

Lucent Technologies
Bell Labs Innovations



LambdaUnite[™] MultiService Switch (MSS)

Release 2.1

Installation Guide

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About this information product

- Purpose** This manual provides information on the installation and configuration of a *LambdaUnite*[™] MultiService Switch (MSS) system. Furthermore, all steps for putting the system into operation are also described.
- Reason for reissue** This is the first issue of this guide for *LambdaUnite* MSS Release 2.1.
- Safety labels** The present manual contains basic safety instructions which have to be strictly observed when handling the equipments and systems described.
- The most important safety instructions and admonishments are collected in the chapter “Safety” in Chapter 1 of this manual, which must be observed before carrying out work of any kind on the equipments and systems described.
- Intended audience** This manual is intended for users who wish to install, configure and cable a *LambdaUnite* MultiService Switch (MSS) rack and/or subrack including all accessories.
- This requires that the installation staff has a basic knowledge of SDH and SONET technology. Working on the complex equipments and

systems described in this manual requires also special training of the personnel.

Conventions used The following conventions are used throughout the manual:

Numbering

The chapters of this document are numbered consecutively. The page numbering restarts at “1” in each chapter. To facilitate identifying pages in different chapters, the page numbers are prefixed with the chapter number. For example, page 2-3 is the third page in chapter 2.

Cross-references

Cross-reference conventions are identical with those used for numbering, i.e. the first number in a reference to a particular page refers to the corresponding chapter.

Keyword-blocks

This document contains so-called keyword blocks to facilitate the location of specific text passages. The keyword blocks are placed to the left of the main text and indicate the contents of a paragraph or group of paragraphs.

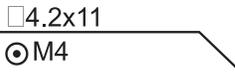
Abbreviations

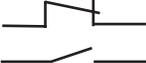
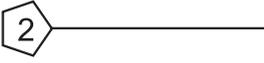
Abbreviations used in this document can be found in the “Glossary” unless it can be assumed that the reader is familiar with the abbreviation.

Symbols

Symbols Listing:

	Front View
	Rear View
	Top View
	Bottom View

★6	Star point. The stars in the figures refer to the descriptions in the text or in the legend.
②	Item. The items mentioned in the figures refer to the text or to the list of materials
□	Washer
■	Ground Washer
•	Spring Washer
⊙	Hexagon Nut
◇	Self-Tapping Screw
▽	Flat-Head Screw
762 [30"]	Measurements. All dimensions are in millimeters with the corresponding measurement in inches in parentheses.
<p>M12x50 □4.2x11 ⊙M4</p> 	Notation of fastening materials. The notation is divided into two parts: above the line, the bolt or screw, plus washer(s) if needed and below the line, the nut, plus any washer(s).
	Pin Connector
	Socket Connector
	Optical-Fiber Connection
	Coaxial Cable
	Shielded Twisted-Pair Cable
	Optical Cable
	Paddle Board

	Alarm Lamp
	Fuse
	Circuit Breaker
	Relay Contacts
	Cable Number
	View of the cabling side of the connector

DC codes

The codes (CC and DC) in this manual are used to define a hardware item owned by the Lucent Technologies Development Systems. The code consists of a letter combination followed by a combination of numbers (Example: DC1234567).

Related documentation

This section briefly describes the documents that are included in the *LambdaUnite* MultiService Switch (MSS) documentation set.

- **Installation Guide**
The *LambdaUnite* MSS Installation Guide is a step-by-step guide to system installation and setup. It also includes information needed for pre-installation site planning and post-installation acceptance testing.
- **Applications and Planning Guide**
The *LambdaUnite* MSS Applications and Planning Guide (APG) is for use by network planners, analysts and managers. It is also for use by the Lucent Account Team. It presents a detailed overview of the system, describes its applications, gives planning requirements, engineering rules, ordering information, and technical specifications.
- **User Operations Guide**
The *LambdaUnite* MSS User Operations Guide provides step-by-step information for use in daily system operations. The manual demonstrates how to perform system provisioning, operations, and administrative tasks by use of WaveStar® CIT.

- Alarm Messages and Trouble Clearing Guide
The *LambdaUnite* MSS Alarm Messages and Trouble Clearing Guide gives detailed information on each possible alarm message. Furthermore, it provides procedures for routine maintenance, troubleshooting, diagnostics, and component replacement.
- Operations System Engineering Guide
The *LambdaUnite* MSS Operations System Engineering Guide serves as a reference for all TL1 commands which can be used to operate the network element. The manual gives an introduction to the concept of the TL1 commands and instructs how to use them.
- *Navis*[™] Optical EMS Provisioning Guide (Application *LambdaUnite* MSS)
The *Navis* Optical EMS Provisioning Guide (Application *LambdaUnite* MSS) gives instructions on how to perform system provisioning, operations, and administrative tasks by use of *Navis* Optical EMS.

The following table lists the documents included in the *LambdaUnite* MSS documentation set.

Document Number	Title
109192484 (365-374-067)	<i>LambdaUnite</i> MSS Application and Planning Guide, DIN A4
109192534 (365-374-068)	<i>LambdaUnite</i> MSS Application and Planning Guide, US Letter
109192492 (365-374-069)	<i>LambdaUnite</i> MSS User Operations Guide, DIN A4
109192542 (365-374-070)	<i>LambdaUnite</i> MSS User Operations Guide, US Letter
109192468 (365-374-071)	<i>LambdaUnite</i> MSS Alarm Messages and Trouble Clearing Guide, DIN A4
109192476 (365-374-072)	<i>LambdaUnite</i> MSS Alarm Messages and Trouble Clearing Guide, US Letter

Document Number	Title
109192500 (365-374-073)	<i>LambdaUnite</i> MSS Installation Guide, DIN A4
109192567 (365-374-074)	<i>LambdaUnite</i> MSS Installation Guide, US Letter
109192518 (365-374-075)	<i>LambdaUnite</i> MSS Operations System Engineering Guide (TL1 Reference Manual), DIN A4
109192583 (365-374-076)	<i>LambdaUnite</i> MSS Operations System Engineering Guide (TL1 Reference Manual), US Letter
109192443 (365-374-077)	<i>Navis</i> Optical EMS Provisioning Guide (Application <i>LambdaUnite</i> MSS), DIN A4
109192450 (365-374-078)	<i>Navis</i> Optical EMS Provisioning Guide (Application <i>LambdaUnite</i> MSS), US Letter
109192617 (365-374-079)	<i>LambdaUnite</i> MSS Safety Guide, DIN A4
109192625 (365-374-080)	<i>LambdaUnite</i> MSS Safety Guide, US Letter
109192526	<i>LambdaUnite</i> MSS CD-ROM Customer Documentation (all manuals on one CD-ROM)

The following additional documents can be helpful for planning and ordering:

- Ordering & Information Drawings (ED8C948-10)
- Cable Ordering & Information Drawings (ED8C948-20).

How to comment

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customers about our information products. Thank you for your feedback.

You can also send or fax comments about this document to:

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1 Safety

Overview

Purpose The aim of this chapter on safety is to provide users of *LambdaUnite*[™] MSS systems with the relevant information and safety guidelines to safeguard against personal injury. Furthermore, this chapter may be useful to prevent material damage to the equipment.

The present chapter on safety *must* be read by the responsible technical personnel before carrying out relevant work on the system. The valid version of this document must always be kept close to the equipment.

Potential sources of danger

The *LambdaUnite* MSS equipment has been developed in line with the present state-of-the-art and fulfils the current national and international safety requirements. It is provided with a high degree of operational safety resulting from many years of development experience and continuous stringent quality checks in our company.

The equipment is safe in normal operation. There are, however, some potential sources of danger that cannot be completely eliminated. In particular, these arise during the:

- opening of housings or equipment covers,
- manipulation of any kind within the equipment, even if it has been disconnected from the power supply,
- disconnection of optical or electrical connections,

through possible contact with the following:

- live parts,
- laser light,
- hot surfaces, or
- sharp edges.

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General notes on safety

Overview

Purpose This section provides general information on the structure of safety instructions and summarizes general safety requirements.

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Structure of safety instructions

General structure All safety instructions include a *warning symbol* and a *signal word* that classify the danger, and a *text block* that contains descriptions of the type and cause of the danger, the consequences of ignoring the safety instruction and the measures that can be taken to minimise the danger.

Example:



DANGER

Arcing on removing or inserting a live power supply plug.

Arcing can cause burns to the hands and damage to the eyes.

Ensure that the line circuit breaker on the Power Interface (PI) is in the “OFF” position before removing or inserting the power supply plug.

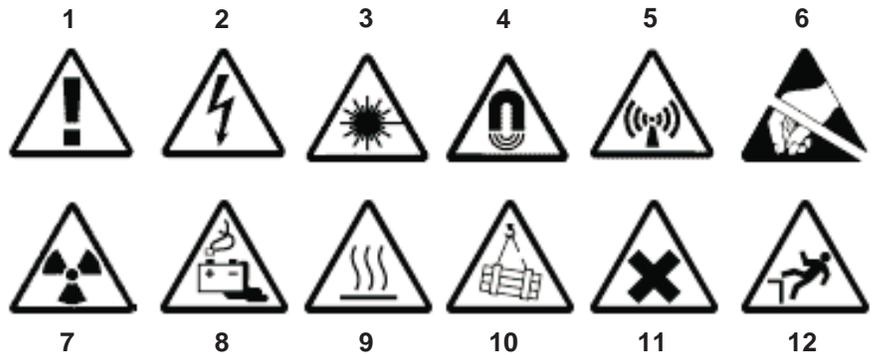
Danger classification There are three classes of safety instructions: “DANGER”, “WARNING” and “CAUTION”. Which class is relevant depends on the consequences of ignoring the safety instruction:

DANGER Serious injury is definite or likely.

WARNING Serious injury is possible.

CAUTION Minor injury is definite, likely or possible, or material damage to the product or in the product environment is definite or likely.

Warning symbols These warning symbols are defined for safety instructions:



Legend:

- 1 General warning of danger
- 2 Electric shock
- 3 Hazard of laser radiation
- 4 Magnetic hazard
- 5 Electromagnetic radiation
- 6 Components sensitive to electrostatic discharge (ESD)
- 7 Radioactivity
- 8 Hazard caused by batteries
- 9 Hot surface
- 10 Heavy load
- 11 Unhealthy, irritating substance
- 12 Hazard of falling



Basic safety aspects

General safety requirements

In order to keep the technically unavoidable residual risk to a minimum, it is imperative to observe the following rules:

- Transport, storage and operation of the system must be under the ***permissible conditions only***.
See accompanying documentation and information on the system.
- Installation, configuration and disassembly must be carried out only by ***expert personnel*** and ***with reference to the respective documentation***.
Due to the complexity of the system, the personnel requires ***special training***.
- The system must be operated by ***expert and authorised users only***.
The user must operate the system only after having ***read and understood*** this chapter on safety and the parts of the documentation relevant to operation. For complex systems, additional training is recommended. Any obligatory training for operating and service personnel must be carried out and documented.
- The system must not be operated unless it is in perfect working order.
Any faults and errors that might affect safety must be reported ***immediately*** by the user to a person in responsibility.
- The system must be operated only with the connections and under the environmental conditions as described in the documentation.
- Any conversions or changes to the system or parts of the system (including the software) must be carried out by qualified Lucent Technologies personnel or by expert personnel authorised by Lucent Technologies.
All changes carried out by other persons lead to a ***complete exemption from liability***.
No components/spare parts must be used other than those recommended by the manufacturer and those listed in the procurement documents.
- The removal or disabling of safety facilities, the clearing of faults and errors, and the maintenance of the equipment must be carried out by ***specially qualified personnel only***.

The respective parts of the documentation must be strictly observed. The documentation must also be consulted during the selection of measuring and test equipment.

- Calibrations, special tests after repairs and regular safety checks must be carried out, documented and archived.
- Non-system software is used at one's *own risk*. The use/installation of non-system software can adversely affect the normal functioning of the system.
- Only use *tested and virus-free* data carriers (floppy disks, streamer tapes, ...).

Summary of important safety instructions

Especially observe the following safety instructions, since they are of particular importance for *LambdaUnite*[™] MSS systems:

- This equipment is to be installed only in *Restricted Access Areas* in business and customer premises.
Applications in accordance with Articles 110-16, 110-17 and 110-18 of the National Electrical Code, ANSI/NFPA No. 70. Other installations exempt from the enforcement of the National Electrical Code may be engineered according to the accepted practices of the local telecommunications utility.
- This product should only be operated from the type of power source indicated on the marking label.
- This equipment must be provided with a readily accessible disconnect device as part of the building installation.
- Disconnect up to four (4) power supply connections when removing power from the system.
- Installation must include an independent frame ground drop to the building ground. Refer to the *LambdaUnite MSS Installation Guide*.
- For information on proper mounting instructions, consult the *LambdaUnite MSS Installation Guide*.
- Install only equipment identified in the *LambdaUnite MSS Installation Guide* provided with this product. Use of other equipment may result in improper connection of circuitry leading to fire or injury to persons.

- To reduce the risk of electrical shock, do not disassemble this product. Installation and service should be performed by trained personnel only. Opening or removing covers and/or circuit boards may expose you to dangerous voltages or other risks. Incorrect re-assembly can cause electrical shock when the unit is subsequently used.
- Slots and openings in this product are provided for ventilation. To protect the product from overheating, these openings must not be blocked or covered. This product should not be placed in a built-in installation unless proper ventilation is provided.
- Never push objects of any kind into this product through slots as they may touch dangerous voltage points or short-out parts that could result in a risk of fire or electrical shock. Never spill liquids of any kind on the product.
- CAUTION: This equipment is designed to permit the connection of the grounded conductor of the DC supply circuit to the grounding conductor at the equipment.
 1. This equipment shall be connected directly to the DC supply system grounding electrode conductor or to a bonding jumper from a grounding terminal bar or bus to which the DC supply system grounding electrode conductor is connected.
 2. This equipment shall be located in the same immediate area (such as, adjacent cabinets) as any other equipment that has a connection between the grounded conductor of the same DC supply circuit and the grounding conductor, and also the point of grounding of the DC system. The DC system shall not be grounded elsewhere.
 3. The DC supply source is to be located within the same premises as this equipment.
 4. There shall be no switching or disconnection devices in the grounded circuit conductor between the DC source and the point of connection of the grounding electrode conductor.



CAUTION

LambdaUnite MSS systems contain optical circuit packs that can emit laser radiation assessed as IEC Hazard Level 3A.

Therefore, LambdaUnite MSS systems may only be installed in restricted access locations! Restricted access locations are controlled environments where there is no ready access to the general public, but only to authorized persons who have received adequate training in laser safety.



Specific safety areas

Overview

Purpose The aspects of “laser safety” and “handling of components sensitive to electrostatic discharge (ESD)” are of vital importance for the *LambdaUnite*[™] MSS equipment. Therefore, the key safety instructions for these subjects are summarised in the following.

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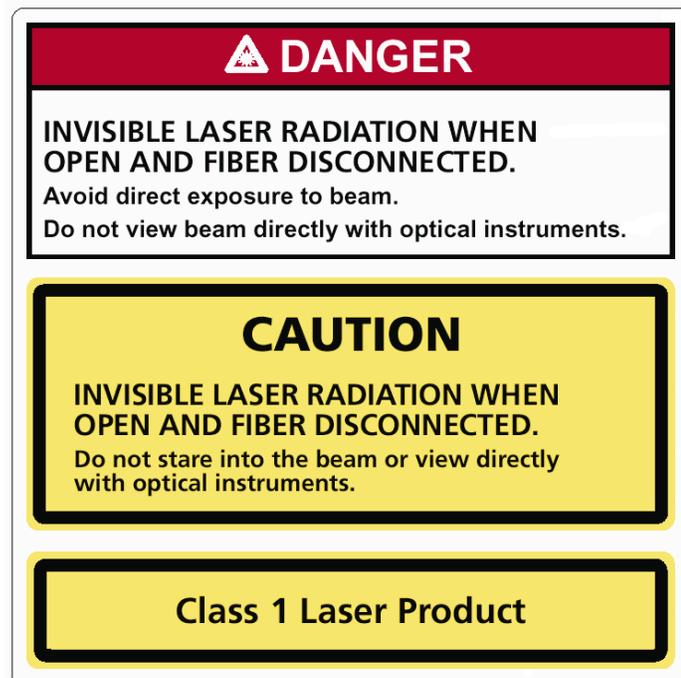


Laser safety

System design The *LambdaUnite*[™] MSS system complies with the Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) regulations FDA/CDRH 21 CFR 1040.10 and 1040.11 as a Class I and with IEC 60825-1 as a Class 1 Optical Fiber Telecommunication laser product.

The system has been designed to ensure that the operating personnel is not endangered by laser radiation during normal system operation. The safety measures specified in the FDA/CDRH regulations and the international standards IEC 60825 and DIN/EN 60825 respectively are met. Please also refer to "[Laser product classification](#)" (1-16).

These laser warning labels (not to scale) are affixed on the *LambdaUnite* MSS equipment. They refer to the system as a whole in normal operation.





Potential sources of danger

Beware of the following potential sources of danger which will remain despite all safety measures taken:

- Laser radiation can cause damage to the skin and eyes.
- Laser radiation from optical transmission systems is in a wavelength range that is invisible to the human eye.

Laser classes

The maximum output power of laser radiation depends on the type of laser diode used. The international standards IEC 60825 and DIN/EN 60825 respectively as well as the FDA/CDRH regulations define the maximum output power of laser radiation for each laser class in accordance with the wavelength.

The classification scheme is based on the ability of the laser emission or the reflected laser emission to cause injury to the eye or skin during normal operating conditions.

Please also refer to [“Laser product classification” \(1-16\)](#).

Laser safety instructions

Observe the following instructions to avoid exposing yourself and others to risk:

- Read the relevant descriptions in the manuals before taking equipment into operation or carrying out any installation and maintenance work on the optical port units, and follow the instructions. Ignoring the instructions may result in hazardous laser radiation exposure.
- Do not view directly into the laser beam with optical instruments such as a fiber microscope, because viewing of laser emission in excess of Class 1 limits significantly increases the risk of eye damage.
- Never look into the end of an exposed fiber or an open connector as long as the optical source is still switched on.

- Ensure that the optical source is switched off or before disconnecting optical fiber connectors.
- In the event of doubt, check that the optical source is switched off by measuring with an optical power meter.



CAUTION

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



Optical circuit pack specifications

Specifications The following table contains the specifications of the *LambdaUnite*[™] MSS optical circuit packs. Please refer to the *LambdaUnite MSS Applications and Planning Guide* for more detailed technical specifications.

Circuit pack	Wavelength [nm]	Fiber type ¹ (core/cladding diameter [μm])	Maximum output power [mW / dBm]	Laser class ² (IEC / FDA)
155-Mbit/s optical circuit packs				
OP155M/1.3IR16 (KFA18)	1310	SM (9/125)	0.15 / -8	1 / I
622-Mbit/s optical circuit packs				
OP622/1.3IR16 (KFA17)	1310	SM (9/125)	0.15 / -8	1 / I
2.5-Gbit/s optical circuit packs				
OP2G5/1.3IOR4 (KFA12)	1310	SM (9/125)	0.5 / -3	1 / I
OP2G5/1.3LR4 (KFA203)	1310	SM (9/125)	1.6 / +2	1 / I
OP2G5/1.5LR4 (KFA204)	1550	SM (9/125)	1.6 / +2	1 / I
OP2G5-1...32PWDM (KFA20) with OM2G5/921PWDM ... 959PWDM (OM2G5A921 ... OM2G5A959)	1560.61 ... 1530.33	SM (9/125)	1 / 0	1 / I
10-Gbit/s optical circuit packs				
OP10/1.3IOR1 (KFA7)	1310	SM (9/125)	0.8 / -1	1 / I
OP10/1.5IR1 (KFA14)	1550	SM (9/125)	1.6 / +2	1 / I
OP10/1.5LR1 (KFA6)	1550	SM (9/125)	20 / +13	1M / IIIb
OP10/01...80/800G (KFA9, KFA81 ... 159)	1530.72 ... 1562.23	SM (9/125)	0.41 / -3.8	1 / I
OP10/9285XT...8650XT (KFA210 ... KFA482)	1554.537 ... 1607.466	SM (9/125)	0.63 / -2	1 / I
40-Gbit/s optical circuit packs				
OP40/1.3IOR1 (KFA202)	1311	SM (9/125)	5 / +7	1M / IIIb
OP40/9280XT ... 8650XT (KFA290 ... 353)	1554.940 ... 1607.466	SM (9/125)	0.5 / -3	1 / I
Gigabit-Ethernet circuit pack				
GE1/SX/4 (KFA13)	850	MM (50/125)	0.4 / -4	1 / I

Notes:

1. SM: Single-mode fiber, MM: multi-mode fiber.
2. It is the class of the circuit pack, not that of the telecommunications

system as a whole, that is specified.

Connector types All optical circuit packs are equipped with LC-type connectors.



Laser product classification

Standards compliance The *LambdaUnite*[™] MSS product complies with the applicable IEC standards and the Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) regulations.

FDA/CDRH regulations Laser products are classified in accordance with the FDA/CDRH - 21 CFR 1010 and 1040. The classification scheme is based on the ability of the laser emission to cause injury to the eye or skin during normal operating conditions.

In the United States, lasers and laser systems in the infrared wavelength range (greater than 700 nm) are assigned to one of the following classes (please refer to [“FDA/CDRH laser classification” \(1-17\)](#)):

- Class I,
- Class IIIb or
- Class IV.

Laser classification is dependent upon operating wavelength, output power and fiber mode field diameter (core diameter).

IEC requirements The International Electro-Technical Commission (IEC) establishes standards for the electrical and electronic industries. IEC 60825 has been established for the worldwide safety of laser products.

According to the IEC classification, lasers and laser systems in the infrared wavelength range (greater than 700 nm) are assigned to one of the following classes (please refer to [“IEC laser classification” \(1-17\)](#)):

- Class 1,
- Class 1M,
- Class 3R,
- Class 3B or
- Class 4.

There are some major differences between the FDA/CDRH regulations and the IEC requirements:

1. The Accessible Emission Limits (AEL) are different.
2. Class 3A applies to all wavelengths.

3. Class 3B requires strict engineering controls.
4. Classification is under single fault conditions.

FDA/CDRH laser classification

The following table provides an overview of laser classes for wavelengths of 1310 nm and 1550 nm in accordance with the FDA/CDRH regulations.

Laser class	Wavelength	Max. output power of laser radiation	
		Power (mW)	Power (dBm)
I	1310 nm	1.53 mW	+1.85 dBm
	1550 nm	8.52 mW	+9.3 dBm
IIIb	1310 nm	500 mW	+27 dBm
	1550 nm	500 mW	+27 dBm
IV	1310 nm	> 500 mW	> +27 dBm
	1550 nm	> 500 mW	> +27 dBm

Explanatory note: In the United States, lasers and laser systems are assigned to one of the following classes: Roman numerals I, IIa, II, IIIa, IIIb, and IV. Classes I, IIIb and IV apply to lasers of all wavelengths. Classes IIa, II and IIIa apply only to those lasers operating within the visible wavelength range (400-700 nm). Lucent Technologies laser products typically operate in the infrared wavelength range (greater than 700 nm) and, therefore, are primarily in the class I or class IIIb classifications.

IEC laser classification

The following table provides an overview of laser classes for wavelengths of 1310 nm and 1550 nm in accordance with the IEC 60825-1 Ed. 1.2 (2001) standard. The precise power limits depend on the mode field diameter and the numerical aperture (NA) of the laser source.

Laser class	Wavelength	Max. output power of laser radiation	
		Power (mW)	Power (dBm)
1	1310 nm	15.6 mW	+11.93 dBm
	1550 nm	10 mW	+10 dBm
1M	1310 nm	50.84 mW	+17.06 dBm
	1550 nm	121.20 mW	+20.84 dBm

Laser class	Wavelength	Max. output power of laser radiation	
3R	1310 nm	86 mW	+18.92 dBm
	1550 nm	- ¹	
3B	1310 nm	500 mW	+27 dBm
	1550 nm	500 mW	+27 dBm
4	1310 nm	> 500 mW	> +27 dBm
	1550 nm	> 500 mW	> +27 dBm

Notes:

- Class 3R only exists if the maximum power is within five times the Accessible Emission Limit (AEL) of Class 1.

Hazard level assignment

“Hazard level” refers to the potential hazard from laser emission at any location in an end-to-end optical fiber communication system that may be accessible during service or in the event of a failure. The assignment of hazard level uses the AELs for the classes.

Hazard levels for optical transmission equipment are assigned in either of the following two ways:

- the actual output power from the connector or fiber cut.
- if automatic power reduction is used, the output power at the connector or fiber cut at one second after automatic power reduction takes place, provided that maximum output and restart conditions are met.

Classification of optical telecommunication equipment

Optical telecommunication equipment is generally classified as IEC Class 1 or FDA/CDRH Class I, because under normal operating conditions the transmitter ports terminate on optical fiber connectors. These are covered by a front panel to ensure protection against emissions from any energized, unterminated transmitter.

The circuit packs themselves, however, may be IEC Class 1 or 1M or FDA/CDRH Class I or Class IIIb.



Electrostatic discharge

Introduction Electrostatic discharge (ESD), caused by touching with the hand for example, can destroy semiconductor components. The correct operation of the complete system is then no longer assured.

Industry experience has shown that *all* semiconductor components can be damaged by static electricity that builds up on work surfaces and personnel. The electrostatic discharge can also affect the components indirectly via contacts or conductor tracks. The electrostatic charges are produced by various charging effects of movement and contact with other objects. Dry air allows greater static charges to accumulate. Higher potentials are measured in areas with low relative humidity, but potentials high enough to cause damage can occur anywhere.

The barred-hand symbol Circuit packs containing components that are especially sensitive to electrostatic discharge are identified by warning labels bearing the barred-hand symbol.



ESD instructions Observe the following ESD instructions to avoid damage to electrostatic-sensitive components:

- Wear working garment made of 100% cotton to avoid electrostatic charging.
- Touch the circuit packs at the edges or the insertion and removal facilities only.
- Ensure that the rack is grounded.
- Wear conductively connected wrist straps and connect them to the rack ESP bonding point.
- Work in an area which is protected against electrostatic discharge. Use conducting floor and bench mats which are conductively connected to the rack ESP bonding point.
- Conductively connect all test equipment and trolleys to the rack ESP bonding point.

- Store and ship circuit packs and components in their shipping packing. Circuit packs and components must be packed and unpacked only at workplaces suitably protected against build-up of charge.
- Whenever possible, maintain the relative humidity of air above 20%.



Safety requirements in specific deployment phases

Overview

Purpose To enable rapid orientation, safety instructions are given on the following pages, which are assigned to various stages in the life cycle of the *LambdaUnite*[™] MSS equipment (“deployment phases”).

Deployment phases The instructions are arranged according to the following deployment phases:

- [“Transportation” \(1-22\)](#)
- [“Storage” \(1-25\)](#)
- [“Installation” \(1-27\)](#)
- [“Taking into operation” \(1-30\)](#)
- [“Operation and maintenance” \(1-32\)](#)
- [“Taking out of operation” \(1-38\)](#)



Transportation

Weight



WARNING

Risk of injury due to unsecured shelf.

A fully-equipped shelf weighs more than 30 kg (66 lbs) and can cause considerable injuries if it is knocked over or dropped. This can also cause serious damage to the shelf.

Use a sturdy vehicle for transportation and secure the shelf against dropping. At least two persons are required for lifting the shelf.

Packaging



CAUTION

Adverse effect on operation due to incorrect packaging.

Dampness and soiling can cause corrosion or tracking paths. This can cause malfunctioning of the system components. Shocks can cause damage.

Protect the system components against dampness, soiling and shocks. Use the original packaging if possible.

Climatic conditions



CAUTION

Damage to system components under extreme environmental conditions.

Extreme environmental conditions can damage system components and cause malfunctioning.

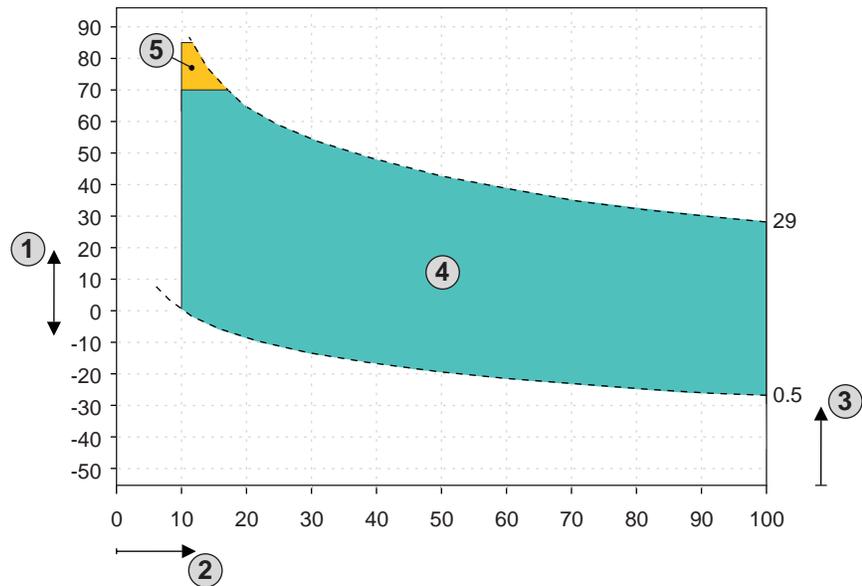
Ensure that the climatic limits for transportation and storage of LambdaUnite™ MSS equipment are complied with during transportation; please refer to [“Climatic limits for transportation and storage” \(1-23\)](#).

Climatic limits for transportation and storage

These are the climatic limits for transportation and storage of LambdaUnite MSS systems:

Temperature range	-40 °C (-40 °F) to +70 °C (+158 °F) (exceptional: +85 °C (+185 °F))
Humidity range	relative humidity: 10% to 100% absolute humidity: 0.5 g/m ³ to 29 g/m ³

The following climatogram visualizes these climatic limits:



Legend:

- 1 Air temperature in degrees Celsius [°C] or degrees Fahrenheit [°F]
- 2 Relative humidity [%]
- 3 Absolute humidity [g/m³]. The dashed curves specify a constant absolute humidity of 0.5 g/m³ or 29 g/m³, respectively.
- 4 Permissible range for transportation and storage of *LambdaUnite* MSS systems.
- 5 Exceptional conditions, permissible for a short duration only.



Storage

Weight



WARNING

Risk of injury due to unsecured shelf.

A fully-equipped shelf weighs more than 30 kg (66 lbs) and can cause considerable injuries if it is knocked over or dropped. This can also cause serious damage to the shelf.

Use only a stable base for storage and secure the shelf against dropping. At least two persons are required for lifting the shelf.

Electrostatic discharge (ESD)



CAUTION

Destruction of components by electrostatic discharge.

Electronic components can be destroyed by electrostatic discharge.

Circuit packs must therefore always be kept in antistatic covers. Use the original packaging if possible. Always observe the ESD instructions (cf. [“Electrostatic discharge” \(1-19\)](#)).

Packaging



CAUTION

Adverse effect on operation due to incorrect packaging.

Dampness and soiling can cause corrosion or tracking paths. This can cause malfunctioning of the system components. Shocks can cause damage.

Protect the system components against dampness, soiling and shocks. Use the original packaging if possible.

Climatic conditions



CAUTION

Damage to system components under extreme environmental conditions.

Extreme environmental conditions can damage system components and cause malfunctioning.

Ensure that the climatic limits for transportation and storage of LambdaUnite™ MSS equipment are complied with during storage; please refer to [“Climatic limits for transportation and storage” \(1-23\)](#).



Installation

Weight



WARNING

Risk of injury due to unsecured shelf.

A fully-equipped shelf weighs more than 30 kg (66 lbs) and can cause considerable injuries if it is knocked over or dropped. This can also cause serious damage to the shelf.

At least two persons are required for lifting the shelf.

Laser warning labels



WARNING

Ineffectiveness of laser warning labels if removed or concealed.

Warning labels on the system and especially on the optical components warn of the dangers of invisible laser radiation. Removed, concealed or illegible labels can lead to incorrect action and thus cause serious injuries to the eyes of operating staff.

Ensure that the laser warning labels are not removed or concealed and always clearly legible.

Electrostatic discharge (ESD)



CAUTION

Destruction of components by electrostatic discharge.

Electronic components can be destroyed by electrostatic discharge.

Hold circuit packs only at the edges or on the insertion and removal facilities. Always observe the ESD instructions (cf. [“Electrostatic discharge” \(1-19\)](#)).

Overheating



CAUTION

Risk of fire due to overheating.

Inadequate heat dissipation can cause heat accumulation or even a fire in the network element.

You must therefore ensure that

- *the fan unit is installed,*
- *the individual fans are not obstructed,*
- *the minimum separation is maintained between two shelves in a rack (follow the installation instructions given in this guide).*

Detector diodes



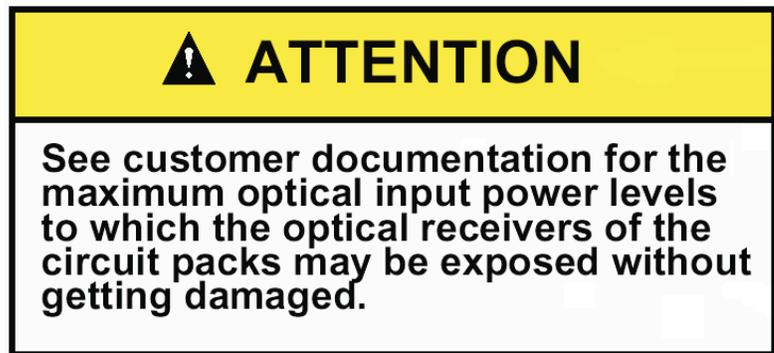
CAUTION

Destruction of the detector diodes caused by too high an input power.

Connecting the output and input of optical circuit packs with a transmit power in excess of -3 dBm over short distances will cause the destruction of the detector diodes, as the input power is then too high.

Use an optical attenuator pad of approx. 10 to 20 dB when establishing connections over short distances for test purposes.

The following label is affixed on the *LambdaUnite*[™] MSS subrack:



Receiver sensitivities

You can find the receiver sensitivities in the *LambdaUnite MSS Applications and Planning Guide* (Technical specifications).



Taking into operation

Invisible laser radiation



DANGER

Injury to eyes caused by invisible laser radiation.

LambdaUnite™ MSS systems operate with invisible laser radiation. Laser radiation can cause considerable injuries to the eyes.

Never look into the end of an exposed fiber or into an open optical connector as long as the optical source is switched on. Always observe the laser warning instructions (cf. [“Laser safety” \(1-11\)](#)).

Arcing



DANGER

Arcing on removing or inserting a live power supply plug.

Arcing can cause burns to the hands and damage to the eyes.

Ensure that the line circuit breaker on the Power Interface (PI) is in the “OFF” position before removing or inserting the power supply plug.

Supply voltage



CAUTION

Destruction of components due to a supply voltage of incorrect polarity or too high.

LambdaUnite MSS equipment operates at a nominal voltage of -48 V or -60 V. The permissible tolerance range is -40.5 V to -72 V.

Ensure that the supply voltage has the correct range and polarity before connecting the voltage.

Fusing



CAUTION

Risk of fire in the event of a short-circuit.

A short-circuit can cause a fire in the network element.

Protect all supply lines with line circuit breakers matched to the load of the shelf equipment. Note the relevant guide values in the LambdaUnite MSS Installation Guide.

Condensation



CAUTION

Condensation causes malfunctioning

Condensation can occur in the network element during transport, especially on moving from outside to closed rooms; this can cause malfunctioning of the circuit packs.

Ensure that circuit packs and shelves have reached room temperature and are dry before taking them into operation.



Operation and maintenance

Invisible laser radiation



DANGER

Injury to eyes caused by invisible laser radiation.

LambdaUnite™ MSS systems operate with invisible laser radiation. Laser radiation can cause considerable injuries to the eyes.

Never look into the end of an exposed fiber or into an open optical connector as long as the optical source is switched on. Always observe the laser warning instructions (cf. [“Laser safety” \(1-11\)](#)).

Arcing



DANGER

Arcing on removing or inserting a live power supply plug.

Arcing can cause burns to the hands and damage to the eyes.

Ensure that the line circuit breaker on the Power Interface (PI) is in the “OFF” position before removing or inserting the power supply plug.

Laser warning labels



WARNING

Ineffectiveness of laser warning labels if removed or concealed.

Warning labels on the system and especially on the optical components warn of the dangers of invisible laser radiation. Removed, concealed or illegible labels can lead to incorrect action and thus cause serious injuries to the eyes of operating staff.

Ensure that the laser warning labels are not removed or concealed and always clearly legible.

Electrostatic discharge (ESD)



CAUTION

Destruction of components by electrostatic discharge.

Electronic components can be destroyed by electrostatic discharge.

Hold circuit packs only at the edges or on the insertion and removal facilities. Always observe the ESD instructions (cf. [“Electrostatic discharge” \(1-19\)](#)).

Overheating



CAUTION

Risk of fire due to overheating.

Inadequate heat dissipation can cause heat accumulation or even a fire in the network element.

You must therefore ensure that

- *the fan unit is installed,*
- *the individual fans are not obstructed,*
- *the minimum separation is maintained between two shelves in a rack (follow the installation instructions given in this guide).*

Detector diodes



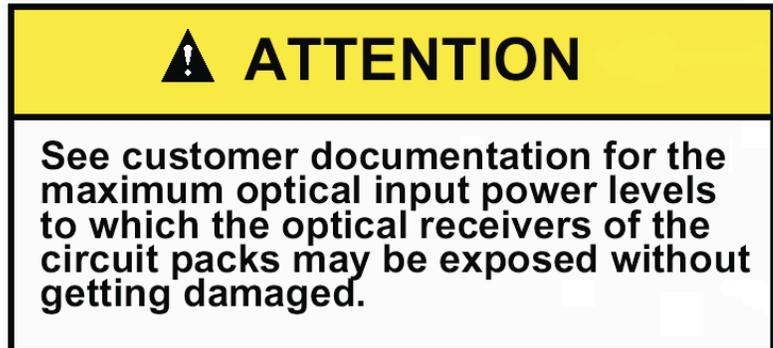
CAUTION

Destruction of the detector diodes caused by too high an input power.

Connecting the output and input of optical circuit packs with a transmit power in excess of -3 dBm over short distances will cause the destruction of the detector diodes, as the input power is then too high.

Use an optical attenuator pad of approx. 10 to 20 dB when establishing connections over short distances for test purposes.

The following label is affixed on the *LambdaUnite* MSS subrack:



Receiver sensitivities

You can find the receiver sensitivities in the *LambdaUnite MSS Applications and Planning Guide* (Technical specifications).

Short-circuit



CAUTION

Destruction of circuit packs in the event of a short-circuit.

A short-circuit in the network element can cause destruction of electronic components and thus malfunctioning of the complete system.

You must therefore not handle objects such as a screwdriver in the circuit pack area of the shelf.

Test voltage



CAUTION

Destruction of components due to test voltage of incorrect polarity or too high.

The use of test voltages above 6 V DC for measurements on circuit packs can cause destruction of components and thus malfunctioning of the complete system.

Ensure that the test voltage does not exceed 6 V DC and that the test equipment is connected with the correct polarity.

Climatic conditions



CAUTION

Damage to system components under extreme environmental conditions.

Extreme environmental conditions can damage system components and cause malfunctioning.

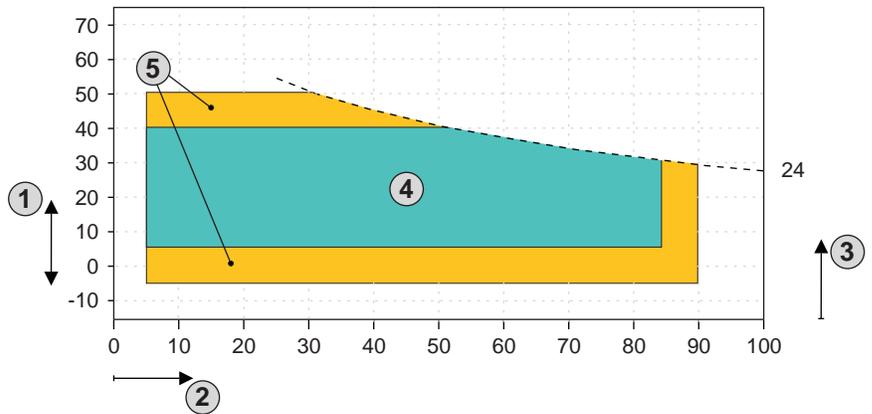
Ensure that the [“Climatic limits for the operation of LambdaUnite MSS equipment” \(1-36\)](#) are complied with during operation.

Climatic limits for the operation of *LambdaUnite* MSS equipment

These are the climatic limits for the operation of *LambdaUnite* MSS systems:

Temperature range	+5 °C (+41 °F) to +40 °C (+104 °F) (exceptional: +50 °C (+122 °F))
Humidity range	relative humidity: 5% to 85% (exceptional: 90%), absolute humidity: 0 to 24 g water per kg dry air

The following climatogram visualizes these climatic limits:



Legend:

- 1 Air temperature in degrees Celsius [°C] or degrees Fahrenheit [°F]
- 2 Relative humidity [%]
- 3 Absolute humidity [g water/kg dry air]. The dashed curve specifies a constant absolute humidity of 24 g water per kg dry air.
- 4 Permissible range for the operation of *LambdaUnite* MSS systems.
- 5 Exceptional conditions, permissible for a short duration only.



Taking out of operation

Invisible laser radiation



DANGER

Injury to eyes caused by invisible laser radiation.

LambdaUnite™ MSS systems operate with invisible laser radiation. Laser radiation can cause considerable injuries to the eyes.

Never look into the end of an exposed fiber or into an open optical connector as long as the optical source is switched on. Always observe the laser warning instructions (cf. [“Laser safety” \(1-11\)](#)).

Arcing



DANGER

Arcing on removing or inserting a live power supply plug.

Arcing can cause burns to the hands and damage to the eyes.

Ensure that the line circuit breaker on the Power Interface (PI) is in the “OFF” position before removing or inserting the power supply plug.

Weight



WARNING

Risk of injury due to unsecured shelf.

A fully-equipped shelf weighs more than 30 kg (66 lbs) and can cause considerable injuries if it is knocked over or dropped. This can also cause serious damage to the shelf.

At least two persons are required for lifting the shelf.

Electrostatic discharge (ESD)



CAUTION

Destruction of components by electrostatic discharge.

Electronic components can be destroyed by electrostatic discharge.

Hold circuit packs only at the edges or on the insertion and removal facilities. Always observe the ESD instructions (cf. [“Electrostatic discharge” \(1-19\)](#)).

Disposal The equipment in the *LambdaUnite* MSS system series must be disposed of at the end of its lifetime. Please contact us in this case and we will arrange for proper and environment-friendly disposal of your equipment (most parts of the system can be recycled).





2 General information

Overview

Purpose The purpose of this chapter is to provide the information needed to plan the installation of a *LambdaUnite*[™] MultiService Switch (MSS) system.

Contents

Important facts to know

2-2



Important facts to know

Floorplan guidelines (ETSI-2 / NEBS-2000)

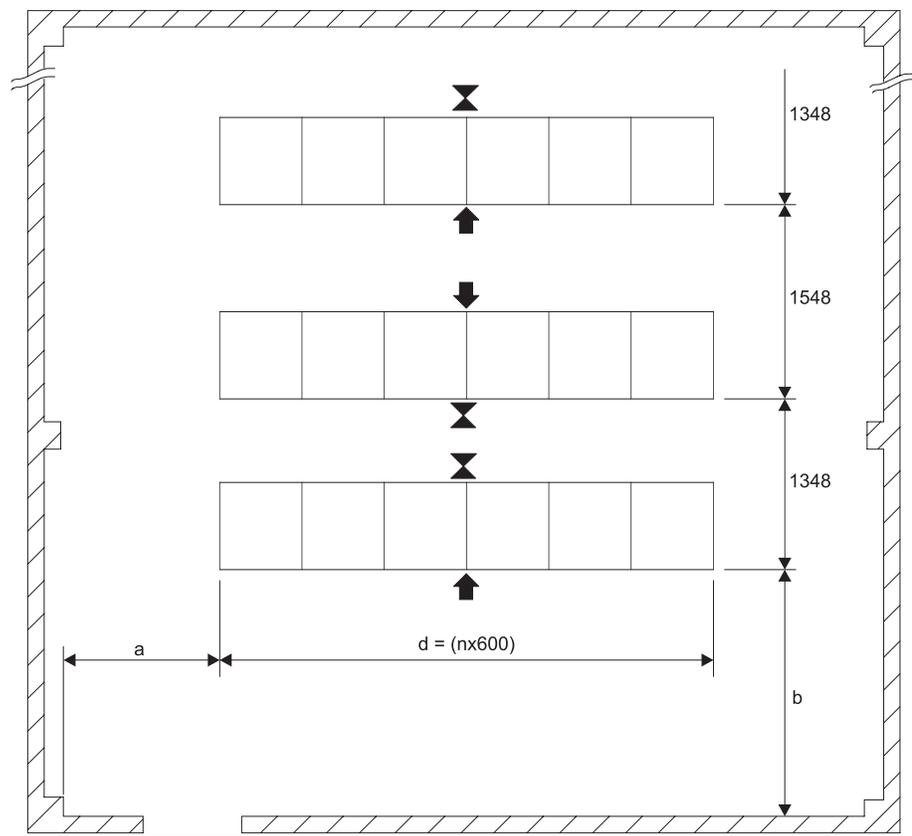
This section describes the floorplan data for both rack types (ETSI-2 and NEBS-2000).

NOTE: For exact measurements see the relevant project documents. Local circumstances can allow deviations from these guidelines.

Use the following figures and data as guidelines:

- $a = >1200$ mm [47.244"]
- $b = >1800$ mm [70.866"]
- $c = >3400$ mm [133.858"]
- $d = nx600$ mm [23.622"] (n = number of cabinets).

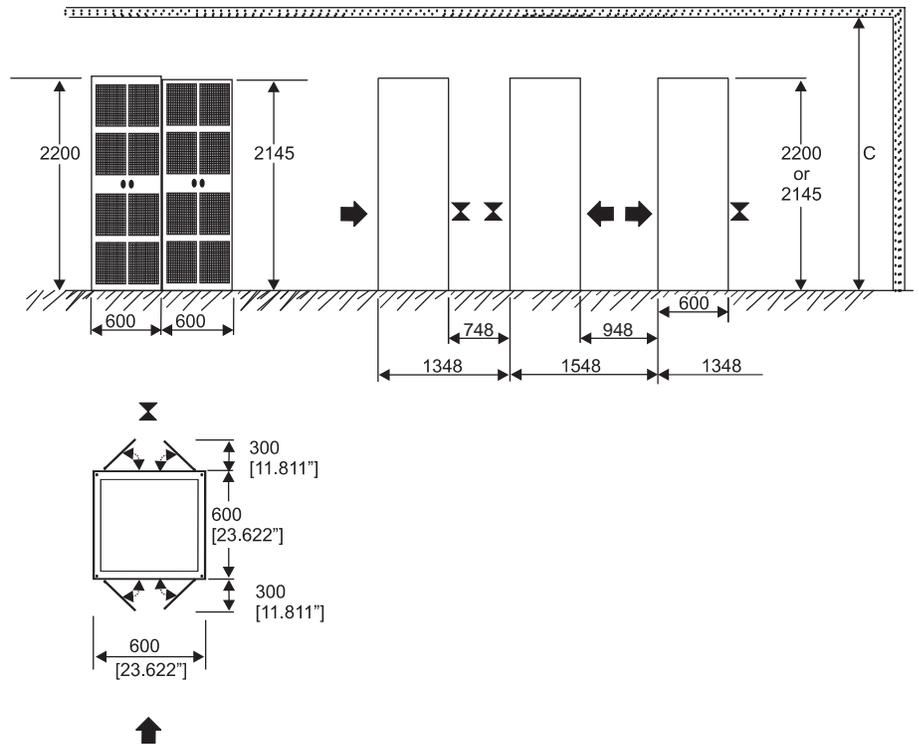
Figure 2-1 Top view



Legend:

mm	Inch
600	23.622"
1348	53.071"
1548	60.945"

Figure 2-2 Side view



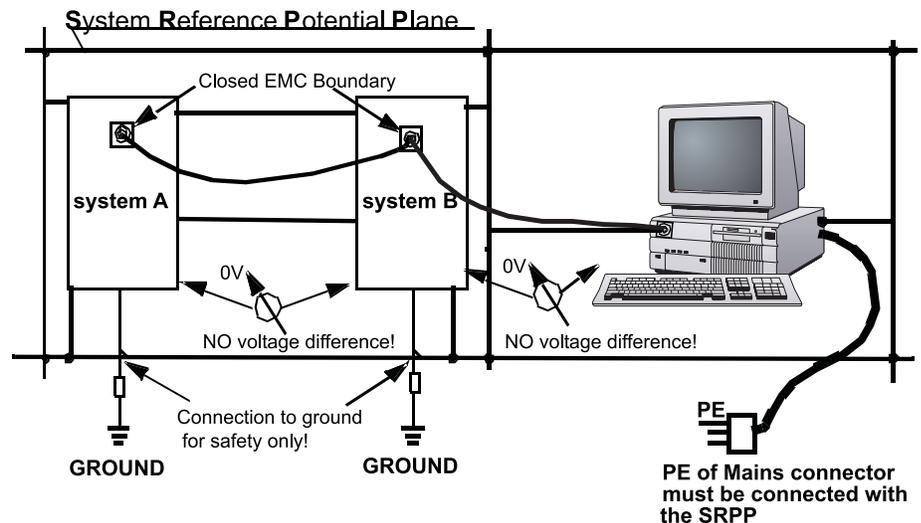
Legend:

mm	Inch
300	11.811"
600	23.622"
748	29.449"
948	37.323"
1345	53.071"
1548	60.945"
2145	84.448"

2200 86.615”

- Rack dimensions** The racks require an area of 600 mm [23.622”] x 600 mm [23.622”] (width x depth). This area represents the absolute system limits which must not be exceeded in the operating state by protruding elements such as switches or plugs. The standard height is 2200 mm [86.614”] for an ETSI-2 rack and 2145 mm [84.448”] for an NEBS-2000 rack. The racks are designed to accommodate two *LambdaUnite*[™] MSS subracks.
- Rack weights** The ETSI-2 rack has a maximum weight of 120 kg/264.6 lbs (including PDP, cables and doors).
The NEBS-2000 rack has a maximum weight of 116 kg/255.8 lbs (including PDP, cables and doors).
- Subrack weight** The subracks have a maximum weight of 41 kg/90.41 lbs (including user panel, fan, PIs, CI-CTL, TIs and 12x blanks at the rear).
- Power consumption** The *LambdaUnite* MSS system has a maximum power consumption of 3500 W.
- EMC/ESD information** The system was developed in compliance with the ETSI Mesh Ground requirements. This means EMC compliance and personnel safety can be achieved only if the system is connected to a System-Reference Potential Plane (SRPP) at many places as described in ETS 300 253 (see the figure below).

All peripheral equipment and its protective earth/ground must also be connected to the SRPP by one or more fixed wires.



The EMC/ESD boundary is defined at subrack level. The principle is based on the “Faraday Cage” theory. If there are covers, then the covers must be closed.

There is an ESD ground/earth socket on the subrack. A grounded wrist strap with banana plug must be worn when opening the subrack covers.

Circuit pack handling

The following *ESD instructions* must be observed when handling circuit packs:

- Wear working garment made of 100% cotton to avoid electrostatic charging.
- Touch the circuit packs at the edges or the insertion and removal facilities only.
- Ensure that the rack is grounded.
- Wear conductively connected wrist straps and connect them to the rack ESP bonding point.
- Work in an area which is protected against electrostatic discharge. Use conducting floor and bench mats which are conductively connected to the rack ESP bonding point.
- Conductively connect all test equipment and trolleys to the rack ESP bonding point.

