	PSA-s-STM1-u-p-AUG1#1-ALL
	PSC-s-STM16-u-p-ALL
	PSC-s-STM16-u-p-AUG4#{1-4}-ALL
	PSC-s-STM16-u-p-AUG4#{1-4}-AUG1#{1-4}-ALL
	PSC-s-STM4-u-p-AUG4#1-ALL
	PSC-s-STM4-u-p-AUG4#1-AUG1#{1-4}-ALL

Signal Type	Entity ID
TU-3	PSA-s-STM1-u-p-AUG1#1-AU4-ALL[-ALL] [2]
	PSA-s-STM1-u-p-AUG1#1-ALL-TUG3#{1-3}-ALL [3]
	PSA-s-STM1-u-p-AUG1#1-ALL-TUG3#{1-3}-TU3 [3]
	PSC-s-STM16-u-p-ALL
	PSC-s-STM16-u-p-AUG4#{1-4}-ALL[-ALL]
	PSC-s-STM16-u-p-AUG4#{1-4}-AUG1#{1-4}-ALL
	PSC-s-STM16-u-p-AUG4#{1-4}-AUG1#{1-4}-AU4-ALL
	PSC-s-STM16-u-p-AUG4#{1-4}-AUG1#{1-4}-AU4-TUG3#{1-3}-ALL [3]
	PSC-s-STM16-u-p-AUG4#{1-4}-AUG1#{1-4}-AU4-TUG3#{1-3}-TU3 [3]
	PSC-s-STM4-u-p-AUG4#1-ALL
	PSC-s-STM4-u-p-AUG4#1-AUG1#{1-4}-ALL
	PSC-s-STM4-u-p-AUG4#1-AUG1#{1-4}-AU4
	PSC-s-STM4-u-p-AUG4#1-AUG1#{1-4}-AU4-TUG3#{1-3}-ALL [3]
	PSC-s-STM4-u-p-AUG4#1-AUG1#{1-4}-AU4-TUG3#{1-3}-TU3 [3]

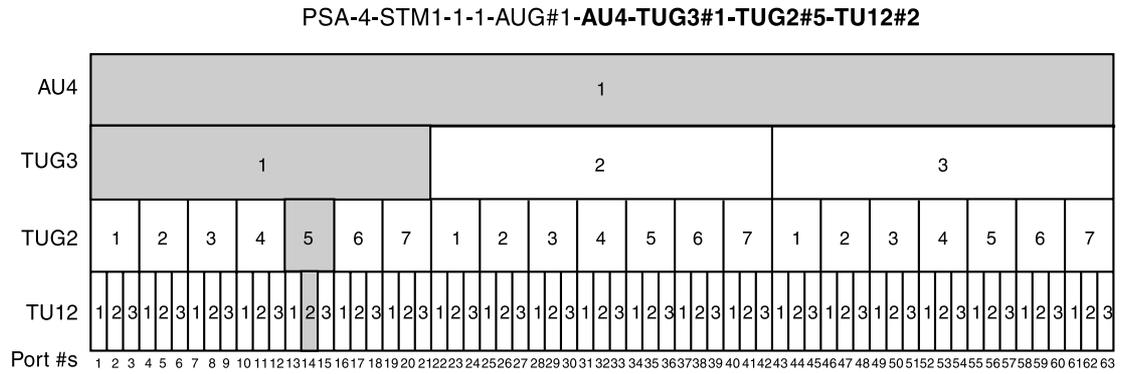| Signal Type	Entity ID
TU-12	PSA-s-STM1-u-p-AUG1#1-AU4-ALL[-ALL][-ALL] [2]
	PSA-s-STM1-u-p-AUG1#1-AU4-TUG3#{1-3}-ALL[-ALL] [3]
	PSC-s-STM16-u-p-ALL
	PSC-s-STM16-u-p-AUG4#{1-4}-ALL[-ALL]
	PSC-s-STM16-u-p-AUG4#{1-4}-AUG1#{1-4}-ALL
	PSC-s-STM16-u-p-AUG4#{1-4}-AUG1#{1-4}-AU4-ALL
	PSC-s-STM16-u-p-AUG4#{1-4}-AUG1#{1-4}-AU4-TUG3#{1-3}-ALL [3]
	PSC-s-STM16-u-p-AUG4#{1-4}-AUG1#{1-4}-AU4-TUG3#{1-3}-ALL[-ALL] [3]
	PSC-s-STM4-u-p-AUG4#1-ALL
	PSC-s-STM4-u-p-AUG4#1-AUG1#{1-4}-ALL
	PSC-s-STM4-u-p-AUG4#1-AUG1#{1-4}-AU4
	PSC-s-STM4-u-p-AUG4#1-AUG1#{1-4}-AU4-TUG3#{1-3}-ALL [3]
	PSC-s-STM4-u-p-AUG4#1-AUG1#{1-4}-AU4-TUG3#{1-3}-ALL[-ALL] [3]

Notes:

1. s = subrack number, u = unit number, p = port number

2. The square brackets indicate values that the system adds automatically. When you specify the value ALL for a field in the entity ID, the system automatically enters the value ALL for all subsequent fields in the entity ID.

3. These forms cannot be used when changing from AU4 clear channel (not TUG structured), because they do not specify how the other two TUG3s are to be multiplexed. For an STM-1 that is already TUG structured within the AU-4, any of the forms can be used, but only the form that specifies all TUG3s can be used when changing from AU-4 clear channel.

Illustration of signal layer addresses

AUG4 number

AUG1 number

AU type

TUG3 value

TUG2 value

TU12 value

Broadband

Wideband

STM-1   STM-4   STM-16

AUG4#1
AUG4#2
AUG4#3
AUG4#4

AUG4#1

AUG1#1
AUG1#2
AUG1#3
AUG1#4

AUG1#1

AU4-4C

VC-4-4C

AU3#1
AU3#2
AU3#3

AU-4

VC-3   VC-4

TUG3#1
TUG3#2
TUG3#3

TUG2#1
TUG2#2
TUG2#3
TUG2#4
TUG2#5
TUG2#6
TUG2#7

TU-3

VC-3

TU12#1
TU12#2
TU12#3

VC-12

Graphical representation of wideband signal

The following illustration shows a graphical representation of a wideband signal.

PSA-4-STM1-1-1-AUG#1-**AU4-TUG3#1-TUG2#5-TU12#2**

AU4	1

TUG3	1	2	3

TUG2	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7

TU12: 1 2 3

Port #s: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63

Wildcard addresses

.... 3 - 9

About wildcards   Rather than entering entity addresses individually, you can use a wildcard to specify a range of addresses. To use a wildcard, select the value ALL for any field in the entity address. The system automatically assigns all subsequent entity address fields the value ALL.

Examples   The following are examples of entity addresses that use wildcards:

- MS-3-BSSU-ALL queries all the BSSUs on the MS-3 subrack.

- PSC-4-ALL-ALL-ALL queries all units, unit numbers, and ports on subrack PSC-4.

- ALL-ALL-ALL-ALL-ALL queries all units, unit numbers, and ports in all subracks in the system.

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365–367–512
Issue 2, July 2002

Lucent Technologies

3 - 9

256 and 512 addressing

Differences between 256 and 512

On the user-interface windows, the port subracks on a 256 STM-1 equivalent system are numbered 4–11. The port subracks on a 512 STM-1 equivalent system are numbered 4–19.

Example

The following table describes the differences between the addressing on a 256 system and a 512 system.

System capacity	Address example
256	PSA-{4–11}-STM1-1
512	PSA-{4–19}-STM1-1

Related topic

For more information about 256 and 512 configurations, see "System capacity" (1-5).

□

MC entity addresses

Table of MC entity addresses

The following table shows the entity addresses for the Main Controller (MC) subrack.

Subrack type	Subrack number	Unit type	Unit number	Port number
MC	1, 2	MPU	1	N/A
		MSU	1	N/A
		LHU	1, 2	1–12
		ARU	1	N/A
		PSP	1	N/A

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MS entity addresses

Table of MS entity addresses

The following table shows the entity addresses for the Matrix and Synchronisation (MS) subrack.

Subrack	Unit type	Unit number	Port number
MS-3	SRC	1, 2	N/A
	BSC	1, 2	N/A
	OLU	1–4	BSFI{1–5}
	BSSU	1–10	ECI{1–16}, BSFI{W, P}
	STU	1, 2	N/A

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PSA entity addresses

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Table of PSA entity addresses for the Physical ID

The following table shows the entity addresses for the Physical ID of a Port Subrack A (PSA).

Subrack type	Subrack number	Unit type	Unit number	Port number
PSA	4–11 or 4–19	SRC	1	N/A
		DTU	1, 2	N/A
		BSIU	1–10	ECI {1, 2}
		STM1	1–9, 11–19	1–4
			GRP1, GRP2	N/A
			MSP1, MSP3, MSP5, MSP7, MSP11, MSP13, MSP15, MSP17	1–4
		IU	1–8, 11–18	1–4

Table of PSA entity addresses for the Signal ID

The following table shows the entity addresses for the Signal ID of a Port Subrack A (PSA). In a PSA subrack, you can provision a Signal ID only for STM-1 ports.

AUG1	AU	TUG3	TUG2	TU12
AUG1#1	AU4	N/A	N/A	N/A
		TUG3#1, TUG3#2, TUG3#3	TUG2#1, TUG2#2, TUG2#3, TUG2#4, TUG2#5, TUG2#6, TUG2#7	TU12#1, TU12#2, TU12#3
			TU3	N/A
	AU3#1, AU3#2, AU3#3	N/A	N/A	N/A

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PSC entity addresses

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Table of PSC entity addresses for the Physical ID

The following table shows the entity addresses for the Physical ID of a Port Subrack C (PSC).

Subrack type	Subrack number	Unit type	Unit number	Port number
PSC	4–11 or 4–19	SRC	1	N/A
		DTU	1, 2	N/A
		BSIU	1–10	ECI {1, 2}
		STM16	1–8	1
		MSP1, MSP3, MSP5, MSP7		1
		STM4	1–8	1–4
		MSP1, MSP3, MSP5, MSP7		1–4

Table of STM-16 entity addresses for the Signal ID

The following table shows the STM-16 entity addresses for the Signal ID of a Port Subrack C (PSC).

AUG4	AUG1	AU	TUG3	TUG2	TU12
AUG4#1, AUG4#2, AUG4#3, AUG4#4	N/A	AU4_4c	N/A	N/A	N/A
	AUG1#1, AUG1#2, AUG1#3, AUG1#4	AU4	N/A	N/A	N/A
			TUG3#1, TUG3#2, TUG3#3	TUG2#1, TUG2#2, TUG2#3, TUG2#4, TUG2#5, TUG2#6, TUG2#7	TU12#1, TU12#2, TU12#3
				TU3	N/A
	N/A	AU3#1, AU3#2, AU3#3	N/A	N/A	N/A

Table of STM-4 entity addresses for the Signal ID

The following table shows the STM-4 entity addresses for the Signal ID of a Port Subrack C (PSC).

....

AUG4	AUG1	AU	TUG3	TUG2	TU12
AUG4#1	N/A	AU4_4c	N/A	N/A	N/A
	AUG1#1, AUG1#2, AUG1#3, AUG1#4	AU4	N/A	N/A	N/A
			TUG3#1, TUG3#2, TUG3#3	TUG2#1, TUG2#2, TUG2#3, TUG2#4, TUG2#5, TUG2#6, TUG2#7	TU12#1, TU12#2, TU12#3
				TU3	N/A
	N/A	AU3#1, AU3#2, AU3#3	N/A	N/A	N/A

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365–367–512
Issue 2, July 2002

Lucent Technologies

3 - 1 5

Equipment protection group addresses

About equipment protection group addresses

The user interface uses GRP addresses to refer to entities that belong to equipment protection groups. The GRP address refers to *both* the working and protection units in an equipment protection group.

GRP address table

The following table lists GRP addresses.

Subrack and unit	Group
MS-3-SRC-{1, 2}	GRP
MS-3-BSSU-{1–10}	GRP
PSA-{4–11, 4–19}-DTU-{1, 2}	GRP
PSA-{4–11, 4–19}-STM1-{1–9}	GRP1
PSA-{4–11, 4–19}-STM1-{11–19}	GRP2
PSC-{4–11, 4–19}-DTU-(1, 2)	GRP

Example of a GRP address

The following is an example of a protection group:

- MS-3-SRC-1 = working unit
- MS-3-SRC-2 = protection unit
- MS-3-SRC-GRP = both the working and protection units

□

MSP addresses

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About MSP addresses   A Multiplex Section Protection (MSP) group is a pair of STM-1, STM-4, or STM-16 ports that are provisioned for MSP. The user interface uses MSP addresses to refer to entities that belong to MSP protection groups. The MSP in the address refers to *both* the working and protection ports in an MSP protection group.

MSP address table   The following table lists MSP addresses.

Subrack and unit	Group	Port
PSA-{4–11, 4–19}-STM1	MSP{1, 3, 5, 7, 9, 11, 13, 15, 17}	1–4
PSC-{4–11, 4–19}-{STM16, STM4}	MSP{1, 3, 5, 7}	1

Example of an MSP address   The following is an example of an MSP protection group:

- PSA-1-STM1-1-1 = working port
- PSA-1-STM1-2-1 = protection port
- PSA-1-STM1-MSP1-1 = both the working and protection ports

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RT addresses

About RT addresses
Certain types of alarms display a rack-top (RT) entity address. The following illustration describes the rack-top address.

MC-1-RT-1-{1, 2}-{1, 2}

                     aux1
                     port number
                     unit number
                     rack-top number
                     subrack number
                     subrack
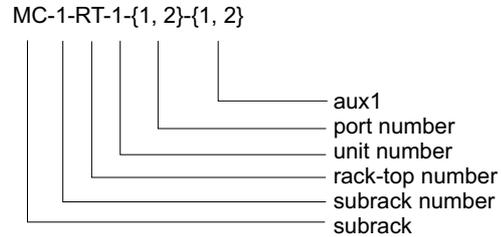
Port number and aux1 table
The following table describes the port number and aux1 values.

Port number	Aux1
1 = rack-top battery input	1 = battery input A 2 = battery input B
2 = rack-top fuse array	1 = fuse 1 2 = fuse 2

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Fibre addresses

About fibre addresses

Fibre addresses are displayed after a query from the View Current Alarms window, *Alarms > View Current Alarms,* for the following alarms:

- CABLEcEQ
- CABLEcTIM
- INTFcEQ

You can also enter fibre addresses from the Fibre Assignments window, *Utilities > Fibre Assignments.*

The following table displays all possible fibre addresses.

Subrack type	Subrack number	Unit type	Unit number	Port number
MS	3	OLU	1–4	BSFI{1–5}
		BSSU	1–10	BSFI{W, P}
PSA	4–11 or 4–19	BSIU	1–10	ECI{1, 2}
PSC	4–11 or 4–19	BSIU	1–10	ECI{1–4}

Example of a fibre address

The following illustration shows the physical port associated with the fibre address MS-3-OLU-3-BSFI2.
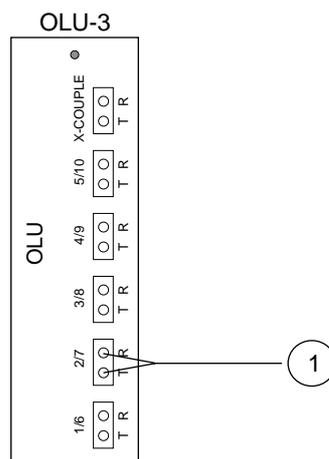
Legend:

1. Port 2 (BSFI2) on OLU-3

4   Cross connects

Overview

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Purpose   "Cross connects" contains the following information:

- General information about cross connects
- Descriptions of the windows that are used to provision cross connects
- Step-by-step procedures for provisioning cross connects

Organisation   The organisation is as follows:

- <u>"Background information"</u> (4-2)
- <u>"Cross Connect window and procedures"</u> (4-5)
- <u>"Connect Roll window and procedures"</u> (4-15)
- <u>"Insert AIS window and procedures"</u> (4-32)

Background information

Overview

Purpose   This section provides the background information about cross connects.

Organisation   This section is organised as follows:

- "Cross-connect tasks" (4-3)
- "Cross-connect terms" (4-4)

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Cross-connect tasks

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Tasks performed on the Cross Connect window

Use the Cross Connect window to do the following tasks:

- Query cross connects
- Connect or disconnect cross connects
- Add or remove multi-point cross connects
- Connect or disconnect loopback cross connects
- Establish or disconnect MONE, MONF, and MONEF test-access connections
- Establish or disconnect LOOPE and LOOPF test-access connections

Tasks performed on the Connect Roll window

Use the Connect Roll window to do the following tasks:

- Perform a bidirectional roll of a bidirectional cross connect
- Perform a unidirectional roll of a unidirectional cross connect
- Establish or disconnect SPLTE and SPLTF test-access connections

Tasks performed on both the Cross Connect and Connect Roll windows

Use the Cross Connect and Connect Roll windows to do the following tasks:

- Perform a unidirectional roll of a unidirectional cross connect
- Perform a unidirectional roll of a bidirectional cross connect
- Perform a bidirectional roll of a bidirectional cross connect
- Roll service in a network with no active service
- Roll service in a network with active service
- Establish or disconnect SPLTA, SPLTB, SPLTAB, and SPLTEF test-access connections

Tasks performed on the Insert AIS window

Use the Insert AIS window to insert or clear Alarm Indication Signal (AIS) on the output port of any cross connect.

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Cross-connect terms

List of terms   **Bidirectional** Bidirectional, or two-way cross connects connect two ports so they can communicate in two directions.

Bridge cross connect A bridge cross connect is another name for a multi-point cross connect.

Broadcast cross connect A broadcast cross connect is another name for a multi-point cross connect.

Cross connects Cross connects are the hardware and software used to connect line-terminating equipment, multiplexers, and other equipment.

Loopback cross connect A loopback cross connect is a special unidirectional cross connect that sends the signal from an input port back to the output port. Loopback cross connects are typically used to isolate trouble on the port units during installation.

Multi-point cross connect Multi-point cross connects have the following characteristics:

- Connect a single input to two or more outputs

- Provide bridging for restoration, testing, or broadcast

- Can be from any input to any available output signal

- Created using the "Uni-Directional" option on the Cross Connect window

- Can be disconnected in any order

- Can be added to any existing service whether originally created as unidirectional or bidirectional

- Were previously called bridge and broadcast cross connects

Rollover (Roll) A roll is used to replace the input of an existing cross connect. All outputs specified in the original connection are moved to the new input. You can roll a unidirectional cross connect, one or both directions of a bidirectional cross connect, or a multi-point cross connection. When performing a roll, you can specify a specific output or all multi-point outputs.

Unidirectional A unidirectional, or one-way cross connect connects two ports so that they can communicate in one direction. Even though most cross connects are bidirectional, the system also allows cross connects in only one transmission direction between all port combinations. Unidirectional cross connects are used mostly for test access.

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Cross Connect window and procedures

Overview

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Purpose   The Cross Connect window is used to query and provision unidirectional, bidirectional, and multi-point cross connections.

Window location   *Provision > Cross Connects > Cross Connect*

Organisation   This section is organised as follows:

- "Cross Connect window description" (4-6)
- "Querying cross connects" (4-8)
- "Cross-connect query results" (4-9)
- "Connecting or disconnecting cross connects" (4-10)
- "Adding or removing multi-points to an existing cross connect" (4-11)
- "Connecting or disconnecting a loopback cross connect" (4-13)

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Cross Connect window description

Illustration   The following illustration shows the Cross Connect window.
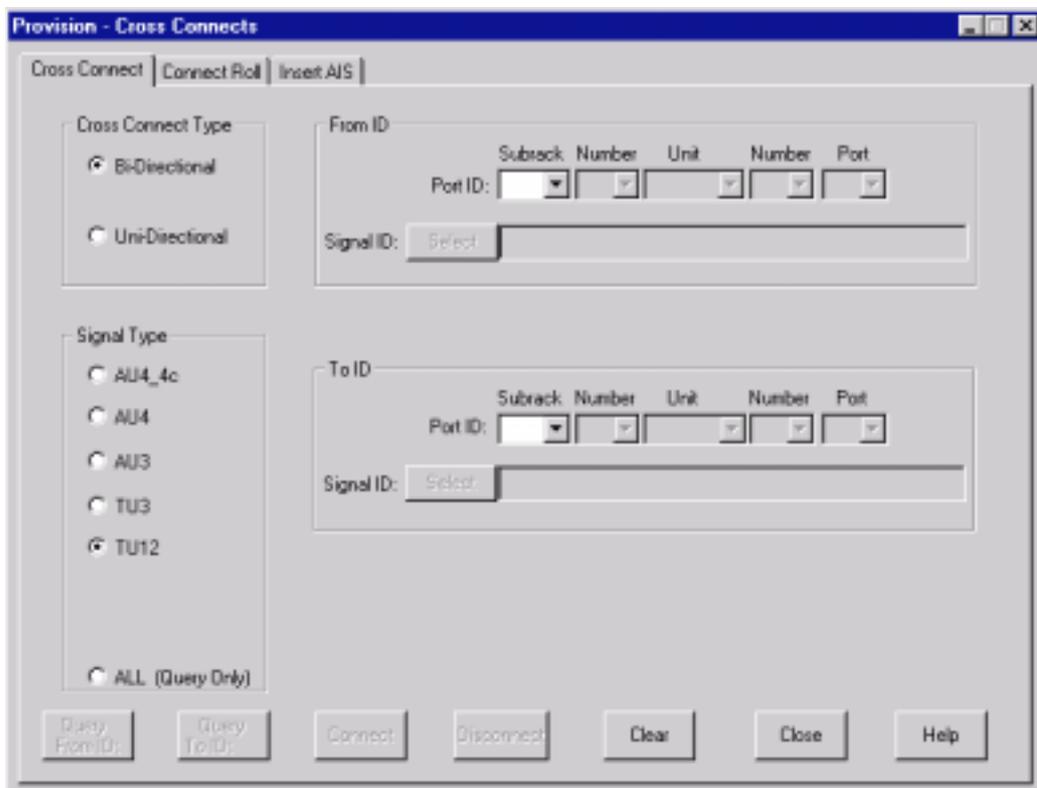
Field descriptions   The Cross Connect window has the following fields.

Field name	Description
Cross Connect Type	The Cross Connect Type specifies the type of cross connect you want to connect or disconnect as bidirectional or unidirectional.
Bi-Directional	Bidirectional, or two-way cross connects connect two ports so they can communicate in two directions.

Field name	Description
Uni-Directional	A unidirectional, or one-way cross connect connects two ports so that they can communicate in one direction. Even though most cross connects are bidirectional, the system also allows cross connects in only one transmission direction between all port combinations. Unidirectional cross connects are used mostly for test access. Loopback and multi-point cross connects are special types of unidirectional cross connects. For more information about these cross connects, see "List of terms" (4-4) .
Signal Type	The Signal Type field specifies the signal level for cross-connect signal provisioning as AU4_4c, AU4, AU3, TU3, or TU12. To query more than one cross-connect signal type, you can specify ALL.
From ID	The From ID fields specify the Port ID and Signal ID addresses of the input port.
To ID	The To ID fields specify the Port ID and Signal ID addresses of the output port.
Port ID	The Port ID fields specify the physical location of the equipment.
Signal ID	The Signal ID fields specify the signal level of the address that you want to query or provision. The options available for Signal ID depend on the Signal Type. For a description of the Signal ID options, see "About signal layer addresses" (3-4).

Related topic For more information about windows, see "About the main application window" (2-10).
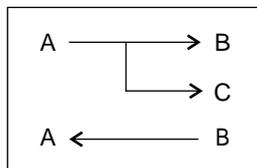
Querying cross connects

Procedure

1 Go to the Cross Connect window at *Provision > Cross Connects > Cross Connect.*

2 Click Bi-Directional or Uni-Directional in the Cross Connect Type field.

3 Select a value for the Signal Type field.

   Select the value ALL to query all signal types.

4 Select values for *either* the From ID fields or the To ID fields.

   Select the value ALL in the From ID or To ID fields to query more than one subrack.

5 Click Query From ID or Query To ID.

   E N D   O F   S T E P S

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Cross-connect query results

Illustration   Use the following illustration only as an example of query results from the Cross Connect window.
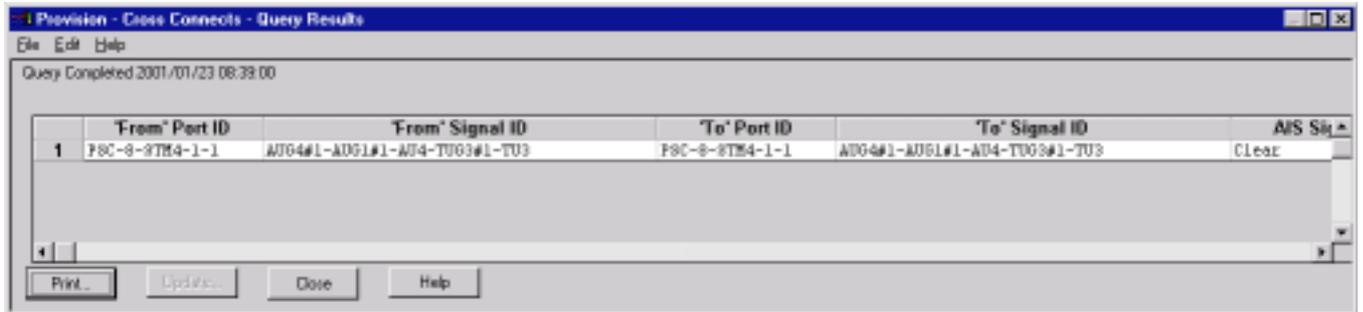
Important! The data displayed on this screen may *not* be typical.

Bidirectional cross connects

Bidirectional cross connects are displayed twice. Each end has its own record that is displayed as From Port ID and From Signal ID.

Results field descriptions   The following information appears in the Cross Connects Query Results window.

Column	Description
From Port ID	Displays the physical address of the input port.
From Signal ID	Displays the signal address of the input port.
To Port ID	Displays the physical address of the output port.
To Signal ID	Displays the signal address of the output port.
AIS Signal	Displays the Alarm Indication Signal (AIS) status of the To Signal ID as one of the following: • Clear — the cross connect does *not* have AIS provisioned • Set — the cross connect has AIS provisioned

Related topic   For more information about windows, see "About the main application window" (2-10).

Connecting or disconnecting cross connects

Gathering information   Do the following before *connecting* a cross connect.

1   Verify that the subrack is provisioned by querying the subrack at *Provision > Equipment > Subrack.*

2   Verify that the signal is provisioned by querying the signal type at *Provision > Transmission > Signal Type.*

E N D   O F   S T E P S

Procedure

1   Go to the Cross Connect window at *Provision > Cross Connects > Cross Connect.*

2   Click Bi-Directional or Uni-Directional in the Cross Connect Type field.

3   Select a value for the Signal Type field.

4   Select the Port ID and the Signal ID for the following:

- From ID input port (A)

- To ID output port (B)
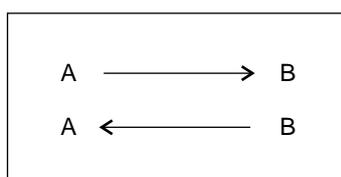
Bidirectional   Unidirectional
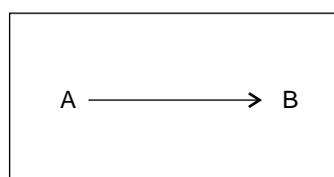
5   Click Connect or Disconnect.

E N D   O F   S T E P S

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Adding or removing multi-points to an existing cross connect

Purpose The following procedure describes how to add or remove multi-points to an *existing* cross connect.

Before you begin Verify that the cross connect is provisioned by querying the cross connect at *Provision > Cross Connects > Cross Connect.*

Procedure

1 Go to the Cross Connect window at *Provision > Cross Connects > Cross Connect.*

2 Click Uni-Directional in the Cross Connect Type field.

3 Select a value for the Signal Type field.

4 Select the Port ID and the Signal ID for the following:

- From ID input port (A)

- To ID output port (C)

If existing cross connect   If existing cross connect
(A -> B) is bidirectional   (A -> B) is unidirectional
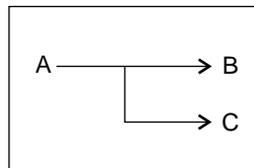
5 Click Connect or Disconnect.

Cross Connect window and procedures
Adding or removing multi-points to an
existing cross connect

Cross connects

....

6 Repeat Steps 4 and 5 to add or remove additional output ports.

```
┌─────────────────────┐   ┌─────────────────────┐
│ A ────────► B        │   │ A ──────► B          │
│           ► C        │   │       ► C            │
│ A ◄────── B          │   │       ► D            │
│ D ◄                  │   │                      │
└─────────────────────┘   └─────────────────────┘
```
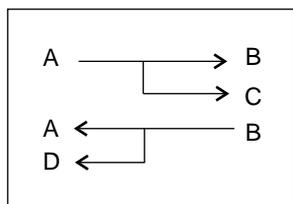
If existing cross connect   If existing cross connect
(A -> B) is bidirectional   (A -> B) is unidirectional

     From A To C   From A To C
     From B To D   From A To D

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Connecting or disconnecting a loopback cross connect

Purpose   Use this procedure to connect or disconnect a loopback cross connect. Loopback cross connects are typically used to isolate trouble on the port units during installation.

Procedure

1   Go to the Cross Connect window at *Provision > Cross Connects > Cross Connect.*

2   Click Uni-Directional in the Cross Connect Type field.

3   Select a value for the Signal Type field.

4   Select the From ID address in the Port ID and the Signal ID fields.

5   Select the To ID address in the Port ID and the Signal ID fields using the identical address you used for the From ID.

> **Result:**

6   Click Connect or Disconnect.

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Cross Connect window and procedures
Connecting or disconnecting a loopback
cross connect
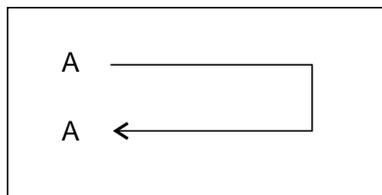
Cross connects

Related topic

To insert Alarm Indication Signal (AIS) on this loopback cross
connect, go to *Provision > Cross Connects > Insert AIS.*

☐

Connect Roll window and procedures

Overview

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Purpose	The Connect Roll window is used to provision rolls on cross connects.
Window location	*Provision > Cross Connects > Connect Roll*
Organisation	This section is organised as follows:

- "Connect Roll window description" (4-16)
- "Doing a unidirectional roll of a unidirectional cross connect" (4-19)
- "Doing a unidirectional roll of a bidirectional cross connect" (4-20)
- "Doing a bidirectional roll of a bidirectional cross connect" (4-23)
- "Rolling service in a network with no active service" (4-24)
- "Rolling service in a network with active service" (4-27)

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365–367–512
Issue 2, July 2002

Lucent Technologies

4 - 1 5

Connect Roll window description

Illustration   The following illustration shows the Connect Roll window.
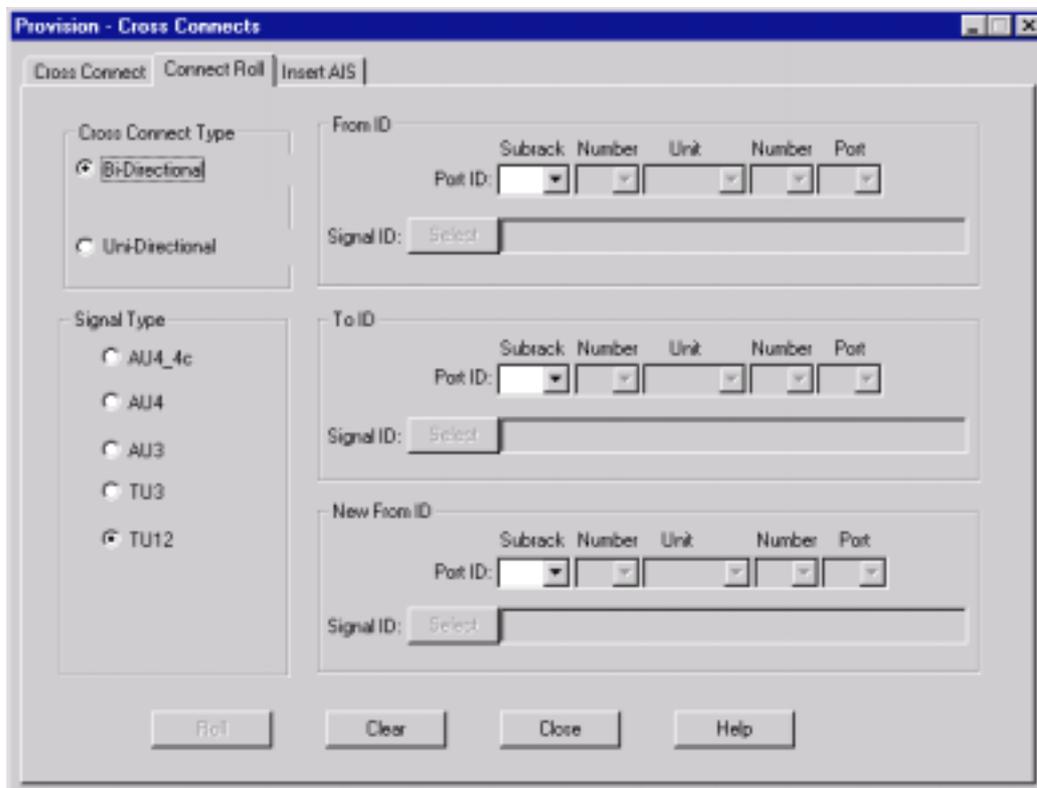
Field descriptions   The Connect Roll window has the following fields.

Field name	Description
Cross Connect Type	The Cross Connect Type field specifies the type of cross connect you want to roll as either unidirectional or bidirectional.
Bi-Directional	A bidirectional roll of a bidirectional cross connect replaces one two-way port with another two-way port at one end of a connection. Use this type of roll only if the cross connect you are rolling is *not* carrying traffic. For more information, see "Rolling service in a network with no active service" (4-24).

Field name	Description
Uni-Directional	A unidirectional roll of a unidirectional cross connect replaces one input with another. This type of roll is accomplished in one step. A unidirectional roll of a bidirectional cross connect replaces one two-way port with another two-way port at one end of a connection. Since this type of roll minimises traffic interruption, use this option when the cross connect you are rolling is carrying traffic. For more information, see "Rolling service in a network with active service" (4-27).
Signal Type	The Signal Type field specifies the signal level for cross-connect signal provisioning as AU4_4c, AU4, AU3, TU3, or TU12.
From ID	The From ID fields specify the Port ID and Signal ID addresses of the input port.
To ID	The To ID fields specify the Port ID and Signal ID addresses of the output port. When you select ALL in this field, the system will simultaneously roll all of the multi-point outputs connected to this input.
New From ID	The New From ID fields specify the address of the new input port. When rolling a cross connect, the new input port is the port to which the original input port is moved.
Port ID	The Port ID fields specify the physical location of the entity.
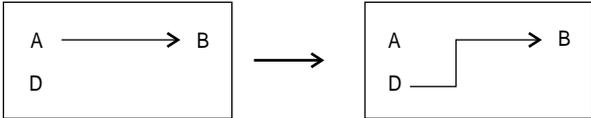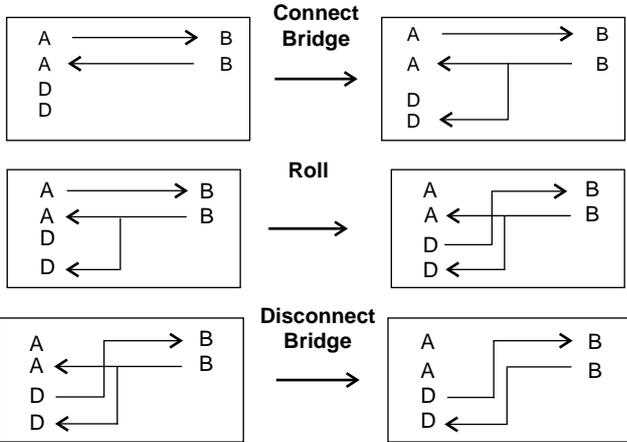
Field name	Description
Signal ID	The Signal ID field specifies the signal level of the address that you want to provision. The options available for Signal ID depend on the Signal Type. For a description of the Signal ID options, see "About signal layer addresses" (3-4).

Related topic For more information about windows, see "About the main application window" (2-10).

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Doing a unidirectional roll of a unidirectional cross connect

Purpose   Use this procedure to replace the input of a unidirectional cross connect with another.

Bridged unidirectional rolls   You can also use the following procedure to perform a bridged unidirectional roll. It is not necessary to specify the bridge because it already exists.

Procedure

1   Go to the Connect Roll window at *Provision > Cross Connects > Connect Roll.*

2   Click Uni-Directional in the Cross Connect Type field.

3   Select a value for the Signal Type field.

4   Select the Port ID and the Signal ID for the following:

   - From ID input port (A)
   - To ID output port (B)
   - New From ID port (D)
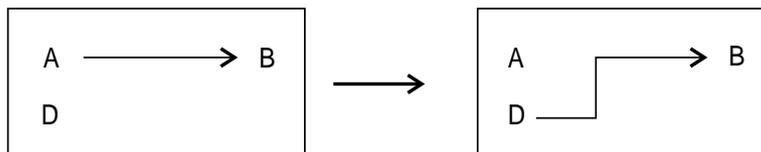
5   Click Roll.

   E N D   O F   S T E P S

Doing a unidirectional roll of a bidirectional cross connect

Purpose Use this procedure to replace one bidirectional port with another bidirectional port at one end of a cross connect. Use this method when the cross connect is carrying traffic.

Related topic

If the cross connect is *not* carrying traffic, see "Doing a bidirectional roll of a bidirectional cross connect" (4-23).

Procedure overview The following is a list showing the entire procedure for performing a unidirectional roll of a bidirectional cross connect:

- "Establish a bridge" (4-20)
- "Perform a unidirectional roll" (4-21)
- "Disconnect the old connection" (4-21)

Establish a bridge Establish a bridge from B to D on the B-to-A connection as follows:

1 Go to the Cross Connect window at *Provision > Cross Connects > Cross Connect.*

2 Click Uni-Directional in the Cross Connect Type field.

3 Select a value for the Signal Type field.

4 Select the Port ID and the Signal ID for the following:

- From ID input port (B)
- To ID output port (D)
  Select ALL for multi-point cross connects.

5 Click Connect.
E N D O F S T E P S

Connect Roll window and procedures
Doing a unidirectional roll of a bidirectional
cross connect
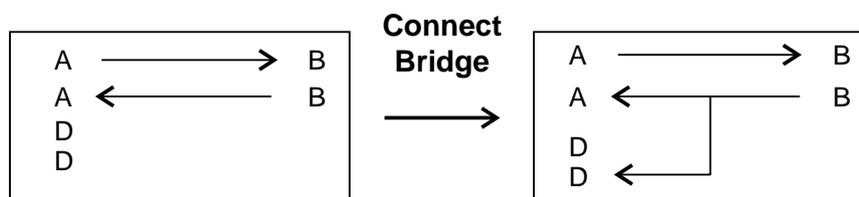
Cross connects

Perform a unidirectional roll

Perform a unidirectional roll from A to D on the A-to-B connection as follows:

....

1 Go to the Connect Roll window at *Provision > Cross Connects > Connect Roll.*

....

2 Click Uni-Directional in the Cross Connect Type field.

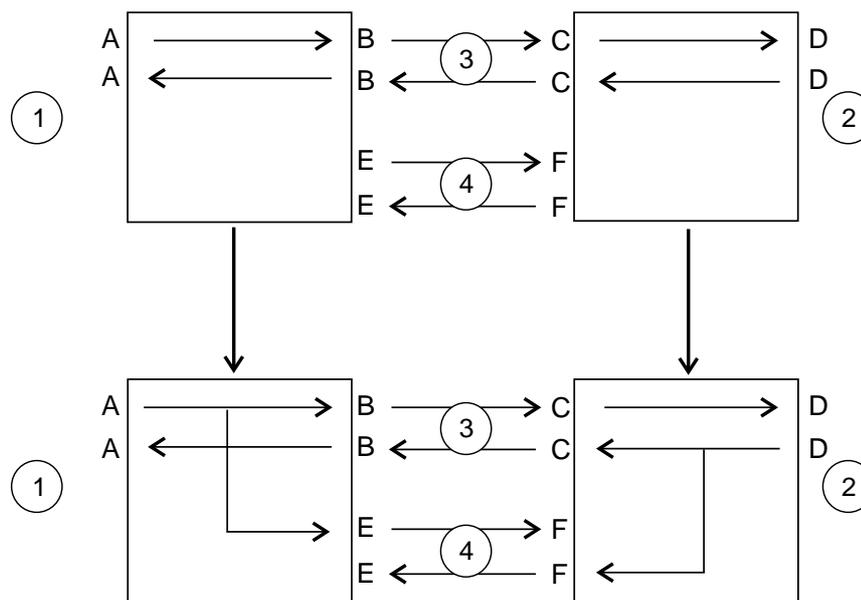...

3 Select a value for the Signal Type field.

....

4 Select the Port ID and the Signal ID for the following:

- From ID input port (A)

- To ID output port (B)
  Select ALL for multi-point cross connects.

- New From ID port (D)

....
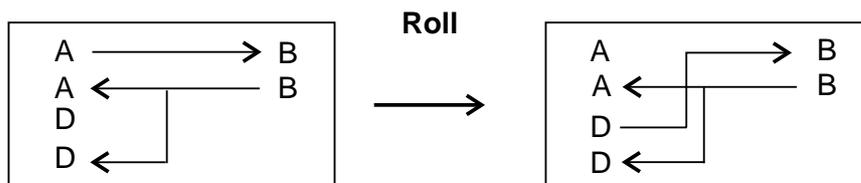
5 Click Roll.

E ND OF S TEPS
....

Disconnect the old connection

Disconnect the B-to-A connection as follows:

....

1 Go to the Cross Connect window at *Provision > Cross Connects > Cross Connect.*

....

2 Click Uni-Directional in the Cross Connect Type field.

....

3 Select a value for the Signal Type field.

....

365–367–512
Issue 2, July 2002

Lucent Technologies

4 - 2 1

Connect Roll window and procedures
Doing a unidirectional roll of a bidirectional
cross connect

Cross connects

....

4   Select the Port ID and the Signal ID for the following:

- •   From ID input port (B)

- •   To ID output port (A)
       Select ALL for multi-point cross connects.
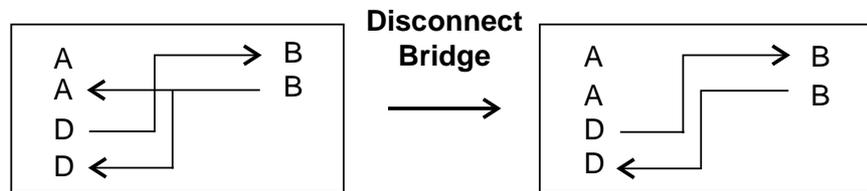
....

5   Click Disconnect.

E ND OF S TEPS

....

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4 - 2 2   **Lucent Technologies**   365–367–512
                                                                              Issue 2, July 2002

Doing a bidirectional roll of a bidirectional cross connect

Purpose   Use this procedure to replace one bidirectional port with another bidirectional port at one end of a cross connect. Use this method when the cross connect is *not* carrying traffic.

Related topic

If the cross connect is carrying traffic, see "Doing a unidirectional roll of a bidirectional cross connect" (4-20).

Procedure

1   Go to the Connect Roll window at *Provision > Cross Connects > Connect Roll.*

2   Click Bi-Directional in the Cross Connect Type field.

3   Select a value for the Signal Type field.

4   Select the Port ID and the Signal ID for the following:

   •   From ID input port (A)

   •   To ID output port (B)
       Select ALL for multi-point cross connects.

   •   New From ID port (D)
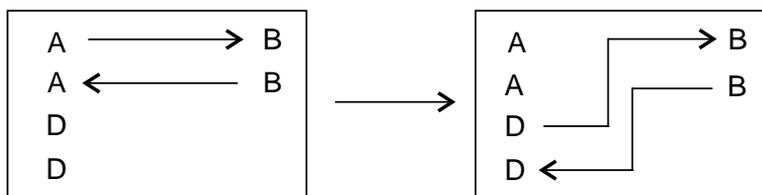
5   Click Roll.
    E N D   O F   S T E P S

Rolling service in a network with no active service

Purpose Typically, service is moved from one facility to another by rolling the service from the old facility to the new facility at the cross connects on each end. One way of doing this is to do a bidirectional roll of a bidirectional cross connect at each end. Use this method when there is no service carried over the facility.

Procedure overview The following is a list showing the entire procedure for rolling service in a network with no active service:

- "Perform a bidirectional roll at DACS 1" (4-24)

- "Perform a bidirectional roll at DACS 2" (4-25)

⚠ **CAUTION**

> *The method used in the following procedure causes service interruption. If service is carried over the facility, see "Rolling service in a network with active service" (4-27).*

Perform a bidirectional roll at DACS 1 Perform a bidirectional roll of a bidirectional cross connect at one end using the following procedure:

1 Go to the Connect Roll window at *Provision > Cross Connects > Connect Roll.*

2 Click Bi-Directional in the Cross Connect Type field.

3 Select a value for the Signal Type field.

4 Select the Port ID and the Signal ID for the following:

- From ID input port (B)

- To ID output port (A)

Connect Roll window and procedures
Rolling service in a network with no active
service

Cross connects

• New From ID port (E)

Legend:

1. DACS 1

2. DACS 2

3. Facility X

4. Facility Y

....
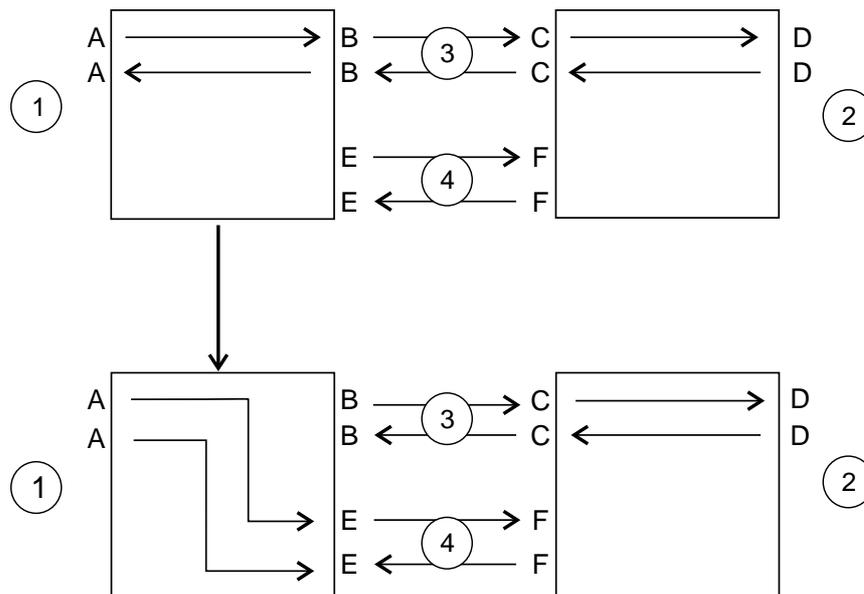
5 Click Roll.

E ND   OF   S TEPS
....

**Perform a bidirectional roll
at DACS 2**

Do a bidirectional roll of a bidirectional cross connect at the
other end using the following procedure:
....

1 Go to the Connect Roll window at *Provision > Cross Connects >
Connect Roll.*
....

2 Click Bi-Directional in the Cross Connect Type field.
....

3 Select a value for the Signal Type field.

....

365–367–512
Issue 2, July 2002

Lucent Technologies

4 - 2 5

Connect Roll window and procedures
Rolling service in a network with no active
service

Cross connects

....

4 Select the Port ID and the Signal ID for the following:

- From ID input port (C)

- To ID output port (D)

- New From ID port (F)

Legend:

1. DACS 1

2. DACS 2

3. Facility X

4. Facility Y

....

5 Click Roll.

E N D   O F   S T E P S
....