- Store and ship circuit packs and components in their shipping packing. Circuit packs and components must be packed and unpacked only at workplaces suitably protected against build-up of charge.
- Whenever possible, maintain the relative humidity of air above 20%.

WaveStar® CIT requirements

The minimum requirements for a *WaveStar* CIT are a personal computer with:

- *Pentium*® 266 MHz processor (*Pentium* III 500 MHz or higher recommended) with 128 MB of RAM (256 MB of RAM or higher recommended)
- 500 MB of free hard-disk drive space
- CD-ROM drive (16X recommended)
- SVGA monitor set to 800x600 resolution or greater, with 256 colors (1024x768, 16 million colors recommended)
- 100BaseT LAN interface, installed and working
- *Microsoft*® *Windows NT*® 4.0 with Service Pack 5 or *Microsoft*® *Windows*® 2000 operating system

NOTE: *Microsoft Windows 2000* does not clean up drivers properly after the removal or exchange of network cards, causing critical network services to fail. This can cause *WaveStar* CIT failing to start after installation, or you will be unable to select the right network card from the list during installation. To solve these problems, deinstall not present network cards from the PC.

- *Adobe*® *Acrobat*® *Reader*® for *Windows* (version 3.01 or later)
- Removable hard-disk drive (optional; required only for system backup).

The performance of the user interface can be enhanced by using a higher performance personal computer. An unshielded crossed LAN cable CAT5 with 4-wire RJ-45/RJ-45 connectors must be used for connecting the *WaveStar* CIT to the NE.

Mark descriptions

The following marks are used within the *LambdaUnite* MSS system:

CE mark

The CE mark indicates that the products conform to the relevant European Community (EC) Directives.

This CE-marked subrack is compliant with the following Directives:

- EC89.336/EEC - Electromagnetic Compatibility (EMC)
- EC73.23/EEC - Low-Voltage Directive (LVD).



UR mark

The UR mark indicates that the products conform to the relevant American Directives.



CSA mark

The CSA mark indicates that the products conform to the relevant American and Canadian Directives.





3 Mechanical installation

Overview

Purpose The purpose of this chapter is to provide the information needed to install all mechanical parts of a *LambdaUnite*[™] MultiService Switch (MSS) system.

The chapter is divided into two sections. The first section describes the ETSI-2 installation for the international market, the second section the NEBS-2000 installation for the USA domestic market.

Pre-cautions



WARNING

Risk of injury due to unsecured shelf.

A fully-equipped shelf weighs more than 30 kg (66 lbs) and can cause considerable injuries if it is knocked over or dropped. This can also cause serious damage to the shelf.

At least two persons are required for lifting the shelf.

**WARNING****Ineffectiveness of laser warning labels if removed or concealed.**

Warning labels on the system and especially on the optical components warn of the dangers of invisible laser radiation. Removed, concealed or illegible labels can lead to incorrect action and thus cause serious injuries to the eyes of operating staff.

Ensure that the laser warning labels are not removed or concealed and always clearly legible.

Contents

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Physical and power installation entry checklist

Overview

Purpose This section ensures the operability of the procedures described in the following.

Contents The entry checklist is related to the following chapters:

- Chapter 3
Mechanical installation
- Chapter 4
System cabling and final assembly
- Chapter 5
Powering, circuit pack installation, and NE software download.



Entry checklist

The following provides a checklist to be completed prior to perform the physical and power installation. Verify that each procedure has been completed. Check off and initial the item.

Procedure	Completed	Initials	Notes
Is the selected installation site accessible for delivery of racks? If on a different level than receiving dock, is the elevator large enough?			
Does the available floor space fulfil the requirements given in Chapter 2, section “Floorplan guidelines (ETSI-2 / NEBS-2000)” (2-2) ?			
Does the floor support a weight of greater than 210 kg [463 lbs]?			
Are the climatic conditions fulfilled as described in Chapter 1, section “Climatic limits for the operation of LambdaUnite™ MSS equipment” (1-36) ?			
Is there enough space in cable rack or under floor to coil/loop excess length of transmission cables?			
Is there enough space in cable rack or under floor for power and other external cables?			
Are there any obstacles that will affect the physical installation or cabling?			
Are the required fuse/breaker positions available?			
Are the needed <i>LambdaUnite</i> MSS racks available (ETSI-2 or NEBS-2000)?			
Are the needed <i>LambdaUnite</i> MSS subracks available?			
Are all needed <i>LambdaUnite</i> MSS circuit packs and cables available?			
Is an ESD wrist strap available?			
Is an external timing source available?			

Procedure	Completed	Initials	Notes
Is the <i>LambdaUnite</i> CD-ROM (CC109088708) available?			



ETSI-2 installation

Overview

Purpose The purpose of this chapter is to provide all needed mounting instructions for the ETSI-2 case (international market).

Contents

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Rack materials

Available ETSI-2 racks The following racks are available for Release 1.0 and 2.0:

- ETSI-2 rack with doors — CC848727095
- ETSI-2 rack without doors — CC848775649.

The following racks are available for Release 2.1:

- ETSI-2 rack with doors — CC848851234
- ETSI-2 rack without doors — CC848851242.

Rack delivery The ETSI-2 rack is delivered in a pre-assembled version, meaning that the following parts of the frame are already mounted:

Quantity	Description — Code
1	Power Distribution Panel (PDP) — CC848727129
2	Cable Assy, PDP - LED, Alarm — CC848811543/ DC1002831 (rear/front)
2	Cable Assy, PI (Upper subrack) - PDP — CC848811501/DC1002826 (A or B), 1850 mm [6,069 ft]
2	Cable Assy, PI (Lower subrack) - PDP — CC848811519/DC1002827 (A or B), 3200 mm [10,499 ft]
1	Cable Assy, PI/100 (A-side) - PDP — CC848850723
1	Cable Assy, PI/100 (B-side) - PDP — CC848850715
1	Cable Assy, CI-CTL (Upper subrack) - PDP — CC848811527/DC1002828, 1100 mm [3,609 ft]
1	Cable Assy, CI-CTL (Lower subrack) - PDP — CC848811535/DC1001829, 3300 mm [10,827 ft]
1	Door Support, Top Assy — DC1001933 (includes: Assy, CM-Alarm - RAL UCMI-I)
1	Door Support Bottom Assy — CC848302527
1	Indicator Strip — DC1000590
2	Subrack Guide — DC1002905 (2 per upper subrack)
4	Adjustable Feet — CC407890623
1	Fiber Guide — SC1007036

Quantity	Description — Code
1	Fiber Guide — SC1007037
2	Cable Rod, short — DC1002903
4	Cable Rod, long — DC1002904
2	Cable Rod, long — SC1002904
1	Cable Guide Rod — SC1006005
4	Clip, Self-Adhesive — CC402185409
1	Anti Recirculation Plate — SC1006011 (only necessary and mounted within racks with rack doors and side cover plates)

Package-bag A package-bag is mounted within the rack and contains the following parts:

Quantity	Description — Code
4	Bushing for Adapter Kit — CC848316279
4	Washer STL, ST-70-140HV, 4.3x12 — CC847174950
4	CH SCR, STL ST-70, M4x25 — CC847117900
14	Screw, Tapping Thread-Forming, M6x16 — CC901331421
3 m	Velcor — DC1005002

Site material (optional) The following site material can separately be ordered for ETSI-2 racks:

Quantity	Description — Code
1	Locking Module — F2-99-2
1	Key-Lock — SC01 ... SC99
Max. 4	Eye Bolt — DC1001689 (2 per rack) with Nut — CC901344184
1	Assy, Sideplates — CC848780177 includes: <ul style="list-style-type: none"> • 2x Side Plate — DC1000577 (left and right), 2200 mm [7,218 ft]

Quantity	Description — Code
as per order	Nylon Cable-Ties — CC407804715

The following site material can separately be ordered for ETSI-2 racks without doors (CC848775649):

Quantity	Description — Code
1	Assy, Doors — CC848795001 includes: <ul style="list-style-type: none">• 2x Assy, Door, Left — DC1000585• 2x Assy, Door, Right — DC1000586



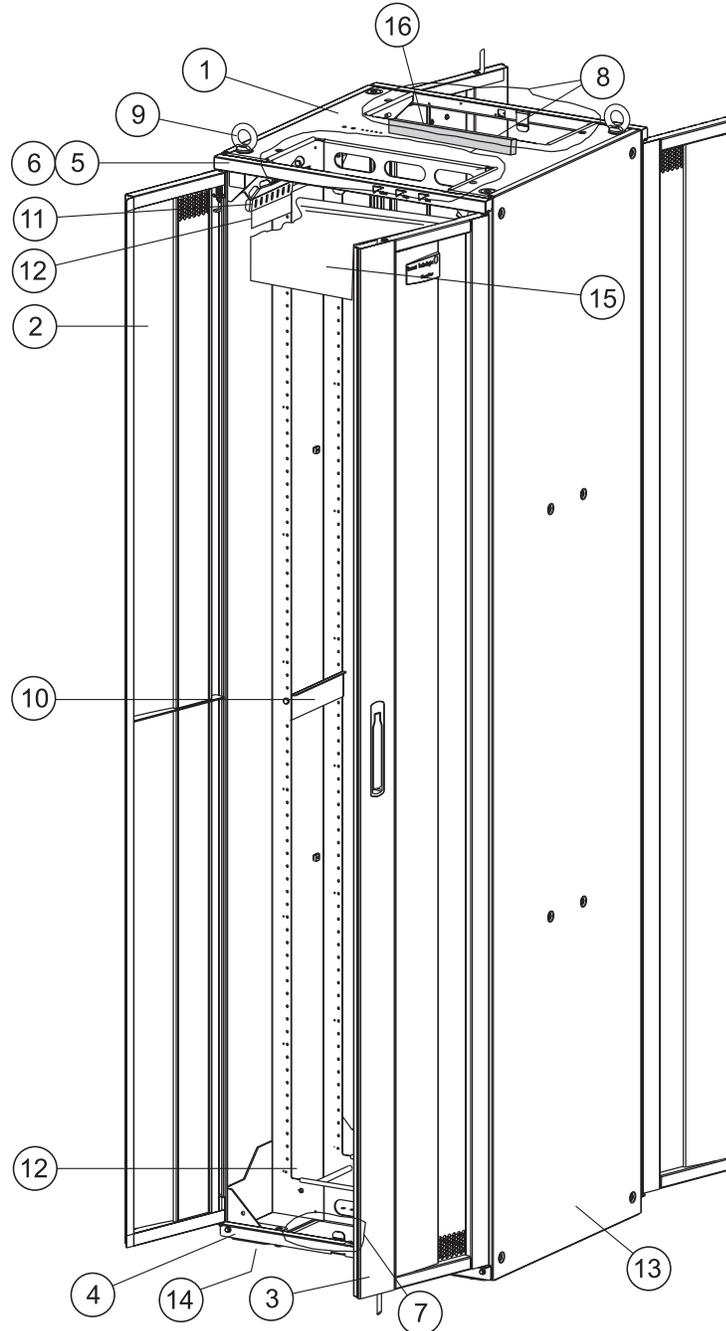
Technical data for rack

Specifications The ETSI-2 rack has the following specifications:

Item	Quantity / Size
Weight	120 kg [264.6 lbs] (including PDP, cables and doors) 80 kg [176.4 lbs] (without doors)
Dimensions (H x W x D)	2200 mm [86.614"] x 600 mm [23.622"] x 600 mm [23.622"]

Layout The ETSI-2 rack is designed to accommodate top and bottom cable access.

Figure 3-1 Rack layout



Legend:

1 ETSI-2 rack

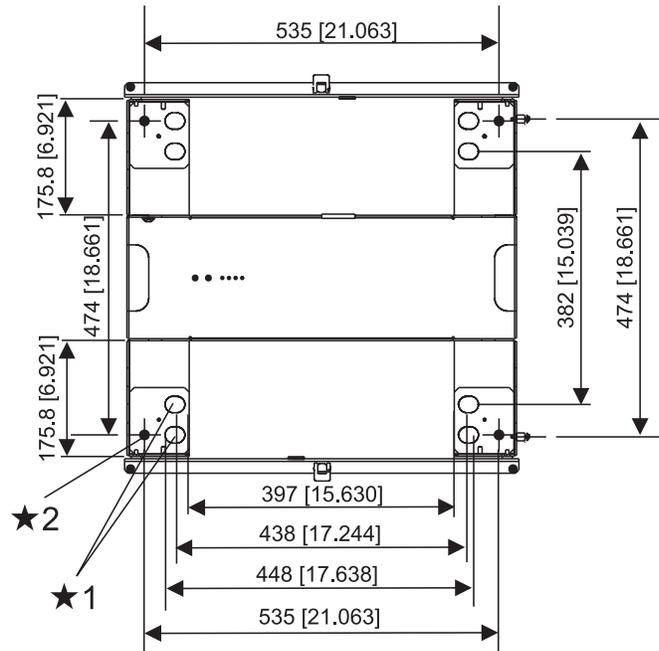
2	Rack door, left
3	Rack door, right
4	Door Support Bottom
5, 6	Door Support Top with Indicator Strip
7	Bottom-Access Entry Hole
8	Top-Access Entry Hole
9	Eye Bolt (optional)
10	Subrack Guide
11	Fiber Guide
12	Cable rod
13	Side Cover Plate
14	Adjustable Feet
15	Anti Recirculation Plate
16	Power Distribution Panel (PDP)



Floor mounting

Dimensions The following figure shows the plate layout (with dimensions) of the ETSI-2 rack.

Figure 3-2 Top/Bottom plate layout



Legend:

- *1 Hex. Bolt, STL ST-70, M12x20 — CC847191574
- *2 Adjustable Feet — CC407890623

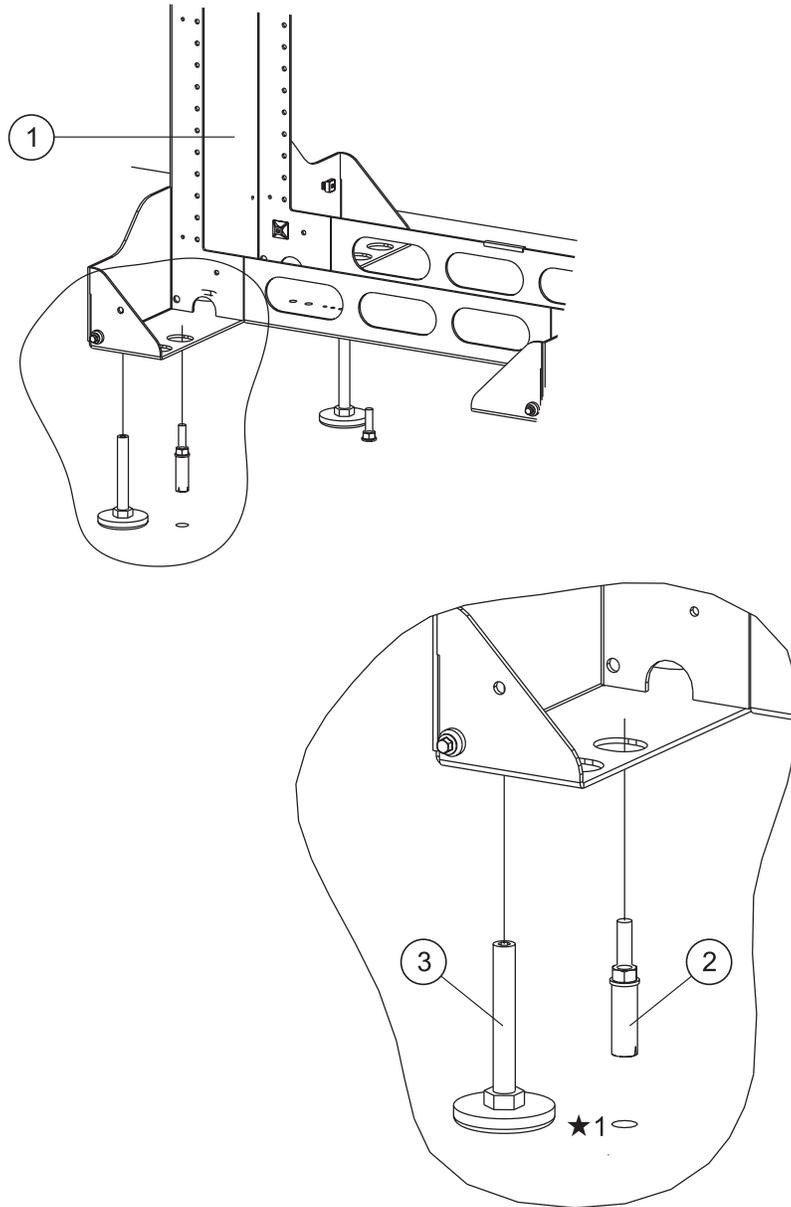
Important! The front side is identified by the Fiber Guides (see item 11 in [Figure 3-1, “Rack layout” \(3-11\)](#)).

Mounting **Important!** If the rack has to be installed on a raised floor, see the customer’s specifications and use customer-provided materials.

Complete the following steps to mount an ETSI-2 rack on the floor:

- 1 Drill the necessary holes (14 mm [0.55”] in diameter) in the floor (*1).

-
- 2** Put the expanding bolt — CC407758200 (item 2) in place and mount the rack frame (item 1) on the floor with the help of the adjustable feet — CC407890623 (item 3).



Important! 25 mm [1"] should be between the floor and the rack before levelling the rack. This initial adjustment of the feet ensures that it is still possible to level the next rack.

END OF STEPS



Rack adapter kit

Overview The rack adapter kit is used to mount rack frames together side-by-side to establish a line-up.

Before you begin If the existing rack(s) already have side-cover plates, remove these cover plates from the sides of the existing rack(s) to which another rack(s) will be connected. See [“Side cover plates” \(4-71\)](#) for instructions on how to re-install side-cover plates.

Installation procedure

1	Extension side of the existing rack is	Then
	At the front to the left	Demount the rack adapter-kit on the extension rack.
	At the front to the right	Demount the rack adapter-kit on the existing rack.

2 Remove the Assy, Cage Nut — DC1002834 on the opposite side to the demounted rack adapter-kit (see Step 1) (two at the top and the two at the bottom).

3 Place the rack frame (item 4) of the extension rack next to the existing rack.

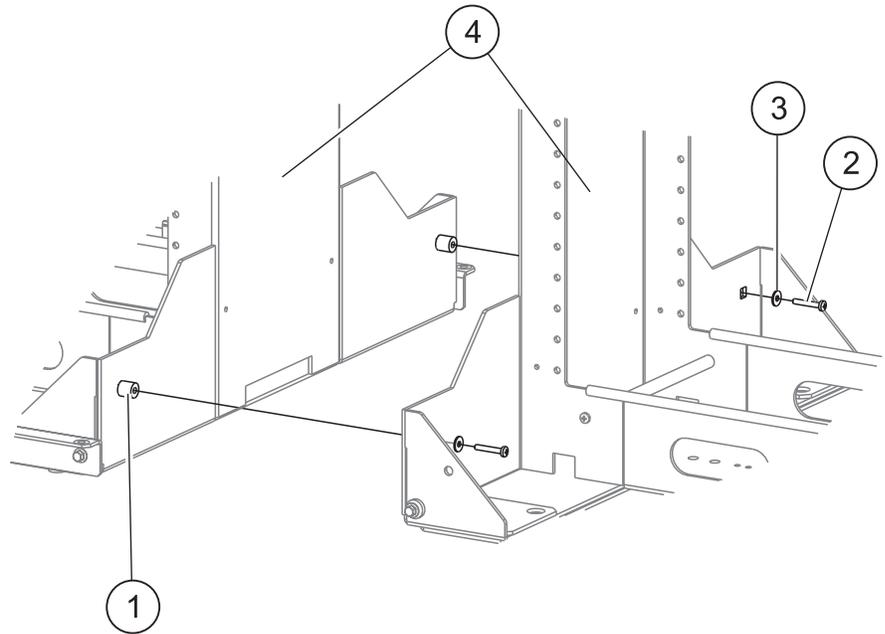
4 Put the bushings (= spacers) for adapter kit — CC848316279 (item 1) in the rack frame and fix them by using CH SCR, STL ST-70, M4x25 screws — CC847117900 (item 2) and STL, ST-70-140HV, 4.3x12 washers — CC847174950 (item 3) at each nut retainer-position.

5 Tighten the CH SCR, STL ST-70, M4x25 screws — CC847117900 (item 2) to tie the rack frames together.

END OF STEPS

Layout

Figure 3-3 Racks side by side

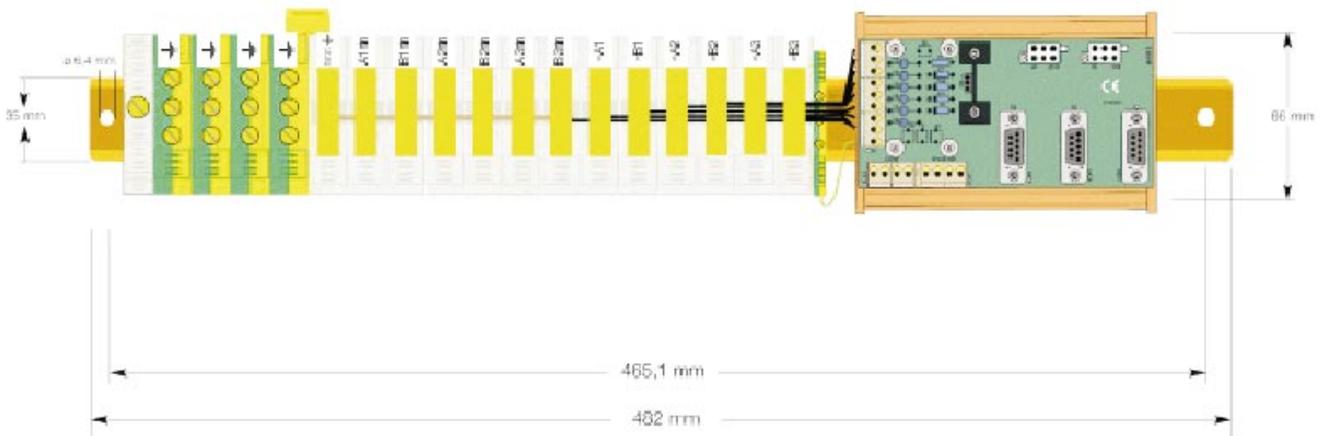


Technical data for PDP

Specifications The PDP has the following specifications:

Item	Quantity / Size
Power consumption, Circuit breakers	<p>Release 1.0 and 2.0:</p> <ul style="list-style-type: none"> • max. 2700 W • 68 A circuit breakers must be used in the External Battery and Fuse Bay (BDFB) • 63 A circuit breakers are part of the subracks. <p>Release 2.1:</p> <ul style="list-style-type: none"> • max. 3500 W • Circuit breakers ≥ 100 A must be used in the External Battery and Fuse Bay (BDFB) • 100 A circuit breakers are part of the subracks.
Voltage range (all components)	-48 to -60 V battery voltages (-40.5 V minimum, -72 V maximum)
Power feeds	3 power feeders (only 2 are necessary for one rack)
Ground	3 ground-connection points (only 2 are necessary for one rack)
Dimensions (H x W x D)	70 mm [2.756"] x 482.6 mm [19"] x 60 mm [2.362"]

Figure 3-4 Layout



Subrack materials

Available subracks The following subracks are available:

- *LambdaUnite*[™] MSS DUR-Subrack Core Assembly — CC848811865 (available for Release 1.0 and 2.0)
- *LambdaUnite* MSS DUR/2-Subrack Core Assembly — CC848824926 (available for Release 2.1).

Subrack delivery The *LambdaUnite* MSS subrack is delivered in a pre-assembled version, meaning that the following parts are already mounted:

Quantity	Description — Code
1	<i>LambdaUnite</i> MSS Dual Unit Row Subrack — CC848727111
	<i>LambdaUnite</i> MSS Dual Unit Row/2 Subrack — CC848824918
1	User Panel — CC848730636
1	Fan Unit — CC848730644
1	Controller Interface — CC109001461
2	Timing Interface, E1/DS1 — CC109001453
1	Filter, washable — CC408643005
8	Paddle Board, blank — CC848780193
For PI in Release 1.0/2.0	
2	Power Interface (PI) — CC109001446
4	Paddle Board, Blank — CC848780193
For PI/100 in Release 2.1	
2	Power Interface 100 (PI/100) — CC109187211
2	Paddle Board, blank — CC848840104
1	Bracket, front-left, Unite — DC1003774
1	Bracket, front-right, Unite — DC1003775
1	Cable Assy, CI-CTL - UPL — CC848811584/DC1003272

Prepacked material The following parts are prepacked:

Quantity	Description — Code
4	Fiber Clip — CC848850756
2	Fiber-Routing Guides (RT/LB) — DC1001516
2	Fiber-Routing Guides (LT/RB) — DC1001517
4	Fiber-Routing Guides (corner) — DC1001518
8	Self-Tapping Screw — DC1002024
26	Screw, Tapping Thread-Forming, M6x16 — CC901331421

Intra-Subrack cables The following intra-subrack cables are delivered:

Quantity	Description — Code	Remarks
1	Cable Assy, PI - FAN Unit, Power B — CC848811576/DC1003270	Prepacked
1	Cable Assy, CI-CTL - FAN Unit — CC848811568/DC1003271	Prepacked
1	Cable Assy, PI - FAN Unit Power A — CC848811550/DC1003269	Prepacked

Intra-Rack cables The following intra-rack cables are delivered:

Quantity	Description — Code	Remarks
1	Cable Assy, PDP - LED, Alarm — CC848811543/DC1002831	Mounted
1	Cable Assy, CI-CTL - PDP, Lower — CC848811535/DC1001829	Prepacked
1	Cable Assy, CI-CTL - PDP, Upper — CC848811527/DC1002828	Prepacked
For PI in <i>Release 1.0/2.0</i>		
1	Cable Assy, PI - PDP, Lower — CC848811519/DC1002827	Pre-mounted in rack
1	Cable Assy, PI - PDP, Upper — CC848811501/DC1002826	
For PI/100 in <i>Release 2.1</i>		

Quantity	Description — Code	Remarks
1	Cable Assy, PI/100 - PDP, A-side — CC848850723	Pre-mounted in rack
1	Cable Assy, PI/100 - PDP, B-side — CC848850715	

**Grounding material
(optional)**

The following grounding material can be ordered separately:

Quantity	Description — Code	Remarks
1	Ground Wire (2000 mm [609,756 ft]) — CC848828174	Upper subrack
1	Ground Wire (3000 mm [914,634 ft]) — CC848828182	Lower subrack



Technical data for subrack

Specifications

Item	Quantity/Value
Voltage range (all components)	-48 to -60 V battery voltage (-40.5 V minimum, -72 V maximum)
Power feeds	2 power feeders (A, B)
Power consumption, Circuit breakers	<p>Release 1.0 and 2.0:</p> <ul style="list-style-type: none"> max. 2700 W 68 A circuit breakers must be used in the External Battery and Fuse Bay (BDFB) 63 A circuit breakers are part of the subracks. <p>Release 2.1:</p> <ul style="list-style-type: none"> max. 3500 W Circuit breakers ≥ 100 A must be used in the External Battery and Fuse Bay (BDFB) 100 A circuit breakers are part of the subracks.
Weight	Maximum 41kg [90.41 lbs] (includes: user panel, fan, PIs, CI-CTL TIs and 12x blanks at the rear).
Dimensions (D x W x H)	545mm [21.457"] x 500mm [19.685"] x 950mm [37.402"] (includes fan and cabling).
Site Engineering Dimensions	545mm [21.457"] x 500mm [19.685"] x 1100mm [43.307"] (includes cabling and fan space)

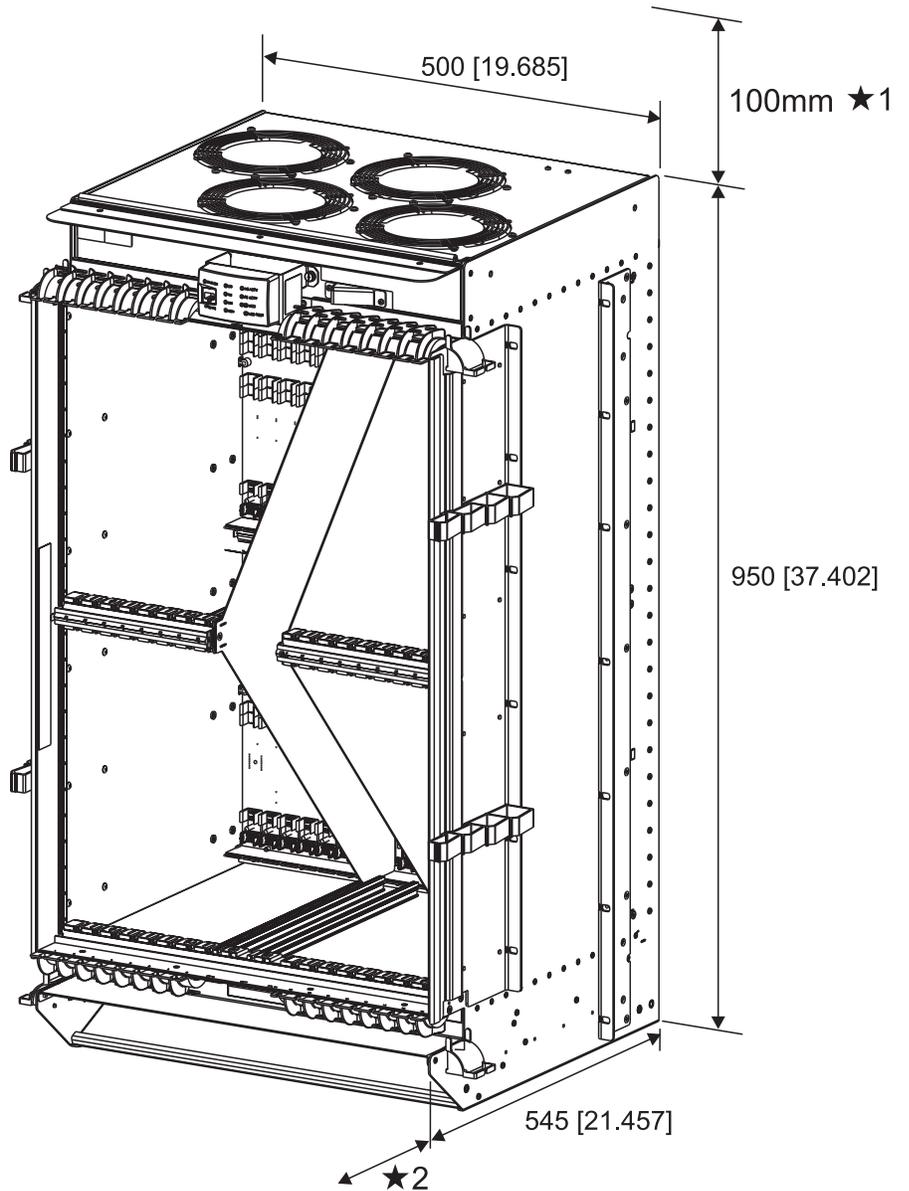
Subrack requirements

The mounting requirements are:

- Leave a space of ≥ 100 mm [3.94"] above the subrack, when a single subrack is mounted into a rack frame.
- The subrack is designed for mounting in the *LambdaUnite*TM MSS rack frames in such a way the temperature can be controlled and the cables laid properly.

Subrack dimensions

Figure 3-5 Subrack mounting dimensions



Legend:

- *1 Required space for air outlet (≥ 100 mm [3.94"]) when a single subrack is mounted into a rack frame.
- *2 Bend radius of fiber and external cabling.



Mounting the subrack into rack

Procedure

- 1 Unpack the subrack and check the installation materials.
- 2 Temporarily remove the front mounting brackets (bracket, front-left, Unite — DC1003774, item 1) and (bracket, front-right, Unite — DC1003775, item 2) from the subrack.
NOTE: The rear brackets shouldn't be removed.
- 3 Mount the Fiber Clip — CC848850756 (item 5) on the front mounting brackets.
- 4 When a second subrack is mounted in the configuration of one *LambdaUnite™* rack frame, temporarily remove the Rubber Profile — DC1003971 (item 6) at the front-top of the bottom subrack.
- 5 Slide the subrack at the rear into its configuration position in the rack.

If subrack is located in the	Then
Upper position in the rack	Use the Subrack Guide — DC1002905 which is mounted at hole 38 on the stile strip of the rack frame.
Lower position in the rack	Use the bottom of the rack frame as a guide.

- 6 Mount the subrack on the stile strip at the rear by using a Screw, Tapping Thread-Forming, M6x16 — CC901331421 with 7 ± 1.0 Nm [61.96 ± 2.65 Lbs-in] torque.
- 7 Where two subracks are mounted in one rack frame, attach the Rubber Profile — DC1003971 (item 6) at the front-top of the bottom subrack from the fan at the rear side of the subrack.

-
- 8** Mount the mounting brackets (bracket, front-left, Unite — DC1003774 (item 1) and (bracket, front-right, Unite — DC1003775 (item 2), on the upright of the rack frame in the brackets configuration positions by using (Screw, Tapping Thread-Forming, M6x16 — CC901331421 (item 4), but do not completely fasten the brackets.

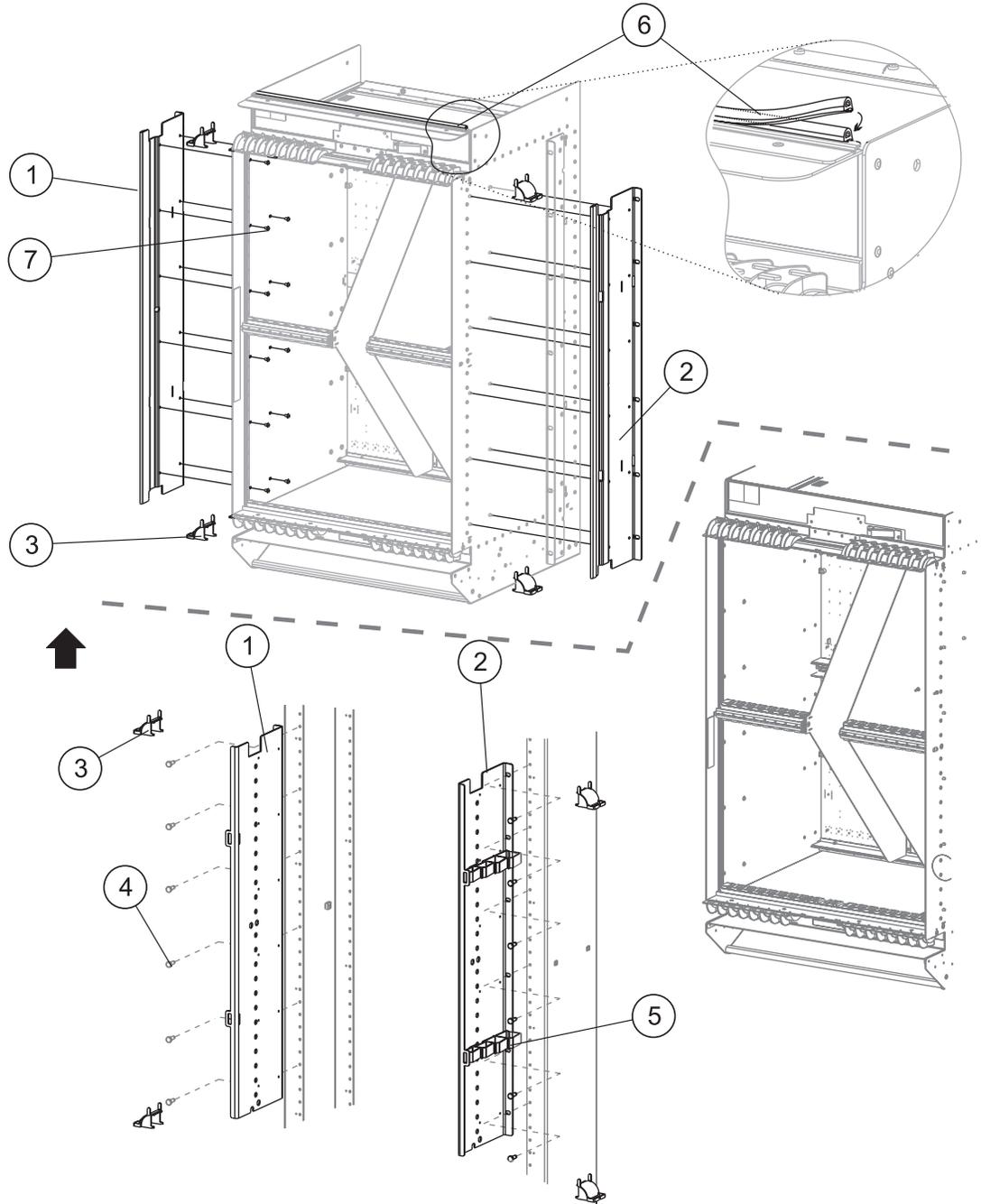
 - 9** Mount the subrack on the mounting brackets at the front from inside the subrack by using a Screw Hexagon Socket Button Head M4x8 — DC1002976 (item 7), but do not completely fasten the brackets.

 - 10** Fasten the front and rear Screw, Tapping Thread-Forming, M6x16 — CC901331421 (item 4) and Screw Hexagon Socket Button Head M4x8 — DC1002976 (item 7).

 - 11** Mount the Fiber-Routing Guides (corner) — DC1001518 (item 3) at each corner of the subrack by clicking them into the holes in the top and bottom sides of the subrack.

END OF STEPS

Figure 3-6 Mounting the subrack



NEBS-2000 installation

Overview

Purpose The purpose of this chapter is to provide all needed mounting instructions for the NEBS-2000 case (USA domestic market).

Contents

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Subrack materials	3-40
Technical data for subrack	3-43
Mounting the subrack into rack	3-45



Rack materials

Available NEBS-2000 racks

The following racks are available for Release 1.0 and 2.0:

- NEBS-2000 rack with doors — CC848727103
- NEBS-2000 rack without doors — CC848775631.

The following racks are available for Release 2.1:

- NEBS-2000 rack with doors — CC848851259
- NEBS-2000 rack without doors — CC848851267.

Rack delivery

The NEBS-2000 rack is delivered in a pre-assembled version, meaning that the following parts of the frame are already mounted:

Quantity	Description — Code
1	Power Distribution Panel (PDP) — CC848727129
2	Cable Assy, PDP - LED, Alarm — CC848811543/ DC1002831 (rear/front)
2	Cable Assy, PI (Upper subrack) - PDP — CC848811501/DC1002826 (A or B), 1850 mm [6,069 ft]
2	Cable Assy, PI (Lower subrack) - PDP — CC848811519/DC1002827 (A or B), 3200 mm [10,499 ft]
1	Cable Assy, PI/100 (A-side) - PDP — CC848850749
1	Cable Assy, PI/100 (B-side) - PDP — CC848850731
1	Cable Assy, CI-CTL (Upper subrack) - PDP — CC848811527/DC1002828, 1100 mm [3,609 ft]
1	Cable Assy, CI-CTL (Lower subrack) - PDP — CC848811535/DC1001829, 3300 mm [10,827 ft]
1	Door Support, Top Assy — DC1001933 (includes: Assy, CM-Alarm - RAL UCMI-I)
1	Door Support Bottom Assy — CC848302527
1	Indicator Strip — DC1000590
2	Subrack Guide — DC1002905 (2 per upper subrack)
1	Fiber Guide — SC1007036

Quantity	Description — Code
1	Fiber Guide — SC1007037
2	Cable Rod, short — DC1002903
4	Cable Rod, long — DC1002904
2	Cable Rod, short — SC1002903
2	Cable Rod, long — SC1002904
1	Cable Guide Rod — SC1006005
4	Clip, Self-Adhesive — CC402185409
1	Strain Relief Plate — SC1006001
1	Anti Recirculation Plate — SC1006011 (only necessary and mounted within racks with rack doors and side cover plates)

Package-bag A package-bag is mounted within the rack and contains the following parts:

Quantity	Description — Code
4	Bushing for Adapter Kit — CC848316279
4	Washer STL, ST-70-140HV, 4.3x12 — CC847174950
4	CH SCR, STL ST-70, M4x25 — CC847117900
14	Screw, Tapping Thread-Forming, M6x16 — CC901331421
3 m	Velcor — DC1005002
1	Ground Strips, Doors (8x) — DC1005100 (wires and nuts)
4	Shim Plates — SC1006075

Site material (optional) The following site material can separately be ordered for NEBS-2000 racks:

Quantity	Description — Code
1	Locking Module — F2-99-2
1	Key-Lock — SC01 ... SC99

Quantity	Description — Code
max. 4	Eye Bolt — DC1001689 (2 per rack) with Nut — CC901344184
1	Assy, Sideplate — CC848780185 includes: <ul style="list-style-type: none">• 2x Side Plate — DC1001939 (left or right), 2145mm [7,037 ft]
as per order	Nylon Cable-Ties — CC407804715

The following site material can separately be ordered for NEBS-2000 racks without doors (CC848775631):

Quantity	Description — Code
1	Assy, Doors — CC848795019 includes: <ul style="list-style-type: none">• 2x Assy, Door, Right — DC1002599• 2x Assy, Door, Left — DC1002598



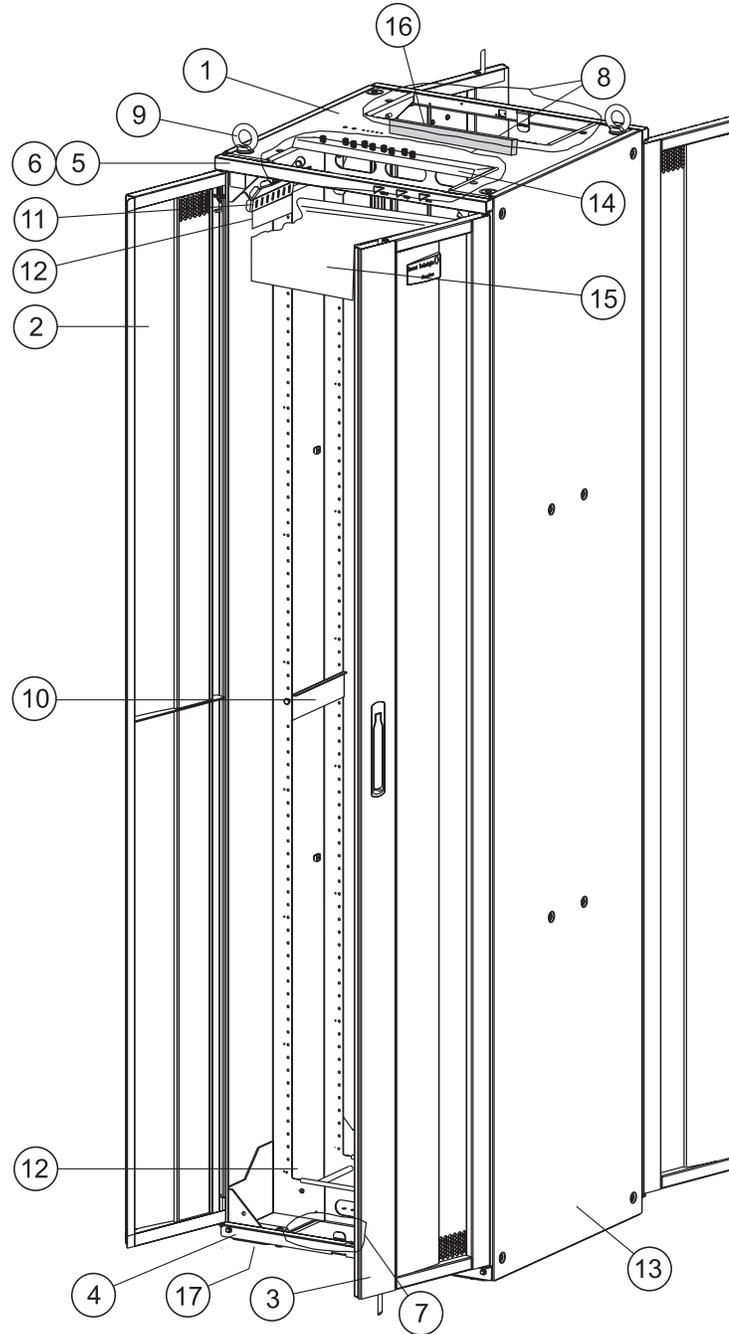
Technical data for rack

Specifications The NEBS-2000 rack has the following specifications:

Item	Quantity/ Size
Weight	116 kg [255.8 lbs] (includes PDP, cables and doors) 79kg [174.2 lbs] (without doors)
Dimensions (H x W x D)	2125mm [83.661"] x 600mm [23.622"] x 600mm [23.622"]

Layout This rack is designed to accommodate top and bottom cable access.

Figure 3-7 Rack layout



Legend:

1 NEBS-2000 rack

2	Rack door, left (optional)
3	Rack door, right (optional)
4	Door Support Bottom
5, 6	Door Support Top with Indicator Strip
7	Bottom-Access Entry Hole
8	Top-Access Entry Hole
9	Eye Bolt (optional)
10	Subrack Guide
11	Fiber Guide
12	Cable rod
13	Side Cover Plate (optional)
14	Strain Relief
15	Anti Recirculation Plate (optional)
16	Power Distribution Panel (PDP)
17	Shim Plates



-
- 2 Put the expanding bolt — CC407758200 (item 2) in place.

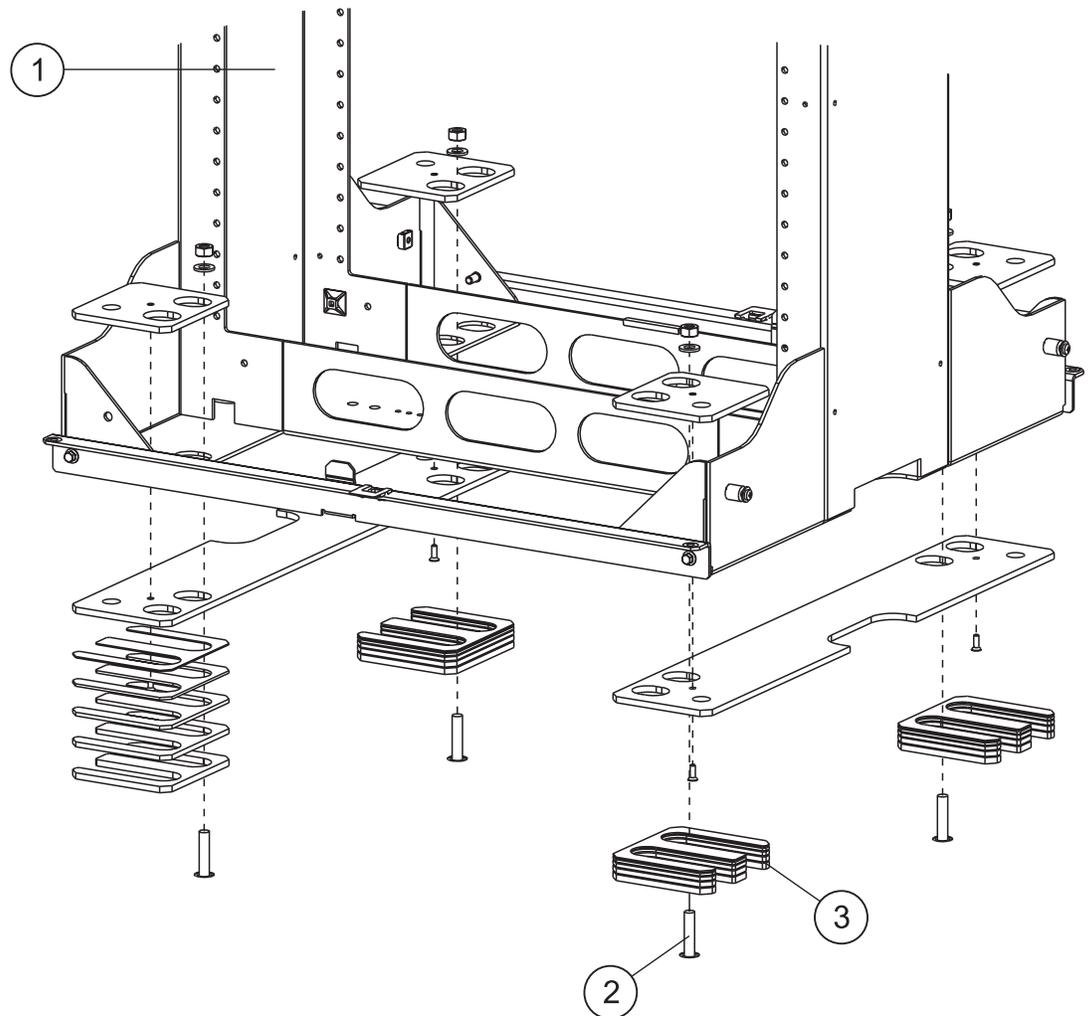
 - 3 Place shim plates — SC1006075 (item 3) around the expanding bolt.

 - 4 Mount the rack frame (item 1) on the floor.

END OF STEPS

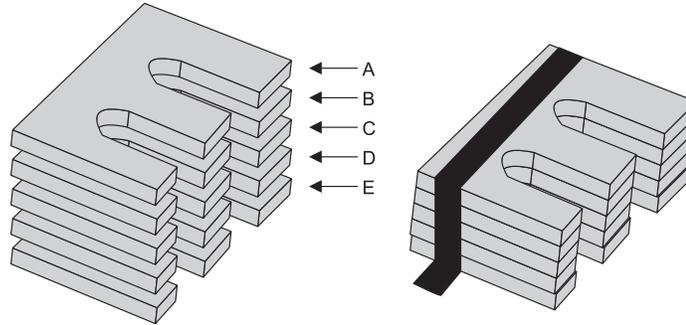
Layout

Figure 3-9 Floor-mounting



Shim plates The shim plates — SC1006075 are used to balance the cabinet in a horizontal position on floor.

Figure 3-10 Shim plates



Legend:

- A 1 mm
- B 2 mm
- C 3 mm
- D 4 mm
- E 5 mm

□

Rack adapter kit

Overview The rack adapter kit is used to mount rack frames together side-by-side to establish a line-up.

Before you begin If the existing rack(s) already have side-cover plates, remove these cover plates from the sides of the existing rack(s) to which another rack(s) will be connected. See [“Side cover plates” \(4-71\)](#) for instructions on how to re-install side-cover plates.

Installation procedure

1

Extension side of the existing rack is	Then
At the front to the left	Demount the rack adapter-kit on the extension rack.
At the front to the right	Demount the rack adapter-kit on the existing rack.

2 Remove the Assy, Cage Nut — DC1002834 on the opposite side to the demounted rack adapter-kit (see Step 1) (two at the top and the two at the bottom).

3 Place the rack frame (item 4) of the extension rack next to the existing rack.

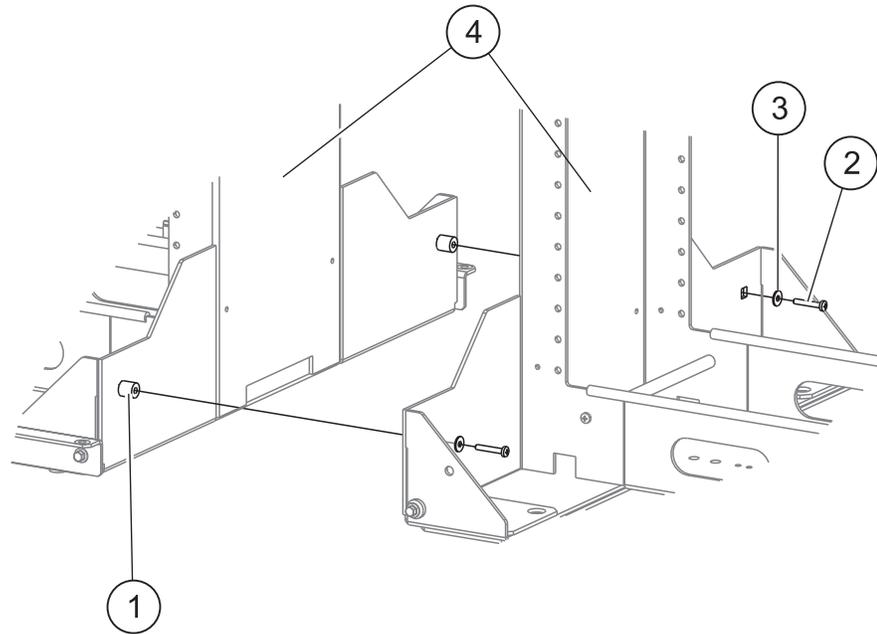
4 Put the bushings (= spacers) for adapter kit — CC848316279 (item 1) in the rack frame and fix them by using CH SCR, STL ST-70, M4x25 screws — CC847117900 (item 2) and STL, ST-70-140HV, 4.3x12 washers — CC847174950 (item 3) at each nut retainer-position.

5 Tighten the CH SCR, STL ST-70, M4x25 screws — CC847117900 (item 2) to tie the rack frames together.

END OF STEPS

Layout

Figure 3-11 Racks side by side

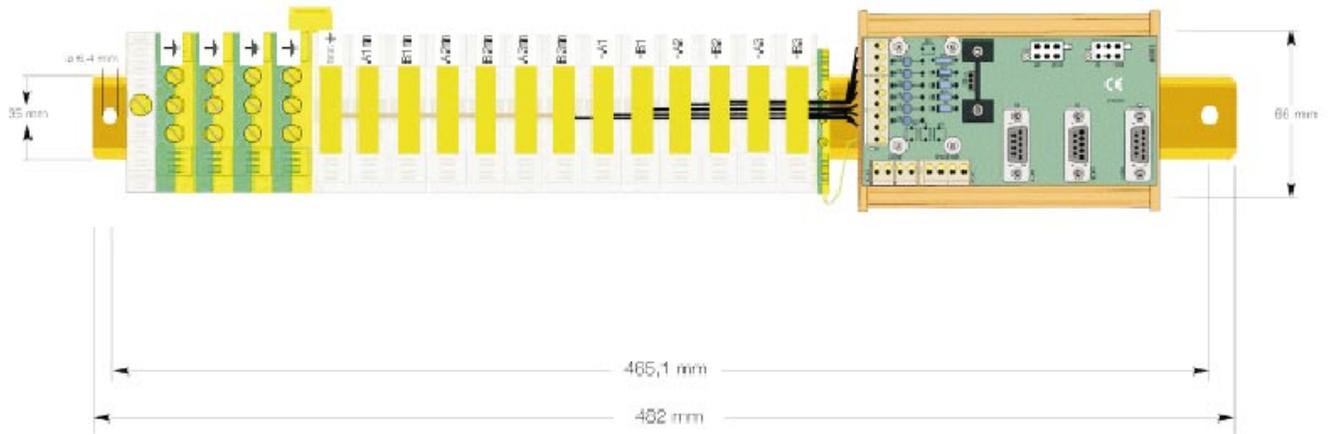


Technical data for PDP

Specifications The PDP has the following specifications:

Item	Quantity / Size
Power consumption, Circuit breakers	<p>Release 1.0 and 2.0:</p> <ul style="list-style-type: none"> max. 2700 W 68 A circuit breakers must be used in the External Battery and Fuse Bay (BDFB) 63 A circuit breakers are part of the subracks. <p>Release 2.1:</p> <ul style="list-style-type: none"> max. 3500 W Circuit breakers ≥ 100 A must be used in the External Battery and Fuse Bay (BDFB) 100 A circuit breakers are part of the subracks.
Voltage range (all components)	-48 to -60 V battery voltages (-40.5 V minimum, -72 V maximum)
Power feeds	3 power feeders (only 2 are necessary for one rack)
Ground	3 ground-connection points (only 2 are necessary for one rack)
Dimensions (H x W x D)	70 mm [2.756"] x 482.6 mm [19"] x 60 mm [2.362"]

Figure 3-12 Layout



Subrack materials

Available subracks The following subracks are available:

- *LambdaUnite*[™] MSS DUR-Subrack Core Assembly — CC848811865 (available for Release 1.0 and 2.0)
- *LambdaUnite* MSS DUR/2-Subrack Core Assembly — CC848824926 (available for Release 2.1).

Subrack delivery The *LambdaUnite* MSS subrack is delivered in a pre-assembled version, meaning that the following parts are already mounted:

Quantity	Description — Code
1	<i>LambdaUnite</i> MSS Dual Unit Row Subrack — CC848727111
	<i>LambdaUnite</i> MSS Dual Unit Row/2 Subrack — CC848824918
1	User Panel — CC848730636
1	Fan Unit — CC848730644
1	Controller Interface — CC109001461
2	Timing Interface, E1/DS1 — CC109001453
1	Filter, washable — CC408643005
8	Paddle Board, blank — CC848780193
For PI in Release 1.0/2.0	
2	Power Interface (PI) — CC109001446
4	Paddle Board, Blank — CC848780193
For PI/100 in Release 2.1	
2	Power Interface 100 (PI/100) — CC109187211
2	Paddle Board, blank — CC848840104
1	Bracket, front-left, Unite — DC1003774
1	Bracket, front-right, Unite — DC1003775
1	Cable Assy, CI-CTL - UPL — CC848811584/DC1003272

Prepacked material The following parts are prepacked:

Quantity	Description — Code
4	Fiber Clip — CC848850756
2	Fiber-Routing Guides (RT/LB) — DC1001516
2	Fiber-Routing Guides (LT/RB) — DC1001517
4	Fiber-Routing Guides (corner) — DC1001518
8	Self-Tapping Screw — DC1002024
26	Screw, Tapping Thread-Forming, M6x16 — CC901331421

Intra-Subrack cables The following intra-subrack cables are delivered:

Quantity	Description — Code	Remarks
1	Cable Assy, PI - FAN Unit, Power B — CC848811576/DC1003270	Prepacked
1	Cable Assy, CI-CTL - FAN Unit — CC848811568/DC1003271	Prepacked
1	Cable Assy, PI - FAN Unit Power A — CC848811550/DC1003269	Prepacked

Intra-Rack cables The following intra-rack cables are delivered:

Quantity	Description — Code	Remarks
1	Cable Assy, PDP - LED, Alarm — CC848811543/DC1002831	Mounted
1	Cable Assy, CI-CTL - PDP, Lower — CC848811535/DC1001829	Prepacked
1	Cable Assy, CI-CTL - PDP, Upper — CC848811527/DC1002828	Prepacked
For PI in <i>Release 1.0/2.0</i>		
1	Cable Assy, PI - PDP, Lower — CC848811519/DC1002827	Pre-mounted in rack
1	Cable Assy, PI - PDP, Upper — CC848811501/DC1002826	
For PI/100 in <i>Release 2.1</i>		

Quantity	Description — Code	Remarks
1	Cable Assy, PI/100 - PDP, A-side — CC848850723	Pre-mounted in rack
1	Cable Assy, PI/100 - PDP, B-side — CC848850715	

**Grounding material
(optional)**

The following grounding material can be ordered separately:

Quantity	Description — Code	Remarks
1	Ground Wire (2000 mm [609,756 ft]) — CC848828174	Upper subrack
1	Ground Wire (3000 mm [914,634 ft]) — CC848828182	Lower subrack



Technical data for subrack

Specifications

Item	Quantity/Value
Voltage range (all components)	-48 to -60 V battery voltage (-40.5 V minimum, -72 V maximum)
Power feeds	2 power feeders (A, B)
Power consumption, Circuit breakers	<p>Release 1.0 and 2.0:</p> <ul style="list-style-type: none"> max. 2700 W 68 A circuit breakers must be used in the External Battery and Fuse Bay (BDFB) 63 A circuit breakers are part of the subracks. <p>Release 2.1:</p> <ul style="list-style-type: none"> max. 3500 W Circuit breakers ≥ 100 A must be used in the External Battery and Fuse Bay (BDFB) 100 A circuit breakers are part of the subracks.
Weight	Maximum 41kg [90.41 lbs] (includes: user panel, fan, PIs, CI-CTL TIs and 12x blanks at the rear).
Dimensions (D x W x H)	545mm [21.457"] x 500mm [19.685"] x 950mm [37.402"] (includes fan and cabling).
Site Engineering Dimensions	545mm [21.457"] x 500mm [19.685"] x 1100mm [43.307"] (includes cabling and fan space)

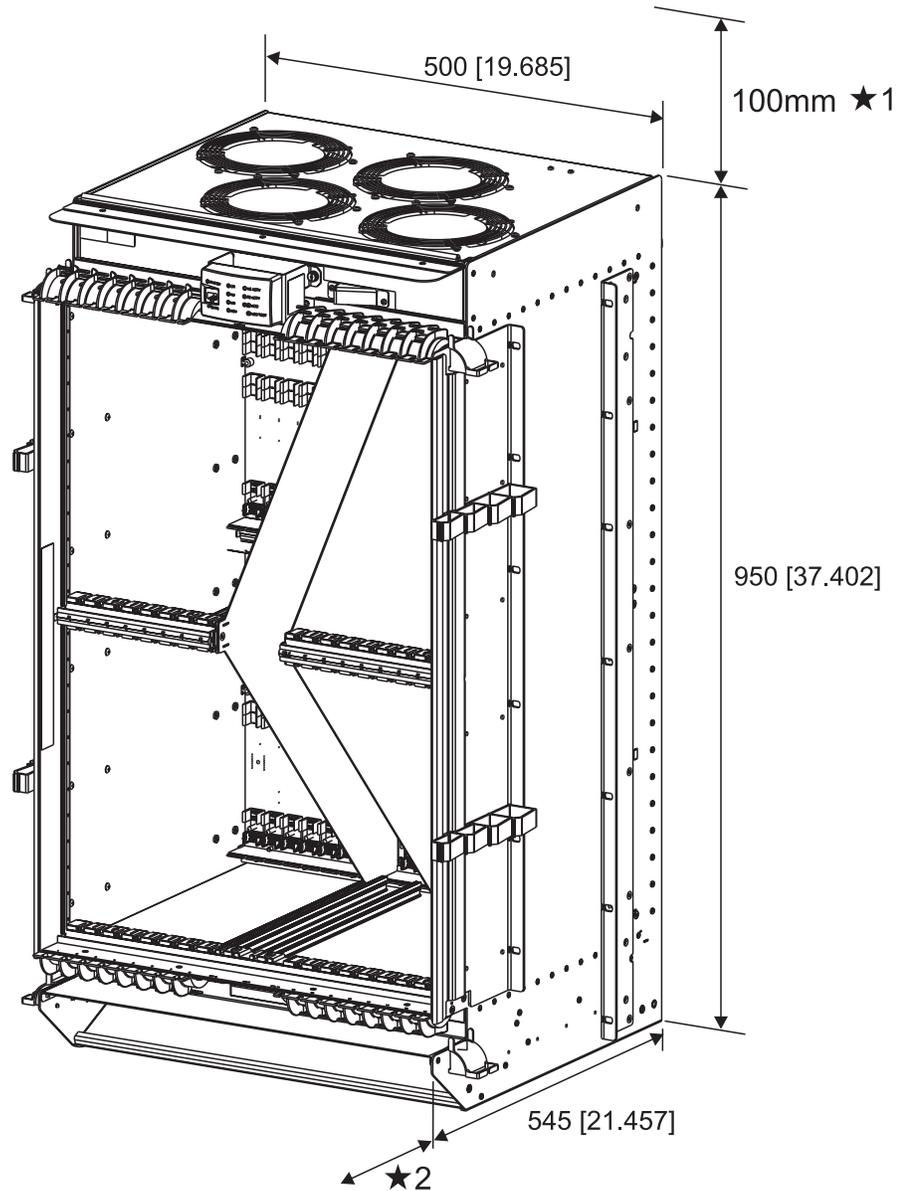
Subrack requirements

The mounting requirements are:

- Leave a space of ≥ 100 mm [3.94"] above the subrack, when a single subrack is mounted into a rack frame.
- The subrack is designed for mounting in the *LambdaUnite*TM MSS rack frames in such a way the temperature can be controlled and the cables laid properly.

Subrack dimensions

Figure 3-13 Subrack mounting dimensions



Legend:

- *1 Required space for air outlet (≥ 100 mm [3.94"]) when a single subrack is mounted into a rack frame.
- *2 Bend radius of fiber and external cabling.



Mounting the subrack into rack

Procedure

- 1 Unpack the subrack and check the installation materials.

- 2 Temporarily remove the front mounting brackets (bracket, front-left, Unite — DC1003774, item 1) and (bracket, front-right, Unite — DC1003775, item 2) from the subrack.
NOTE: The rear brackets shouldn't be removed.

- 3 Mount the Fiber Clip — CC848850756 (item 5) on the front mounting brackets.

- 4 When a second subrack is mounted in the configuration of one *LambdaUnite™* rack frame, temporarily remove the Rubber Profile — DC1003971 (item 6) at the front-top of the bottom subrack.

- 5 Slide the subrack at the rear into its configuration position in the rack.

If subrack is located in the	Then
Upper position in the rack	Use the Subrack Guide — DC1002905 which is mounted at hole 38 on the stile strip of the rack frame.
Lower position in the rack	Use the bottom of the rack frame as a guide.

- 6 Mount the subrack on the stile strip at the rear by using a Screw, Tapping Thread-Forming, M6x16 — CC901331421 with 7 ± 1.0 Nm [61.96 ± 2.65 Lbs-in] torque.

- 7 Where two subracks are mounted in one rack frame, attach the Rubber Profile — DC1003971 (item 6) at the front-top of the bottom subrack from the fan at the rear side of the subrack.

-
- 8** Mount the mounting brackets (bracket, front-left, Unite — DC1003774 (item 1) and (bracket, front-right, Unite — DC1003775 (item 2), on the upright of the rack frame in the brackets configuration positions by using (Screw, Tapping Thread-Forming, M6x16 — CC901331421 (item 4), but do not completely fasten the brackets.

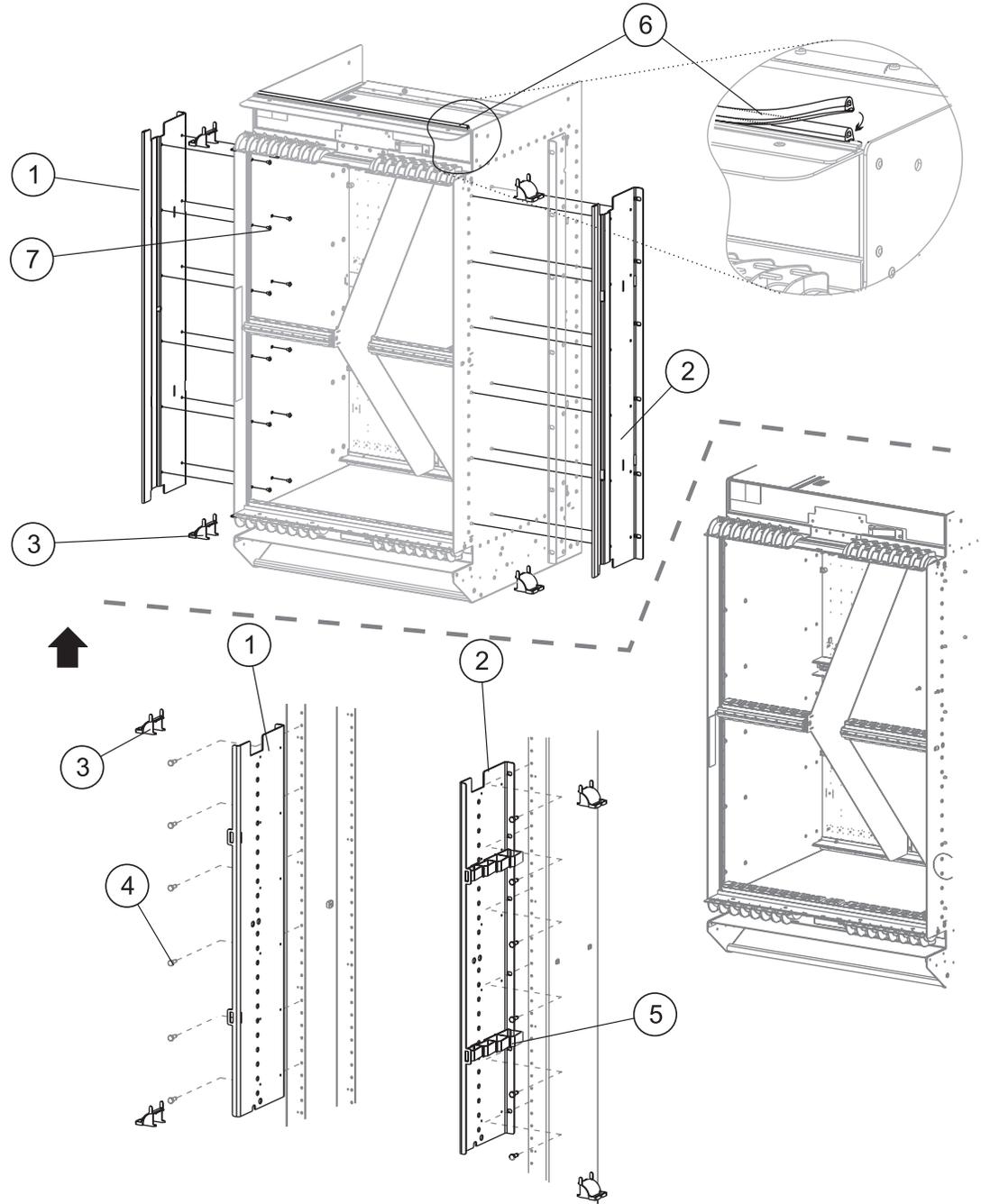
 - 9** Mount the subrack on the mounting brackets at the front from inside the subrack by using a Screw Hexagon Socket Button Head M4x8 — DC1002976 (item 7), but do not completely fasten the brackets.

 - 10** Fasten the front and rear Screw, Tapping Thread-Forming, M6x16 — CC901331421 (item 4) and Screw Hexagon Socket Button Head M4x8 — DC1002976 (item 7).

 - 11** Mount the Fiber-Routing Guides (corner) — DC1001518 (item 3) at each corner of the subrack by clicking them into the holes in the top and bottom sides of the subrack.

END OF STEPS

Figure 3-14 Mounting the subrack





4 System cabling and final assembly

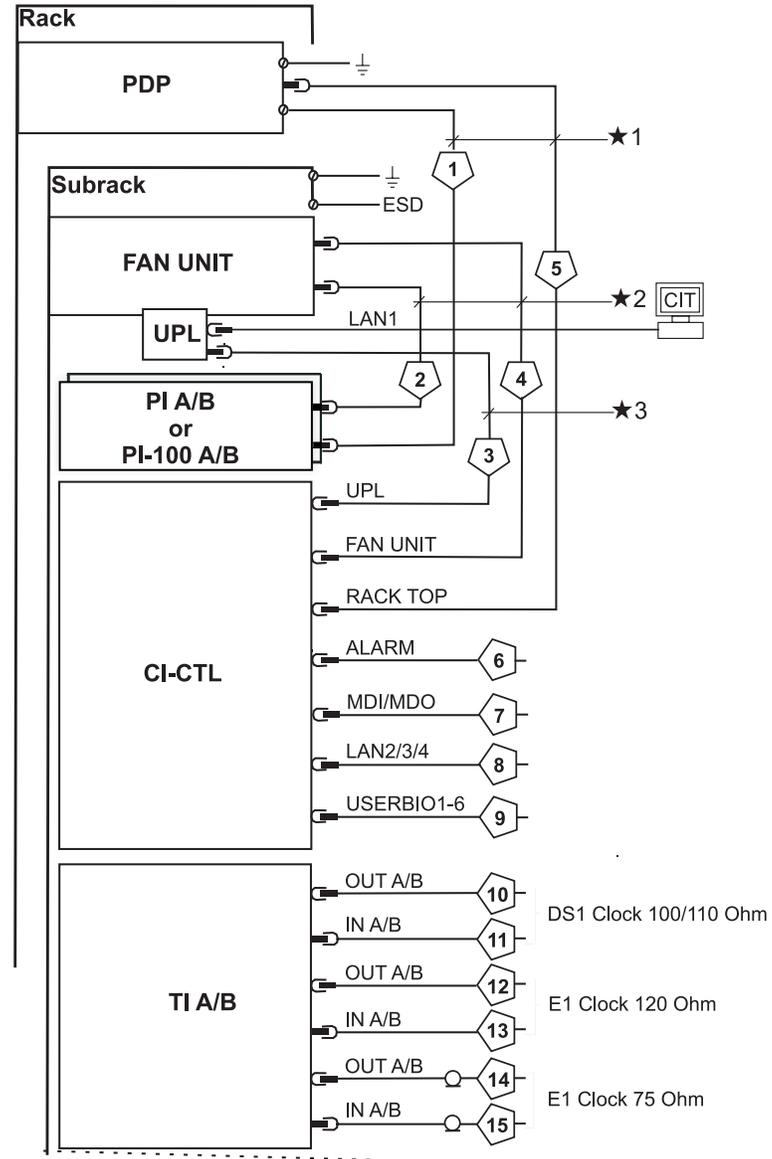
Overview

Purpose The purpose of this chapter is to provide all tasks for a complete system cabling. This chapter will also provide instruction for the final assembly steps of side cover and door mounting installation.

Block diagram for cables

The connection points of this product are marked by cable numbers as shown below.

Figure 4-1 Layout



Legend:

- *1 These prefabricated cables are to be connected to the PDP.
- *2 These prefabricated cables are to be connected.
- *3 This prefabricated cable is already installed in the subrack.

Contents

<u>Power and ground cable installation</u>	<u>4-4</u>
<u>Power wiring (External battery - PDP)</u>	<u>4-5</u>
<u>Power wiring (PDP - PI)</u>	<u>4-7</u>
<u>Power wiring (PDP - PI/100)</u>	<u>4-12</u>
<u>Ground wiring</u>	<u>4-17</u>
<u>Internal cable installation</u>	<u>4-19</u>
<u>Cable management</u>	<u>4-20</u>
<u>Subrack alarm wiring</u>	<u>4-23</u>
<u>Station alarm interface</u>	<u>4-26</u>
<u>External cable installation</u>	<u>4-29</u>
<u>Miscellaneous Discrete Inputs/Outputs (MDIs/MDOs)</u>	<u>4-30</u>
<u>User byte interfaces (G.703/V.11)</u>	<u>4-33</u>
<u>TI-DS1 Station Clock I/O Interface (100/110 Ohm)</u>	<u>4-37</u>
<u>TI-E1 Station clock I/O interface (120 Ohm)</u>	<u>4-41</u>
<u>TI-E1 Station clock I/O interface (75 Ω)</u>	<u>4-44</u>
<u>LAN 10/100 Base-T interface</u>	<u>4-47</u>
<u>External alarms</u>	<u>4-51</u>
<u>Fiber cabling</u>	<u>4-53</u>
<u>Optical interfaces</u>	<u>4-54</u>
<u>Gigabit Ethernet interfaces</u>	<u>4-61</u>
<u>Fiber management in rack</u>	<u>4-63</u>
<u>Fiber management in subrack</u>	<u>4-67</u>
<u>Side panel and doors installation</u>	<u>4-70</u>
<u>Side cover plates</u>	<u>4-71</u>
<u>Rack doors</u>	<u>4-73</u>

Power and ground cable installation

Overview

Purpose This section provides information about the power and ground cable installation.

Contents

Power wiring (External battery - PDP)	4-5
Power wiring (PDP - PI)	4-7
Power wiring (PDP - PI/100)	4-12
Ground wiring	4-17



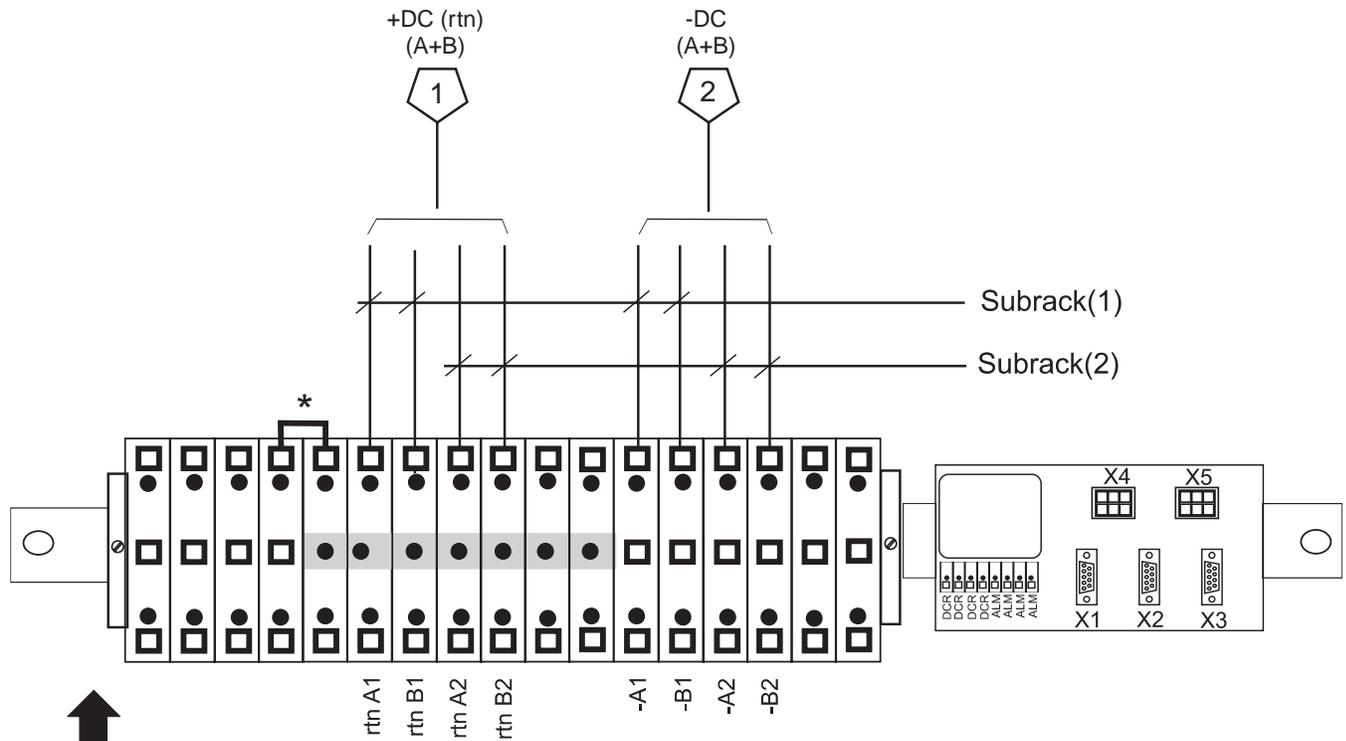
Power wiring (External battery - PDP)

Before you begin Before connecting any power cables be sure that all circuit breakers which are located in the external Battery Distribution and Fuse Bay (BDFB) and at the rear side of the subracks (on the PIs) are in the **OFF** position!

Cabling Depending on the length the following power input cables should be used:

- Power input cable 25 m [82.021 ft] — CC848827457
- Power input cable 16 m [52.493 ft] — CC848827499
- Power input cable 8 m [26.247 ft] — CC848827481
- Power input cable 5 m [16.404 ft] — CC848827473.

Figure 4-2 PDP connection (power input cables)



Legend:

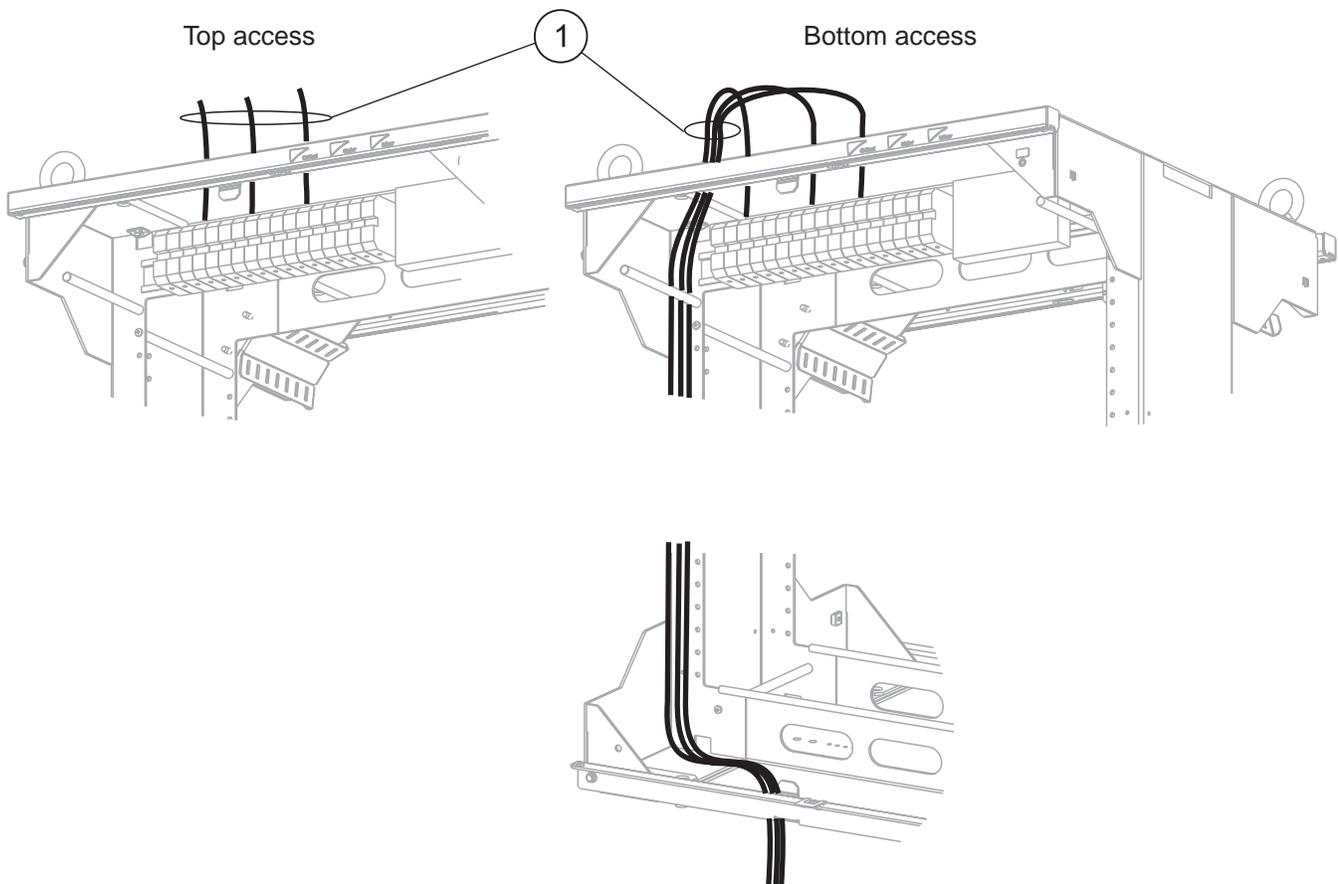
- 1 +DC (red, return)
- 2 -DC (blue)

- * The U-bracket (connection between return and ground) has to be removed, if the return wire is **only** grounded at the external battery (BDFB) source (e.g. valid for the USA domestic market); see also section [“Ground wiring” \(4-17\)](#).

Routing

In case of ...	then ...
top access	route the cables (item 1) directly into the PDP.
bottom access	route the cables (item 1) via the right rear side of the rack frame into the PDP (see figure below).

Figure 4-3 Routing the power input cables



Power wiring (PDP - PI)

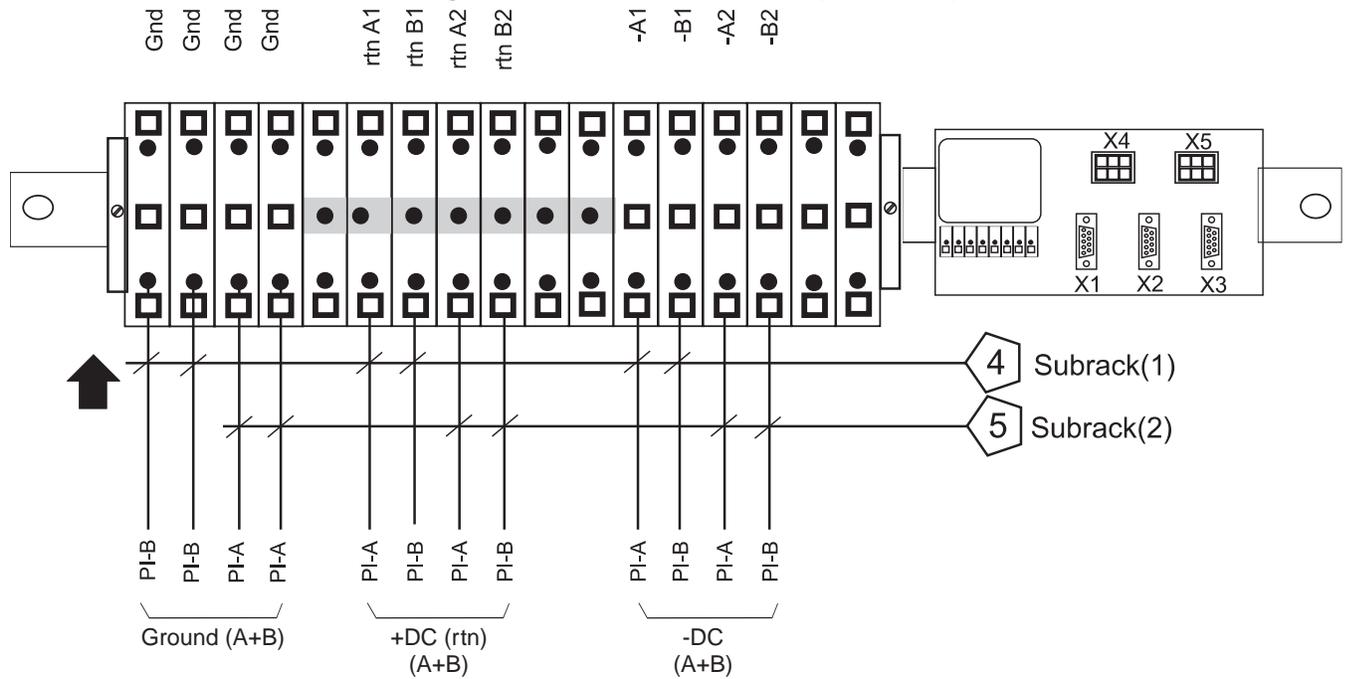
Before you begin This section can be skipped, if PI/100 units are used (see section [“Power wiring \(PDP - PI/100\)” \(4-12\)](#)).

PI cables **Important!** The cables are prefabricated and mounted within the rack frames.

The following PI cables should be used:

- PI cable, upper subrack — CC848811501/DC1002826
- PI cable, lower subrack — CC848811519/DC1002827.

Figure 4-4 PDP connection (PI cables)



Legend:

- | | |
|-----------|---|
| 4, 5 | PI cables (combined: yellow/green, red, blue) |
| +DC (rtn) | red |
| -DC | blue |
| Ground | yellow/green |

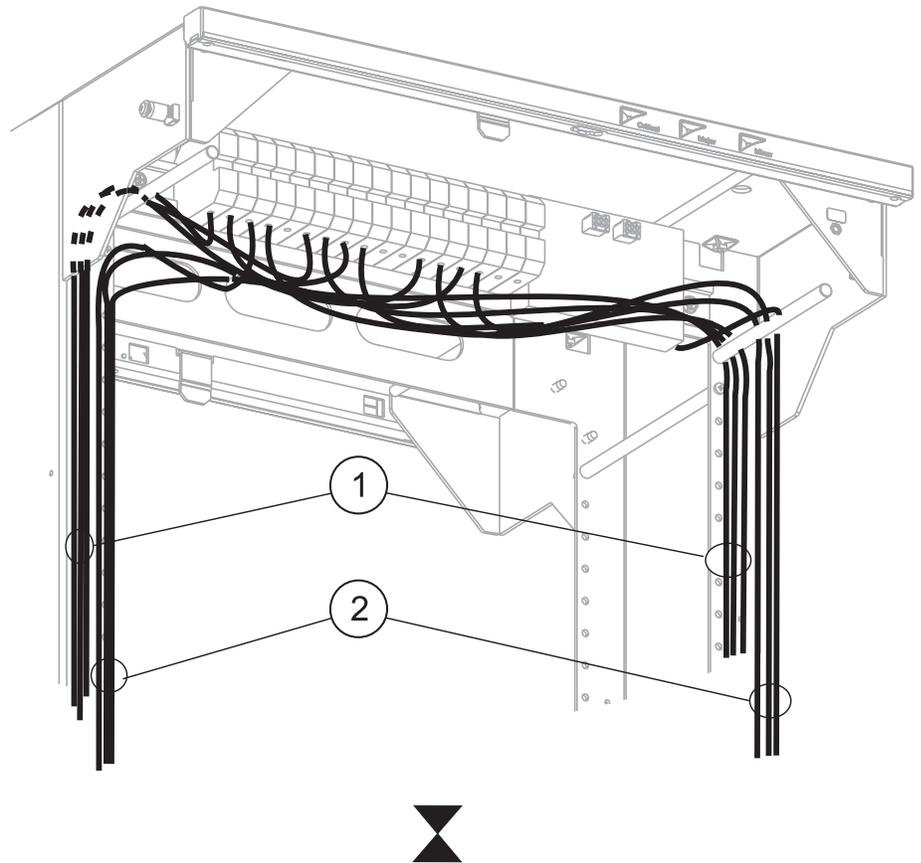
Routing The PI cables should be routed as follows:

1

In the case of ...	Then ...
an upper subrack	the PI cables, upper subrack — CC848811501 (item 1) should be routed at the rear side of the “stile strips” of the frame. The B side to the left “stile strip” and the A side to the right “stile strip”.
a lower subrack	the PI cables, lower subrack — CC848811519 (item 2) should be routed at the rear side of the “stile strips” of the frame. The B side to the left “stile strip” and the A side to the right “stile strip”.

Result:

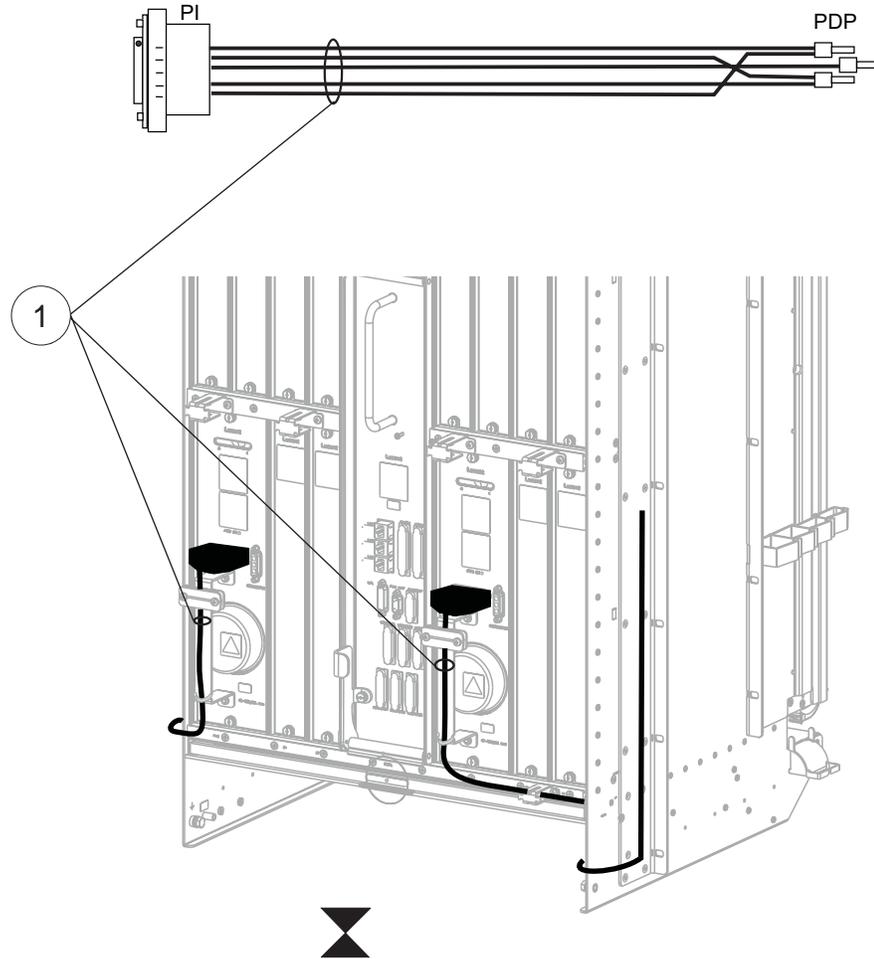
Figure 4-5 Routing PI cables (PDP side)



-
- 2** Connect the cables (item 1) to the PI connectors of the subrack. Tie the cables to the handles of the PIs by using tie-wraps.

Result:

Figure 4-6 Routing the PI cables (PI/subrack side)



END OF STEPS

Pin arrangement of the PI connector

Point on connector	Signal name	Color
A1	-DC	Blue
A2	+DC (return)	Red
A3	Ground	Yellow/Green
A4	+DC (return)	Red
A5	-DC	Blue



Power wiring (PDP - PI/100)

Before you begin This section can be skipped, if PI units are used (see section [“Power wiring \(PDP - PI\)” \(4-7\)](#)).

Important! The PI/100 unit can only be used when the rack is provided with 25mm² power cables.

PI/100 cables **Important!** The cables are prefabricated and mounted within the rack frames. Each cable (cable for side A and cable for side B) supports both subracks (upper and lower).

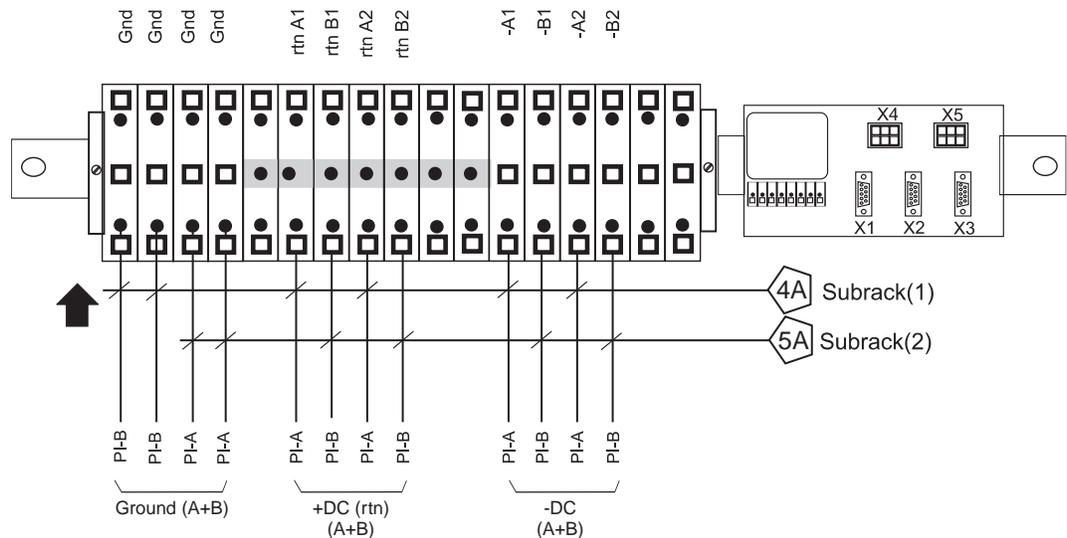
The following PI/100 cables should be used within ETSI-2 racks:

- PI/100 cable, A-side — CC848850723
- PI/100 cable, B-side — CC848850715.

The following PI/100 cables should be used within NEBS-2000 racks:

- PI/100 cable, A-side — CC848850749
- PI/100 cable, B-side — CC848850731.

Figure 4-7 PDP connection (PI/100 cables)



Legend:

- 4, 5 PI/100 cables (combined: yellow/green, red, blue)
- +DC (rtn) red

-DC blue
 Ground yellow/green

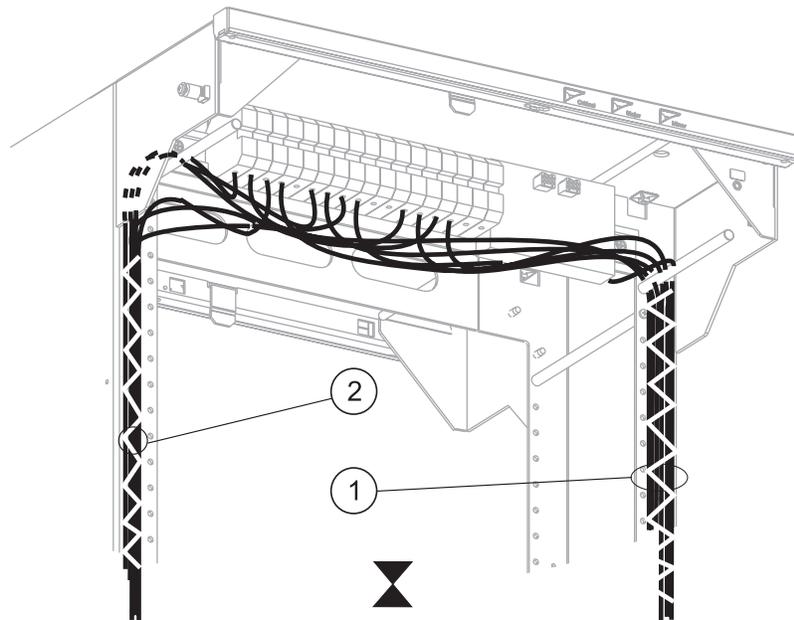
Routing The PI/100 cables should be routed as follows:

1

In the case of ...	then ...
side A	the PI/100 cables, A-side (item 1) should be routed at the right-rear side of the “stile strips” of the frame.
side B	the PI/100 cables, B-side (item 2) should be routed at the left-rear side of the “stile strips” of the frame.

Result:

Figure 4-8 Routing PI/100 cables (PDP side)



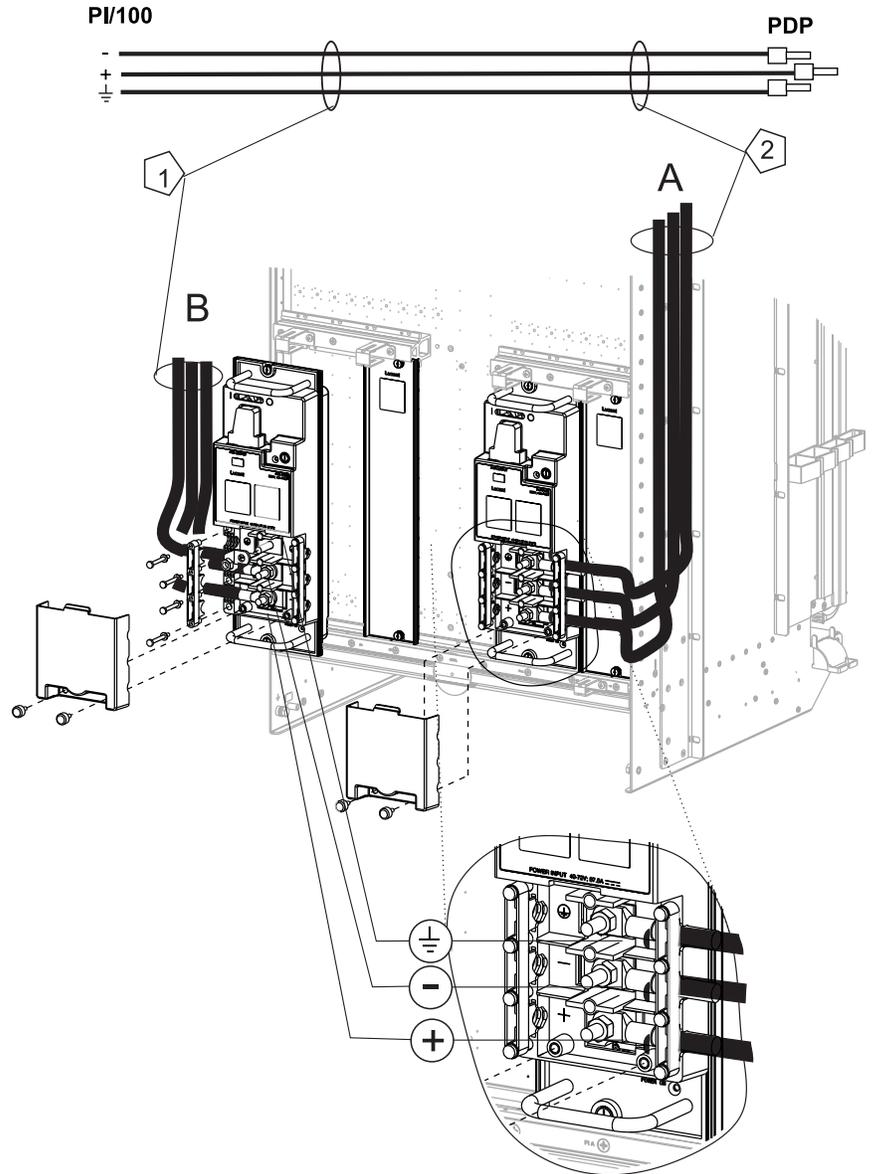
END OF STEPS

Cable connection

- 1 Remove the protection cap by unscrewing the two screws at the bottom of the protection cap.
.....
- 2 Remove the strain relief by unscrewing the four screws.
.....
- 3 Connect the pre-mounted rack cables of the rack frame or the Stud Cable Set — DC1006622 to the studs of the PI/100 unit.
.....
- 4 Mount the strain relief. Secure the four screws with a torque of 1 Nm starting with the two middle screws.
Important! Spare screws are available from the other unused strain relief.
.....
- 5 Mount the protection cap back in its position.

Result:

Figure 4-9 Connecting the PI/100 cables (PI/100 / subrack side)



END OF STEPS

Pin arrangement

Point on Connector	Signal Name	Color
	Ground	Yellow/Green
-	-DC	Blue
+	Return	Red

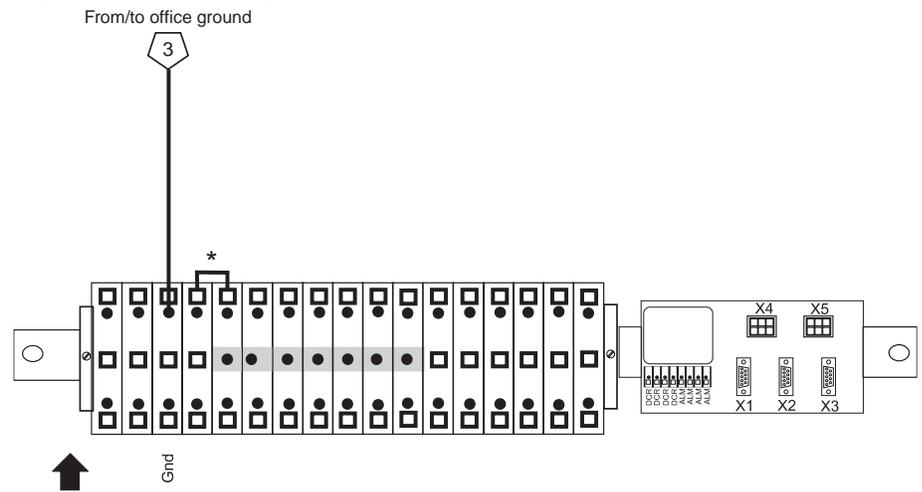


Ground wiring

Required grounding Only the PDP must be grounded with the office ground as shown in the figure below. All the other parts (rack, subracks, ...) are grounded as a result of the physical mounting (physical/electrical connection of device and rackframe).