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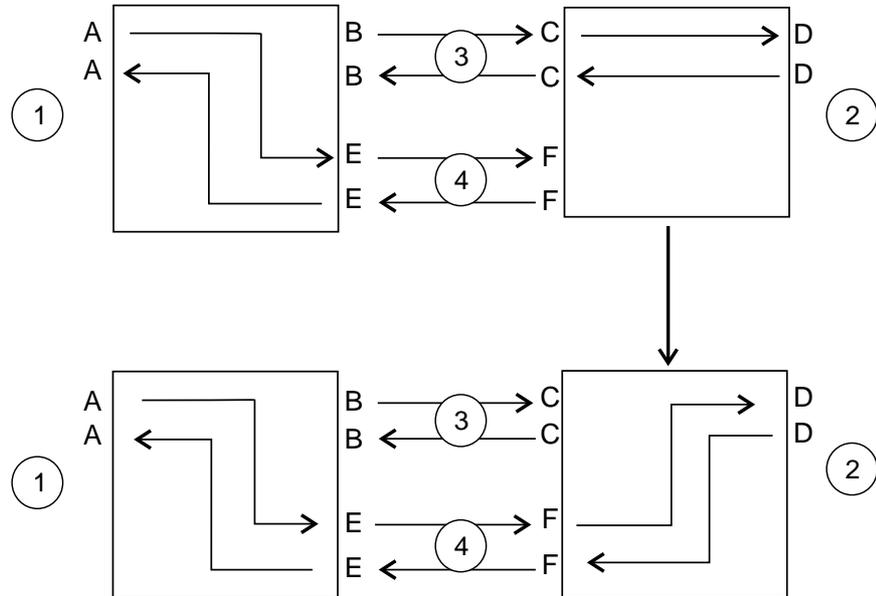
Rolling service in a network with active service

....

Purpose
To move *active* service from one facility to another, do a unidirectional roll of a bidirectional cross connect at DACS 1 and DACS 2.

Procedure overview
The following is a list showing the entire procedure for rolling service in a network with active service:

- "Establish a bridge cross connect" (4-27)
- "Perform a unidirectional roll" (4-28)
- "Disconnect the ports" (4-30)

Establish a bridge cross connect
Set up a bridge to the new facility in the send direction on each end by doing the following:

....

1 Go to the Cross Connect window at *Provision > Cross Connects > Cross Connect.*

....

2 Click Uni-Directional in the Cross Connect Type field.

....

3 Select a value for the Signal Type field.

....

4 Select the Port ID and the Signal ID for the following:

- From ID input port (A)
- To ID output port (E)

....

5 Click Connect.

....

6 Return to the Cross Connect window.

....

7 Click Uni-Directional in the Cross Connect Type field.

....

8 Select a value for the Signal Type field.

....

9 Select the Port ID and the Signal ID for the following:

- From ID input port (D)

....

Connect Roll window and procedures
Rolling service in a network with active
service

Cross connects

• To ID output port (F)

Legend:

1. DACS 1

2. DACS 2

3. Facility X

4. Facility Y

....

10 Click Connect.
E ND OF S TEPS ....

Perform a unidirectional roll

Do a unidirectional roll of the inputs on each end using the following procedure:
....

1 Go to the Connect Roll window at *Provision > Cross Connects > Connect Roll.*

....

2 Click Uni-Directional in the Cross Connect Type field.

....

3 Select a value for the Signal Type field.

....

4 - 2 8   **Lucent Technologies**   365–367–512
Issue 2, July 2002

Connect Roll window and procedures
Rolling service in a network with active
service

Cross connects

....

4 Select the Port ID and the Signal ID for the following:

- From ID input port (B)

- To ID output port (A)

- New From ID port (E)

....

5 Click Roll.

....

6 Return to the Connect Roll window.

....

7 Click Uni-Directional in the Cross Connect Type field.

....

8 Select a value for the Signal Type field.

....

9 Select the Port ID and the Signal ID for the following:

- From ID input port (C)

- To ID output port (D)

- New From ID port (F)

....

Connect Roll window and procedures
Rolling service in a network with active
service
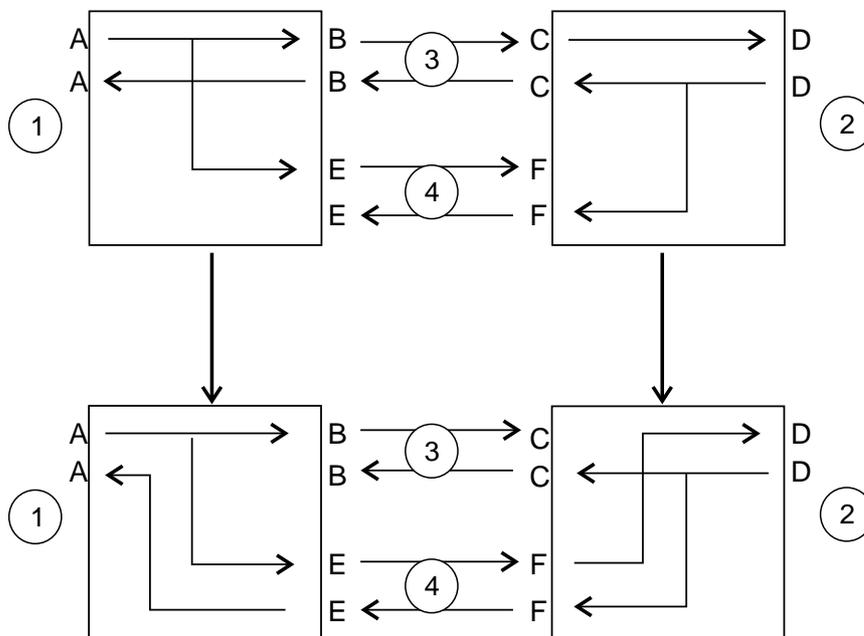
Cross connects

Legend:

1.   DACS 1

2.   DACS 2

3.   Facility X

4.   Facility Y

....

10   Click Roll.

E N D   O F   S T E P S
....

Disconnect the ports   Disconnect ports B and C from the bridge connections on each
end by doing the following:
....

1   Go to the Cross Connect window at *Provision > Cross Connects >
Cross Connect.*

....

2   Click Uni-Directional in the Cross Connect Type field.

....

3   Select a value for the Signal Type field.

....

4   Select the Port ID and the Signal ID for the following:

- From ID input port (A)

- To ID output port (B)

....

5   Click Disconnect.

....

6   Return to the Cross Connect window.

....

7   Click Uni-Directional in the Cross Connect Type field.

....

8   Select a value for the Signal Type field.

....

9   Select the Port ID and the Signal ID for the following:

- From ID input port (D)

....

Connect Roll window and procedures
Rolling service in a network with active
service

Cross connects

- To ID output port (C)
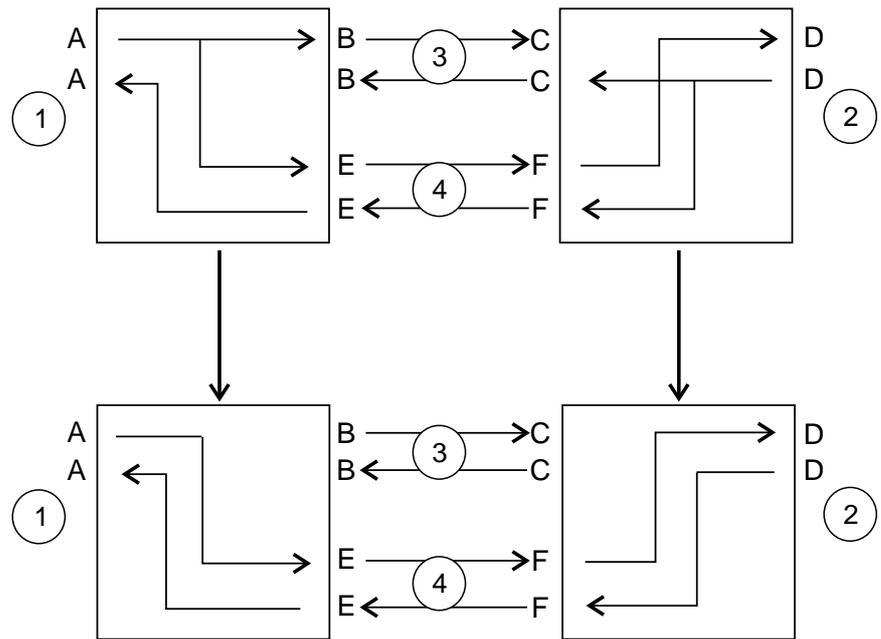
Legend:

1. DACS 1

2. DACS 2

3. Facility X

4. Facility Y

....

10 Click Disconnect.

E ND OF S TEPS

....

365–367–512
Issue 2, July 2002

Lucent Technologies

4 - 3 1

Insert AIS window and procedures

Overview

Purpose The Insert AIS window is used to insert or clear Alarm Indication Signal (AIS) on a provisioned cross connect.

Window location *Provision > Cross Connects > Insert AIS*

Organisation This section is organised as follows:

- "Insert AIS window description" (4-33)
- "Querying AIS" (4-35)
- "Provisioning AIS" (4-36)

□

Insert AIS window description

Illustration   The following illustration shows the Insert AIS window.
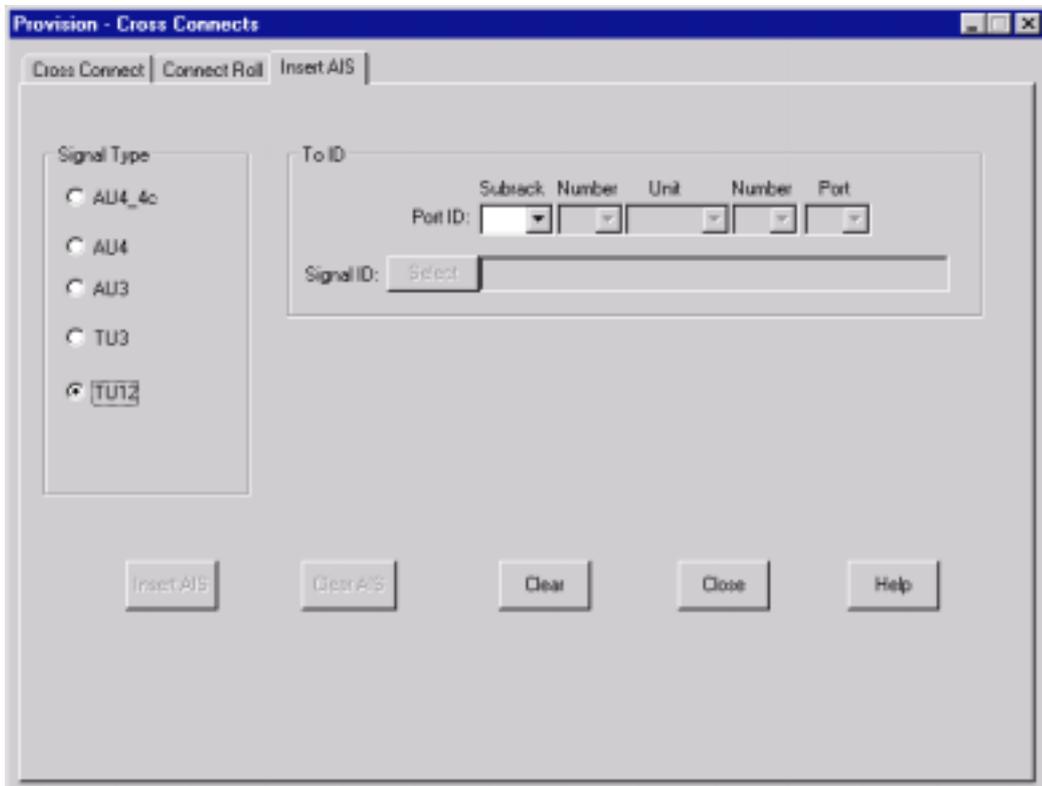
Field descriptions   The Insert AIS window has the following fields.

Field name	Description
Signal Type	The Signal Type field specifies the signal level for cross-connect signal provisioning as AU4_4c, AU4, AU3, TU3, or TU12.
To ID	The To ID fields specify the Port ID and Signal ID addresses for the output port of a provisioned cross connect.
Port ID	The Port ID field specifies the physical location of the output port.
Signal ID	The Signal ID field specifies the signal level of the address that you want to provision. The options available for Signal ID depend on the Signal Type.
	For a description of the Signal ID options, see "About signal layer addresses" (3-4).

Related topic   For more information about windows, see "About the main
application window" (2-10).

☐

Querying AIS

Procedure

1   Use the Cross Connect window to query the Alarm Indication Signal (AIS) status for the output port (To ID) of a provisioned cross connect.

   Reference:

   Go to *Provision > Cross Connects > Cross Connect.*

   E ND OF S TEPS

   ☐

Provisioning AIS

Before you begin Do the following before inserting AIS:

- Query the signal at *Provision > Cross Connects > Cross Connect*and verify that the signal is cross connected.

- You *cannot* insert AIS on signals that are provisioned as supervisory unequipped. Query the signal at *Provision > Transmission > High Order Path* and verify that the signal is provisioned as "Normal".

Procedure

1 Go to the Insert AIS window at *Provision > Cross Connects > Insert AIS.*

2 Select a value for the Signal Type field.

3 Select the Port ID and the Signal ID for the To ID output port.

4 Click Insert AIS or Clear AIS.

E N D   O F   S T E P S

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5   Monitoring control

Overview

Purpose   "Monitoring control" contains the following information:

- General information about provisioning monitoring control and alarm reporting

- Descriptions of the windows that are used to provision monitoring control and alarm reporting

- Step-by-step procedures for provisioning the following:

  - Monitoring control for transmission ports and for each signal layer within an STM-N signal

  - Alarm Indication Signal (AIS) and Remote Defect Indication (RDI) alarm reporting for each signal layer within an STM-N signal

Organisation   The organisation is as follows:

- "Background information" (5-2)

- "Port Monitoring window and procedures" (5-6)

- "Signal Monitoring window and procedures" (5-12)

□

Background information

Overview

....

Purpose   This section contains background information about provisioning monitoring control.

Organisation   This section is organised as follows:

- "General information about monitoring control" (5-3)
- "The monitoring control provisioning process" (5-5)

....

5 - 2   **Lucent Technologies**   365–367–512
                                                                                                     Issue 2, July 2002

General information about monitoring control

What is monitoring control? The system can be provisioned to monitor transmission ports and signals for defects and failures, and to report alarm conditions. Each transmission port and each signal layer within an STM-N signal can be provisioned as monitored or as not monitored. The following table shows the alarm conditions that are monitored if the corresponding layer is provisioned as monitored.

Layer	Alarm
Port	STMcLOS — Loss of incoming STM Signal
RS	RScLOF — Loss of STM Frame
MS	MScDEG — Multiplex Section Degraded bit error rate
	MScFOP — Multiplex Section Failure Of Protocol
AU	AUcLOP — Administrative Unit Loss Of Pointer
HP	HPcDEG — Higher order Path Degraded bit error rate
	HPcPLM — Higher order Path Payload Label Mismatch
	HPcTIM — Higher order Path Trace Identifier Mismatch
	HPcUNEQ — Higher order Path Unequipped
	TUcLOP — Tributary Unit Loss Of Pointer
TU	TUcLOM — Tributary Unit Loss Of Multiframe
LP	LPcDEG — Lower order Path Degraded bit error rate
	LPcTIM — Lower order Path Trace Identifier Mismatch
	LPcUNEQ — Lower order Path Unequipped

AIS and RDI alarm reporting The system monitors transmission defects and reports Alarm Indication Signal (AIS) and Remote Defect Indication (RDI) alarms only if the following provisioning tasks have been performed:

- The appropriate signal layers are provisioned as monitored (MON).

- AIS and RDI alarm reporting are enabled for the appropriate signal layers.

The following table shows the signal layers for which the reporting of AIS, RDI, or both can be enabled or disabled.

Layer	Alarm
MS	MScAIS
	MScRDI
AU	AUcAIS
HP	HPcRDI
TU	TUcAIS
LP	LPcRDI

□

The monitoring control provisioning process

Definition   Monitoring control provisioning is the process of specifying the ports and SDH signal layers for which you want alarms and defects reported.

Provisioning monitoring control   To provision monitoring control, do the following:

1   Use the Port Monitoring window to query and provision a monitoring mode for transmission ports.

2   Use the Signal Monitoring window to query and provision a monitoring mode for transmission signal layers.

3   Use the Signal Monitoring window to query and provision AIS or RDI alarm reporting for transmission signal layers.

□

Port Monitoring window and procedures

Overview

....

Purpose   Use the Port Monitoring window to query and provision the monitoring control mode for a port.

Window location   *Provision > Monitoring Control > Port Monitoring*

Organisation   This section is organised as follows:

- <u>"Port Monitoring window description" (5-7)</u>
- <u>"Querying port monitoring" (5-9)</u>
- <u>"Port Monitoring query results" (5-10)</u>
- <u>"Assigning port monitoring" (5-11)</u>

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Port Monitoring window description

Illustration   The following illustration shows the Port Monitoring window.

Field descriptions   The Port Monitoring window has the following fields.

Field name	Description
Port ID	The Port ID fields specify the physical location of a port.
	For a description of the Port ID options, see "About physical layer addresses" (3-3).
MON	Selecting the MON field turns on alarm and defect monitoring and reporting for the specified port.
NMON	Selecting the NMON field turns off alarm and defect monitoring and reporting for the specified port. No transmission alarms or defects will be reported for a port with a monitoring mode of NMON.
	NMON is the default value for monitoring mode.

Field name	Description
AUTO	Selecting the AUTO field turns on automatic alarm and defect monitoring and reporting for the specified port. With automatic monitoring, the port remains in NMON (not monitored) mode until a valid signal is received for a predetermined amount of time, then the port changes automatically to MON (monitored) mode. The amount of time that a valid signal must be received is set by the pre-service timer value.
	For a description of the pre-service timer, see "Pre-Service Timer " (12-13).

Related topic   For more information about windows, see "About the main application window" (2-10).

☐

Querying port monitoring

Procedure

1   Go to the Port Monitoring window at *Provision > Monitoring Control > Port Monitoring*.

2   Select the Port ID.

> **Reference:**
>
> For more information about Port IDs, see "About physical layer addresses" (3-3).

3   Click Query.

E ND O F S TEPS

□

Port Monitoring query results

Illustration Use the following illustration only as an example of query results for the Port Monitoring window.
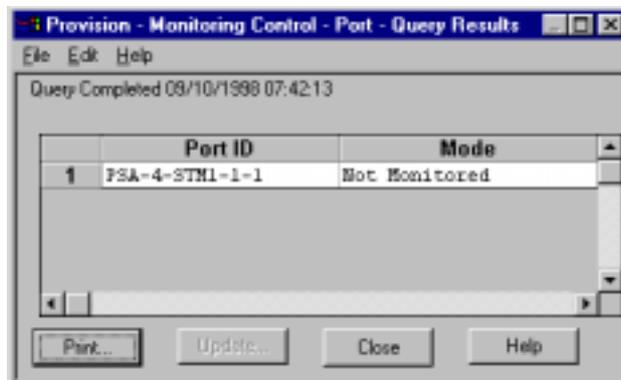
Important! The data displayed on this screen may *not* be typical.

Results field descriptions The following information appears in the Port Monitoring Query Results window.

Column	Description
Port ID	Displays the physical location of the port.
Mode	Displays the monitoring mode for the port. The values are as follows: • Monitored • Not Monitored

Related topic For more information about windows, see "About the main application window" (2-10).

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Assigning port monitoring

....

Procedure ....

1 Go to the Port Monitoring window at *Provision > Monitoring Control > Port Monitoring*.

....

2 Select the Port ID.

Reference:

For more information about Port IDs, see "About physical layer addresses" (3-3).

....

3 Select one of the following values for the monitoring control mode:

- MON
- NMON
- AUTO

....

4 Click Apply.

E ND OF S TEPS
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365–367–512 **Lucent Technologies** 5 - 1 1
Issue 2, July 2002

Signal Monitoring window and procedures

Overview

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Purpose Use the Signal Monitoring window to do the following:

- Query and provision alarm and defect monitoring for a signal layer.

- Enable or disable AIS or RDI alarm reporting for a signal layer.

Window location *Provision > Monitoring Control > Signal Monitoring*

Organisation This section is organised as follows:

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5 - 1 2   **Lucent Technologies**   365–367–512
Issue 2, July 2002

Signal Monitoring window description

Illustration   The following illustration shows the Signal Monitoring window.

Field descriptions   The Signal Monitoring window has the following fields.

Field name	Description
Port ID	The Port ID fields specify the physical location of a port.
	For a description of the Port ID options, see "About physical layer addresses" (3-3).
Signal ID	The Signal ID field specifies the multiplexing structure for a signal that you want to query or provision.
	For a description of the Signal ID options, see "About signal layer addresses" (3-4).

Field name	Description
Layer	The Layer field specifies the SDH signal layer for provisioning layer monitoring and alarm reporting. The valid values for the Layer field depend on the Signal ID that you specify. The following values may appear: • RS — Regenerator Section • MS — Multiplex Section • AU — Administrative Unit • HP — Higher order Path • TU — Tributary Unit • LP — Lower order Path
MON	Selecting the MON field turns on alarm and defect monitoring and reporting for the specified signal layer.
NMON	Selecting the NMON field turns off alarm and defect monitoring and reporting for the specified signal layer. No transmission alarms or defects will be reported for a signal layer with a monitoring mode of NMON. NMON is the default value for layer monitoring.
AIS Active	Selecting the AIS Active field enables the reporting of AIS alarms for the specified SDH signal layer.
AIS Inactive	Selecting the AIS Inactive field disables the reporting of AIS alarms for the specified SDH signal layer. AIS Inactive is the default value for layer alarm reporting.
RDI Active	Selecting the RDI Active field enables the reporting of RDI alarms for the specified SDH signal layer. RDI Active is the default value for layer alarm reporting.
RDI Inactive	Selecting the RDI Inactive field disables the reporting of RDI alarms for the specified SDH signal layer.

Related topic   For more information about windows, see "About the main application window" (2-10).

☐

Querying signal monitoring and alarm reporting

Procedure

1   Go to the Signal Monitoring window at *Provision > Monitoring Control > Signal Monitoring.*

2   Select the Port ID and the Signal ID.

3   Click Query.

    END OF STEPS

Signal Monitoring query results

Illustration   Use the following illustration only as an example of query results for the Signal Monitoring window.

Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The following information appears in the Signal Monitoring Query Results window.

Column	Description
Port ID	Displays the physical location of the port.
Signal ID	Displays the signal address.
SDH Layer	Displays the SDH signal layer associated with the Signal ID. The values are as follows: • RS — Regenerator Section • MS — Multiplex Section • AU — Administrative Unit • HP — Higher order Path • TU — Tributary Unit • LP — Lower order Path
All Alarms	Displays the monitoring status for all alarms. The values are as follows: • Monitored • Not Monitored
AIS Only	Displays the monitoring status for the AIS alarm. The values are as follows: • Monitored • Not Monitored

Column	Description
RDI Only	Displays the monitoring status for the RDI alarm. The values are as follows: • Monitored • Not Monitored

Related topic   For more information about windows, see "About the main application window" (2-10).

☐

Assigning RS and MS signal monitoring

Procedure

1 Go to the Signal Monitoring window at *Provision > Monitoring Control > Signal Monitoring.*

2 Select the Port ID.

3 Select RS or MS for the Layer field in Layer Monitoring.

4 Select one of the following values:
   - MON
   - NMON

5 Click Apply.
   E N D   O F   S T E P S

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Assigning AU, HP, TU, and LP signal monitoring

Procedure

1   Go to the Signal Monitoring window at *Provision > Monitoring Control > Signal Monitoring.*

2   Select the Port ID and the Signal ID.

3   Select a value for the Layer field in Layer Monitoring.

4   Select one of the following values:

   • MON

   • NMON

5   Click Apply.

E N D   O F   S T E P S

Turning AIS or RDI alarm reporting on or off

Procedure

1   Go to the Signal Monitoring window at *Provision > Monitoring Control > Signal Monitoring.*

2   Select the Port ID and the Signal ID.

3   Select a value for the Layer field in Layer Alarm Reporting.

4   Select one of the following values:

- Either AIS Active or AIS Inactive
- Either RDI Active or RDI Inactive

5   Click Apply.

E N D   O F   S T E P S

6   Equipment

Overview

Purpose   "Equipment" contains the following information:

- General information about equipment provisioning
- Descriptions of the windows that are used to provision equipment
- Step-by-step procedures for provisioning racks, subracks, and units

Organisation   The organisation is as follows:

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Background information

Overview

Purpose   This section contains background information about equipment provisioning.

Organisation   This section is organised as follows:

- "General information about equipment provisioning" (6-3)
- "Subrack degrade inhibit" (6-5)
- "MCLAN hub ports" (6-4)
- "About deleting units" (6-6)
- "The equipment provisioning process" (6-7)
- "Single-fibre PSA port subrack configurations" (6-9)
- "Dual-fibre PSA port subrack configurations" (6-10)
- "Single-fibre PSC port subrack configurations" (6-11)
- "Dual-fibre PSC port subrack configurations" (6-12)
- "Quad-fibre PSC port subrack configurations" (6-13)

□

General information about equipment provisioning

Definition

Equipment provisioning is the process of specifying the configuration of the system equipment. This includes specifying where equipment racks are located in the office, where a port subrack is located in an equipment rack, and the configuration of port subracks.

Equipment you can provision

You can provision only port racks, port subracks, and port units.

About provisioning the MC rack and the MS rack

The system provisions the subracks and units in the Matrix and Control (MC) rack and in the Matrix and Synchronisation (MS) rack when the system is installed. You cannot change the configuration of this equipment.

Interface mixing

Interface mixing allows the flexible assignment of different transmission interface types and different types of protection in a PSA subrack.

For more information about this feature, see one of the following topics:

- "Single-fibre PSA port subrack configurations" (6-9)
- "Dual-fibre PSA port subrack configurations" (6-10)

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MCLAN hub ports

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**MCLAN hub port
assignments**

The following table displays the MCLAN hub port assignments. The MCLAN hub ports do not need to be provisioned. The system automatically assigns a hub port when a subrack is created.

Port number	Is assigned to...
1	MC working
2	MC protection
3	MS working
4	MS protection
5	PSA-4 or PSC-4
6	PSA-5 or PSC-5
7	PSA-6 or PSC-6
8	PSA-7 or PSC-7
9	PSA-8 or PSC-8
10	PSA-9 or PSC-9
11	PSA-10 or PSC-10
12	PSA-11 or PSC-11
13	PSA-12 or PSC-12
14	PSA-13 or PSC-13
15	PSA-14 or PSC-14
16	PSA-15 or PSC-15
17	PSA-16 or PSC-16
18	PSA-17 or PSC-17
19	PSA-18 or PSC-18
20	PSA-19 or PSC-19

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Subrack degrade inhibit

What is subrack degrade inhibit?

The Subrack window has a Degrade Inhibit field. If checked (enabled), the Degrade Inhibit option inhibits matrix slice protection switching for the specified port subrack. If the field is unchecked (blank), the Degrade Inhibit option is disabled.

Why inhibit matrix slice protection switching?

Matrix slice protection is equipment protection for the cross-connect matrix and internal transmission paths. The matrix and internal transmission paths are composed of ten sets of components, called slices. Under normal circumstances, slices one through eight, the working slices, carry all system traffic. Slices nine and ten provide protection. A protection slice can substitute for one of the working slices or for the other protection slice if there is an equipment failure.

When a subrack is created, the Degrade Inhibit option is automatically set to enabled. This prevents the subrack provisioning process from causing a matrix slice protection switch.

☐

About deleting units

About provisioning a unit after deleting it

A unit is provisioned automatically when you insert it into a port subrack. Port units are the only units you can delete from the system database. Deleting a unit makes it nonoperational until it is reprovisioned by physically removing it from the subrack and re-inserting it or by initialising the unit.

Related topics

Use the following windows to initialise a unit:

- To initialise an SRC, use the Subrack Control window at *Maintenance > Controller Maintenance > Subrack Control.*

- To intialise any other unit, use the Unit Control window at *Maintenance > Controller Maintenance > Unit Control.*

About deleting units that are part of an equipment protection group

To delete a unit that is part of an equipment protection group, the following conditions must be true:

- If the unit is the protection unit of a 1:8 equipment protection group, the unit cannot be active.

- If the unit is a working unit of a 1:8 equipment protection group, the unit must be active.

Related topic

To query STM-1 1:8 protection groups and perform protection switch requests, use the STM1 1:8 window at *Protection > Equipment > STM1 1:8.*

What happens when you delete a port unit?

When you delete port units, the following will occur:

- If there is a corresponding Interface Unit (IU), the IU is also deleted.

- For an STM-1 protection unit, the equipment protection group is also deleted.

- All port parameters are reset to the default values.

Related topic

For more information about deleting equipment, see "The process for deleting units" (6-7).

□

The equipment provisioning process

The process for adding a subrack to an existing rack

To add a subrack to an existing rack, do the following:

1 Use the Subrack window to query and provision port subracks.

2 Insert port and interface units into the subracks.

The process for adding units to an existing rack and subrack

To add units to an existing rack and subrack, do the following:

1 Insert port and interface units into the subracks.

The process for deleting units

To delete units, do the following:

1 Find and delete any unit-related provisioning, such as a line-timing reference or an MSP protection group.

> **Reference:**
>
> For more information, see "Before deleting a unit" (6-40).

2 Use the Unit window to delete units.

> **Reference:**
>
> Use the Unit window at *Provision > Equipment > Unit.*

The process for deleting subracks and racks

To delete subracks, do the following:

1 Find and delete any unit-related provisioning, such as a line-timing reference or an MSP protection group.

> **Reference:**
>
> For more information, see "Before deleting a unit" (6-40).

2 Use the Unit window to delete units.

> **Reference:**
>
> Go to *Provision > Equipment > Unit.*

3 Use the Subrack window to delete subracks.

Reference:

Go to *Provision > Equipment > Subrack.*

....

4   Use the Rack window to delete racks.

Reference:

Go to *Provision > Equipment > Rack.*

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6 - 8   **Lucent Technologies**   365–367–512
Issue 2, July 2002

Single-fibre PSA port subrack configurations

About single-fibre PSA configurations

The single-fibre Port Subrack A (PSA) configuration supports up to 32 STM-1 equivalents and is best suited for Multiplex Section Protection (MSP). You can equip a single-fibre PSA subrack with STM-1 port units and any combination of optical or electrical interface units.

The port units can be configured in any of the following ways:

- Unprotected
- 1:8 equipment protection
- MSP
- Both 1:8 equipment protection and MSP

MSP and single-fibre PSA configurations

MSP can be assigned to a pair of ports on adjacent port units. The working port is on an odd-numbered port unit, and the protection port is the port with the same number on the even-numbered port unit to the right of the working port. ITU MSP, ANSI MSP, or NTT MSP can be used on any combination of STM-1 port units and electrical or optical interface units.

Since the even-numbered port units are always designated as the protection ports in an MSP group, and since single-fibre PSA subracks were designed to be used with MSP, bandwidth is not allocated to the even-numbered port units in a single-fibre PSA subrack. Consequently, you can provision cross connections only for ports on odd-numbered port units in a single-fibre PSA subrack.

Equipment protection

You can configure 1:8 equipment protection on a per-shelf basis. The system automatically creates an equipment protection group when an STM-1 port unit is inserted into slot 9 (upper shelf) or slot 19 (lower shelf). The protection unit can substitute for any port unit that has an electrical interface unit (IU) and is not provisioned for MSP. Even-numbered port units with electrical IUs will be protected, even though they do not carry traffic.

Related topics

For more information, see one of the following topics:

- "General information about MSP" (9-5)
- "Creating a single-fibre subrack" (6-30)

☐

Dual-fibre PSA port subrack configurations

About dual-fibre PSA configurations

The dual-fibre PSA subrack configuration supports up to 64 STM-1 equivalents and is best suited for 1:8 equipment protection or for unprotected port units. You can equip a dual-fibre PSA subrack with STM-1 port units and any combination of optical or electrical interface units.

MSP and dual-fibre PSA configurations

You can provision Multiplex Section Protection (MSP) in a dual-fibre subrack, but the overall system bandwidth will be reduced. Bandwidth is reduced because MSP uses two physical ports, but carries the bandwidth of one port.

Equipment protection

Because the dual-fibre subrack is designed to be used with 1:8 equipment protection or unprotected port units, bandwidth is allocated to all port units in the subrack except port units 9 and 19, which are used for 1:8 equipment protection.

You can configure 1:8 equipment protection on a per-shelf basis. The system automatically creates an equipment protection group when an STM-1 port unit is inserted into slot 9 (upper shelf) or slot 19 (lower shelf). The protection unit can substitute for any port unit that has an electrical interface unit and is not provisioned for MSP.

Related topics

For more information, see one of the following topics:

* "General information about MSP" (9-5)
* "Creating a dual-fibre PSA subrack" (6-30)

□

Single-fibre PSC port subrack configurations

About single-fibre PSC configurations

The single-fibre Port Subrack C (PSC) configuration supports up to 32 STM-1 equivalents. It can be equipped with STM-4 or STM-16 port units. You cannot mix STM-16 and STM-4 port units in the same subrack. You can equip a single-fibre PSC subrack with up to 8 STM-16 interfaces or up to 32 STM-4 interfaces.

Because bandwidth is allocated only to port units 1 and 3 in a single-fibre PSC subrack, it is best suited for applications that require only a small number of STM-16 or STM-4 interfaces.

MSP and single-fibre PSC configurations

MSP can be assigned to a pair of ports on adjacent port units. The working port is on an odd-numbered port unit, and the protection port is the port with the same number on the even-numbered port unit to the right of the working port. ITU MSP or ANSI MSP can be used on STM-16 or STM-4 ports.

No bandwidth is allocated to port units 2, 4, 5, 6, 7, and 8 in the single-fibre PSC configuration and, therefore, cross connects cannot be provisioned on these port units. Port units 5 and 6, or 7 and 8 can support other port functions such as line timing references or supervisory unequipped signal generation.

Equipment protection

You cannot use 1:8 equipment protection in a single-fibre PSC subrack.

Related topics

For more information, see one of the following topics:

- "General information about MSP" (9-5)
- "Creating a single-fibre subrack" (6-30)

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Dual-fibre PSC port subrack configurations

About dual-fibre PSC configurations

The dual-fibre PSC subrack configuration supports up to 64 STM-1 equivalents. It can be equipped with STM-4 or STM-16 port units. You cannot mix STM-16 and STM-4 port units in the same subrack. You can equip a dual-fibre PSC subrack with up to 8 STM-16 interfaces or up to 32 STM-4 interfaces.

The dual-fibre PSC subrack is best suited for Multiplex Section Protection (MSP), because bandwidth is allocated only to the odd-numbered port units. Port units in a dual-fibre PSC subrack can be unprotected. However, because bandwidth is not allocated to the even-numbered ports units, cross connects can be provisioned only for ports on odd-numbered port units.

MSP and dual-fibre PSC configurations

MSP can be assigned to a pair of ports on adjacent port units. The working port is on an odd-numbered port unit, and the protection port is the port with the same number on the even-numbered port unit to the right of the working port. ITU MSP or ANSI MSP can be used on STM-16 or STM-4 ports.

Since the even-numbered port units are always designated as the protection ports in an MSP group, and since dual-fibre PSC subracks were designed to be used with MSP, bandwidth is not allocated to the even-numbered port units in a dual-fibre PSC subrack. Consequently, you can provision cross connections only for ports on odd-numbered port units in a dual-fibre PSC subrack.

Equipment protection

You cannot use 1:8 equipment protection in a dual-fibre PSC subrack.

Related topics

For more information, see one of the following topics:

- "General information about MSP" (9-5)
- "Creating a dual-fibre PSC subrack" (6-31)

□

Quad-fibre PSC port subrack configurations

About quad-fibre PSC configurations

The quad-fibre PSC subrack configuration supports up to 128 STM-1 equivalents. It can be equipped with STM-4 or STM-16 port units. You cannot mix STM-16 and STM-4 port units in the same subrack. You can equip a quad-fibre PSC subrack with up to eight STM-16 or eight STM-4 port units.

The quad-fibre PSC subrack is best suited for unprotected port units, because bandwidth is allocated to all port units in the subrack.

MSP and quad-fibre PSC configurations

You can provision Multiplex Section Protection (MSP) in a quad-fibre subrack, but the overall system bandwidth will be reduced. Bandwidth is reduced because MSP uses two physical ports, but carries the bandwidth of one port.

Related topics

For more information, see one of the following topics:

- "General information about MSP" (9-5)
- "Creating a quad-fibre PSC subrack" (6-31)

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Rack window and procedures

Overview

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Purpose   Use the Rack window to query and provision equipment racks. You cannot create or delete the Main Controller and Matrix/Synchronisation racks (racks 1 and 2); you can change only the rack location. You can create, delete, or change port racks (racks 3 through 99).

Window location   *Provision > Equipment > Rack*

Organisation   This section is organised as follows:

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Rack window description

Illustration The following illustration shows the Rack window.
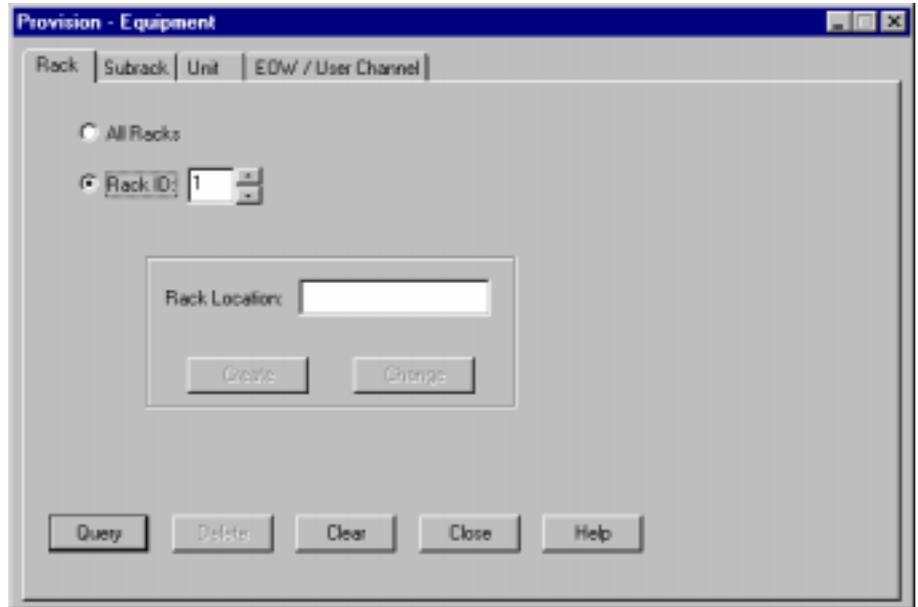
Field descriptions The Rack window has the following fields.

Field name	Description
Rack ID	The Rack ID field specifies the identification number for an equipment rack. The Rack ID must be unique, and it is required to create a rack. Once a rack is created, the Rack ID cannot be changed. The following values are available: • 1 — Main Controller and part of Matrix and Synchronisation rack • 2 — Matrix and Synchronisation rack • 3–99 — Port rack
Rack Location	The Rack Location field specifies the location of an equipment rack in the office. This field is optional when creating a rack and does not affect the operation of the system. This field accepts up to 12 alphanumeric characters. The characters *, ; : # { } space* are not allowed.

Related topic For general information about windows, see "About the main application window" (2-10).

□

Querying a rack

Procedure

1   Go to the Rack window at *Provision > Equipment > Rack.*

2   Select All Racks or a specific Rack ID.

3   Click Query.

E N D O F S T E P S

☐

Rack query results

....

Illustration   Use the following illustration as an example of query results for an All Racks query on the Rack window.

Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The Rack Query Results window has the following fields.

Column	Description
Rack ID	Displays the identification number for an equipment rack. The following values are available: • 1 — Main Controller and part of Matrix and Synchronisation rack • 2 — Matrix and Synchronisation rack • 3–99 — Port rack
Rack Location	Displays the location of an equipment rack in the office, as provisioned by the user.
Subrack ID	Displays the identification number for each subrack in a rack.
Subrack Type	Displays one of the following values: • MC — Main Controller subrack • MS — Matrix and Synchronisation subrack • PSA — Port subrack A • PSC — Port subrack C

Column	Description
Subrack Position	Displays one of the following values: • Top — Port and Main Controller subracks • Bottom — Port subracks • All — Matrix and Synchronisation subracks

Related topic   For general information about windows, see "About the main application window" (2-10).

☐

Creating a rack

Procedure

1 Go to the Rack window at *Provision > Equipment > Rack.*

2 Select the Rack ID.

3 Specify a Rack Location (optional).

4 Click Create.

E N D O F S T E P S

☐

Changing a rack

Procedure

1 Go to the Rack window at *Provision > Equipment > Rack.*

2 Select the Rack ID.

3 Specify a Rack Location.

4 Click Change.

E N D   O F   S T E P S

□

Deleting a rack

....

Before you begin   You can delete only port racks that do not have a subrack provisioned.

Procedure   ....

1   Go to the Rack window at *Provision > Equipment > Rack.*

    ....

2   Query the rack that you want to delete.

    ....

3   Are subracks provisioned?

If	Then
Subracks are provisioned.	Go to the Subrack window and delete the subracks.
Subracks are *not* provisioned, or after the subracks are deleted.	Go to the next step.

    ....

4   Select the Rack ID.

    ....

5   Click Delete.
    E N D   O F   S T E P S
    ....

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Subrack window and procedures

Overview

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Purpose   Use the Subrack window to query subracks and to provision port subracks. You can also use this window to provision the optical-fibre connections for each port subrack.

When creating a port subrack, you can provision the default multiplexing structure as either AU4 or TU12.

Window location   *Provision > Equipment > Subrack*

Organisation   This section is organised as follows:

- "Subrack window description" (6-23)
- "Querying a subrack" (6-26)
- "Subrack query results" (6-27)
- "Creating a subrack" (6-30)
- "Deleting a subrack" (6-32)
- "Enabling or disabling degrade inhibit for a subrack" (6-34)

□

....

Subrack window description

Illustration   The following illustration shows the Subrack window.

Field descriptions   The Subrack window has the following fields.

Field name	Description
Subrack ID	The Subrack ID fields specify the subrack identification number.
	To create a subrack, you must specify a unique Subrack ID.
Degrade Inhibit	If checked, the Degrade Inhibit field inhibits matrix slice protection switching for the specified port subrack. If unchecked, matrix slice protection switching is allowed.
	For more information about this feature, see "Subrack degrade inhibit" (6-5).
Rack ID	The Rack ID field specifies the identification number for an equipment rack. The Rack ID is required to create a subrack. The following values are available:
	• 1 — Main Controller and part of the Matrix and Synchronisation rack
	• 2 — Matrix and Synchronisation rack
	• 3–99 — Port rack

Field name	Description
Subrack Configuration	The Subrack Configuration field specifies the configuration of a port subrack. The following values are available: • Single Fibre — PSA or PSC • Dual Fibre — PSA or PSC • Quad Fibre — PSC only
Subrack Position	The Subrack Position field specifies the position of a subrack in an equipment rack. A port rack can be equipped with two port (PSA or PSC) subracks. A port subrack can be installed in the top or bottom half of a port rack. The values are as follows: • Top — Port subracks • Bottom — Port subracks • All — MC and MS subracks
Fibre 1	The Fibre 1 field specifies the first optical-fibre connection from the BSIUs to ports on the BSSUs. All fibres between the BSIUs and BSSUs for a given port subrack will go to the same BSSU port number on each of the BSSUs. You must select a value for the Fibre 1 field for all port subrack configurations. The following values are available: • 1–8 for a 256 system • 1–16 for a 512 system
Fibre 2	The Fibre 2 field specifies the second optical-fibre connection from the BSIUs to ports on the BSSUs. All fibres between the BSIUs and BSSUs for a given port subrack will go to the same BSSU port number on each of the BSSUs. You must select a value for the Fibre 2 field for dual-fibre and quad-fibre subrack configurations. The following values are available: • 1–8, NONE for a 256 system • 1–16, NONE for a 512 system

Field name	Description
Fibre 3	The Fibre 3 field specifies the third optical-fibre connection from the BSIUs to ports on the BSSUs. All fibres between the BSIUs and BSSUs for a given port subrack will go to the same BSSU port number on each of the BSSUs. You must select a value for the Fibre 3 field for quad-fibre subrack configurations. The following values are available: • 1–8, NONE for a 256 system • 1–16, NONE for a 512 system
Fibre 4	The Fibre 4 field specifies the fourth optical-fibre connection from the BSIUs to ports on the BSSUs. All fibres between the BSIUs and BSSUs for a given port subrack will go to the same BSSU port number on each of the BSSUs. You must select a value for the Fibre 4 field for quad-fibre subrack configurations. The following values are available: • 1–8, NONE for a 256 system • 1–16, NONE for a 512 system
Default Multiplexing	The Default Multiplexing field specifies the default multiplexing structure that will be assigned to port units when they are inserted into the subrack. If necessary, you can change a port's default multiplexing structure after you insert a port unit into the subrack. The following values are available for the port subracks: • AU4 • TU12 (default)

Related topics   For more information, see one of the following topics:

- "Single-fibre PSA port subrack configurations" (6-9)

- "Dual-fibre PSA port subrack configurations" (6-10)

- "Single-fibre PSC port subrack configurations" (6-11)

- "Dual-fibre PSC port subrack configurations" (6-12)

- "Quad-fibre PSC port subrack configurations" (6-13)

- For general information about windows, see "About the main application window" (2-10).

□

Querying a subrack

Procedure

1   Go to the Subrack window at *Provision > Equipment > Subrack.*

2   Do you want to query all subracks or a specific subrack?

If	Then
You want to query all subracks	Select the ALL value for the Subrack field.
You want to query a specific subrack	Select a value other than ALL for the Subrack and Number fields.

3   Click Query.

E ND O F S TEPS

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Subrack query results

....

Illustration   Use the following illustration only as an example of query results for the Subrack window.

Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The Subrack Query Results window has the following fields.

Column	Description
Rack ID	The Rack ID field displays the identification number for an equipment rack. The following values are available: • 1 — Main Controller and part of Matrix and Synchronisation rack • 2 — Matrix and Synchronisation rack • 3–99 — Port rack
Subrack ID	The Subrack ID field displays the identification number for each subrack in a rack. The following values are available: • 1 — Working Main Controller subrack • 2 — Protection Main Controller subrack • 3 — Matrix and Synchronisation subrack • 4–11 — port subrack on a 256 system • 4–19 — port subrack on a 512 system
Subrack Type	The Subrack Type field displays one of the following values: • MC — Main Controller subrack • MS — Matrix and Synchronisation subrack • PSA — Port Subrack A • PSC — Port Subrack C

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365–367–512
Issue 2, July 2002

Lucent Technologies

6 - 2 7

Column	Description
Subrack Position	The Subrack Position field displays one of the following values: • Top — Port or Main Controller subracks • Bottom — Port subracks • All — Matrix/Synchronisation subrack
Subrack Configuration	The Subrack Configuration field displays one of the following values: • STM16 - Single Fibre (PSC subracks) • STM16 - Dual Fibre (PSC subracks) • STM16 - Quad Fibre (PSC subracks) • STM4 - Single Fibre (PSC subracks) • STM4 - Dual Fibre (PSC subracks) • STM4 - Quad Fibre (PSC subracks) • STM1 - Single Fibre (PSA subracks) • STM1 - Dual Fibre (PSA subracks) • Blank (Main Controller and Matrix/Synchronisation subracks)
Fibre 1	The Fibre 1 field displays the Fibre 1 value as one of the following: • 1–8 for port subracks on a 256 system • 1–16 for port subracks on a 512 system • Blank for Main Controller subracks and Matrix/Synchronisation subracks
Fibre 2	The Fibre 2 field displays the Fibre 2 value as one of the following: • 1–8 for dual-fibre port subracks on a 256 system • 1–16 for dual-fibre port subracks on a 512 system • Blank for single-fibre port subracks, Main Controller subracks, and Matrix/Synchronisation subracks

Column	Description
Fibre 3	The Fibre 3 field displays the Fibre 3 value as one of the following: • 1–8 for quad-fibre port subracks on a 256 system • 1–16 for quad-fibre port subracks on a 512 system • Blank for single-fibre and dual-fibre port subracks, Main Controller subracks, and Matrix/Synchronisation subracks
Fibre 4	The Fibre 4 field displays the Fibre 4 value as one of the following: • 1–8 for quad-fibre port subracks on a 256 system • 1–16 for quad-fibre port subracks on a 512 system • Blank for single-fibre and dual-fibre port subracks, Main Controller subracks, and Matrix/Synchronisation subracks
Inhibit Status	The Inhibit Status field displays the degrade inhibit status for the subrack (Inhibit or Allowed).
Multiplexing	The Multiplexing field displays the default multiplexing structure for port subracks (AU4 or TU12).

Related topic   For general information about windows, see "About the main application window" (2-10).

☐

Creating a subrack

....

Before you begin   Do the following before creating a subrack:

- Verify that the rack that houses the subrack is provisioned. Use the Rack window at *Provision > Equipment > Rack* to query the rack.

- Verify that the MCLAN port is not connected to any device, including a valid device, such as an SRC.

Creating a single-fibre subrack

....

1   Go to the Subrack window at *Provision > Equipment > Subrack.*

....

2   Select values for the Subrack ID and Rack ID fields.

....

3   Select Single Fibre for the Subrack Configuration field.

....

4   Select values for the Subrack Position, Fibre 1, and Default Multiplexing fields.

....

5   Click Create.
    E N D   O F   S T E P S

Creating a dual-fibre PSA subrack

....

1   Go to the Subrack window at *Provision > Equipment > Subrack.*

....

2   Select values for the Subrack ID and Rack ID fields.

....

3   Select Dual Fibre for the Subrack Configuration field.

....

4   Select values for the Subrack Position, Fibre 1, Fibre 2, and Default Multiplexing fields.

....

5   Click Create.
    E N D   O F   S T E P S

....

Creating a dual-fibre PSC subrack

....

1 Go to the Subrack window at *Provision > Equipment > Subrack.*

....

2 Select values for the Subrack ID and Rack ID fields.

....

3 Select Dual Fibre for the Subrack Configuration field.

....

4 Select values for the Subrack Position, Fibre 1, Fibre 3, and Default Multiplexing fields.

....

5 Click Create.

E N D   O F   S T E P S
....

Creating a quad-fibre PSC subrack

....

1 Go to the Subrack window at *Provision > Equipment > Subrack.*

....

2 Select values for the Subrack ID and Rack ID fields.

....

3 Select Quad Fibre for the Subrack Configuration field.

....

4 Select values for the Subrack Position, Fibre 1, Fibre 2, Fibre 3, Fibre 4, and Default Multiplexing fields.

....

5 Click Create.

E N D   O F   S T E P S
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Deleting a subrack

....

Before deleting a subrack   Do the following before deleting a subrack:

....

1   Verify that diagnostic tests are not running on the subrack.

      Reference:

      To query any tests in progress or to cancel tests, go to
Maintenance > Background Tests.

....

2   Delete any line-timing references on the subrack.

      Reference:

      Use the System Clock window at *Provision > Synchronisation
and Timing > System Clock.*

....

3   Delete any Multiplex Section Protection (MSP) groups on the subrack.

      Reference:

      Use the MSP Group window at *Provision > Protection Switch >
MSP Group.*

....

4   Delete any cross connections on the subrack.

      Reference:

      Use the Cross Connect window at *Provision > Cross Connects
> Cross Connect.*

....

5   Remove the subrack controller from service.

      Reference:

      Use the Subrack Control window at *Maintenance > Controller
Maintenance > Subrack Control.*

E N D   O F   S T E P S
....

Procedure
....

1   Go to the Subrack window at *Provision > Equipment > Subrack.*

....

2   Select the Subrack ID.

....

3   Click Delete.

E N D   O F   S T E P S
....

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Enabling or disabling degrade inhibit for a subrack

Before you begin   Before you can enable or disable the Degrade Inhibit option, the port subrack must be provisioned (created).

Procedure

1   Go to the Subrack window at *Provision > Equipment > Subrack.*

2   Select the Subrack ID.

3   Select Degrade Inhibit (a check mark means enable degrade inhibit).

4   Click Apply.

E N D O F S T E P S

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Unit window and procedures

6 - 3 5

Overview

Purpose The Unit window is used to query units or to delete port units from a subrack.

Window location *Provision > Equipment > Unit*

Organisation This section is organised as follows:

- "Unit window description" (6-36)
- "Querying a unit" (6-37)
- "Unit query results" (6-38)
- "Deleting a unit" (6-40)

□

Unit window description

Illustration The following illustration shows the Unit window.
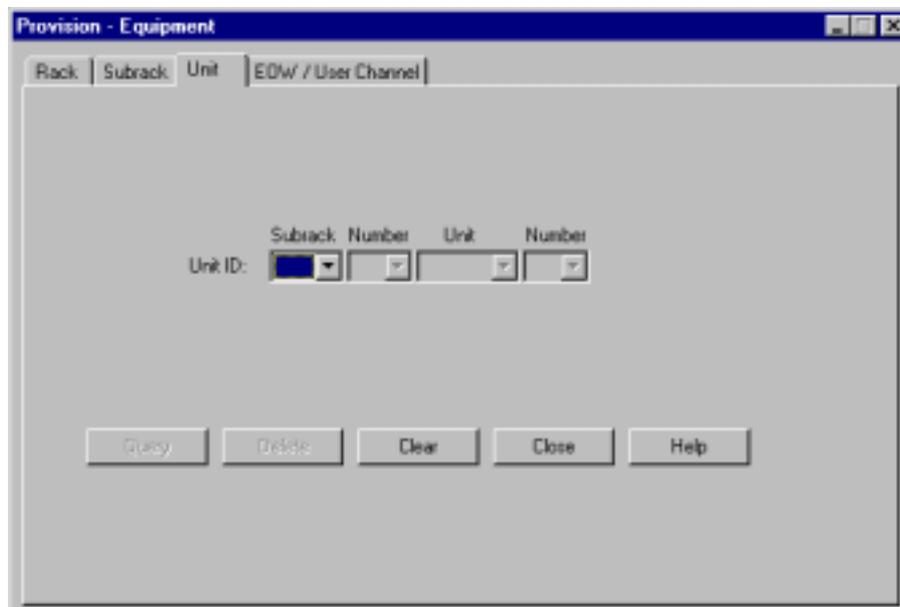
Field descriptions The Unit window has the following fields.

Field name	Description
Unit ID	The Unit ID fields specify the unit identification number.
	For a description of the Unit ID options, see "About physical layer addresses" (3-3).

Related topic For general information about windows, see "About the main application window" (2-10).

☐

Querying a unit

Procedure

1   Go to the Unit window at *Provision > Equipment > Unit.*

2   Do you want to query all units or a specific unit?

If	Then
You want to query all units in a subrack.	Select the ALL value for the Unit field.
You want to query a specific unit.	Select a value other than ALL for the Unit and Number fields.

3   Click Query.

Result:

This query may fail if a diagnostic test that has a high loop count is running on the Main Controller subrack. Wait until the diagnostic test completes before querying again.

E ND OF S TEPS

☐

Unit query results

Illustration   Use the following illustration only as an example of query results for the Unit window.

Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The Unit Query Results window has the following fields.

Column	Description
Unit ID	Displays the identification number of a unit.
	For a description of the Unit IDs, see "About physical layer addresses" (3-3).
Unit Status	Displays one of the following:
	• Not-required unit, needs to be initialised.
	• Unit is being initialised.
	• Attempt to initialise unit has failed.
	• Unit provisioned and initialised.
	• Required unit not present.
	• Wrong unit in slot. Population of slot is not required.
	• Wrong unit in slot. Population of slot is required.
	• Unit deleted but physically present and DB record present.
	• Controller unit out-of-service.
	• Unit undergoing maintenance procedures.

Column	Description
Apparatus Code	Displays the apparatus code of a unit.
Serial Number	Displays the serial number of a unit.
Series and Vintage	Displays the series and vintage of a unit.
Unit Qualifier	(see table below)

For	The screen displays
A port IU that is provisioned, but has not been inserted in the subrack	NONE
A port IU that is provisioned and inserted in the subrack	Electrical Optical NTT Optical ITU Optical S-1.1 (STM-4) Optical L-1.2 (STM-16)
An STM16 optical port unit	1310nm Long Haul
An STM4 optical port unit	1310nm Short Haul
A BSIU128	128 STM1 Capacity Matrix
An STU with a G.812 Type VI clock	2 Mhz Station Clock Input 64 Khz Station Clock Input
An STU with a G.812 Type I clock	2 Mhz Station Clock Input G.812 Type I 64 Khz Station Clock Input G.812 Type I
All other units	No value

Related topics For more information, see any of the following topics:

- For general information about windows, see "About the main application window" (2-10).

- For more information about the unit status, see the Controller maintenance chapter in the *Maintenance guide,* 365-367-513.

□

Deleting a unit

Purpose Use the following procedure only when you physically remove a port unit and plan to leave that slot empty. This procedure will remove the unit from the database.

Before deleting a unit Do the following before deleting a unit:

1 Verify that diagnostic tests are not running on the unit.

   Reference:

   To query any tests in progress or to cancel tests, use the Background Tests window at *Maintenance > Background Tests.*

2 Delete any line-timing references on the unit.

   Reference:

   Use the System Clock window at *Provision > Synchronisation and Timing > System Clock.*

3 Delete any Multiplex Section Protection (MSP) groups on the unit.

   Reference:

   Use the MSP Group window at *Provision > Protection Switch > MSP Group.*

4 Delete any cross connections on the unit.

   Reference:

   Use the Cross Connect window at *Provision > Cross Connects > Cross Connect.*

5 Query the cross connect to make sure that no trail on the unit is part of a Sub-Network Connection Protection (SNCP) group.

   Reference:

   Use the SNCP Group window at *Provision > Protection Switch > SNCP Group.*

   E N D   O F   S T E P S

Deleting a unit **Important!** You can delete only port units.

....

1 Go to the Unit window at *Provision > Equipment > Unit.*

....

2 Select the Unit ID.

....

3 Click Delete.

E N D   O F   S T E P S
....

Related topics For more information about deleting units, see one of the following topics.

- "About provisioning a unit after deleting it" (6-6)

- "About deleting units that are part of an equipment protection group" (6-6)

- "What happens when you delete a port unit?" (6-6)

- "The process for deleting units" (6-7)

□

7 EOW and user channel

Overview

Purpose "EOW and user channel" describes how to use the EOW / User Channel window. The EOW / User Channel window is used to provision an Engineering Order Wire (EOW) or user channel on a PSC subrack.

Window location *Provision > Equipment > EOW / User Channel*

Organisation "EOW and user channel" is organised as follows:

☐

EOW and user channel concepts

EOW The Engineering Order Wire (EOW) channel is a 64 kbps voice path used for communication between regenerator or multiplex section terminating equipment. This communication path is used primarily by technicians for maintenance communications. The E1 EOW channel is in the Regenerator Section (RS), and the E2 EOW channel is in the Multiplexer Section (MS). The E1 EOW channel in the RS can be accessed by RS terminating equipment. The E2 EOW channel in the MS can be accessed by MS terminating equipment.

Example

You can plug in a telephone using a standard voice jack at the repeater location, so that you can have instant voice access on the fibre span.

User channel Whereas the EOW channel is used primarily for voice communications, the user channel is used primarily for data. Each network provider can use the user channel to fit specific needs. The user channel uses the F1 bytes in the higher order path overhead.

□

EOW / User Channel window description

....

Illustration   The following illustration shows the EOW / User Channel window.

Field descriptions   The EOW / User Channel window has the following fields.

Field name	Description
Unit ID	The Unit ID fields specify the STM-4 or STM-16 unit identification number.
	For a description of the Unit ID options, see "About physical layer addresses" (3-3).
EOW	The EOW field specifies the Engineering Order Wire (EOW) port number connection. The values are as follows:
	• OFF
	• E1_PORT1
	• E2_PORT1
	• E1_PORT2
	• E2_PORT2
	• E1_PORT3
	• E2_PORT3
	• E1_PORT4
	• E2_PORT4
	The E1 EOW channel is in the Regenerator Section (RS), and the E2 EOW channel is in the Multiplexer Secton (MS).

....

Field name	Description
User Channel	The User Channel field specifies the user channel port number connection. The values are as follows: • F1_OFF • F1_PORT1 • F1_PORT2 • F1_PORT3 • F1_PORT4

Related topics   For more information, see one of the following topics:

• "EOW and user channel concepts" (7-2)

• For general information about windows, see "About the main application window" (2-10).

☐

Querying the EOW and user channel status

Procedure

1 Go to the EOW / User Channel window at *Provision > Equipment > EOW / User Channel.*

2 Enter the STM-4 or STM-16 address you wish to query in the Unit ID field.

   Reference:

   For more information about Unit ID addresses, see "About physical layer addresses" (3-3).

3 Click Query.

   E N D   O F   S T E P S

☐

EOW / User Channel query results

Illustration   Use the following illustration only as an example of query results for the EOW / User Channel window.

Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The EOW / User Channel Query Results window has the following fields.

Column	Description
Unit ID	Displays the identification number of the STM-4 or STM-16 unit. For a description of the Unit IDs, see "About physical layer addresses" (3-3).
EOW	The EOW field displays the Engineering Order Wire (EOW) port number connection.
User Channel	The User Channel field displays the user channel port number connection.

Related topics   For more information, see one of the following topics:

- "About the main application window" (2-10)
- "EOW and user channel concepts" (7-2)

☐

Changing the EOW

Procedure

1   Go to the EOW / User Channel window at *Provision > Equipment > EOW / User Channel.*

2   Enter the STM-4 or STM-16 address you wish to change in the Unit ID field.

   Reference:

   For more information about Unit ID addresses, see "About physical layer addresses" (3-3).

3   Select the appropriate value in the EOW field.

4   Click Apply.

   E N D   O F   S T E P S

   □

Changing the user channel

Procedure

1   Go to the EOW / User Channel window at *Provision > Equipment > EOW / User Channel.*

2   Enter the STM-4 or STM-16 address you wish to change in the Unit ID field.

   Reference:

   For more information about Unit ID addresses, see "About physical layer addresses" (3-3).

3   Select the appropriate value in the User Channel field.

4   Click Apply.
   E N D O F S T E P S

   □

8   Transmission

Overview

Purpose   "Transmission" contains the following information:

- General information about transmission provisioning

- Descriptions of the windows that are used to provision transmission ports and signals

- Step-by-step procedures for provisioning transmission ports, SDH signal layers, and higher order path parameters

Organisation   The organisation is as follows:

☐

Background information

Overview

Purpose   This section contains background information about transmission provisioning.

Organisation   This section is organised as follows:

- "Transmission provisioning terms" (8-3)
- "General information about transmission provisioning" (8-4)
- "The transmission provisioning process" (8-7)

□

Transmission provisioning terms

List of terms   **AU-3** An Administrative Unit 3 (AU-3) consists of a Virtual Container 3 (VC-3) plus an AU pointer.

AU-4 An Administrative Unit 4 (AU-4) consists of a Virtual Container 4 (VC-4) plus an AU pointer.

AU-4-4c An AU-4-4c consists of four concatenated, meaning linked together in a series, AU-4s.

Path Trace Identifier The purpose of the Path Trace Identifier (PTI) is to transmit a path access point identifier so that a receiving terminal can verify that the receiving terminal is connected to the intended transmitter.

TU-12 A Tributary Unit 12 (TU-12) consists of a Virtual Container 12 (VC-12) plus a TU pointer.

TU-3 A Tributary Unit 3 (TU-3) consists of a Virtual Container 3 (VC-3) plus a TU pointer.

☐

General information about transmission provisioning

Monitoring Control button

The Port, Signal Type, and High Order Path windows have a button labelled Monitoring Control. Clicking this button takes you directly to the Port Monitoring and Signal Monitoring windows. You can use these windows to specify the ports and SDH signal layers for which you want to monitor alarms and defects.

Signal type provisioning for STM-1 ports

The following illustration shows the multiplexing structure that the system supports for an STM-1 port. The signal types that can be provisioned and cross connected for an STM-1 port are shown as rectangles. The multiplexing factor is shown as an x plus a number. For example: the x3 above the TU-12 signal layer means that there are three TU-12s in a TUG2.

An AU-4 signal can be provisioned as TUG structured or as clear channel. A clear channel AU-4 does not have a TUG structure.
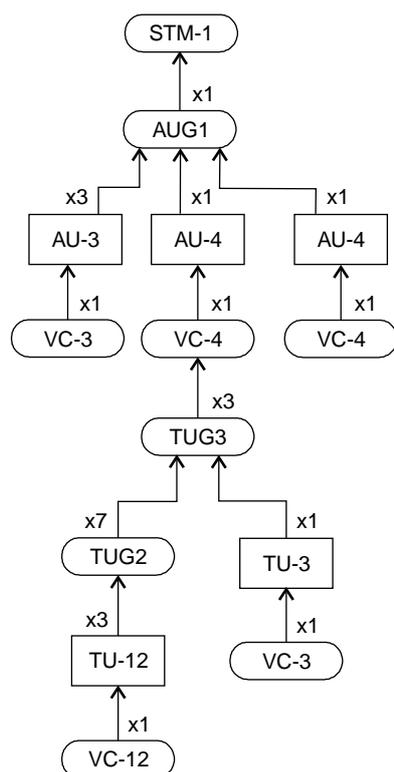
The signal type that you assign to an STM-1 port determines how that port can be cross connected. If you want to cross connect an STM-1 port at the TU-12 signal level, the signal type for that port must be provisioned as TU-12.

As shown in the multiplexing structure illustration, there are three TUG3s in an STM-1 signal.

The TUG3s in an STM-1 signal can be provisioned as follows:

- All TUG3s can be provisioned as TU-12s.

- All TUG3s can be provisioned as TU-3s.

- Individual TUG3s can be provisioned as either TU-12s or TU-3s. For example: the signal type for one TUG3 can be provisioned as TU-3, and the signal type for the other TUG3s can be provisioned as TU-12.

Signal type provisioning for STM-4 and STM-16 ports

The following illustration shows the multiplexing structure that the system supports for STM-4 and STM-16 ports.
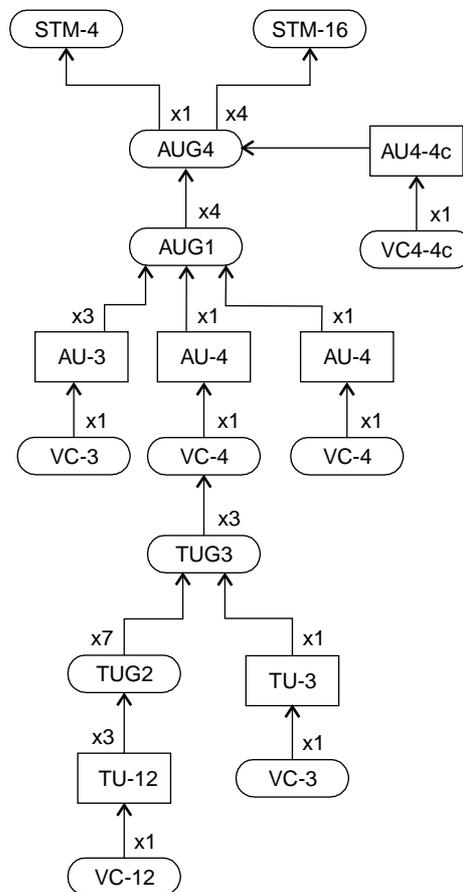
Changing the signal type

When you change the signal type from AU-4 to AU-3 or from AU-3 to AU-4, the system will change all higher order path parameters to the default values, and change the monitoring mode of the AU and HP layers to NMON (not monitored). When you change the signal type to TU-3 or TU-12, the system will change the monitoring mode of all the TUs in the changed TUG3s to NMON.

Related topic   For more information about signal addressing, see "Table of signal
layer addresses" (3-4).

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The transmission provisioning process

Provisioning transmission parameters

To provision transmission parameters, do the following:

1 Use the Port window to query and provision transmission parameters for a port.

   Reference:

   Use the Port window at *Provision > Transmission > Port.*

2 Use the Signal Type window to query and provision the signal type or multiplexing structure for a transmission port.

   Reference:

   Use the Signal Type window at *Provision > Transmission > Signal Type.*

3 Use the High Order Path window to query and provision higher order path parameters.

   Reference:

   Use the High Order Path window at *Provision > Transmission > High Order Path.*

4 Use the Low Order Path window to query and provision lower order path parameters.

   Reference:

   Use the Low Order Path window at *Provision > Transmission > Low Order Path.*

□

Port window and procedures

Overview

....

Purpose   Use the Port window to do the following:

- Query ports on a per-unit or per-port basis.

- Change the values of the port parameters M and IT%. These parameters determine when a Multiplex Section Degraded (MSdDEG) defect is declared.

Window location   *Provision > Transmission > Port*

Organisation   This section is organised as follows:

- "Port window description" (8-9)

- "Querying port transmission parameters" (8-11)

- "Port query results" (8-12)

- "Changing port transmission parameters" (8-14)

- "Enabling or disabling automatic laser shutdown" (8-15)

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8 - 8   **Lucent Technologies**   365–367–512
Issue 2, July 2002

Port window description

Illustration   The following illustration shows the Port window.
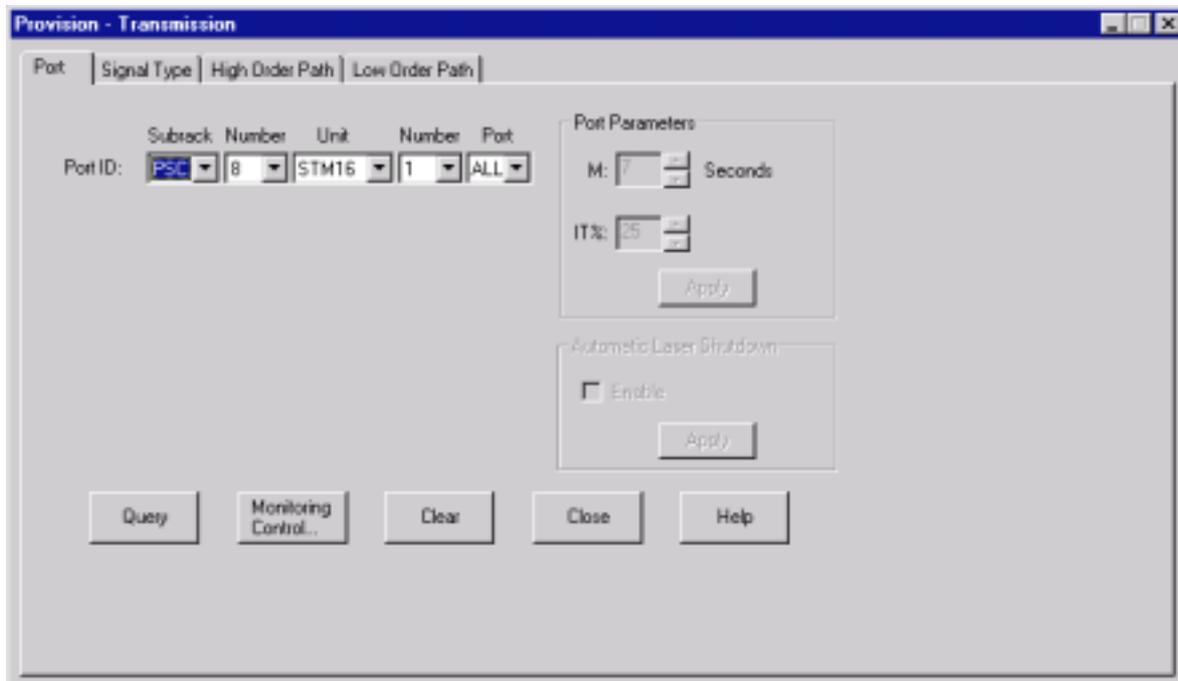
Field descriptions   The Port window has the following fields.

Field name	Description
Port ID	The Port ID fields specify the physical location of a port.
	For a description of the Port ID options, see "About physical layer addresses" (3-3).
M	The M field is a port parameter that specifies the number of consecutive errored seconds before a Multiplex Section Degraded (MSdDEG) defect is declared.
	The values are 2–10. The default value is 7.
IT%	The IT% field is a port parameter that specifies the minimum percentage of errored blocks detected in a one-second interval for the second to be considered errored. Combined with M, IT% determines when a Multiplex Section Degraded (MSdDEG) defect is declared.
	The values are 1–100. The default value is 25.

Field name	Description
Enable (Automatic Laser Shutdown)	A check in this box will enable the automatic laser shutdown feature. For more information about the automatic laser shutdown feature, see the *Maintenance guide,* 365-367-513.

Related topic   For general information about windows, see "About the main application window" (2-10).

□

Querying port transmission parameters

Procedure

1   Go to the Port window at *Provision > Transmission > Port.*

2   Do you want to query all ports on a unit or a specific port?

If	Then
You want to query all ports on a unit	Select the ALL value for the Port ID field.
You want to query a specific port	Select a value other than ALL for the Port ID field.

3   Click Query.

END OF STEPS

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Port query results

Illustration   Use the following illustration only as an example of query results for the Port window.

Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The Port Query Results window has the following fields.

Column	Description
Port ID	Displays the physical location of the port.
M (seconds)	Displays the M value (2–10). M is the number of consecutive errored seconds before a Multiplex Section Degraded (MSdDEG) defect is declared.
IT% Threshold	Displays the IT% value (1–100). IT% is the minimum percentage of errored blocks detected in a one-second interval for the second to be considered errored. Combined with M, IT% determines when a Multiplex Section Degraded (MSdDEG) defect is declared.
ALS	Displays the provisioned value of the Automatic Laser Shutdown (ALS) feature as one of the following: • ON • OFF • Not Applicable — for STM-1 ports

Column	Description
Laser	Displays the current state of the laser as one of the following: • ON • OFF • Not Applicable — for STM-1 ports

Related topic   For general information about windows, see "About the main application window" (2-10).

☐

Changing port transmission parameters

Procedure

1 Go to the Port window at *Provision > Transmission > Port.*

2 Select the Port ID.

Reference:

For more information about Port IDs, see "About physical layer addresses" (3-3).

3 Select values for the following fields:

- M

- IT%

4 Click Apply.

E N D O F S T E P S

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Enabling or disabling automatic laser shutdown

Procedure   The following procedure will enable or disable the automatic laser shutdown feature:

1   Go to the Port window at *Provision > Transmission > Port.*

2   Select the STM-4 or STM-16 Port ID that you want enabled or disabled.

   Reference:

   For more information about Port IDs, see "About physical layer addresses" (3-3).

3   Do you want to enable or disable automatic laser shutdown?

To	Then
Enable	Select the checkmark in the Enable field.
Disable	Deselect the checkmark in the Enable field.

4   Click Apply.
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Signal Type window and procedures

Overview

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Purpose Use the Signal Type window to do the following:

- Query the signal type assigned to a transmission port.

- Change the signal type or multiplexing structure of a transmission port.

Window location *Provision > Transmission > Signal Type*

Organisation This section is organised as follows:

- "Signal Type window description" (8-17)

- "Querying a signal type" (8-19)

- "Signal Type query results" (8-20)

- "Changing a signal type" (8-22)

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8 - 1 6   **Lucent Technologies**   365–367–512
Issue 2, July 2002

Signal Type window description

Illustration The following illustration shows the Signal Type window.
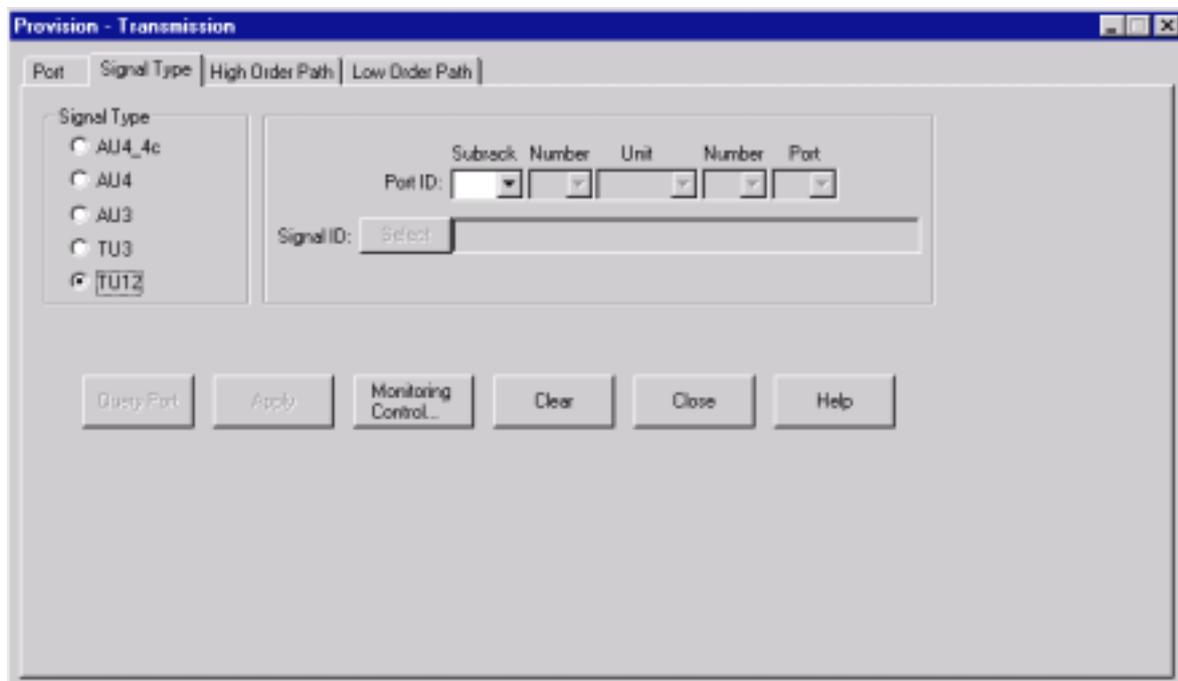
Field descriptions The Signal Type window has the following fields.

Field name	Description
Signal Type	The Signal Type field specifies the signal level for provisioning a transmission signal. The values are as follows: • AU4_4c • AU4 • AU3 • TU3 • TU12
Port ID	The Port ID fields specify the physical location of a port. For a description of the Port ID options, see "About physical layer addresses" (3-3).

Field name	Description
Signal ID	The Signal ID field specifies the multiplexing structure for a signal. The options available for Signal ID depend on the Signal Type. For a description of the Signal ID options, see "About signal layer addresses" (3-4).

Related topic For general information about windows, see "About the main application window" (2-10).

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Querying a signal type

Procedure

1   Go to the Signal Type window at *Provision > Transmission > Signal Type*.

2   Select the Port ID.

Reference:

For more information about Port IDs, see "About physical layer addresses" (3-3).

3   Click Query.

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Signal Type query results

Illustration   Use the following illustration only as an example of query results for the Signal Type window.
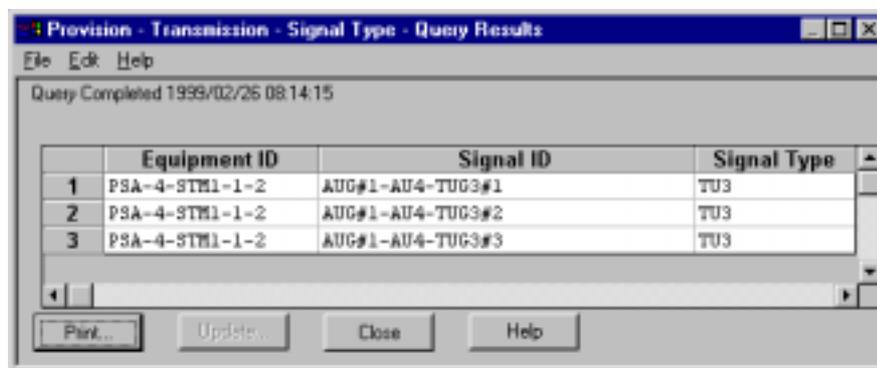
Important! The data displayed on this screen may *not* be typical.

Results field descriptions   Depending on how an STM-1 port is provisioned, either one record (row of data) or three records will be displayed for a signal type query. For an STM-1 port provisioned as AU-3, TU-3, or TU-12, three records (rows) will be displayed. For an STM-1 port provisioned as AU-4 one record will be displayed.

The following information appears in the Signal Type Query Results window.

Column	Description
Equipment ID	The Equipment ID column displays the physical location of the equipment you queried. For a description of the equipment addresses, see "About physical layer addresses" (3-3).
Signal ID	The Signal ID column displays the multiplexing structure of a signal. The options available for Signal ID depend on the Signal Type. For a description of the Signal ID options, see "About signal layer addresses" (3-4).
Signal Type	The Signal Type column displays one of the following values: • AU4_4c • AU4 • AU3 • TU3 • TU12

Related topic   For general information about windows, see "About the main
                    application window" (2-10).

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Changing a signal type

Before you begin   You cannot change a signal type if:

- The affected unit is the protection unit in an STM-1 1:8 electrical protection group.

- The affected port is the protection port in an MSP group.

- The signal layer that you want to change has a cross connect provisioned.

- The higher order path of the affected port is provisioned as supervisory unequipped.

Procedure

1   Go to the Signal Type window at *Provision > Transmission > Signal Type.*

2   Select the Signal Type, Port ID, and Signal ID.

3   Click Apply.

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High Order Path window and procedures

Overview

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Purpose   Use the High Order Path window to query and provision higher order path parameters.

Higher order path parameters apply to the following:

- AU-4-4c, AU-4, and AU-3 clear-channel signals provisioned as supervisory unequipped

- TUG-structured AU-4 signals that contain TU-3s or TU-12s

Higher order path parameters do *not* apply to AU-4-4c, AU-4, and AU-3 clear-channel signals that are provisioned as Normal.

The values that you specify for the M and IT% parameters determine when a Higher order Path Degraded (HPdDEG) defect is declared.

Window location   *Provision > Transmission > High Order Path*

Organisation   This section is organised as follows:

- "High Order Path window description" (8-24)

- "Querying higher order path parameters" (8-27)

- "High Order Path query results" (8-28)

- "Changing higher order path parameters" (8-30)

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High Order Path window description

Illustration   The following illustration shows the High Order Path window.
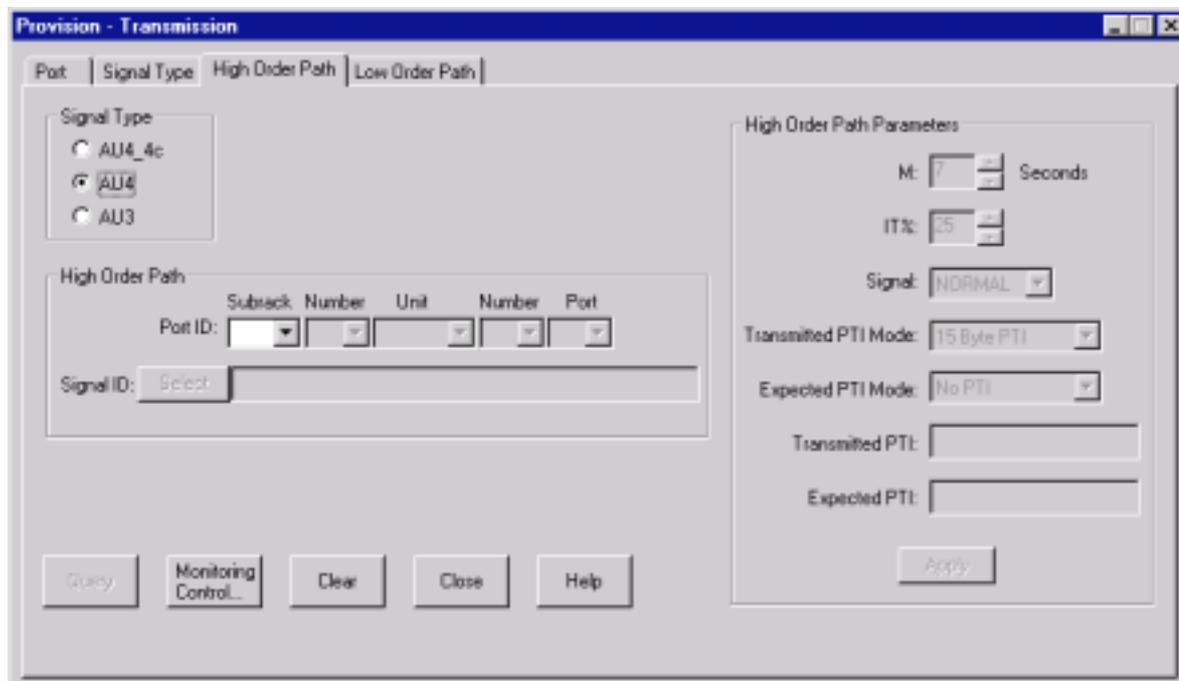
Field descriptions   The High Order Path window has the following fields.

Field name	Description
Signal Type	The Signal Type field specifies the signal level for a transmission signal. The values are as follows: • AU4_4c • AU4 • AU3 To provision higher order path parameters for a signal multiplexed as TU-3 or TU-12, choose AU-4 as the Signal Type.
Port ID	The Port ID fields specify the physical location of a port. For a description of the Port ID options, see "About physical layer addresses" (3-3).

Field name	Description
Signal ID	The Signal ID field specifies the multiplexing structure for a transmission signal. The options available for Signal ID depend on the Signal Type. For a description of the Signal ID options, see "About signal layer addresses" (3-4).
M	The M field is a higher order path parameter that specifies the number of consecutive errored seconds before a Higher order Path Degraded (HPdDEG) defect is declared. The values are 2–10. The default value is 7.
IT%	The IT% field is a higher order path parameter that specifies the minimum percentage of errored blocks detected in a one-second interval for the second to be considered errored. Combined with M, IT% determines when a Higher order Path Degraded (HPdDEG) defect is declared. The values are 1–100. The default value is 25.
Signal	The Signal field is a higher order path parameter that specifies the type of outgoing signal for a higher order path. The values are as follows: • Normal — The outgoing signal is a normal signal. • Supuneq — The outgoing signal is a supervisory unequipped signal as defined by ITU-T G.783. The default value is Normal.
Transmitted PTI Mode	The Transmitted PTI Mode field is a higher order path parameter that specifies the mode that a port uses to transmit the Path Trace Identifier. The values are as follows: • 15 Byte PTI — A specific string of characters plus the result of a CRC-7 calculation will be transmitted. • No PTI — No PTI value is transmitted. The default value is 15 Byte PTI.

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365–367–512
Issue 2, July 2002

Lucent Technologies

8 - 2 5

Field name	Description
Expected PTI Mode	The Expected PTI Mode field is a higher order path parameter that specifies the mode of the Path Trace Identifier that a port expects to receive. The values are as follows: • 15 Byte PTI — A specific string of characters plus the result of a CRC-7 calculation will be received. • No PTI — The received PTI value is ignored. The default value is No PTI.
Transmitted PTI	The Transmitted PTI field is a higher order path parameter that specifies the Path Trace Identifier that a port transmits. A value can be specified for this field only if the Transmitted PTI Mode field is set to 15 Byte PTI. This field accepts up to 15 alphanumeric characters. The characters *, ; : # { } space* are not allowed. The default value is WaveStar.
Expected PTI	The Expected PTI field is a higher order path parameter that specifies the Path Trace Identifier that a port expects to receive. A value can be specified for this field only if the Expected PTI Mode field is set to 15 Byte PTI. This field accepts up to 15 alphanumeric characters. The characters *, ; : # { } space* are not allowed.

Related topic   For general information about windows, see "About the main application window" (2-10).

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Querying higher order path parameters

Procedure

1   Go to the High Order Path window at *Provision > Transmission > High Order Path.*

2   Select the Signal Type and the Port ID.

3   Click Query.
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High Order Path query results

Illustration   Use the following illustration only as an example of query results for the High Order Path window.
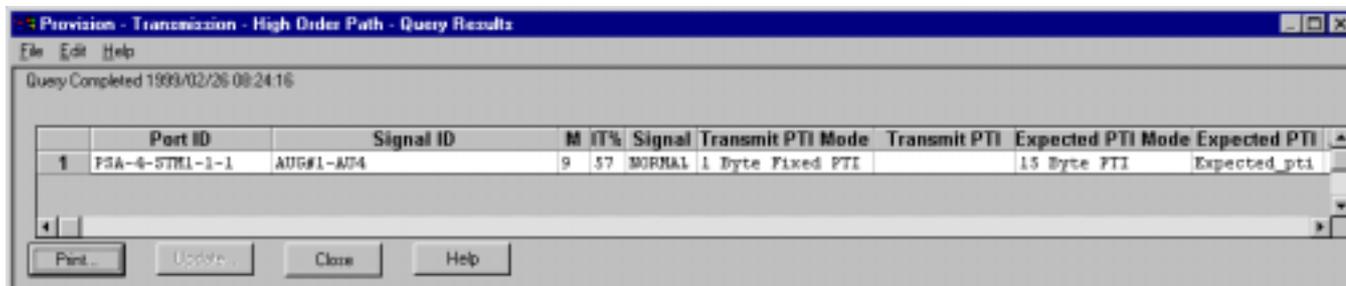
Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The following information appears in the High Order Path Query Results window.

Column	Description
Port ID	Displays the physical location of the port.
Signal ID	Displays the multiplexing structure of the signal. The options available for Signal ID depend on the Signal Type.
	For a description of the Signal ID options, see "About signal layer addresses" (3-4).
M	Displays the M value (2–10). M is the number of consecutive errored seconds before a Higher order Path Degraded (HPdDEG) defect is declared.
IT%	Displays the IT% value (1–100). IT% is the minimum percentage of errored blocks detected in a one-second interval for the second to be considered errored. Combined with M, IT% determines when a Higher order Path Degraded (HPdDEG) defect is declared.
Signal	Displays one of the following values: • Normal — The outgoing signal is a normal signal. • Supuneq — The outgoing signal is a supervisory unequipped signal as defined by ITU-T G.783.

Column	Description
Transmit PTI Mode	Displays one of the following values: • 15 Byte PTI • No PTI
Transmit PTI	Displays the Transmitted PTI value.
Expected PTI Mode	Displays one of the following values: • 15 Byte PTI • No PTI
Expected PTI	Displays the Expected PTI value.
Accepted PTI	Displays the accepted Path Trace Identifier (PTI). The accepted PTI will be displayed if the expected PTI mode is provisioned as 15 Byte PTI and a valid path trace is being received. If a valid PTI is not received, or if the expected PTI mode is provisioned as No PTI, the Accepted PTI column will be blank.
Accepted PSL	Displays the accepted Path Signal Label (PSL). If a valid PSL is not received, the Accepted PSL column will be blank.

Related topic For general information about windows, see "About the main application window" (2-10).

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Changing higher order path parameters

Before you begin   You cannot provision higher order path parameters if:

- The affected unit is the protection unit in an STM-1 1:8 electrical protection group.

- The affected port is the protection port in an MSP group.

Procedure

1   Go to the High Order Path window at *Provision > Transmission > High Order Path.*

2   Select the Signal Type, Port ID, and Signal ID.

3   Select values for one or more of the following fields:

- M

- IT%

- Signal

- Transmitted PTI Mode

- Expected PTI Mode

- Transmitted PTI

- Expected PTI

4   Click Apply.

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Low Order Path window and procedures

Overview

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Purpose Use the Low Order Path window to query and provision lower order path parameters.

Lower order path parameters apply to TUG-structured AU-4 signals that contain TU-3s or TU-12s. Also, the TUG-structured AU-4 signal must be provisioned as supervisory unequipped.

Lower order path parameters do *not* apply to TUG-structured AU-4 signals that are provisioned as Normal.

The values that you specify for the M and IT% parameters determine when a Lower order Path Degraded (LPdDEG) defect is declared.

Window location *Provision > Transmission > Low Order Path*

Organisation This section is organised as follows:
- "Low Order Path window description" (8-32)
- "Querying lower order path parameters" (8-34)
- "Low Order Path query results" (8-35)
- "Changing lower order path parameters" (8-37)

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365–367–512
Issue 2, July 2002

Lucent Technologies

8 - 3 1

Low Order Path window description

Illustration   The following illustration shows the Low Order Path window.
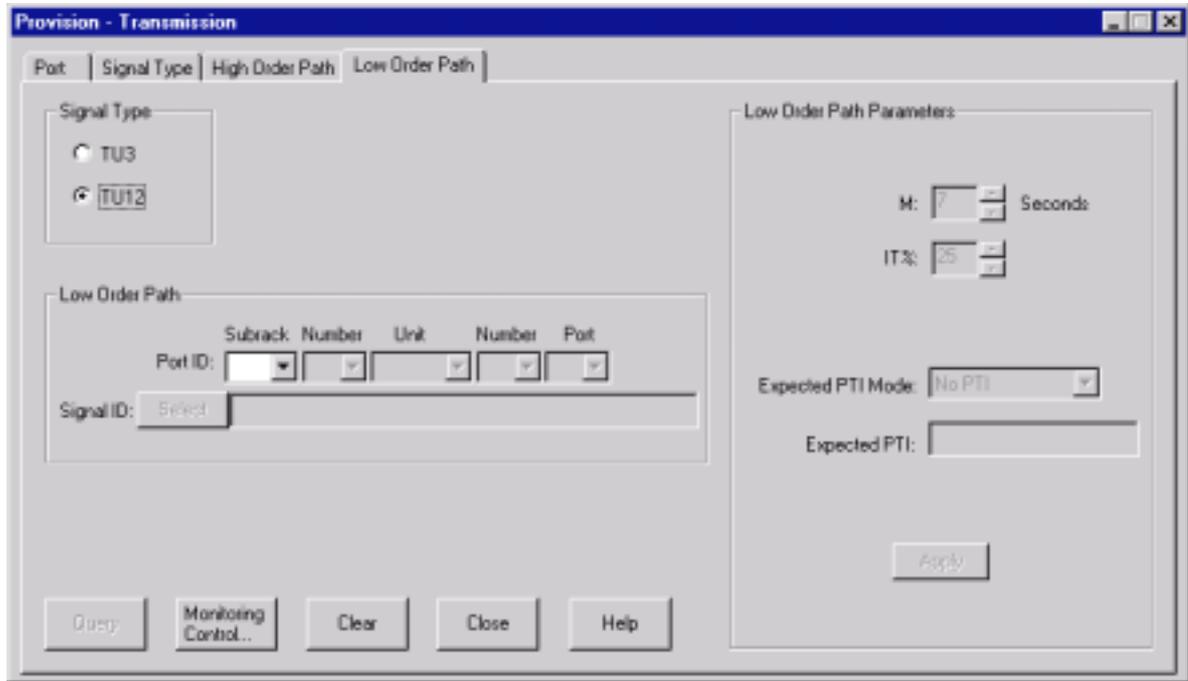
Field descriptions   The Low Order Path window has the following fields.

Field name	Description
Signal Type	The Signal Type field specifies the signal level for a transmission signal. The values are as follows: • TU3 • TU12
Port ID	The Port ID fields specify the physical location of a port. For a description of the Port ID options, see "About physical layer addresses" (3-3).
Signal ID	The Signal ID field specifies the multiplexing structure for a transmission signal. The options available for Signal ID depend on the Signal Type. For a description of the Signal ID options, see "About signal layer addresses" (3-4).

Field name	Description
M	The M field is a lower order path parameter that specifies the number of consecutive errored seconds before a Lower order Path Degraded (LPdDEG) defect is declared.
	The values are 2–10. The default value is 7.
IT%	The IT% field is a lower order path parameter that specifies the minimum percentage of errored blocks detected in a one-second interval for the second to be considered errored. Combined with M, IT% determines when a Lower order Path Degraded (LPdDEG) defect is declared.
	The values are 1–100. The default value is 25.
Expected PTI Mode	The Expected Path Trace Identifier (PTI) Mode field is a lower order path parameter that specifies the mode of the Path Trace identifier that a port expects to receive. The values are as follows:
	• 15 Byte PTI — A specific string of characters plus the result of a CRC-7 calculation will be received.
	• No PTI — The received PTI value is ignored.
	The default value is No PTI.
Expected PTI	The Expected Path Trace Identifier (PTI) field is a lower order path parameter that specifies the Path Trace identifier that a port expects to receive. A value can be specified for this field only if the Expected PTI Mode field is set to 15 Byte PTI.
	This field accepts up to 15 alphanumeric characters. The characters *, ; : # { } space* are not allowed.

Related topic   For general information about windows, see "About the main application window" (2-10).

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365–367–512   **Lucent Technologies**   8 - 3 3
Issue 2, July 2002

Querying lower order path parameters

Procedure

1   Go to the Low Order Path window at *Provision > Transmission > Low Order Path.*

2   Select the Signal Type and the Port ID.

3   Click Query.

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Low Order Path query results

Illustration   Use the following illustration only as an example of query results for the Low Order Path window.

Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The following information appears in the Low Order Path Query Results window.

Column	Description
Port ID	Displays the physical location of the port.
Signal ID	Displays the multiplexing structure of the signal. The options available for Signal ID depend on the Signal Type. For a description of the Signal ID options, see "About signal layer addresses" (3-4).
M	Displays the M value (2–10). M is the number of consecutive errored seconds before a Lower order Path Degraded (LPdDEG) defect is declared.
IT%	Displays the IT% value (1–100). IT% is the minimum percentage of errored blocks detected in a one-second interval for the second to be considered errored. Combined with M, IT% determines when a Lower order Path Degraded (LPdDEG) defect is declared.

Column	Description
Expected PTI Mode	Displays one of the following values: • 15 Byte PTI • No PTI
Expected PTI	Displays the Expected PTI value.
Accepted PTI	Displays the accepted Path Trace Identifier (PTI). The accepted PTI will be displayed if the expected PTI mode is provisioned as 15 Byte PTI and a valid path trace is being received. If a valid PTI is not received, or if the expected PTI mode is provisioned as No PTI, the Accepted PTI column will be blank.
Accepted PSL	Displays the accepted Path Signal Label (PSL). If a valid PSL is not received, the Accepted PSL column will be blank.

Related topic For general information about windows, see "About the main application window" (2-10).

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Changing lower order path parameters

Before you begin   You cannot provision lower order path parameters if:

- The affected trail is contained within the secondary trail of a higher order SNCP group.

- The affected trail is on the protection port in an MSP group.

Procedure

1   Go to the Low Order Path window at *Provision > Transmission > Low Order Path.*

2   Select the Signal Type, Port ID, and Signal ID.

3   Select values for one or more of the following fields:

- M

- IT%

- Expected PTI Mode

- Expected PTI

4   Click Apply.

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9   Protection switching

Overview

Purpose "Protection switching" contains the following information:

- General information about Multiplex Section Protection (MSP) and Sub-Network Connection Protection (SNCP)

- Descriptions of the windows that are used to provision transmission protection switching

- Step-by-step procedures for provisioning the following:

  - Protection switching for an MSP group

  - Protection switching for an SNCP group

  - The Wait-To-Restore timer for matrix and STM-1 protection groups

Organisation The organisation is as follows:

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MSP background information

Overview

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Purpose   This section contains background information about Multiplex Section Protection (MSP) and the different types of MSP.

Organisation   This section is organised as follows:

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9 - 2   **Lucent Technologies**   365–367–512
Issue 2, July 2002

MSP terms

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List of terms   **MSP** 1+1 Multiplex Section Protection (MSP) is a transmission protection arrangement. The same signal is sent and received over two separate transmission lines. These transmission lines terminate on separate transmission ports that are logically linked in software.

The following types of MSP are available:

- ITU MSP complies with ITU-T Recommendation G.783, Annex A.

- NTT MSP complies with ITU-T Recommendation G.783, Annex B, and a set of recommendations provided by Nippon Telegraph and Telephone (NTT).

- ANSI MSP complies with American National Standards Institute (ANSI) T1–105.01.

MSP group An MSP group is a pair of associated ports on a pair of physically-adjacent port units. An MSP group, also called an MSP pair, provides transmission line protection between network elements.

ITU MSP ITU MSP provides 1+1 unidirectional or bidirectional nonrevertive switching for STM-16, STM-4, and STM-1 optical interfaces, and for STM-1 electrical interfaces. Two lines carry identical payloads in a permanent bridged arrangement between network elements.

NTT MSP NTT MSP provides switching similar to bidirectional ITU MSP for STM-1 optical interfaces, and for STM-1 electrical interfaces.

ANSI MSP ANSI MSP provides switching similar to unidirectional ITU MSP for STM-16, STM-4, and STM-1 optical interfaces, and for STM-1 electrical interfaces.

Line restore time Line restore time is the number of minutes that the system waits, after a failure condition that caused a protection switch clears, before switching to the line that is not carrying service (the line where the fault cleared). Line restore time applies only to NTT MSP.

Nonrevertive Nonrevertive is a protection-switching operation type. When a protection group is nonrevertive, the protection entity will continue to operate as the active entity even after a failure clears on the working entity.

Revertive Revertive is a protection-switching operation type. When a protection group is revertive, the system will

....

automatically switch service from the protection entity back to
the working entity when a failure clears and the Wait-To-Restore
time has elapsed.

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General information about MSP

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What is transmission protection?

Transmission protection protects a transmission facility from failures that can affect service. If a failure is detected, service is switched automatically to a facility that is reserved for protection.

What is an MSP group?

A Multiplex Section Protection (MSP) group is a pair of transmission ports, a working port and a protection port. Because MSP is assigned to pairs of transmission ports, an MSP group is also called an MSP pair.

MSP provides the capability for switching the transmission path from the working line to the protection line in a point-to-point connection between network elements. The protection line is reserved for protection and cannot be used for carrying other traffic.

Where are the working and protection ports?

For all types of port subracks, an MSP group is a pair of transmission ports on adjacent port units. The transmission ports have the following characteristics:

- The working port is on an odd-numbered port unit.

- The protection port is the corresponding port on the even-numbered port unit to the right of the working unit.

Example of an MSP group

The following illustration shows an example of an MSP group.

PSA-4-STM1-**MSP1**-①
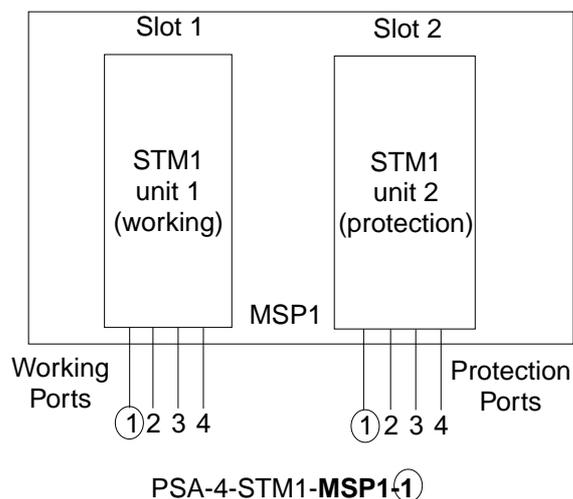
How many MSP groups can I provision?

You can create an MSP group on any port subrack. The following table shows how many MSP groups you can provision per pair of port units.

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Port unit	Subrack	Maximum Number of MSP Groups
STM-1	PSA	4
STM-4	PSC	4
STM-16	PSC	1

About MSP types

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Purpose of MSP   NTT, ANSI, and ITU MSP are similar, and their purpose is the same: to protect a transmission facility from failures that can affect service.

Hardware differences   The following table shows the port units that can and cannot be used with ITU MSP, ANSI MSP, and NTT MSP.

MSP type	STM-16/4 optical	STM-1 electrical	STM-1 optical
ITU MSP	Yes	Yes	Yes
NTT MSP	No	Yes	Yes
ANSI MSP	Yes	Yes	Yes

Provisioning differences   Except for creating an MSP group, all provisioning procedures, such as connecting cross connections, are the same for ITU MSP, ANSI MSP, and NTT MSP. For ITU MSP, you must choose UNI_ITU (unidirectional) or BI_ITU (bidirectional) in the Switching Type field on the MSP Group window. NTT MSP can be provisioned only as bidirectional. ANSI MSP can be provisioned only as unidirectional.

Functional differences   There are no functional differences between ITU MSP and ANSI MSP. The following table describes the functional differences between ITU MSP and NTT MSP.

ITU and ANSI MSP	NTT MSP
Designed to keep service on the working line — always treating the working line as the preferred line	Either the working or the protection line can be the preferred line
Transmits and acknowledges a lockout condition by using the K-bytes (K1 and K2)	Lockout condition is not carried by the K-bytes
Never interprets K-bytes received on the working line	Transmits K-bytes on both the working and protection lines and, depending on the state of the lines, receives K-bytes from either line
Waits 2.5 seconds for an acknowledgment from the far-end before giving up on a manual request	Waits 1 second for an acknowledgment from the far-end before giving up on a manual request

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ITU and ANSI MSP	NTT MSP
Supports both forced and manual switches	Supports only forced switches

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About NTT line restore time

What is line restore time?   Although NTT MSP is nonrevertive, it makes use of a Wait-To-Restore (WTR) timer. On the DACS user interface, this timer is referred to as "Line Restore Time." When a fault on the service-carrying line causes a protection switch, the received K-bytes continue to be interpreted from the new line carrying service. When the fault clears, the line restore timer is started. When the line restore timer expires, the line used to interpret the received K-bytes is switched to the line that is not carrying service (the line where the fault cleared).

Each NTT MSP group must be assigned a line restore time when the MSP group is created.

What are the line restore time values?   The line restore time range is 0 to 60 minutes in 1-minute increments. The default value is 5 minutes. If the line restore time is set to 0, the system automatically changes it to 1-second. This means that line restore cannot be disabled by setting the value to 0.

How do I change line restore time?   You cannot directly change the line restore time value. To change the value, you must delete the MSP group, and then create it again with the new line restore time value.

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About provisioning MSP groups

How creating an MSP group affects other provisioning

When you create an MSP group, the higher and lower order path provisioning and multiplexing for both lines become what was provisioned for the working port.

MSP groups and IU types on PSA subracks

For PSA subracks, the creation of MSP groups is not affected by the type of Interface Unit (IU). You can create MSP groups for STM-1 ports with electrical or optical IUs, or a mixture of IU types.

MSP groups and bandwidth on single-fibre PSA subracks

For a single-fibre PSA subrack configuration, there is no lost bandwidth when you create MSP groups, since bandwidth was never allocated to the even-numbered (protection) units. Although cross connections cannot be made to ports on even-numbered units, provisioning is not blocked for other port features. For example, it is possible to put a port in supervisory unequipped mode to verify connectivity even if that port has no bandwidth because it is a protection port in a single-fibre subrack. A port on a protection unit in a single-fibre PSA subrack will carry traffic only when the port is provisioned as part of an MSP protection group and service switches to that port from a working unit.

Related topics

For more information about single-fibre subracks, see one of the following topics:

- "Single-fibre PSA port subrack configurations" (6-9)

- "Single-fibre PSC port subrack configurations" (6-11)

MSP groups and bandwidth on dual-fibre PSA subracks

Whenever you create an MSP group in a dual-fibre PSA subrack configuration, the overall system bandwidth is reduced, since the MSP group uses two physical ports but carries the bandwidth of only one. The bandwidth that ordinarily would have been allocated to the protection port is inaccessible once you have created the MSP group.

Related topics

For more information about dual-fibre subracks, see one of the following topics:

- "Dual-fibre PSA port subrack configurations" (6-10)

- "Dual-fibre PSC port subrack configurations" (6-12)

MSP groups and bandwidth on quad-fibre PSC subracks

You can provision MSP in a quad-fibre PSC subrack, but the overall system bandwidth will be reduced. Bandwidth is reduced because MSP uses two physical ports, but carries the bandwidth of one port.

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SNCP background information

Overview

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Purpose   This section contains background information about Sub-Network
Connection Protection (SNCP).

Organisation   This section is organised as follows:

- "SNCP terms" (9-12)
- "About SNCP" (9-13)
- "SNCP configurations" (9-14)
- "SNCP ring architectures" (9-18)
- "About trail protection" (9-21)
- "Higher order and lower order trails" (9-22)
- "TSF conditions for inherently-monitored trails" (9-23)
- "TSF and TSD conditions for nonintrusively-monitored trails" (9-24)
- "SNCP with other types of protection" (9-25)
- "Cross connect status of SNCP trails" (9-26)

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365–367–512   **Lucent Technologies**   9 - 1 1
Issue 2, July 2002

SNCP terms

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List of terms   **Add traffic** Add traffic is traffic that is inserted into a working trail at a ring node.

Bridge A bridge transmits identical traffic on both the working and protection trails.

Drop and continue Drop and continue is a function within a ring node where traffic is both extracted from the working channels on the ring (drop), and transmitted onwards on the ring (continue).

Drop traffic Drop traffic is traffic that is extracted from a working trail at a ring node.

Dual node interconnection Dual node interconnection is an architecture between two rings where two nodes in each ring are interconnected.

Head end The node that executes a bridge.

Hold-off time The time (0 to 10 seconds) that the system waits after detecting a failure before initiating a protection switch. The hold-off time can be used to control switching order when multiple protection mechanisms are protecting the same service. For example, lower order or higher order SNCP can be combined with MSP or equipment protection.

Node A node is a point of connection into a network.

Path selector Within an Sub-Network Connection Protection (SNCP) architecture, the node function that selects a tributary which is extracted from the working channels arriving from one side of the node or from the other side of the node, according to path level criteria.

Protection trail The trail allocated to carry traffic if a failure is detected on the working trail.

Ring A ring is constructed within a layer consisting of a set of nodes, each of which is connected to its immediate neighbor (adjacent) nodes by a trail connection, forming a closed loop.

Single node interconnection Single node interconnection is an architecture between two rings where one node in each ring is interconnected.

Tail end The node that executes the switch.

Working trail The trail over which traffic is transported when there is no switch event (such as a cable cut).

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About SNCP

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What is transmission protection?

Transmission protection protects a transmission facility from failures that can affect service. If a failure is detected, service is switched automatically to a facility that is reserved for protection.

What is SNCP?

Sub-Network Connection Protection (SNCP) is a transmission protection feature that provides protection for all or part of a trail through a network. At the head end of the protected subnetwork connection, a bridge is created. The bridge sends two identical copies of the protected trail toward the tail end over different routes. The tail end selects which copy of the trail to take as input based on manual and automatic switching criteria. For bidirectional traffic, each end of the connection provides both the head end (bridging) and the tail end (selector) functions.

Trail monitoring

When SNCP is provisioned for a higher order or a lower order trail, the system monitors the trail for Trail Signal Fail (TSF) and Trail Signal Degrade (TSD) conditions. When a TSF or TSD condition occurs and the trail was not previously in a failed or degraded state, the hold-off timer is started. If the hold-off timer is set to zero, or if the TSF or TSD condition exists at the expiry of the hold-off timer, service is switched away from the failed trail unless an equal or higher priority request is in effect.

Inherent and nonintrusive monitoring

The monitoring that triggers protection switching for SNCP trails can be provisioned as inherent (SNCP/I) or nonintrusive (SNCP/N). The automatic switching criteria are based on the following criteria:

- Inherent — Trail Signal Fail (TSF) conditions in the server layer

- Nonintrusive — TSF conditions in the server layer and client layer; Trail Signal Degrade (TSD) and TSF conditions in the client layer

Related topics

For more information, see one of the following topics:

- "TSF conditions for inherently-monitored trails" (9-23)

- "TSF and TSD conditions for nonintrusively-monitored trails" (9-24)

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365–367–512
Issue 2, July 2002

Lucent Technologies

9 - 1 3

SNCP configurations

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Unidirectional   The unidirectional VC-trail selector configuration creates a
unidirectional selector on the incoming direction of a port. The
unidirectional VC-trail selector configuration also applies to multipoint
(bridge and broadcast) connections. The working trail is the primary
trail, and the protection trail is the secondary trail.

Working   Protection

Unidirectional connection   Protected unidirectional
without protection   connection
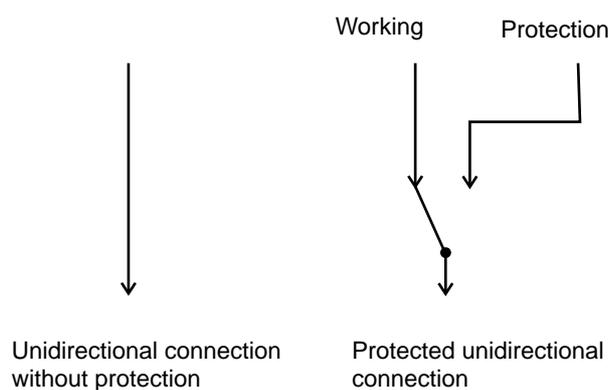
Bidirectional   Bidirectional SNCP operates with incoming and outgoing traffic on
the working port. Each end of the connection provides both the head
end (bridging) and the tail end (selector) functions. The working trail
is the primary trail, and the protection trail is the secondary trail.

Working   Protection

Bidirectional connection   Protected bidirectional
without protection   connection

....
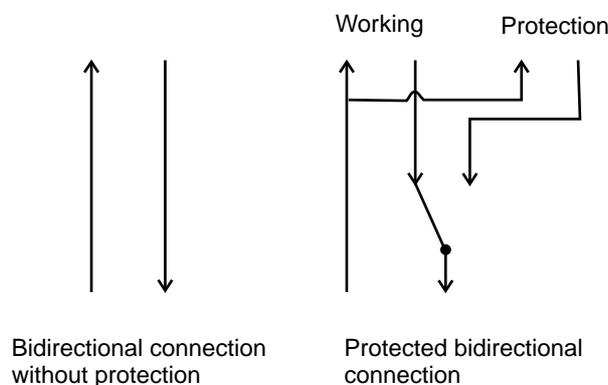
The bidirectional SNCP configuration applies also to multipoint connections (bridge or broadcast).

Bidirectional multi-point
connection without protection

Multi-point connection
with bidirectional
SNCP protection
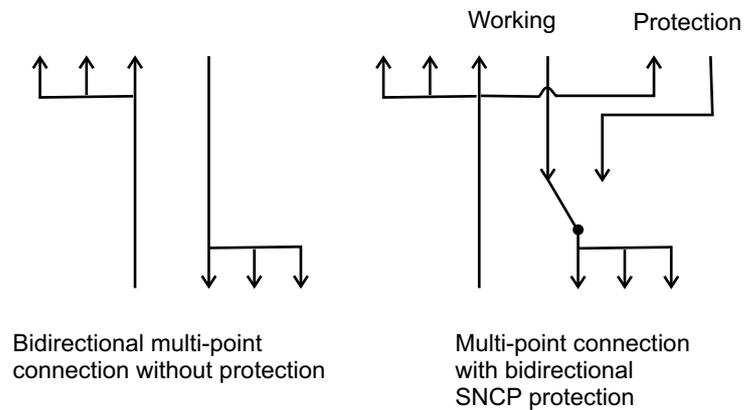
The following illustration shows an example of a ring that uses bidirectional SNCP.

Node A

Node B

Node C

Node D
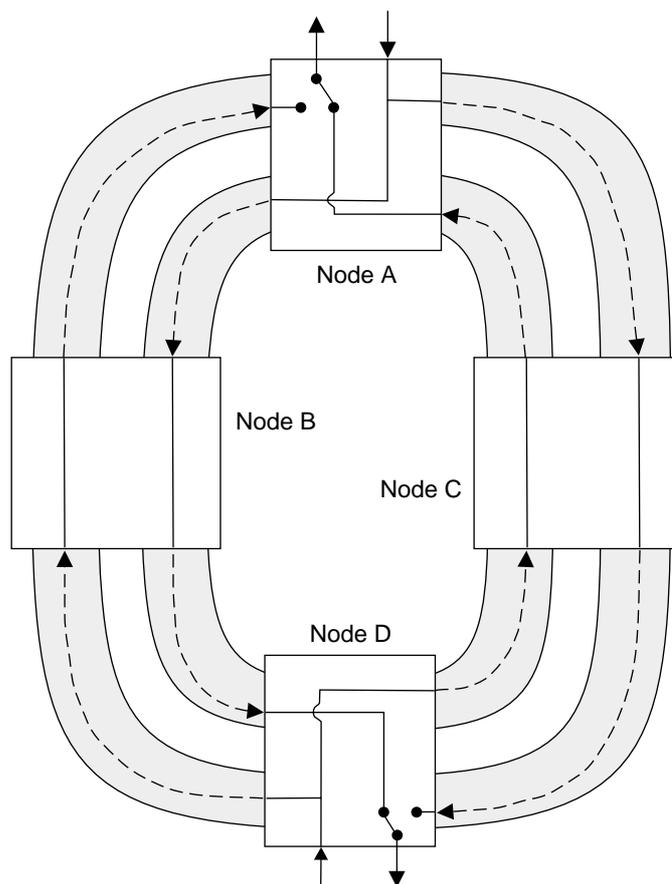
Nodes A and D both have a head end bridge and a tail end selector. Nodes B and C both have bidirectional cross connects.

Drop and continue working

The drop and continue working configuration is used at the primary interconnection node in rings with dual node interconnections. This configuration provides the same selector in the incoming direction as the bidirectional SNCP configuration. However, the outgoing signal is sent only to the working trail, and the incoming signal on the working trail is bridged to the outgoing signal on the protection trail. The working trail is the primary trail, and the protection trail is the secondary trail.

Working   Working   Protection

Bidirectional connection   Protected bidirectional
without protection   connection
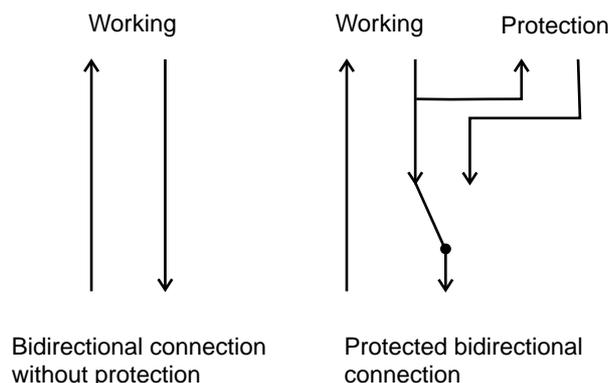
Related topic

For more information, see "Dual node interconnection" (9-18).

Drop and continue protection

The drop and continue protection configuration is used at the secondary interconnection node in rings with dual node interconnection. This configuration provides the same selector on the incoming direction as the bidirectional SNCP configuration. However, the outgoing signal is sent only to protection trail, and the incoming signal on the protection trail is bridged to the outgoing signal on the working trail. The protection trail is the primary trail, and the working trail is the secondary trail.

Protection   Working   Protection

Bidirectional connection   Protected bidirectional
without protection   connection
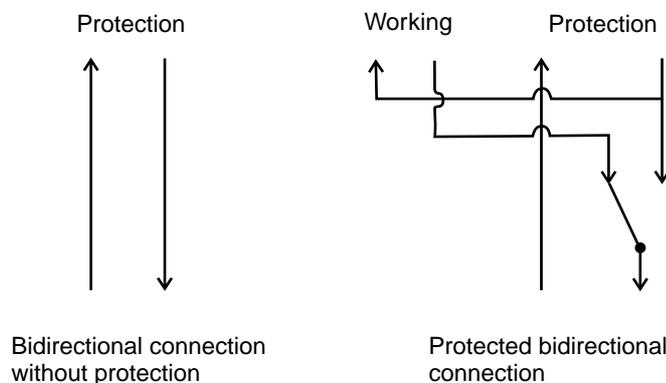
Related topic   For more information about the drop and continue working, and the drop and continue protection configurations, refer to ITU-T Recommendation G.842.

For more examples, see "Example of dual node interconnection" (9-19).

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SNCP ring architectures

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**Single node
interconnection**

Single node interconnection is an architecture between two rings
where one node in each ring is interconnected.
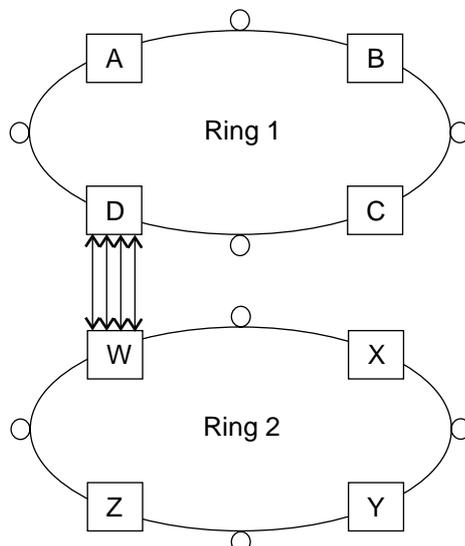
Dual node interconnection

Dual node interconnection is an architecture between two rings where
two nodes in each ring are interconnected.
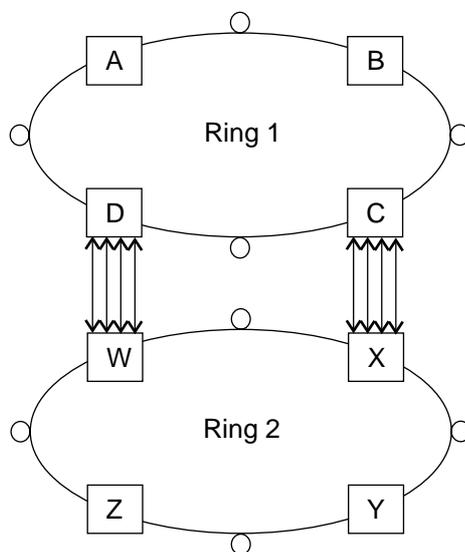
Related topic

For more information, see "Example of dual node interconnection"
(9-19).

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Example of dual node interconnection

Example
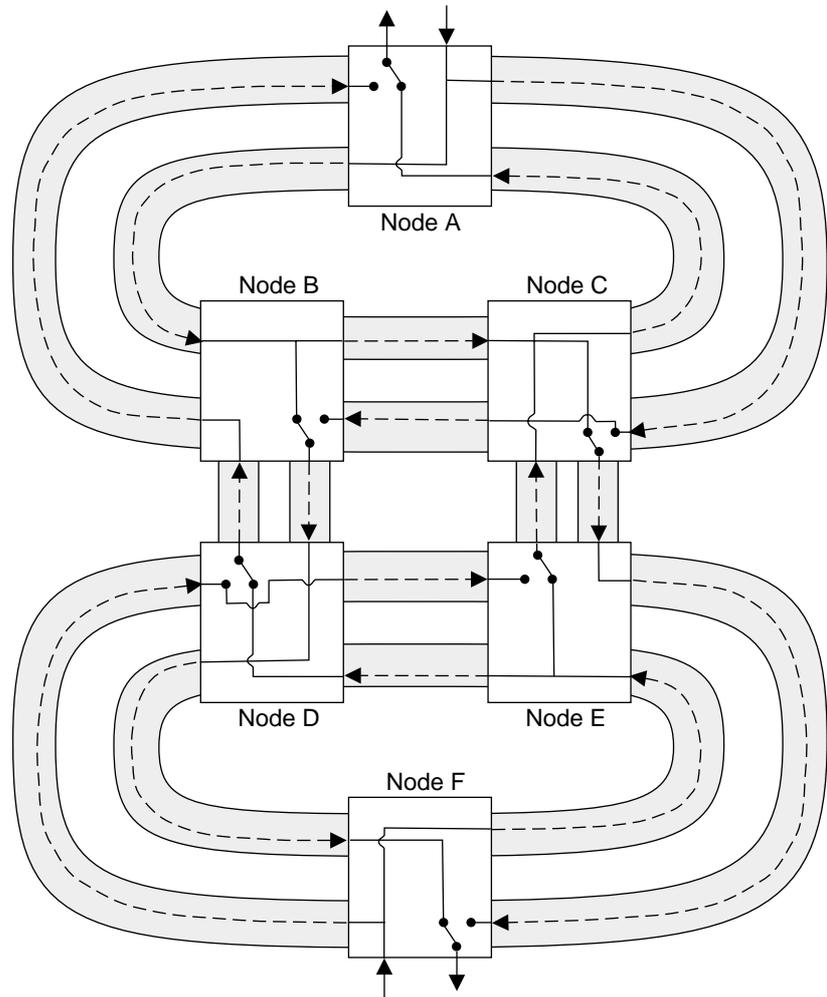
Legend:

Node A   A bidirectional SNCP bridge and selector configuration

Node B   A primary interconnection node with a drop and
               continue working configuration, and a unidirectional
               cross connect

Node C   A secondary interconnection node with a drop and
               continue protection configuration, and a unidirectional
               cross connect

Node D   A secondary interconnection node with a drop and
               continue protection configuration, and a unidirectional
               cross connect

Node E	A primary interconnection node with a drop and continue working configuration, and a unidirectional cross connect
Node F	A bidirectional SNCP bridge and selector configuration

□

About trail protection

....

**What trails can be
protected?**

You can provision SNCP for the following:

- Trails that are cross connected through the DACS, but not terminated on the DACS, at any rate

- Trails that have not yet been cross connected

The signal multiplexing must match the SNCP multiplexing. This applies to the secondary trail as well as to the primary trail. Always query the signal multiplexing structure at *Provision > Transmission > Signal Type* before provisioning an SNCP group.

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Higher order and lower order trails

Higher order trails   You can provision SNCP for the following types of higher order trails, whether the trail is terminated on the DACS or not:

- VC-4-4c
- VC-3

Lower order trails   You can provision SNCP for the following types of lower order trails when the higher order path contains VC-4s that are provisioned as TUG structured:

- VC-3 as TU-3
- VC-12 as TU-12

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TSF conditions for inherently-monitored trails

Higher order trails The following are Trail Signal Fail (TSF) conditions for higher order inherently-monitored trails:

- Port unit failure
- STMdLOS
- RSdLOF
- MSdAIS
- AUdLOP
- AUdAIS

Because TSD detection requires nonintrusive monitoring, TSD conditions do not apply to higher order inherently-monitored trails.

Lower order trails The following are Trail Signal Fail conditions for lower order inherently-monitored trails:

- Port unit failure
- STMdLOS
- RSdLOF
- MSdAIS
- AUdLOP
- AUdAIS
- HPdUNEQ
- HPdTIM
- HPdPLM
- TUdLOM (only for VC-12 trails)
- TUdAIS
- TUdLOP

Because TSD detection requires nonintrusive monitoring, TSD conditions do not apply to lower order inherently-monitored trails.

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TSF and TSD conditions for nonintrusively-monitored trails

Higher order trails   The following are Trail Signal Fail (TSF) conditions for higher order nonintrusively-monitored trails:

- Port unit failure
- STMdLOS
- RSdLOF
- MSdAIS
- AUdAIS
- HPdUNEQ and accepted PTI is all zeros
- HPdTIM

HPdDEG is a Trail Signal Degrade (TSD) condition for higher order nonintrusively-monitored trails.

Lower order trails   The following are TSF conditions for lower order nonintrusively-monitored trails:

- Port unit failure
- STMdLOS
- RSdLOF
- MSdAIS
- AUdAIS
- HPdUNEQ
- HPdTIM
- HPdPLM
- TUdLOM (only for VC-12 trails)
- TUdAIS
- TUdLOP
- LPdUNEQ and accepted PTI is all zeros
- LPdTIM

LPdDEG is a TSD condition for lower order nonintrusively-monitored trails.

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SNCP with other types of protection

....

Hold-off timer   You can provision SNCP with MSP or equipment protection. When you use SNCP with another type of protection, you should provision a hold-off timer for the SNCP group. Hold-off time is the amount of time that the system waits after detecting a Trail Signal Fail (TSF) or Trail Signal Degrade (TSD) condition before initiating a protection switch. Provisioning a hold-off timer for an SNCP group allows MSP or equipment protection switching to operate first.

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365–367–512
Issue 2, July 2002   **Lucent Technologies**   9 - 2 5

Cross connect status of SNCP trails

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Guidelines   The cross connect status of the primary and secondary trails on bidirectional and unidirectional configurations must comply with the following guidelines:

- The working and protection trails are clear channel AU-4-4c, AU-4, AU-3, or TU-12 with no cross connects on the secondary trail. You can use any selector type.

- The working and protection trails are clear channel AU-4-4c, AU-4, AU-3, or TU-12 with no cross connects in the incoming direction on the secondary trail for the unidirectional trail protection selector type. Cross connects in the outgoing direction are unrelated to the SNCP group for this selector type.

SNCP and cross connect provisioning   You identify the working and protection trails when you create an SNCP group. Subsequently, you will need to connect or disconnect cross connects only on the working trail. The system will automatically configure the corresponding connections for the protection trail.

Protection bridge   For bidirectional, drop and continue working, and drop and continue protection configurations, the system will automatically create the protection bridge when you create the cross connect.

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MSP Group window and procedures

Overview

Purpose Use the MSP Group window to query and provision Multiplex Section Protection (MSP) groups. This window is also used to specify a Line Restore Time and the Switching Type for an MSP group.

Window location *Provision > Protection Switching > MSP Group*

Organisation This section is organised as follows:

□

MSP Group window description

Illustration   The following illustration shows the MSP Group window.
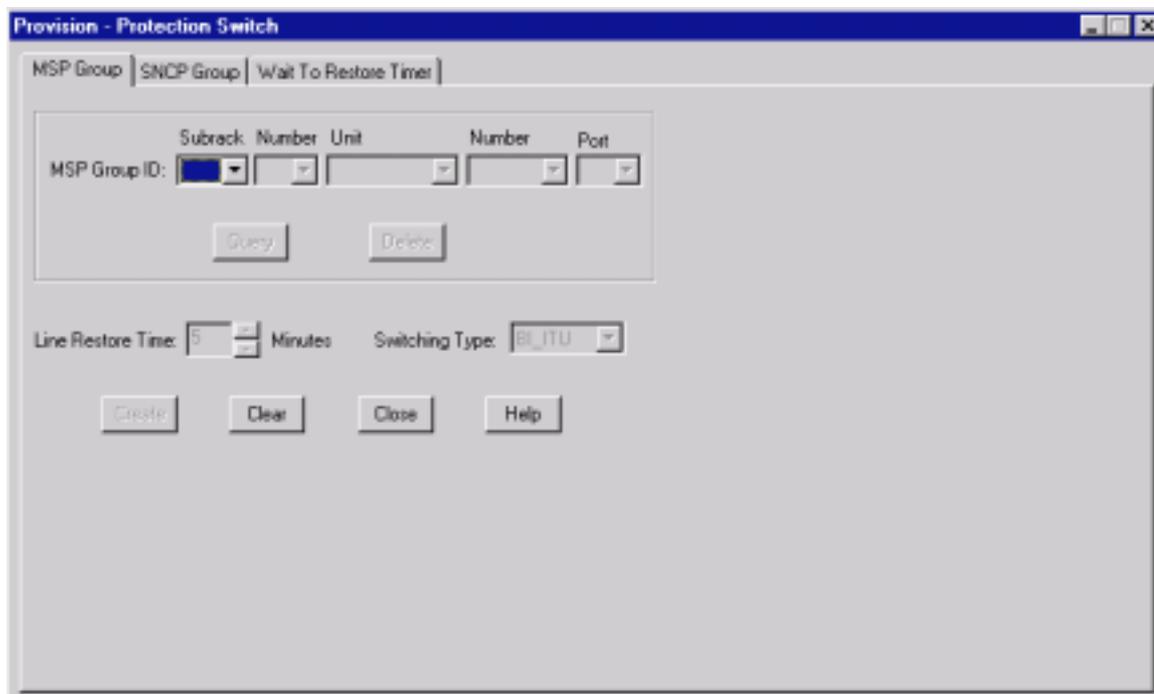
Field descriptions   The MSP Group window has the following fields.

Field name	Description
MSP Group ID	The MSP Group ID fields specify the address of an MSP group. For a description of the MSP group addresses, see "MSP addresses" (3-17).
Line Restore Time	The Line Restore Time field specifies the number of minutes that the system waits, after a failure condition that caused a protection switch clears, before switching to the line that is not carrying service (the line where the fault cleared). A line restore time can be provisioned only for Bidirectional NTT MSP (BI_NTT). The values are 0–60 minutes. The default value is 5.

Field name	Description
Switching Type	The Switching Type field specifies the type of MSP switching as one of the following values: • BI_ITU (Bidirectional MSP that complies with ITU-T Recommendation G.783) • UNI_ITU (Unidirectional MSP that complies with ITU-T Recommendation G.783) • BI_NTT (Bidirectional MSP designed to Nippon Telegraph and Telephone specifications) • UNI_ANSI (Unidirectional MSP that complies with ANSI T1–105.01)

Related topic   For general information about windows, see "About the main application window" (2-10).

☐

Querying an MSP group

Procedure

1   Go to the MSP Group window at *Provision > Protection Switching > MSP Group.*

2   Select the MSP Group ID.

For a description of the MSP group addresses, see "MSP addresses" (3-17).

3   Click Query.

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MSP Group query results

Illustration Use the following illustration only as an example of query results for the MSP Group window.
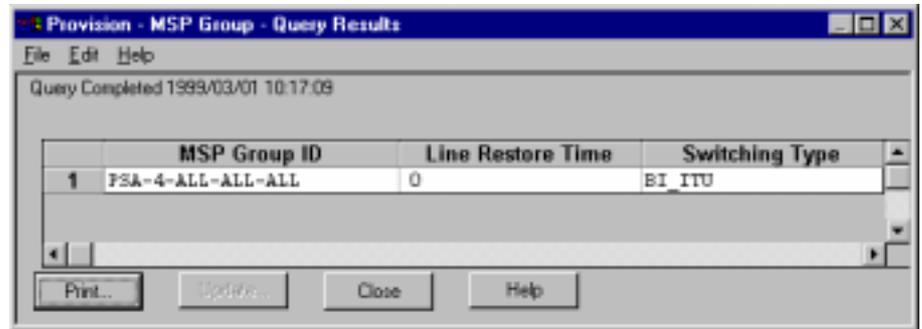
Important! The data displayed on this screen may *not* be typical.

Results field descriptions The MSP Group Query Results window has the following fields.

Column	Description
MSP Group ID	Displays the physical location of the MSP group.
Line Restore Time	Displays the provisioned line restore time (0–60 minutes).
Switching Type	Displays one of the following values: • BI_ITU (Bidirectional ITU MSP) • UNI_ITU (Unidirectional ITU MSP) • BI_NTT (Bidirectional NTT MSP) • UNI_ANSI (Unidirectional ANSI MSP)

Related topic For general information about windows, see "About the main application window" (2-10).

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Creating an MSP group

Before you begin   Before creating an MSP group, perform the following steps:

1   Verify that both port units are the same type. They should have the same apparatus code. For STM1 port units, the associated Interface Units do *not* have to be the same.

   Reference:

   Query the Unit window at *Provision > Equipment > Unit.*

2   Verify that the protection ports do not have cross connections provisioned.

   Reference:

   Query the Cross Connect window at Provision > Cross Connects > Cross Connect.

3   Verify that neither the working nor the protection port is used as a line-timing reference.

   Reference:

   Query the System Clock window at *Provision > Synchronisation and Timing > System Clock.*

4   Verify that an MSP group has not already been created.

   Reference:

   Query the MSP Group window at *Provision > Protection Switch > MSP Group.*

5   Verify that the protection port for the MSP group is not the working nor the protection trail for a Sub-Network Connection Protection (SNCP) group.

   Reference:

   Query the SNCP Group window at *Provision > Protection Switch > SNCP Group.*

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Related topics

For more information about MSP groups, see one of the following topics:

- "General information about MSP" (9-5)

- "About provisioning MSP groups" (9-10)

Procedure

....

1 Go to the MSP Group window at *Provision > Protection Switching > MSP Group.*

....

2 Select values for the following fields:

- MSP Group ID

- Line Restore Time

- Switching Type

....

3 Click Create.

Result:

You will receive a confirmation request if both of the following conditions are true:

- Either of the units in the group you are creating has an electrical Interface Unit

- Service is currently being provided through the equipment protection unit

Please note that creating an MSP group with this configuration will cause service to revert to the working unit. This may affect service if the working unit is defective.

E ND OF S TEPS

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365–367–512
Issue 2, July 2002

Lucent Technologies

9 - 3 3

Deleting an MSP group

Before you begin   Before deleting an MSP group, perform the following steps:

1   Verify that the MSP group is not provisioned as a line-timing
reference.

Reference:

Query the System Clock window at *Provision > Synchronisation
> System Clock.*

2   For an ITU MSP group, verify that the protection line is not active.

Reference:

Query the MSP transmission window at *Protection Switch >
Transmission > MSP.*

E N D   O F   S T E P S

Procedure

1   Go to the MSP Group window at *Provision > Protection Switching >
MSP Group.*

2   Select the MSP Group ID.

For a description of the MSP group addresses, see "MSP addresses"
(3-17).

3   Click Delete.

Result:

You will receive a confirmation request if you are deleting an
NTT MSP group, and the protection line is the active line.

E N D   O F   S T E P S

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Changing the Line Restore Time

Procedure

1 Go to the MSP Group window at *Provision > Protection Switching > MSP Group.*

2 Delete the MSP group that has the Line Restore Time that you want to change.

3 Create a new MSP group with the new Line Restore Time.

E ND OF S TEPS

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SNCP Group window and procedures

Overview

....

Purpose Use the SNCP Group window to query and provision Sub-Network Connection Protection (SNCP) groups.

Window location *Provision > Protection Switching > SNCP Group*

Organisation This section is organised as follows:

- "SNCP Group window description" (9-37)
- "Querying an SNCP group" (9-39)
- "SNCP Group query results" (9-40)
- "Creating an SNCP group" (9-42)
- "Deleting an SNCP group" (9-48)

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9 - 3 6 **Lucent Technologies** 365–367–512
Issue 2, July 2002

SNCP Group window description

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Illustration   The following illustration shows the SNCP Group window.
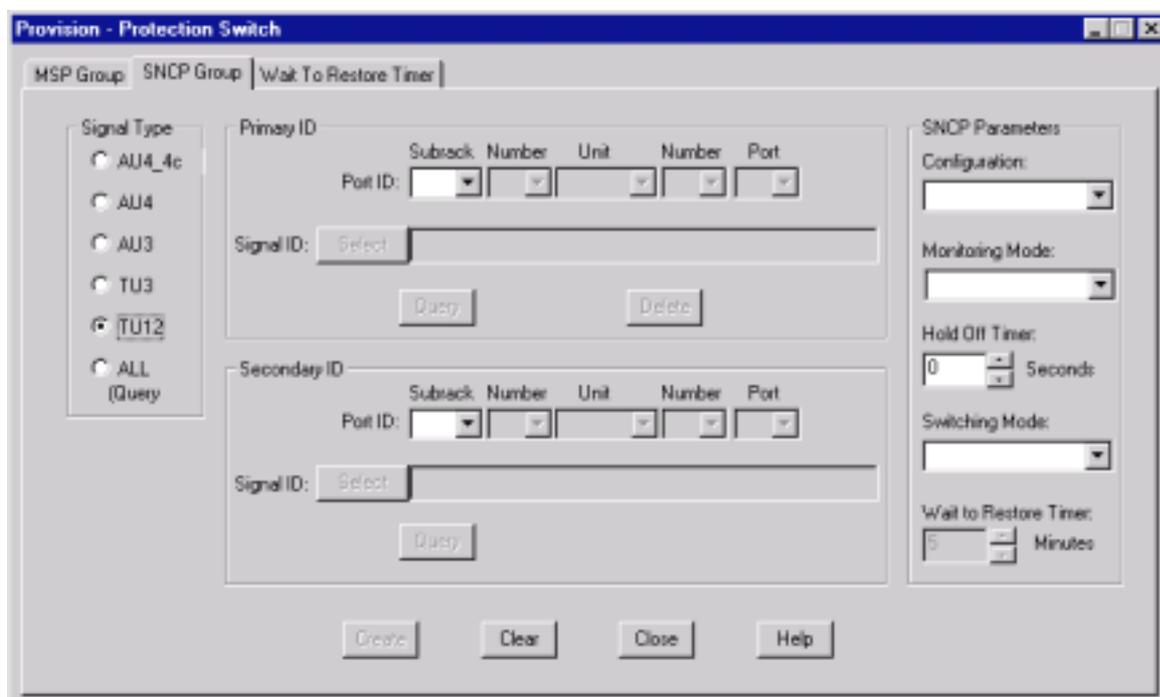
Field descriptions   The SNCP Group window has the following fields.

Field name	Description
Signal Type	The Signal Type field specifies the signal level as AU4_4c, AU4, AU3, TU3, or TU12.
Primary ID	The Primary ID is the entity that is the preferred routing that traffic travelling from one network element to another normally follows.
Port ID	The Port ID field specifies the physical location of the entity.
Signal ID	The Signal ID field specifies the signal level of the address. The options available for Signal ID depend on the Signal Type.
	For a description of the Signal ID options, see "About signal layer addresses" (3-4).
Secondary ID	The Secondary ID identifies the alternate routing that traffic travelling from one network element to another follows. The system will use this alternate routing when a manual or automatic request switches service away from the primary route.

Field name	Description
Configuration	Select one of the following configurations: • Bi-Directional • Uni-Directional • Drop and Continue Working • Drop and Continue Protection For more information, see "SNCP configurations" (9-14).
Monitoring Mode	Select one of the following values: • Inherent • Non-Intrusive For more information, see one of the following topics: • "Inherent and nonintrusive monitoring" (9-13) • "TSF conditions for inherently-monitored trails" (9-23) • "TSF and TSD conditions for nonintrusively-monitored trails" (9-24)
Hold Off Timer	Use the Hold Off Timer field to set the amount of time that the system waits after detecting a failure, before initiating a protection switch. The values for hold-off time are 0–10 seconds. The default value is 0 seconds.
Switching Mode	Select one of the following values: • REVERTIVE — Service will be restored to the working trail when the manual or automatic switch request has cleared. • NON-REVERTIVE — Service will *not* be restored to the working trail when manual or automatic switch request has cleared.
Wait to Restore Time	A wait-to-restore time can be provisioned only if the Switching Mode field is set to revertive. Wait-to-restore time is the amount of time that the working entity must remain fault free before the system restores service to the working trail after a protection switch that is caused by a TSF or TSD condition. The values for wait-to-restore time are 0–60 minutes. The default value is 5 minutes.

Related topic   For general information about windows, see "About the main application window" (2-10).

☐

Querying an SNCP group

Procedure

1   Go to the SNCP Group window at *Provision > Protection Switching > SNCP Group.*

2   Select the entity address in the Primary ID field or the Secondary ID field.

3   Click Query.

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SNCP Group query results

....

Illustration   Use the following illustration only as an example of query results for the SNCP Group window.
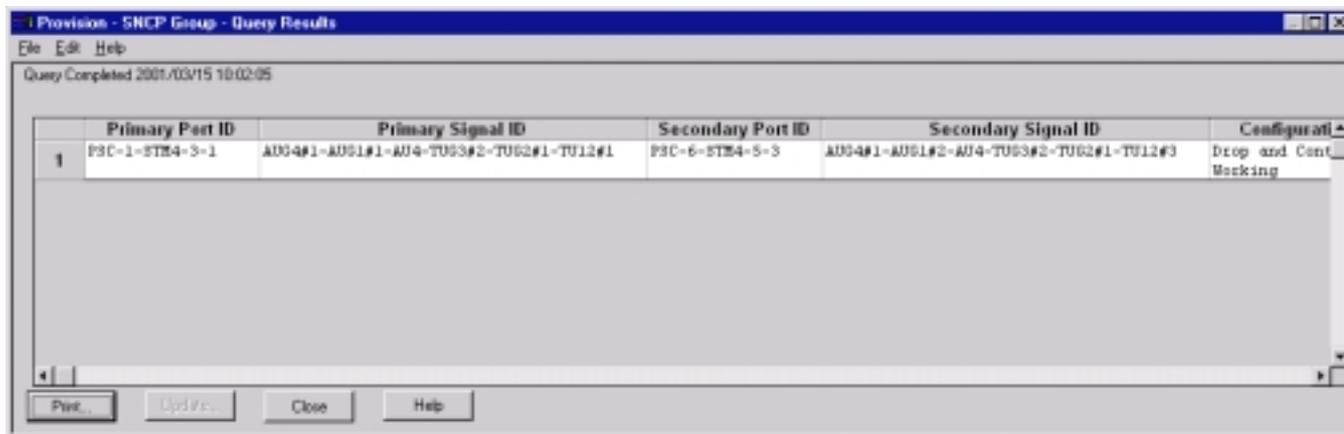
Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The SNCP Group Query Results window has the following fields.

Column	Description
Primary Port ID	Displays the port address that provides the preferred routing that traffic travelling from one network element to another normally follows.
Primary Signal ID	Displays the signal address that provides the preferred routing that traffic travelling from one network element to another normally follows.
Secondary Port ID	Displays the port address that provides the alternate routing that traffic travelling from one network element to another follows.
Secondary Signal ID	Displays the signal address that provides the alternate routing that traffic travelling from one network element to another follows.
Configuration	Displays one of the following values: • Bi-Directional • Uni-Directional • Drop and Continue Working • Drop and Continue Protection For more information, see "SNCP configurations" (9-14).