NOTE: If isolated return wire is required (e.g. for the USA domestic market), the U-bracket (connection between return and ground) has to be removed!

Figure 4-10 PDP grounding



Legend:

- 3 Grounding cable — CC848833604 (yellow/green)
- * The U-bracket has to be removed, if the return wire is *only* grounded at the external battery (BDFB) source (e.g. valid for the USA domestic market)

Additional grounding (optional) **Important!** The cables mentioned in the procedure below are not part of the system delivery, but they can be ordered separately.

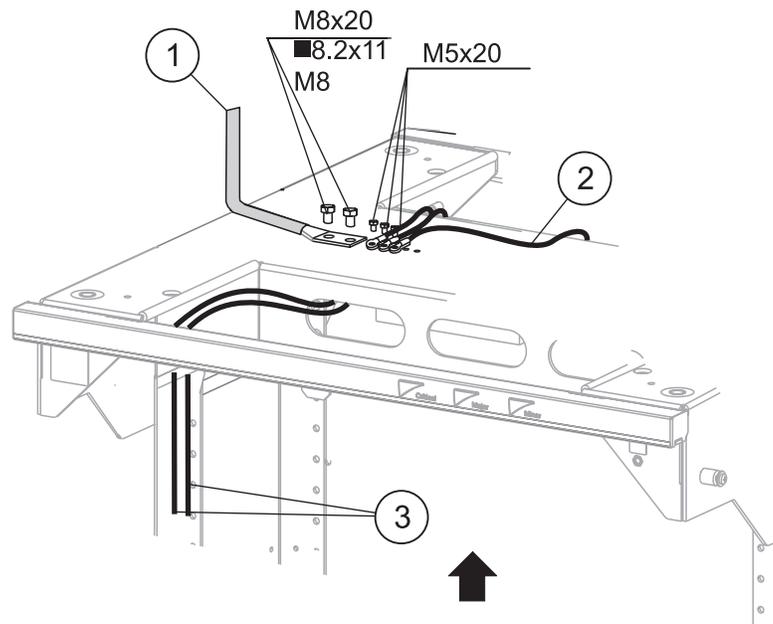
If additional grounding connections are wanted (or required), you can do the following:

- 1 Connect the office grounding cable — CC848834974 (item 1) to the top of the rack-frame using two hexagonal M8 bolts and nuts as shown in the figure below.
- 2 Ground the PDP, the subracks, and all units which are also mounted in the rack as shown in the figure below. The following ground cables can be ordered:
 - Ground wire “PDP” 800 mm [2.625 ft] — CC848828158 (item 2)
 - Ground wire “upper subrack” 2000 mm [6.562 ft] — CC848828174 (item 3)
 - Ground wire “lower subrack” 3000 mm [9.843 ft] — CC848828182 (item 3).

END OF STEPS

Result

Figure 4-11 Office and subrack grounding



Internal cable installation

Overview

Purpose This section provides information about the intra system cabling.

Contents

Cable management	4-20
Subrack alarm wiring	4-23
Station alarm interface	4-26



Cable management

Electrical cables Electrical cables are:

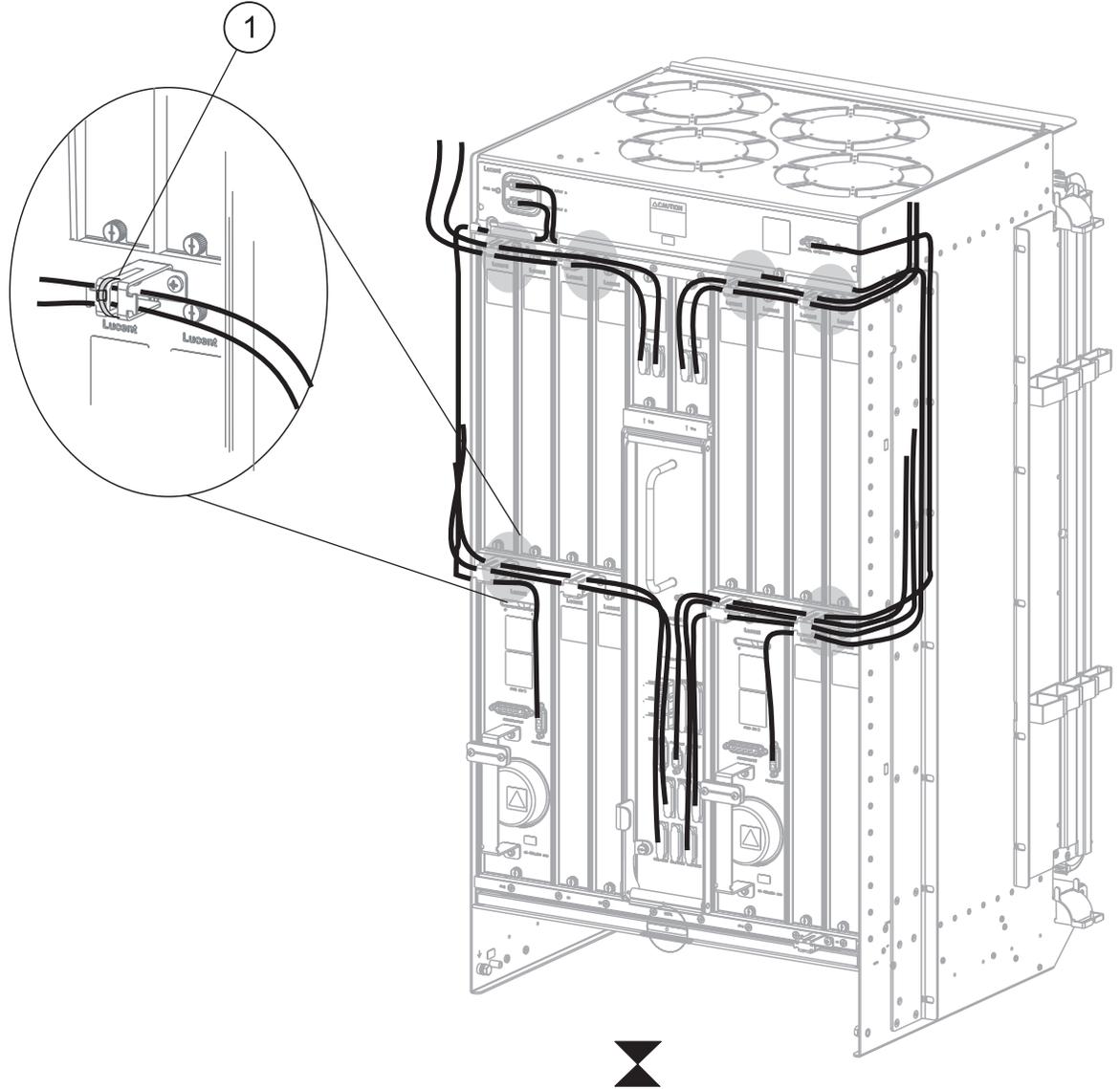
- TI-E1/DS1 (75/100/120)
- PI-FAN
- PI-PDP
- Alarm-PDP
- User bytes
- MDI/MDO
- LAN.

The above electrical cables are routed on both sides from the top or bottom of the Unite rack-frame to the subrack via the guides that are mounted on the rear of the subrack.

Important! When dressing the cables attach them to the guides by using tie wraps (item 1). See the following figures.

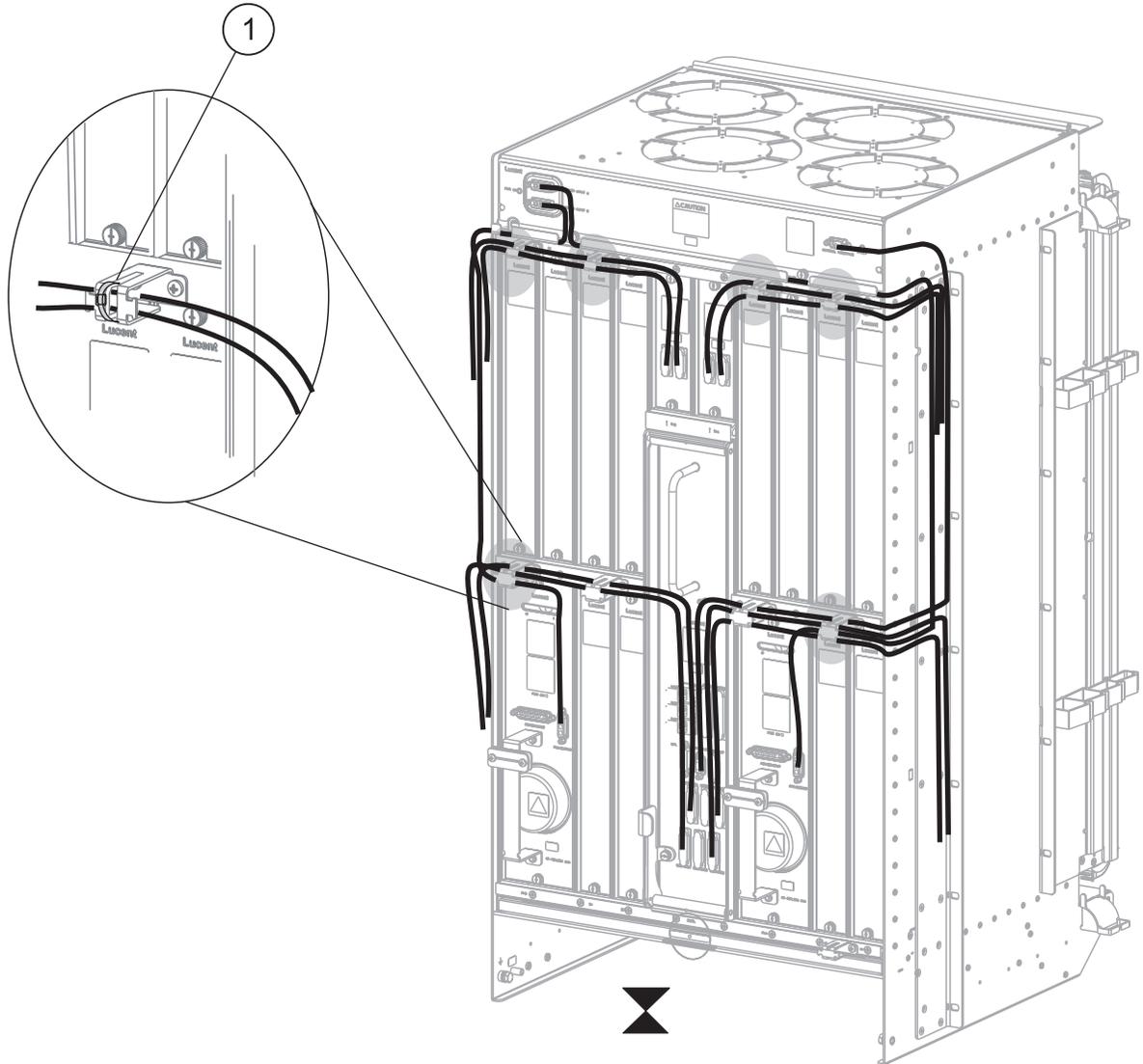
Top access

Figure 4-12 Cable management (top access)



Bottom access

Figure 4-13 Cable management (bottom access)



Subrack alarm wiring

Cables The following subrack alarm cables should be used:

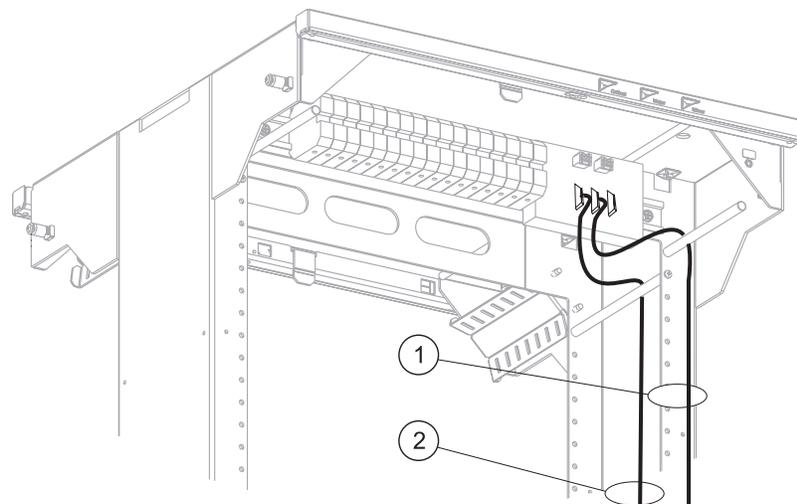
- CI-CTL - PDP, upper — CC848811527/DC1002828
- CI-CTL - PDP, lower — CC848811535/DC1001829.

Routing (PDP side) **Important!** These cables are mounted on the right rear stile of the rack frame. Remove two or three transport tie-wraps to route these cables to the subrack.

In the case of ...	Then ...
an upper subrack	route the cable — CC848811527/DC1002828 (item 2) at the right rear side of the stile strip of the frame.
a lower subrack	route the cable — CC848811535/DC1001829 (item 1) at the right rear side of the stile strip of the frame.

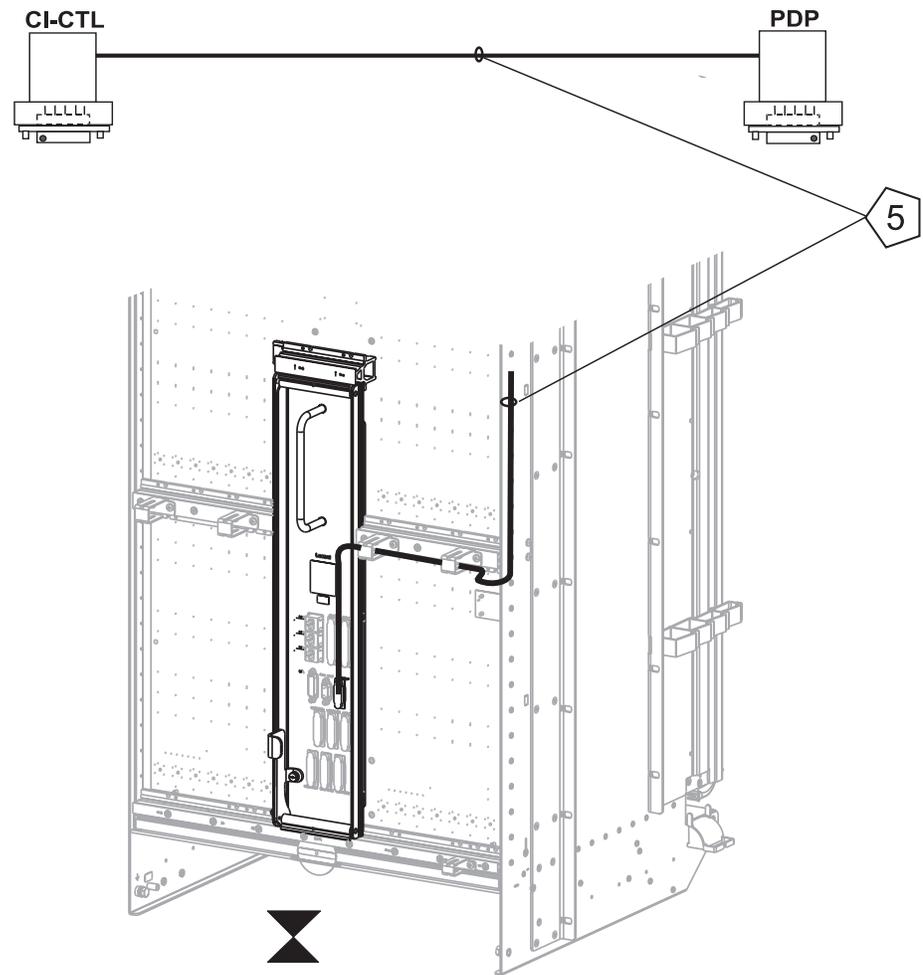
Result

Figure 4-14 Routing of the subrack alarm cables (PDP side)



Routing (subrack side)

Figure 4-15 Routing of the subrack alarm cables (subrack side)



Pin arrangements

CI-CTL		PDP	
Point on connector	Signal name	Point on connector	Signal name
1	Ground	1	Ground
2	Major rack-top return	2	Major rack-top return
3	Ground	3	Ground
4	Critical rack-top output	4	Critical rack-top output
5	Minor rack-top output	5	Minor rack-top output
6	Critical rack-top return	6	Critical rack-top return
7	Minor rack-top return	7	Minor rack-top return
8	Ground	8	Ground
9	Major rack-top output	9	Major rack-top output



Station alarm interface

Station alarms This interface consists of 6 isolated output-pairs. The ports can switch both 0.5A at 72V and 2.0A at 30V. Critical contacts (visual and acoustic) can be configured to be active without system power. These contacts are closed if there is loss of control or of power.

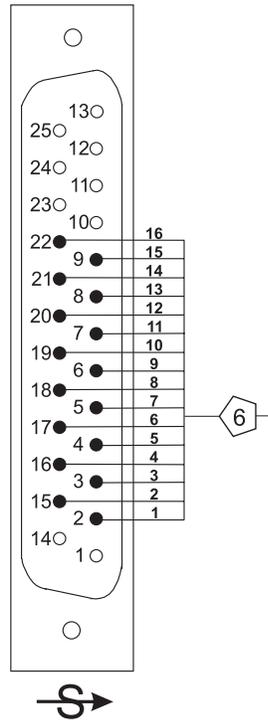
Cable data Length of pre-fabricated cables, 8 x 2 x 0.4 mm / AWG26 + overall screen:

- 10 m [32.808 ft] Cable Assy, Station Alarm — CC109155788
- 25 m [82.021 ft] Cable Assy, Station Alarm — CC109155796
- 50 m [164.042 ft] Cable Assy, Station Alarm — CC109155804
- 75 m [246.063 ft] Cable Assy, Station Alarm — CC109164186
- 100 m [328.084 ft] Cable Assy, Station Alarm — CC109164194

Connector data

Type of Connector	D-SUB pin, 25p solder
Code no. of Connector	CC407362730
Code no. of Hood	DC1003599

Figure 4-16 Station alarm interface

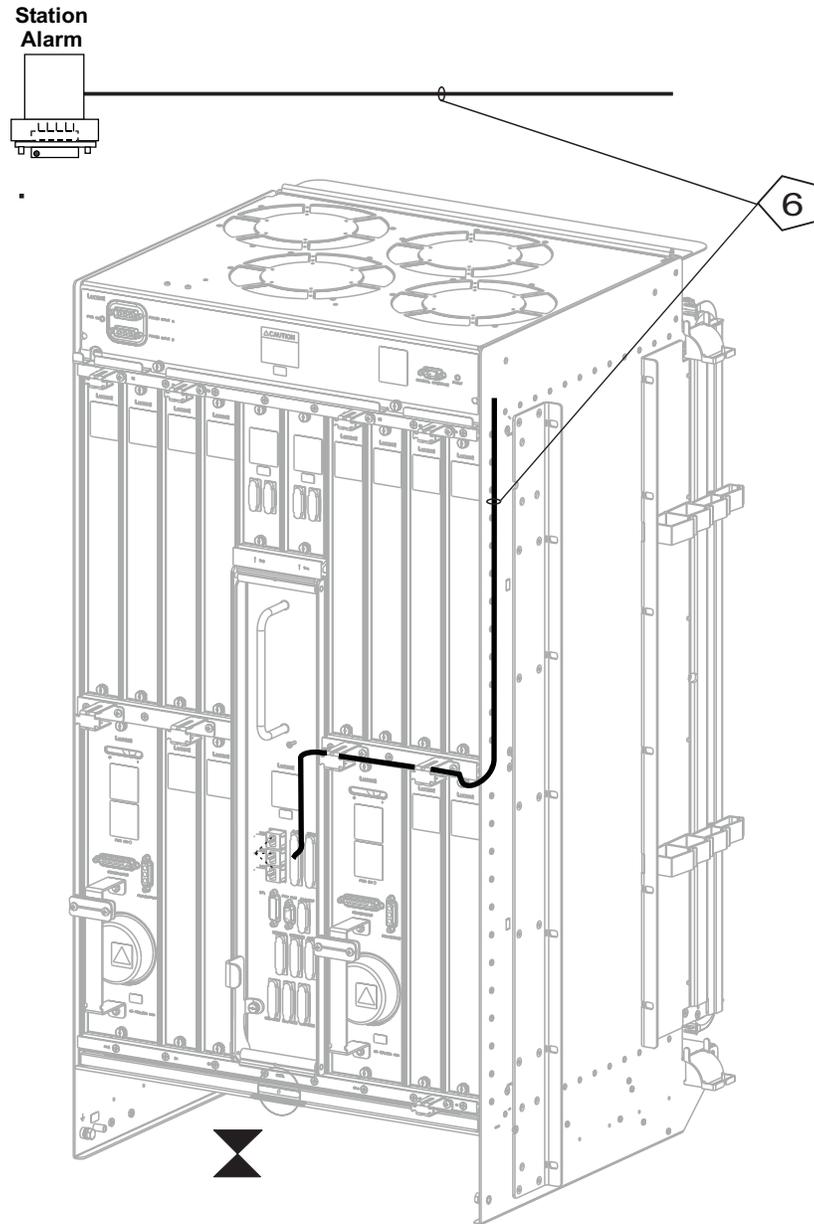


Point on Connector	Signal Name
2	Critical audio output
3	Critical visual output
4	Major audio-output return
5	Major visual output
6	Minor audio output
7	Minor visual output
8	Ground
9	Ground
15	Critical audio-output return
16	Critical visual-output return
17	Major audio output
18	Major visual-output return
19	Minor audio-output return

Point on Connector	Signal Name
20	Minor visual-output return
21	Ground
22	Ground

Routing and layout

Figure 4-17 Station alarm layout and routing



External cable installation

Overview

Purpose This section provides information about the external system cabling.

Contents

Miscellaneous Discrete Inputs/Outputs (MDIs/MDOs)	4-30
User byte interfaces (G.703/V.11)	4-33
TI-DS1 Station Clock I/O Interface (100/110 Ohm)	4-37
TI-E1 Station clock I/O interface (120 Ohm)	4-41
TI-E1 Station clock I/O interface (75 Ω)	4-44
LAN 10/100 Base-T interface	4-47
External alarms	4-51



Miscellaneous Discrete Inputs/Outputs (MDIs/MDOs)

Description The system supports 8 MDIs and 8 MDOs. The maximum current of 500mA/72V and 2A/30V may not be exceeded by the connected circuit.

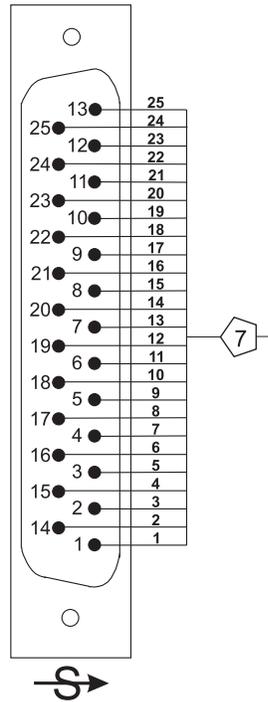
Cable data Length of pre-fabricated 13x2 wires x 0.5mm / AWG26 cables + overall screen:

- 10 m [32.808 ft] Cable Assy, MDI/MDO — CC109155481
- 25 m [82.021 ft] Cable Assy, MDI/MDO — CC109155499
- 50 m [164.042 ft] Cable Assy, MDI/MDO — CC109155507
- 75 m [246.063 ft] Cable Assy, MDI/MDO — CC109164202
- 100 m [328.084 ft] Cable Assy, MDI/MDO — CC109164210.

Connector data

Type of Connector	D-SUB pin, 25p solder
Code no. of Connector	CC407362730
Code no. of Hood	DC1003599

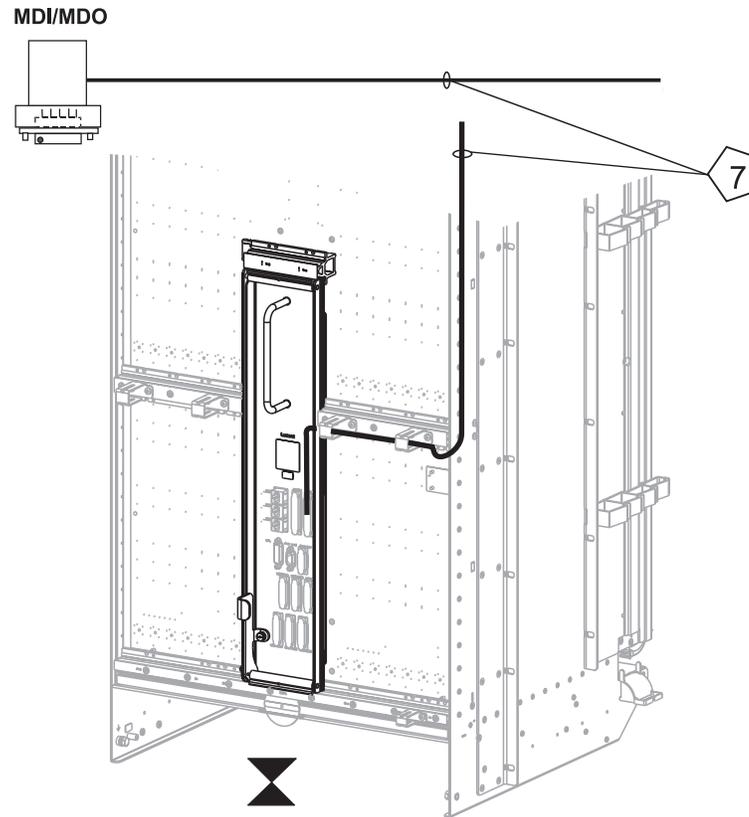
Figure 4-18 MDI/MDO interface



Point on Connector	Signal Name	Point on Connector	Signal Name
1	IN 0	14	IN 1
2	IN 2	15	IN 3
3	IN 4	16	IN 5
4	IN 6	17	IN 7
5	IN common	18	OUT 0 return
6	OUT 0	19	OUT 1 return
7	OUT 1	20	OUT 2 return
8	OUT 2	21	OUT 3 return
9	OUT 3	22	OUT 4 return
10	OUT 4	23	OUT 5 return
11	OUT 5	24	OUT 6 return
12	OUT 6	25	OUT 7 return
13	OUT 7		

Routing and layout

Figure 4-19 MDI/MDO layout and routing



User byte interfaces (G.703/V.11)

User Bytes For G.703 and V.11:

- USERBIO1
- USERBIO2
- USERBIO3
- USERBIO4

For V.11 only:

- USERBIO5
- USERBIO6.

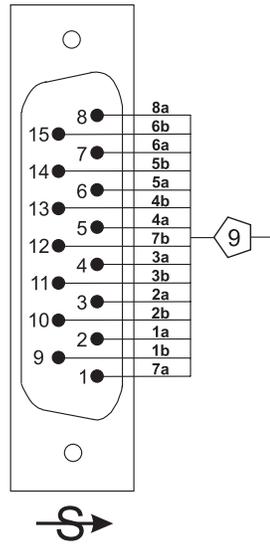
Cable data Length of pre-fabricated UTP cables, 100 Ω , 8 pairs + overall screen:

- 10 m [32.808 ft] Cable Assy, G.703/V.11 — CC109155523
- 25 m [82.021 ft] Cable Assy, G.703/V.11 — CC109155531
- 50 m [164.042 ft] Cable Assy, G.703/V.11 — CC109155549
- 75 m [246.063 ft] Cable Assy, G.703/V.11 — CC109164228
- 100 m [328.084 ft] Cable Assy, G.703/V.11 — CC109164236.

Connector data

Type of Connector	D-SUB pin, 15p solder
Code no. of Connector	CC407362755
Code no. of Hood	DC1003265

Figure 4-20 G.703/V.11 interface

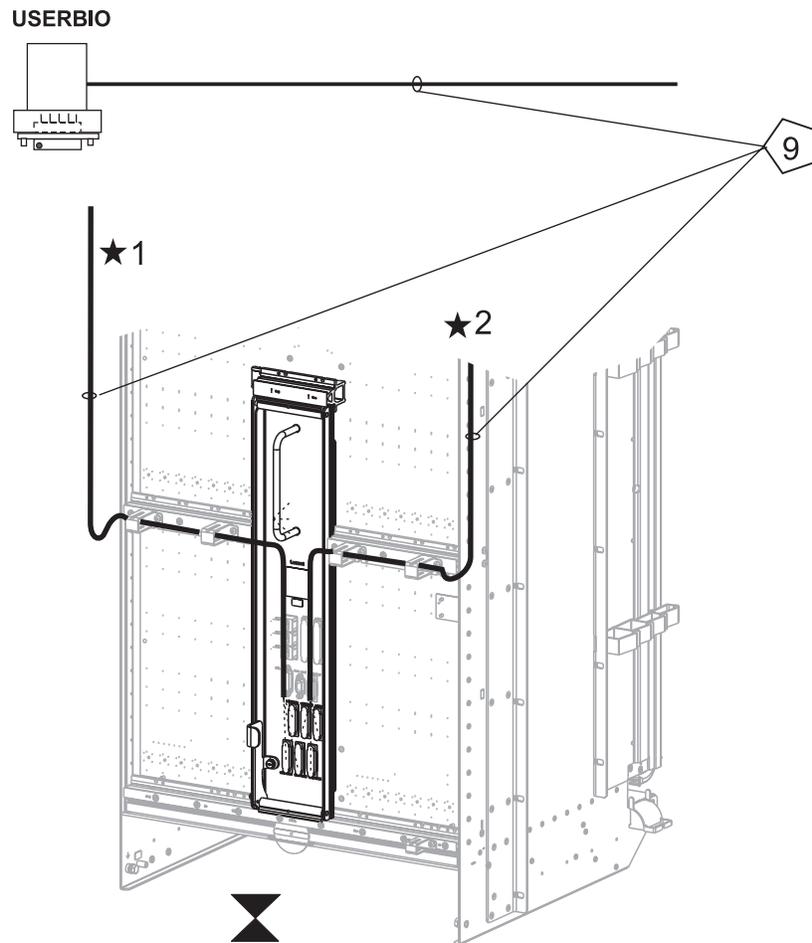


Point on Connector	Signal Name	V.11	G.703
1	Ground		
2	Output-Clock Positive		
3	Output-Frame Positive		
4	Output-Data Positive	Tx-Data Positive	Output Ring
5	Input-Clock Positive		
6	Input-Frame Positive		
7	Input-Data Positive	Rx-Data Positive	Input Ring
8	Ground		
9	Output-Clock Negative		
10	Output-Frame Negative		

Point on Connector	Signal Name	V.11	G.703
11	Output-Data Negative	Tx-Data Negative	Output Tip
12	Ground		
13	Input-Clock Negative		
14	Input-Frame Negative		
15	Input-Data Negative	Rx-Data Negative	Input Tip

Routing and layout

Figure 4-21 User byte layout and routing



Legend:

- *1 Routing for USERBIO 1, 4 and 5.
- *2 Routing for USERBIO 2, 3 and 6.



TI-DS1 Station Clock I/O Interface (100/110 Ohm)

Cable data (TI-DS1 output, 100/110 Ω)

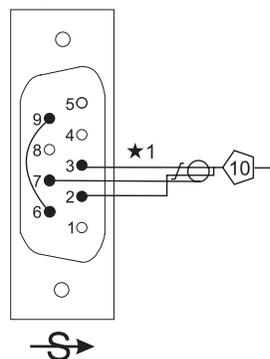
Length of pre-fabricated cables, shielded twisted pair 100 Ω + overall screen:

- 10 m [32.808 ft] Cable Assy, TI-DS1 — CC109155580
- 25 m [82.021 ft] Cable Assy, TI-DS1 — CC109155598
- 50 m [164.042 ft] Cable Assy, TI-DS1 — CC109155606
- 75 m [246.063 ft] Cable Assy, TI-DS1 — CC109164269
- 100 m [328.084 ft] Cable Assy, TI-DS1 — CC109164277
- 125 m [410.105 ft] Cable Assy, TI-DS1 — CC109187484
- 150 m [492.126 ft] Cable Assy, TI-DS1 — CC109187492
- 175 m [574.147 ft] Cable Assy, TI-DS1 — CC109187500
- 200 m [656.168 ft] Cable Assy, TI-DS1 — CC109187518.

Connector data (TI-DS1 output, 100/110 Ω)

Type of Connector	D-SUB pin, 9p solder
Code no. of Connector	CC407362748/DC1003660
Code no. of Hood	DC1003609

Figure 4-22 DS1 – Station clock output interface, 100 Ω



Point on Connector	Signal Name	Wire Color *1
2	Station-Clock Output Positive	White
3	Station-Clock Output Negative	Blue
7	Ground	Screen

Point on Connector	Signal Name	Wire Color *1
6, 9	Strap	

Cable data (TI-DS1 input, 100/110 Ω)

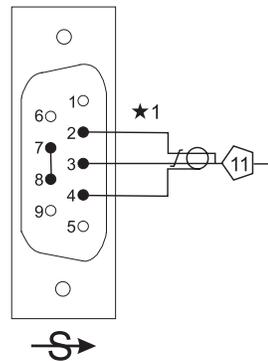
Length of pre-fabricated cables, shielded twisted pair 100 Ω + overall screen:

- 10 m [32.808 ft] Cable Assy, TI-DS1 — CC109155846
- 25 m [82.021 ft] Cable Assy, TI-DS1 — CC109155853
- 50 m [164.042 ft] Cable Assy, TI-DS1 — CC109155861
- 75 m [246.063 ft] Cable Assy, TI-DS1 — CC109164327
- 100 m [328.084 ft] Cable Assy, TI-DS1 — CC109164335
- 125 m [410.105 ft] Cable Assy, TI-DS1 — CC109187526
- 150 m [492.126 ft] Cable Assy, TI-DS1 — CC109187534
- 175 m [574.147 ft] Cable Assy, TI-DS1 — CC109187542
- 200 m [656.168 ft] Cable Assy, TI-DS1 — CC109187559.

Connector data (TI-DS1 input, 100/110 Ω)

Type of Connector	D-SUB Socket, 9p Solder
Code no. of Connector	CC407362797/DC1003661
Code no. of Hood	DC1003609

Figure 4-23 DS1 – Station clock input interface, 100 Ω

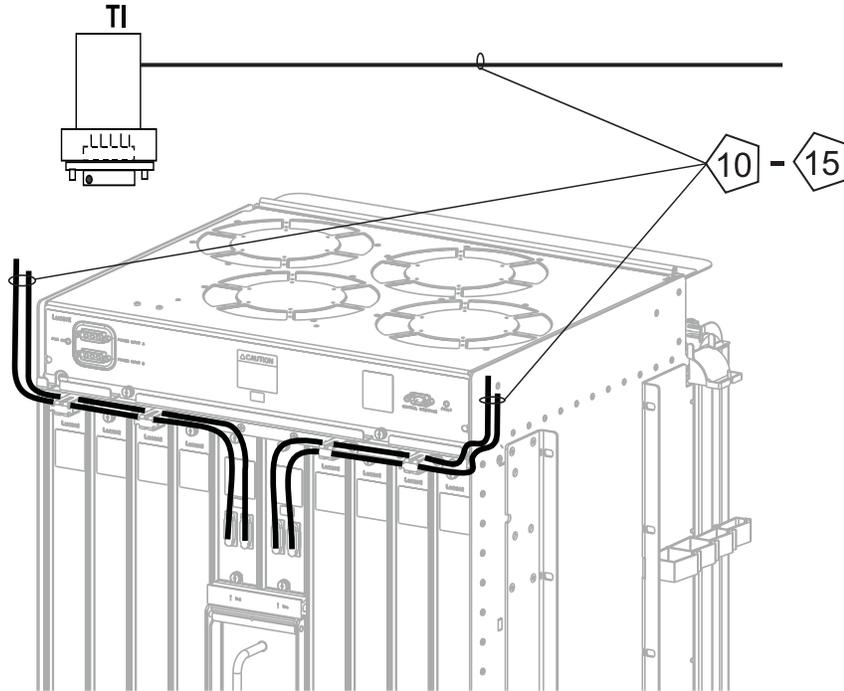


Point on Connector	Signal Name	Wire Color *1
2	Station-Clock Input Positive	White

Point on Connector	Signal Name	Wire Color *1
3	Station-Clock Input Negative	Blue
4	Ground	Screen
7, 8	Strap	

Routing and layout The upper and lower subracks have the cabling at the rear side: the B (IN/OUT) to the left and the A (IN/OUT) to the right.

Figure 4-24 Routing and layout



TI-E1 Station clock I/O interface (120 Ohm)

Cable data (TI-E1 Output, 120 Ω)

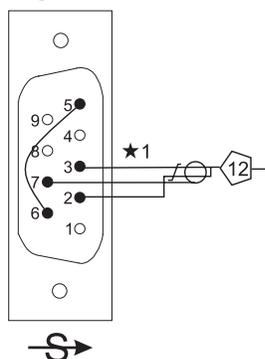
Length of pre-fabricated cables, shielded twisted pair, 120 Ω + overall screen:

- 10 m [32.808 ft] Cable Assy, TI-E1 (120Ω) — CC109155556
- 25 m [82.021 ft] Cable Assy, TI-E1 (120Ω) — CC109155564
- 50 m [164.042 ft] Cable Assy, TI-E1 (120Ω) — CC109155572
- 75 m [246.063 ft] Cable Assy, TI-E1 (120Ω) — CC109164244
- 100 m [328.084 ft] Cable Assy, TI-E1 (120Ω) — CC109164251.

Connector data (TI-E1 Output, 120 Ω)

Type of Connector	D-SUB pin, 9p solder
Code no. of Connector	CC407362748
Code no. of Hood	DC1003609

Figure 4-25 E1 – Station clock output interface, 120 Ω



Point on Connector	Signal Name	Wire Color *1
2	Station-Clock Output Positive	White
3	Station-Clock Output Negative	Blue
7	Ground	Screen
5, 6	Strap	

TI-E1 Station clock I/O interface (120 Ohm)

Cable data (TI-E1 input, 120 Ω)

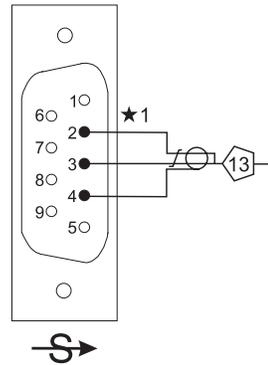
Length of pre-fabricated cables, shielded twisted pair, 120 Ω + overall screen:

- 10 m [32.808 ft] Cable Assy, TI-E1 (120Ω) — CC109155812
- 25 m [82.021 ft] Cable Assy, TI-E1 (120Ω) — CC109155820
- 50 m [164.042 ft] Cable Assy, TI-E1 (120Ω) — CC109155838
- 75 m [246.063 ft] Cable Assy, TI-E1 (120Ω) — CC109164301
- 100 m [328.084 ft] Cable Assy, TI-E1 (120Ω) — CC109164319.

Connector data (TI-E1 input, 120 Ω)

Type of Connector	D-SUB Socket, 9p Solder
Code no. of Connector	CC407362797
Code no. of Hood	DC1003609

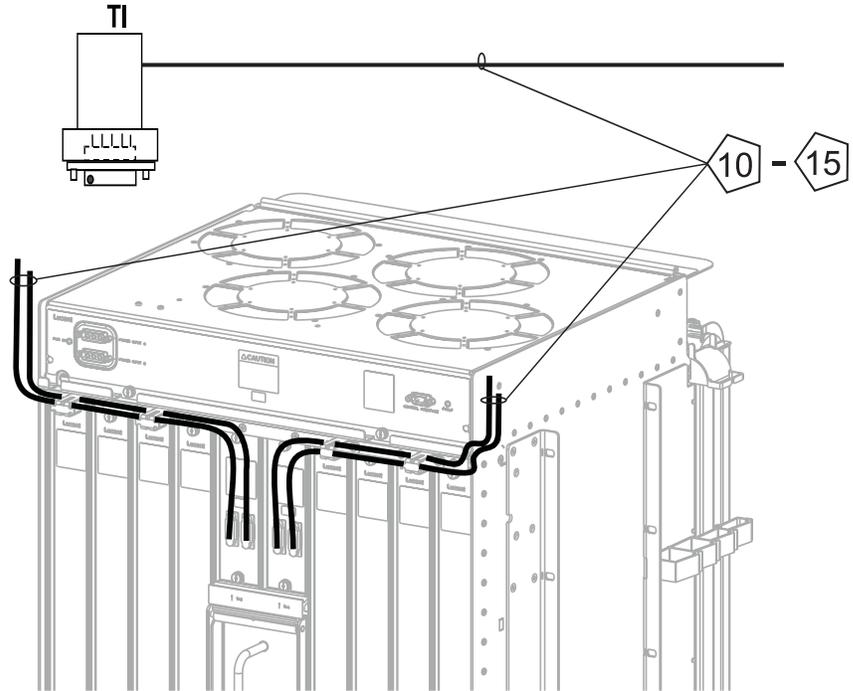
Figure 4-26 E1 – Station clock input interface, 120 Ω



Point on Connector	Signal Name	Wire Color *1
2	Station-Clock Input Positive	White
3	Station-Clock Input Negative	Blue
4	Ground	Screen

Routing and layout The upper and lower subracks have the cabling at the rear side: the B (IN/OUT) to the left and the A (IN/OUT) to the right.

Figure 4-27 Routing and layout



TI-E1 Station clock I/O interface (75 Ω)

Cable data (TI-E1 output, 75 Ω)

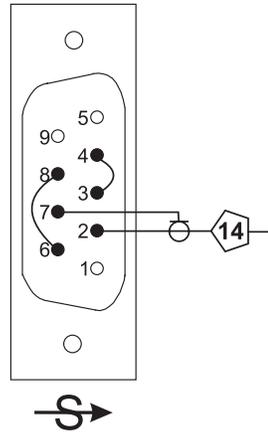
Length of pre-fabricated cables, coaxial 75 Ω:

- 10 m [32.808 ft] Cable Assy, TI-E1 (75Ω) — CC109155614
- 25 m [82.021 ft] Cable Assy, TI-E1 (75Ω) — CC109155622
- 50 m [164.042 ft] Cable Assy, TI-E1 (75Ω) — CC109155630
- 75 m [246.063 ft] Cable Assy, TI-E1 (75Ω) — CC109164285
- 100 m [328.084 ft] Cable Assy, TI-E1 (75Ω) — CC109164293.

Connector data (TI-E1 output, 75 Ω)

Type of Connector	D-SUB pin, 9p solder
Code no. of Connector	CC407362748
Code no. of Hood	DC1003609

Figure 4-28 TI-E1 Station clock output interface, 75 Ω



Point on Connectors	Signal Name	Wire Color
2	Station-Clock Output	Inner wire
7	Ground	Screen
3, 4	Strap	
6, 8	Strap	

Cable data (TI-E1 input, 75 Ω)

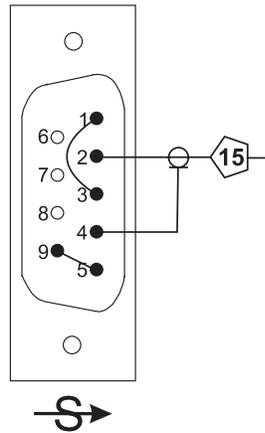
Length of pre-fabricated cables, coaxial 75 Ω:

- 10 m [32.808 ft] Cable Assy, TI-E1 (75Ω) — CC109155879
- 25 m [82.021 ft] Cable Assy, TI-E1 (75Ω) — CC109155887
- 50 m [164.042 ft] Cable Assy, TI-E1 (75Ω) — CC109155895
- 75 m [246.063 ft] Cable Assy, TI-E1 (75Ω) — CC109164343
- 100 m [328.084 ft] Cable Assy, TI-E1 (75Ω) — CC109164350.

Connector data (TI-E1 input, 75 Ω)

Type of Connector	D-SUB Socket, 9p Solder
Code no. of Connector	CC407362797
Code no. of Hood	DC1003609

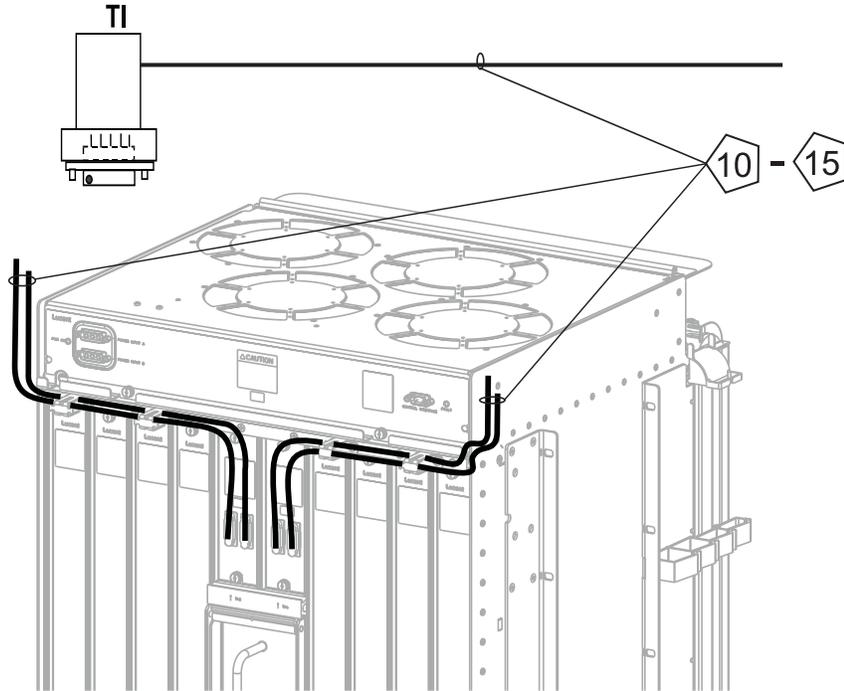
Figure 4-29 TI-E1 Station clock input interface, 75 Ω



Point on Connectors	Signal Name	Wire Color
1, 3	Strap	
2	Station-Clock Input	Inner wire
4	Ground	Screen
5, 9	Strap	

Routing and layout The upper and lower subracks have the cabling at the rear side: the B (IN/OUT) to the left and the A (IN/OUT) to the right.

Figure 4-30 Routing and layout



LAN 10/100 Base-T interface

Locations The LAN ports are positioned at:

- LAN1 – CIT Interface
- CI-CTL:
 - LAN2, LAN3 – Local EMS (HUB) or CIT Interfaces
 - LAN4 – XTreme Interface

Connector data

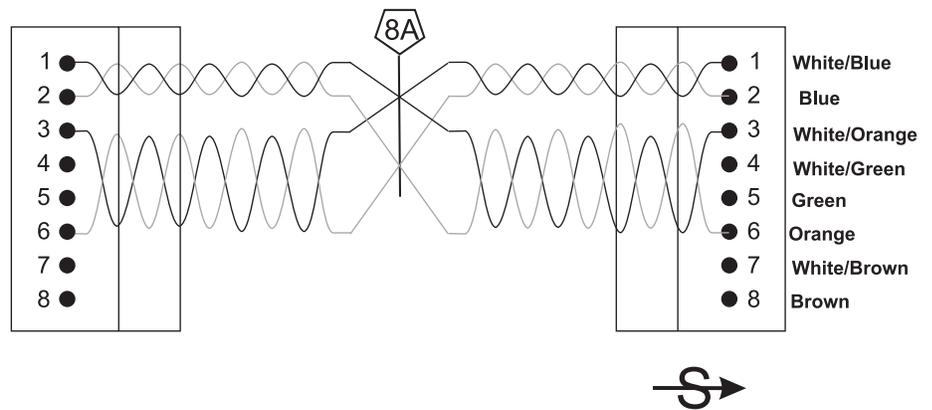
Type of Connector	Modular Plug / RJ45 8p, shielded
Code no. of Connector	CC407890193 / DC1003604
	336 330-1

CIT Connection(s) The LAN1 port at the front on the User Panel is the dedicated port for the CIT, but the LAN2, 3 and 4 ports can be used at the rear on the CI-CTL.

Each CIT connection uses these crossed LAN cables:

- 5 m LAN cable
- 10 m LAN cable.

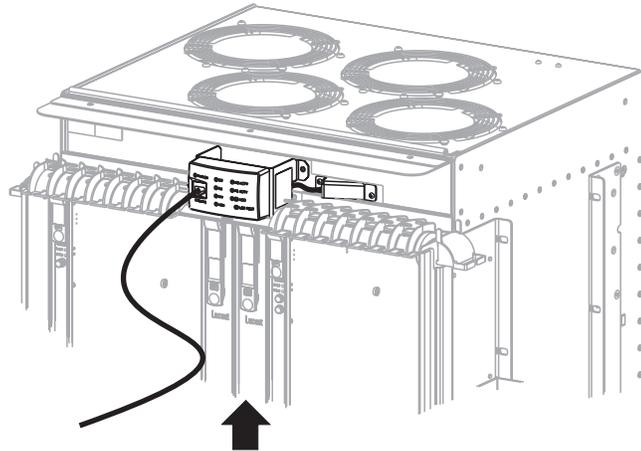
Figure 4-31 CIT Connection (LAN crossed)



Point on Connector	Signal Name
1	Transmit-data positive

Point on Connector	Signal Name
2	Transmit-data negative
3	Receive-data positive
6	Receive-data negative

Figure 4-32 Routing and layout (User Panel)



HUB connections

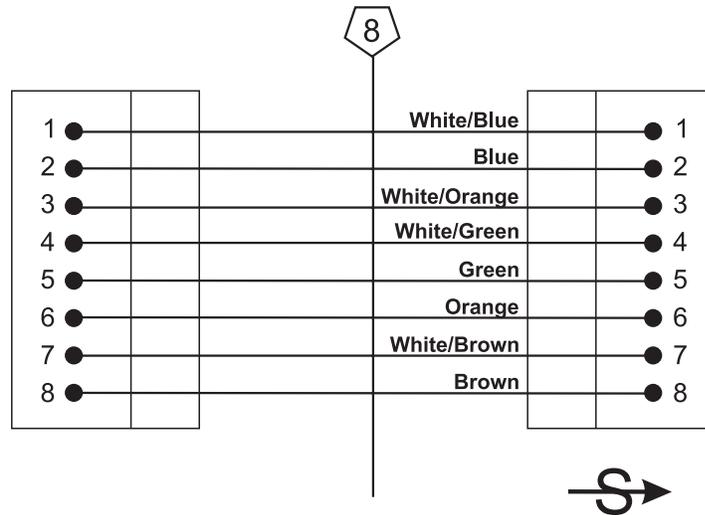
The LAN2, 3 and 4 ports at the rear on the CI-CTL are defined as HUB connections, that use straight LAN cables.