....

Column	Description
Monitoring Mode	Displays one of the following values: • Inherent • Non-Intrusive For more information, see one of the following topics: • "Inherent and nonintrusive monitoring" (9-13) • "TSF conditions for inherently-monitored trails" (9-23) • "TSF and TSD conditions for nonintrusively-monitored trails" (9-24)
Hold Off Time	Displays the provisioned hold-off time.
Switching Mode	Displays one of the following values: • REVERTIVE • NON-REVERTIVE
Wait to Restore Time	Displays the provisioned wait-to-restore time.

Related topic   For general information about windows, see "About the main application window" (2-10).

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Creating an SNCP group

Before you begin

Before creating a Sub-Network Connection Protection (SNCP) group, perform the following steps:

1   Verify that the primary and secondary trails you want to use are different trails.

2   Verify that neither the primary nor secondary trail you want to use is on the protection port of an MSP pair nor on the protection unit (9 or 19) of an STM-1 electrical equipment protection group. The primary or secondary trail you want to use can be on the working port of an MSP pair or on one of the working units of an STM-1 electrical equipment protection group.

> **Reference:**
>
> For more information, see "SNCP with other types of protection" (9-25).

3   Verify that neither the primary nor secondary trail you want to use is within the secondary trail of another SNCP group.

> **Reference:**
>
> Query the SNCP group window at *Provision > Protection Switch > SNCP Group.*

4   Verify that the multiplexing for both primary and secondary trails is identical.

> **Reference:**
>
> Use the Signal Type window at *Provision > Transmission > Signal Type.*

5   Verify that the signal for both primary and secondary trails is provisioned as normal, and *not* supervisory unequipped.

> **Reference:**
>
> Use the High Order Path window at *Provision > Transmission > High Order Path.*

6   Verify that the cross connect status of both trails are part of an acceptable configuration.

Reference:

For more information, see "Cross connect status of SNCP trails" (9-26).

....

7 Verify that the SNCP group has not already been created.

Reference:

Query the SNCP group window at *Provision > Protection Switch > SNCP Group.*

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....

Related topics

For more information about SNCP groups, see "SNCP background information" (9-11).

Procedure What type of SNCP do you want to create?

If	Then
Bidirectional ring	Go to "Provisioning a bidirectional SNCP ring" (9-44)
Ring with a Dual Node Interconnection (DNI)	Go to "Provisioning SNCP for a ring with a DNI" (9-46)

□

Provisioning a bidirectional SNCP ring

Before you begin   If you have not done so already, perform the "Before you begin" tasks in "Creating an SNCP group" (9-42).

Illustration   The following illustration shows an example of a ring that uses bidirectional SNCP. The following procedure describes how to provision the nodes shown in this illustration.
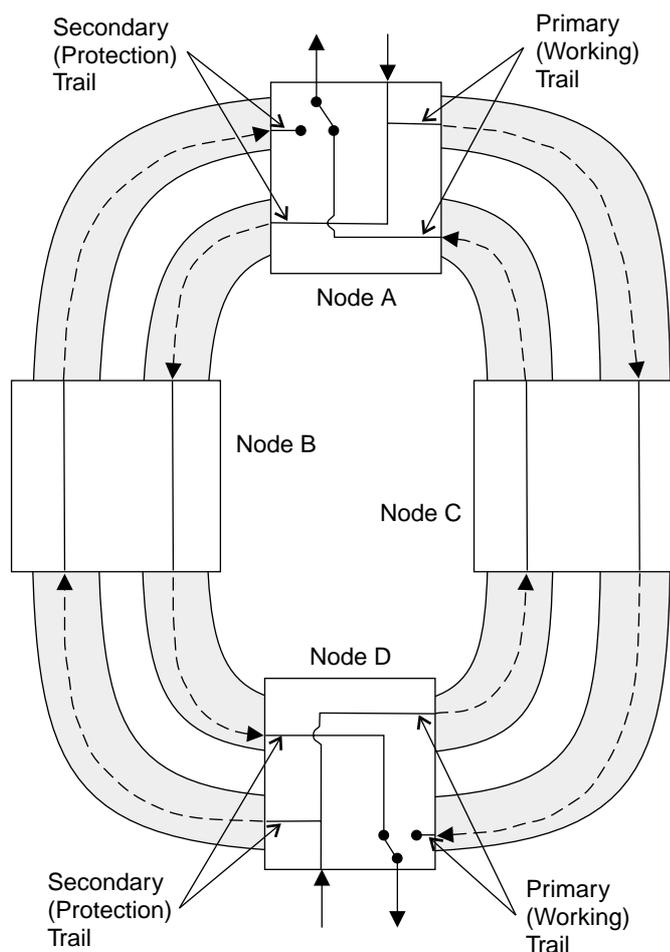
Provisioning node A and node D

....

1   Using the SNCP Group window, create an SNCP group with a bidirectional configuration.

....

2   Using the Cross Connect window, create a bidirectional cross connect for the primary trail.

Result:

The system automatically creates the bridged cross connect when you create the bidirectional SNCP group.

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Provisioning node B and node C

....

1   Using the Cross Connect window, create a bidirectional cross connect.

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365–367–512
Issue 2, July 2002

Lucent Technologies

9 - 4 5

Provisioning SNCP for a ring with a DNI

Before you begin   If you have not done so already, perform the "Before you begin" tasks in "Creating an SNCP group" (9-42).

Illustration   The following illustration shows an example of rings with SNCP and dual node interconnections. The following procedure describes how to provision the nodes shown in this illustration.
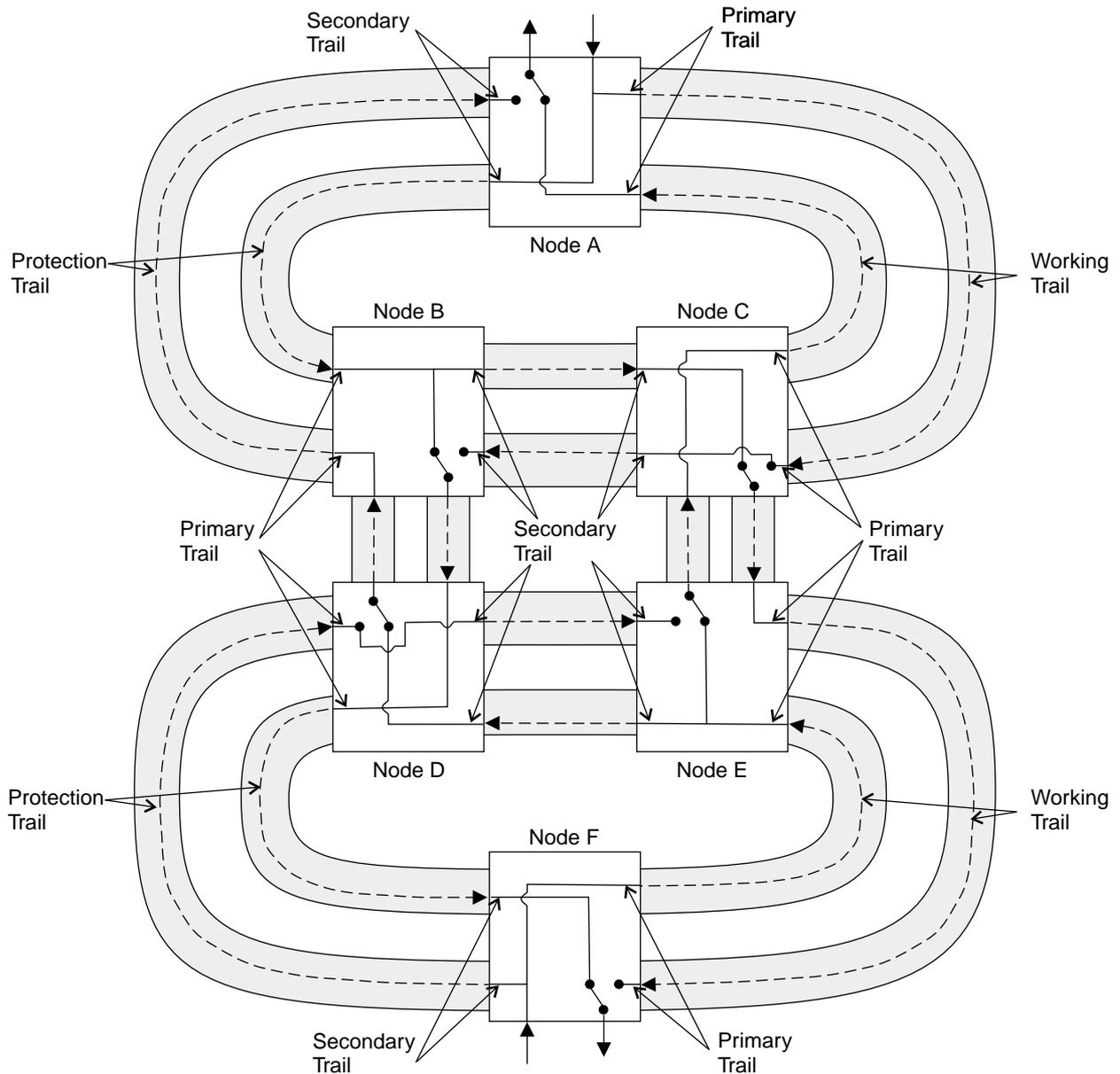
Provisioning node A and node F

1   Using the SNCP Group window, create an SNCP group with a bidirectional configuration.

....

2 Using the Cross Connect window, create a bidirectional cross connect for the primary trail.

> **Result:**
>
> The system automatically creates the bridged cross connect when you create the bidirectional SNCP group.

E N D   O F   S T E P S

....

Provisioning node C and node D

....

1 Using the SNCP Group window, create an SNCP group with a drop and continue protection configuration.

....

2 Using the Cross Connect window, create a bidirectional cross connect for the primary trail to the drop port.

E N D   O F   S T E P S

....

Provisioning node B and node E

....

1 Using the SNCP Group window, create an SNCP group with a drop and continue working configuration.

....

2 Using the Cross Connect window, create a bidirectional cross connect for the primary trail to the drop port.

E N D   O F   S T E P S

....

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Deleting an SNCP group

Before you begin   Before deleting a Sub-Network Connection Protection (SNCP) group, perform the following steps:

1   Verify that the SNCP group exists.

2   Verify that the primary trail is active.

Important! If you delete an SNCP group with the secondary trail active, you will force service back to the primary trail. This could affect service if there is a failure on the primary trail.

E ND OF S TEPS

Procedure

1   Go to the SNCP Group window at *Provision > Protection Switching > SNCP Group.*

2   Select the Signal Type.

3   Select the Primary ID in the Port ID and Signal ID fields.

4   Click Delete.

E ND OF S TEPS

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Wait To Restore Timer window and procedures

Overview

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Purpose
Use the Wait To Restore Timer window to query and provision a Wait-To-Restore (WTR) time for the matrix protection group or for STM-1 equipment protection groups.

Window location
Provision > Protection Switching > Wait To Restore Timer

Organisation
This section is organised as follows:

- "Wait To Restore Timer window description" (9-50)
- "Querying the WTR time for STM-1 protection" (9-52)
- "Querying the WTR time for matrix protection" (9-53)
- "Changing the WTR time for STM-1 protection" (9-54)
- "Changing the WTR time for matrix protection" (9-55)

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365–367–512
Issue 2, July 2002

Lucent Technologies

9 - 49

Wait To Restore Timer window description

Illustration   The following illustration shows the Wait To Restore Timer window.
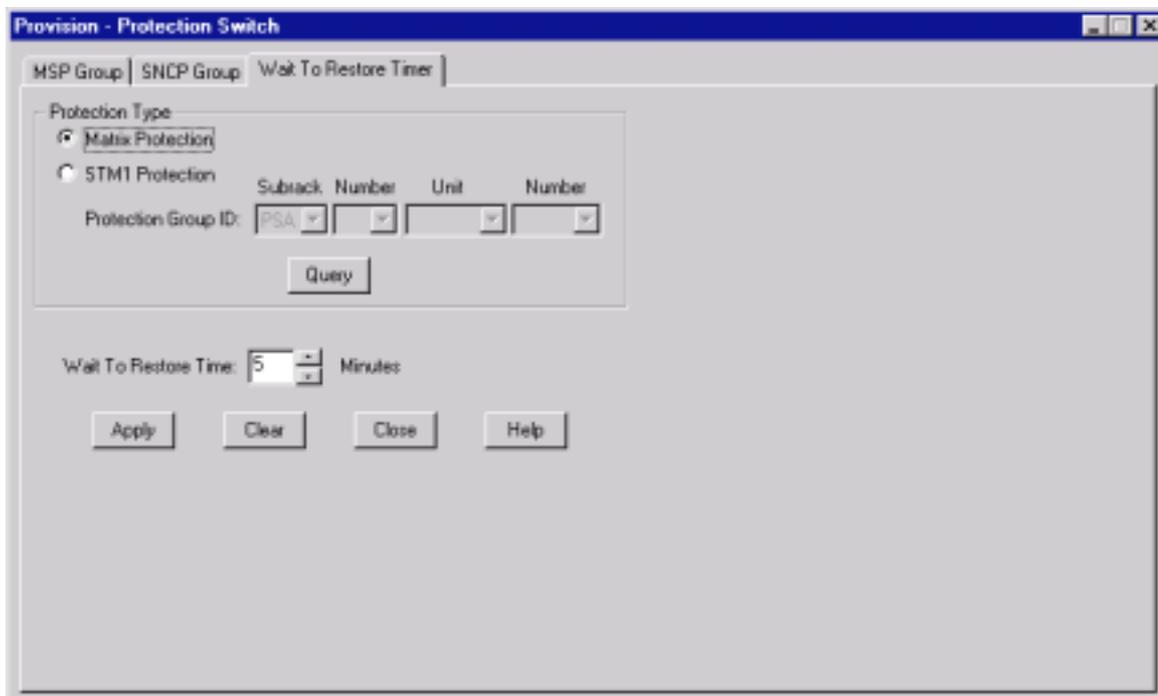
Field descriptions   The Wait To Restore Timer window has the following fields.

Field name	Description
Matrix Protection	Select the Matrix Protection field to query or provision the matrix protection group.
STM1 Protection	Select the STM1 Protection field to query or provision an STM-1 equipment protection group.
Protection Group ID	The Protection Group ID specifies the address of an STM-1 equipment protection group.
	For a description of equipment protection group addresses, see "Equipment protection group addresses" (3-16).
Wait To Restore Time	The Wait To Restore Time field specifies the amount of time that the system waits, after a failure condition that caused a protection switch clears, before switching back to the previously-active equipment (matrix slice or STM-1 unit).
	The values are 0–60 minutes. The default value is 5.

Wait To Restore Timer window and
procedures
Wait To Restore Timer window description

Protection switching

Related topic   For general information about windows, see "About the main
application window" (2-10).

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Querying the WTR time for STM-1 protection

Procedure

1   Go to the Wait To Restore Timer window at *Provision > Protection Switching > Wait To Restore Timer.*

2   Select STM1 Protection and the Protection Group ID.

3   Click Query.

       Result:

       The provisioned Wait-To-Restore time displays in a query results window.

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Querying the WTR time for matrix protection

Procedure

1   Go to the Wait To Restore Timer window at *Provision > Protection Switching > Wait To Restore Timer.*

2   Select Matrix Protection.

3   Click Query.

Result:

The provisioned Wait-To-Restore time displays in a query results window.

END OF STEPS

Changing the WTR time for STM-1 protection

Procedure

1 Go to the Wait To Restore Timer window at *Provision > Protection Switching > Wait To Restore Timer*.

2 Select STM1 Protection and a Protection Group ID.

3 Change the Wait To Restore Time.

4 Click Apply.

E N D   O F   S T E P S

Changing the WTR time for matrix protection

Procedure

1   Go to the Wait To Restore Timer window at *Provision > Protection Switching > Wait To Restore Timer.*

2   Select Matrix Protection.

3   Change the Wait To Restore Time.

4   Click Apply.

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10 Performance monitoring

Overview

Purpose "Performance monitoring" contains the following information:

- General information about performance monitoring (PM)
- Descriptions of the windows that are used to provision PM
- Step-by-step procedures for provisioning PM

Organisation The organisation is as follows:

- "Background information" (10-2)
- "Count Control window and procedures" (10-14)
- "TCA Control window and procedures" (10-25)
- "TCA Thresholds window and procedures" (10-37)

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Background information

Overview

Purpose   This section provides background information about performance monitoring (PM).

Organisation   This section is organised as follows:

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PM tasks

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Starting PM   Use the following procedure when provisioning PM for the first time.

....

1   Go to "Starting PM counts" (10-20).

....

2   Go to "Changing TCA threshold values" (10-44). This procedure is optional. Perform this procedure only if you want to change the default TCA threshold values.

....

3   Go to "Starting TCA reporting when all parameters are inhibited" (10-31) or "Starting TCA reporting when some parameters are enabled" (10-33).

Ongoing PM tasks   Perform the following tasks as needed:

- "Querying PM count control" (10-17)
- "Inhibiting PM counts" (10-23)
- "Clearing the PM counters" (10-24)
- "Querying TCA reporting" (10-28)
- "Inhibiting TCA reporting" (10-35)
- "Querying TCA threshold values" (10-41)
- "Changing TCA threshold values" (10-44)

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PM terms

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List of terms   **Background Block Errors** Background Block Errors (BBEs) are the number of errored blocks that were detected. A block is a set of consecutive bits associated with the path; each bit belongs to only one block. An Errored Block is a block in which one or more bits are in error.

Errored Seconds Errored Seconds (ES) is a performance-monitoring parameter that refers to the number of one-second periods in which one or more Errored Blocks occur.

Estimator value The estimator value is a value that is used in the performance-monitoring calculation process. The estimator value is the error rate, in errored-blocks-per second, at which the errored seconds become severely-errored seconds.

Far end Far end refers to the *remote* network element. For PM, the system collects performance-monitoring data on the local network element from anomalies detected in the incoming signal by the remote (far-end) network element.

Multiplex section A multiplex section (MS) is a transmission medium, together with the associated equipment, required to provide the means of transporting information between two consecutive network elements. One of the network elements originates the line signal and the other network element terminates the line signal.

Multiplex section terminating equipment Multiplex section terminating equipment is a network element that originates or terminates STM-1, STM-4, or STM-16 signals.

Near end Near end refers to the *local* network element. For PM, the system collects performance-monitoring data on the local network element from anomalies detected in the incoming signal by the local (near-end) network element.

Parameter Parameters are the output of the performance-monitoring calculation process. For example: background block errors, errored seconds, severely-errored seconds, and unavailable seconds are all parameters.

Path terminating equipment Path terminating equipment is a network element that multiplexes or demultiplexes the VC-4 payloads.

Regenerator section A regenerator section (RS) is the portion of a transmission facility, including terminating points, between a terminating network element and regenerator, or two regenerators.

....

Severely-Errored Seconds Severely-Errored Seconds (SES) refers to the number of one-second periods in which the number of Errored Blocks equals or exceeds the estimator value.

Threshold A threshold is the level of a parameter count at which the system sends a Threshold Crossing Alert.

Threshold Crossing Alert The system reports a Threshold Crossing Alert (TCA) whenever a performance-monitoring parameter exceeds a specified threshold.

Trail A trail is the logical transmission path between two path termination points.

Unavailable Seconds Unavailable Seconds is the number of one-second periods when performance-monitoring data is unavailable due to prolonged severely-errored conditions. The Unavailable Seconds count begins when the system detects ten or more consecutive Severely-Errored Seconds. The system will count these severely-errored seconds as an unavailable second instead. The Unavailable Seconds count stops when the system detects ten or more consecutive, nonseverely-errored seconds. All other counts stop during Unavailable Seconds.

VC-4-4c A VC-4-4c consists of four concatenated, meaning linked together in a series, VC-4s.

VC A Virtual Container (VC) is the information structure used to support path layer connections in the Synchronous Digital Hierarchy (SDH).

Related topics For more information about these terms, see one of the following topics:

- "VC-3, VC-4, and VC-4-4c threshold values" (10-9)
- "VC-12 threshold values" (10-10)
- "RS threshold values" (10-11)
- "MS threshold values" (10-12)
- For a graphical description of the differences between trail types, see "Trail types" (10-8)
- For a flowchart of the parameters, see "How PM works" (10-7)

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365–367–512
Issue 2, July 2002

Lucent Technologies

1 0 - 5

PM concepts

What is PM?

You can provision the system to monitor the quality of transmission signals. By default, transmission signals are not monitored. You can define thresholds for PM parameters, also called performance events. If one of these thresholds is crossed, the system notifies you by automatically generating a Threshold Crossing Alert (TCA) message.

Related topic

You can query the system about previous PM TCA messages. For more information about TCA records, see the Reports chapter in the *Maintenance guide,* 365-367-513.

Why use PM?

Because degraded performance often precedes signal failure, PM lets you know where corrective action may be necessary before service is affected.

What happens during a protection switch?

When a protection switch occurs on a transmission unit, all the PM counts on the unit are set to zero.

How do I choose meaningful thresholds?

It is best to start with high thresholds and then set lower thresholds once the degraded performance problems associated with the higher thresholds have been resolved. For more information, see the ITU-T Recommendations G.826 and G.784.

Do transmission alarms affect the counts?

The system stops collecting far-end counts if there is a Loss of Incoming Signal, but it continues to collect near-end counts.

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How PM works

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Process flowchart   The following flowchart describes the PM process.
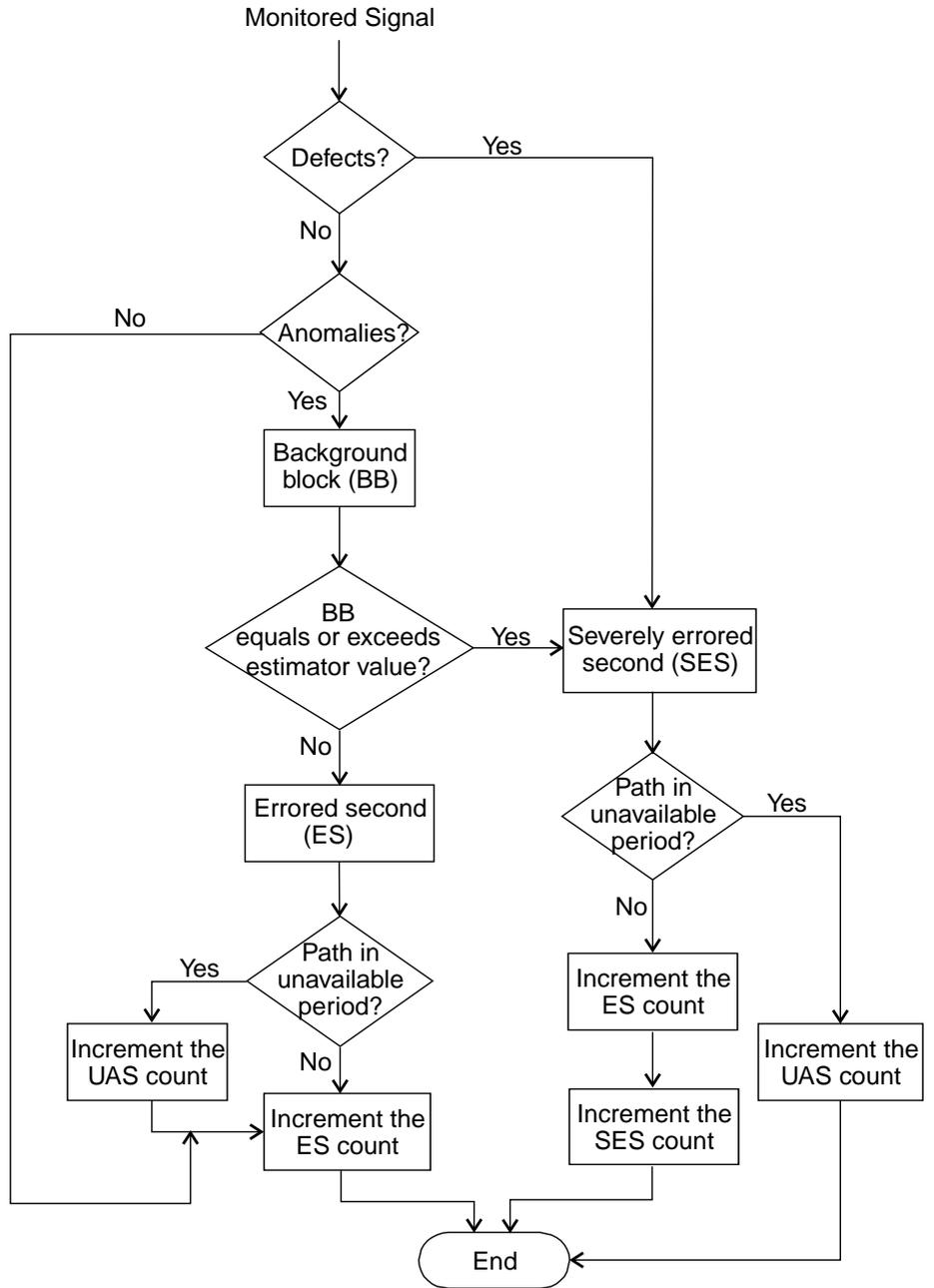
Trail types

....

Trail types you can monitor   Performance monitoring is available on Regenerator section (RS), Multiplex section (MS), VC-4-4c, VC-4, VC-3 (Higher order Path), VC-3 (Lower order Path), and VC-12 trail types.

Differences between trail types   This illustration provides a basic overview of PM trail types.
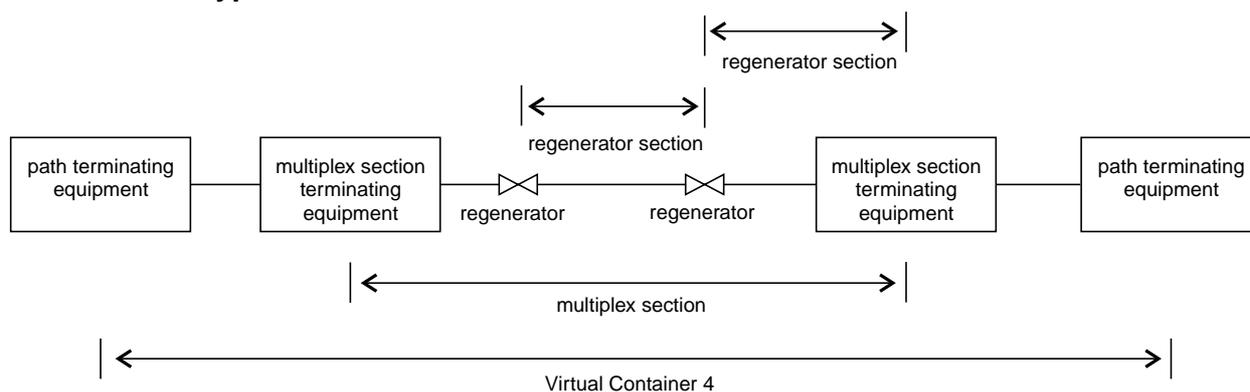
Note

A VC-4-4c consists of four concatenated VC-4s.

Related topic   For more information, see one of the following:

- For more information about the terms used in this topic, see "PM terms" (10-4).

- For more information about Synchronous Digital Hierarchy (SDH) standards, concepts, and applications, see the ITU-T standards.

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VC-3, VC-4, and VC-4-4c threshold values

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Table   The following table displays the allowable range and default values for Virtual Container 3 (VC-3), Virtual Container 4 (VC-4), and VC-4-4c counts.

Parameter	15-minute threshold		24-hour threshold	
	Range	**Default**	**Range**	**Default**
NE-BBE	1–7,200,000	720,000	1–691,200,000	69,120,000
NE-ES	1–900	90	1–86,400	8,640
NE-SES	1–900	90	1–86,400	8,640
NE-UAS	1–900	90	1–86,400	8,640
FE-BBE	1–7,200,000	720,000	1–691,200,000	69,120,000
FE-ES	1–900	90	1–86,400	8,640
FE-SES	1–900	90	1–86,400	8,640
FE-UAS	1–900	90	1–86,400	8,640

Related topic   "How do I choose meaningful thresholds?" (10-6)

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VC-12 threshold values

Table   The following table displays the allowable range and default values for Virtual Container 12 (VC-12) counts.

Parameter	15-minute threshold		24-hour threshold	
	Range	**Default**	**Range**	**Default**
NE-BBE	1–1,800,000	180,000	1–172,800,000	17,280,000
NE-ES	1–900	90	1–86,400	8,640
NE-SES	1–900	90	1–86,400	8,640
NE-UAS	1–900	90	1–86,400	8,640
FE-BBE	1–1,800,000	180,000	1–172,800,000	17,280,000
FE-ES	1–900	90	1–86,400	8,640
FE-SES	1–900	90	1–86,400	8,640
FE-UAS	1–900	90	1–86,400	8,640

Related topic   "How do I choose meaningful thresholds?" (10-6)

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RS threshold values

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Table   The following table displays the allowable range and default values
for Regenerator Section (RS) counts.

Parameter	15-minute threshold		24-hour threshold	
	Range	**Default**	**Range**	**Default**
NE-BBE	1–7,200,000	720,000	1–691,200,000	69,120,000
NE-ES	1–900	90	1–86,400	8,640
NE-SES	1–900	90	1–86,400	8,640
NE-UAS	1–900	90	1–86,400	8,640

Related topic   "How do I choose meaningful thresholds?" (10-6)

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MS threshold values

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STM-1 The following table displays the allowable range and default values for STM-1 Multiplex Section (MS) counts.

Parameter	15-minute threshold		24-hour threshold	
	Range	**Default**	**Range**	**Default**
NE-BBE	1–21,600,000	2,160,000	1–2,073,600,000	207,360,000
NE-ES	1–900	90	1–86,400	8,640
NE-SES	1–900	90	1–86,400	8,640
NE-UAS	1–900	90	1–86,400	8,640
FE-BBE	1–21,600,000	2,160,000	1–2,073,600,000	207,360,000
FE-ES	1–900	90	1–86,400	8,640
FE-SES	1–900	90	1–86,400	8,640
FE-UAS	1–900	90	1–86,400	8,640

STM-4 The following table displays the allowable range and default values for STM-4 Multiplex Section (MS) counts.

Parameter	15-minute threshold		24-hour threshold	
	Range	**Default**	**Range**	**Default**
NE-BBE	1–86,400,000	8,640,000	1–8,294,400,000	829,440,000
NE-ES	1–900	90	1–86,400	8,640
NE-SES	1–900	90	1–86,400	8,640
NE-UAS	1–900	90	1–86,400	8,640
FE-BBE	1–86,400,000	8,640,000	1–8,294,400,000	829,440,000
FE-ES	1–900	90	1–86,400	8,640
FE-SES	1–900	90	1–86,400	8,640
FE-UAS	1–900	90	1–86,400	8,640

STM-16 The following table displays the allowable range and default values for STM-16 Multiplex Section (MS) counts.

Parameter	15-minute threshold		24-hour threshold	
	Range	**Default**	**Range**	**Default**
NE-BBE	1–345,600,000	34,560,000	1–33,177,600,000	3,317,760,000
NE-ES	1–900	90	1–86,400	8,640
NE-SES	1–900	90	1–86,400	8,640

....

Parameter	15-minute threshold		24-hour threshold	
	Range	**Default**	**Range**	**Default**
NE-UAS	1–900	90	1–86,400	8,640
FE-BBE	1–345,600,000	34,560,000	1–33,177,600,000	3,317,760,000
FE-ES	1–900	90	1–86,400	8,640
FE-SES	1–900	90	1–86,400	8,640
FE-UAS	1–900	90	1–86,400	8,640

Related topic "How do I choose meaningful thresholds?" (10-6)

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Count Control window and procedures

Overview

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Purpose   Use the Count Control window to query and provision performance monitoring (PM) count control. This window can be used to start or stop (inhibit) PM counts for a trail, or to clear (set to zero) the PM counters for a trail.

You can start or stop PM counts for the following trail types:

- RS
- MS
- VC4_4c
- VC4
- VC3 (HP) — VC-3 as AU-3
- VC3 (LP) — VC-3 as TU-3
- VC12

Window location   *Provision > Performance Monitoring > Count Control*

Organisation   This section is organised as follows:

- "Count Control window description" (10-15)
- "Querying PM count control" (10-17)
- "Count Control query results" (10-18)
- "Starting PM counts" (10-20)
- "Inhibiting PM counts" (10-23)
- "Clearing the PM counters" (10-24)

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Count Control window description

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Illustration   The following illustration shows the Count Control window.
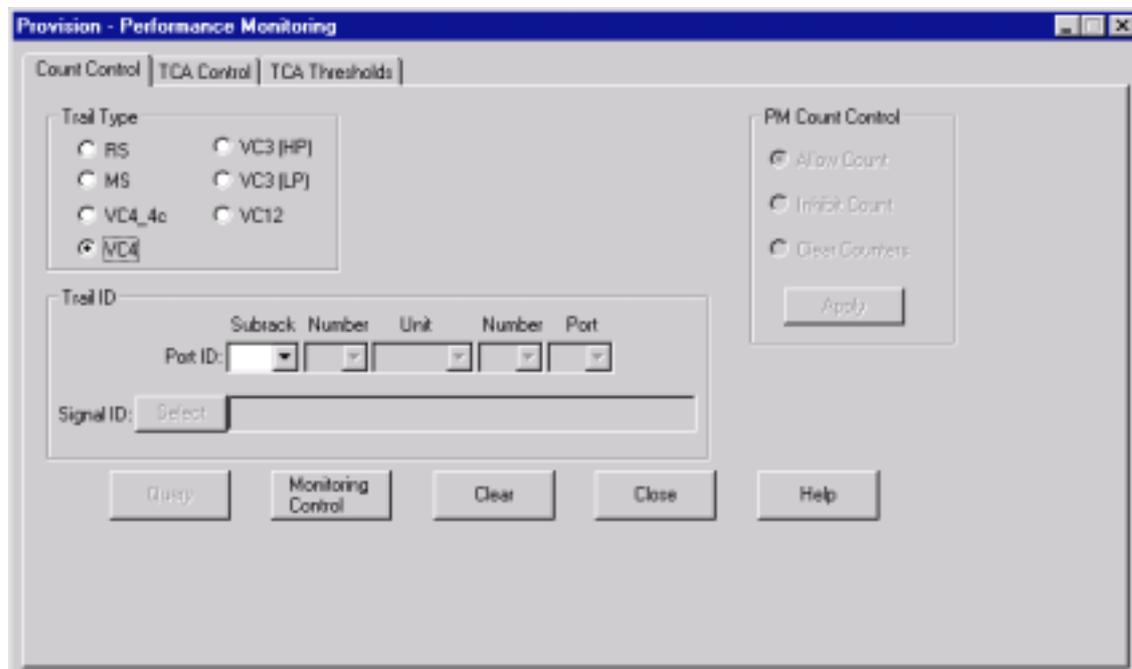
Field descriptions   The Count Control window has the following fields.

Field name	Description
Trail Type	The Trail Type column displays the trail type for PM signal provisioning. The following options are available: • RS • MS • VC4_4c • VC4 • VC3 (HP) — VC-3 as AU-3 • VC3 (LP) — VC-3 as TU-3 • VC12 For more information, see one of the following topics: • For definitions of trail types, see "PM terms" (10-4). • For a graphical description of the differences between trail types, see "Trail types" (10-8).

....

Field name	Description
Port ID	The Port ID fields specify the physical location of the port.
	For more information about addresses, see "About entity addresses" (3-2).
Signal ID	The Signal ID field specifies the signal that you want to query or provision.
	• For some Trail Type and Port ID combinations, the system automatically populates the Signal ID field.
	• For RS and MS signals, this field is unavailable.
	For more information about signal addresses, see "About signal layer addresses" (3-4).
PM Count Control	The PM Count Control field specifies the count control task as one of the following:
	• Allow Count — starts PM counts on one trail.
	• Inhibit Count — prevents count control on one trail at a time.
	• Clear Counters — clears the current 15-minute and the current 24-hour counts on one trail by setting them to 0.

Related topic   For general information about windows, see "About the main application window" (2-10).

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Querying PM count control

....

Purpose   This procedure displays the allow/inhibit status for a specified trail ID. It will *not* display the PM counts that are currently being collected for the specified trail. Query the PM report at *Reports > Performance Monitoring* to determine whether PM counts are currently being collected.

Procedure ....

1   Go to the Count Control window at *Provision > Performance Monitoring > Count Control.*

....

2   Select the trail type in the Trail Type field.

    Reference: For more information, see one of the following topics:

- For definitions of trail types, see "PM terms" (10-4).

- For a graphical description of the differences between trail types, see "Trail types" (10-8).

....

3   Select the port address in the Port ID field.

    Result:

    Depending on what you enter in the Port ID field, the system automatically populates the Signal ID field or the field is unavailable.

    Reference: For more information, see one of the following topics:

- For general information about port addresses and signal addresses, see "About entity addresses" (3-2).

- For specific information about the Signal ID field, see "About signal layer addresses" (3-4).

....

4   Click Query.

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Count Control query results

Illustration   Use the following illustration only as an example of query results from the Count Control window.
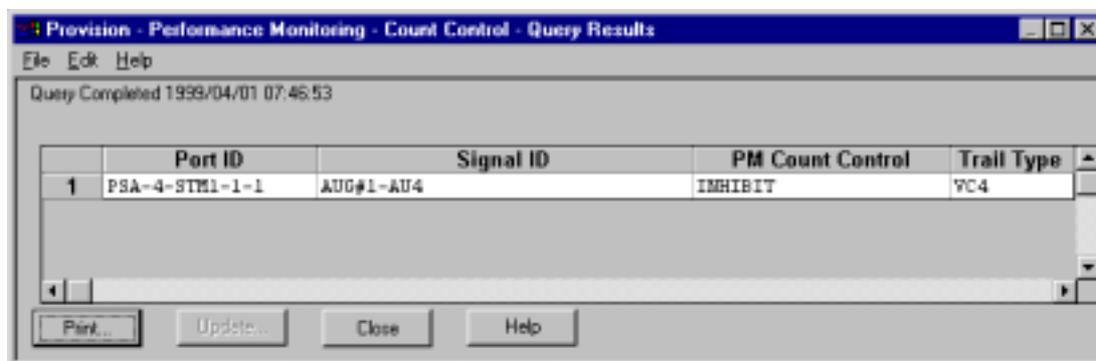
Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The following information appears in the Count Control Query Results window.

Column	Description
Port ID	The Port ID column displays the Port ID, or physical address, of the input port.
	For more information about addresses, see "About entity addresses" (3-2).
Signal ID	The Signal ID column displays the Signal ID, or signal address.
	For more information about signal addresses, see "About signal layer addresses" (3-4).
PM Count Control	The PM Count Control column displays the count control state as one of the following:
	• Allow — PM counts are allowed on this trail.
	• Inhibit — PM counts are *not* allowed on this trail.

Column	Description
Trail Type	The Trail Type column displays the trail type for PM signal provisioning. The following options are available: • RS • MS • VC4_4c • VC4 • VC3 (HP) — VC-3 as AU-3 • VC3 (LP) — VC-3 as TU-3 • VC12 For more information, see one of the following topics: • For definitions of trail types, see "PM terms" (10-4). • For a graphical description of the differences between trail types, see "Trail types" (10-8).

Related topic   For general information about windows, see "About the main application window" (2-10).

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Starting PM counts

Purpose   Use this procedure to turn on the PM count control for a specified Trail ID.

Gathering information   Before applying PM count control on a port, perform the following steps.

1   Query the unit to verify that the unit is fully operational.

    Reference:

    Use the Unit window at *Provision > Equipment > Unit.*

2   Query the port monitoring to verify that the port monitoring mode is set to MON. If the mode is set to AUTO, it will automatically transition to MON if the signal is valid.

    Reference:

    Use the Port Monitoring window at *Provision > Monitoring Control > Port Monitoring.*

3   Query the signal monitoring to check one of the following:

- For VC4_4c trails, check the HP row to verify that the higher order path monitoring mode for the AU-4-4c is set to MON.

- For VC4 trails, check the HP row to verify that the higher order path monitoring mode for the AU-4 is set to MON.

- For VC3 (HP) trails, check the HP row to verify that the higher order path monitoring mode for the AU-3 is set to MON.

- For VC3 (LP) trails, check the LP row to verify that the lower order path monitoring mode for the TU-3 is set to MON.

- For VC12 trails, check the LP row to verify that the lower order path monitoring mode for the TU-12 is set to MON.

- For RS trails, verify that the RS monitoring mode is set to MON.

- For MS trails, verify that the MS monitoring mode is set to MON.

    Reference:

    Use the Signal Monitoring window at *Provision > Monitoring Control > Signal Monitoring.*

....

4 Look at the Alarm Panel to see if there are any diagnostic tests in progress. If there are, wait until the diagnostic test completes.

....

5 For VC4 or VC4_4c trails only, if the port is part of an MSP group, query the MSP group to verify that the specified unit is the working unit.

> **Reference:**
>
> Use the MSP Group window at *Provision > Protection Switch > MSP Group.*

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Procedure ....

1 Go to the Count Control window at *Provision > Performance Monitoring > Count Control.*

....

2 Select the trail type in the Trail Type field.

> **Reference:** For more information, see one of the following topics:
>
> • For definitions of trail types, see "PM terms" (10-4).
>
> • For a graphical description of the differences between trail types, see "Trail types" (10-8).

....

3 Select the port address in the Port ID field.

> **Result:**
>
> Depending on what you enter in the Port ID field, the system automatically populates the Signal ID field or the field is unavailable.
>
> **Reference:** For more information, see one of the following topics:
>
> • For general information about port addresses and signal addresses, see "About entity addresses" (3-2).
>
> • For specific information about the Signal ID field, see "About signal layer addresses" (3-4).

....

4 Click the Allow Count button in the PM Count Control field.

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365–367–512
Issue 2, July 2002

Lucent Technologies

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5   Click Apply.

Result:

The counts will start at zero.

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6   If you want to change the system default TCA threshold values, go to the TCA Thresholds window to change them.

Reference:

Provision > Performance Monitoring > TCA Thresholds

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1 0 - 2 2   **Lucent Technologies**   365–367–512
Issue 2, July 2002

Inhibiting PM counts

Purpose   Use this procedure to stop count control for the specified trail ID.

Procedure

1   Go to the Count Control window at *Provision > Performance Monitoring > Count Control.*

2   Select the trail type in the Trail Type field.

> **Reference:** For more information, see one of the following topics:
> - For definitions of RS, MS, VC4_4c, VC4, VC3 (HP), VC3 (LP), and VC12 see "PM terms" (10-4).
> - For a graphical description of the differences between trail types, see "Trail types" (10-8).

3   Select the port address in the Port ID field.

> **Result:**
>
> Depending on what you enter in the Port ID field, the system automatically populates the Signal ID field or the field is unavailable.
>
> **Reference:** For more information, see one of the following topics:
> - For general information about port addresses and signal addresses, see "About entity addresses" (3-2).
> - For specific information about the Signal ID field, see "About signal layer addresses" (3-4).

4   Click the Inhibit Count button in the PM Count Control field.

5   Click Apply.

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Clearing the PM counters

Purpose   Use this procedure to set the current 15-minute and the current 24-hour counts to zero for the specified Trail ID.

Procedure

1   Go to the Count Control window at *Provision > Performance Monitoring > Count Control.*

2   Select the trail type in the Trail Type field.

Reference: For more information, see one of the following topics:

- For definitions of trail types, see "PM terms" (10-4).

- For a graphical description of the differences between trail types, see "Trail types" (10-8).

3   Select the port address in the Port ID field.

Result:

Depending on what you enter in the Port ID field, the system automatically populates the Signal ID field or the field is unavailable.

Reference: For more information, see one of the following topics:

- For general information about port addresses and signal addresses, see "About entity addresses" (3-2).

- For specific information about the Signal ID field, see "About signal layer addresses" (3-4).

4   Click the Clear Counters button in the PM Count Control field.

5   Click Apply.
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TCA Control window and procedures

Overview

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Purpose   Use the TCA Control window to query, allow, or inhibit the reporting of a Threshold Crossing Alert (TCA) for one or more performance monitoring (PM) parameters.

Window location   *Provision > Performance Monitoring > TCA Control*

Organisation   This section is organised as follows:

- "TCA Control window description" (10-26)
- "Querying TCA reporting" (10-28)
- "TCA Control query results" (10-29)
- "Starting TCA reporting when all parameters are inhibited" (10-31)
- "Starting TCA reporting when some parameters are enabled" (10-33)
- "Inhibiting TCA reporting" (10-35)

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365–367–512
Issue 2, July 2002

Lucent Technologies

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TCA Control window description

Illustration   The following illustration shows the TCA Control window.
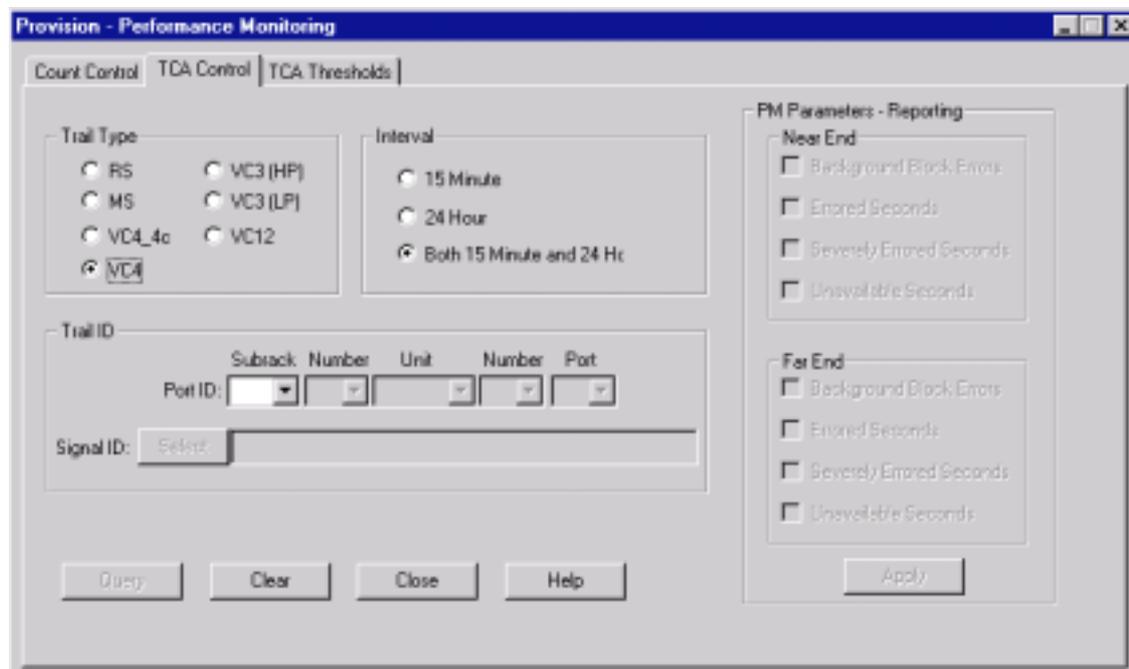
Field descriptions   The following information appears in the TCA Control window.

Field name	Description
Trail Type	The Trail Type column displays the trail type for PM signal provisioning. The following options are available: • RS • MS • VC4_4c • VC4 • VC3 (HP) — VC-3 as AU-3 • VC3 (LP) — VC-3 as TU-3 • VC12 For more information, see one of the following topics: • For definitions of trail types, see "PM terms" (10-4). • For a graphical description of the differences between trail types, see "Trail types" (10-8).

Field name	Description
Port ID	The Port ID fields specify the physical location of the port. For more information about addresses, see "About entity addresses" (3-2).
Signal ID	The Signal ID field specifies the signal that you want to query or provision. • For some Trail Type and Port ID combinations, the system automatically populates the Signal ID field. • For RS and MS signals, this field is unavailable. For more information about signal addresses, see "About signal layer addresses" (3-4).
Interval	The Interval field tells the system to allow or inhibit TCAs for the following time intervals: • 15-Minute • 24-Hour • Both 15-Minute and 24-Hour
PM Parameters — Reporting: Near End	Near-end parameters are monitored and reported by a *local* system. When the near-end parameters exceed their threshold, the system will report a Threshold Crossing Alert. For a list and a definition of each parameter, see "List of terms" (10-4).
PM Parameters — Reporting: Far End	Far-end parameters are monitored by a *remote* system and reported by a local system. When the far-end parameters exceed their threshold, the system will report a Threshold Crossing Alert. There are no far-end parameters for an RS trail. For a list and a definition of each parameter, see "List of terms" (10-4).

Related topic   For general information about windows, see "About the main application window" (2-10).

□

Querying TCA reporting

Purpose   Use this procedure to query and display the TCA reporting status for the specified Trail Type and Trail ID.

Procedure

1   Go to the TCA Control window at *Provision > Performance Monitoring > TCA Control.*

2   Select the trail type in the Trail Type field.

   Reference: For more information, see one of the following topics:

   •   For definitions of trail types, see "PM terms" (10-4).

   •   For a graphical description of the differences between trail types, see "Trail types" (10-8).

3   Select the port address in the Port ID field.

   Result:

   Depending on what you enter in the Port ID field, the system automatically populates the Signal ID field or the field is unavailable.

   Reference: For more information, see one of the following topics:

   •   For general information about port addresses and signal addresses, see "About entity addresses" (3-2).

   •   For specific information about the Signal ID field, see "About signal layer addresses" (3-4).

4   Click the appropriate Interval as 15-Minute or 24-Hour.

5   Click Query.
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TCA Control query results

Illustration   Use the following illustration only as an example of query results from the TCA Control window.

Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The following information appears in the TCA Control Query Results window.

Column	Description
Port ID	The Port ID column displays the Port ID, or physical address, of the input port.
	For more information about addresses, see "About entity addresses" (3-2).
Signal ID	The Signal ID column displays the Signal ID, or signal address.
	For more information about signal addresses, see "About signal layer addresses" (3-4).
Interval	The Interval column displays the time interval associated with the displayed Allow/Inhibit statuses as one of the following:
	• 15-Minute
	• 24-Hour

Column	Description
Trail Type	The Trail Type column displays the trail type for PM signal provisioning. The following options are available: • RS • MS • VC4_4c • VC4 • VC3 (HP) — VC-3 as AU-3 • VC3 (LP) — VC-3 as TU-3 • VC12 For more information, see one of the following topics: • For definitions of trail types, see "PM terms" (10-4). • For a graphical description of the differences between trail types, see "Trail types" (10-8).
NE_BBE	The NE_BBE column displays the Allow/Inhibit status for Near-End Background-Block Errors.
NE_ES	The NE_ES column displays the Allow/Inhibit status for Near-End Errored Seconds.
NE_SES	The NE_SES column displays the Allow/Inhibit status for Near-End Severely-Errored Seconds.
NE_UAS	The NE_UAS column displays the Allow/Inhibit status for Near-End Unavailable Seconds.
FE_BBE	The FE_BBE column displays the Allow/Inhibit status for Far-End Background Block Errors.
FE_ES	The FE_ES column displays the Allow/Inhibit status for Far-End Errored Seconds.
FE_SES	The FE_SES column displays the Allow/Inhibit status for Far-End Severely-Errored Seconds.
FE_UAS	The FE_UAS column displays the Allow/Inhibit status for Far-End Unavailable Seconds.

RS and far-end parameters   The far-end parameter fields are unavailable if you select RS as a trail type.

Related topic   For general information about windows, see "About the main application window" (2-10).

□

Starting TCA reporting when all parameters are inhibited

Purpose   Use this procedure to start the reporting of a Threshold Crossing Alert (TCA) for one or more PM parameters when all the parameters are currently inhibited.

Before you begin   If you are provisioning PM for the first time, perform the following steps before starting TCA reporting.

1   Start the counting from the Count Control window.

> **Reference:**
>
> *Provision > Performance Monitoring > Count Control*

2   If you want to change the default TCA threshold values, set the new values from the TCA Thresholds window.

> **Reference:**
>
> *Provision > Performance Monitoring > TCA Thresholds*

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Procedure

1   Go to the TCA Control window at *Provision > Performance Monitoring > TCA Control.*

2   Select the trail type in the Trail Type field.

> **Reference:** For more information, see one of the following topics:
>
> • For definitions of trail types, see "PM terms" (10-4).
>
> • For a graphical description of the differences between trail types, see "Trail types" (10-8).

3   Select the port address in the Port ID field.

> **Result:**
>
> Depending on what you enter in the Port ID field, the system automatically populates the Signal ID field or the field is unavailable.

TCA Control window and procedures
Starting TCA reporting when all parameters
are inhibited

Performance monitoring

> **Reference:** For more information, see one of the following topics:
>
> - For general information about port addresses and signal addresses, see "About entity addresses" (3-2).
>
> - For specific information about the Signal ID field, see "About signal layer addresses" (3-4).

....

4   Click the appropriate Interval.

....

5   Check the box for each parameter in the Near End and Far End fields that you want to enable with TCA reporting. Each parameter with its box checked will have TCA reporting enabled for the specified interval. Each parameter with its box not checked will have TCA reporting inhibited.

....

6   Click Apply.

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1 0 - 3 2   **Lucent Technologies**   365–367–512
                                                                                                            Issue 2, July 2002

Starting TCA reporting when some parameters are enabled

Purpose   Use this procedure to start the reporting of a Threshold Crossing Alert (TCA) for one or more PM parameters when some parameters are enabled for the specified Trail ID.

Before you begin   If you are provisioning PM for the first time, perform the following steps before starting TCA reporting.

1   Start the counting from the Count Control window.

> **Reference:**
>
> *Provision > Performance Monitoring > Count Control*

2   If you want to change the default TCA threshold values, set the new values from the TCA Thresholds window.

> **Reference:**
>
> *Provision > Performance Monitoring > TCA Thresholds*

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Procedure   **Important!** If you already have TCA reporting enabled for some parameters (for example: BBE, ES, and SES) and you want to enable TCA reporting for another parameter (for example: UAS), then you must check the boxes for *all* of the parameters that you want enabled, not just for the new parameters. The easiest way to enable TCA reporting for another parameter is to query the TCA reporting first, as described in the following procedure. This will tell you which parameters are already enabled. Then you can check the box for these parameters plus the new parameter that you want to enable.

1   Go to the TCA Control window at *Provision > Performance Monitoring > TCA Control.*

2   Select the trail type in the Trail Type field.

> **Reference:** For more information, see one of the following topics:
>
> - For definitions of trail types, see "PM terms" (10-4).
> - For a graphical description of the differences between trail types, see "Trail types" (10-8).

TCA Control window and procedures
Starting TCA reporting when some
parameters are enabled

Performance monitoring

3 Select the port address in the Port ID field.

> **Result:**
>
> Depending on what you enter in the Port ID field, the system automatically populates the Signal ID field or the field is unavailable.
>
> **Reference:** For more information, see one of the following topics:
>
> - For general information about port addresses and signal addresses, see "About entity addresses" (3-2).
>
> - For specific information about the Signal ID field, see "About signal layer addresses" (3-4).

4 Click the appropriate Interval.

5 Click Query.

> **Result:**
>
> The current TCA control state displays on the TCA Control Results window.

6 Write down which parameters have TCA Reporting allowed, and close the window, or click on the Update button to populate the fields in the TCA Control window.

7 In the TCA Control window, check the box for each parameter in the Near End and Far End fields that you want to enable with TCA reporting. Include all the parameters that were allowed in the TCA Control Results window (see the previous step), unless you want to disable them at this time.

8 Click Apply.

> **Result:**
>
> Every parameter with its box checked will have TCA reporting enabled for the specified interval. Every parameter with its box not checked will have TCA reporting inhibited.

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Inhibiting TCA reporting

....

Purpose   Use this procedure to turn off the reporting of a Threshold Crossing Alert (TCA) for one or more PM parameters for the specified Trail ID.

Procedure   ....

1   Go to the TCA Control window at *Provision > Performance Monitoring > TCA Control.*

....

2   Select the trail type in the Trail Type field.

Reference: For more information, see one of the following topics:

- For definitions of trail types, see "PM terms" (10-4).

- For a graphical description of the differences between trail types, see "Trail types" (10-8).

....

3   Select the port address in the Port ID field.

Result:

Depending on what you enter in the Port ID field, the system automatically populates the Signal ID field or the field is unavailable.

Reference: For more information, see one of the following topics:

- For general information about port addresses and signal addresses, see "About entity addresses" (3-2).

- For specific information about the Signal ID field, see "About signal layer addresses" (3-4).

....

4   Click the appropriate Interval.

....

5   Click Query to determine which parameters have TCA reporting enabled for the interval.

....

6   Write down which parameters are allowed, and close the window, or click on the Update button to populate the fields in the TCA Control window.

....

7   In the TCA Control window, check the box for each parameter noted in the previous step. Remove the checks for the PM parameters in the Near End or Far End fields that you want to inhibit at this time.

8   Click Apply.

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TCA Thresholds window and procedures

Overview

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Purpose   Use the TCA Thresholds window to query and provision the threshold values for one or more performance-monitoring parameters.

Window location   *Provision > Performance Monitoring > TCA Thresholds*

Organisation   This section is organised as follows:

- "TCA Thresholds window description" (10-38)
- "Querying TCA threshold values" (10-41)
- "Changing TCA threshold values" (10-44)

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TCA Thresholds window description

Illustration   The following illustration shows the TCA Thresholds window.
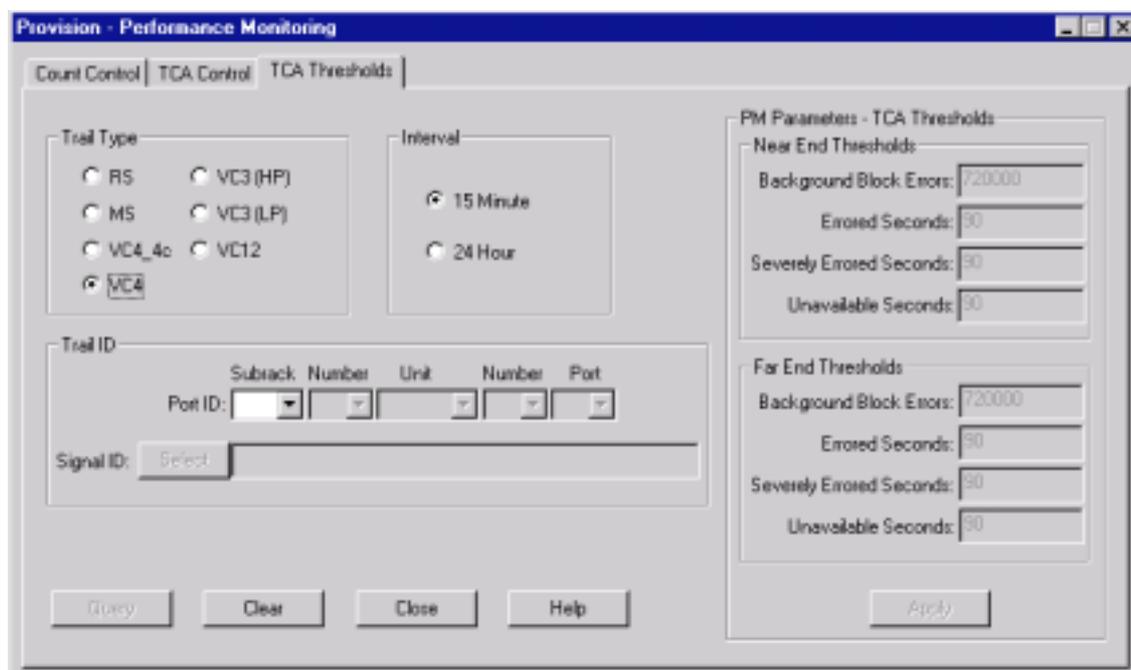
Field descriptions   The TCA Thresholds window has the following fields.

Field name	Description
Trail Type	The Trail Type column displays the trail type for PM signal provisioning. The following options are available: • RS • MS • VC4_4c • VC4 • VC3 (HP) — VC-3 as AU-3 • VC3 (LP) — VC-3 as TU-3 • VC12 For more information, see one of the following topics: • For definitions of trail types, see "PM terms" (10-4). • For a graphical description of the differences between trail types, see "Trail types" (10-8).

Field name	Description
Port ID	The Port ID fields specify the physical location of the port. For more information about addresses, see "About entity addresses" (3-2).
Signal ID	The Signal ID field specifies the signal that you want to query or provision. • For some Trail Type and Port ID combinations, the system automatically populates the Signal ID field. • For RS and MS signals, this field is unavailable. For more information about signal addresses, see "About signal layer addresses" (3-4).
Interval	Tells the system to set TCA thresholds for parameters at the following time intervals: • 15-Minute • 24-Hour
PM Parameters — TCA Thresholds: Near End Thresholds	The Near End Thresholds fields specify the Threshold Crossing Alert (TCA) thresholds for PM parameters. Near-end PM parameters are monitored and reported by a *local* system. When the near-end parameters exceed their threshold, the system will report a Threshold Crossing Alert. For more information, see any of the following topics: • "VC-3, VC-4, and VC-4-4c threshold values" (10-9) • "VC-12 threshold values" (10-10) • "RS threshold values" (10-11) • "MS threshold values" (10-12) • For a list and a definition of each parameter, see "List of terms" (10-4).

Field name	Description
PM Parameters — TCA Thresholds: Far End Thresholds	The PM Parameters field specifies the Threshold Crossing Alert (TCA) thresholds for PM parameters. Far-end PM parameters are monitored by a *remote* system and reported by a local system. When the far-end parameters exceed their threshold, the system will report a Threshold Crossing Alert. For more information, see any of the following topics: • "VC-3, VC-4, and VC-4-4c threshold values" (10-9) • "VC-12 threshold values" (10-10) • "RS threshold values" (10-11) • "MS threshold values" (10-12) • For a list and a definition of each parameter, see "List of terms" (10-4).

RS and far-end parameters   The far-end parameter fields are unavailable if you select RS as a trail type.

Related topic   For general information about windows, see "About the main application window" (2-10).

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1 0 - 4 0   **Lucent Technologies**   365–367–512
Issue 2, July 2002

Querying TCA threshold values

....

Purpose   Use this procedure to query and display the TCA threshold values and intervals for PM parameters for the specified Trail ID.

Procedure   ....

1   Go to the TCA Thresholds window at *Provision > Performance Monitoring > TCA Thresholds.*

....

2   Select the trail type in the Trail Type field.

Reference: For more information, see one of the following topics:

- For definitions of trail types, see "PM terms" (10-4).

- For a graphical description of the differences between trail types, see "Trail types" (10-8).

....

3   Select the port address in the Port ID field.

Result:

Depending on what you enter in the Port ID field, the system automatically populates the Signal ID field or the field is unavailable.

Reference: For more information, see one of the following topics:

- For general information about port addresses and signal addresses, see "About entity addresses" (3-2).

- For specific information about the Signal ID field, see "About signal layer addresses" (3-4).

....

4   Click the Interval to display the 15-minute or the 24-hour intervals.

Result:

The default threshold values for the selected trail and interval will automatically display on the screen.

....

5   Click Query for the currently-provisioned threshold values.

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TCA Thresholds query results

Illustration   Use the following illustration only as an example of query results from the TCA Threshold window.

Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The following information appears in the TCA Thresholds Query Results window.

Column	Description
Port ID	The Port ID column displays the Port ID, or physical address, of the input port.
	For more information about addresses, see "About entity addresses" (3-2).
Signal ID	The Signal ID column displays the Signal ID, or signal address.
	For more information about signal addresses, see "About signal layer addresses" (3-4).
Interval	The Interval column displays the time interval associated with the displayed TCA threshold values as one of the following: • 15-Minute • 24-Hour

Column	Description
Trail Type	The Trail Type column displays the trail type for PM signal provisioning. The following options are available: • RS • MS • VC4_4c • VC4 • VC3 (HP) — VC-3 as AU-3 • VC3 (LP) — VC-3 as TU-3 • VC12 For more information, see one of the following topics: • For definitions of trail types, see "PM terms" (10-4). • For a graphical description of the differences between trail types, see "Trail types" (10-8).
NE_BBE	The NE_BBE column displays the TCA threshold for Near-End Background-Block Errors.
NE_ES	The NE_ES column displays the TCA threshold for Near-End Errored Seconds.
NE_SES	The NE_SES column displays the TCA threshold for Near-End Severely-Errored Seconds.
NE_UAS	The NE_UAS column displays the TCA threshold for Near-End Unavailable Seconds.
FE_BBE	The FE_BBE column displays the TCA threshold for Far-End Background-Block Errors.
FE_ES	The FE_ES column displays the TCA threshold for Far-End Errored Seconds.
FE_SES	The FE_SES column displays the TCA threshold for Far-End Severely-Errored Seconds.
FE_UAS	The FE_UAS column displays the TCA threshold for Far-End Unavailable Seconds.

RS and far-end parameters The far-end parameter fields are unavailable if you select RS as a trail type.

Related topic For general information about windows, see "About the main application window" (2-10).

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Changing TCA threshold values

Purpose   Use this procedure to change the default TCA thresholds for one or more performance-monitoring parameters.

Procedure

1   Go to the TCA Thresholds window at *Provision > Performance Monitoring > TCA Thresholds.*

2   Select the trail type in the Trail Type field.

> **Reference:** For more information, see one of the following topics:
>
> - For definitions of trail types, see "PM terms" (10-4).
>
> - For a graphical description of the differences between trail types, see "Trail types" (10-8).

3   Select the port address in the Port ID field.

> **Result:**
>
> Depending on what you enter in the Port ID field, the system automatically populates the Signal ID field or the field is unavailable.
>
> **Reference:** For more information, see one of the following topics:
>
> - For general information about port addresses and signal addresses, see "About entity addresses" (3-2).
>
> - For specific information about the Signal ID field, see "About signal layer addresses" (3-4).

4   Click the appropriate Interval.

> **Important!** Perform a query before changing the threshold value for any parameter. If you do not perform a query, you may inadvertently set the threshold value of another parameter to its default value.

5   Click Query to see the currently-provisioned threshold values.

6   Write down the threshold value of each parameter, and close the window, or click on the Update button to populate the fields in the TCA Thresholds window.

....

7   In the TCA Thresholds window, change the threshold values for the parameters in the Near End Thresholds and Far End Thresholds fields based on the data you collected in the previous step. You may also change any other threshold values at this time.

....

8   Click Apply.

....

9   If you are provisioning PM for the first time, go to the TCA Control window to start the TCA reporting.

   Reference: For more information, see one of the following topics:

   - "Starting TCA reporting when all parameters are inhibited" (10-31)

   - "Starting TCA reporting when some parameters are enabled" (10-33)

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365–367–512
Issue 2, July 2002

Lucent Technologies

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11 About alarms

Overview

Purpose   "About alarms" contains general information about alarms.

Organisation   "About alarms" is organised as follows:
- "Alarm terms" (11-2)
- "Defects and failures" (11-3)
- "Delay timers" (11-4)
- "Alarm Panel" (11-5)
- "User Panel" (11-6)
- "Conditions that affect service" (11-7)
- "Alarm indicator definition" (11-8)
- "Alarm indicator descriptions" (11-9)
- "MDIs and MDOs" (11-10)
- "About disconnecting and suppressing alarm indicators" (11-12)
- "About provisioning alarm indicators" (11-13)

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Alarm terms

List of terms

Deferred Deferred indicates one, or both, of the following: a performance-degrading condition exists, but the condition does not affect service; a changeover to standby equipment has been used to restore service. Maintenance personnel must take immediate action, but they must resolve any prompt alarms first.

Information An alarm designated as information means that the alarm requires no immediate action. Maintenance personnel can perform the required actions on a scheduled basis or after an accumulation of maintenance events. Information alarms are indicated only on the User Panel.

Prompt A prompt alarm indicates that maintenance personnel must repair the defective equipment or take whatever corrective action is necessary to restore good service. Alarms for conditions that affect service are always classified as prompt.

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Defects and failures

Differences between transmission and equipment defects or failures

The system collects information about transmission and equipment defects, failures, or degraded performance.

The difference between a transmission defect or failure, and an equipment defect or failure is as follows:

- A transmission defect or failure indicates a problem with the transmission signal received from outside your local equipment.

- An equipment defect or failure indicates a problem with the system equipment.

Alarm and defect reports

The system logs information about transmission and equipment defects and alarms. You can examine or print a report from a local or remote PC.

How the system correlates defects

The system correlates observed defects to determine the source of the trouble. If multiple parts of the system detect defects caused by one problem, the system uses defect correlation to try to find the real cause and to suppress side-effect causes. After the system correlates a defect, the system will time the defect to determine if the defect should be declared a failure.

Failures and consequent actions

If a defect persists long enough to be considered a failure, the system initiates the consequent actions defined for that failure. Consequent actions return the system to proper operation or prevent faults from propagating through the network.

Example of a consequent action

One example of a consequent action is the switching of service from the equipment that is currently providing service to standby or protection equipment.

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Delay timers

Defect-to-alarm delay timers

The defect-to-alarm delay is the amount of time the system waits after a defect occurs before the system declares and reports a failure. If the defect goes away before the defect-to-alarm delay expires, no alarm is generated.

Alarm-clear delay timers

The alarm-clear delay is the number of seconds that the system waits after an equipment or transmission alarm has cleared before turning off the associated alarm indicators and generating an alarm-clear message.

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Alarm Panel

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Illustration   The following illustration shows the Alarm Panel.

What is displayed on the Alarm Panel?   The Alarm Panel displays alarm tallies and information about autonomous events. You can gain access to the Alarm Panel from a local or remote PC.

What are alarm tallies?   Alarm tallies are the current numbers of prompt, deferred, and information alarms for the system.

What are autonomous events?   Autonomous events are actions that the system initiates automatically.

Examples of autonomous events

Alarms, protection-switching events, and system clock reference changes are examples of autonomous events.

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User Panel

User Panel alarm indicators and controls

The User Panel is located on the front of the Main Controller rack, below the Main Controller subrack. The User Panel displays general system status and alarm information.

The Alarm Connector Panel (ACP) and the Fan Connector Panel (FCP) are located on the back of the User Panel. The ACP and the FCP have connectors for alarm-related cables.

Related topics

For more information, see one of the following topics:

- "User Panel" (1-20)

- "Alarm Connector Panel (ACP)" (1-22)

- "Fan Connector Panel (FCP)" (1-25)

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Conditions that affect service

What affects service? Any of the following conditions will affect service:

- Protection is not available for the alarmed equipment or transmission entity.

- The alarmed entity is still providing service and cannot be protected.

- For control functions, any condition that can cause a cross-connect command to be denied.

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Alarm indicator definition

What are alarm indicators?

Once a failure is declared, the system raises an alarm and turns on the appropriate alarm indicators. The alarm indicators provide a *trail of lights* that identifies the suite, rack, and unit on which the failure occurred. Alarm indicators are interfaced through solid-state relays located on the ARU in the Main Controller subrack. Alarm indicators are turned on or off by opening or closing relay contacts. When the condition that caused an alarm clears, the system clears the failure and automatically turns the alarm indicators off.

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Alarm indicator descriptions

End-of-suite alarm indicators

Typically, Prompt and Deferred end-of-suite alarm indicators are located at the end of every suite (aisle), and are activated when the system detects a fault in that suite. You can disconnect or suppress end-of-suite alarm indicators from the User Panel or from a local or remote PC.

Rack-top alarm indicators

Prompt and Deferred rack-top alarm indicators are located at the top of each equipment rack and are activated when the system detects a fault in that rack. You can suppress rack-top alarm indicators from the User Panel or from a local or remote PC. You cannot disconnect rack-top alarm indicators.

Station alarm indicators

Station alarm indicators are alarm indicators that your company has designed to draw attention to an alarm condition. Station alarm indicators can be designed to either ring or light. These alarm indicators can be located in the equipment room or in other parts of the office. The system provides relays for the disconnectable and nondisconnectable station alarm indicators.

Disconnectable and nondisconnectable station alarm indicators

In a typical configuration, disconnectable station alarm indicators are connected to audible alarms, and nondisconnectable station alarm indicators are connected to visual alarms. If you disconnect a station alarm indicator, the audible alarms are silenced, but the visual alarms remain active until the failure has cleared.

You can disconnect or suppress disconnectable station alarm indicators on a system-wide basis. You cannot disconnect nondisconnectable station alarm indicators, but you can suppress nondisconnectable station alarm indicators on a system-wide basis.

You can disconnect or suppress station alarm indicators from the User Panel or from a local or remote PC.

Related topic

For information about Miscellaneous Discrete (MD) alarm indicators, see "MDIs and MDOs" (11-10).

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MDIs and MDOs

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Description Miscellaneous Discrete (MD) alarm indicators provide alarm indications for internal and external events; such as burglar alarms, smoke detectors, door contacts, and fan failures in port racks that are equipped with PSC subracks. MD alarm indicators are connected on the Fan Connector Panel (FCP), which is located on the back of the User Panel. The system provides Miscellaneous Discrete Inputs (MDIs) and Miscellaneous Discrete Outputs (MDOs).

MDIs MDIs provide inputs to the DACS system from fan trays in port racks that are equipped with PSC subracks, and from external equipment. You can use MDIs to collect status information from other transmission equipment or to monitor internal and external events. The DACS system allows up to eight inputs from fan trays in port racks that are equipped with PSC subracks, and up to four inputs from external equipment.

MDOs You can use MDOs to provide outputs from the DACS system to drive external equipment. The DACS system allows three MDOs.

Connecting MDIs to the FCP MDIs from external equipment are connected to the connector labeled MD IN on the FCP. Refer to "Fan Connector Panel (FCP)" (1-25) for a description and illustration of the FCP.

MDIs from fan trays in port racks that are equipped with PSC subracks are connected to the connectors labeled MDI 1 through MDI 4 on the FCP. Each of the four MDIs is a group of four connectors, for a total of 16 connectors. This configuration gives you flexibility in connecting the MDIs.

If you want to use MDIs to monitor fan failures and external equipment alarms and you have more than four MDIs, group the fan tray inputs, because fan failures are also indicated by lighting an LED on the connector panel of the failed port rack fan tray. If fan tray MD inputs are grouped and one of the fans in the group fails, you can identify which port rack fan tray has the failure by looking for a lighted FAIL LED on each fan tray connector panel.

MDI connection example If you have four port rack fan trays that you want to connect to MDIs, you can connect all four fan trays to one MDI, one fan tray to each of the four MDIs, or two fan trays to two of the four MDIs. If you have more than four port rack fan trays, more than one fan tray will have to be connected to at least one MDI.

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Provisioning MDs   You cannot enable or disable MDs from the user interface on the DACS system. MDs are always enabled.

Testing MDOs   You can test the MDO alarm indicators from the *Maintenance > Alarm Indicator Tests* window. If the MDOs are not connected to any external equipment, you can run an Alarm Indicator test and check for continuity on a specific output with a Volt Ohm Meter (VOM).

Testing MDIs   All MDIs were tested during installation. If you need to test the MDIs again, you can short the appropriate pins and check for an alarm indication. You can also run a diagnostic test on the MD input circuitry on the ARU using the MD Inputs diagnostic test.

Related topic

Use the *Maintenance > Execute Tests > Diagnostic Tests* window to run an MD Inputs diagnostic test.

Alarms on MDs   MDcIP{1–4} alarms report monitored internal or external events to the local system. If an event occurs, the system will raise an alarm. You can change the severity of these alarms.

Related topic

To change the alarm severity, go to *Provision > Alarm Settings > Severity Levels* on the user interface.

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About disconnecting and suppressing alarm indicators

General information about disconnecting and suppressing alarm notifications

When you disconnect or suppress alarm indicators, the system will turn off the corresponding visual or audible notifications of the alarm. However, you can still gain access to information about alarms through a local or remote PC with XC-CIT application software. A yellow LED next to the DISCONNECTED or SUPPRESSED button on the User Panel indicates that alarm indicators are disconnected or suppressed.

About disconnecting alarm indicators

When you disconnect alarm indicators, the disconnection becomes a system-wide and permanent condition. Alarms that occur after you disconnect alarm indicators will not be indicated until you remove the disconnection.

You can remove the disconnection in either of the following ways:

- Press the DISCONNECT button on the User Panel

- Go to *Alarms > Station Alarm Control*

About suppressing alarm indicators

When you suppress alarm indicators, the suppression becomes a system-wide and temporary condition. The system will turn off suppressible indicators for current alarms only. Any subsequent alarms will light the alarm indicators. Once you suppress the alarm indicators, the SUPPRESSED alarm indicator on the User Panel lights and remains lit until you clear the originally-suppressed alarms. You must clear the originally-suppressed alarms to remove the suppression of any alarm indicators.

☐

About provisioning alarm indicators

Changing alarm indicators   You can change station, rack-top, end-of-suite, and User Panel alarm indicators from suppressible to nonsuppressible or vice versa by using the Alarm Suppress Control window at *Provision > Alarm Settings > Alarm Suppress Control.*

□

12   Alarm settings

Overview

Purpose	"Alarm settings" contains the following information:

- Descriptions of the windows that are used to provision alarm settings

- Step-by-step procedures for provisioning alarm-severity levels, delay and pre-service timer values, and the suppress status of alarm indicators

Related topic

For general information about alarms, see Chapter 11, "About alarms".

Organisation	The organisation is as follows:

- "Severity Levels window and procedures" (12-2)

- "Timers window and procedures" (12-11)

- "Alarm Suppress Control window and procedures" (12-16)

□

Severity Levels window and procedures

Overview

....

Purpose   Use the Severity Levels window to do the following:

- Query the severity levels for all equipment or transmission alarms

- Change the severity levels for equipment or transmission failure conditions

- Restore the severity levels for all equipment or transmission alarms to the system defaults

Window location   *Provision > Alarm Settings > Severity Levels*

Organisation   This section is organised as follows:

- "Severity Levels window description" (12-3)

- "Querying alarm severity levels" (12-5)

- "Severity Levels query results" (12-6)

- "Changing alarm severity levels" (12-9)

- "Restoring the severity levels" (12-10)

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Severity Levels window description

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Illustration   The following illustration shows the Severity Levels window.

Field descriptions   The Severity Levels window has the following fields.

Field name	Description
Equipment	Select Equipment to query or provision equipment alarms.
Transmission	Select Transmission to query or provision transmission alarms.
Failure Condition	The Failure Condition field specifies the alarm for which you want to change the severity levels. For more information about each of these failure conditions, see the Alarm clearing chapter in the *Maintenance guide,* 365-367-513.

Field name	Description
Service-Affecting Severity	The Service-Affecting Severity field specifies the severity level of the equipment or transmission alarm that is raised for the specified Failure Condition when a service-affecting condition exists. If this area of the window is not accessible, it means that the corresponding severity level is not applicable to that failure condition. The valid values are as follows: • Prompt • Deferred • Info • No change
Non-Service-Affecting Severity	The Non-Service-Affecting Severity field specifies the severity level of the equipment or transmission alarm that is raised for the specified Failure Condition when a non-service-affecting condition exists. If this area of the window is not accessible, it means that the corresponding severity level is not applicable to that failure condition. The valid values are as follows: • Prompt • Deferred • Info • No change

Related topic   For general information about windows, see "About the main application window" (2-10).

□

Querying alarm severity levels

Procedure

1   Go to the Severity Levels window at *Provision > Alarm Settings > Severity Levels.*

2   Select Equipment or Transmission.

3   Click Query.

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Severity Levels query results

Illustration   Use the following illustration only as an example of query results for *equipment* alarms on the Severity Levels window.

Important! The data displayed on this screen may *not* be typical.

Illustration   Use the following illustration only as an example of query results for *transmission* alarms on the Severity Levels window.

Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The following information appears in the Severity Levels Query Results window.

Column	Description
Failure Condition	The Failure Condition column displays the failure condition associated with the alarm.
	For more information about each of these failure conditions, see the Alarm clearing chapter in the *Maintenance guide,* 365-367-513.
Service Affecting Severity	Displays one of the following values: • Prompt • Deferred • Info • NA (not applicable)

Column	Description
Non-Service-Affecting Severity	Displays one of the following values: • Prompt • Deferred • Info • NA (not applicable)

Related topic For general information about windows, see "About the main application window" (2-10).

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Changing alarm severity levels

Procedure

1 Go to the Severity Levels window at *Provision > Alarm Settings > Severity Levels.*

2 Select Equipment or Transmission.

3 Select a Failure Condition.

4 Change the Service-Affecting Severity, Non-Service-Affecting Severity, or both.

5 Click Apply.

E N D   O F   S T E P S

Restoring the severity levels

Procedure

1   Go to the Severity Levels window at *Provision > Alarm Settings > Severity Levels.*

2   Select Equipment or Transmission.

3   Click Restore All.

    E N D   O F   S T E P S

Timers window and procedures

Overview

Purpose Use the Timers window to query or change the value of any of the following timers:

- Defect to Alarm Delay
- Alarm Clear Delay
- Pre-Service

When you open the Timers window, the default timer values are displayed. To display a currently-provisioned timer value, click the appropriate Query button.

Window location *Provision > Alarm Settings > Timers*

Organisation This section is organised as follows:

□

Timers window description

Illustration   The following illustration shows the Timers window.
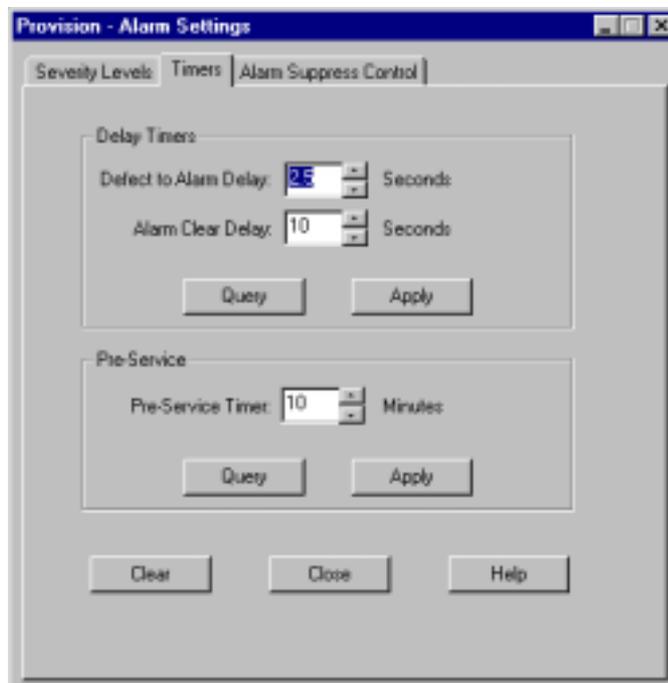
Field descriptions   The Timers window has the following fields.

Field name	Description
Defect to Alarm Delay	The Defect to Alarm Delay field specifies the number of seconds that the system waits after detecting an equipment or transmission defect before generating an alarm. If the defect clears (goes away) before the delay interval expires, the system *does not* raise an alarm.
	The field also specifies the number of seconds that the system waits after an alarm is raised before turning on the station alarm indicators.
	The valid values are 0–128 seconds, in 1/2-second increments. The default value is 2.5.
Alarm Clear Delay	The Alarm Clear Delay field specifies the number of seconds that the system waits, after an equipment or transmission alarm has cleared, before turning off the associated alarm indicators and generating an alarm clear message.
	The valid values are 0–128 seconds, in 1/2-second increments. The default value is 10.

Field name	Description
Pre-Service Timer	The Pre-Service Timer field specifies the number of minutes that a valid transmission signal must be received before the monitoring mode for ports provisioned as AUTO (automatic monitoring) changes to MON (monitored).
	The valid values are 0–30 minutes, in 1-minute increments. The default value is 10.

Related topic   For general information about windows, see "About the main application window" (2-10).

☐

Querying timer values

Procedure

1   Go to the Timers window at *Provision > Alarm Settings > Timers.*

2
If you want to query	Then
Delay timer values	Click the Query button in the Delay Timers area of the window.
The pre-service timer value	Click the Query button in the Pre-Service area of the window.

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Result

The system displays the provisioned timer value in a query results window.

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Changing a timer value

....

Procedure   ....

1   Go to the Timers window at *Provision > Alarm Settings > Timers.*

....

2   Select a value for Defect to Alarm Delay, Alarm Clear Delay, or
     Pre-Service Timer.

....

3   Click Apply.
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Alarm Suppress Control window and procedures

Overview

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Purpose Use the Alarm Suppress Control window to query or change the suppress status (suppressible or nonsuppressible) of the following alarm indicators:

- Station

- End-of-suite and Rack top

- User Panel

When you open the Alarm Suppress Control window, the default alarm suppress values are displayed. To display the currently-provisioned values, click the Query button.

Window location *Provision > Alarm Settings > Alarm Suppress Control*

Organisation This section is organised as follows:

- "Alarm Suppress Control window description" (12-17)

- "Querying the suppress status of alarm indicators" (12-18)

- "Changing the suppress status of alarm indicators" (12-19)

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Alarm Suppress Control window description

Illustration   The following illustration shows the Alarm Suppress Control window.
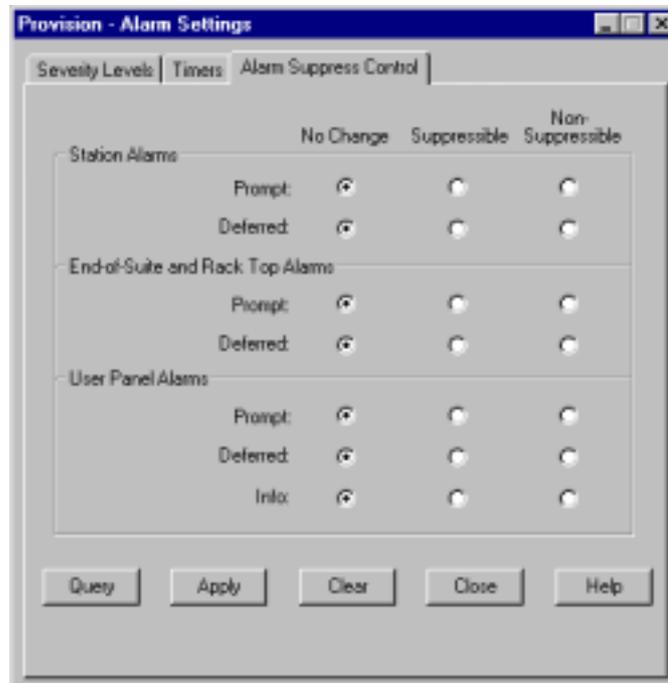
Field descriptions   The Alarm Suppress Control window has the following fields.

Field name	Description
No Change	Select No Change if you do *not* want to change the suppress status (suppressible or nonsuppressible) of an alarm indicator.
Suppressible	Select Suppressible to provision alarm indicators as suppressible. Alarm indicators that are provisioned as suppressible can be suppressed from the User Panel or from a local or remote PC with XC-CIT application software.
Non-Suppressible	Select Non-Suppressible to provision alarm indicators as nonsuppressible. Alarm indicators that are provisioned as nonsuppressible cannot be suppressed.

Related topic   For general information about windows, see "About the main
application window" (2-10).

☐

Querying the suppress status of alarm indicators

Procedure

1   Go to the Alarm Suppress Control window at *Provision > Alarm
Settings > Alarm Suppress Control.*

2   Click Query.

Result:

The suppress status (suppressible or nonsuppressible) displays in
a query results window.

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Changing the suppress status of alarm indicators

Procedure

1 Go to the Alarm Suppress Control window at *Provision > Alarm Settings > Alarm Suppress Control.*

2 Select No Change, Suppressible, or Non-Suppressible as desired for each type of alarm indicator that you want to modify.

3 Click Apply.

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13 Synchronisation and timing

Overview

Purpose "Synchronisation and timing" contains the following information:

- General information about synchronisation and timing
- Descriptions of the windows that are used to provision synchronisation and timing
- Step-by-step procedures for the following:
  - Querying the system clock, station clock, or the status of the working and protection STUs
  - Assigning the station clock as the timing reference for the system clock
  - Assigning a transmission port as the timing reference for the system clock
  - Deleting a timing reference for the system clock
  - Changing the priority of the system's internal clock
  - Assigning the system clock as the timing reference for the station clock
  - Assigning a transmission port as the timing reference for the station clock

Organisation The organisation is as follows:

- "Background information" (13-2)
- "System Clock window and procedures" (13-13)
- "Station Clock window and procedures" (13-27)

Background information

Overview

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Purpose   This section contains background information about synchronisation and timing.

Organisation   This section is organised as follows:

- "Synchronisation and timing hardware" (13-3)
- "Input reference definitions" (13-4)
- "Timing modes" (13-5)
- "How synchronisation and timing works" (13-6)
- "System clock input timing references" (13-7)
- "Input timing references for station clock output ports" (13-8)
- "Synchronisation and priorities" (13-10)
- "About changing timing references" (13-11)
- "The synchronisation and timing provisioning process" (13-12)

□

Synchronisation and timing hardware

Synchronisation and timing hardware capabilities

The system has duplicated synchronisation and timing hardware that provides the following capabilities:

- The STU has an ITU G.812 Type I clock with holdover mode.
- System clock input references can be derived from traffic-carrying lines (transmission ports or MSP pairs) or from external references (station clock inputs).
- External references can be derived from 2048 kHz inputs or from 64 kHz composite clock inputs.
- Reference source and timing mode selection are based on user-assigned priorities.
- System timing is distributed to transmission hardware within the system.
- A 2048 kHz station clock output port on each STU that can be used as a timing source for other equipment.
- When no faults are present, user-initiated protection switching of the synchronisation and timing hardware is glitchless.

Cross-couple link

A cross-couple link between the active and standby synchronisation and timing hardware enables the standby hardware to maintain the same frequency and phase as the active hardware. Consequently, no bit errors (also called hits or glitches) are caused by manual switching of the synchronisation and timing hardware.

Station clock cable connections

Each Matrix and Synchronisation subrack has connectors for station clock input and output cables. There are two station clock input connectors (Station Clock In 1 and Station Clock In 2) and one station clock output connector (Station Clock Out) on each Matrix and Synchronisation subrack.

□

Input reference definitions

List of terms   **Station clock input** The station clock input (2048 kHz or 64 kHz) depends on the type of System Timing Unit (STU) that is installed in the system.

System clock input reference System clock input references can be derived from transmission ports or from external timing references (station clock inputs). External references can be derived from one or two 2048 kHz timing inputs or from one or two 64 kHz composite clock inputs.

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Timing modes

Free-running mode The system operates in free-running mode when it is initially put into service. In free-running mode, the system timing is provided by the internal clock. This timing mode can be used for installation/testing before timing references are provisioned. If a protection switch of the synchronisation and timing hardware occurs while the system is in free-running mode, the timing mode changes to holdover mode. After the system has been phaselocked to a timing reference, it will not return to free-running mode.

Phaselocked mode Phaselocked mode is the normal mode of operation. In this mode, the active STU is slaved to an external timing reference (transmission port or station clock input). The standby STU is phaselocked to the active STU through a cross-couple link.

Holdover mode Holdover mode is a backup operational mode that the system switches to automatically if all provisioned timing references have failed, or if a protection switch of the STU occurs while the system is in free-running mode. In holdover mode, the internal system clock simulates the timing that occurred during a previous period in free-running mode or phaselocked mode. Before switching to holdover mode, the system should be phaselocked to a good timing reference for at least 30 minutes. The system can enter holdover mode after a shorter phaselock interval, but transmission performance requirements may not be satisfied.

An alarm is raised whenever the system enters holdover mode.

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How synchronisation and timing works

Synchronisation and timing diagram

The following illustration shows the duplicated STUs and the various input timing references for the system clock and station clock.
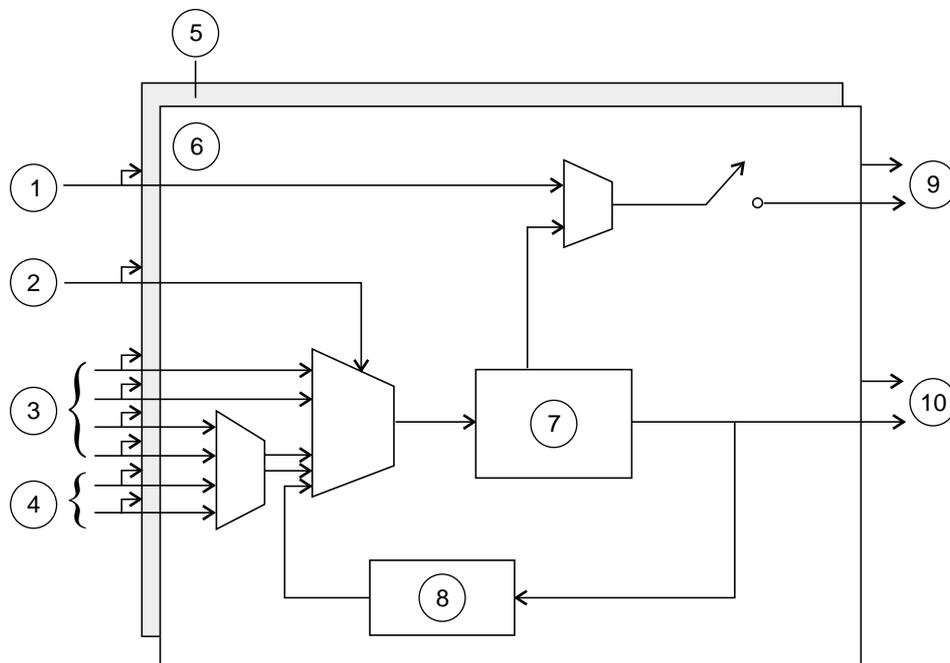
Legend:

1. Station clock input reference from the transmission port
2. Cross-couple from the standby STU
3. System clock input references
4. Station clock inputs
5. Protection STU
6. Working STU
7. System clock
8. Internal clock
9. Station clock outputs
10. Timing for transmission ports

System clock input timing references

Types of STUs

Two types of STU are available. One STU accepts 2048 kHz station clock inputs, and the other STU accepts 64 kHz station clock inputs. Both types of STU have two station clock input ports.

The STU with the G.812 Type VI clock that was used in Release 1.0 and Release 1.1 systems can also be used in later releases.

Types of system clock input references

System clock input references can be derived from transmission ports or from external timing references (station clock inputs).

Types of external or station clock inputs

External references can be derived from one or two 2048 kHz timing inputs or from one or two 64 kHz composite clock inputs. The type of station clock input (2048 kHz or 64 kHz composite clock) depends on the type of STU that is installed in the system.

Limits on timing references

You can provision as many as four prioritised timing references for the system clock. If no references are provisioned, the system operates in free-running or holdover timing mode.

There is a limit of one timing reference per port unit. If MSP is provisioned, only one port per MSP pair can be a timing reference, and the port must be on the working unit. If SNCP is provisioned, the working or protection port unit can be provisioned as a timing reference. For a two-fibre or a four-fibre port subrack, you can provision as many as four timing references. For a one-fibre port subrack, you can provision as many as two timing references.

The limits for line-derived timing references apply to both system clock input references and station clock input references. For example, if four STM-1 ports in a dual-fibre port subrack are provisioned as system clock input references, a fifth STM-1 port in the same port subrack cannot be provisioned as a station clock input reference. Also, if a port on an STM-1 port unit is provisioned as a system clock input reference, another port on the same unit cannot be provisioned as a station clock input reference.

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Input timing references for station clock output ports

Station clock output ports   The system provides two 2048 kHz station clock output ports, one output port on each STU. The station clock output port can be used as a timing source for other equipment. The input timing reference for the station clock output port can be derived from the system clock or from a transmission port, including ports provisioned for MSP or SNCP.

If the input timing reference used for the station clock outputs is a transmission port, the port can be one of the transmission ports used as an input reference for the system clock, or the port can be different from any of the transmission ports used as input references for the system clock. Because both station clock output ports get their input from the same timing source, the output signals are not independent. A failure of the timing source affects both station clock output ports.