Each HUB connection uses the following pre-fabricated straight LAN cables (CAT5 with 4-wire RJ-45/RJ-45 connectors):

- 10 m [32.808 ft] Cable Assy, LAN — CC109155929
- 25 m [82.021 ft] Cable Assy, LAN— CC109155945
- 50 m [164.042 ft] Cable Assy, LAN— CC109155952
- 75 m [246.063 ft] Cable Assy, LAN — CC109164368

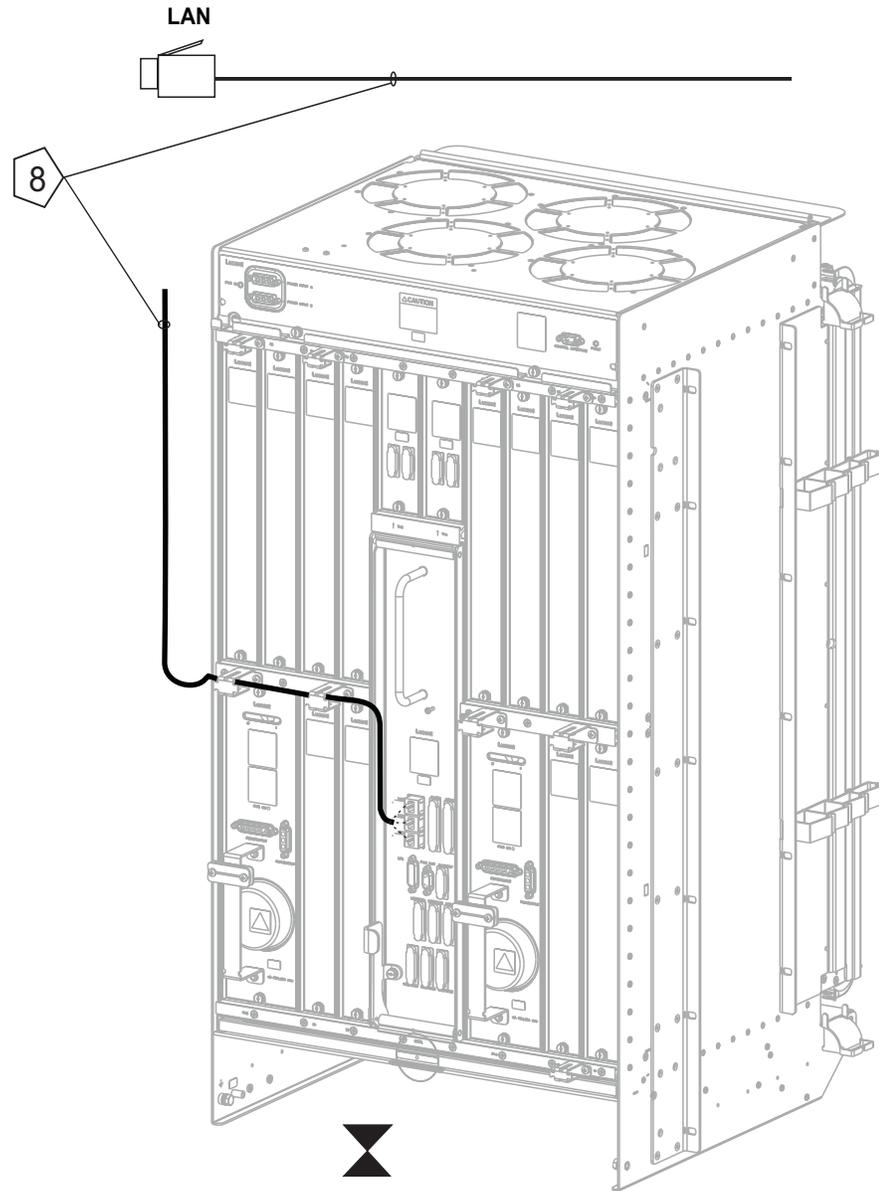
- 91 m [298.556 ft] Cable Assy, LAN — CC109164376.

Figure 4-33 HUB connection (LAN straight)



Point on Connector	Signal Name
1	Transmit-data positive
2	Transmit-data negative
3	Receive-data positive
6	Receive-data negative

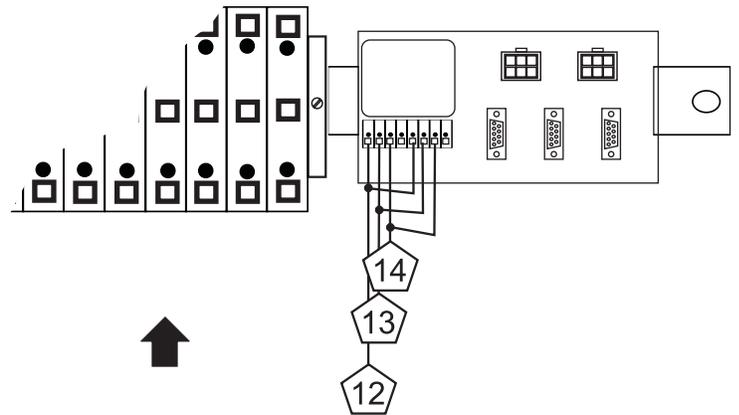
Figure 4-34 Routing and layout (CI-CTL)



External alarms

- Cable data** The office alarm cables are available in the following lengths:
- 15 m [49.212 ft] Office alarm cable — CC848834925
 - 30 m [98.424 ft] Office alarm cable — CC848834933
 - 45 m [147.636 ft] Office alarm cable — CC848834941
 - 75 m [246.063 ft] Office alarm cable — CC848834958.

Figure 4-35 PDP external alarms



Legend:

- 12 External Critical Alarm
- 13 External Major Alarm
- 14 External Minor Alarm

Connector data The following figure shows the pin assignment of the PDP external alarm connector.

Figure 4-36 PDP external alarm connector



Legend:

- 1, 5 Critical Alarm

2, 6 Major Alarm
3, 7 Minor Alarm



Fiber cabling

Overview

Purpose This section provides information about the fiber cabling and routing. Be aware that **the fiber cables cannot be connected** to the optical circuit packs **at this moment**. That should be done later (see Chapter 8, section [“Connecting the fiber cables” \(8-6\)](#)). However, the fiber cables should now be laid loosely for the complete network.

Contents

Optical interfaces	4-54
Gigabit Ethernet interfaces	4-61
Fiber management in rack	4-63
Fiber management in subrack	4-67



Optical interfaces

Application packs The following pack types are available:

- OP155M
- OP622M
- OP2G5
- OP10G
- OP40G.

See [“Specifications for *LambdaUnite*[™] MSS optical circuit packs” \(C-15\)](#) for order codes and specifications.

Cables **Important!** Only the fiber cables with listed comcode are allowed to be used , otherwise the proper functioning of the system can not be guaranteed.

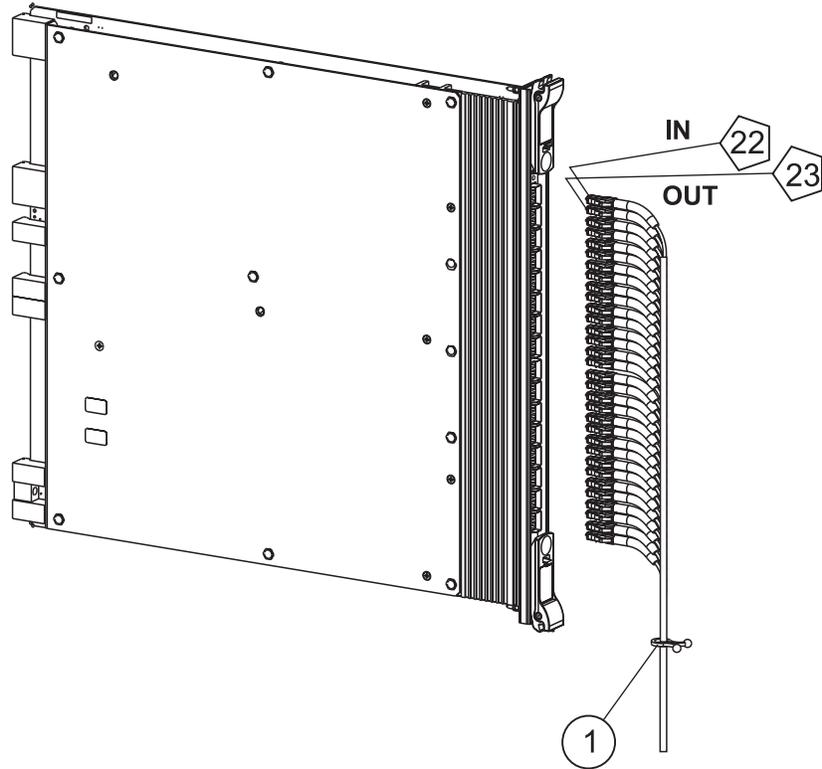
The fiber types are:

- SM-minicord BreakOut cable
- SM-simplex cable.

Connector type LC connector with an angled Boot 40-45 degrees for termination to port units. Blue connector for SM, beige connector for MM. The LC boot must remain freely rotatable around the connector length axis after termination, in order to adjust its orientation to the fiber routing direction without damaging the fiber.

OP155M

Figure 4-37 OP155M layout

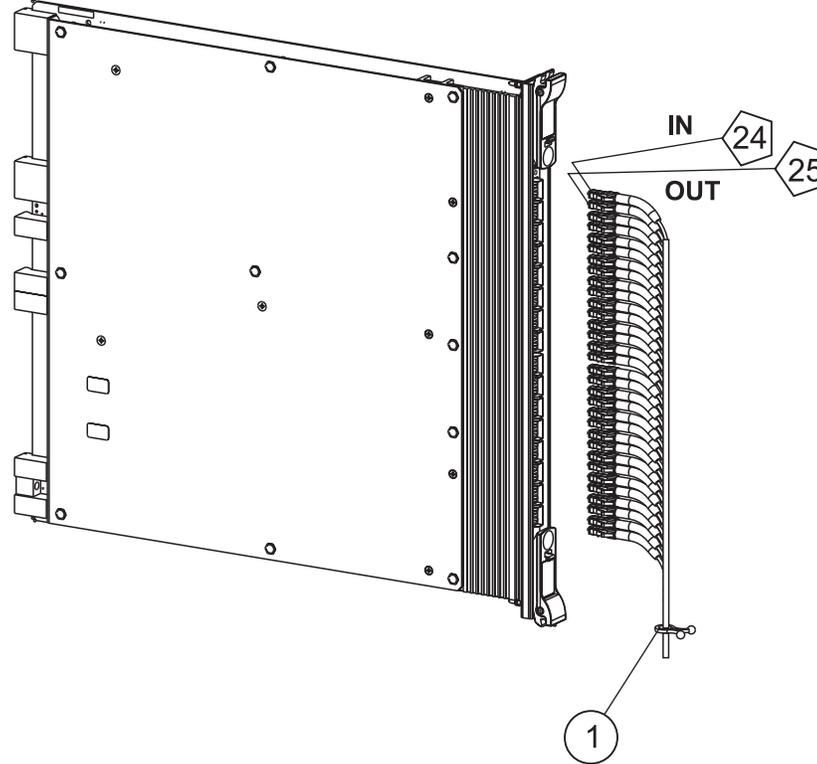


Legend:

- 1 Richeo Twist Lock TL250 — DC1004336 (part of circuit pack delivery)

OP622M

Figure 4-38 OP622M layout

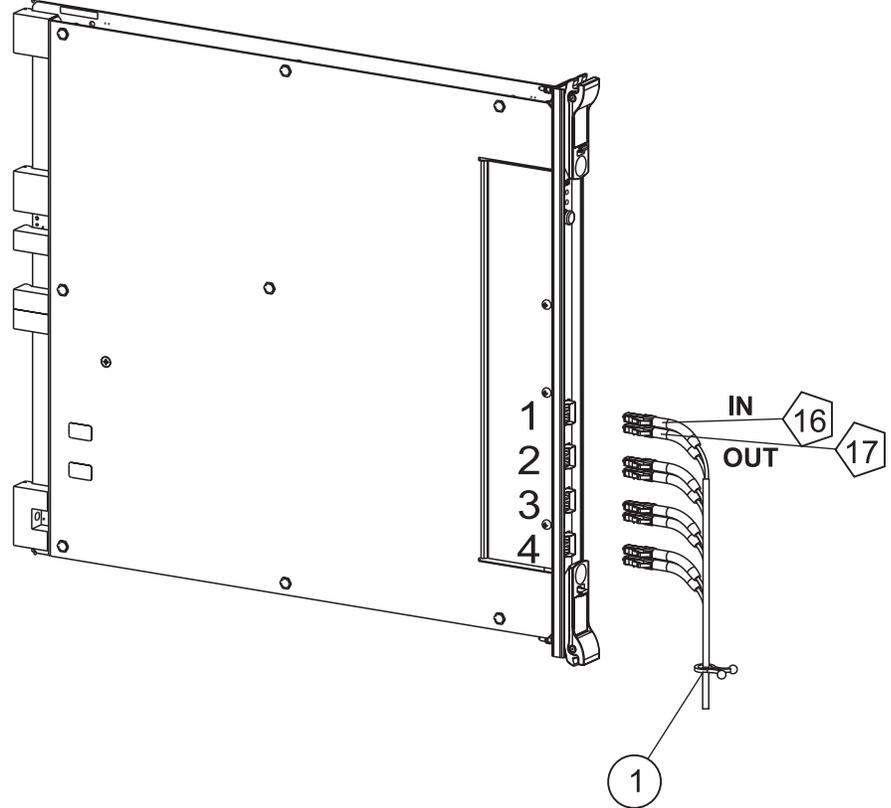


Legend:

- 1 Richco Twist Lock TL25 — DC1004336 (part of circuit pack delivery)

OP2G5

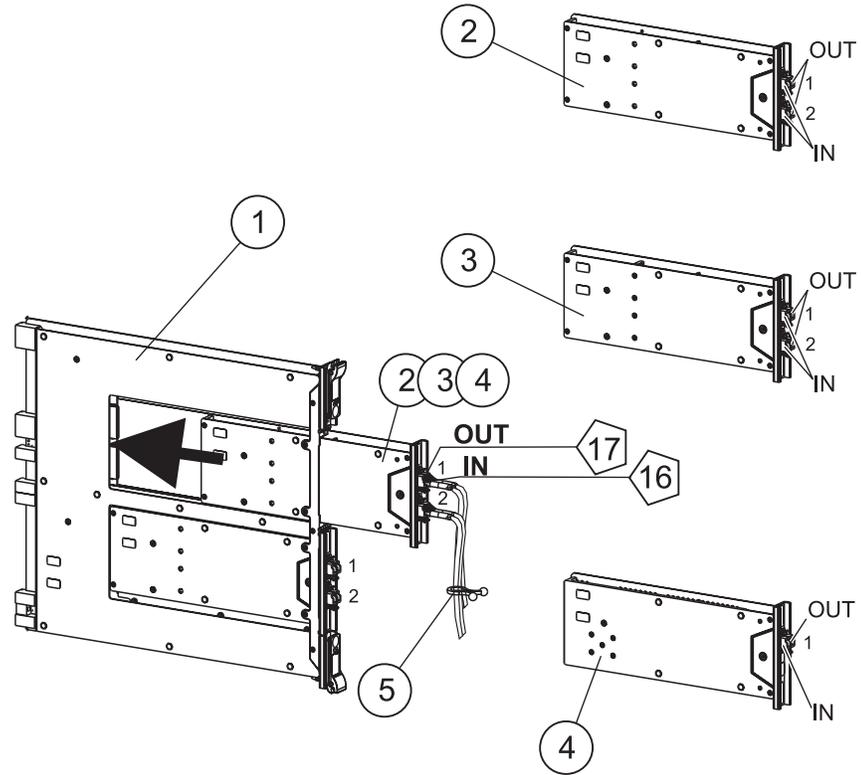
Figure 4-39 OP2G5 layout



Legend:

- 1 Richco Twist Lock TL250 — DC1004336 (part of circuit pack delivery)

Figure 4-40 OP2G5 main board and modules layout

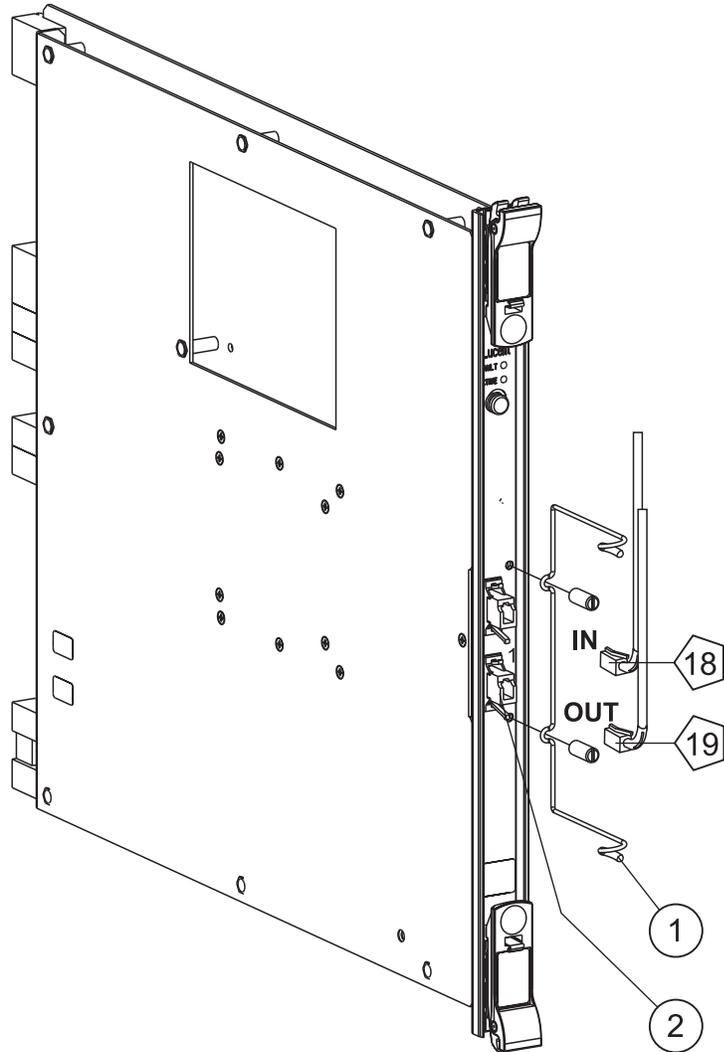


Legend:

- 1 Main Board
- 2 OP2G5M AM1 Ap 1.X — KFA203 (1300nm)
- 3 OP2G5M AM1 Ap 1.X — KFA204 (1550nm)
- 4 OP2G5 PWDM AM1 Ap 1.X – KFA20
- 5 Richco Twist Lock TL250 — DC1004336 (part of circuit pack delivery)

OP10G

Figure 4-41 OP10G layout



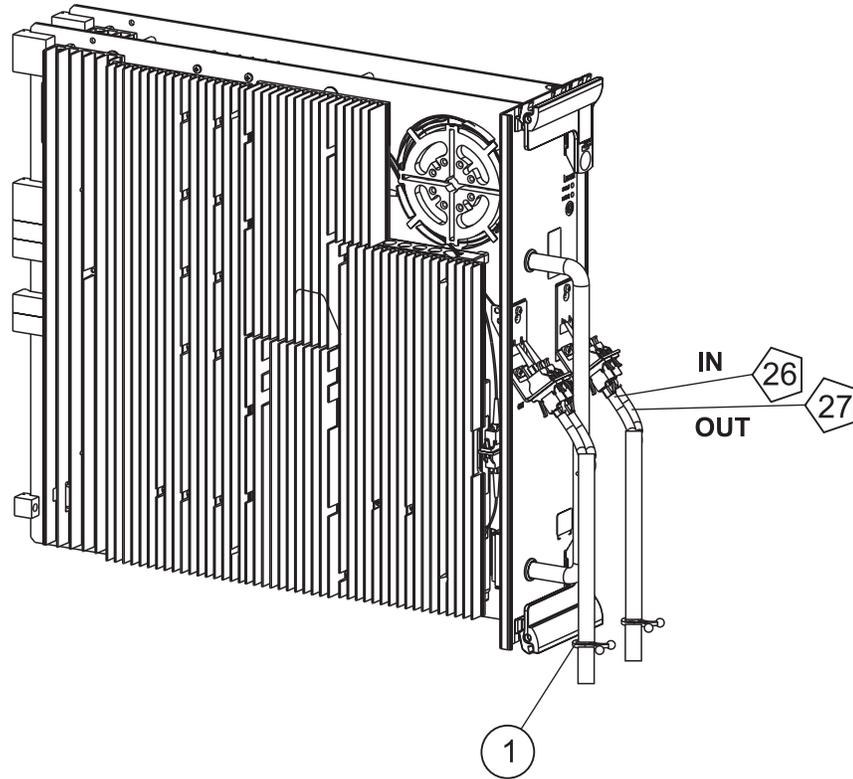
Legend:

- 1 is part of the circuit pack
- 2 LC connector — CC108265950 and ASSY-A1LC-BASE (BLACK) B* — CC108265950

See Appendix C, section [“LC attenuators” \(C-12\)](#) for a list of various attenuators.

OP40G

Figure 4-42 OP40G layout



Legend:

- 1 Richco Twist Lock TL250 — DC1004336 (part of circuit pack delivery)



Gigabit Ethernet interfaces

Application packs The following pack type is available:

- GE1/SX4.

See [“Specifications for *LambdaUnite*[™] MSS optical circuit packs” \(C-15\)](#) for order codes and specifications.

Cables **Important!** Only the fiber cables with listed comcode are allowed to be used, otherwise the proper functioning of the system can not be guaranteed.

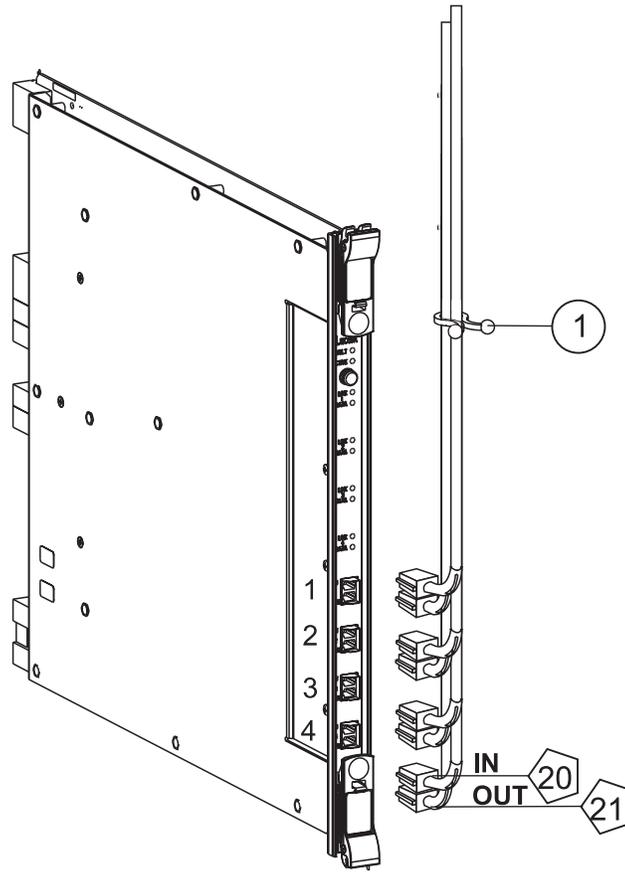
The types of [“Multi-Mode 62.5/125 fiber-optic cables” \(C-8\)](#) are:

- MM-minicord break out cable
- MM-simplex cable.

Connector type LC connector with an angled Boot 40-45 degrees for termination to port units. Blue connector for SM, beige connector for MM. The LC boot must remain freely rotatable around the connector length axis after termination, in order to adjust its orientation to the fiber routing direction without damaging the fiber.

GE1/SX4

Figure 4-43 GE1/SX4



Legend:

- 1 Richco Twist Lock TL250 — DC1004336 (part of circuit pack delivery)



Important! The entries (*1) in the fiber guides are counted from the front (first entry) to the back of the bracket (fourth entry). The cables are tied together with velcro at the entries (*2) of the rack frame and subrack

Upper subrack

The upper subrack cables are using the third entry of the fiber guide (a) to route down first and then upwards to:

- The upper row via the first entry (b)
- The bottom row directly

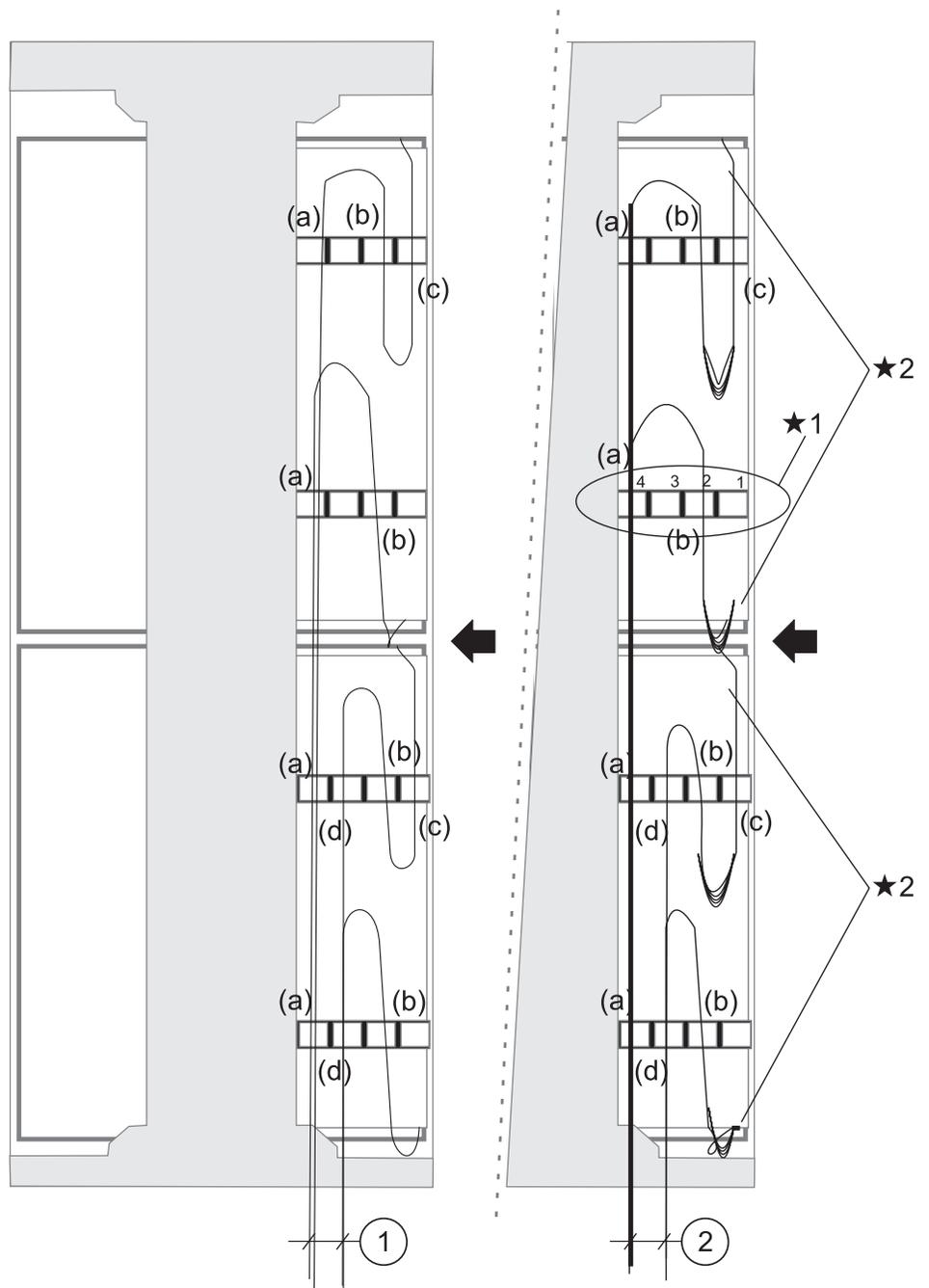
Bottom subrack

The bottom subrack cables are using the fourth entry of the fiber guide (c) to route down first and then upwards to:

- The upper row via the first entry (d)
- The bottom row directly

Bottom access

Figure 4-45 Bottom access fiber management (side view rack)



Important! The entries (*1) in the fiber guides are counted from the front (first entry) to the end of the bracket (fourth entry). The cables are tight together with velcro at the entries (*2) of the rack frame and subrack

Upper subrack

The upper subrack cables are using the fourth entry of the fiber guide (a) to route up first and then upwards to:

- The upper row down via the second entry (b) and up via the first entry (c)
- The bottom row down via the second entry (b) and directly to the row

Bottom subrack

The bottom subrack cables are using the third entry (d) of the fiber guide to route up first and then upwards to:

- The upper row down via the second entry (b) and up via the first entry (c)
- The bottom row down via the second entry (b) and directly to the row.

□

Fiber management in subrack

Optical cables

The Fiber optic cables are:

- [“Single Mode 9/125 fiber-optic cables” \(C-2\)](#) for [“Optical interfaces” \(4-54\)](#) (OP155M, OP622M, OP2G5, OP10G and OP40G)
- [“Multi-Mode 62.5/125 fiber-optic cables” \(C-8\)](#) for [“Gigabit Ethernet interfaces” \(4-61\)](#)

The above optical cables are routed on both sides from the top or bottom of the Unite rack-frame to the subrack via the fiber guides that are on the subrack’s mounting brackets at the right-front and left-front sides of the subrack.

The break-out cables will be stripped to the halfway point of the subracks’s height.

Important! When dressing the optical cables (break-out or simplex) use a bending radius of a minimum of 25mm [1”] for stripped break-out or single fibers and a minimum of 77 mm [3.03”] for an unstripped break-out cable.

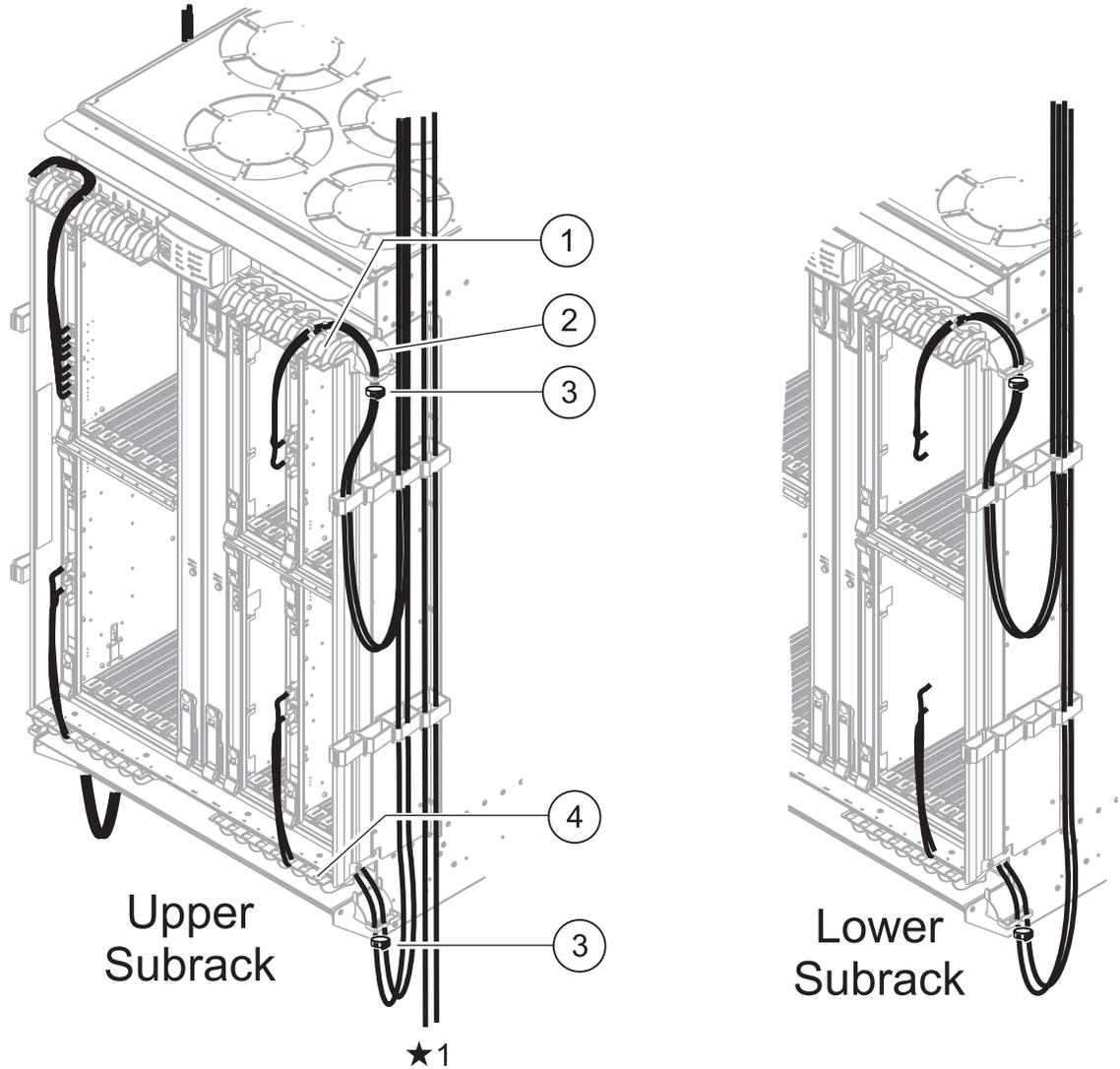
Fiber routing

The fiber cables are routed from both sides of the subrack to the top or bottom via the Fiber-Routing Guides (corner) — DC1001518 (item 2) which are mounted at each corner position of the subrack. The cables are tightened with Velcor — DC1005002 (item 3) before they enter the subrack.

Cables are lead to the slot position via the Fiber-Routing Guides (RT/LB) — DC1001516 (item 1) or the Fiber-Routing Guides

(LT/RB) — DC1001517 (item 4) which are mounted on the top/bottom of the subrack.

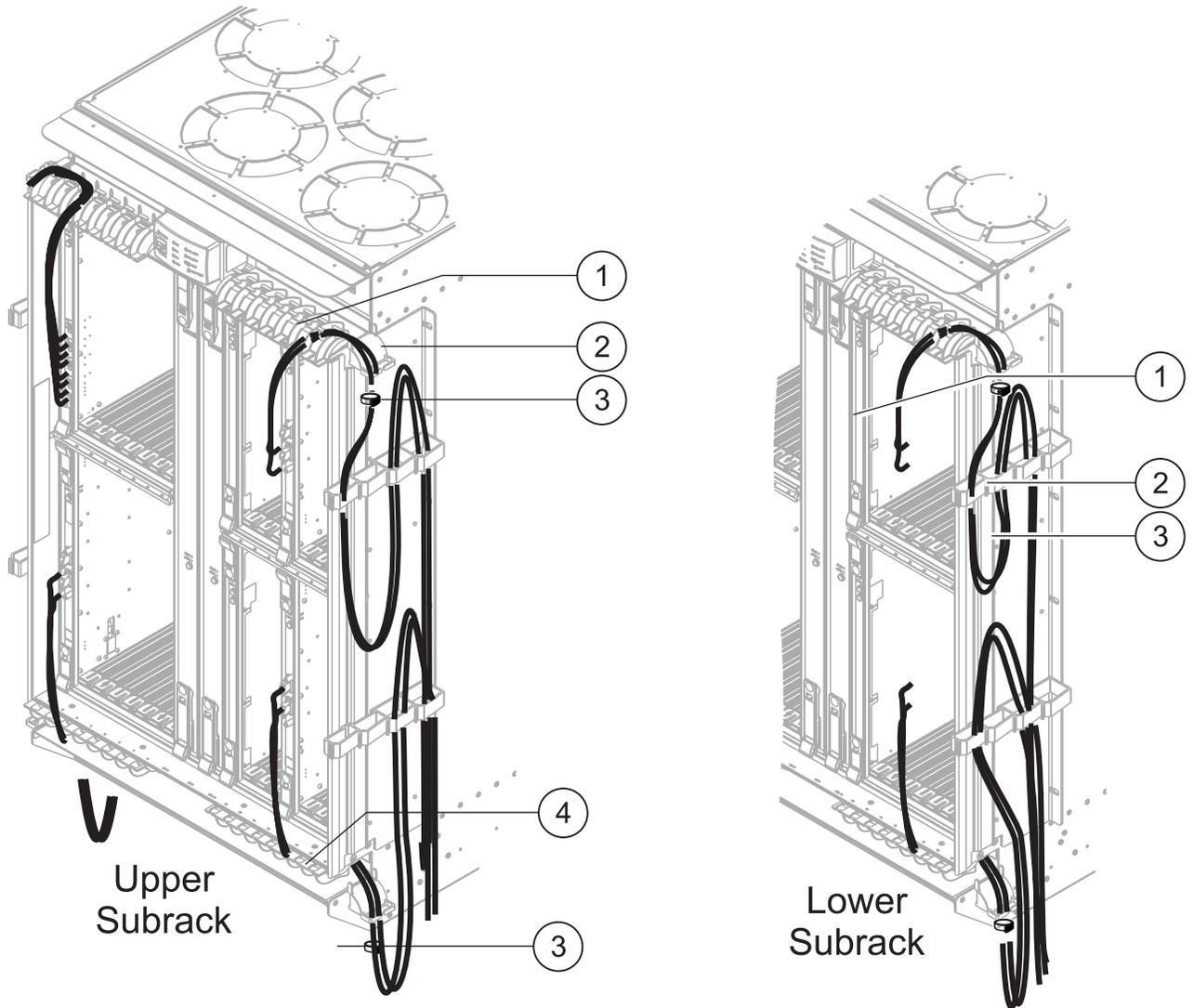
Figure 4-46 Fiber management in the subrack (top access)



Legend:

*1 Cable routed to the lower subrack

Figure 4-47 Fiber management in the subrack (bottom access)



Legend:

*1 Cable routed to the upper subrack



Side panel and doors installation

Overview

Purpose This section describes the two final assembly steps, the side cover plate and rack door mounting.

Contents

Side cover plates	4-71
Rack doors	4-73



Side cover plates

Before you begin The side cover plates can be mounted on each side of a stand-alone rack frame, but within a rack line-up the two outer sides of the cabinet can be covered only.

Installation procedure

- 1 Check that the cage nuts — DC1002834 (item 3) are mounted in the designated gaps in the rack frame.
-

- 2 Attach the side cover plates (item 1) to the rack frame by using screws (item 2). The following side cover plates should be used:

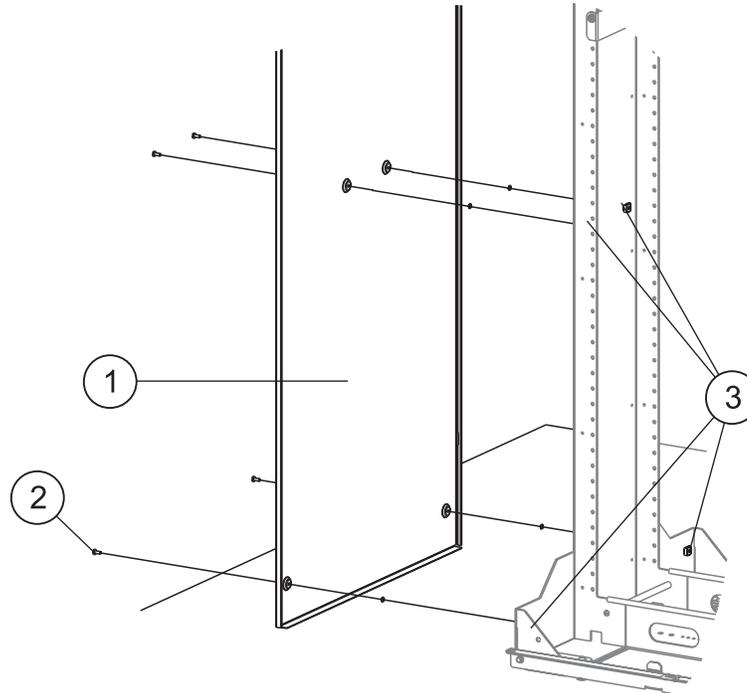
- CC848780177 in case of an ETSI-2 rack.
- CC848780185 in case of an NEBS-2000 rack

NOTE: The mentioned comcodes represent always a pair of side cover plates (left and right).

END OF STEPS

Result

Figure 4-48 Mounting the side cover plates



Rack doors

Positioning

- 1 Place the lower hinge-pin of the door into the eye of the Door Support Bottom. The following rack doors should be used:

- CC848795001 in case of an ETSI-2 rack.
- CC848795019 in case of an NEBS-2000 rack

NOTE: The mentioned comcodes represent always a pair of rack doors (left and right).

- 2 Pull down the locking mechanism at the top of the door.
-

- 3 Lock the door by releasing the locking mechanism of the upper hinge-pin in the eye of the Door Support Top.
-

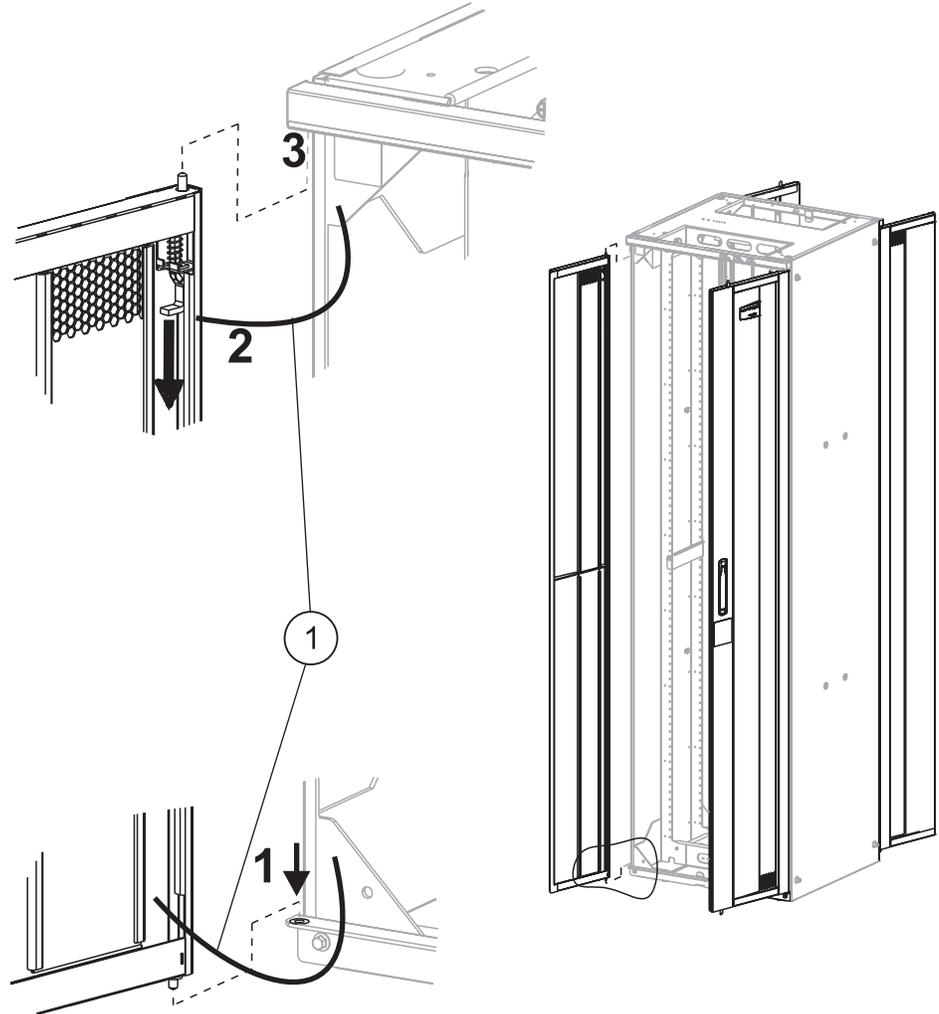
- 4

In the case of ...	Then ...
an ETSI-2 rack	no grounding is needed between doors and rack frame.
an NEBS-2000 rack	connect the Ground Strips — DC1005100 (item 1) at the top and bottom of each rack door.

END OF STEPS

Result

Figure 4-49 Positioning the rack door



Opening the door

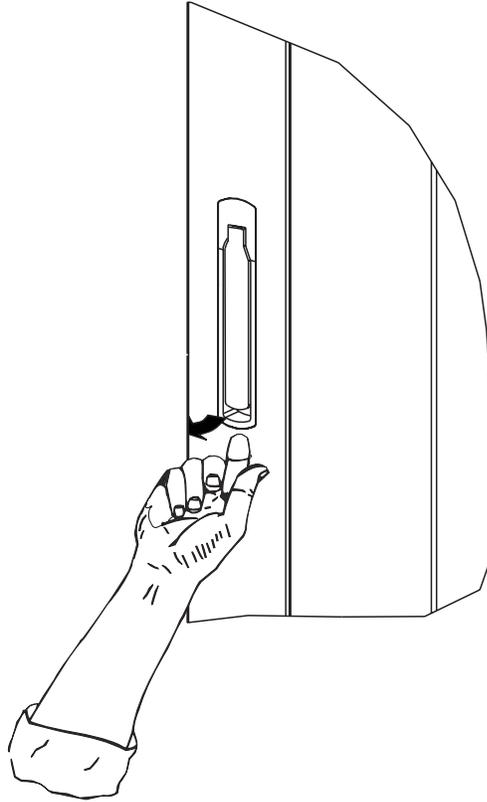
- 1 Put a finger in the hole below the door latch to lift the latch (see figure below).

- 2 Pull the latch to open the door.

END OF STEPS

Result

Figure 4-50 Opening the rack door



Installing the Door-Lock

- 1 Follow the procedure for [“Opening the door” \(4-74\)](#).
.....
- 2 Put a screwdriver at the top of the latch.
.....
- 3 Pry out the Trim Plate — F2-99-1 (item 1) by using the screwdriver.
.....
- 4 Insert the Locking Module — F2-99-2 (item 2).
Important! The Key-Lock (item 3) must be unlocked as shown.
.....
- 5 Press straight in the bezel, then upwards.

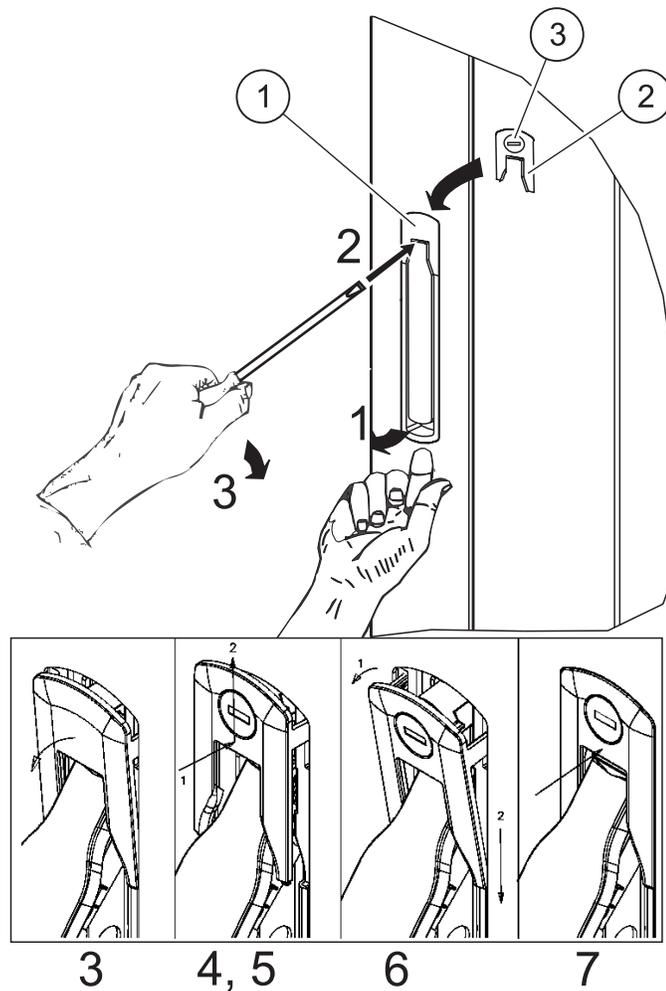
-
- 6 Tilt the Locking Module and engage the tabs into the holes in the bezel.
-

- 7 Snap the Locking Module into place.

END OF STEPS

Results

Figure 4-51 Installing the Door-Lock





5 Powering, circuit pack installation, and NE software download

Overview

Purpose This chapter describes the powering of the *LambdaUnite*[™] MultiService Switch (MSS) system, the circuit pack installation, the NE software installation and two final tests which should be performed to end the physical installation part.

Assumption All NEs must be mounted and cabled correctly (see Chapters 3 and 4).

Contents

<u>Power initialisation</u>	<u>5-2</u>
<u>Switching on and testing supply voltage</u>	<u>5-4</u>
<u>Fan unit test</u>	<u>5-7</u>
<u>Circuit pack installation</u>	<u>5-8</u>
<u>Circuit packs</u>	<u>5-9</u>
<u>Slot positions of the circuit packs</u>	<u>5-13</u>
<u>Mounting the circuit packs</u>	<u>5-15</u>
<u>Physical installation check</u>	<u>5-18</u>
<u>Physical and power installation exit checklist</u>	<u>5-19</u>

Power initialisation

Overview

Purpose This section describes all steps which are necessary for the power initialisation.

Pre-cautions



DANGER

Injury to eyes caused by invisible laser radiation.

LambdaUnite™ MSS systems operate with invisible laser radiation. Laser radiation can cause considerable injuries to the eyes.

Never look into the end of an exposed fiber or into an open optical connector as long as the optical source is switched on. Always observe the laser warning instructions (cf. [“Laser safety” \(1-11\)](#)).



DANGER

Arcing on removing or inserting a live power supply plug.

Arcing can cause burns to the hands and damage to the eyes.

Ensure that the line circuit breaker on the Power Interface (PI) is in the “OFF” position before removing or inserting the power supply plug.



CAUTION

Destruction of components due to a supply voltage of incorrect polarity or too high.

LambdaUnite MSS equipment operates at a nominal voltage of -48 V or -60 V. The permissible tolerance range is -40.5 V to -72 V.

Ensure that the supply voltage has the correct range and polarity before connecting the voltage.

Contents

Switching on and testing supply voltage	5-4
Fan unit test	5-7



Switching on and testing supply voltage

Overview This section describes the procedure for getting active voltage supply lines. Please observe the order of steps described below.

Procedure Proceed as follows to switch on and test the voltage supply lines:

1 Insert a 68 A fuse (for Release 1.0 and 2.0) or a 100 A fuse (for Release 2.1) for each supply line into the external Battery Distribution and Fuse Bay (BDFB). If circuit breakers are being used (in BDFB), put both of them in the *ON* position.

2 Use the voltage meter to check the primary voltage at the Power Distribution Panel (PDP) for both power supply feeders.

Result:

The voltage on the PDP must be in the range of -40.5 ... -72 DC.

NOTE: Do not power up the system if the voltage is outside the range!

Feeder	Measured voltage
A	
B	

-
- 3 Switch the right circuit breaker of the subrack (located on the rear) to the *ON* position (= 1).