Hardware connections for station clock input references   When the input timing reference for the system clock is derived from an external reference, the station clock input ports on the working and protection MS subracks should be connected to the same external reference. The following illustration shows the connections for two station clock input references. The connectors for the station clock inputs are located on the back of the Matrix and Synchronisation subrack.
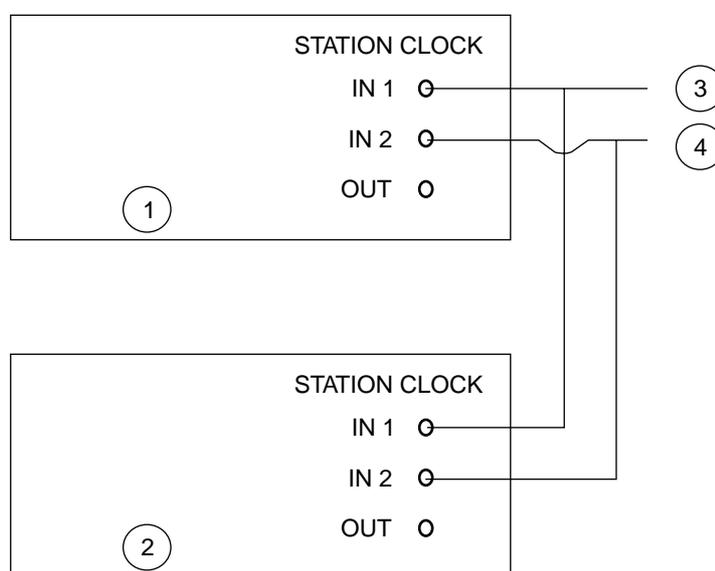
Legend:

1.   Working Matrix and Synchronisation subrack

2.   Protection Matrix and Synchronisation subrack

3.   Reference 1

4.   Reference 2

Signal failures   The timing output signal is squelched (no signal is transmitted) if the STU has a hardware failure that prevents a valid signal from being transmitted. If timing is derived from a transmission port, a signal failure will also cause the output signal to be squelched.

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Synchronisation and priorities

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About assigning priorities to system clock input references and to the internal clock

A priority can be assigned to each system clock input reference and to the internal clock. The system selects the active timing reference for the system clock based on the status of the provisioned references (good or failed) and the assigned priority. Only a reference whose status is good will be selected as the active reference. Priority assignments do not have to be unique. That is, the same priority can be assigned to more than one reference.

Priorities and timing modes

The priority you assign to system clock input references and to the internal clock determine how timing modes are selected. The default priority for the internal clock (holdover timing mode) is lower than any of the priorities that can be assigned to system clock input references. Consequently, under normal circumstances, the system will go into holdover timing mode only if all references provisioned for the system clock have failed. The system can, however, be forced into holdover mode by assigning the internal clock a higher priority than any of the references provisioned for the system clock.

Priorities and protection switching

The priority assigned to system clock input references also determines whether reference selection (switching) is revertive or nonrevertive. If timing references are assigned different priority values, reference selection is revertive. If the highest priority reference is active and fails, the system selects the next highest priority reference. However, if the status of the highest priority reference becomes good, the system switches back (reverts) to that reference. If all provisioned timing references are assigned equal priority values, reference selection is nonrevertive.

Using priorities to force or prevent the selection of a timing reference

You can force the selection of a particular system clock input reference by assigning it a priority that is higher than the priority assigned to the internal clock or to other provisioned references. You can prevent the system from selecting a provisioned reference by assigning it the priority "None." You can also force the system to select a different active reference by changing the priority of the active reference or by assigning it the priority "None."

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About changing timing references

**Information about
changing a timing
reference**
To change the source of a provisioned timing reference (from station clock to port or vice versa, or from one transmission port to another), you first have to delete the reference that you want to change, and then provision a different reference. If the reference that you want to change is the active reference, you first have to force the system to select a different active reference by changing the priority of the active reference or by assigning it the priority "None."

Related topics
For more information, see one of the following topics:

- "Querying the system clock" (13-16)

- "Deleting a timing reference for the system clock" (13-25)

- "Assigning the station clock as a timing reference for the system clock" (13-22)

- "Assigning a transmission port as the timing reference for the system clock" (13-23)

- "Changing the priority of a timing reference for the system clock" (13-24)

- "Changing the priority of the system's internal clock" (13-26)

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The synchronisation and timing provisioning process

Provisioning synchronisation and timing

To provision synchronisation and timing, do the following:

1   Use the System Clock window to query and provision as many as four input timing references for the system clock, and to assign a priority to the timing references. This window can also be used to change the priority of the internal clock, if necessary, or to query the status of the working and protection System Timing Units (STUs).

2   Use the Station Clock window to query and provision the input timing reference for the station clock.

☐

System Clock window and procedures

Overview

Purpose Use the System Clock window to do the following:

- Query and provision input timing references for the system clock
- Assign a priority to as many as four timing references
- Change the priority of a timing reference
- Change the priority of the internal clock

Window location *Provision > Synchronisation and Timing > System Clock*

Organisation This section is organised as follows:

- "System Clock window description" (13-14)
- "Querying the system clock" (13-16)
- "System Clock query results" (13-17)
- "Assigning the station clock as a timing reference for the system clock" (13-22)
- "Assigning a transmission port as the timing reference for the system clock" (13-23)
- "Changing the priority of a timing reference for the system clock" (13-24)
- "Deleting a timing reference for the system clock" (13-25)
- "Changing the priority of the system's internal clock" (13-26)

□

System Clock window description

Illustration   The following illustration shows the System Clock window.
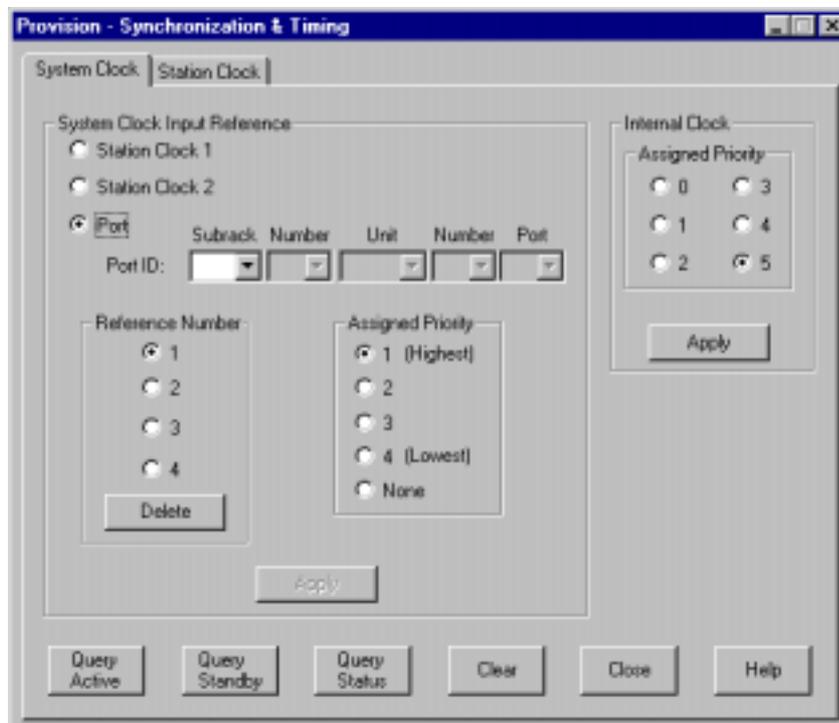
Field descriptions   The System Clock window has the following fields.

Field name	Description
Station Clock 1	Selecting the Station Clock 1 field specifies that the input timing reference for the system clock is derived from Station Clock In 1 (input 1).
Station Clock 2	Selecting the Station Clock 2 field specifies that the input timing reference for the system clock is derived from Station Clock In 2 (input 2).
Port	Selecting the Port field specifies that the input timing reference for the system clock is derived from a transmission port.
Port ID	The Port ID fields specify the physical location of a port. For a description of the Port ID options, see "About physical layer addresses" (3-3).

Field name	Description
Reference Number	The Reference Number field specifies the number of the system clock input reference. You must specify a reference number to assign (apply) or delete a system clock input reference. The values are 1–4.
Assigned Priority (System Clock Input Reference)	The Assigned Priority (System Clock Input Reference) field specifies the priority of an input timing reference for the system clock. 1 is the highest priority, and 4 is the lowest priority. A reference assigned the priority None will not be selected as the active reference for the system clock, but it will be monitored for failures. The values are 1–4, None.
Assigned Priority (Internal Clock)	The Assigned Priority (Internal Clock) specifies the priority of the system's internal clock. 0 is the highest priority, and 5 is the lowest priority. The values are 0–5. The default value is 5.

Related topic   For general information about windows, see "About the main application window" (2-10).

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Querying the system clock

Procedure

1   Go to the System Clock window at *Provision > Synchronisation and Timing > System Clock.*

2   To query the active STU, click Query Active. To query the standby STU, click Query Standby.

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System Clock query results

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Illustration for active STU results Use the following illustration only as an example of query results for the active STU.

Important! The data displayed on this screen may *not* be typical.

Illustration for standby STU results Use the following illustration only as an example of query results for the standby STU.

Important! The data displayed on this screen may *not* be typical.

Results field descriptions The following information appears in the System Clock Query Results window.

Column	Description
Reference Number	Displays the provisioned Reference Number (1–4 for a Station Clock, or the field will be blank for both the internal clock and the cross-couple link)

....

Column	Description
Timing Source	Displays one of the following values: • Internal clock • Cross couple • Station Clock 1 • Station Clock 2 • The physical location of a port provisioned for line-derived timing
Priority	Displays the priority (0–5, or None) assigned to the timing source.
Status	Displays one of the following values: • Active — The source is providing timing. • Standby — The source is available for providing timing. • Failed — The source has a failure condition. • OK — The source has no failures, but it will not become active because the priority assigned to the timing reference is less than the priority assigned to the internal clock, or the priority None is assigned to the timing reference. A query on the standby STU will display OK for all timing references that are not failed. • Unknown — The status of the reference is unknown because the STU is not equipped, meaning that it is not physically present or booting.

Related topic   For general information about windows, see "About the main
application window" (2-10).

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Querying the status of the working and protection STUs

Procedure

1   Go to the System Clock window at *Provision > Synchronisation and Timing > System Clock.*

2   Click Query Status.

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STU Status query results

Illustration   Use the following illustration only as an example of query results for STU Status.
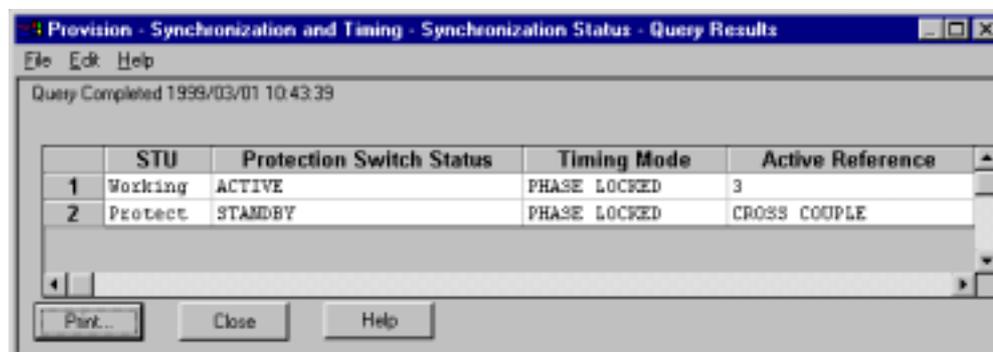
Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The following information appears in the STU Status Query Results window.

Column	Description
STU	The STU column displays one of the following values: • Working • Protect
Protection Switch Status	The Protection Switch Status column displays the protection switching status of the working or protection STU as one of the following: • Active — The STU is active. • Standby — The STU is standby. • Unequipped — Unequipped is displayed if the STU is not available.
Timing Mode	The Timing Mode column displays the current timing mode of the working or protection STU as one of the following: • Phase Locked • Holdover • Freerunning • Blank — No value is displayed if the STU is not available

Column	Description
Active Reference	The Active Reference column displays the active timing reference for the working or protection STU. For the active STU, if the system is in phaselocked mode, this column displays the reference number of the port or station clock input that is providing the timing reference. If the system is *not* in phaselocked mode, this column is blank. For the standby STU, if the standby STU is cross-coupled to the active STU, this column displays Cross Couple. If the standby STU is *not* cross-coupled to the active STU, this column is blank.

Related topic   For general information about windows, see "About the main application window" (2-10).

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365–367–512
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Assigning the station clock as a timing reference for the system clock

Procedure

1 Go to the System Clock window at *Provision > Synchronisation and Timing > System Clock.*

2 Select Station Clock 1 or Station Clock 2 as the System Clock Input Reference.

3 Select values for the following fields:
   - Reference Number
   - Assigned Priority

4 Click Apply.

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Assigning a transmission port as the timing reference for the system clock

Procedure

....

1   Go to the System Clock window at *Provision > Synchronisation and Timing > System Clock*.

....

2   Select Port as the System Clock Input Reference.

....

3   Select values for the following fields:

- Port ID
- Reference Number
- Assigned Priority

....

4   Click Apply.
    E N D   O F   S T E P S

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Changing the priority of a timing reference for the system clock

Procedure

1   Go to the System Clock window at *Provision > Synchronisation and Timing > System Clock.*

2   Select Station Clock 1, Station Clock 2, or Port as the System Clock Input Reference.

3   Select values for the following fields:

  • Port ID, if you selected Port in the previous step

  • Reference Number

  • Assigned Priority

4   Click Apply.
    E N D   O F   S T E P S

Deleting a timing reference for the system clock

Procedure   **Important!** You can delete only timing references that are not active. To delete the active timing reference, you must first lower its priority or change its priority to None, so that another timing reference becomes active.

1   Go to the System Clock window at *Provision > Synchronisation and Timing > System Clock.*

2   Select the Reference Number.

3   Click Delete.

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Changing the priority of the system's internal clock

Procedure   **Important!** If you assign the internal clock a priority that is higher than the priority of the active timing reference for the system clock, you will force the system clock into holdover timing mode.

1   Go to the System Clock window at *Provision > Synchronisation and Timing > System Clock.*

2   Select an Assigned Priority for the Internal Clock.

3   Click Apply.

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Station Clock window and procedures

Overview

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Purpose   Use the Station Clock window to query and provision the input timing reference for the Station Clock output port. The input timing reference can be derived from traffic-carrying lines (transmission ports or MSP pairs) or from the system clock.

The station clock input timing reference is the timing source for the Station Clock output port on each System Timing Unit. The station clock output is a 2048 kHz clock that can be used as a timing source for other equipment.

The timing source for the station clock can be different from the timing source for the system clock.

Window location   *Provision > Synchronisation and Timing > Station Clock*

Organisation   This section is organised as follows:

- "Station Clock window description" (13-28)

- "Querying the station clock" (13-29)

- "Station Clock query results" (13-30)

- "Assigning the system clock as the timing reference for the station clock" (13-32)

- "Assigning a transmission port as the timing reference for the station clock" (13-33)

- "Changing the timing reference for the station clock" (13-34)

☐

Station Clock window description

Illustration   The following illustration shows the Station Clock window.
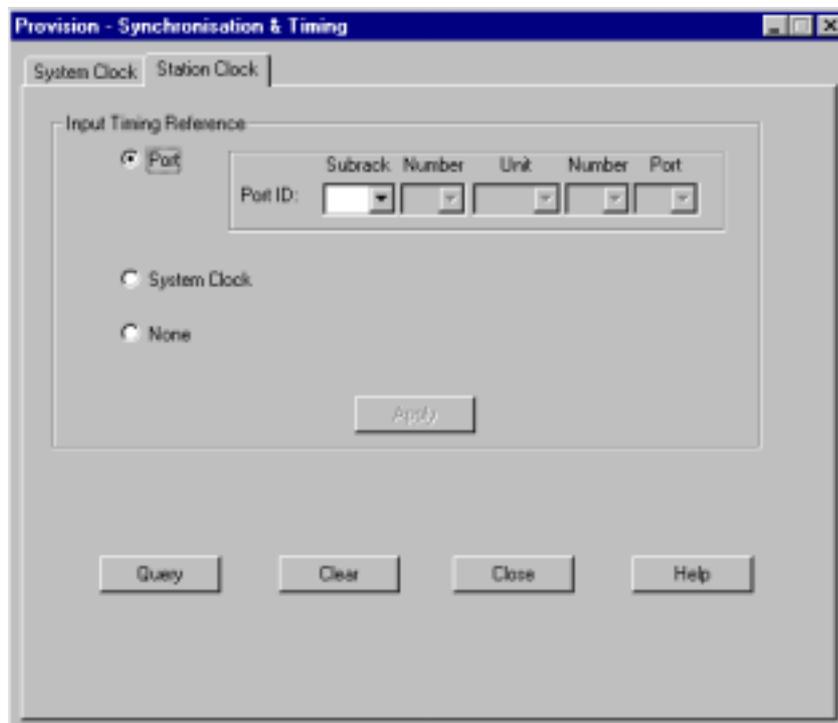
Field descriptions   The Station Clock window has the following fields.

Field name	Description
Port	Selecting the Port field specifies that the input timing reference for the station clock is derived from a transmission port.
Port ID	When Port is selected as the input timing reference, the Port ID fields specify the physical location of the port. For a description of the Port ID options, see "About physical layer addresses" (3-3).
System Clock	Selecting the System Clock field specifies that the input timing reference for the station clock is derived from the system clock.
None	Selecting the None field removes the currently-assigned input timing reference for the station clock.

Related topic   For general information about windows, see "About the main application window" (2-10).

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Querying the station clock

Procedure

1 Go to the Station Clock window at *Provision > Synchronisation and Timing > Station Clock.*

2 Click Query.

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Station Clock query results

Illustration   Use the following illustration only as an example of query results for the Station Clock window.
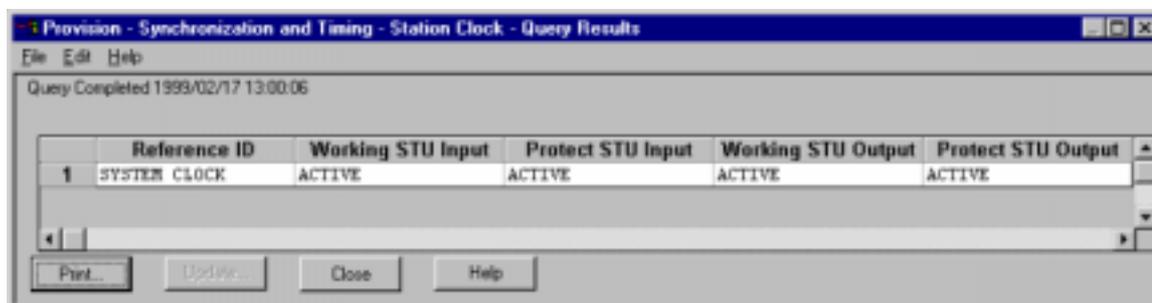
Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The following information appears in the Station Clock Query Results window.

Column	Description
Reference ID	Displays one of the following values: • The location of the port being used for line-derived timing • System Clock • None
Working STU Input	Displays one of the following values: • Active — The source is providing timing. • Failed — The source has a failure condition. • Not Provisioned — The STU is not provisioned. • Unknown — The STU is not available.
Protect STU Input	Displays one of the following values: • Active — The source is providing timing. • Failed — The source has a failure condition. • Not Provisioned — The STU is not provisioned. • Unknown — The STU is not available.

Column	Description
Working STU Output	Displays one of the following values: • Active — The source is providing timing. • Failed — The source has a failure condition. • Not Provisioned — The STU is not provisioned. • Unknown — The STU is not available.
Protect STU Output	Displays one of the following values: • Active — The source is providing timing. • Failed — The source has a failure condition. • Not Provisioned — The STU is not provisioned. • Unknown — The STU is not available.

Related topic   For general information about windows, see "About the main application window" (2-10).

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Assigning the system clock as the timing reference for the station clock

Procedure

1   Go to the Station Clock window at *Provision > Synchronisation and Timing > Station Clock.*

2   Select System Clock as the Input Timing Reference.

3   Click Apply.

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Assigning a transmission port as the timing reference for the station clock

Procedure

1 Go to the Station Clock window at *Provision > Synchronisation and Timing > Station Clock.*

2 Select Port as the Input Timing Reference.

3 Select the Port ID.

4 Click Apply.

E N D   O F   S T E P S

Changing the timing reference for the station clock

Procedure

1   Go to the Station Clock window at *Provision > Synchronisation and Timing > Station Clock.*

2   Select None.

3   Click Apply.

4   Provision a different timing reference.

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14   Data Communication Channel

Overview

Purpose   "Data Communication Channel " contains the following information:

- General information about Data Communication Channel

- Descriptions of the windows that are used to provision a Data Communication Channel

- Step-by-step procedures for the following:

   - Procedures for setting up and changing Data Communication Channels and networks

   - Procedures for doing various queries associated with Data Communication Channels and networks

Organisation   The organisation is as follows:

Data Communication Channel background information   The DCC is the Data Communication Channel. It consists of several channels, each of which may or may not be present (depending on the type of network element).

All DCC channels together form a network, which is called the Data Communication Network (DCN). The goal of the DCN is to provide a management network. The Network Element Managers (for example, ITM-SC, and SNMS) use the DCN to communicate with their

respective managed network elements. The DCN is also used by the network elements themselves to exchange management-related information.

Be aware that, technically speaking, only the D1 thru D3 and D4 thru D12 channels are DCC channels. Q-LAN and OSC are not formally DCC channels. However, they are integral parts of the DCN.

The following is a brief summary of important information concerning DCC and DCC:

DCC: Data Communication Channel

- D1 thru D3 (192 kbit/s)
- D4 thru D12 (576 kbit/s)
- Q-LAN (Ethernet)
- OSC (Supervisory Channel).

DCN: Data Communication Network

- The network of all DCC channels
- Goal of the DCN: to provide network management.

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Data Communication Channel window and procedures

Overview

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Purpose   Use the Data Communication Channel window to do the following:

- Query DCC status

- Assign the DCC channel mode

- Enable or disable a DCC channel.

Window location   *Provision > Data Communication Channel > Data Communication Channel*

Organisation   This section is organised as follows:

- "Data Communication Channel window description" (14-4)

- "Enabling or disabling a Data Communication Channel" (14-6)

- "Querying a Data Communication Channel" (14-7)

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365–367–512
Issue 2, July 2002

Lucent Technologies

1 4 - 3

Data Communication Channel window description

Illustration The following illustration shows the Data Communication Channel window.

Field descriptions The Data Communication Channel window has the following fields.

Field name	Description
Port ID	The Port ID fields specify the physical location of a port.
	For a description of the Port ID options, see "About physical layer addresses" (3-3).
DCC Channel	The DCC Channel field specifies the overhead section that carries the DCC channel as either RS (Regenerator Section) or MS (Multiplex Section).

Field name	Description
DCC Status	The DCC Status field specifies whether the status is Enabled or Disabled.

Related topic   For general information about windows, see "About the main
application window" (2-10).

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Enabling or disabling a Data Communication Channel

Procedure

1   Go to the Data Communication Channel window at *Provision > Data Communication Channel > Data Communication Channel.*

2   Specify the Subrack and Number, Port and Number, and the Port ID.

3   Also, if necessary, change the DCC Channel and DCC Status as desired.

4   Click Apply.

Result:
```
If the NE is installed and configured correctly, the command will
be performed. Otherwise, an error message will be returned.
```
E ND OF S TEPS

Querying a Data Communication Channel

Procedure

1 Go to the Data Communication Channel window at *Provision > Data Communication Channel > Data Communication Channel.*

2 Specify the Subrack and Number, Port and Number, and the Port ID.

3 Also, if necessary, change the DCC Channel and DCC Status as desired.

4 Click Query.

Result:

A query results window will appear.

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Data Communication Channel query results

Results field descriptions   The following information appears in the Data Communication
Channel Query Results window.

Column	Description
Port ID	Displays the Port ID associated with the Data Communication Channel
Channel	Displays the DCC Channel as either RS or MS for the Data Communication Channel
DCC Status	Displays the DCC Status as either Enable or Disable for the Data Communication Channel

DCC in MSP Mode Provision window and procedures

Overview

Purpose   *This feature only applies to PSC subracks (for STM–4 and STM–16).*

To support DCC communication over 1+1 MSP protected STM-N links, two modes of operation are defined, which can be selected independently for RS-DCC and MS-DCC:

- Independent mode (default). In this mode, the DCC channels over the working and protection STM-N interface operate independently from the MSP protocol and can be individually enabled/disabled. DCC protection is performed at the IS-IS protocol level.

- Slaved to MSP. In this mode, the DCC information in the transmit direction is bridged over both the working and the protection part of the MSP connection. At the receive end, the DCC is retrieved from the service (= active) part.

Window location   *Provision > Data Communication Channel > DCC in MSP Mode Provision*

Organisation   This section is organised as follows:

- "DCC in MSP Mode Provision window description" (14-10)
- "Provisioning a Data Communication Channel in MSP Mode" (14-12)
- "Querying a Data Communication Channel in MSP Mode" (14-13)

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DCC in MSP Mode Provision window description

Illustration   The following illustration shows the DCC in MSP Mode Provision
window.
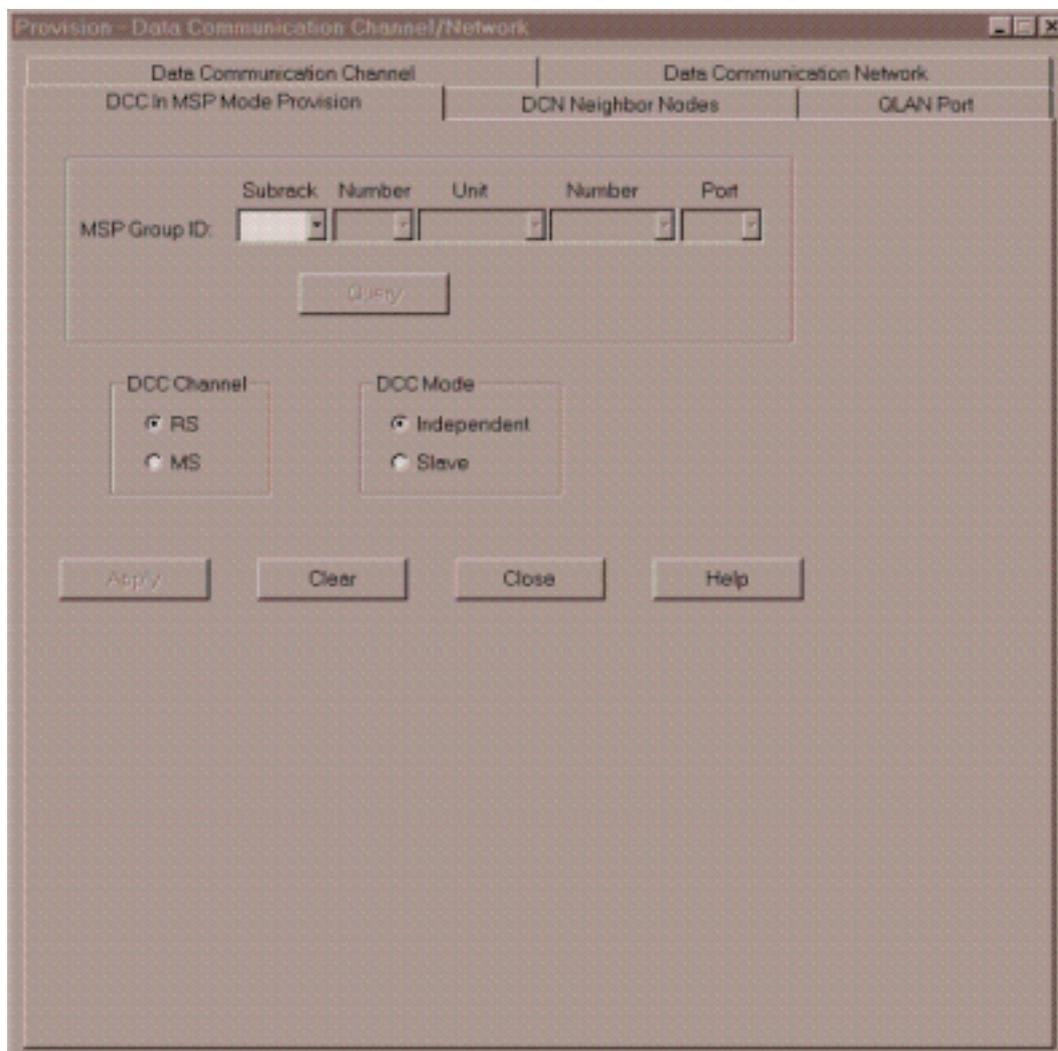
Field descriptions   The DCC in MSP Mode Provision window has the following fields.

Field name	Description
MSP Group ID	The MSP Group ID fields specify the physical location of a port.
	For a description of the MSP Group ID options, see "About physical layer addresses" (3-3).

DCC in MSP Mode Provision window and
procedures
DCC in MSP Mode Provision window
description

Data Communication Channel

Field name	Description
DCC Channel	The DCC Channel field specifies the overhead section that carries the DCC channel. The following values are available: • RS (Regenerator Section) • MS (Multiplex Section)
DCC Mode	The DCC Mode field specifies the mode in which the DCC channel operates over 1 + 1 MSP protected interfaces. The following values are available: • Independent mode (default) — The DCC channels over the working and protection STM-N interface operate independently from the MSP protocol and can be individually enabled or disabled. • Slaved to MSP — In the transmit direction, DCC information is bridged over both working and protection trails of the MSP connection. At the receive end, the DCC information is retrieved from the active trail.

Related topic   For general information about windows, see "About the main application window" (2-10).

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Provisioning a Data Communication Channel in MSP Mode

Important! This procedure is only used for PSC subracks. Be sure to check this before proceeding.

Procedure

1   Go to the DCC in MSP Mode Provision window at *Provision > Data Communication Channel > DCC in MSP Mode Provision.*

2   Specify the MSP Group ID by selecting a Subrack and Number, Unit and Number, and the Port ID.

3   Also, if necessary, change the DCC Channel and DCC Mode as desired.

4   Click Apply.

   Result:

```
 If the NE is installed and configured correctly,
    the command will
be performed. Otherwise, an error message will be
    returned.
```

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Querying a Data Communication Channel in MSP Mode

Procedure

1 Go to the DCC in MSP Mode Provision window at *Provision > Data Communication Channel > DCC in MSP Mode Provision.*

2 Specify the MSP Group ID by selecting a Subrack and Number, Unit and Number, and the Port ID.

3 Also, if necessary, change the DCC Channel and DCC Mode as desired.

4 Click Query.

Result:

A query results window will appear.

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Data Communication Channel in MSP Mode query results

Results field descriptions   The following information appears in the Data Communication
Channel in MSP Mode Query Results window.

Column	Description
MSP Group ID	Displays the MSP Group ID for the Data Communication Channel
DCC Channel	Displays the DCC Channel as either RS or MS for the Data Communication Channel
DCC Mode	Displays the DCC mode as either Independent or Slave for the Data Communication Channel

Related topic   For general information about windows, see "About the main
application window" (2-10).

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DCN Neighbor Nodes window and procedures

Overview

....

Purpose   Use the DCN Neighbor Nodes window to query the NSAP addresses
                     of neighbor nodes attached to peer DCC channels of the specified
                     ports or subracks.

Window location *Provision > Data Communication Channel > DCN Neighbor Nodes*

Organisation   This section is organised as follows:

- "DCN Neighbor Nodes" (14-16)

- "Querying DCN neighbor nodes" (14-18)

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DCN Neighbor Nodes

Illustration   The following illustration shows the DCC in DCN Neighbor Nodes
window.
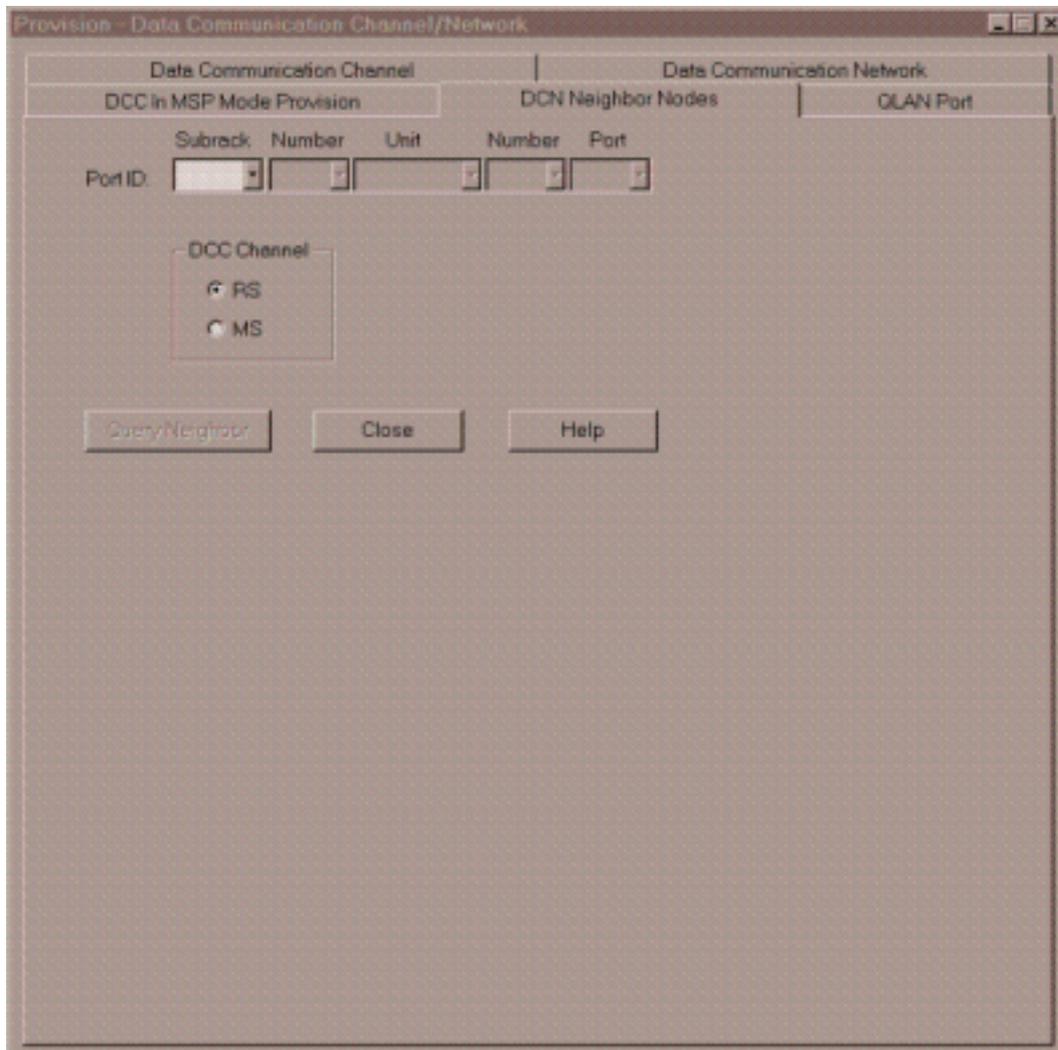
Field descriptions   The DCN Neighbor Nodes window has the following fields.

Field name	Description
Port ID	The Port ID fields specify the physical location of a port.
	For a description of the Port ID options, see "About physical layer addresses" (3-3).

Field name	Description
DCC Channel	The DCC Channel field specifies the overhead section that carries the DCC channel. The following values are available: • RS (Regenerator Section) • MS (Multiplex Section)

Related topic For general information about windows, see "About the main application window" (2-10).

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Querying DCN neighbor nodes

Procedure

1 Go to the DCN Neighbor Nodes window at *Provision > Data Communication Channel > DCN Neighbor Nodes.*

2 Specify the Port ID by selecting a Subrack and Number, Unit and Number, and the Port number.

3 Also, if necessary, change the DCC Channel as desired.

4 Click Query Neighbor.

> **Result:**
>
> A query results window will appear.

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DCN Neighbor Nodes query results

Results field descriptions   The following information appears in the DCN Neighbor Nodes Query Results window.

Column	Description
Port ID	The Port ID fields specify the physical location of a port. For a description of the Port ID options, see "About physical layer addresses" (3-3).
DCC Channel	The DCC Channel field specifies the overhead section that carries the DCC channel. The following values are available: • RS (Regenerator Section) • MS (Multiplex Section)
Neighbor Node NSAP	The Neighbor Node NSAP field specifies the NSAP address of the peer NE of the DCC channel in the queried port.

Related topic   For general information about windows, see "About the main application window" (2-10).

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QLAN Link window and procedures

Overview

....

Purpose   Use the QLAN Link window to do the following:

- Query QLAN links

Window location   *Provision > Data Communication Channel > QLAN Link*

Organisation   This section is organised as follows:

- "QLAN Link window description" (14-21)

- "Querying a QLAN link" (14-22)

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1 4 - 2 0   **Lucent Technologies**   365–367–512
Issue 2, July 2002

QLAN Link window description

Illustration The following illustration shows the QLAN Link window.
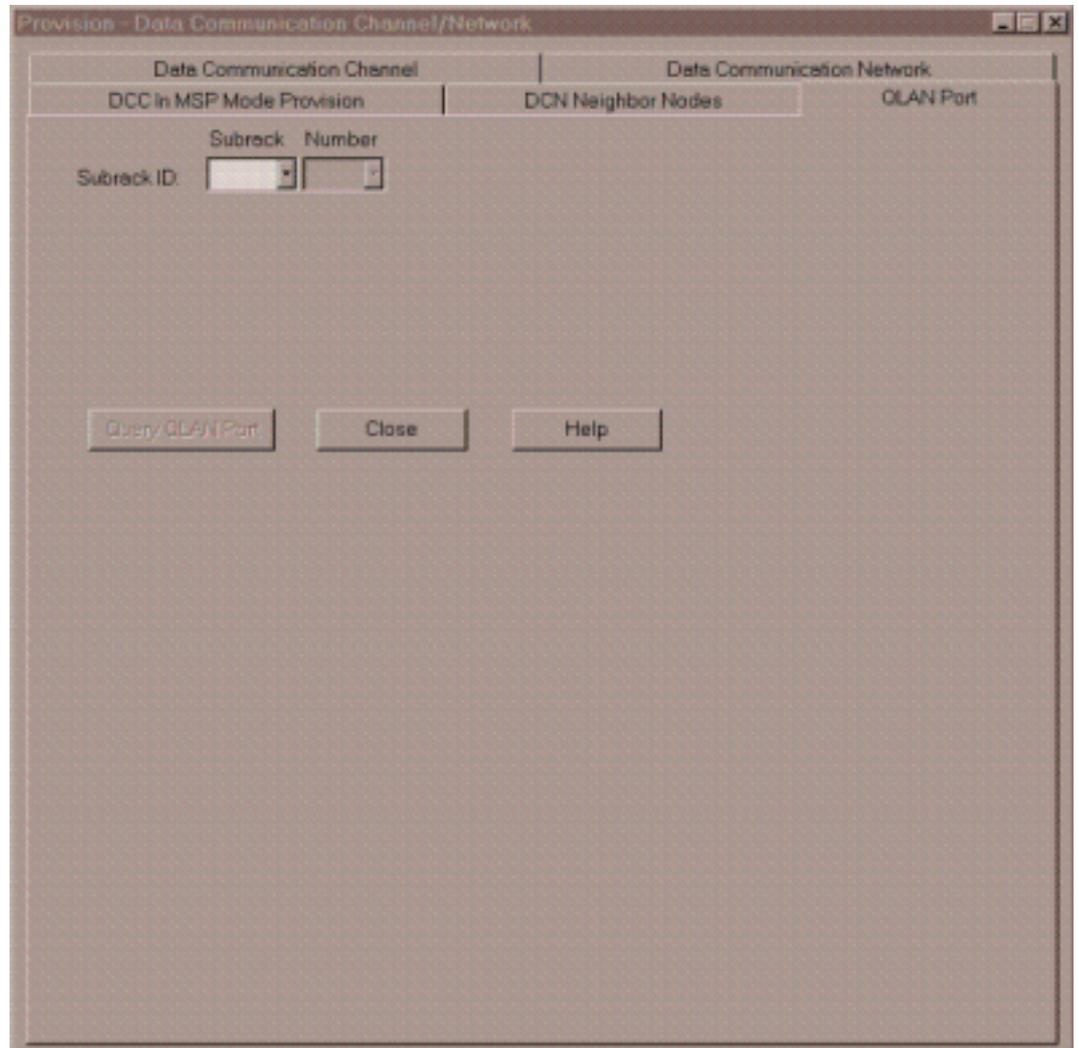
Field descriptions The QLAN Link window has the following fields.

Field name	Description
Subrack ID	The Subrack ID fields specify the physical location of a port. For a description of the Subrack ID options, see "About physical layer addresses" (3-3).

Related topic For general information about windows, see "About the main application window" (2-10).

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Querying a QLAN link

Procedure

1 Go to the Data Communication Channel window at *Provision > Data Communication Channel > QLAN Link.*

2 Specify the Subrack ID by selecting a Subrack and Number.

3 Click Query QLAN Link.

Result:

A query results window will appear.

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QLAN Link query results

Results field descriptions   The following information appears in the QLAN Link Query Results window.

Column	Description
Subrack ID	Displays the subrack ID
QLAN Port Status	Displays the QLAN Link Status as either Active or Inactive

Related topic   For general information about windows, see "About the main application window" (2-10).

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Data Communication Network window and procedures

Overview

Purpose   Use the Data Communication Network window to do the following:

- Assign a primary area ID or address to a related dSRC for the specified subrack

- Optionally assign a manual area adress to a related dSRC for the specified subrack

- Query a computed area address

- Assign an IS-IS level for an NE and the QLAN

- Assign a designated router priority for the QLAN

- Query DCN information for the specified subrack.

Window location   *Provision > Data Communication Channel > Data Communication Network*

Organisation   This section is organised as follows:

- "Data Communication Network window description" (14-25)

- "Provisioning Data Communication Network parameters" (14-27)

- "Querying a Computed Area Address" (14-30)

- "Querying the DCN" (14-28)

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Data Communication Network window description

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Field descriptions The Data Communication Network window has the following fields.

Field name	Description
Subrack ID	The Subrack ID fields specify the physical location of a port. For a description of the Subrack ID options, see "About physical layer addresses" (3-3).
NSAP Format	The NSAP Format field specifies the format of the network address. The following values are available: • Fixed 20 byte • Fixed 10 byte • Flexible
Area ID	The Area ID field specifies a part of the Area Address, identifying an address group as specified by a local addressing authority. The Area Address is a variable-length quantity consisting of the entire high-order part of the NSAP, the Network Protocol Addressing Information, excluding the SID, the 6–byte System IDentifier, and the SEL, the Selector.
Additional Manual Area Addresses	The Additional Manual Area Addresses specify a list of synonomous Area addresses associated with an IS. All of the IS's manual area addresses, when combined with the IS's SID and SEL, are valid Network Entity Titles for the IS. For a level–1 adjacency between two IS nodes there must be at least one Area address in common between their two manual Area address lists. The Area address of an ES must match an entry in the IS's manual Area address list in order to establish an adjacency.
NE IS–IS Level	The NE IS–IS Level field specifies the network element IS to IS routing. The following values are available: • Level 1 • Level 1 + Level 2 • Level 1 + Level 2 + Area Repair Access

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365–367–512
Issue 2, July 2002

Lucent Technologies

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Field name	Description
LAN IS–IS Level	The LAN IS–IS Level field specifies the LAN IS to IS routing. The following values are available: • Follow NE IS-IS Level • Level 2 • None
Designated Router Priority	The Designated Router Priority is a function of the IS–IS protocol. It represents a Pseudo or Virtual node on a LAN subnet which assumes much of the routing tasks for the LAN circuit. One of the physical nodes must do the actual work. This node is the DR. Election of the DR depends first on the circuit priority and second on the SID, or MAC address.

Related topic   For general information about windows, see "About the main application window" (2-10).

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Provisioning Data Communication Network parameters

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Procedure ....

1   Go to the Data Communication Network window at *Provision > Data Communication Channel > Data Communication Network.*

....

2   Specify the Subrack ID by selecting a Subrack and Number.

....

3   Select a new area ID. *Do not use the default value 0000.* The 2nd and 3rd additional manual area addresses are optional.

....

4   You can also change the selection for the IS–IS level and the designated router priority, if desired, based on your particular DCN design.

....

5   Click Apply.

> **Result:**
> If the NE is installed and configured correctly, the command will
> be performed. Otherwise, an error message will be returned.

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365–367–512
Issue 2, July 2002

Lucent Technologies

1 4 - 2 7

Querying the DCN

Procedure

1   Go to the Data Communication Channel window at *Provision > Data Communication Channel > Data Communication Network.*

2   Specify the Subrack ID by selecting a Subrack and Number.

3   Click Query DCN.

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DCN query results

Results field descriptions   The following information appears in the DCN Query Results window.

Column	Description
Subrack ID	Displays the subrack ID
Status	Displays the status as either Configured or Not Configured
Full NSAP	Displays the NSAP address of the queried dSRC
NSAP Format	Displays the format as Fixed 20 bytes, Fixed 10 bytes, or Flexible
Area	Displays the Area address or the Area ID
SID	Displays a unique MAC address for the dSRC. This is programmed at the factory.
NE IS-IS Level	Displays Level 1, Level 2, or Level1+Level2+ AreaRepairAccess
LAN IS-IS Level	Displays Follow NE Level, Level 2, or None
Router Priority	Displays a valid value in the range of 0–127
2nd Area	Displays the flexible area address format for the second manual area address
3rd Area	Displays the flexible area address format for the third manual area address

Related topic   For general information about windows, see "About the main application window" (2-10).

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Querying a Computed Area Address

Procedure

1 Go to the Data Communication Channel window at *Provision > Data Communication Channel > Data Communication Network*.

2 Specify the Subrack ID by selecting a Subrack and Number.

3 Click Query Computed Area Address.

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Computed Area Address query results

Results field descriptions   The following information appears in the Computed Area Address Query Results window.

Column	Description
Subrack ID	Displays the subrack ID
Computed Area Address	Displays the computed area address

Related topic   For general information about windows, see "About the main application window" (2-10).

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15   System ID

Overview

Purpose	"System ID" describes how to provision the System ID and other system parameters.
	The System ID is used by network and element management systems to identify a particular Network Element.
Window location	*Provision > System ID*
Organisation	The organisation is as follows:

- "System ID window description" (15-2)
- "Querying system parameters" (15-3)
- "Changing the System ID or the Frame ID" (15-4)

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System ID window description

Illustration   The following illustration shows the System ID window.

Field descriptions   The System ID window has the following fields.

Field name	Description
System ID	The System ID field is optional and specifies the system identification. The System ID identifies a particular DACS system when communicating with a Network Management System.
	This field accepts up to 18 alphanumeric characters. The characters *, ; : # { } space* are not allowed. Furthermore, the System ID cannot be set to -1.
Frame ID	The Frame ID field is optional and specifies the frame identification. This field can be used for additional system identification. The value specified for the Frame ID field is not used by the DACS system or by a Network Management System.
	The values are 0–65535. The default value is 0.

Related topic   For general information about windows, see "About the main application window" (2-10).

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Querying system parameters

Procedure

1 Go to the System ID window at *Provision > System ID.*

2 Click Query.
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System ID query results The following information is displayed in a query results window:

- System ID
- Frame ID
- Date and time of the last database backup
- The maximum system capacity

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Changing the System ID or the Frame ID

Procedure

1 Go to the System ID window at *Provision > System ID.*

2 Specify a System ID, a Frame ID, or both.

3 Click Change.

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16   Password administration

Overview

Purpose "Password administration" describes the Change Password window. Use the Change Password window to change your password for logging into the system.

Window location *Utilities > Change Password*

Organisation "Password administration" is organised as follows:
- "Change Password window description" (16-2)
- "Changing your password" (16-3)

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Change Password window description

Illustration   The following illustration shows the Change Password window.

Field descriptions   The Change Password window has the following fields.

Field name	Description
Login ID	The Login ID field displays the Login ID that was used to log into the system.
Old Password	The Old Password field specifies the current password associated with the Login ID.
New Password	The New Password field specifies a new user password. The password must be from four to eight characters in length. There are no restrictions on what characters can be used in the password.
Confirm New Password	You must confirm the password specified in the New Password field by reentering it in the Confirm New Password field.

Related topic   For general information about windows, see "About the main application window" (2-10).

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Changing your password

Procedure

1   Go to the Change Password window at *Utilities > Change Password.*

2   In the Old Password field, enter the current password for the displayed Login ID.

3   In the New Password field, enter a new password.

4   In the Confirm New Password field, reenter the new password.

5   Click Apply.

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17   Login administration

Overview

Purpose   "Login administration" contains information about the Login Administration window and the step-by-step procedures administrators use for adding, changing, or deleting a user login. Login administration also contains information about changing a user's password and access class.