Figure 5-1 PI switching

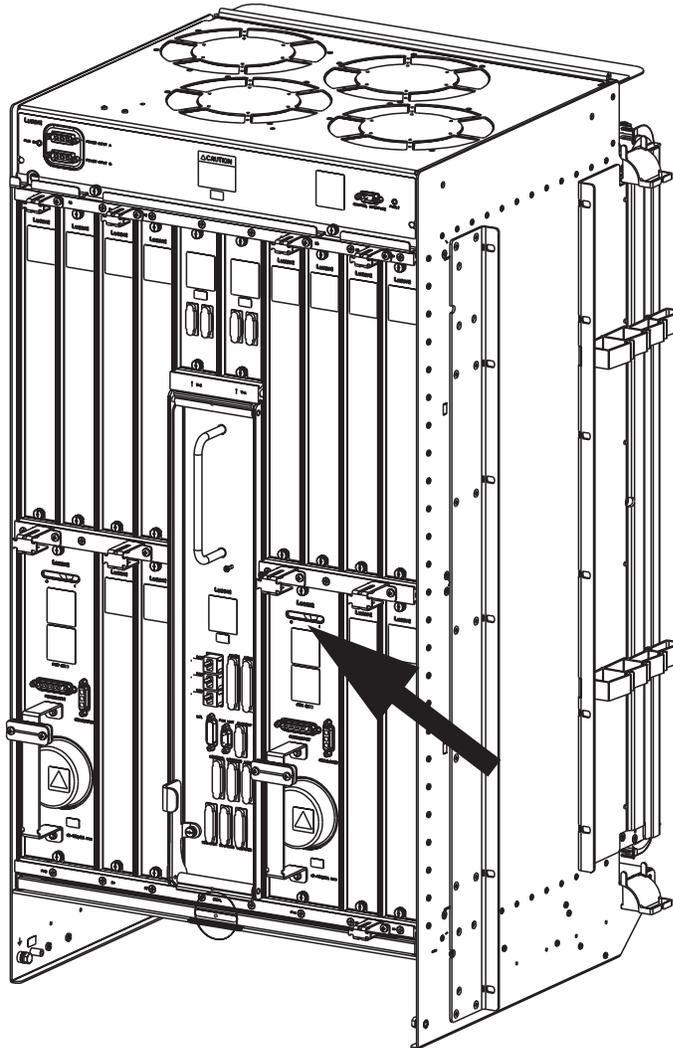
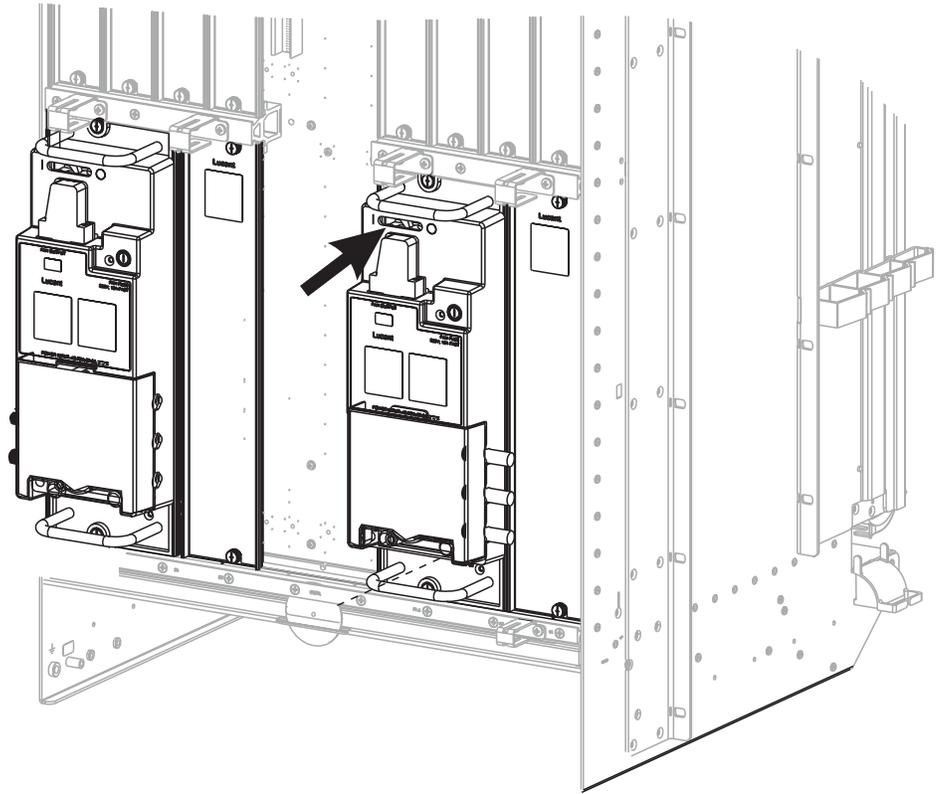


Figure 5-2 PI/100 switching



Requirement: The power LED on the respective PI / PI/100 must be lit.

The PWR ON LED on the user panel will not light up until the CTL circuit pack is inserted.

-
- 4** Switch the right circuit breaker of the subrack to the **OFF** (= 0) position.

Requirement: The power LED on the respective PI / PI/100 is extinguished.

-
- 5** Repeat Steps 3 and 4 with the left circuit breaker of the subrack.

-
- 6** Switch both circuit breakers of the subrack to the **ON** (= 1) position.

END OF STEPS



Fan unit test

Overview This test clarifies the correct working of the fan unit in the *LambdaUnite*[™] MultiService Switch (MSS) subrack. The test should be carried out for each installed NE.

Procedure Proceed as follows to test the correct functionality of the fan unit:

- 1 Control the status indication on the faceplate of the fan unit.

Result:

On the fan unit only the PWR ON LED should be lit.

- 2 Check that
 - all fans of the unit are running
 - the air flow direction is from bottom to top.

END OF STEPS



Circuit pack installation

Overview

Purpose This section describes the circuit pack installation which includes configuration rules and the mounting procedures.

Pre-caution



CAUTION

Destruction of components by electrostatic discharge.

Electronic components can be destroyed by electrostatic discharge.

Hold circuit packs only at the edges or on the insertion and removal facilities. Always observe the ESD instructions (see [“Electrostatic discharge” \(1-19\)](#)).

Contents

Circuit packs	5-9
Slot positions of the circuit packs	5-13
Mounting the circuit packs	5-15
Physical installation check	5-18
Physical and power installation exit checklist	5-19



Circuit packs

Overview This section gives an overview about the available circuit packs. The comcodes for the optical circuit packs are given in Appendix C, “Ordering codes and specifications”.

Available circuit packs The following circuit packs are used in the *LambdaUnite*[™] MSS shelf:

Short Names	Function	Ports per pack	Max. packs per shelf	Max. ports per shelf
OP40G	Optical Interface Unit OC-768 / STM-256	1	8	8
OP10G	Optical Interface Unit OC-192 / STM-64 / 10-Gbit/s Ethernet WANPHY	1	32	32
OP2G5	Optical Interface Unit OC-48 / STM-16	4	32	128
OP2G5	Optical Interface Unit OC-48 / STM-16 pWDM	2	32	64
OP622M	Optical Interface Unit OC-12 / STM-4	16	32	512
OP155M	Optical Interface Unit OC-3 / STM-1	16	32	512
GE1/SX4	Optical Interface Unit 1-Gigabit Ethernet	4	32	128
XC320	Switching Unit (incl. timing generator function) (upgradable)	n/a	2	n/a
CTL	System controller and DCC controller unit (upgradable, protection controller in future release)	n/a	1	n/a

For the optical interface units, there is a second level of identification (qualifier) which carries information about reach, lambda and other variants, e.g. OP10G/1.5LR1, or OP40G/1.3IOR1 (see Appendix C, “Ordering codes and specifications”).

Minimum required circuit packs

The minimum complement of circuit packs required for an operational *LambdaUnite* MSS subrack is

- one working and one protection XC320 switch circuit pack
- one CTL circuit pack
- any optical circuit packs in the universal slots.

A subrack equipped with these circuit packs would be fully functional. Other essential parts of the system which always have to be installed in the subrack are the Power Interfaces (PIs), the Fan Unit, the User Panel and a CI-CTL.

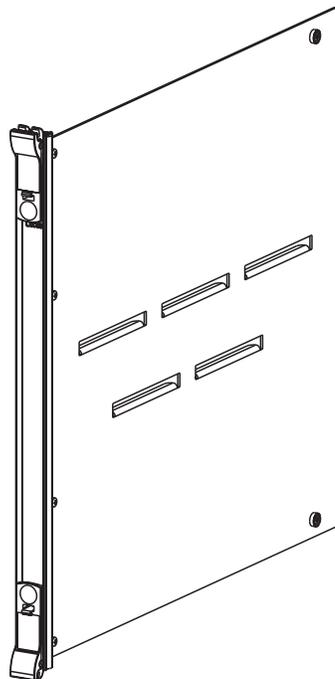
Blank front plates

Blank front plates are available in two different heights:

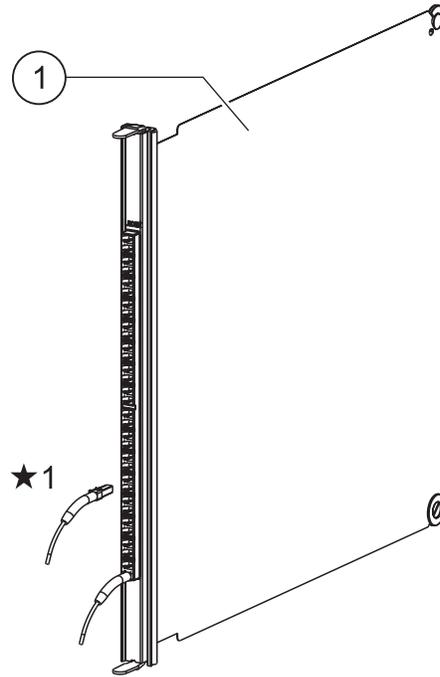
- 3N types
- 6N type.

3N types

Figure 5-3 Blank front plate (3N) — CC848782868



**Figure 5-4 Blank front plate (3N) with empty holes —
CC848840112**

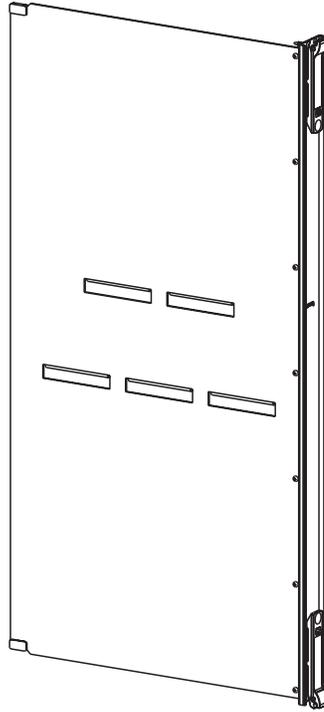


Legend:

- *1 Hang the cables temporarily in the empty holes in the front blank when the cables are pre-arranged.

6N type

Figure 5-5 Blank front plate (6N) — CC848782876

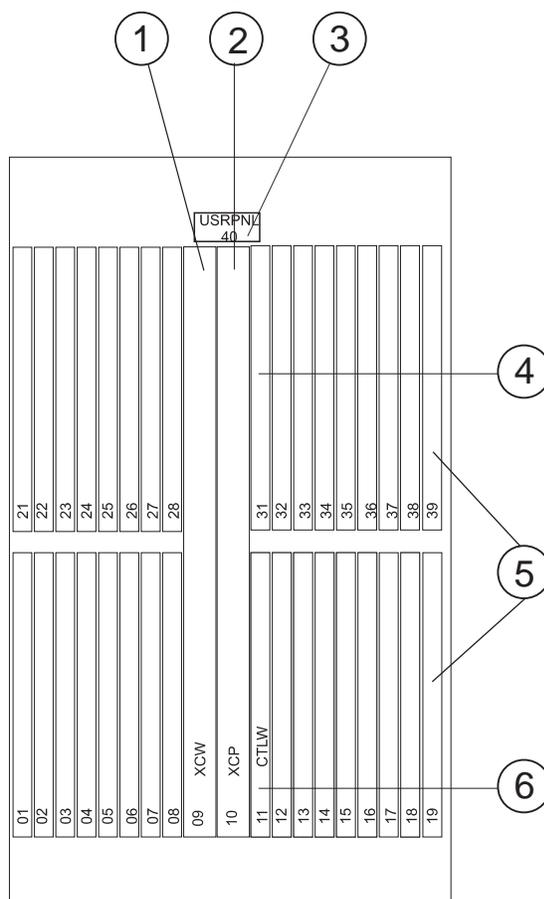


Slot positions of the circuit packs

Overview This section gives an overview about the valid slot positions of the circuit packs.

Slot positions The following figure and table show the valid slot positions of the circuit packs at the front side of the subrack.

Figure 5-6 Slot positions of the circuit packs



Legend	Circuit pack	Valid slots
1	XC320 (working)	#09

Legend	Circuit pack	Valid slots
2	XC320 (protection) or blank front plate (6N)	#10
3	User panel — CC848730636	#40
4	Blank front plate (3N)	#31
5	Any optical circuit pack (OP155M, OP622M, OP2G5, OP10G, OP40G or GE1) or blank front plate (3N)	#01 ... #08, #12 ... #19, #21 ... #28, #32 ... #39 Each optical board covers the following positions: <ul style="list-style-type: none">• OP155M - 1 slot• OP622M - 1 slot• OP2G5 - 1 slot• OP10G - 1 slot• OP40G - 4 slots• GE1 - 1 slot.
6	CTL (working)	#11

Gigabit Ethernet and 10-Gbit/s port units

It is recommended, to avoid thermic stress, not to place a 10-Gbit/s port unit directly above a Gigabit Ethernet port unit.

Optical port unit protection

In the case of optical port protection (1+1 Linear APS / 1+1 MSP) it is recommended to place the working port unit and the protection port unit side by side for ease of maintenance.



Mounting the circuit packs

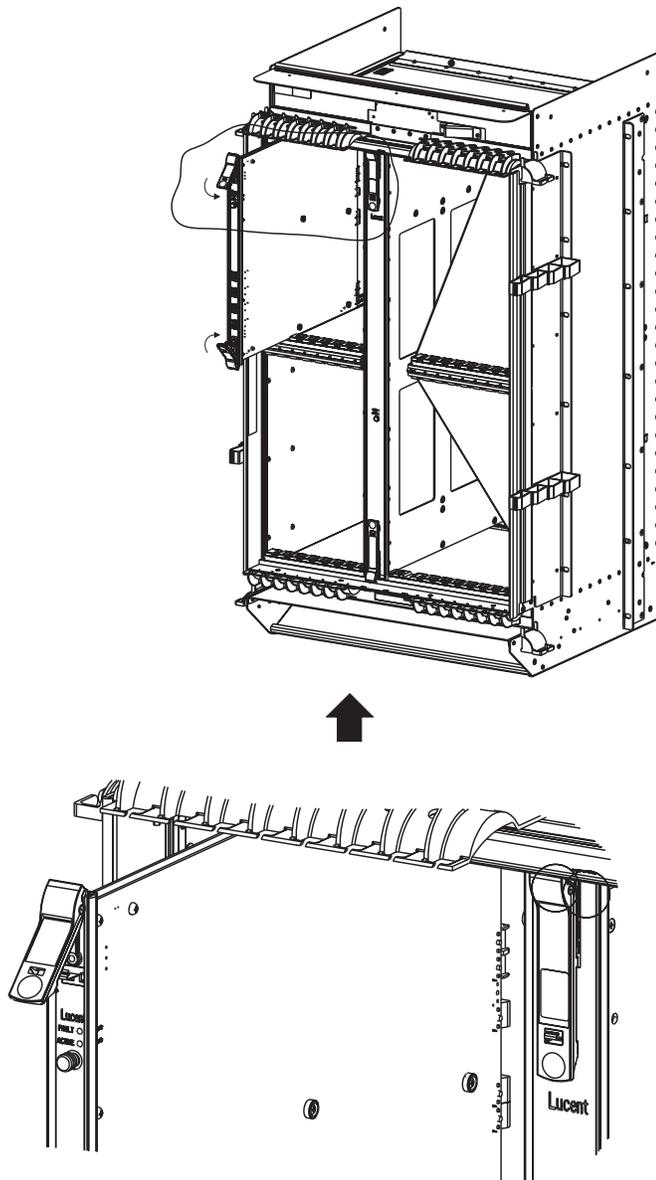
Overview This section describes the physical mounting of the circuit packs.

Procedure Proceed as follows to mount the circuit packs:

- 1** With the exception of the CTL circuit pack insert all needed circuit packs as shown below. The CTL circuit pack will be installed last.

NOTE: A circuit pack may only be inserted when it is positioned inside the upper and lower guiding extrusions.

Figure 5-7 Insertion of a circuit pack



Important! Operate both latches **simultaneously** during insertion and extraction of a circuit pack.

- 2 Check that all circuit packs are firmly seated.

-
- 3** Insert the CTL circuit pack.

Important! Be sure that the CTL circuit pack contains a *CompactFlash*[™] card with loaded NE software (as delivered from manufacturer) and the flash card is secured by the protecting bar.

Result:

The NE automatically starts the download (takes about 20 minutes).

-
- 4** Check that the ACTIVE LEDs on the circuit packs are lit up.

Important! After the first boot the red LED of the XC320 board is still flashing. To clear that, enter the **NE Date and Time** (see Chapter 6, section [“System parameters” \(6-16\)](#)) and select **Fault** → **Enter/Exit Maintenance Condition...** → **Exit Maintenance Condition...** from the **System View** main menu.

END OF STEPS

Software download failure

In the case of a download failure (red LEDs are still illuminating), please refer to Appendix A, section [“SW download failure” \(A-7\)](#).



Physical installation check

Overview A complete physical installation check should be done to ensure that all components are complete and the cables are connected correctly. It should also be checked if the NE is up and running.

- Checks** Check that
- there are no visible defects
 - the mechanical parts are secured
 - all cables are assembled correctly
 - the optical couplings are affixed to the optical circuit packs
 - all circuit packs are situated in the slots according to the guidelines described above.
 - the NE is up and running.



Physical and power installation exit checklist

Checklist Verify that all procedures described below has been completed. If a procedure was not applicable, indicate “N/A”.

Procedure	Result (Passed, Failed, N/A)	Initials	Notes
Rack floor mounting			
Anti Recirculation Plate mounting			
Rack adapter kit mounting			
Subrack mounting			
Power cabling			
Ground cabling			
Subrack alarm cabling			
Station alarm interface cabling			
MDI/MDO cabling			
User byte cabling			
Station clock cabling			
LAN cabling			
Fiber cabling			
Side cover plate mounting			
Rack door mounting			
Powering			
Fan unit test			
Circuit pack installation			
NE software installation			





6 WaveStar[®] CIT installation and NE provisioning

Overview

Purpose This chapter describes the *WaveStar* CIT installation and the initial NE provisioning via *WaveStar* CIT.

Assumption The person setting up the system should be familiar with *LambdaUnite*[™] MSS, the SDH or SONET functionality and *WaveStar* CIT.

Contents

<u>NE provisioning and stand alone installation test entry checklist</u>	<u>6-2</u>
<u>WaveStar CIT</u>	<u>6-4</u>
<u>Installing WaveStar CIT</u>	<u>6-5</u>
<u>WaveStar CIT login procedure</u>	<u>6-8</u>
<u>Connecting the WaveStar CIT to the NE</u>	<u>6-9</u>
<u>NE login procedure</u>	<u>6-12</u>
<u>Provisioning system parameters</u>	<u>6-13</u>
<u>Changing the NE name (TID)</u>	<u>6-14</u>
<u>System parameters</u>	<u>6-16</u>
<u>Timing references</u>	<u>6-21</u>
<u>System timing</u>	<u>6-24</u>

NE provisioning and stand alone installation test entry checklist

Overview

Purpose This section ensures the operability of the procedures described in the following.

Contents The entry checklist is related to the following chapters:

- Chapter 6,
WaveStar® CIT installation and NE provisioning
- Chapter 7,
Stand alone test procedures.



Entry checklist

The following provides a checklist to be completed prior to perform the WaveStar® CIT installation, NE provisioning and stand alone installation tests. Verify that each procedure has been completed. Check off and initial the item.

Procedure	Completed	Initials	Notes
Have all procedures been completed which are required in Chapter 5, “Physical and power installation exit checklist” (5-19) ?			
Is the CD-ROM (CC109088708) available which contains WaveStar® CIT and the NE software?			
Is a laptop or desktop PC available meeting the minimum requirements (see section “WaveStar CIT requirements” (2-6))?			
Is a crossed LAN cable CAT5 with 4-wire RJ-45/RJ-45 connectors available?			
Is the following test equipment available? <ul style="list-style-type: none"> • Optical power meter with LC connectors • Multimeter 			



WaveStar® CIT

Overview

Purpose This section describes the installation procedure of *WaveStar* CIT and how to perform an NE login.

Contents

<u>Installing <i>WaveStar</i> CIT</u>	<u>6-5</u>
<u><i>WaveStar</i> CIT login procedure</u>	<u>6-8</u>
<u>Connecting the <i>WaveStar</i> CIT to the NE</u>	<u>6-9</u>
<u>NE login procedure</u>	<u>6-12</u>



Installing WaveStar® CIT

Purpose Use this procedure to:

- Install the *WaveStar* CIT software onto a new system.
- Upgrade/change an existing *WaveStar* CIT to a new software version.

Required equipment The minimum requirements for a *WaveStar* CIT are a personal computer with:

- *Pentium*® 266 MHz processor (*Pentium* III 500 MHz or higher recommended) with 128 MB of RAM (256 MB of RAM or higher recommended)
- 500 MB of free hard-disk drive space
- CD-ROM drive (16X recommended)
- SVGA monitor set to 800x600 resolution or greater, with 256 colors (1024x768, 16 million colors recommended)
- 100BaseT LAN interface, installed and working
- *Microsoft*® *Windows NT*® 4.0 with Service Pack 5 or *Microsoft Windows*® 2000 operating system
NOTE: Microsoft Windows 2000 does not clean up drivers properly after the removal or exchange of network cards, causing critical network services to fail. This can cause WaveStar CIT failing to start after installation, or you will be unable to select the right network card from the list during installation. To solve these problems, deinstall not present network cards from the PC.
- *Adobe*® *Acrobat*® *Reader*® for *Windows* (version 3.01 or later)
- Removable hard-disk drive (optional; required only for system backup).

The performance of the user interface can be enhanced by using a higher performance personal computer. An unshielded crossed LAN cable CAT5 with 4-wire RJ-45/RJ-45 connectors must be used for connecting the *WaveStar* CIT to the NE.

Before you begin A user who has *Windows NT* / *Windows 2000* System Administration privileges must install the software. That same user, then, becomes the *WaveStar* CIT System Administrator. The *WaveStar* CIT System

Administrator sets up the operating environment for other users. Some of these administration functions include:

- Assigning login IDs
- Assigning an initial password for each login ID
- Customizing the access privileges and security attributes for each login ID, and so forth.

The installation program cannot install system files or update shared files if they are in use by other programs. For this reason you should stop as many *Windows NT* applications as possible, before starting with the installation procedure.

Installation procedure Complete the following steps to install the *WaveStar* CIT software on your PC:

- 1 Insert the *WaveStar* CIT CD-ROM (Comcode: 109088708) into the appropriate drive of your PC.

Result:

Autorun will start the install process.

2 IF	THEN
autorun does not start	manually start the program by clicking Start → Run , click on Browse , select the CD-ROM drive, and select setup.exe , click Open and click ok . Result: The <i>WaveStar</i> CIT CD Browser appears.
autorun starts	no action is required. Result: The <i>WaveStar</i> CIT CD Browser appears.

- 3 Click on **continue**.

- 4 Choose the entry **CIT Software**.

-
- 5 Select the **WaveStar CIT** area on the right.

 - 6 Follow the on-screen instructions. Select **Full Install** when prompted.

 - 7 If there are 2 or more LAN cards on the PC, select the LAN card with the IP Address that corresponds to the OSI LAN, otherwise if there is only 1 LAN card, *WaveStar* CIT will select it automatically.

 - 8 If not yet available on your PC, install the **Acrobat Reader** by selecting the respective area below the entry **CIT Software**.

 - 9 The PC will have to be rebooted if the OSILLC driver is installed. This is installed on the initial *WaveStar* CIT installation. Subsequent upgrades do not require OSILLC driver installation.

END OF STEPS



WaveStar® CIT login procedure

Overview Some procedures throughout this document require the user to log into the *WaveStar* CIT GUI. The following procedure describes how this is accomplished. This procedure requires the *WaveStar* CIT to be already loaded on the PC (see section [“Installing WaveStar CIT” \(6-5\)](#)).

Procedure Complete the following steps to log into the *WaveStar* CIT GUI:

- 1 Start the *WaveStar* CIT software by double clicking on the *WaveStar* CIT icon.
-

- 2

IF ...	THEN ...
it is the first <i>WaveStar</i> CIT installation on the respective PC,	log into <i>WaveStar</i> CIT with User Id: “LUC01” or “LUC02” and Password: “LUC+01” or “LUC+02”.
a previous <i>WaveStar</i> CIT version has already been installed on the respective PC,	log into <i>WaveStar</i> CIT with User Id: “LUC01” or “LUC02” and the last used Password .

- 3 Click **OK** to connect. *WaveStar* CIT will be “initializing views” for about 3 minutes. Read the legal notice and click **OK**.

END OF STEPS



Connecting the WaveStar® CIT to the NE

Overview The *WaveStar* CIT can be connected to a network element in 3 different ways:

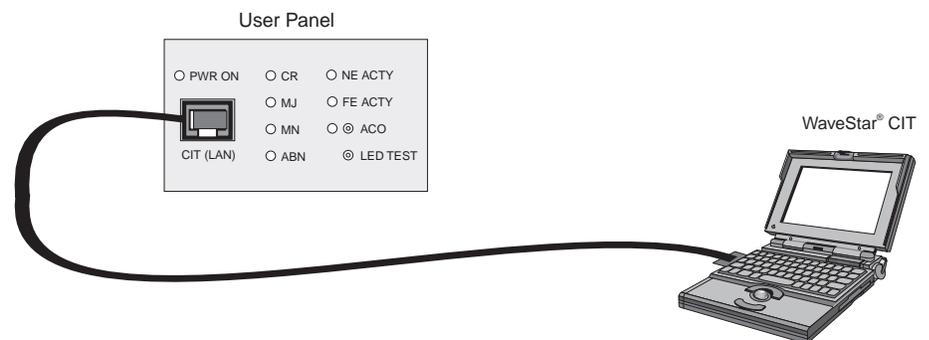
- Direct LAN Access (point-to-point)
- LAN Access (network)
- Remote Access via DCC.

Direct LAN access (point-to-point)

The *WaveStar* CIT (LAN card) is connected to the *LambdaUnite*™ MultiService Switch (MSS) via the “CIT” port of the user panel or through a backplane connector (LAN I/O Panel). An unshielded **crossed** LAN cable CAT5 with 4-wire RJ-45/RJ-45 connectors must be used for this connection.

The usage of *shielded* 100BaseT LAN cables is only allowed if the applicable national safety requirements have been met by the user. Otherwise, there is a **risk of electrical shock and/or serious injury**.

The following figure illustrates the Direct LAN Access (Point-to-Point).

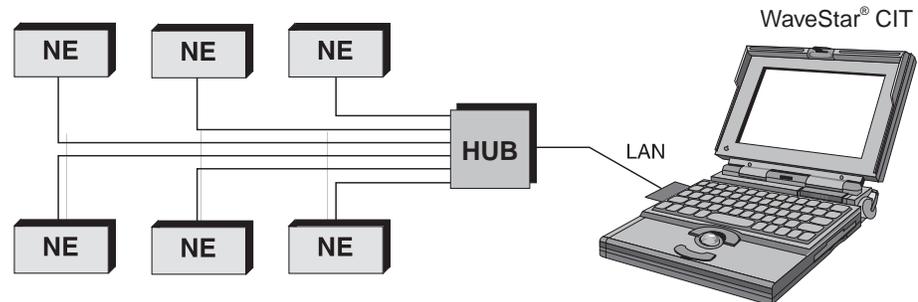


WaveStar CIT LAN access (network)

WaveStar CIT access to more than one NE can be done via a HUB. Unshielded **straight** LAN cables CAT5 with 4-wire RJ-45/RJ-45 connectors must be used for this connection.

Connecting the WaveStar® CIT to the NE

The following figure illustrates the WaveStar CIT LAN Access (Network).

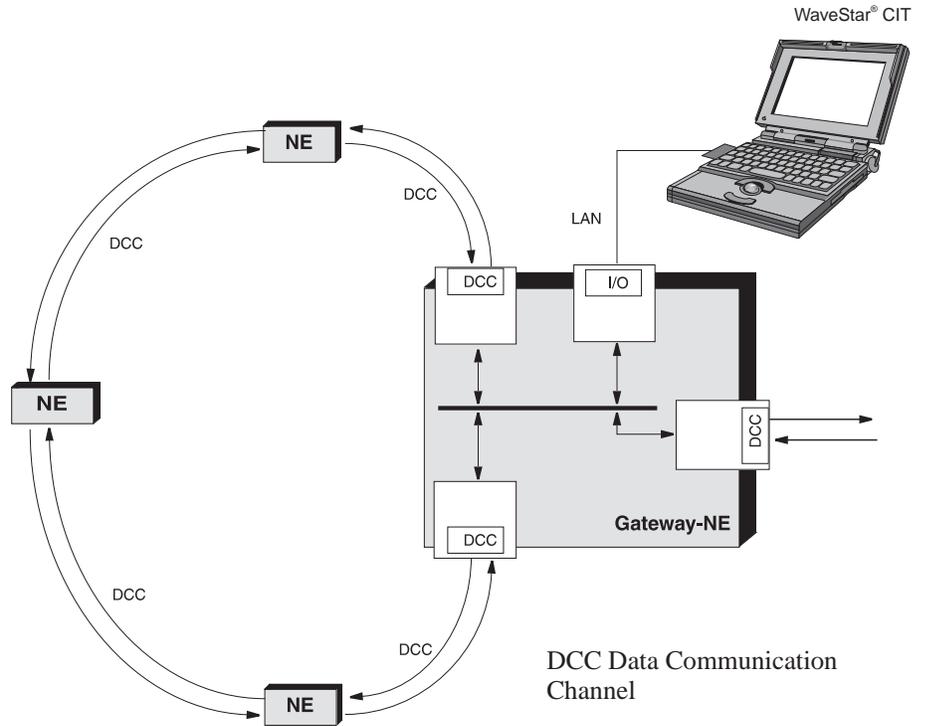


The usage of *shielded* 100BaseT LAN cables is only allowed if the applicable national safety requirements have been met by the user. Otherwise, there is a *risk of electrical shock and/or serious injury*.

**WaveStar CIT access via
Data Communications
Channel (DCC)**

WaveStar CIT access to remote NEs can easily be done via the Data Communications Channel (DCC) which are part of the SDH/SONET aggregate or tributary signals. The CIT is connected via a point-to-point connection to one NE of the network (cf. “Direct Access”), which is then called the Gateway NE. All other NEs can be reached by the DCC. Thus, no additional management network is needed to connect the CIT to each individual NE.

The following figure shows an example of the access via the Data Communications Channel.



□

NE login procedure

Overview This section describes the login procedure to an NE. It is necessary that the WaveStar® CIT is already connected to the NE (see section [“Connecting the WaveStar CIT to the NE” \(6-9\)](#)).

Initial login procedure Complete the following steps to login to an NE:

- 1 Login to WaveStar CIT as described in section [“WaveStar CIT login procedure” \(6-8\)](#).

- 2 Enter the target identifier (TID) in the **NE Name** box. The default TID (= default name of the NE) is: “LUCENT-UNITE-NE”.

- 3 Select “LambdaUnite(TM) MSS” as **NE Type** and “OSI” as **Connection Type** and click on **Graphical**.

- 4 Login with **UserId** “LUC01” or “LUC02” and the associated **Password** “UNITE+01” or “UNITE+02”.

- 5 Click **OK** to confirm, then **OK** to the legal notice.

Result:

The **System View** window appears for the selected NE.

END OF STEPS



Provisioning system parameters

Overview

Purpose This section describes all provisioning tasks which should be performed to prepare the system for operation and to be able to perform some tests.

Related information An overview about all WaveStar® CIT related tasks is given in the “*LambdaUnite™* MultiService Switch (MSS) User Operation Guide”.

Contents

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Changing the NE name (TID)

Overview This section provides a procedure for changing the NE name (TID).

NE names NE names must be unique within a network to guarantee the reachability by management systems and the proper interworking of NEs.

Before you begin Prior to performing this task, you must:

- have a valid user login and password,
- be connected to the subject NE, and
- have proper access privileges to perform this task.

Required privilege codes

You must have at least privilege codes of S4 and M4 and P1 to perform this task.

Required equipment

The following equipment is required to perform this task:

- WaveStar® CIT.

Procedure Complete the following steps to change a network element's name:

- 1 Invoke the **Provision TID/NE Name** window from the **System View** main menu via **Administration** → **Set TID...**

- 2 Place the cursor in the **New TID/NE Name** text box and key in the new TID observing the following configuration rules:
 - Each NE name must be unique within the network.
 - The following characters are allowed in an NE name:
 - Upper-case letters (“A” .. “Z”),
 - Lower-case letters (“a” .. “z”),
 - Special characters (“-”, “+”, “_”, “.”, “/”),
 - Digits (“0” .. “9”).
 - An NE name must not end and begin with an special character.

- Each NE name must be maximally 20 characters in length.
- The NE name may contain segments separated by hyphens (“-”) or slashes (“/”), but each segment must begin with a letter or number.

Please note that NE names are case-insensitive.

.....

3 Make sure that the new TID is correct.

IF ...	THEN ...
the new TID is correct,	continue with Step 4 .
the new TID is not correct,	correct the entry in the New TID/NE Name text box and continue with Step 4 .

.....

4 Place the cursor in the **Confirm TID/NE Name** text box and key in the new TID again.

Important! Take a note of the TID you are going to assign to the NE!

.....

5 Click **OK** to assign the new TID and to dismiss the window.

END OF STEPS



System parameters

Overview This section provides a procedure for configuring the system parameters (e.g. date and time).

Before you begin Prior to performing this task, you must be logged into the WaveStar® CIT and the respective NE.

Required privilege code(s)

You must have at least a privilege code of P3, Provisioning, or M3, Maintenance, to set the system parameters.

Required equipment

The following equipment is required to perform this task:

- WaveStar CIT.

Setting of general parameters Complete the following steps to set the system parameters:

- 1 In the WaveStar CIT **System View**, select **Configuration** → **Provision**.

Result:

The window **Provision Parameters for Protection Groups or Equipment** opens. The **Equip** selection tab appears on the left side of the window.

- 2 Select the system in the **Equip** selection tab and click on **Provision**.

Result:

The selection window for the system parameters appears on the right side of the window. This window consists of two tabs, **Settings** and **Date and Time**.

- 3 In the **Settings** tab you can set or modify various parameters associated with the entire system. Click on the respective check box.

IF	THEN
you want to change the default interface standard to SONET,	set the Optical Interface Standard to SONET .
you want to change the default interface standard to SDH,	set the Optical Interface Standard to SDH . This is the default value.
you want a fixed tributary rate list,	set the Tributary Mode Default to Fixed-Rate . This is the default value.
you want the tributary signal rate list to adapt,	set the Tributary Mode Default to Adaptive-Rate .
you want that the system synchronization is in SDH characteristics,	set the System Synch Characteristics to SDH . This is the default value.
you want that the system synchronization is in SONET characteristics,	set the System Synch Characteristics to SONET .

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

Setting of the NE date and time

.....

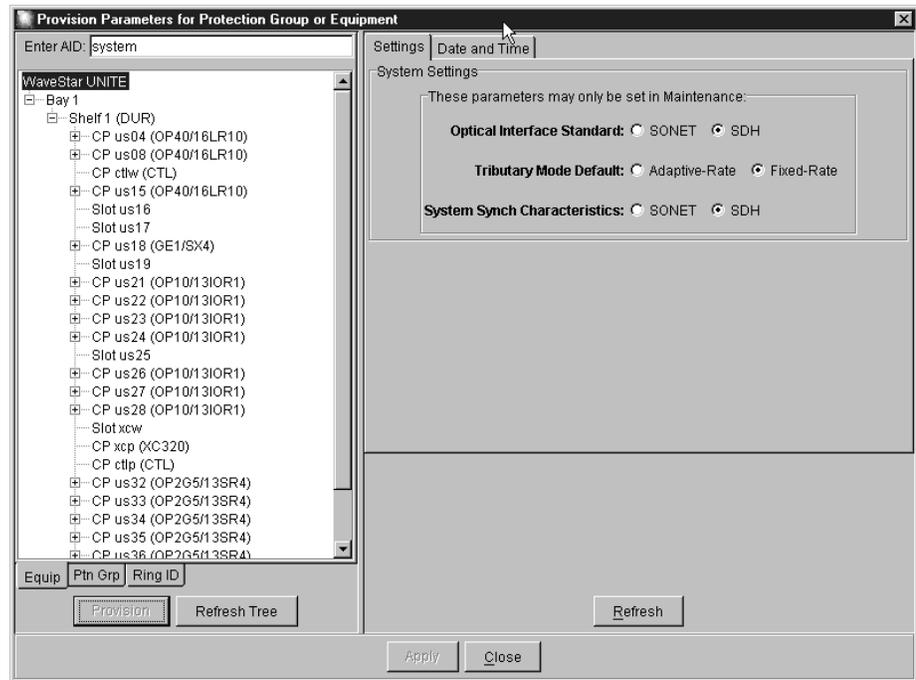
- 1 Select the **Date and Time** tab.
.....
- 2 Select the day (by clicking on the respective date), month (via the drop-down list box) and year (via the drop-down list box) in the group box **Date**.
.....
- 3 Set the time in the group box **Time**.
.....
- 4 Click the **Apply** pushbutton and confirm the resulting system message by clicking **OK**.
.....
- 5 Select **Fault** → **Enter/Exit Maintenance Condition...** → **Exit Maintenance Condition...** from the **System View** main menu.

Result:

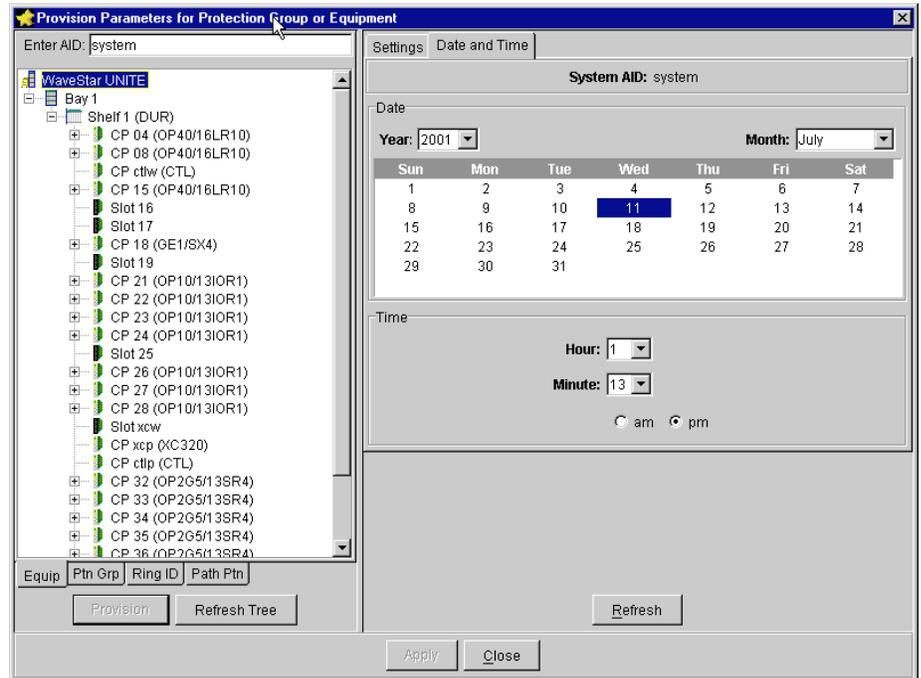
The *LambdaUnite*™ MSS NE will now perform a system reset.
As a consequence, the management association between the
WaveStar CIT and the NE will be lost.

END OF STEPS

Screen of the tab *Settings*



Screen of the tab *Date and Time*



Elements of the tab *Settings*

The elements of the **Settings** tab and their meaning are listed in the following table.

Option	Meaning
Optical Interface Standard	Used to set the Optical Interface Standard for the actual NE by selecting the according radio button (SONET or SDH).
Tributary Mode Default	Used to set the Tributary Mode Default for the actual NE by selecting the according radio button (Adaptive-Rate or Fixed-Rate).
System Synch Characteristics	Used to set the System Synch Characteristics for the actual NE by selecting the according radio button (SONET or SDH).

Elements of the tab *Date and Time*

The elements of the **Date and Time** tab and their meaning are listed in the following table.

Option	Meaning
Year	Select the year to be set.
Month	Select the month to be set.
Day field	Select the day to be set.
Time	Select the time to be set.



Timing references

Overview This section provides a procedure for configuring the external timing references.

Before you begin Prior to performing this task, you must be logged into the WaveStar® CIT and the respective network element.

Be sure that the correct system mode is selected (**SONET mode** or **SDH mode**, see section [“System parameters” \(6-16\)](#)).

Required privilege code

You must have at least a privilege code of P3 to configure the external timing references.

Required equipment

The following equipment is required to perform this task:

- WaveStar CIT.

Procedure Complete the following steps to configure the external timing references:

- 1 Select **Configuration** → **Timing/Sync** in the **System View** of the WaveStar CIT.

Result:

The window **Synchronisation Characteristics** appears.

- 2 Select the tab of the **External Timing Reference** which you wish to configure. You can select two external timing signals from the external timing input ports. There is one tab for each port (**External Timing Reference 1** and **External Timing Reference 2**). 2 MHz or 2 Mbit/s signals for SDH mode or DS1 timing signals for SONET mode can be used as external timing sources.

- 3 Select the timing quality belonging to the external timing reference in the drop-down list box **Quality Level**. Assign the actual quality level of the external timing source (**PRC**, **SSUT**, **SSUL**, **SEC** for SDH mode or **PRS**, **STU**, **ST2**, **ST3** for SONET mode).

Result:

The timing references are now used in the order of their quality level.

-
- 4 Select the port AID in the drop-down-list box **Assigned Port AID**. Select in the drop-down list box **Not Connected**, if the respective external timing signal should not be used or select **External Timing Input Port 1** or **External Timing Input Port 2** depending on the tab you have selected.

-
- 5 Select in the drop-down list box **System Timing Reference Priority** the priority of the selected timing reference. The values can be
- **Disable** (initial value)
 - **1, 2, 3, 4, 5, 6, 7, or 8**

Make sure that all configured timing references have different priorities assigned.

Result:

A priority list is created for the configured timing reference signals. Initially the signal with the highest quality level is used as timing reference signal. If it fails, the system switches to the signal with the next lower quality level. If there are several timing references with the same quality level, they are used according to the priority list. If all possible timing reference signals fail, the timing generator enters the holdover mode.

-
- 6 Select the **Timing Port Mode Monitoring**. The values **Monitored** or **Not Monitored** are possible. This defines whether alarms are raised for the timing signals or not.

-
- 7 Select the **ASAP Name** Alarm Severity Assignment Profile. Via the push-button **Browse...** you can select the alarm in the drop-down list box. Click on **OK** to apply your setting.

By clicking on the push-button **Info...** you can call up a table with details on the ASAPs.

8 Apply the changes by clicking on **Apply**. If you wish to discard the changes click on **Cancel** or **Undo**.

9 Repeat to [Step 8](#) until all timing references are configured. Click on **OK** to close the window.

END OF STEPS



System timing

Overview This section provides a procedure for configuring the system timing.

Before you begin Prior to performing this task, you must be logged into the *WaveStar*® CIT and the respective network element. Furthermore, you must have completed the task.

Required privilege code

You must have at least a privilege code of P3 to configure the system timing.

Required equipment

The following equipment is required to perform this task:

- *WaveStar* CIT.

Procedure Complete the following steps to configure the system timing:

- 1 Select **Configuration** → **Timing/Sync** in the **System View** of the *WaveStar* CIT.

Result:

The window **Synchronisation Characteristics** appears.

- 2 Select the **System Timing Parameters** tab.
-

- 3 Select the **System Timing** tab.
-

- 4 Select the wait-to-restore time in the group box **Wait To Restore**. Click on the respective radio button. The values can be:

- **Zero** (initial value)
- **20 SEC(SONET mode only)**
- **1 Minutes ... 60 Minutes** (selectable via a spin box)
- **Infinite (SONET mode only)**

The wait-to-restore time is the wait which is made before switching from one timing reference to another.

-
- 5 Enable or disable the use of **System Synchronisation Status Messaging Mode** by selecting **QL Disable** or **QL Enable**. This means that the selection of timing reference for the system timing is either determined only by the provisioned priority list or by the quality level given by the timing marker (SSM, Synchronization Status Message) and secondly by the priority list. Click on the respective radio button.
-

- 6 Select the clock mode in the group box **Clock Mode**. Click on the respective radio button. You can select the following values:
- **Free Running** (The system is synchronized to the internal oscillator.)
 - **Locked** (The system is synchronized to a timing reference signal.)

During normal operation in a network, the timing generator should be locked to a timing reference signal as far as available. Normally the free-running mode is used directly after the system start.

Result:

If you select **Free Running** the following warning window appears: *“Switching the timing clock from locked to free running can temporarily result into transmission errors.”*

- 7 Select the **ASAP Name** Alarm Severity Assignment Profile. Via the push-button **Browse...** you can select the alarm in the drop-down list box. Click on **OK** to apply your setting.

By clicking on the push-button **Info...** you can call up a table with details on the ASAPs.

- 8 Apply the changes by clicking on **OK** or **Apply**. If you wish to discard the changes, click on **Cancel** or **Undo**.

END OF STEPS





7 Stand alone test procedures

Overview

Purpose This chapter describes all the tests that should be carried out to check the functionality of the NEs.

Assumptions Be sure all listed assumptions described below are fulfilled before carrying out any tests:

- All NEs must be mounted and cabled correctly (see Chapters 3 and 4).
- The people carrying out the tests are familiar with LambdaUnite MSS, the SDH or SONET functionality, the *WaveStar*[®] CIT software and the handling of the test equipment.

Contents

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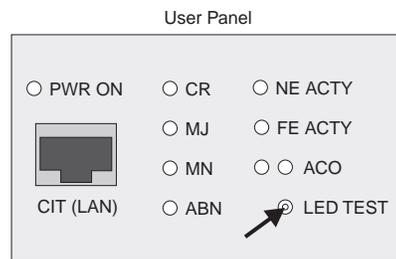


LED Test

Overview This test ensures the functionality of the LEDs on all circuit packs as well as on the user panel. The PWR ON LED on the user panel and the fan unit LEDs are not affected by the LED test.

Test procedure Proceed as follows to perform an LED test:

- 1 Push the LED TEST button on the user panel to test the circuit pack and user panel LEDs.



Result:

The following should happen:

1. The LEDs on the user panel (except the PWR ON LED) turn on for 2 seconds and then off for 2 seconds three times in sequence.
2. The LEDs on the circuit packs turn on for 2 seconds and then off for 2 seconds three times in sequence.

END OF STEPS

LED test failure In the case of a LED test failure (LEDs are not lit), please refer to Appendix A, section [“LED test failure” \(A-8\)](#).



Alarm reporting test

Overview This test verifies that currently active alarms of the system are reported to the *WaveStar*[®] CIT and the user panel. The test includes raise and clear behaviour of the alarms created.

Related information All the needed information for the tasks described below (creating and clearing of alarms) is given in the “*LambdaUnite*[™] MultiService Switch (MSS) User Operations Guide”.

Procedure Proceed as follows to complete the alarm test:

- 1 Login to the NE as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).

- 2 Create the different alarms in sequence as shown in the table below.

Example:

Create the following alarms separately:

Created alarm	Alarm level	Example for creation of the alarm
Protection Clock Input Fail	Deferred/Minor	Remove the XC320 circuit pack which is located in the protection slot 10.
NE Clock Failure	Prompt/Critical	Remove both XC320 circuit packs (worker and protection).

Created alarm	Alarm level	Example for creation of the alarm
Fan Voltage Feed A Failure	Prompt/Major	1. Reprovision the ASAP level for the “Fan Voltage Feed A Failure” alarm from “Deferred/Minor” to “Prompt/Major”. 2. Disconnect the fan power cable from the Power Input A connector of the Fan Unit and verify the receipt of a “Prompt/Major” alarm. 3. Change the ASAP back to “Deferred/Minor”.

.....

3 Check whether alarms are reported to the *WaveStar* CIT (via **Fault** → **NE Alarm List...** or **Reports** → **NE Alarm List...**). Check also the correct behaviour of the LEDs on the user panel and on the circuit pack, which generates the produced failure.

.....

4 Clear alarms created at step 2.

.....

5 Check the *WaveStar* CIT alarm list for correct clearing of the reported alarm. To make sure that the “NE Alarm List” reflects the current alarm status, click the **Refresh** button.

.....

6 Repeat [Step 2](#) to [Step 5](#) for all alarm levels.

END OF STEPS

.....



NE synchronisation test

Overview This test ensures protected synchronisation of the NE to external clock sources.

Important! The test must only be carried out for NEs with connected external clock sources.

Procedure Proceed as follows to complete the NE synchronisation test:

- 1 If not already done connect an external clock source to both external timing input ports located on the rear side of the subrack.

Use a 2.048 MHz or 2.048 Mbit/s framed signal for SDH, and a 1.544 Mbit/s framed signal for SONET.

- 2 Login to the NE as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).
-

- 3 Select **Configuration** → **Timing/Sync** in the System view.

Result:

The window **Synchronisation Characteristics** appears.

- 4 Assign the first clock source.

Select the tab **External Input 1** and set the following parameters:

- Select the **Input Signal Format** depending on the input signal.
- Set the **SSM Support** field to **Supported** in the case of **2 Mbit/s - framed** (SDH mode) or **ESF** (SONET mode) external timing input signals. In all other cases select **Not Supported**.

Select the tab **External Reference 1** and set the following parameters:

- Select **PRC** (SDH) or **PRS** (SONET) in the **Provisioned Quality Level** drop-down list box.
 - Select the priority **1** in the drop-down list box **System Timing Reference Priority**.
-

- Select **External Timing Input Port 1** in the drop-down list box **Assigned Port AID**.
 - Select **Monitored** in the drop-down list box **Timing Port Mode Monitoring**.
-

5 Assign the second clock source.

Select the tab **External Input 2** and set the following parameters:

- Select the **Input Signal Format** depending on the input signal.
- Set the **SSM Support** field to **Supported** in the case of **2 Mbit/s - framed** (SDH mode) or **ESF** (SONET mode) external timing input signals. In all other cases select **Not Supported**.

Select the tab **External Reference 2** and set the following parameters:

- Select **PRC** (SDH) or **PRS** (SONET) in the **Provisioned Quality Level** drop-down list box.
 - Select the priority **2** in the drop-down list box **System Timing Reference Priority**.
 - Select **External Timing Input Port 2** in the drop-down list box **Assigned Port AID**.
 - Select **Monitored** in the drop-down list box **Timing Port Mode Monitoring**.
-

6 Check that only these two external timing sources are enabled. If not, disable all other timing sources.

7 Select the tab **System Timing**, then again the tab **System Timing** and set the following parameters:

- Set the **Wait To Restore** (WTR) time to **1 minute**.
 - Set the **Clock Mode** to **Locked**.
-

8 Verify that the NE is synchronising onto the first clock source for at least 3 minutes. To do this, select **View** → **Timing/Sync**, then the tab **System Timing**.

Result:

“**External Timing Input Port 1**” should be displayed in the **System Timing Reference AID** field.

Select the tab **System Timing**. “**Normal**” should be displayed in the **System Clock mode Status** field.

- 9 Disconnect the first clock source.

Result:

The second clock source should become active.

To check that, select the tab **System Timing Reference**. “**External Timing Input Port 2**” should be displayed in the **System Timing Reference AID** field.

- 10 Reconnect the first clock source.

Result:

The first clock source should become active again after WTR time has expired.

- 11 Return all timing parameters to their prior state.

END OF STEPS

NE synchronisation failure In the case of an NE synchronisation failure (NE cannot synchronise to an external clock source), please refer to Appendix A, section [“NE synchronisation failure” \(A-5\)](#).



Optical power meter test

Overview This test verifies that the optical mean launched power is within specification at all optical interfaces.



DANGER

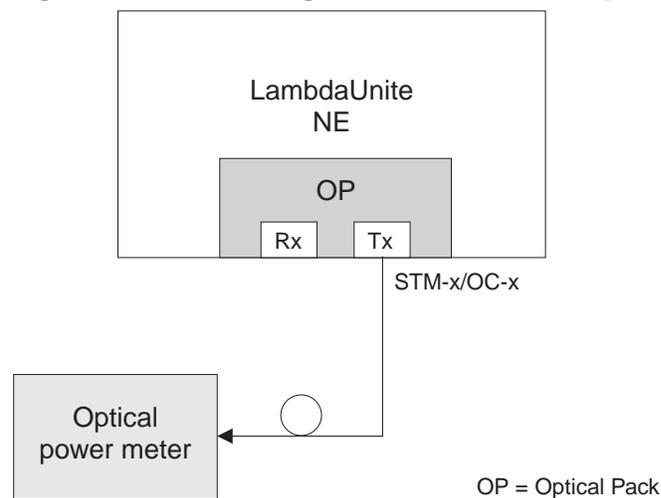
Injury to eyes caused by invisible laser radiation.

LambdaUnite™ MSS systems operate with invisible laser radiation. Laser radiation can cause considerable injuries to the eyes.

Never look into the end of an exposed fiber or into an open optical connector as long as the optical source is switched on. Always observe the laser warning instructions (cf. [“Laser safety” \(1-11\)](#)).

Test setup The following figure illustrates a possible test setup. The number and type of optical interfaces used can vary according to the customer configuration.

Figure 7-1 Measuring the mean launched power



Procedure Proceed as follows to check the mean launched power:

1 Connect the optical power meter to one output port of the optical circuit pack to be tested.

2 Measure the mean launched power at the connected port.

Important! The optical power meter must be set to the appropriate wavelength range (see [“Value and wavelength ranges” \(7-10\)](#)). The supported max. optical power limit of the optical power meter must be greater than the maximum mean launched power of the measured optical circuit pack to avoid damage.

3 Check that the measured value is within the range shown below.

4 Repeat the measurement for all optical ports.

END OF STEPS

Value and wavelength ranges

The following table provides the mean launched power value and wavelength ranges of the optical circuit packs.

Circuit pack	Wavelength range [nm]	Mean launched power range [dBm]
OP40/1.3IOR1	1310	+5.0 ... +7.0
OP40/8650...9280XT	1550	-5.0 ... -3.0
OP10/1.3IOR1	1310	-6.0 ... -1.0
OP10/1.5IR1	1550	-1.0 ... +2.0
OP10/1.5LR1	1550	+10.0 ... +13.0
OP10/01...80/800G	1550	-6.2 ... -3.8
OP10/8650...9285XT	1550	-2.0 ... n/a
OP2G5/1.3SR4	1310	-10.0 ... -3.0
OP2G5/1.3LR4	1310	-2.0 ... +2.0
OP2G5/1.5LR4	1550	-2.0 ... +2.0

Circuit pack	Wavelength range [nm]	Mean launched power range [dBm]
OP2G5/01...32PWDM	1550	-3.0 ... 0
OP2G5/ 921...959PWDM	1550	-3.0 ... 0
OP622M/1.3IR16	1310	-15.0 ... -8.0
OP155M/1.3IR16	1310	-15.0 ... -8.0
GE1/SX4	850	> -9.5



Port transmission test (daisy chain test)

Overview This test verifies the cross-connect functionality and if all optical ports are working properly.



DANGER

Injury to eyes caused by invisible laser radiation.

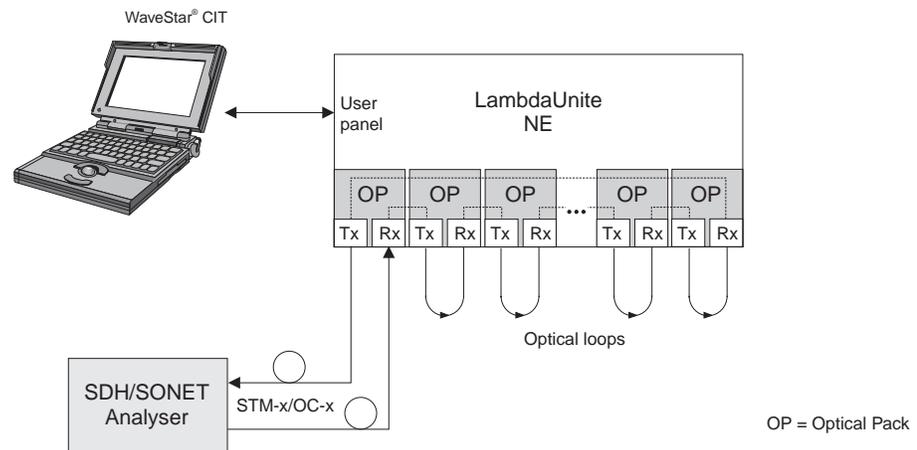
LambdaUnite™ MSS systems operate with invisible laser radiation. Laser radiation can cause considerable injuries to the eyes.

Never look into the end of an exposed fiber or into an open optical connector as long as the optical source is switched on. Always observe the laser warning instructions (cf. [“Laser safety” \(1-11\)](#)).

Before you begin Prior performing this task, you must have at least a privilege code of P3. For some fields privilege code M1 is required.

Test setup The following figure illustrates a possible test setup. The number and type of optical interfaces depends on the customer configuration.

Figure 7-2 Daisy chain test



Procedure Proceed as follows to perform the port transmission test:

- 1 Establish a test setup as shown above.

NOTE: The analyser should be connected to a port with the lowest optical port rate (excluding the GE1SX/4, this might be 2.5G).

- 2 Login to the NE as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).
-

- 3 Set up the first cross-connection by calling up the **Cross-Connection Wizard** via **Configuration** → **Cross-Connections...** in the **System View** of the *WaveStar*[®] CIT.
-

- 4 Click on the radio button **Create a new cross-connection** and click on **Next>**.

Result:

Screen 1 appears.

- 5 Define the cross-connection rate according to the used analyser signal in the drop-down list box **Rate**. The following values are possible:

- **VC3** (default value)
- **VC4**
- **VC44c**
- **VC416c**
- **VC464c**
- **STS1**
- **STS3**
- **STS12**
- **STS48**
- **STS192**

Please note that it is not possible to proceed to the next window before selecting the cross-connection rate.

-
- 6 Select **1-Way Point-to-Point** in the group box **Type of Cross-connection**.
-

- 7 Click on **Next>** to proceed to the next window.

Result:

Screen 2 of 3 opens.

- 8 Click on **Select....** to select the source tributary.

Result:

The **Ptn Grp** selection tab appears. In the list box of the **Ptn Grp** selection tab the system is displayed. The displays can be expanded. Thus a tree of systems, bays, shelves, circuit packs, and ports is depicted.

- 9 Select one port in the list or enter the AID in the text box **Enter AID** above.

Result:

In the list box **Tributary** on the right, the AIDs of all VCs/STSs belonging to the respective port are displayed.

- 10 Select the VC/STS which shall be used as the source and click on the **Select...** button.
-

- 11 Select the destination port in the **Ptn Grp** selection tab and the corresponding VC/STS in the **Tributary** list box and click on the **Select...** button.

Result:

On **Screen 2 of 3** both, the source and destination tributary, are displayed.

- 12 Click on the **Next>** button.
-

Result:

The **Screen 3 of 3** opens.

The current data of the cross connection are displayed.

.....
13 Select **NORM** as **Output Mode** in the group boxes **Source to Destination** and **Destination to Source**.
.....

14 Type a 9-digit number for the cross connection in the field **XC Number** or use the automatically generated one.
.....

15 Click on the **Finish** button to apply your settings.
.....

16 Repeat [Step 4](#) to [Step 15](#) for all the other required cross-connections according to the test setup.

Important! Use in [Step 5](#) always the same cross-connection rate!
.....

17 Start a signal transmission via the SDH/SONET analyser for 3 minutes.

Result:

No bit errors are present during

END OF STEPS
.....



NE provisioning and stand alone installation test exit checklist

Checklist Verify that all procedures described below has been completed. If a procedure was not applicable, indicate “N/A”.

Procedure	Result (Passed, Failed, N/A)	Initials	Notes
WaveStar® CIT installation			
NE login			
NE name (TID) provisioning			
Provisioning of the system parameters			
Provisioning of the timing references			
Provisioning of the system timing			
LED test			
Alarm reporting test			
NE synchronisation test			
Optical power meter test			
Port and cross-connect test			





8 Span / Ring testing

Overview

Purpose This chapter describes all steps which are required for establishing the network and the tests that should be carried out to check the functionality of the overall system.

The test procedures are described for SDH and SONET systems. The section which is not relevant can be ignored.

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Span/Ring testing entry checklist

Overview

Purpose This section ensures the operability of the procedures described in this chapter.

Contents The entry checklist is related to this chapter only.



Entry checklist

The following provides a checklist to be completed prior to perform the span/ring testing. Verify that each procedure has been completed. Check off and initial the item.

Procedure	Completed	Initials	Notes
Have all procedures been completed which are required in Chapter 7, “NE provisioning and stand alone installation test exit checklist” (7-18) ?			
Is a laptop or desktop PC available meeting the minimum requirements (see section “WaveStar® CIT requirements” (2-6))?			
Is a crossed LAN cable CAT5 with 4-wire RJ-45/RJ-45 connectors available?			
Is the following test equipment available? <ul style="list-style-type: none"> • Optical power meter with LC connectors • Multimeter 			



Network establishment

Overview

Purpose This section provides a procedure for establishing a network via fiber connections from NE to NE.

Related information The fiber cabling and routing within a rack and an NE is described in Chapter 4, section [“Fiber cabling” \(4-53\)](#).

If passive DWDM equipment is used please refer to [Appendix D, “Passive DWDM \(OEM equipment\)”](#).

If DCM equipment is used please refer to [Appendix E, “DCM \(OEM equipment\)”](#).

□

Connecting the fiber cables

Background information The LC attenuator which will be determined in the procedure described below should be placed on the INPUT port because this is the furthest physical point on the fiber line from the OUTPUT port and takes all connector losses into account.

Before you begin Be sure that all fiber connectors are clean. A cleaning procedure is described in Appendix A, section [“Fiber cleaning” \(A-13\)](#).

Procedure



DANGER

Injury to eyes caused by invisible laser radiation.

LambdaUnite™ MSS systems operate with invisible laser radiation. Laser radiation can cause considerable injuries to the eyes.

Never look into the end of an exposed fiber or into an open optical connector as long as the optical source is switched on. Always observe the laser warning instructions (cf. [“Laser safety” \(1-11\)](#)).

Proceed as follows to establish a network:

- 1 Connect an optical fiber to the OUT port of one optical circuit pack.

- 2 Move to the next NE. At the IN port of the respective optical circuit pack measure the received optical power from the far-end transmitter.
Important! The optical power meter must be set to the appropriate wavelength range.

- 3 Check that the measured value is within the range shown below (see section [“Optical power and wavelength ranges” \(8-8\)](#)).

IF...	THEN...
the measured value is within the range,	END OF STEPS
the measured value is not within the range,	choose the appropriate LC attenuator value. All orderable LC attenuators are mentioned in Appendix C, section “LC attenuators” (C-12) .

-
- 4 Replace the 0-dB LC attenuator by the chosen one.

NOTE: In the case of Gigabit Ethernet ports, a multi-mode LBO (Lightguide Build-Out) must be used.

.....

- 5 Measure the received optical power again. To be able to do that a coupler and an extra fiber jumper could be required.

Result:

The measured value must lie within the valid range.

.....

- 6 Connect the fiber to this IN port.
-

- 7 Repeat [Step 1](#) to [Step 6](#) for all required fiber connections.

END OF STEPS

.....

Optical power and wavelength ranges

The following table provides the allowed value range of the received optical power as well as the wavelength ranges of the optical circuit packs.

Circuit pack	Wavelength range [nm]	Allowed range [dBm]
OP40/1.3IOR1	1310	-5.0 ... +2.0
OP40/8650...9280XT	1550	-10.5 ... -0.5
OP10/1.3IOR1	1310	-11.0 ... -1.0
OP10/1.5IR1	1550	-14.0 ... -1.0
OP10/1.5LR1	1550	-14.0 ... -1.0
OP10/01-80/800G	1550	-20.0 ... -13.0
OP10/8650...9285XT	1550	-13.0 ... -3.0
OP2G5/1.3SR4	1310	-18.0 ... -3.0
OP2G5/1.3LR4	1310	-27.0 ... -8.0
OP2G5/1.5LR4	1550	-28.0 ... -8.0
OP2G5/01...32PWDM	1550	-28.0 ... -8.0
OP2G5/ 921...959PWDM	1550	-28.0 ... -8.0
OP622M/1.3IR16	1310	-28.0 ... -8.0
OP155M/1.3IR16	1310	-28.0 ... -8.0
GE1/SX4	850	-17.0 ... 0



SDH test procedures

Overview

Purpose This chapter describes all the tests that should be carried out to check the functionality of the system.

Assumptions Be sure all listed assumptions described below are fulfilled before carrying out any tests:

- All NEs must be mounted and cabled correctly.
- The people carrying out the tests are familiar with the SDH functionality, the *WaveStar*[®] CIT software and the handling of the test equipment.

Related information An overview about all *WaveStar* CIT related tasks is given in the “*LambdaUnite*[™] MultiService Switch (MSS) User Operations Guide”.

Contents

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Provision DCC

Purpose Use this procedure to create new DCC (Data Communication Channel) terminations. They are necessary for exchanging network management information between NEs and performing the tests described in this chapter.

Before you begin **Important!** Only ports to which fiber cables are connected should be configured for DCC terminations!

Prior performing this task,

- you must have at least a privilege code of S4
- a XC320 circuit pack must be plugged.

Max. number of active DCC links The maximum number of simultaneously supported DCC channels per DCC controller is 64. That means, each DCC controller can support up to 64 active DCC links.

Procedure Proceed as follows to create a new DCC termination:

- 1 Login to the NE as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).

- 2 Invoke the **Configure DCC Terminations** window from the **System View** main menu via **Configuration → DCC Terminations...**

- 3 Select the circuit pack for which you want to configure the DCC terminations and click **Select**.

- 4 Select **New Termination** in the parameter part (tab **Section DCC**).

- 5 Click on **Select port for new DCC termination...** and select the optical interface port for which you want to configure the DCC terminations.

.....
6 Enable the DCC termination by selecting the **Enabled** option in the **DCC Channel Parameters** group box.
.....

7 Select **AIMS** as **LAPD Mode**.
.....

8 Select the **LAPD Role**.

Important! This selection is not relevant for connections between UNITE NEs. For interworking with not-UNITE NEs the chosen parameters have to be different at both ends of the DCC termination. That means at the one end must be set **USER-SIDE**, on the other end **NETWORK-SIDE**.
.....

9 Repeat [Step 3](#) to [Step 8](#) for all ports to which fiber cables are connected.
.....

10 Repeat [Step 1](#) to [Step 9](#) for all other NEs in the ring/network.

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

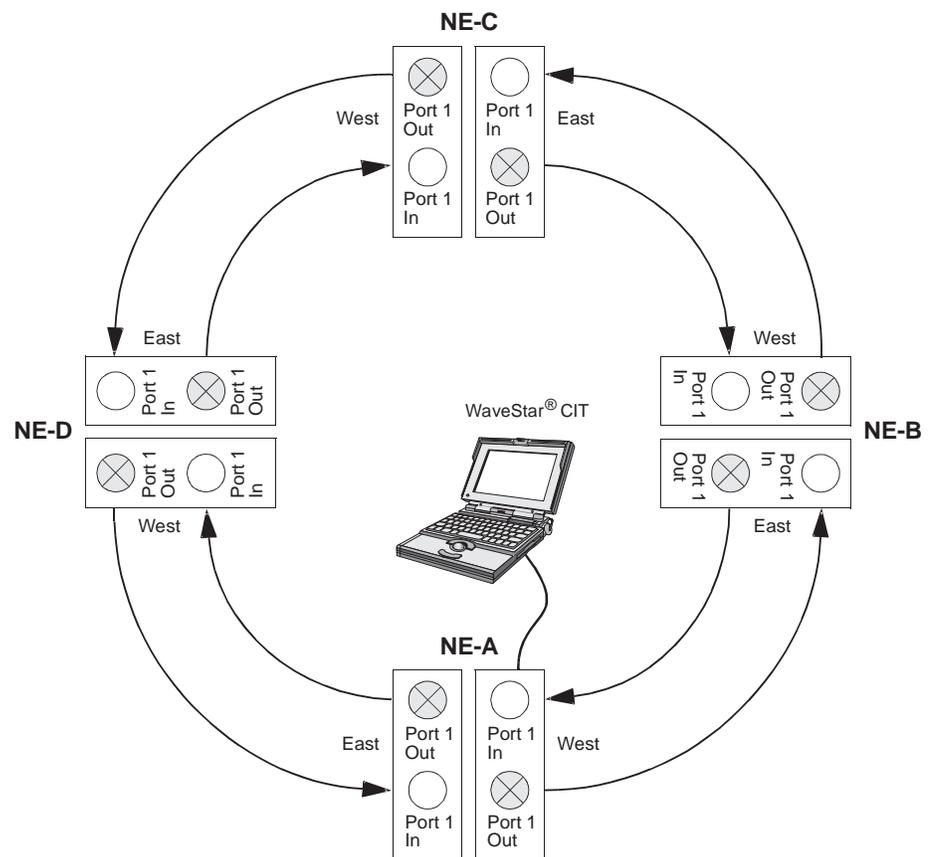


Remote login

Overview The test ensures the accessibility to all NEs via remote login. In the test procedure a protected ring configuration will be used as example. However, the described procedure is in principle also valid for other network topologies.

Before you begin This test can only be done after the DCC channels have been configured correctly (see section [“Provision DCC” \(8-10\)](#)).

Test setup



Procedure Proceed as follows to test the NE control and supervision functionality via remote login:

- 1 Login to the NE-A as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).

-
- 2 Start a remote login to NE-B by double clicking on the NE-B icon.

Result:

All units of the NE-B will be displayed.

- 3 Read out the inventory data by double clicking on a unit.

Result:

The inventory data window (Pack Data) for the selected board will be opened.

Tab Pack Data



Tab Status



-
- 4 Set the NE-B date and time to the actual values (see Chapter 6, section [“System parameters” \(6-16\)](#)).
-

- 5 Repeat [Step 2](#) to [Step 4](#) for all other NEs within the ring/network.

END OF STEPS

Remote login failure In the case of a remote login failure, please refer to Appendix A, section [“Remote login failure” \(A-9\)](#).



Line timing provisioning

Overview This section provides a procedure which must be carried out before performing the line timing test (see section [“Line timing test” \(8-17\)](#)). Be If necessary existing timing references must be deleted before

Before you begin Prior performing this task,

- you must have at least a privilege code of P3
- the DCC channels must be configured correctly (see section [“Provision DCC” \(8-10\)](#))
- the correct synchronisation system mode (SDH) must be selected (see Chapter 6, section [“System parameters” \(6-16\)](#)).
- existing timing references must be deleted.

Procedure Proceed as follows to configure the line timing reference:

1 Login to the NE-A as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).

2 Select **Configuration** → **Timing/Sync** in the **System View** of the *WaveStar*[®] CIT.

Result:

The window **Synchronisation Characteristics** appears.

3 Select the tab **Line Reference 1** and set the following parameters:

- Select **PRC** in the **Provisioned Quality Level** drop-down list box.
- Select the priority **1** in the drop-down list box **System Timing Reference Priority**.
- Select the port AID in the drop-down-list box **Assigned Port AID**. Click on **Browse...** in order to open the window **Select Line Timing Port AID**.

NOTE: Only ports to which fiber cables are connected can be configured for line timing!

- Select **Monitored** in the drop-down list box **Timing Port Mode Monitoring**.

.....
4 Check that only the line timing reference is enabled. If not, disable all other timing sources.

.....
5 Select the tab **System Timing**, then again the tab **System Timing** and set the following parameters:

- Set the **Wait To Restore** (WTR) time to **1 minute**.
- Set the **Clock Mode** to **Locked**.

.....
6 Click on the **Apply** button and then **Yes** in the confirmation window.

.....
7 Repeat [Step 1](#) to [Step 6](#) for all other NEs within the ring/network.

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

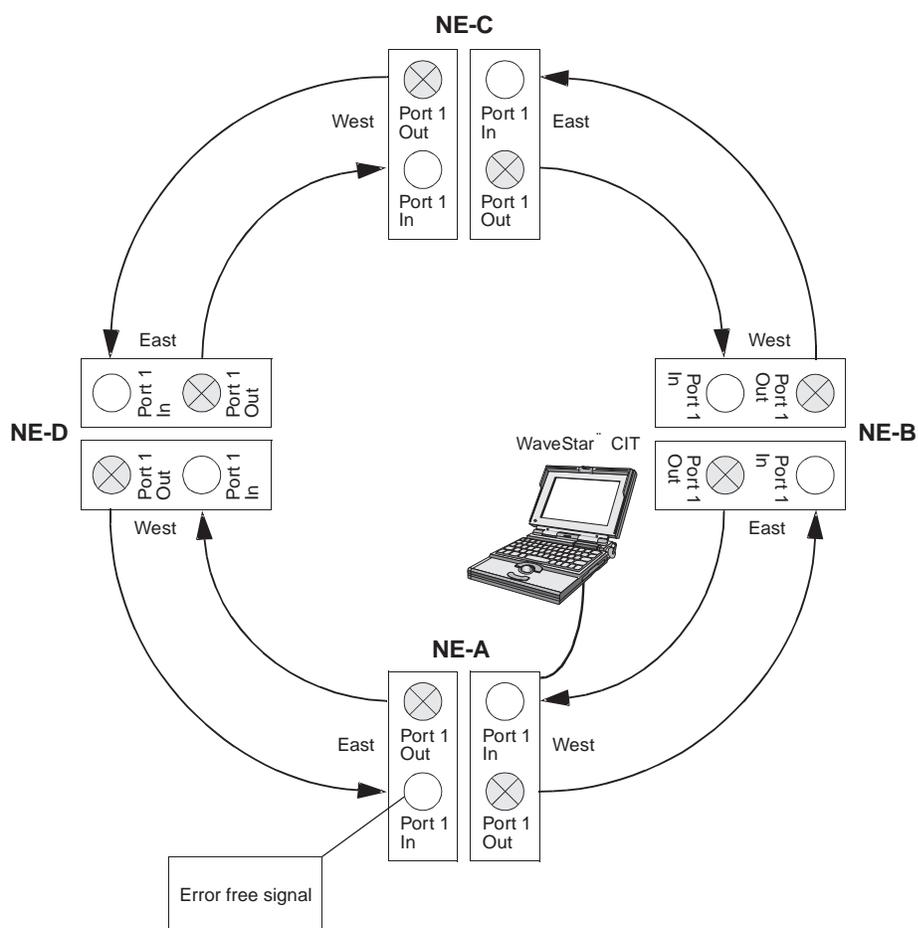


Line timing test

Overview This test checks that all NEs can be synchronised using the line timing function. In the test procedure a protected ring configuration will be used as example. However, the described procedure is in principle also valid for other network topologies.

Before you begin This test can only be done after the line timing functionality has been configured correctly (see section [“Line timing provisioning” \(8-15\)](#)).

Test setup



Procedure Proceed as follows to test the network line timing functionality:

- 1 Connect an error free SDH signal to the optical port which has been configured for line timing (see section [“Line timing provisioning” \(8-15\)](#)).

Important! Clarify that the optical input signal is in the correct optical power input range (see section [“Optical power and wavelength ranges” \(8-8\)](#)).

- 2 Login to the NE-A as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).
-

- 3 Check that NE-A is synchronized onto the line timing. To do this select **View** → **Timing/Sync** → **tab: System Timing** → **tab: System Timing**.

Result:

The following should be displayed:

- **“Locked”** in the **Clock Mode** field
 - **“Normal”** in the **System Clock mode Status** field.
-

- 4 Disconnect the SDH signal.

Result:

NE-A must switch to the **“holdover”** state, because no second timing source is configured.

Click on the **Alarm List** button in the **System View** of the *WaveStar*[®] CIT. The following alarms should be displayed:

- **“Loss of Synchronisation”**
 - **“Timing Reference Failure”**
 - **“Loss of Signal”**.
-

- 5 Reconnect the SDH signal.

Result:

The alarms should be cleared after the provisioned WTR time.

The **Clock Mode** and **System Clock mode Status** fields switch back to the old values (**“Locked”** and **“Normal”**).

- 6 Start a remote login to NE-B and repeat [Step 3](#) to [Step 5](#).
-

.....
7 Repeat [Step 6](#) for all other NEs within the ring/network.
.....

8 Return all timing parameters to their prior state.

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



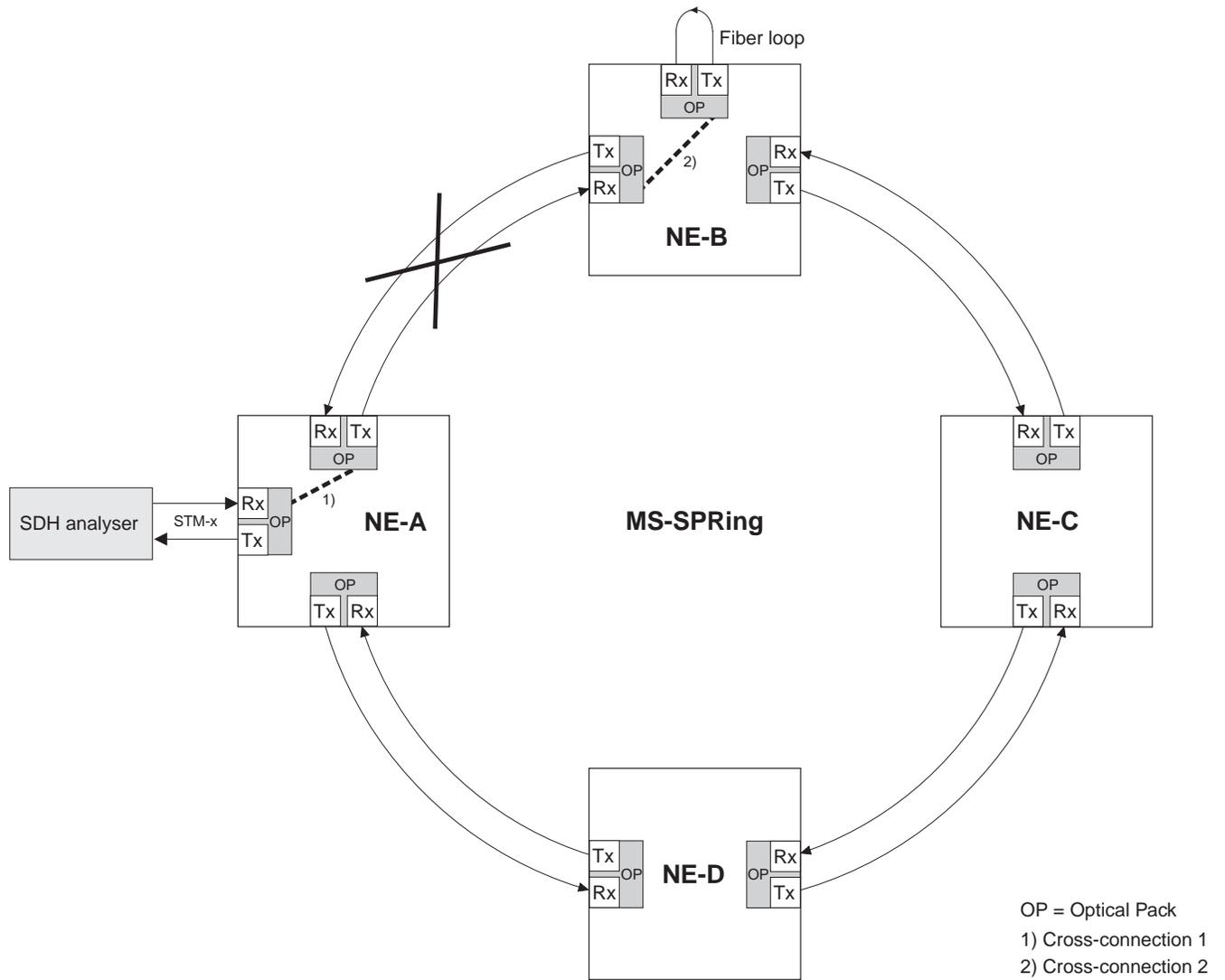
Point to point / Ring testing

Overview This test provides procedures for testing the 2-fiber MS-SPRing functionality and verifies the end-to-end transmission through the ring.

Before you begin Prior to performing this task, you must:

- verify that all required circuit packs are installed (see Chapter 5, section [“Circuit pack installation” \(5-8\)](#))
- verify that no cross-connections have been made on any port to be included in the protection group
- verify that the DCC channels are configured correctly (see section [“Provision DCC” \(8-10\)](#)).

Test setup



Creating a 2-fiber MS-SPRing

Important! You must have at least a privileged code of M4 to perform this task.

Proceed as follows to create a new MS-SPRing:

- 1 Login to the NE-A as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).

-
- 2 Call up the window **Create New Protection Group** via **Configuration** → **Create New** → **Protection Group...** in the **System View** of the CIT.

Result:

On the left side of the window the tab **Ptn Grp** appears. The selected system and bay and the available shelf are displayed.

-
- 3 Select the shelf and click on the pushbutton **Select I/O Shelf**.

-
- 4 Select in the drop-down list box **Protection Type** the type **2 Fiber MS-SPRing**.

Result:

The parameter fields for the 2-fiber MS-SPRing appear.

-
- 5 Define the **Protection Group AID** by typing the last digit(s) in the respective text box. This can be max. 3 digits, a value from **1** to **239** is possible. Please note that you have to choose different AIDs for different protection groups within one network element. Within the whole ring equal Protection Group AIDs may exist.

-
- 6 Enter the Ring ID. The Ring ID must be defined for the whole ring.
Important! For all MS-SPRing protection groups which are defined in network elements belonging to one ring always the same Ring ID has to be inserted.

-
- 7 Select the AIDs of **East Port** and **West Port** in the respective drop-down list boxes in the group box **Group Member**. The values correspond to the slot designations.

-
- 8 Set the **Wait to Restore** time in the drop-down list box to **1** minute.

-
- 9 Select the **MS-SPRing Alarm Severity Assignment Profile**.

-
- 10 Verify that all parameters are correct. Click the **Apply** pushbutton and then **Yes** in the confirmation window.

Result:

If the creation of the MS-SPRing protection group was successful, a DCC termination provisioning message appears indicating that the LAPD role has been set at user-side.

.....

- 11 Click **OK**, then click on **Close**.
-

- 12 Repeat [Step 1](#) to [Step 11](#) for all other NEs within the ring.
-

- 13 Verify the correct configuration via **View** → **Rings** → **Ring Maps...** in the WaveStar® CIT **System View**.

END OF STEPS

.....

Creating cross-connections

Important! You must have at least a privilege code of P3 to perform this task.

Proceed as follows to create the required cross-connections:

.....

- 1 Login to the NE-A as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).

.....

- 2 Set up a cross-connection by calling up the **Cross-Connection Wizard** via **Configuration** → **Cross-Connections...** in the **System View** of the WaveStar® CIT.

.....

- 3 Click on the radio button **Create a new cross-connection** and click on **Next>**.

Result:

Screen 1 appears.

-
- 4 Define the cross-connection rate according to the used analyser signal in the drop-down list box **Rate**. The following values are possible:
- **VC3**
 - **VC4**
 - **VC44c**
 - **VC416c**
 - **VC464c**

Please note that it is not possible to proceed to the next window before selecting the cross-connection rate.

- 5 Select **2 Way Point-to-Point** in the group box **Type of Cross-connection**.
-

- 6 Click on **Next>** to proceed to the next window.

Result:

Screen 2 of 3 opens.

- 7 Click on **Select....** to select the source tributary.

Result:

The **Ptn Grp** selection tab appears.

- 8 Select the port to which the SDH analyser is connected.

Result:

In the list box **Tributary** on the right, the AIDs of all VCs belonging to the respective port are displayed.

- 9 Select the VC which shall be used as the source and click on the **Select** button.
-

- 10 Select the destination port which is interface to the MS-SPRing in the **Ptn Grp** selection tab and the corresponding VC in the **Tributary** list box.
-

11 Click on the **Select** button.

Result:

On **Screen 2 of 3** both, the source and destination tributary, are displayed.

12 Click on the **Next>** button.

Result:

The **Screen 3 of 3** opens.

The current data of the cross connection are displayed. The **Source NE Name** is greyed out.

13 Select **NE-B** as the **Destination NE Name**.

14 Click on the **Finish** button to apply your settings.

15 Repeat [Step 1](#) to [Step 14](#) for NE-B.

Be aware of the following differences:

- As **Source** select the port which is interface to the MS-SPRing.
- As **Destination** select the port to which the fiber loop is connected.
- Select **NE-A** as the **Source NE Name**.

END OF STEPS

Test procedure Proceed as follows to perform the test:

.....

- 1 Start a signal transmission via the SDH analyser.

Result:

No bit errors are present.

.....

- 2 Remove the fiber connection between NE-A and NE-B.

Result:

A short interruption of the traffic can be observed. However, the traffic should be restored after a short time.

END OF STEPS

.....



Span/Ring testing exit checklist

Checklist Verify that all tasks described in this chapter has been completed. If a procedure was not applicable, indicate “N/A”.

Task	Result (Passed, Failed, N/A)	Initials	Notes
Fiber connection			
DCC provisioning			
Remote login test			
Line timing provisioning			
Line timing test			
Point to point / Ring test			



SONET test procedures

Overview

Purpose This chapter describes all the tests that should be carried out to check the functionality of the system.

Assumptions Be sure all listed assumptions described below are fulfilled before carrying out any tests:

- All NEs must be mounted and cabled correctly.
- The people carrying out the tests are familiar with the SONET functionality, the *WaveStar*[®] CIT software and the handling of the test equipment.

Related information An overview about all *WaveStar* CIT related tasks is given in the “*LambdaUnite*[™] MultiService Switch (MSS) User Operations Guide”.

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Provision DCC

Purpose Use this procedure to create new DCC (Data Communication Channel) terminations. They are necessary for exchanging network management information between NEs and performing the tests described in this chapter.

Before you begin **Important!** Only ports to which fiber cables are connected should be configured for DCC terminations!

Prior performing this task,

- you must have at least a privilege code of S4
- a XC320 circuit pack must be plugged.

Max. number of active DCC links The maximum number of simultaneously supported DCC channels per DCC controller is 64. That means, each DCC controller can support up to 64 active DCC links.

Procedure Proceed as follows to create a new DCC termination:

- 1 Login to the NE as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).

- 2 Invoke the **Configure DCC Terminations** window from the **System View** main menu via **Configuration → DCC Terminations...**

- 3 Select the circuit pack for which you want to configure the DCC terminations and click **Select**.

- 4 Select **New Termination** in the parameter part (tab **Section DCC**).

- 5 Click on **Select port for new DCC termination...** and select the optical interface port for which you want to configure the DCC terminations.

.....
6 Enable the DCC termination by selecting the **Enabled** option in the **DCC Channel Parameters** group box.

.....
7 Select **AIMS** as **LAPD Mode**.

.....
8 Select the **LAPD Role**.

Important! This selection is not relevant for connections between UNITE NEs. For interworking with not-UNITE NEs the chosen parameters have to be different at both ends of the DCC termination. That means at the one end must be set **USER-SIDE**, on the other end **NETWORK-SIDE**.

.....
9 Repeat [Step 3](#) to [Step 8](#) for all ports to which fiber cables are connected.

.....
10 Repeat [Step 1](#) to [Step 9](#) for all other NEs in the ring/network.

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

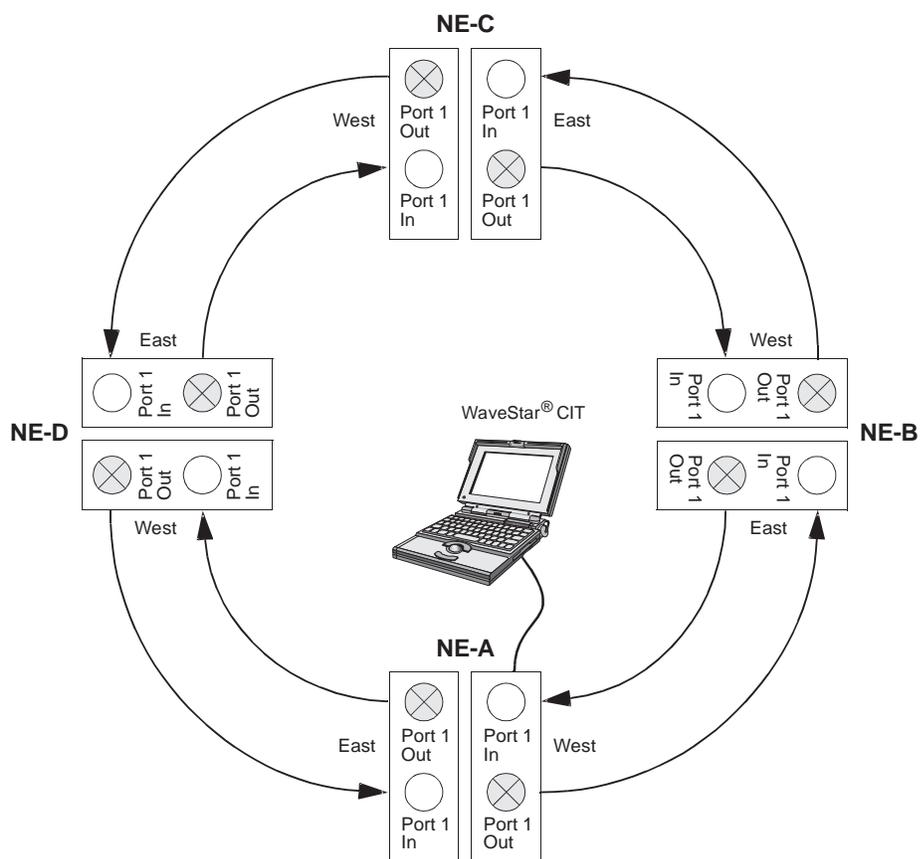


Remote login

Overview The test ensures the accessibility to all NEs via remote login. In the test procedure a protected ring configuration will be used as example. However, the described procedure is in principle also valid for other network topologies.

Before you begin This test can only be done after the DCC channels have been configured correctly (see section [“Provision DCC” \(8-29\)](#)).

Test setup



Procedure Proceed as follows to test the NE control and supervision functionality via remote login:

- 1 Login to the NE-A as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).

-
- 2 Start a remote login to NE-B by double clicking on the NE-B icon.

Result:

All units of the NE-B will be displayed.

- 3 Read out the inventory data by double clicking on a unit.

Result:

The inventory data window (Pack Data) for the selected board will be opened.

Tab Pack Data



Tab Status



-
- 4 Set the NE-B date and time to the actual values (see Chapter 6, section [“System parameters” \(6-16\)](#)).
-

- 5 Repeat [Step 2](#) to [Step 4](#) for all other NEs within the ring/network.

END OF STEPS

Remote login failure In the case of a remote login failure, please refer to Appendix A, section [“Remote login failure” \(A-9\)](#).



Line timing provisioning

Overview This section provides a procedure which must be carried out before performing the line timing test (see section [“Line timing test” \(8-36\)](#)).

- Before you begin** Prior performing this task,
- you must have at least a privilege code of P3
 - the DCC channels must be configured correctly (see section [“Provision DCC” \(8-29\)](#))
 - the correct synchronisation system mode (SONET) must be selected (see Chapter 6, section [“System parameters” \(6-16\)](#)).
 - existing timing references must be deleted.

Procedure Proceed as follows to configure the line timing reference:

1 Login to the NE-A as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).

2 Select **Configuration** → **Timing/Sync** in the **System View** of the *WaveStar*[®] CIT.

Result:

The window **Synchronisation Characteristics** appears.

3 Select the tab **Line Reference 1** and set the following parameters:

- Select **PRS** in the **Provisioned Quality Level** drop-down list box.
- Select the priority **1** in the drop-down list box **System Timing Reference Priority**.
- Select the port AID in the drop-down-list box **Assigned Port AID**. Click on **Browse...** in order to open the window **Select Line Timing Port AID**.

NOTE: Only ports to which fiber cables are connected can be configured for line timing!

- Select **Monitored** in the drop-down list box **Timing Port Mode Monitoring**.

.....
4 Check that only the line timing reference is enabled. If not, disable all other timing sources.

.....
5 Select the tab **System Timing**, then again the tab **System Timing** and set the following parameters:

- Set the **Wait To Restore (WTR)** time to **1 minute**.
- Set the **Clock Mode** to **Locked**.

.....
6 Click on the **Apply** button and then **Yes** in the confirmation window.

.....
7 Repeat [Step 1](#) to [Step 6](#) for all other NEs within the ring/network.

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

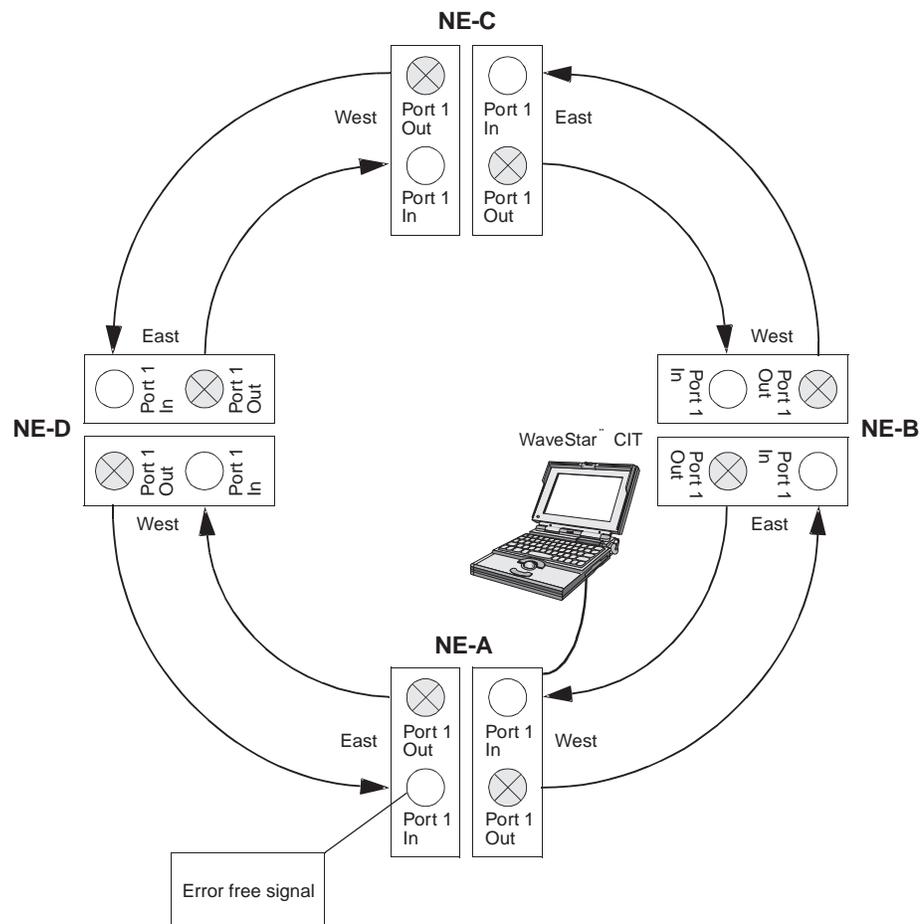


Line timing test

Overview This test checks that all NEs can be synchronized using the line timing function. In the test procedure a protected ring configuration will be used as example. However, the described procedure is in principle also valid for other network topologies.

Before you begin This test can only be done after the line timing functionality has been configured correctly (see section [“Line timing provisioning” \(8-34\)](#)).

Test setup



Procedure Proceed as follows to test the network line timing functionality:

- 1 Connect an error free SONET signal to the optical port which has been configured for line timing (see section [“Line timing provisioning” \(8-34\)](#)).

Important! Clarify that the optical input signal is in the correct optical power input range (see section [“Optical power and wavelength ranges” \(8-8\)](#)).

- 2 Login to the NE-A as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).
-

- 3 Check that NE-A is synchronized onto the line timing. To do this select **View** → **Timing/Sync** → **tab: System Timing** → **tab: System Timing**.

Result:

The following should be displayed:

- **“Locked”** in the **Clock Mode** field
 - **“Normal”** in the **System Clock mode Status** field.
-

- 4 Disconnect the SONET signal.

Result:

NE-A must switch to the **“holdover”** state, because no second timing source is configured.

Click on the **Alarm List** button in the **System View** of the *WaveStar*[®] CIT. The following alarms should be displayed:

- **“Loss of Synchronisation”**
 - **“Timing Reference Failure”**
 - **“Loss of Signal”**.
-

- 5 Reconnect the SONET signal.

Result:

The alarms should be cleared after the provisioned WTR time. The **Clock Mode** and **System Clock mode Status** fields switch back to the old values (**“Locked”** and **“Normal”**).

- 6 Start a remote login to NE-B and repeat [Step 3](#) to [Step 5](#).
-

.....
7 Repeat [Step 6](#) for all other NEs within the ring/network.
.....

8 Return all timing parameters to their prior state.

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



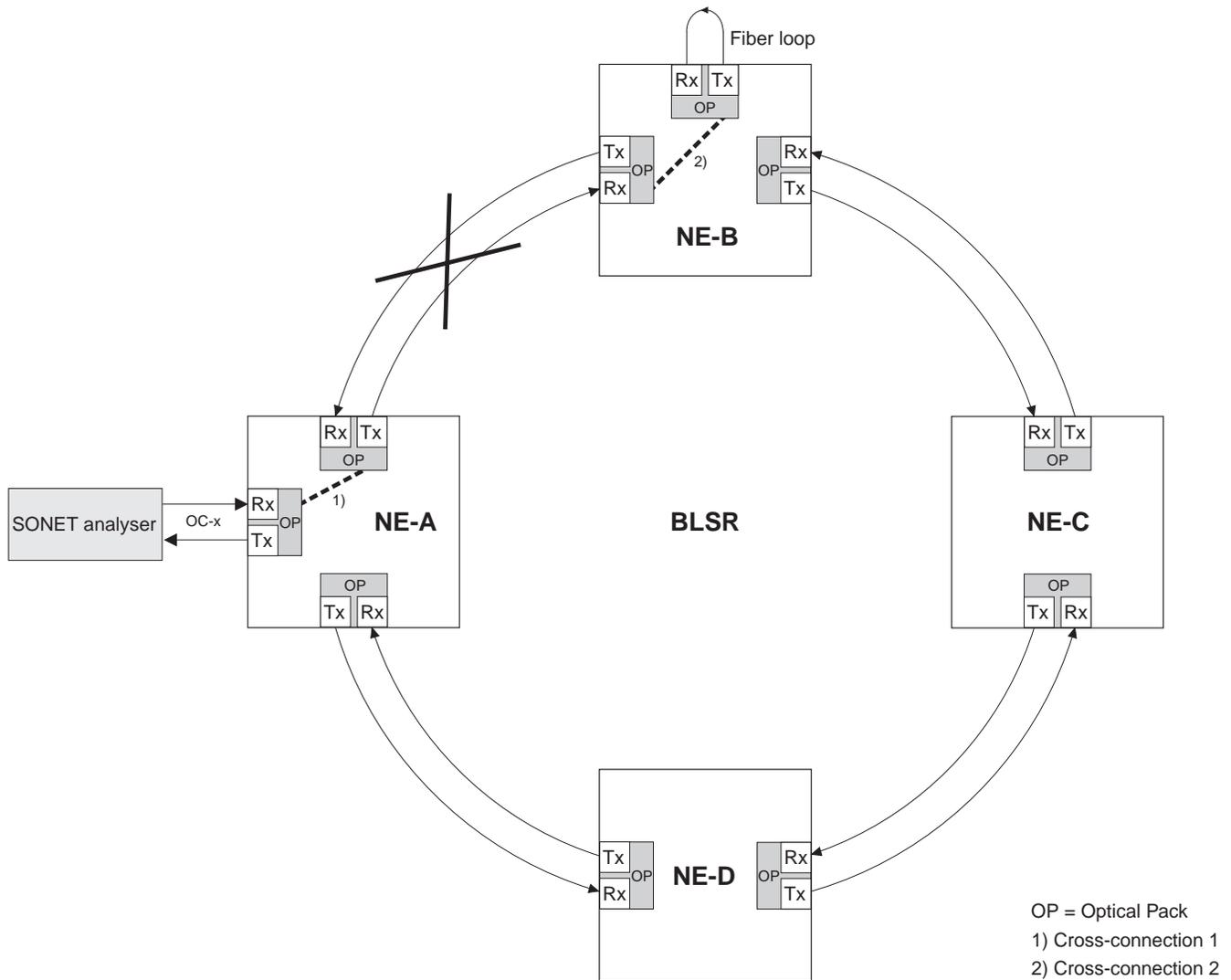
Point to point / Ring testing

Overview This test provides procedures for testing the 2-fiber BLSR functionality and verifies the end-to-end transmission through the ring.

Before you begin Prior to performing this task, you must:

- verify that all required circuit packs are installed (see Chapter 5, section [“Circuit pack installation” \(5-8\)](#))
- verify that no cross-connections have been made on any port to be included in the protection group
- verify that the DCC channels are configured correctly (see section [“Provision DCC” \(8-29\)](#)).

Test setup



Creating a 2-fiber BLSR

Important! You must have at least a privilege code of M4 to perform this task.

Proceed as follows to create a new BLSR:

- 1 Login to the NE-A as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).

-
- 2 Call up the window **Create New Protection Group** via **Configuration** → **Create New** → **Protection Group...** in the **System View** of the CIT.

Result:

On the left side of the window the tab **Ptn Grp** appears. The selected system and bay and the available shelf are displayed.

-
- 3 Select the shelf and click on the pushbutton **Select I/O Shelf**.

-
- 4 Select in the drop-down list box **Protection Type** the type **2 Fiber BLSR**.

Result:

The parameter fields for the 2-fiber BLSR appear.

-
- 5 Define the **Protection Group AID** by typing the last digit(s) in the respective text box. This can be max. 3 digits, a value from **1** to **239** is possible. Please note that you have to choose different AIDs for different protection groups within one network element. Within the whole ring equal Protection Group AIDs may exist.

-
- 6 Enter the Ring ID. The Ring ID must be defined for the whole ring.
Important! For all BLSR protection groups which are defined in network elements belonging to one ring always the same Ring ID has to be inserted.

-
- 7 Select the AIDs of **East Port** and **West Port** in the respective drop-down list boxes in the group box **Group Member**. The values correspond to the slot designations.

-
- 8 Set the **Wait to Restore** time in the drop-down list box to **1** minute.

-
- 9 Select the **BLSR Alarm Severity Assignment Profile**.

-
- 10 Verify that all parameters are correct. Click the **Apply** pushbutton and then **Yes** in the confirmation window.

Result:

If the creation of the BLSR protection group was successful, a DCC termination provisioning message appears indicating that the LAPD role has been set at user-side.

.....

- 11 Click **OK**, then click on **Close**.
-

- 12 Repeat [Step 1](#) to [Step 11](#) for all other NEs within the ring.
-

- 13 Verify the correct configuration via **View** → **Rings** → **Ring Maps...** in the WaveStar® CIT **System View**.

END OF STEPS

.....

Creating cross-connections

Important! You must have at least a privilege code of P3 to perform this task.

Proceed as follows to create the required cross-connections:

.....

- 1 Login to the NE-A as described in Chapter 6, section [“NE login procedure” \(6-12\)](#).

.....

- 2 Set up a cross-connection by calling up the **Cross-Connection Wizard** via **Configuration** → **Cross-Connections...** in the **System View** of the WaveStar® CIT.

.....

- 3 Click on the radio button **Create a new cross-connection** and click on **Next>**.

Result:

Screen 1 appears.

-
- 4 Define the cross-connection rate according to the used analyser signal in the drop-down list box **Rate**. The following values are possible:
- **STS1**
 - **STS3**
 - **STS12**
 - **STS48**
 - **STS192**

Please note that it is not possible to proceed to the next window before selecting the cross-connection rate.

- 5 Select **2 Way Point-to-Point** in the group box **Type of Cross-connection**.
-

- 6 Click on **Next>** to proceed to the next window.

Result:

Screen 2 of 3 opens.

- 7 Click on **Select....** to select the source tributary.

Result:

The **Ptn Grp** selection tab appears.

- 8 Select the port to which the SONET analyser is connected.

Result:

In the list box **Tributary** on the right, the AIDs of all STSs belonging to the respective port are displayed.