Organisation   "Login administration" is organised as follows:

- "Background information" (17-2)
- "Login Administration window and procedures" (17-5)

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Background information

Overview

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Purpose   This section contains background information about login administration.

Organisation   "Login administration" contains the following information:

- "Access class definitions" (17-3)
- "Access classes and permissions" (17-4)

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1 7 - 2   **Lucent Technologies**   365–367–512
Issue 2, July 2002

Access class definitions

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What is an access class?   A user's access class determines the types of operations, administration, maintenance, and provisioning tasks that a user can perform. Access classes are set by the system administrator.

Access classes   **Administrator** An administrator can perform the following tasks:

- Suppress alarms

- Control all network element functions

- Query and modify all system data including login and password information

Supervisor A supervisor can perform the following tasks:

- Suppress alarms

- Control all network element functions

- Query and modify all system data *except* login and password information

Operator An operator can only suppress alarms and query all system data except login and password information.

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Access classes and permissions

Table of access classes   An access class determines the types of tasks the system will allow a user to perform. The following diagram describes each access class and the permissions.

Tasks	Admin [1]	Sup [2]	Operator
Change system date/time	Yes	Yes	No
Change PC date/time	Yes	Yes	Yes
Administer users and access classes	Yes	No	No
Database backup	Yes	Yes	Yes
Change own user password	Yes	Yes	Yes
Remove, restore, initialise controller	Yes	No	No
Perform safepointing	Yes	Yes	No
Provision equipment	Yes	Yes	No
Change port	Yes	Yes	No
Change path overhead	Yes	Yes	No
Provision performance monitoring	Yes	Yes	No
Provision cross connects	Yes	Yes	No
Execute tests	Yes	Yes	No
Provision protection switching	Yes	Yes	No
Request protection switching	Yes	Yes	No
Provision fault management	Yes	Yes	No
Request station alarm suppress & disconnect	Yes	Yes	No
Provision timing	Yes	Yes	No
Switch system clock	Yes	Yes	No
Perform queries	Yes	Yes	Yes

Notes:

1.   Administrator

2.   Supervisor

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Login Administration window and procedures

1 7 - 5

Overview

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Purpose   Administrators can use the Login Administration window to query, add, change, or delete a user login ID. Administrators can also change a user's password, name, or access class.

Window location   *Utilities > Login Administration*

Organisation   This section is organised as follows:

- "Login Administration window description" (17-6)
- "Querying a user login ID" (17-8)
- "Login Administration query results" (17-9)
- "Adding a user login ID" (17-10)
- "Changing a user login ID" (17-11)
- "Deleting a user login ID" (17-12)
- "Changing a user's password" (17-13)
- "Changing a user's access class" (17-14)

General information related topics   For general information, click on one of the following topics:

- "Login Administration window description" (17-6)
- "Login Administration query results" (17-9)

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365–367–512
Issue 2, July 2002

Lucent Technologies

1 7 - 5

Login Administration window description

Illustration The following illustration shows the Login Administration window.

Field descriptions The Login Administration window has the following fields.

Field name	Description
Login ID	The Login ID field specifies a user login ID. The login identification can contain from two to eight letters or numbers. The first character must be a letter, and at least one character must be a lower-case letter. A default login ID is provided for the system administrator. Only the system administrator can add, change, or delete a login ID.
	The system allows a maximum of 30 user login IDs.
Access Class	A user's access class determines the types of operations, administration, maintenance, and provisioning tasks that a user can perform. Access classes are set by the system administrator. If a user is logged in and the administrator changes the user's access class, the change does not become effective until the user logs off.

Login Administration window and
procedures
Login Administration window description

Login administration

Field name	Description
User Name	The User Name field specifies a user's name. A user name can be up to 50 characters. The characters "#" and ":" must not be used in a user name. If an Administrator changes a user name, the change becomes effective immediately.
New Password	The New Password field specifies a new password for the specified login ID. The password must be from four to eight characters. If an Administrator changes a user password, the change becomes effective immediately.
Confirm New Password	You must confirm the password specified in the New Password field by reentering it in the Confirm New Password field.

Related topics For more information, see one of the following topics:

- "About the main application window" (2-10)

- "Access class definitions" (17-3)

- "Access classes and permissions" (17-4)

□

Querying a user login ID

Procedure

1 Go to the Login Administration window at *Utilities > Login Administration.*

2 Specify a Login ID.

Important! You can query all login IDs by leaving the Login ID field blank.

3 Click Query.

E N D   O F   S T E P S

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Login Administration query results

Illustration   Use the following illustration only as an example of query results for the Login Administration window.
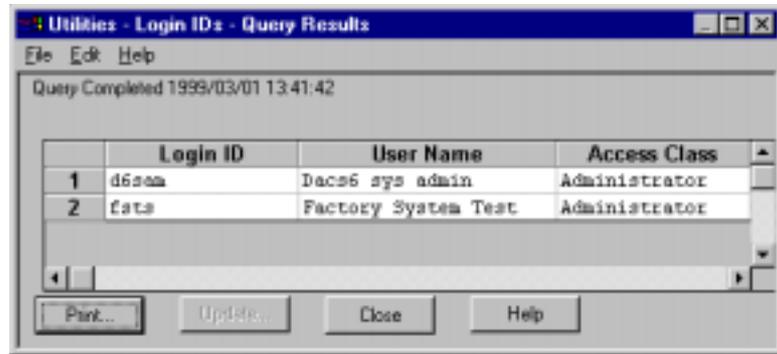
Important! The data displayed on this screen may *not* be typical.

Results field descriptions   The following information appears in the Login Administration Query Results window.

Column	Description
Login ID	Displays the requested login ID.
User Name	Displays the user name associated with the requested login ID.
Access Class	Displays one of the following values: • Administrator • Supervisor • Operator

Related topics   For more information, see one of the following topics:

- "About the main application window" (2-10)
- "Access class definitions" (17-3)
- "Access classes and permissions" (17-4)

□

Adding a user login ID

Procedure

1   Go to the Login Administration window at *Utilities > Login
     Administration.*

2   Specify a Login ID.

3   Select an Access Class.

4   Specify a User Name and a New Password.

5   In the Confirm New Password field, reenter the new password.

6   Click Create.
     E ND OF S TEPS

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Changing a user login ID

Procedure

1   Go to the Login Administration window at *Utilities > Login Administration.*

2   Specify a Login ID.

3   Select an Access Class.

4   Change the User Name, New Password, or both.

5   If you changed the password, reenter the new password in the Confirm New Password field.

6   Click Change.
    E N D   O F   S T E P S

Deleting a user login ID

Procedure

1 Go to the Login Administration window at *Utilities > Login Administration.*

2 Specify a Login ID.

3 Click Delete.

E N D   O F   S T E P S

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Changing a user's password

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Procedure   Perform the following procedure when a user forgets his or her
password.

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1   Go to the Login Administration window at *Utilities > Login
Administration.*

....

2   Specify the user's Login ID.

....

3   Enter a new password in the New Password field.

....

4   Reenter the new password in the Confirm New Password field.

....

5   Click Change.

E N D   O F   S T E P S

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Changing a user's access class

Procedure

1   Go to the Login Administration window at *Utilities > Login Administration.*

2   Specify the user's Login ID.

3   Enter a new access class in the Access Class field.

> **Reference:** For more information, see one of the following topics:
> - "Access class definitions" (17-3)
> - "Access classes and permissions" (17-4)

4   Click Change.
E N D   O F   S T E P S

When changes become effective

Changes will not become effective until your user logs off and logs back on again.

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18   Date and time administration

Overview

Purpose   "Date and time administration" describes the Date and Time Administration window. Use the Date and Time Administration window to query or change the date and time on a Personal Computer (PC) that is used for provisioning and maintenance tasks or on the system (Network Element). You can set the date and time on a PC to the system date and time, or you can set the system date and time to the PC date and time.

Window location   *Utilities > Date and Time Administration*

Organisation   "Date and time administration" is organised as follows:

- "Date and Time Administration window description" (18-2)
- "Querying the date and time" (18-3)
- "Changing the date and time" (18-4)
- "Setting the PC date and time to the system date and time" (18-5)
- "Setting the system date and time to the PC date and time" (18-6)

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Date and Time Administration window description

Illustration   The following illustration shows the Date and Time Administration window.

Field descriptions   The Date and Time Administration window has the following fields.

Field name	Description
Date	The Date field displays or sets the current date on a PC or the system.
	The date format is: YYYY/MM/DD, where YYYY is the year, MM is the month, and DD is the day.
Time	The Time field displays or sets the current time on a PC or the system.
	The time format is: HH/MM/SS, where HH is the hour, MM is the minute, and SS is the second.

Related topic   For general information about windows, see "About the main application window" (2-10).

☐

Querying the date and time

Procedure

1 Go to the Date and Time Administration window at *Utilities > Date and Time Administration.*

2 Do one of the following:

- To query the PC date and time, click Query PC Date/Time.

- To query the system (NE) date and time, click Query NE Date/Time.

E N D   O F   S T E P S

Example

The following is an example of a date and time query result.

☐
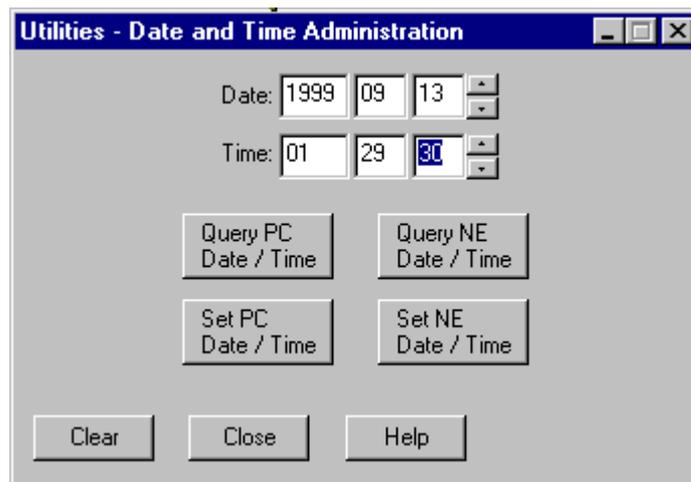
Changing the date and time

Procedure

Important! You cannot change the system date and time from the Date and Time Administration window if an ITM-SC is connected to the system.

1 Go to the Date and Time Administration window at *Utilities > Date and Time Administration.*

2 Query the PC date and time or the system (NE) date and time.

3 Change the appropriate Date and Time fields.

4 Click Set PC Date/Time or Set NE Date/Time.
E ND OF S TEPS

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Setting the PC date and time to the system date and time

Procedure

1 Go to the Date and Time Administration window at *Utilities > Date and Time Administration.*

2 Query the system (NE) date and time.

3 Click Set PC Date/Time.
   END OF STEPS

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Setting the system date and time to the PC date and time

Procedure

1 Go to the Date and Time Administration window at *Utilities > Date and Time Administration.*

2 Query the PC date and time.

3 Click Set NE Date/Time.

E N D   O F   S T E P S

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Lucent Technologies

19 Autonomous message indicator administration

Overview

Purpose   "Autonomous message indicator administration" describes the Autonomous Message Indicator window. Use the Autonomous Message Indicator window to enable or disable the audible autonomous message indicator. When the audible autonomous message indicator is enabled, the PC bell sounds whenever the system generates an autonomous message.

Window location   *Utilities > Autonomous Message Indicator*

Organisation   "Autonomous message indicator administration" is organised as follows:

- "What are autonomous messages and events?" (19-2)
- "Autonomous Message Indicator window description" (19-3)
- "Enabling or disabling the audible autonomous message indicator" (19-4)

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What are autonomous messages and events?

Description   The system generates an autonomous message for every autonomous event. Autonomous events are actions that the system initiates automatically.

Examples of autonomous events   Alarms, protection-switching events, and system clock reference changes are examples of autonomous events.

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Autonomous Message Indicator window description

Illustration The following illustration shows the Autonomous Message Indicator window.
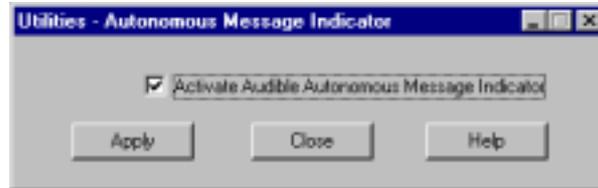
Field descriptions The Autonomous Message Indicator window has the following field.

Field name	Description
Activate Audible Autonomous Message Indicator	The Activate Audible Autonomous Message Indicator field enables or disables the Audible Autonomous Message Indicator feature. When the Activate Audible Autonomous Message Indicator field is checked, the feature is enabled. When the feature is enabled, the PC bell sounds whenever the system generates an autonomous message.

Related topic For general information about windows, see "About the main application window" (2-10).

□

Enabling or disabling the audible autonomous message indicator

Procedure

1 Go to the Autonomous Message Indicator window at *Utilities > Autonomous Message Indicator.*

2 Click the box next to Activate Audible Autonomous Message Indicator. A check mark in the box means that the feature is enabled.

3 Click Apply.

E N D   O F   S T E P S

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Glossary

A   Abnormal alarm

An Abnormal alarm indicates that self tests, manual tests, or maintenance operations are in progress. The alarm is displayed via a yellow LED located on the User Panel. For example: a user manually switching the timing to holdover mode will cause an abnormal alarm. This feature is not yet available.

ACP

See Alarm Connector Panel.

Active

When an entity is duplicated, one of the duplicated entities (the active entity) is currently providing service, while the other is in standby. Either the working or protection entity could be active at any time.

Active and standby

These terms refer to the operational state of entities that are part of a protection group. An active entity is one that is currently providing service; a standby entity substitutes for an active entity if necessary.

A direction

The A direction is the direction in which the signal travels through the system from the E-END to the F-END, or the direction in a unidirectional cross connect.

Administrative Unit

An Administrative Unit (AU) is the information structure that provides adaptation between the higher order path layer and the Multiplex Section layer. The AU consists of a higher order Virtual Container information payload and an AU pointer. The AU pointer indicates the offset of the payload frame start relative to the Multiplex Section frame start. An AU-4 consists of a VC-4 plus an AU pointer. An AU-3 consists of a VC-3 plus an AU pointer.

Administrative Unit 3

An Administrative Unit 3 (AU-3) consists of a Virtual Container 3 (VC-3) plus an AU pointer.

Administrative Unit 4

An Administrative Unit 4 (AU-4) consists of a Virtual Container 4 (VC-4) plus an AU pointer.

Administrative Unit 4-4c

An Administrative Unit 4-4c (AU-4-4c) consists of four concatenated AU-4s. Concatenated means linked together in a series.

Administrative Unit Group

An Administrative Unit Group (AUG) consists of one or more byte-interleaved AUs. For an STM-1, an AUG can be either a single AU-4 or three byte-interleaved AU-3s.

AIS

See Alarm Indication Signal.

Alarm

An alarm is a visible or audible signal that indicates that an equipment failure or a significant event has occurred.

Alarm Connector Panel

The Alarm Connector Panel (ACP) is located on the back of the User Panel, below the Main Controller (MC) subrack. The ACP has connectors for alarm-related cables.

Alarm delay

Alarm delay is the amount of time the system waits after a failure occurs before activating an alarm.

Alarm Indication Signal

An Alarm Indication Signal (AIS) is a signal sent downstream indicating that an upstream failure has occurred. AIS is transmitted by the network element that detected the failure to prevent downstream failures being declared and alarms being raised.

Alarm indicator

An alarm indicator is a visual or audible indication that an alarm is active. One example of an alarm indicator is the red LED on a unit. The red LED lights if a unit fails.

Alarm Relay Unit

The Alarm Relay Unit (ARU) is located on the Main Controller (MC) subrack and provides system relay control and non 48V power distribution to the MC subrack.

Alarm severity

Alarm severity is an attribute that defines the priority of the alarm message. The way the system processes alarms depends on the alarm severity.

Alarm suppression

When you suppress an alarm, you selectively prevent the system from forwarding alarm messages to the user interface.

ALS

See Automatic Laser Shutdown.

American National Standards Institute

The American National Standards Institute (ANSI) is a standards-setting, non government organisation that develops and publishes standards for transmission codes, protocols, and high-level languages for voluntary use in the United States.

American National Standards Institute, Multiplex Section Protection

American National Standards Institute, Multiplex Section Protection (ANSI MSP) provides switching similar to unidirectional ITU MSP for STM-16, STM-4, and STM-1 optical interfaces, and for STM-1 electrical interfaces. ANSI MSP complies with American National Standards Institute (ANSI) T1–105.01. See International Telecommunications Union — Transmission, Multiplex Section Protection.

ANSI

See American National Standards Institute.

ANSI MSP

See American National Standards Institute, Multiplex Section Protection.

Apparatus code

Apparatus codes are unit codes used by the factory. For example, IM09 and LAH203 are apparatus codes.

ARU

See Alarm Relay Unit.

AU

See Administrative Unit.

AU-3

See Administrative Unit 3.

AU-4

See Administrative Unit 4.

AU-4-4c

See Administrative Unit 4_4c.

AUG

See Administrative Unit Group.

Automatic Laser Shutdown

Automatic Laser Shutdown (ALS) is a feature that causes the system to automatically shutdown the output power of laser transmitters and optical amplifiers. ALS can prevent a technician's eyes from being exposed to hazardous laser levels.

Auto-provisioning

Auto-provisioning is the system's ability to automatically provision equipment.

Autonomous

An autonomous command is initiated by the system without direction by a user.

Autonomous messages

Autonomous messages are messages generated automatically by the system.

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B   **Background Block Errors**

Background Block Errors (BBEs) are the number of errored blocks that were detected. A block is a set of consecutive bits associated with the path; each bit belongs to only one block. An Errored Block is a block in which one or more bits are in error.

Background test

An equipment diagnostic test is in background test mode when 2-6 diagnostic tests are running at the same time, and more than one unit is being tested. You can perform other tasks from the terminal while the system is executing tests in background mode.

Backup

Backup refers to the duplicate hardware, software, or data that can be used in case of failure, or when the primary system is unavailable.

Bandwidth

Bandwidth is the difference in Hz between the highest and lowest frequencies in a transmission channel. Bandwidth is also the data rate that can be carried by a given communications circuit.

BCC

See Board Controller Complex.

BCLAN

See Board Controller Local Area Network.

B direction

The B direction is the direction in which the signal travels through the system from the F-END to the E-END.

Bidirectional

Bidirectional, or two-way cross connects connect two ports so they can communicate in two directions.

Bit Slice Controller

The Bit Slice Controller (BSC) is located on the Matrix and Synchronisation (MS) subrack. The BSC works with the System Timing Unit (STU) to provide timing signals for internal transmission paths. The BSC also provides control information for the Bit Slice Switch Units (BSSUs). The BSC's interface module, the Optical Link Unit (OLU), provides the BSC's optical links to the switch matrix units, and to the BSC's duplicate mate. There are two OLUs for each BSC.

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G L O S S A R Y   **Lucent Technologies**   365–367–512
G L - 4   Issue 2, July 2002

Bit Slice Fibre Interface

The Bit Slice Fibre Interface (BSFI) is a control interface between the Bit Slice Controller (BSC) and Bit Slice Switch Unit (BSSU). The Optical Link Unit (OLU) contains the circuitry for the BSFI. See also Equipment Core Interface.

Bit Slice Interface Unit

The Bit Slice Interface Units (BSIUs) are located on the port subracks. BSIUs transport data betwen the Bit Slice Switch Units (BSSUs) and the port units. The BSIU also monitors the transmission data and provides automatic protection switching for hardware failures.

Bit Slice Switch Unit

The Bit Slice Switch Units (BSSUs) are cross-connect matrix components. The WaveStar DACS has ten BSSUs. Five BSSUs are located in the bottom of the Matrix and Synchronisation rack, and five BSSUs are located in the bottom of the Matrix and Control rack. Each BSSU carries either 256 or 512 slices of Synchronous Digital Hierarchy (SDH) traffic (STM-1 equivalent).

Board Controller Complex

Many units contain Board Controller Complex (BCC) circuitry that allows the unit to talk to and be controlled by the Subrack Controller (SRC).

Board Controller Local Area Network

The Board Controller Local Area Network (BCLAN) is a subrack backplane communications link that the SRC uses to communicate with the other units in the subrack.

Boot

A boot transfers the contents of backup memory into working memory. Booting usually occurs when a unit or controller is inserted, when the system is powered up, or when a subrack is created.

Bridge cross connect

A bridge cross connect is another name for a multi-point cross connect.

Bridge (SNCP)

An SNCP bridge transmits identical traffic on both the working and protection trails.

Broadband

Broadband is a networking technique for transmitting large amounts of voice, data, image, and multimedia signals over long distances on coaxial or fibre-optic cables. In digital communication, signals are transmitted at the 45 Mbps or higher rate.

Broadcast cross connect

A broadcast cross connect is another name for a multi-point cross connect.

BSC

See Bit Slice Controller.

BSFI

See Bit Slice Fibre Interface.

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365–367–512
Issue 2, July 2002

Lucent Technologies

GLOSSARY
GL - 5

BSIU

See Bit Slice Interface Unit.

BSSU

See Bit Slice Switch Unit.

C **Central Office**

A Central Office (CO) is a building that houses telecommunications equipment.

Circuit pack

See Unit.

CIT

See Craft Interface Terminal.

CO

See Central Office.

Cold start

A cold start initialises or recovers a single unit. A cold start may affect service.

Controller

Controller is another name for the Subrack Controllers (SRCs) and Main Processor Units (MPUs). Controllers administer the other units on their respective subracks.

Craft Interface Terminal

The Craft Interface Terminal (CIT) is a computer terminal used for provisioning and maintenance.

Cross connects

Cross connects are the hardware and software used to connect line-terminating equipment, multiplexers, and other equipment.

Current request

A current request is the current state of the entity with regard to protection switching. A current request is either the result of a previous user-initiated protection switch request or the result of a system-initiated switch request that was made due to the condition of the software and hardware. The current request is called the "current switch state" on the Integrated Transport Management-Subnetwork Controller (ITM-SC).

D **DACS VI-2000**

The Digital Access Cross-Connect System (DACS) VI-2000 was a first generation digital access cross-connect system with an initial capacity of 64 STM-1 equivalents.

DACScan

The DACScan was a network management system for a Data Communications Network (DCN). The DACScan is now called the Integrated Transport Management-Subnetwork Controller

(ITM-SC).

Default

A default is a value the system automatically provides if the user does not specify a value.

Defect

A defect is a fault that interrupts a specific function. A defect does not affect the performance of a function. See Failure.

Deferred

Deferred indicates one, or both, of the following:

• A change over to standby equipment has been used to restore service.

• A performance-degrading condition exists, but the condition does not affect service.
Maintenance personnel must take immediate action, but they must resolve any prompt alarms first.

Degradation

Degradation pertains to the reduced service level available from a computer system when one or more of its component parts is unavailable due to malfunction or maintenance.

Diagnostic test

Tests the internal hardware on a unit.

Digital cross connect system

A digital cross connect is an electronic switching system that routes digital signals among multiple paths without the need to demultiplex signals.

Digital Timing Unit

The Digital Timing Unit (DTU) provides timing for the transmission units in a port subrack. The DTU is always duplicated.

Downstream

The downstream signal points at or towards the destination of the transmission stream. In other words, the downstream signal looks in the direction of transmission.

Drop and continue

A function within a ring node where traffic is both extracted from the working channels on the ring (drop), and transmitted onwards on the ring (continue).

DTU

See Digital Timing Unit.

Dual node interconnection

An architecture between two rings where two nodes in each ring are interconnected.

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E   ECI

See Equipment Core Interface.

....

E-END

E-END is an arbitrary designation used to distinguish one end of a unidirectional, bidirectional, idle (unmapped), or bridge cross connect as the signal travels through the system. You can establish test access at either the E-END or the F-END.

EID

See Equipment Identification.

Electrostatic Discharge

Electrostatic Discharge (ESD) is the sudden release of the charge associated with static electricity. Static charge is generated whenever two materials come into contact with each other and are then separated.

Entity

Entity is a term used to generically refer to a piece of equipment or to a signal.

Equipment Core Interface

The Equipment Core Interface (ECI) is a data and control interface between the Bit Slice Switch Unit (BSSU) and Bit Slice Interface Unit (BSIU). This interface also distributes the timing information between the port subracks and the BSSU. See Bit Slice Fibre Interface.

Equipment Identification

The Equipment Identification (EID) is the address the software uses to identify equipment.

Equipped

An equipped unit is a unit that has been successfully inserted into the subrack and has program image and configuration data.

Error

An error is any difference between a computed, observed, or measured condition and the theoretically-correct condition.

Errored

When a diagnostic test displays an errored message, it means that the system could not complete a diagnostic test.

Errored Seconds

Errored Seconds (ES) is a performance-monitoring parameter that refers to the number of one-second periods in which one or more Errored Blocks occur.

ESD

See Electrostatic Discharge.

Estimator value

The estimator value is a value that is used in the performance-monitoring calculation process. The estimator value is the error rate, in errored-blocks-per second, at which the errored seconds become severely-errored seconds.

ETSI

See European Telecommunications Standards Institute.

European Telecommunications Standards Institute

The European Telecommunications Standards Institute (ETSI) is a committee designed to provide inter-vendor and inter-operator compatibility of Synchronous Digital Hierarchy (SDH) equipment.

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F   F-END

F-END is an arbitrary designation used to distinguish the end opposite the E-END of a unidirectional, bidirectional, or bridge cross connect as the signal travels through the system. You can establish test access at either the E-END or the F-END.

Failed

When a diagnostic test displays a failed message, it means that the equipment did not pass a diagnostic test.

Failure

A failure is a defect that has persisted long enough to be considered a permanent condition. A failure can affect the performance of a specific function.

Far end

Far end refers to the *remote* network element. For performance monitoring, the system collects performance-monitoring data on the local network element from anomalies detected in the incoming signal by the remote (far-end) network element.

Fatal

A fatal condition means that the system has detected a fatal failure on either the active or the standby unit. A fatal failure is brought about by a unit being removed or by the loss of power to the unit.

Fibre-optic cable

Fibre-optic cable is a transmission medium consisting of a core of glass or plastic surrounded by a protective cladding, strengthening material, and outer jacket. Also called an optical-fibre cable.

Frame

A frame is the smallest repetitive block of digital data being transmitted.

Frame ID

The Frame ID uniquely identifies a system within the office.

Free-running mode

The system operates in free-running mode when it is initially put into service. In free-running mode, the system timing is provided by the internal clock. After the system has been phaselocked to a timing reference, the system will not return to free-running mode.

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365–367–512   **Lucent Technologies**   G L O S S A R Y
Issue 2, July 2002   G L - 9

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G   G.xxx

G.xxx refers to ITU Standards documents.

Graphical User Interface

A Graphical User Interface (GUI) is a graphics-based user interface that incorporates icons, pull-down menus, and a mouse.

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H   Head end

A Sub-Network Connection Protection (SNCP) node that executes a bridge.

Hold off time

The time (0 to 10 seconds) that the system waits after detecting a failure before initiating a protection switch. The hold-off time can be used to control switching order when multiple protection mechanisms are protecting the same service. For example, lower order or higher order SNCP can be combined with MSP or equipment protection.

Holdover mode

Holdover mode is a backup operational mode that the system enters automatically if all provisioned timing references have failed. In holdover mode, the internal system clock simulates the timing that occurred during a previous period in free-running mode or phaselocked mode. An alarm is raised whenever the system enters holdover mode.

....

I   Idle

An output port is idle if the port is not cross connected to an input port.

Information

An alarm designated as information means that the alarm requires no immediate action. Maintenance personnel can perform the required actions on a scheduled basis or after an accumulation of maintenance events. Information alarms are indicated only on the User Panel.

Initialisation

An initialisation is a restart that synchronises the hardware with the software. Warm and cold starts are also called initialisations.

Integrated Transport Management Network Module

An Integrated Transport Management Network Module (ITM-NM) is a network management system for a Data Communications Network (DCN). The ITM-NM was formerly called DACScan.

Integrated Transport Management Subnetwork Controller (ITM-SC)

The Integrated Transport Management Subnetwork Controller (ITM-SC) is the remote manager for Synchronous Digital Hierarchy (SDH) network elements in a subnetwork. The ITM-SC is also referred to as an Element Management System (EMS).

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Interface Unit
The Interface Unit (IU) provides the SDH Physical Interface (SPI) function for STM-1 electrical and optical signals. All STM-1 IUs work with the STM-1 port unit.

International Telecommunications Union — Transmission
The International Telecommunications Union — Transmission (ITU) is an international consultative committee that studies technical, operating, and tariff questions and issues recommendations on them with a view to standardising telecommmunications on a worldwide basis. The ITU was formerly called the Consultative Committee for International Telegraph and Telephone (CCITT).

International Telecommunications Union — Transmission, Multiplex Section Protection
International Telecommunications Union — Transmission, Multiplex Section Protection (ITU MSP) provides 1+1 unidirectional or bidirectional nonrevertive switching for STM-16, STM-4, and STM-1 optical interfaces, and for STM-1 electrical interfaces. Two lines carry identical payloads in a permanent bridged arrangement between network elements. ITU MSP complies with ITU-T Recommendation G.783, Annex A.

ITM-NM
See Integrated Transport Management Network Module.

ITM-SC
See Integrated Transport Management Subnetwork Controller.

ITU MSP
See International Telecommunications Union — Transmission, Multiplex Section Protection.

ITU-T
See International Telecommunications Union — Transmission.

IU
See Interface Unit.

K **K bytes**
K bytes are Automatic Protection Switching (APS) bytes that are used by the Multiplex Section Protection (MSP) functions at the ends of a multiplex section in making requests for, and giving acknowledgements of, protection-switching actions.

Kbps
The term Kbps refers to Kilobits per second.

L **LAN hub**
See Local Area Network hub.

LAN Hub Unit
The LAN Hub Units (LHUs) are located in the back of Main Controller subrack. The LHUs provide the hub ports for system LAN connections.

LHU

See LAN Hub Unit.

Line

Line refers to a transmission medium, together with the associated high speed equipment that are required for providing the means of transporting information between two consecutive network elements. One line originates the line signal, and the other line terminates the line signal.

Line condition

The line condition is the current state of health of a working or a protection line.

Line restore time

Line restore time is the number of minutes that the system waits, after a failure condition that caused a protection switch clears, before switching to the line that is not carrying service (the line where the fault cleared). Line restore time applies only to NTT MSP.

Line-derived timing

Line-derived timing means that the system timing is derived from the signal received from a transmission port.

Local Area Network hub

A Local Area Network (LAN) hub connects multiple LAN entities.

LOF

See Loss of Frame.

Loopback cross connect

A loopback cross connect is a special unidirectional cross connect that sends the signal from an input port back to the output port. Loopback cross connects are typically used to isolate trouble on the port units during installation.

Loopback test access connection

A loopback test access connection loops back one end of a signal onto itself and bridges the connection to the test access port. Use loopback test access connections to test idle ports. LOOPE and LOOPF are loopback test access connections.

LOP

See Loss of Pointer.

LOS

See Loss of Signal.

Loss of Frame

A Loss of Frame (LOF) is a failure to synchronise to an incoming signal.

Loss of Pointer

A Loss of Pointer (LOP) is a failure to extract good data from a signal payload.

GLOSSARY   **Lucent Technologies**   365–367–512
GL-12   Issue 2, July 2002

Loss of Signal

A Loss of Signal (LOS) is the complete absence of an incoming signal.

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M   Magneto Optical disks

A Magneto Optical (MO) disk is a removable storage medium. MO disks are used for backing up the system database and for loading software onto the system.

Main Controller Local Area Network

The Main Controller Local Area Network (MCLAN) is a LAN used by the system for inter-processor communication between the Main Controller (MC) subrack and other system subracks.

Main Controller subrack

The Main Controller (MC) subrack contains the main processor, memory, Local Area Network (LAN) hubs, hard disk, removable optical disk, alarm unit, main connector panel, and User Panel.

Main Processor Unit

The Main Processor Unit (MPU) is located on the front of the Main Controller (MC) subrack. The MPU provides the central processing function which includes control of the ARU, LHU, and MSU.

Mass Storage Unit

The Mass Storage Unit (MSU) is located on the front of the Main Controller (MC) subrack. The MSU contains a hard disk drive and a Magneto-Optical (MO) drive.

Master unit

A master unit is a unit that controls a slave unit by sending messages or writing registers to the slave. BSC, DTU, and port units are master units.

Matrix and Control rack

The Matrix and Control (MC) rack is an equipment rack that contains the Main Controller subrack and five Bit Slice Switch Units (BSSUs).

Matrix and Synchronisation rack

The Matrix and Synchronisation (MS) rack is an equipment rack that contains the Matrix and Synchronisation subrack and five Bit Slice Switch Units (BSSUs).

Mbps

Mbps is a term that refers to Megabits per second. Mega is the Greek prefix for "big." A megabit is one million bits.

MCLAN

See Main Controller Local Area Network.

Module

See Subrack.

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Monitor test access connection

A monitor test access connection allows you to connect test equipment in parallel with a digital signal path while maintaining the digital transmission signal. Even though this test does *not* affect service, you will receive a confirmation notice from the user interface when you make a monitor test access connection. MONE, MONF, and MONEF are monitor test access connections.

MPU

See Main Processor Unit.

MS

See Multiplex section.

MSP

See Multiplex Section Protection.

MSU

See Mass Storage Unit.

Multiplexing

Multiplexing is the process of transmitting multiple signals over a single communications line or computer channel by interleaving the messages.

Multiplex section

A multiplex section (MS) is a transmission medium, together with the associated equipment, required to provide the means of transporting information between two consecutive network elements. One of the network elements originates the line signal and the other network element terminates the line signal.

Multiplex Section Protection

1+1 Multiplex Section Protection (MSP) is a transmission protection arrangement. The same signal is sent and received over two seperate transmission lines. These transmission lines terminate on separate transmission ports that are logically linked in software. The system supports three types of MSP: ITU MSP, NTT MSP, and ANSI MSP.

Multiplex Section Protection group

A Multiplex Section Protection (MSP) group is a pair of associated ports on a pair of physically-adjacent port units. An MSP group, which is also called an MSP pair, provides transmission line protection between network elements.

Multiplex section terminating equipment

Multiplex section terminating equipment is a network element that originates or terminates STM-1, STM-4, or STM-16 signals.

Multi-point cross connect

Multi-point cross connects have the following characteristics:

- Connect a single input to two or more outputs

- Provide bridging for restoration, testing, or broadcast

- Can be from any input to any available output signal
- Created using the "Uni-Directional" option on the Cross Connect window
- Can be disconnected in any order
- Can be added to any existing service whether originally created as unidirectional or bidirectional
- Were previously called bridge and broadcast cross connects

N   Near end

Near end refers to the *local* network element. For performance monitoring, the system collects performance-monitoring data on the local network element from anomalies detected in the incoming signal by the local (near-end) network element.

Network element

A network element is a piece of equipment that provides a component function in a network. Examples are: channel banks, digital cross-connects, and multiplexers.

Network Interface Chip

A Network Interface Chip (NIC) is a DEC 21140-A device capable of both 10BaseT or 100BaseT operations.

NIC

See Network Interface Chip.

Nippon Telephone and Telegraph, Multiplex Section Protection

Nippon Telephone and Telegraph, Multiplex Section Protection (NTT MSP) provides switching similar to bidirectional International Telecommunications Union, Multiplex Section Protection (ITU MSP) for STM-1 optical interfaces, and for STM-1 electrical interfaces. NTT MSP complies with ITU-T Recommendation G.783, Annex B, and a set of recommendations provided by NTT. See International Telecommunications Union — Transmission, Multiplex Section Protection.

Nonrevertive

Nonrevertive is a protection-switching operation type. When a protection group is nonrevertive, the protection entity will continue to operate as the active entity even after a failure clears on the working entity.

NTT MSP

See Nippon Telephone and Telegraph, Multiplex Section Protection.

O   OLU

See Optical Link Unit.

Optical disk

An optical disk is a storage medium that contains digital data readable by optical techniques.

Optical Link Unit

The Optical Link Unit (OLU) is part of the internal transmission path. It provides interfaces for the optical-fibre cables that carry transmission data between the Bit Slice Controllers (BSCs) and the Bit Slice Switch Units (BSSUs). The OLU also provides interfaces for the optical-fibre cables that carry timing information between the duplicated BSCs in the Matrix and Synchronisation subrack.

OOS

See Out-of-service.

Optical-fibre cable

See Fibre-optic cable.

Out-of-service

Out-of-service is a controller state that means that the MPU and SRC controllers are in firmware mode. No application or system base is running.

Overhead

Overhead (OH) is the term for auxiliary bytes used for everything but customer payload (for example: signalling) carried with Synchronous Digital Hierarchy (SDH) signals.

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P   Pack

See Unit.

Parameter

Parameters are the output of the performance-monitoring calculation process. For example: background block errors, errored seconds, severely-errored seconds, and unavailable seconds are all parameters.

Partial Passed

When a diagnostic test displays a Partial Passed message, it means that the system tested and passed all the equipment *available* for the test in the current configuration. The screen will display this result if one or more units that could have been tested were not present, and therefore, were not tested.

Passed

When a diagnostic test displays a passed message, it means that the system tested all the equipment available for the test, and all of the equipment passed the diagnostic test.

Path terminating equipment

Path terminating equipment is a network element that multiplexes or demultiplexes the VC-4 payloads.

Path selector

Within an Sub-Network Connection Protection (SNCP) architecture, the node function that selects a tributary which is extracted from the working channels arriving from one side of the node or from the other side of the node, according to path level criteria.

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GLOSSARY   **Lucent Technologies**   365–367–512
GL-16   Issue 2, July 2002

Path Trace Identifier

The purpose of the Path Trace Identifier (PTI) is to transmit a path access point identifier so that a receiving terminal can verify that the receiving terminal is connected to the intended transmitter.

Performance monitoring

Performance monitoring (PM) measures the quality of service and identifies degrading or marginally operating systems before an alarm is generated.

Phaselocked mode

Phaselocked mode is the normal mode of operation. In this mode, the system clock is slaved to an external timing reference such as a transmission port or a station clock input.

Plug-in

See Unit.

PM

See Performance monitoring.

Port subrack

Port subrack is a generic term that refers to either the PSA or the PSC subracks.

Port subrack A

Port Subrack A (PSA) houses the STM-1 electrical and optical interfaces.

Port subrack C

Port Subrack C (PSC) houses the STM-4 or STM-16 optical interfaces.

Port unit

A port unit and an interface unit work together to transmit and receive optical or electrical signals. The STM-1, STM-4, and STM-16 units are port units.

Power Supply

The Power Supply (PSP) supplies DC power for the midplane, fans, and units in the Main Controller (MC) subrack. The PSP is located below the fan trays at the bottom of the MC subrack.

Power Terminal Module

The Power Terminal Module (PTM) filters incoming station power from two separate power sources and distributes power across the midplane.

Prompt

A prompt alarm indicates that maintenance personnel must repair the defective equipment or take whatever corrective action is necessary to restore good service. Alarms for conditions that affect service are always classified as prompt.

Protection

When an entity is duplicated, one of the duplicated entities is designated as the protection entity, while the other is designated as the working entity. If the status of the protection entity

changes from standby to active, the entity still retains its designation as the protection entity.

Protocol

Protocol is a formal set of conventions governing the format and relative timing of message exchange between two communicating processes.

Provisioning

Provisioning refers to the user's ability to create, change, view, and delete system information.

PSA subrack

See Port Subrack A.

PSC subrack

See Port Subrack C.

PSP

See Power Supply.

PTM

See Power Terminal Module.

R   Rack

A rack is a mechanical assembly that houses the system equipment.

Revertive

Revertive is a protection-switching operation type. When a protection group is revertive, the system will automatically switch service from the protection entity back to the working entity when a failure clears and the Wait-To-Restore time has elapsed.

Rollover (Roll)

A roll is used to replace the input of an existing cross connect. All outputs specified in the original connection are moved to the new input. You can roll a unidirectional cross connect, one or both directions of a bidirectional cross connect, or a multi-point cross connection. When performing a roll, you can specify a specific output or all multi-point outputs.

S   SCSI

See Small Computer System Interface.

SDH

See Synchronous Digital Hierarchy.

Secondary line (NTT MSP only)

The secondary line is the line in an NTT MSP arrangement that provides service when there is an active protection request.

Severely-Errored Seconds

Severely-Errored Seconds (SES) refers to the number of one-second periods in which the number of Errored Blocks equals or exceeds the estimator value.

Single node interconnection

An architecture between two rings where one node in each ring is interconnected.

Slave unit

A slave unit is a unit that is controlled by a master unit. BSSUs, BSIUs, and IUs are slave units.

Slot

A slot is the space in a subrack that is designed to hold a unit.

Small Computer System Interface

A Small Computer System Interface (SCSI) is a hardware interface that allows for the connection of peripheral devices to a computer.

SNCP

See Sub-Network Connection Protection.

Split test access connection

A split test access connection splits the digital transmission path so that you can perform tests in both directions. SPLTA, SPLTB, SPLTAB, SPLTE, SPLTF, and SPLTEF are split test access connections.

Squelch

A squelched signal means that no signal is being transmitted.

SRC

See Subrack Controller.

Standby

When an entity is duplicated, one of the duplicated entities, the active entity, is currently providing service while the other entity is in standby. Either the working or protection entity can be in standby at any time.

State

State indicates whether an entity is defective or normal, in service or out of service, etc.

Station alarm

A station alarm is an alarm that appears visually or audibly anywhere other than on the User Panel or on a unit.

Station clock input

The station clock input (2048 kHz or 64 kHz) depends on the type of System Timing Unit (STU) that is installed in the system.

STM

See Synchronous Transport Mode.

STU

See System Timing Unit.

Sub-Network Connection Protection

Sub-Network Connection Protection (SNCP) is a transmission protection feature that provides protection for all or part of a trail through a network. At the head end of the protected subnetwork connection, a bridge is created. The bridge sends two identical copies of the protected trail toward the tail end over different routes. The tail end selects which copy of the trail to take as input based on manual and automatic switching criteria. For bidirectional traffic, each end of the connection provides both the head end (bridging) and the tail end (selector) functions.

Subrack

A subrack is a mechanical assembly that houses plug-in units, also referred to as circuit packs, that contain the circuitry for the system. All subracks conform to European Telecommunications Standards Institute (ETSI) equipment practices for transmission products. Subracks have a midplane or a backplane that interconnects the units in the subrack.

Subrack Controller

The Subrack Controller (SRC) routes messages back and forth from the Main Controller (MC) to the units in the Matrix and Synchronisation subrack.

Suite

A suite is an equipment aisle or set of frames.

Synchronous

Synchronous is a method of transmitting data in which discrete signal elements are transmitted at a fixed and continuous rate. Synchronous data transmission requires that the timing of the transmission be synchronised between the sending and receiving devices.

Synchronous Digital Hierarchy

Synchronous Digital Hierarchy (SDH) is a hierarchical set of digital transport structures, standardised for the transport of suitably-adapted payloads over physical transmission networks.

Synchronous Transport Mode

The Synchronous Transport Mode (STM) is a transport and switching method that depends on information occurring in regular and fixed patterns with respect to a reference such as a frame pattern.

Synchronous Transport Module, level 1

Synchronous Transport Module, level 1 (STM-1) is a 155.52 Mbps data stream in a Synchronous Digital Hierarchy (SDH) frame format. This is the lowest level SDH signal.

Synchronous Transport Module, level n

Synchronous Transport Module, level "n" (STM-n) is a Synchronous Digital Hierarchy (SDH) standard for transmission over optical fibre by multiplexing "n" times the basic rate (STM-1).

- STM-4 = 622.08 Mbps
- STM-16 = 2.488 Mbps

System

System refers to groups of software and hardware that operate as a whole.

System clock input reference

System clock input references can be derived from transmission ports (STM-1, STM-4, STM-16 ports or MSP pairs) or from external timing references (station clock inputs). External references can be derived from one or two 2048 kHz timing inputs or from one or two 64 kHz composite clock inputs.

System Timing Unit

The System Timing Unit (STU) provides system timing and synchronisation. The STU-64 has an extra 64 KHz clock input for external timing purposes.

T   Tail end

A Sub-Network Connection Protection (SNCP) node that requests the bridge.

TCA

See Threshold Crossing Alert.

Test access ports TP1 and TP2

Test access ports TP1 and TP2 are the software addresses for the test access ports. Test access ports are located on the port units.

Threshold

A threshold is the level of a parameter count at which the system sends a Threshold Crossing Alert.

Threshold Crossing Alert

The system reports a Threshold Crossing Alert (TCA) whenever a performance-monitoring parameter exceeds a specified threshold.

Trail

A trail is the logical transmission path between two path termination points.

Tributary Unit

A Tributary Unit (TU) is an information structure that provides adaptation between the lower order path layer and the higher order path layer. A TU consists of an information payload, also referred to as a lower order Virtual Container, and a TU pointer. The TU pointer indicates the offset of the payload frame start relative to the higher order Virtual Container frame start.

Tributary Unit 3

A Tributary Unit 3 (TU-3) consists of a Virtual Container 3 (VC-3) plus a TU pointer.

Tributary Unit 12
A Tributary Unit 12 (TU-12) consists of a Virtual Container 12 (VC-12) plus a TU pointer.

Tributary Unit Group
A Tributary Unit Group (TUG) consists of one or more TUs occupying fixed, defined positions in a higher order Virtual Container payload.

Tributary Unit Group 2
A TUG-2 is 12 columns of an STM-1 frame that can contain four TU-11s, three TU-12s, or one TU-2.

Tributary Unit Group 3
A TUG-3 is 86 columns of an STM-1 frame that can contain either one TU-3 or seven TUG-2s.

TU
See Tributary Unit.

TU-12
See Tributary Unit 12.

TU-3
See Tributary Unit 3.

TUG
See Tributary Unit Group.

TUG-2
See Tributary Unit Group 2.

TUG-3
See Tributary Unit Group 3.

U   Unassigned alarm indicator
Unassigned alarms are customer-designed alarm interfaces. They consist of eight output relays for devices such as burglar alarms and fire detectors. Check office records for more details.

Unavailable Seconds
Unavailable Seconds is the number of one-second periods when performance-monitoring data is unavailable due to prolonged severely-errored conditions. The Unavailable Seconds count begins when the system detects ten or more consecutive Severely-Errored Seconds. The system will count these severely-errored seconds as an unavailable second instead. The Unavailable Seconds count stops when the system detects ten or more consecutive, nonseverely errored seconds. All other counts stop during Unavailable Seconds.

Unidirectional
A unidirectional, or one-way cross connect connects two ports so that they can communicate in one direction. Even though most cross connects are bidirectional, the system also allows cross connects in only one transmission direction between all port combinations. Unidirectional cross

connects are used mostly for test access.

Unit

A unit is the hardware that is inserted into an equipment shelf. A unit is also called a plug-in, circuit pack, or pack.

Upstream

The upstream signal points at or towards the source of the transmission stream. In other words, the upstream signal looks in the direction opposite to the direction of transmission.

V   ### VC-4-4c

See Virtual Container 4_4c

VC

See Virtual Container.

VersaModule Europe

VersaModule Europe (VME) is a 1 through 21 slot, mechanical and electrical bus standard. VME is also known as the InterExchange Carrier (IEC) 821 bus.

Virtual Container

A Virtual Container (VC) is the information structure used to support path layer connections in the Synchronous Digital Hierarchy (SDH).

Virtual Container 4-4c

A Virtual Container 4-4c (VC-4-4c) consists of four concatenated VC-4s. Concatenated means linked together in a series.

VME

See VersaModule Europe.

W   ### Wait-To-Restore time

The Wait-To-Restore (WTR) time is the amount of time (in minutes) that the system waits, after a failure condition that caused a protection switch clears, before switching back to the previously-active equipment (matrix slice or port unit).

Warm start

A warm start initialises or recovers a single unit or a group of units without affecting service.

Wideband

Wideband is one type of voice, data, or video rate that transmits digital rates between 1.5 Mbps and 45 Mbps.

Working

When an entity is duplicated, one of the duplicated entities is designated as the working entity, while the other is designated as the protection entity. If the status of the working entity changes from active to standby, the entity still retains its designation as the working entity. The working

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entity is the preferred active entity.

WTR
See Wait-To-Restore time.

Lucent Technologies

Index

365–367–512
Issue 2, July 2002
        Lucent Technologies   INDEX
        IN - 7