- 9 Select the STS which shall be used as the source and click on the **Select** button.
-

- 10 Select the destination port which is interface to the BLSR in the **Ptn Grp** selection tab and the corresponding STS in the **Tributary** list box.
-

11 Click on the **Select** button.

Result:

On **Screen 2 of 3** both, the source and destination tributary, are displayed.

12 Click on the **Next>** button.

Result:

The **Screen 3 of 3** opens.

The current data of the cross connection are displayed. The **Source NE Name** is greyed out.

13 Select **NE-B** as the **Destination NE Name**.

14 Click on the **Finish** button to apply your settings.

15 Repeat [Step 1](#) to [Step 14](#) for NE-B.

Be aware of the following differences:

- As **Source** select the port which is interface to the BLSR.
- As **Destination** select the port to which the fiber loop is connected.
- Select **NE-A** as the **Source NE Name**.

END OF STEPS

Test procedure Proceed as follows to perform the test:

- 1** Start a signal transmission via the SONET analyser.

Result:

No bit errors are present.

- 2** Remove the fiber connection between NE-A and NE-B.

Result:

A short interruption of the traffic can be observed. However, the traffic should be restored after a short time.

END OF STEPS



Span/Ring testing exit checklist

Checklist Verify that all procedures described below has been completed. If a procedure was not applicable, indicate "N/A".

Procedure	Result (Passed, Failed, N/A)	Initials	Notes
Fiber connection			
DCC provisioning			
Remote login test			
Line timing provisioning			
Line timing test			
Point to point / Ring test			





9 Conclusion

Overview

Purpose This chapter provides a final checklist and a signoff sheet to be sure that all required tasks described in this manual have been done.

Contents

Final checklist	9-2
Completion form	9-3



Final checklist

Verify that all chapters in this manual have been passed completely.

Chapter	Passed (Yes, No)	Initials	Notes
Mechanical installation			
System cabling			
System turn up procedures			
System provisioning			
Stand alone test procedures			
Network establishment and test			

If all chapters have been passed successfully, please sign the Completion Form.



Completion form

Lucent Technologies
Bell Labs Innovations



Document Title: *Lambda Unite™* MultiService Switch (MSS)
Installation Guide

Identification No.: _____ **Issue No.:** _____ **Date :** _____

Location Information

All chapters have been passed successfully:

Start Date : _____ Completion Date: _____

Station Location : _____

Country : _____

Participants

	Names (printed)	Company
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____

Customer Acceptance Signature

Please read and sign the statement below:

I have witnessed and/or accepted the successful installation of all equipped equipment in the Lambda Unite System.

_____ Date

Customer Signature

Note:

This Completion Form is to be retained by the Lucent Technologies Representative as a record of successfully completion of all required procedures.





Appendix A: Installation trouble shooting

Overview

Purpose This chapter provides basic installation troubleshooting information for the *LambdaUnite*[™] MultiService Switch (MSS) system.

Contents

Power failure	A-2
NE synchronisation failure	A-5
SW download failure	A-7
LED test failure	A-8
Remote login failure	A-9
Alarm handling	A-12
Fiber cleaning	A-13

Power failure

Overview The procedures described below should be performed if the subrack powering procedure was unsuccessful.

Procedure 1 should be used if the measured voltage at the termination blocks of the PDP does not lie between -40.5 and -72 V.

Procedure 2 should be used if the PWR ON LED does not light up on the user panel.

Procedure 3 should be used if the PWR ON LED does not light up on the fan unit.

Procedure 1 Follow the steps below if the measured voltage at the termination blocks of the PDP does not lie between -40.5 and -72 V:

- 1 Switch off the external battery.

- 2 Replace all affected power supply lines between the external battery and the termination blocks of the PDP. Make sure the cables are tight afterwards.

- 3 Switch on the external battery.

IF ...	THEN ...
the measured voltage does not lie between -40.5 and -72 V,	check the external battery.
the measured voltage lies between -40.5 and -72 V,	END OF STEPS

END OF STEPS

Procedure 2 Follow the steps below if the PWR ON LED does not light up on the user panel:

1 Switch all circuit breakers on the subrack backplane to the **OFF** position.

2 Replace all affected shelf power cables between the PDP and the power connectors of the Power Interfaces (PIs). Make sure that the cables are tight afterwards.

3 Switch all circuit breakers on the subrack backplane to the **ON** position.

IF ...	THEN ...
the PWR ON LED does not light up on the user panel,	switch all circuit breakers on the subrack backplane to the OFF position and replace all affected PIs.
the PWR ON LED lights up on the user panel,	END OF STEPS

END OF STEPS

Procedure 3 Follow the steps below if the PWR ON LED does not light up on the fan unit:

1 Switch all circuit breakers on the subrack backplane to the **OFF** position.

2 Replace all affected fan power cables between the PIs and the Fan Unit. Make sure that the cables are tight afterwards.

3 Switch all circuit breakers on the subrack backplane to the **ON** position.

IF ...	THEN ...
the PWR ON LED does not light up on the Fan Unit,	switch all circuit breakers on the subrack backplane to the OFF position and replace the affected Fan Unit.
the PWR ON LED lights up on the Fan Unit,	END OF STEPS

END OF STEPS



NE synchronisation failure

Overview The procedure described below should be performed if no valid timing reference signal is received at the respective external synchronization input (see Chapter 7, section [“NE synchronisation test” \(7-6\)](#)).

Procedure Follow the steps below in the case of an NE synchronization failure:

- 1 Check for correct cabling and change as necessary.

IF ...	THEN ...
the NE does not synchronize to the external clock source,	proceed to step 2.
the NE synchronizes to the external clock source,	END OF STEPS

- 2 Check for correct input impedance (75 Ω , 100/110 Ω , 120 Ω) and change as necessary.

IF ...	THEN ...
the NE does not synchronize to the external clock source,	proceed to step 3.
the NE synchronizes to the external clock source,	END OF STEPS

- 3 Check for an external fault: input/output reversed or exchange supply defect.

IF ...	THEN ...
the NE does not synchronize to the external clock source,	proceed to step 4.

IF ...	THEN ...
the NE synchronizes to the external clock source,	END OF STEPS

4 Replace the currently active Timing Generator Unit.

IF ...	THEN ...
the NE does not synchronize to the external clock source,	proceed to step 5.
the NE synchronizes to the external clock source,	END OF STEPS

5 Replace the timing interfaces E1/DS1.

END OF STEPS



SW download failure

Overview The procedure described below should be performed if the circuit packs have the red LEDs illuminated (instead of the green LEDs) after the reset of the CTL circuit pack. This indicates a software download failure.

Procedure Follow the steps below in the case of a software download failure:

- 1 Reset the CTL circuit pack. To do this, open the latches simultaneously and wait until the red LED is illuminating continuously. Then pull and move back the controller. The system automatically starts the download (takes about 20 minutes).

IF ...	THEN ...
the circuit packs do not have the green LEDs illuminated,	proceed to step 2.
the circuit packs have the green LEDs illuminated,	END OF STEPS

- 2 Perform a reload of the NE software to the *CompactFlash* card (see [Appendix B, “NE software installation”](#)).

IF ...	THEN ...
the circuit packs do not have the green LEDs illuminated,	proceed to step 3.
the circuit packs have the green LEDs illuminated,	END OF STEPS

- 3 Replace the CTL circuit pack.

END OF STEPS



LED test failure

Overview The procedure described below should be performed if some LEDs do not light up during an LED test (see Chapter 7, section [“LED Test” \(7-2\)](#)).

Procedure Follow the steps below in the case of an LED test failure:

- 1 Check that the circuit packs are plugged in correctly and the power supply is on.

IF ...	THEN ...
circuit pack LEDs do not light up,	replace the respective circuit packs.
LEDs of the User Panel do not light up,	make sure that the User Panel control cable is installed correctly. If that is the case and the LEDs don't light up replace the User Panel.
all LEDs light up,	END OF STEPS

END OF STEPS



Remote login failure

Overview The procedure described below should be performed if no remote login is possible (see Chapter 8, section [“Remote login” \(8-12\)](#)).

Procedure Follow the steps below in the case of a remote login failure:

- 1 Check that the DCC channels are configured correctly (see Chapter 8, section [“Provision DCC” \(8-10\)](#)).

IF ...	THEN ...
a remote login is not possible,	proceed to step 2.
a remote login is possible,	END OF STEPS

- 2 Reset the CTL circuit pack of the near-end NE. To do this, open the latches simultaneously and wait until the red LED is illuminating continuously. Then pull and move back the controller.

IF ...	THEN ...
a remote login is not possible,	proceed to step 3.
a remote login is possible,	END OF STEPS

- 3 Reset the CTL circuit pack of the far-end NE.

IF ...	THEN ...
a remote login is not possible,	proceed to step 4.
a remote login is possible,	END OF STEPS

- 4 Perform a reload of the NE software to the *CompactFlash* card of the near-end NE (see [Appendix B, “NE software installation”](#)).

IF ...	THEN ...
a remote login is not possible,	proceed to step 5.
a remote login is possible,	END OF STEPS

-
- 5** Perform a reload of the NE software to the *CompactFlash* card of the far-end NE.

IF ...	THEN ...
a remote login is not possible,	proceed to step 6.
a remote login is possible,	END OF STEPS

-
- 6** Replace the optical transmitter in the near-end NE.

IF ...	THEN ...
a remote login is not possible,	proceed to step 7.
a remote login is possible,	END OF STEPS

-
- 7** Replace the optical transmitter in the far-end NE.

IF ...	THEN ...
a remote login is not possible,	proceed to step 8.
a remote login is possible,	END OF STEPS

-
- 8** Replace the CTL circuit pack of the near-end NE.

IF ...	THEN ...
a remote login is not possible,	proceed to step 9.
a remote login is possible,	END OF STEPS

-
- 9** Replace the CTL circuit pack of the far-end NE.

END OF STEPS



Alarm handling

Overview The procedure described below should be performed if there are active alarms after an alarm test via WaveStar® CIT (see Chapter 7, section [“Alarm reporting test” \(7-4\)](#)).

Procedure Follow the steps below in the case of active alarms:

- 1 Note all active alarms.

- 2 Follow the trouble clearing tasks described in the “*LambdaUnite*[™] MultiService Switch (MSS) Alarm Messages and Trouble Clearing Guide”.

END OF STEPS



Fiber cleaning

Overview This procedure describes the Lucent recommended method for the cleaning and inspection of optical connectors using specific tools and materials that have been proven to be effective in the assembly and testing of optical transmission equipment. It is critical that the connector endfaces are clean and free from particular contamination to assure proper performance and reliability of lightwave systems. With the modern high-speed, high-power and wider bandwidth optical transmission systems, clean connectors along the optical path are absolutely essential for successful operation.

Before working with optical fibre cables please observe the following safety warnings:



DANGER

Never look into the end of an exposed fibre or plug-in optical connectors as long as the optical source is switched on. This applies particularly to the connections of the optical plug-in units.



CAUTION

To avoid cable break ensure that the bending radius of optical fibre cables is not less than 30 mm.

Cleaning of optical connectors

Optical connectors are only to be cleaned in accordance with the cleaning instructions listed below.

If impurities are assumed, the use of a fiberscope is recommended in order to check the connector face for impurities (e.g. fluff, dust particles). A fiberscope with a magnification x 200 is preferred.

Connectors

If impurities are discovered, the optical connector must be cleaned in accordance with the following rules:

- 1 Wipe off the connector face **lengthwise** (not with a circular motion!) using a **smooth** tissue (**moistened** with isopropanol).
-

-
- 2 Wipe off the connector face *lengthwise* (not with a circular motion!) using a *dry and smooth* tissue.
-
- 3 Then let the connector face air-dry (the isopropanol must evaporate completely!). As an option, purified compressed air can also be used for drying.
-
- 4 If necessary, the connector face can additionally be dabbed on the tape dispenser.
-
- 5 Finally check the connector face for cleanliness using the fiberscope. If the connector impurities were not removed completely during the first cleaning procedure, repeat steps 1-5 until the result is satisfactory.
-
- END OF STEPS
-

Note:

Do not connect the optical connectors without checking them for impurities under the fiberscope!

Coupling Impurities caused by dust particles or fluff etc. can also occur on the optical coupling. To clean the coupling follow the instructions below:

.....

- 1 Soak the coupling cleaner in isopropanol and move it back and forth in the coupling several times.
-
- 2 Blow purified compressed air through the coupling and visually check for residual impurities by holding it to the light.

Important! Lightguide Build-Outs (LBOs) may be damaged when compressed air is used for drying. Therefore, do not use compressed air for drying LBOs.

END OF STEPS

.....





Appendix B: NE software installation

Overview

Purpose This appendix describes all steps for performing a reload of the NE software. The procedure described below should only be done if a reload of the NE software is necessary, e.g. in the case of a software download failure (see [Chapter 5, “Powering, circuit pack installation, and NE software download”](#)).



Installing the NE software

Overview The software generic has to be copied from the CD-ROM (Comcode 109088708) to the *WaveStar*[®] CIT PC and then to an empty *CompactFlash*[™] card via *WaveStar* CIT. Afterwards, the *CompactFlash* card is inserted into the NE.

Before you begin Prior to performing this task, you must

1. have 120 MB of free hard-disk drive space.
2. have a valid login on both the *WaveStar* CIT and the NE.
3. acquire the CD-ROM that contains the generic/version of the NE software (Comcode 109088708).

Required privilege code

You must have at least a privilege code of S4.

Required equipment

The following equipment is required to perform this task:

- Empty 256 MB *CompactFlash* card (as delivered from manufacturer)
- CD-ROM that contains the generic/version of the NE software
- PC with *CompactFlash* or PCMCIA slot. For the second case an adapter is required.

Software installation To reload the NE software proceed as follows:

- 1 Power up the *WaveStar* CIT PC and log into Windows[®] NT / Windows[®] 2000 as administrator. If you are already logged into Windows[®] NT / Windows[®] 2000, close any open window.

- 2 Install the NE software onto your PC. To do this, use one of the following two methods (automatic or manual installation):

Automatic Installation:

- Insert the *LambdaUnite*[™] CD-ROM with the new NE software and wait for the welcoming screen to appear. If your PC does not start the CD-ROM automatically, perform the following:
 - Double-click **My Computer** on your desktop
 - Right click on your CD-ROM drive's icon
 - Click **Auto Play**.If **Auto Play** is not available in this menu list, you have to start the *setup.exe* file in the root directory of your CD-ROM.
- Choose the entry **NE Software**.
- Click the **Next** button.
- Wait for the software transfer to complete. You will notice that the “Decompressing Files In ...” message and also the InstallShield Wizard disappears when this operation has completed.

Manual Installation:

- Insert the *LambdaUnite* CD-ROM with the new NE software. If the welcoming screen appears, select **Cancel** to exit from the automatic installation procedure.
- Open the Windows® NT / Windows® 2000 Explorer on your desktop.
- Select the harddisk drive where the *WaveStar* CIT is installed and click through to **Program Files** → **Lucent Technologies** → **WaveStar CIT** → **generics**.
NOTE: If the subdirectory **generics** does not exist, you must create it!
- In the **generics** directory, create a new folder, preferably stating the new software version in its name.
- In the Windows® NT / Windows® 2000 Explorer, right click the CD-ROM drive of your computer and select **Explore**. Go to the **generics** directory. This directory contains two subdirectories: **p** and **up**.
- Select the complete **up** and **p** directories and copy them to the folder you created two steps before.

- To install *Acrobat Reader* on your system, go to the *AcrobatReader* subdirectory on your CD-ROM drive and double click the *AcrobatReader40.exe* file.
 - The Software Release Description (SRD) is located in the **Documentation** subdirectory of the CD. You can read it by double clicking the **pdf** file in this subdirectory.
-

3 Remove the *CompactFlash* card from the CTL circuit pack.

To do this

- open the latches simultaneously
 - wait until the red LED is illuminating continuously
 - pull the CTL pack out of its position
 - unscrew and open the protecting bar
 - Remove the *CompactFlash* card.
-

4 Insert the *CompactFlash* card into the *CompactFlash* slot (or PCMCIA slot with adapter) of the *WaveStar* CIT PC.

5 Format the *CompactFlash* card by performing the following:

- Double click the **My Computer** icon on your desktop.
- Select **Cards** → **Format...** in the PC card control window.
- Select **FAT** in the **File System** selection box.
- Select **Quick Format**
- Click **Start**.

Important! Formatting the *CompactFlash* card sporadically fails when you are using a PC running the *Microsoft® Windows®* 2000 operating system. The reason is that not all types of *CompactFlash* cards might be natively supported by *Windows* 2000. As a consequence the *CompactFlash* card becomes unreadable and the NE software cannot be successfully copied to the card. Therefore, it is recommended to use a PC running the *Microsoft Windows NT®* 4.0 operating system to format the *CompactFlash* card.

6 Start *WaveStar* CIT.

-
- 7 In the *WaveStar* CIT **System View**, choose the option **Administration** → **Prepare PCMCIA Disks....**

Result:

The **Prepare PCMCIA Disk** window appears.

- 8 In the left list, under **Available Generics**, click the version of network element software you are installing.
-

- 9 In the right list, click on the drive letter that represents the *CompactFlash* card.
-

- 10 Click on **Copy Generic**.

Result:

The file copy function starts and you see a **Copying files...** message.

- 11 The “Coying files...” message will disappear when the file transfer is complete. Click the **Close** button to exit the **Prepare PCMCIA Disk** window.
-

- 12 If the *CompactFlash* card driver software you are using requires you to stop the *CompactFlash* card before ejecting it, stop the card now. If the software you are using does not allow for this procedure, make sure that the used slot is not being accessed (the LED is not blinking) before continuing.
-

- 13 Eject the *CompactFlash* card from the *CompactFlash* slot (or from the PCMCIA adapter) of the PC.
-

- 14 Insert the *CompactFlash* card with the new loaded software into the CTL circuit pack.
-

To do this

- insert the *CompactFlash* card (red arrow on card down and facing left)
- close and screw the protecting bar
- Move the CTL pack back to its prior position
- Close the latches simultaneously.

Result:

The system automatically starts the download (takes about 20 minutes).

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





Appendix C: Ordering codes and specifications

Overview

Purpose This appendix describes the ordering codes and specifications of this product.

Contents

Single Mode 9/125 fiber-optic cables	C-2
Multi-Mode 62.5/125 fiber-optic cables	C-8
LC attenuators	C-12
Specifications for <i>LambdaUnite</i>TM MSS optical circuit packs	C-15
Spare parts	C-27

Single Mode 9/125 fiber-optic cables

Break-out cables

LC 45° (12x) to x 180° (12x)

Important! x = connector types (LC, SC, FC, ST, DIN, E-2000)

Cable Data

Type	SM-Simplex cable 9/125	
Connectors	LC (45°) to LC, SC, FC, ST, DIN (180°)	Blue

SM LC to LC (12 to 12)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
3	109165779						
5	109158451	30	109158519	55	109158568	80	109158618
10	109158477	35	109158527	60	109158576	85	109158626
15	109158485	40	109158535	65	109158584	90	109158634
20	109158493	45	109158543	70	109158592	95	109158642
25	109158501	50	109158550	75	109158600	100	109158659

SM LC to SC (12 to 12)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109158667	30	109158717	55	109158766	80	109158816
10	109158675	35	109158725	60	109158774	85	109158824
15	109158683	40	109158733	65	109158782	90	109158832
20	109158691	45	109158741	70	109158790	95	109158840
25	109158709	50	109158758	75	109158808	100	109158857

SM LC to FC (12 to 12)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109158865	30	109158915	55	109158964	80	109159012
10	109158873	35	109158923	60	109158972	85	109159020
15	109158881	40	109158931	65	109158980	90	109159038

20	109158899	45	109158949	70	109158998	95	109159046
25	109158907	50	109158956	75	109159004	100	109159053

SM LC to ST (12 to 12)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109159061	30	109159111	55	109159160	80	109159210
10	109159079	35	109159129	60	109159178	85	109159228
15	109159087	40	109159137	65	109159186	90	109159236
20	109159095	45	109159145	70	109159194	95	109159244
25	109159103	50	109159152	75	109159202	100	109159251

SM LC to DIN (12 to 12)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109159269	30	109159319	55	109159368	80	109159418
10	109159277	35	109159327	60	109159376	85	109159426
15	109159285	40	109159335	65	109159384	90	109159434
20	109159293	45	109159343	70	109159392	95	109159442
25	109159301	50	109159350	75	109159400	100	109159459

SC with short boot 180° (12x) to x 45° (12x)**Important!** x = connector types (LC, SC, FC, ST, DIN, E-2000)

Cable Data

Type	SM-Simplex cable 9/125	
Connectors	SC(180°) to LC, SC, FC, ST, DIN (45°)	

SM SC to LC (12 to 12)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109188318	30	109188367	55	109188417	80	109188466
10	109188326	35	109188375	60	109188425	85	109188474
15	109188334	40	109188383	65	109188433	90	109188482
20	109188342	45	109188391	70	109188441	95	109188490
25	109188359	50	109188409	75	109188458	100	109188508

Simplex cables**LC 45° (1x) to x 180° (1x)****Important!** x = connector types (LC, SC, FC, ST, DIN, E-2000)

Cable Data

Type	SM-minicord Break-Out Cable, 12 Fibers	Remarks
Connector	LC (45°) to LC, SC, FC, ST, DIN (180°)	Blue

SM LC to LC (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
3	109165761						
5	109159467	30	109159517	55	109159566	80	109159624
10	109159475	35	109159525	60	109159574	85	109159632
15	109159483	40	109159533	65	109159590	90	109159640
20	109159491	45	109159541	70	109159608	95	109159657
25	109159509	50	109159558	75	109159616	100	109159665

SM LC to SC (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109159673	30	109159723	55	109159772	80	109159822
10	109159681	35	109159731	60	109159780	85	109159830
15	109159699	40	109159749	65	109159798	90	109159848
20	109159707	45	109159756	70	109159806	95	109159855
25	109159715	50	109159764	75	109159814	100	109159863

SM LC to FC (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109159871	30	109159921	55	109159970	80	109160028
10	109159889	35	109159939	60	109159988	85	109160036
15	109159897	40	109159947	65	109159996	90	109160044
20	109159905	45	109159954	70	109160002	95	109160051

25	109159913	50	109159962	75	109160010	100	109160069
----	-----------	----	-----------	----	-----------	-----	-----------

SM LC to ST (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109160077	30	109160127	55	109160176	80	109160226
10	109160085	35	109160135	60	109160184	85	109160234
15	109160093	40	109160143	65	109160192	90	109160242
20	109160101	45	109160150	70	109160200	95	109160259
25	109160119	50	109160168	75	109160218	100	109160267

SM LC to DIN (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109160275	30	109160325	55	109160374	80	109160424
10	109160283	35	109160333	60	109160382	85	109160432
15	109160291	40	109160341	65	109160390	90	109160440
20	109160309	45	109160358	70	109160408	95	109160457
25	109160317	50	109160366	75	109160416	100	109160465

SC with short boot 180° (1x) to x 180° (1x)**Important!** x = connector types (LC, SC, FC, ST, DIN, E-2000)

Cable Data

Type	SM-Simplex cable 9/125	
Connectors	SC (45°) to LC, SC, FC, ST, DIN (180°)	

SM SC to LC (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109172338	30	109172387	55	109172437	80	109172486
10	109172346	35	109172395	60	109172445	85	109172494
15	109172353	40	109172403	65	109172452	90	109172502
20	109172361	45	109172411	70	109172460	95	109172510
25	109172379	50	109172429	75	109172478	100	109172528

SM SC to SC (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109172767	30	109172817	55	109172866	80	109172916
10	109172775	35	109172825	60	109172874	85	109172924
15	109172783	40	109172833	65	109172882	90	109172932
20	109172791	45	109172841	70	109172890	95	109172940
25	109172809	50	109172858	75	109172908	100	109172965

SM SC to FC (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109172973	30	109172021	55	109172070	80	109172120
10	109172981	35	109172039	60	109172088	85	109172138
15	109172999	40	109172047	65	109172096	90	109172146
20	109172005	45	109172054	70	109172104	95	109172153
25	109172013	50	109172062	75	109172112	100	109172161

SM SC to ST (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109173575	30	109173625	55	109173674	80	109173724
10	109173583	35	109173633	60	109173682	85	109173732
15	109173591	40	109173641	65	109173690	90	109173740
20	109173609	45	109173658	70	109173708	95	109173757
25	109173617	50	109173666	75	109173716	100	109173765

SM SC to DIN (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109172536	30	109172585	55	109172635	80	109172684
10	109172544	35	109172593	60	109172643	85	109172692
15	109172551	40	109172601	65	109172650	90	109172700
20	109172569	45	109172619	70	109172668	95	109172718
25	109172577	50	109172627	75	109172676	100	109172726

SC with short boot 180° (1x) to x 45° (1x)**Important!** x = connector types (LC, SC, FC, ST, DIN, E-2000)

Cable Data

Type	SM-Simplex cable 9/125	
Connectors	SC(180°) to LC, SC, FC, ST, DIN (45°)	

SM SC to LC (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
3	109174169						
5	109174177	30	109174227	55	109174276	80	109174326
10	109174185	35	109174235	60	109174284	85	109174334
15	109174193	40	109174243	65	109174292	90	109174342
20	109174201	45	109174250	70	109174300	95	109174359
25	109174219	50	109174268	75	109174318	100	109174367



Multi-Mode 62.5/125 fiber-optic cables

Break-out cables

LC 45° (12x) to x 180° (12x)

Important! x = connector types (LC, SC, FC, ST, DIN, E-2000)

Cable Data

Type	MM-minicord Break-Out Cable 62.5/125, 12 Fibers	Remarks
Connectors	LC (45°) to LC, SC, FC, ST, DIN (180°)	

MM LC to LC (12 to 12)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
3	109165746						
5	109161422	30	109161471	55	109161521	80	109161570
10	109161430	35	109161489	60	109161539	85	109161588
15	109161448	40	109161497	65	109161547	90	109161596
20	109161455	45	109161505	70	109161554	95	109161604
25	109161463	50	109161513	75	109161562	100	109161612

MM LC to SC (12 to 12)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109161620	30	109161679	55	109161729	80	109161786
10	109161638	35	109161687	60	109161737	85	109161794
15	109161646	40	109161695	65	109161752	90	109161802
20	109161653	45	109161703	70	109161760	95	109161810
25	109161661	50	109161711	75	109161778	100	109161828

MM LC to FC (12 to 12)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109161836	30	109161885	55	109161935	80	109161984
10	109161844	35	109161893	60	109161943	85	109161992

15	109161851	40	109161901	65	109161950	90	109162008
20	109161869	45	109161919	70	109161968	95	109162016
25	109161877	50	109161927	75	109161976	100	109162024

MM LC to ST (12 to 12)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109162032	30	109162081	55	109162131	80	109162180
10	109162040	35	109162099	60	109162149	85	109162198
15	109162057	40	109162107	65	109162156	90	109162206
20	109162065	45	109162115	70	109162164	95	109162214
25	109162073	50	109162123	75	109162172	100	109162222

MM LC to DIN (12 to 12)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109162230	30	109162289	55	109162339	80	109162388
10	109162248	35	109162297	60	109162347	85	109162396
15	109162255	40	109162305	65	109162354	90	109162404
20	109162263	45	109162313	70	109162362	95	109162412
25	109162271	50	109162321	75	109162370	100	109162420

Simplex cables**LC 45° (1x) to x 180° (1x)****Important!** x = connector types (LC, SC, FC, ST, DIN, E-2000)

Cable Data

Type	MM-Simplex cable 62.5/125	
Connectors	LC (45°) to LC, SC, FC, ST, DIN (180°)	Beige

MM LC to LC (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
3	109165753						

5	109162438	30	109162487	55	109162537	80	109162586
10	109162446	35	109162495	60	109162545	85	109162594
15	109162453	40	109162503	65	109162552	90	109162602
20	109162461	45	109162511	70	109162560	95	109162610
25	109162479	50	109162529	75	109162578	100	109161628

MM LC to SC (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109162636	30	109162693	55	109162750	80	109162800
10	109162651	35	109162701	60	109162768	85	109162818
15	109162669	40	109162719	65	109162776	90	109162826
20	109162677	45	109162727	70	109162784	95	109162842
25	109162685	50	109162743	75	109162792	100	109162859

MM LC to FC (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109162883	30	109162933	55	109162982	80	109163030
10	109162891	35	109162941	60	109162990	85	109163048
15	109162909	40	109162958	65	109163006	90	109163055
20	109162917	45	109162966	70	109163014	95	109163063
25	109162925	50	109162974	75	109163022	100	109163089

MM LC to ST (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109163097	30	109163147	55	109163196	80	109163253
10	109163105	35	109163154	60	109163204	85	109163261
15	109163113	40	109163162	65	109163212	90	109163279
20	109163121	45	109163170	70	109163238	95	109163287
25	109163139	50	109163188	75	109163246	100	109163295

MM LC to DIN (1 to 1)

Length	Comcode	Length	Comcode	Length	Comcode	Length	Comcode
5	109163303	30	109163352	55	109163402	80	109163451

10	109163311	35	109163360	60	109163410	85	109163469
15	109163329	40	109163378	65	109163428	90	109163477
20	109163337	45	109163386	70	109163436	95	109163485
25	109163345	50	109163394	75	109163444	100	109163493



LC attenuators

Fiber type	Single Mode (SM)
Attenuator type	LC Modular Adapter used with A1LC-BASE — 108265950
Tolerance at 1550 nm	AALCS-00.5 – AALCS-10.0 — ± 0.25 dB AALCS-11.0 – AALCS-20.0 — ± 0.50 dB

List of attenuators (for OP10 circuit packs)

Product Code	Nominal Loss dB	Comcode
AALCS-0.5	0.5	108355363
AALCS-1.0	1	108355371
AALCS-1.5	1.5	108355389
AALCS-2.0	2	108349457
AALCS-2.5	2.5	108349440
AALCS-3.0	3	108288481
AALCS-3.5	3.5	108288440
AALCS-4.0	4	108357963
AALCS-4.5	4.5	108357971
AALCS-5.0	5	108288473
AALCS-5.5	5.5	108357989
AALCS-6.0	6	108349432
AALCS-6.5	6.5	108357997
AALCS-7.0	7	108288465
AALCS-7.5	7.5	108358003
AALCS-8.0	8	108358011
AALCS-8.5	8.5	108358029
AALCS-9.0	9	108358037
AALCS-9.5	9.5	108358045
AALCS-10.0	10	108288457
AALCS-11.0	11	108358078
AALCS-12.0	12	108358094

Product Code	Nominal Loss dB	Comcode
AALCS-13.0	13	108358128
AALCS-14.0	14	108358144
AALCS-15.0	15	108358169
AALCS-18.0	18	108358193
AALCS-19.0	19	108358201
AALCS-20.0	20	108358219

**List of attenuators (for
OP2G5 circuit packs)**

Product Code	Nominal Loss dB	Comcode
ABLCS-0.5	0.5	108279290
ABLCS-1.0	1	108279308
ABLCS-1.5	1.5	108279316
ABLCS-2.0	2	108279324
ABLCS-2.5	2.5	108279332
ABLCS-3.0	3	108279340
ABLCS-3.5	3.5	108279357
ABLCS-4.0	4	108279365
ABLCS-4.5	4.5	108279373
ABLCS-5.0	5	108279381
ABLCS-6.0	6	108279399
ABLCS-7.0	7	108279407
ABLCS-8.0	8	108279415
ABLCS-9.0	9	108279423
ABLCS-10.0	10	108279431
ABLCS-11.0	11	108279449
ABLCS-12.0	12	108279456
ABLCS-13.0	13	108279464
ABLCS-14.0	14	108279472
ABLCS-15.0	15	108279480
ABLCS-16.0	16	108279498

Product Code	Nominal Loss dB	Comcode
ABLCS-17.0	17	108279506
ABLCS-18.0	18	108279514
ABLCS-19.0	19	108279522
ABLCS-20.0	20	108279530
ABLCS-25.0	25	108279548



Specifications for *LambdaUnite*[™] MSS optical circuit packs

Optical circuit packs The following optical circuit packs are available:

Description	Functional Name	ITEM CODE	APP. CODE	COMCODE
OC768/STM256, 1 port, 4 slots, intra-office, 1300 nm, (2 km)	OP40/1.3IOR1		KFA202	109055640
OC768/STM256, 1 port, 4 slots, Direct Optics for <i>LambdaXtreme</i> [™] Transport, 64 colors	OP40/9280XT ... 8650XT	See “<i>LambdaXtreme</i> Transport 40-Gbit/s DWDM direct optics” (C-16)		
OC192/STM64, 1 port, LR/LH 1550 nm, (80km)	OP10G/1.5LR1		KFA6	109000208
OC192/STM64 or 10-Gigabit Ethernet WANPHY, 1 port, IR/SH 1550 nm, (40km)	OP10G/1.5IR1		KFA14	109077073
OC192/STM64, 1 port, Intra-Office 1310 nm (600m)	OP10G/1.3IOR1		KFA7	109000216
OC192/STM64, 1 port, Direct Optics for <i>WaveStar</i> [®] OLS 1.6T (800G), 80 colors	OP10G/01...80/800G	See “<i>LambdaUnite</i> OLS 1.6T 10-Gbit/s DWDM direct optics” (C-18)		
OC192/STM64, 1 port, Direct Optics for <i>LambdaXtreme</i> Transport, 128 colors	OP10/9285XT...8650XT	See “<i>LambdaXtreme</i> Transport 10-Gbit/s DWDM direct optics” (C-21)		
OC48/STM16, 4 ports, LR 1550 nm, 80 km	OP2G5/1.5LR4		KFA204	109055665
OC48/STM16, 4 ports, LR 1310 nm, 40 km	OP2G5/1.3LR4		KFA203	109055657
OC48/STM16, 4 ports, IR/SH 1310 nm, 2 km	OP2G5/1.3SR4		KFA12	109000265
OC48/STM16, Parent board bearing two modules for pWDM Direct Optics	OP2G5-1...32PWDM		KFA20	109154484
OC48/STM16, 1 Port, Direct Optics Module for PWDM, 32 colors	OM2G5/921PWDM ... 959PWDM	See “2.5-Gbit/s PWDM direct optics modules” (C-25)		

Description	Functional Name	ITEM CODE	APP. CODE	COMCODE
OC12/STM4, 16 ports, IR/SH 1300 nm (15 km)	OP622M/1.3IR16		KFA17	109091595
OC3/STM1, 16 ports, IR/SH 1300 nm, (15 km)	OP155M/1.3IR16		KFA18	109091603
1000 Base SX (1-Gigabit) Ethernet Interface, 4 ports	GE1/SX/4		KFA13	109000273

***LambdaXtreme* Transport
40-Gbit/s DWDM direct
optics**

FUNCTIONAL	Nominal central frequencies (THz)	Nominal central wavelengths (nm)	APP. CODE	COMCODE
OP40G/9280XT	192.800	1554,940	KFA290	109055772
OP40G/9270XT	192.700	1555,747	KFA291	109055780
OP40G/9260XT	192.600	1556,555	KFA292	109055798
OP40G/9250XT	192.500	1557,363	KFA293	109055806
OP40G/9240XT	192.400	1558,173	KFA294	109055814
OP40G/9230XT	192.300	1558,983	KFA295	109055822
OP40G/9220XT	192.200	1559,794	KFA296	109055830
OP40G/9210XT	192.100	1560,201	KFA297	109055848
OP40G/9200XT	192.000	1561,419	KFA298	109055855
OP40G/9190XT	191.900	1562,233	KFA299	109055863
OP40G/9180XT	191.800	1563,047	KFA300	109055871
OP40G/9170XT	191.700	1563,863	KFA301	109055889
OP40G/9160XT	191.600	1564,679	KFA302	109055897
OP40G/9150XT	191.500	1565,496	KFA303	109055905
OP40G/9140XT	191.400	1566,314	KFA304	109055913
OP40G/9130XT	191.300	1567,133	KFA305	109055921
OP40G/9120XT	191.200	1567,952	KFA306	109055939
OP40G/9110XT	191.100	1568,773	KFA307	109055954
OP40G/9100XT	191.000	1569,594	KFA308	109055962
OP40G/9090XT	190.900	1570,416	KFA309	109056002
OP40G/9080XT	190.800	1571,239	KFA310	109056010

FUNCTIONAL	Nominal central frequencies (THz)	Nominal central wavelengths (nm)	APP. CODE	COMCODE
OP40G/9070XT	190.700	1572,063	KFA311	109056028
OP40G/9060XT	190.600	1572,888	KFA312	109056036
OP40G/9050XT	190.500	1573,714	KFA313	109056051
OP40G/9040XT	190.400	1574,540	KFA314	109056069
OP40G/9030XT	190.300	1575,368	KFA315	109056077
OP40G/9020XT	190.200	1576,196	KFA316	109056085
OP40G/9010XT	190.100	1577,025	KFA317	109056093
OP40G/9000XT	190.000	1577,855	KFA318	109056101
OP40G/8990XT	189.900	1578,686	KFA319	109056127
OP40G/8980XT	189.800	1579,518	KFA320	109056135
OP40G/8970XT	189.700	1580,350	KFA321	109056143
OP40G/8960XT	189.600	1581,184	KFA322	109056168
OP40G/8950XT	189.500	1582,018	KFA323	109056184
OP40G/8940XT	189.400	1582,854	KFA324	109056200
OP40G/8930XT	189.300	1583,690	KFA325	109056218
OP40G/8920XT	189.200	1584,527	KFA326	109056226
OP40G/8910XT	189.100	1585,365	KFA327	109056234
OP40G/8900XT	189.000	1586,203	KFA328	109056242
OP40G/8890XT	188.900	1587,043	KFA329	109056259
OP40G/8880XT	188.800	1587,884	KFA330	109056267
OP40G/8870XT	188.700	1588,725	KFA331	109056275
OP40G/8860XT	188.600	1589,568	KFA332	109056283
OP40G/8850XT	188.500	1590,411	KFA333	109056291
OP40G/8840XT	188.400	1591,255	KFA334	109056309
OP40G/8830XT	188.300	1592,100	KFA335	109056317
OP40G/8820XT	188.200	1592,946	KFA336	109056325
OP40G/8810XT	188.100	1593,793	KFA337	109056333
OP40G/8800XT	188.000	1594,641	KFA338	109056341
OP40G/8790XT	187.900	1595,489	KFA339	109056358
OP40G/8780XT	187.800	1596,339	KFA340	109056366
OP40G/8770XT	187.700	1597,189	KFA341	109056374
OP40G/8760XT	187.600	1598,041	KFA342	109056382

FUNCTIONAL	Nominal central frequencies (THz)	Nominal central wavelengths (nm)	APP. CODE	COMCODE
OP40G/8750XT	187.500	1598,893	KFA343	109056390
OP40G/8740XT	187.400	1599,746	KFA344	109056408
OP40G/8730XT	187.300	1600,600	KFA345	109056416
OP40G/8720XT	187.200	1601,455	KFA346	109056424
OP40G/8710XT	187.100	1602,311	KFA347	109056432
OP40G/8700XT	187.000	1603,168	KFA348	109056440
OP40G/8690XT	186.900	1604,026	KFA349	109056457
OP40G/8680XT	186.800	1604,885	KFA350	109056465
OP40G/8670XT	186.700	1605,744	KFA351	109056473
OP40G/8660XT	186.600	1606,605	KFA352	109056481
OP40G/8650XT	186.500	1607,466	KFA353	109056499

***LambdaUnite* OLS 1.6T
10-Gbit/s DWDM direct
optics**

FUNCTIONAL	Nominal central frequencies (THz)	Nominal central wavelengths (nm)	APP. CODE	COMCODE
OP10G/01/800G	195.85	1530.72	KFA9	109000232
OP10G/02/800G	195.8	1531.12	KFA81	109006155
OP10G/03/800G	195.75	1531.51	KFA82	109006163
OP10G/04/800G	195.7	1531.9	KFA83	109006171
OP10G/05/800G	195.65	1532.29	KFA84	109006189
OP10G/06/800G	195.6	1532.68	KFA85	109006197
OP10G/07/800G	195.55	1533.07	KFA86	109006205
OP10G/08/800G	195.5	1533.47	KFA87	109006213
OP10G/09/800G	195.45	1533.86	KFA88	109006221
OP10G/10/800G	195.4	1534.25	KFA89	109006247
OP10G/11/800G	195.35	1534.64	KFA90	109006262
OP10G/12/800G	195.3	1535.04	KFA91	109006270
OP10G/13/800G	195.25	1535.43	KFA92	109006288

FUNCTIONAL	Nominal central frequencies (THz)	Nominal central wavelengths (nm)	APP. CODE	COMCODE
OP10G/14/800G	195.2	1535.82	KFA93	109006296
OP10G/15/800G	195.15	1536.22	KFA94	109006304
OP10G/16/800G	195.1	1536.61	KFA95	109006312
OP10G/17/800G	195.05	1537	KFA96	109006320
OP10G/18/800G	195	1537.4	KFA97	109006338
OP10G/19/800G	194.95	1537.79	KFA98	109006346
OP10G/20/800G	194.9	1538.19	KFA99	109006353
OP10G/21/800G	194.85	1538.58	KFA100	109006361
OP10G/22/800G	194.8	1538.98	KFA101	109006379
OP10G/23/800G	194.75	1539.37	KFA102	109006387
OP10G/24/800G	194.7	1539.77	KFA103	109006395
OP10G/25/800G	194.65	1540.16	KFA104	109006403
OP10G/26/800G	194.6	1540.56	KFA105	109006411
OP10G/27/800G	194.55	1540.95	KFA106	109006429
OP10G/28/800G	194.5	1541.35	KFA107	109006437
OP10G/29/800G	194.45	1541.75	KFA108	109006445
OP10G/30/800G	194.4	1542.14	KFA109	109006452
OP10G/31/800G	194.35	1542.54	KFA110	109006460
OP10G/32/800G	194.3	1542.94	KFA111	109006478
OP10G/33/800G	194.25	1543.33	KFA112	109006486
OP10G/34/800G	194.2	1543.73	KFA113	109006494
OP10G/35/800G	194.15	1544.13	KFA114	109006502
OP10G/36/800G	194.1	1544.53	KFA115	109006510
OP10G/37/800G	194.05	1544.92	KFA116	109006528
OP10G/38/800G	194	1545.32	KFA117	109006536
OP10G/39/800G	193.95	1545.72	KFA118	109006544
OP10G/40/800G	193.9	1546.12	KFA119	109006551
OP10G/41/800G	193.85	1546.52	KFA120	109006569
OP10G/42/800G	193.8	1546.92	KFA121	109006585
OP10G/43/800G	193.75	1547.32	KFA122	109006593
OP10G/44/800G	193.7	1547.72	KFA123	109006601
OP10G/45/800G	193.65	1548.11	KFA124	109006619

FUNCTIONAL	Nominal central frequencies (THz)	Nominal central wavelengths (nm)	APP. CODE	COMCODE
OP10G/46/800G	193.6	1548.51	KFA125	109006627
OP10G/47/800G	193.55	1548.91	KFA126	109006635
OP10G/48/800G	193.5	1549.32	KFA127	109006643
OP10G/49/800G	193.45	1549.72	KFA128	109006650
OP10G/50/800G	193.4	1550.12	KFA129	109008540
OP10G/51/800G	193.35	1550.52	KFA130	109008557
OP10G/52/800G	193.3	1550.92	KFA131	109008565
OP10G/53/800G	193.25	1551.32	KFA132	109008573
OP10G/54/800G	193.2	1551.72	KFA133	109008581
OP10G/55/800G	193.15	1552.12	KFA134	109008599
OP10G/56/800G	193.1	1552.52	KFA135	109008607
OP10G/57/800G	193.05	1552.93	KFA136	109008615
OP10G/58/800G	193	1553.33	KFA137	109008623
OP10G/59/800G	192.95	1553.73	KFA138	109008631
OP10G/60/800G	192.9	1554.13	KFA139	109008649
OP10G/61/800G	192.85	1554.54	KFA140	109008656
OP10G/62/800G	192.8	1554.94	KFA141	109008672
OP10G/63/800G	192.75	1555.34	KFA142	109008680
OP10G/64/800G	192.7	1555.75	KFA143	109008698
OP10G/65/800G	192.65	1556.15	KFA144	109008706
OP10G/66/800G	192.6	1556.55	KFA145	109008714
OP10G/67/800G	192.55	1556.96	KFA146	109008722
OP10G/68/800G	192.5	1557.36	KFA147	109008730
OP10G/69/800G	192.45	1557.77	KFA148	109008748
OP10G/70/800G	192.4	1558.17	KFA149	109008755
OP10G/71/800G	192.35	1558.58	KFA150	109008763
OP10G/72/800G	192.3	1558.98	KFA151	109008771
OP10G/73/800G	192.25	1559.39	KFA152	109008789
OP10G/74/800G	192.2	1559.79	KFA153	109008797
OP10G/75/800G	192.15	1560.2	KFA154	109008805
OP10G/76/800G	192.1	1560.61	KFA155	109008813
OP10G/77/800G	192.05	1561.01	KFA156	109008821

FUNCTIONAL	Nominal central frequencies (THz)	Nominal central wavelengths (nm)	APP. CODE	COMCODE
OP10G/78/800G	192	1561.42	KFA157	109008839
OP10G/79/800G	191.95	1561.83	KFA158	109008847
OP10G/80/800G	191.9	1562.23	KFA159	109008854

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FUNCTIONAL	Nominal central frequencies (THz) for spacings of 50 GHz	Nominal central wavelengths (nm)	APP. CODE	COMCODE
OP10/9285XT	192.850	1554,537	KFA210	109056895
OP10/9280XT	192.800	1554,940	KFA211	109056903
OP10/9275XT	192.750	1555,343	KFA212	109056911
OP10/9270XT	192.700	1555,747	KFA213	109056929
OP10/9265XT	192.650	1556,151	KFA214	109056937
OP10/9260XT	192.600	1556,555	KFA215	109056945
OP10/9255XT	192.550	1556,959	KFA216	109056952
OP10/9250XT	192.500	1557,363	KFA217	109056960
OP10/9245XT	192.450	1557,768	KFA218	109056978
OP10/9240XT	192.400	1558,173	KFA219	109056986
OP10/9235XT	192.350	1558,578	KFA220	109056994
OP10/9230XT	192.300	1558,983	KFA221	109057000
OP10/9225XT	192.250	1559,389	KFA222	109057018
OP10/9220XT	192.200	1559,794	KFA223	109057026
OP10/9215XT	192.150	1560,200	KFA224	109065821
OP10/9210XT	192.100	1560,606	KFA225	109065839
OP10/9205XT	192.050	1561,013	KFA226	109065847
OP10/9200XT	192.000	1561,419	KFA227	109065854
OP10/9195XT	191.950	1561,828	KFA228	109065862
OP10/9190XT	191.900	1562,233	KFA229	109065870
OP10/9185XT	191.850	1562,640	KFA230	109065813

FUNCTIONAL	Nominal central frequencies (THz) for spacings of 50 GHz	Nominal central wavelengths (nm)	APP. CODE	COMCODE
OP10/9180XT	191.800	1563,047	KFA231	109065888
OP10/9175XT	191.750	1563,455	KFA232	109065896
OP10/9170XT	191.700	1563,863	KFA233	109065904
OP10/9165XT	191.650	1564,271	KFA234	109065912
OP10/9160XT	191.600	1564,679	KFA235	109065920
OP10/9155XT	191.550	1565,087	KFA236	109065938
OP10/9150XT	191.500	1565,496	KFA237	109065946
OP10/9145XT	191.450	1565,905	KFA238	109065953
OP10/9140XT	191.400	1566,314	KFA239	109065961
OP10/9135XT	191.350	1566,723	KFA240	109065979
OP10/9130XT	191.300	1567,133	KFA241	109065987
OP10/9125XT	191.250	1567,542	KFA242	109065995
OP10/9120XT	191.200	1567,952	KFA243	109066001
OP10/9115XT	191.150	1568,362	KFA244	109066019
OP10/9110XT	191.100	1568,773	KFA245	109066027
OP10/9105XT	191.050	1569,183	KFA246	109066035
OP10/9100XT	191.000	1569,594	KFA247	109066050
OP10/9095XT	190.950	1570,005	KFA248	109066068
OP10/9090XT	190.900	1570,416	KFA249	109066076
OP10/9085XT	190.850	1570,828	KFA250	109066084
OP10/9080XT	190.800	1571,239	KFA251	109066092
OP10/9075XT	190.750	1571,651	KFA252	109066100
OP10/9070XT	190.700	1572,063	KFA253	109066118
OP10/9065XT	190.650	1572,476	KFA254	109066126
OP10/9060XT	190.600	1572,888	KFA255	109066134
OP10/9055XT	190.550	1573,301	KFA256	109066142
OP10/9050XT	190.500	1573,714	KFA257	109066159
OP10/9045XT	190.450	1574,127	KFA258	109066167
OP10/9040XT	190.400	1574,540	KFA259	109066175
OP10/9035XT	190.350	1574,954	KFA260	109066183
OP10/9030XT	190.300	1575,368	KFA261	109066191
OP10/9025XT	190.250	1575,782	KFA262	109066209

FUNCTIONAL	Nominal central frequencies (THz) for spacings of 50 GHz	Nominal central wavelengths (nm)	APP. CODE	COMCODE
OP10/9020XT	190.200	1576,196	KFA263	109066217
OP10/9015XT	190.150	1576,610	KFA264	109066225
OP10/9010XT	190.100	1577,025	KFA265	109066233
OP10/9005XT	190.050	1577,440	KFA266	109066241
OP10/9000XT	190.000	1577,855	KFA267	109066258
OP10/8995XT	189.950	1578,270	KFA268	109066266
OP10/8990XT	189.900	1578,686	KFA269	109066274
OP10/8985XT	189.850	1579,102	KFA270	109066282
OP10/8980XT	189.800	1579,518	KFA271	109066290
OP10/8975XT	189.750	1579,934	KFA272	109066308
OP10/8970XT	189.700	1580,350	KFA273	109066316
OP10/8965XT	189.650	1580,767	KFA274	109066324
OP10/8960XT	189.600	1581,184	KFA275	109066332
OP10/8955XT	189.550	1581,601	KFA276	109066340
OP10/8950XT	189.500	1582,018	KFA277	109066357
OP10/8945XT	189.450	1582,436	KFA278	109066365
OP10/8940XT	189.400	1582,854	KFA279	109066373
OP10/8935XT	189.350	1583,271	KFA280	109066381
OP10/8930XT	189.300	1583,690	KFA281	109066399
OP10/8925XT	189.250	1584,108	KFA282	109066407
OP10/8920XT	189.200	1584,527	KFA283	109066415
OP10/8915XT	189.150	1584,946	KFA284	109066423
OP10/8910XT	189.100	1585,365	KFA285	109066431
OP10/8905XT	189.050	1585,784	KFA286	109066449
OP10/8900XT	189.000	1586,203	KFA287	109066456
OP10/8895XT	188.950	1586,623	KFA288	109066464
OP10/8890XT	188.900	1587,043	KFA289	109066472
OP10/8885XT	188.850	1587,463	KFA435	109066498
OP10/8880XT	188.800	1587,884	KFA436	109066506
OP10/8875XT	188.750	1588,304	KFA437	109066514
OP10/8870XT	188.700	1588,725	KFA438	109066522
OP10/8865XT	188.650	1589,146	KFA439	109066530

FUNCTIONAL	Nominal central frequencies (THz) for spacings of 50 GHz	Nominal central wavelengths (nm)	APP. CODE	COMCODE
OP10/8860XT	188.600	1589,568	KFA440	109066548
OP10/8855XT	188.550	1589,989	KFA441	109066555
OP10/8850XT	188.500	1590,411	KFA442	109066563
OP10/8845XT	188.450	1590,833	KFA443	109066571
OP10/8840XT	188.400	1591,255	KFA444	109066589
OP10/8835XT	188.350	1591,678	KFA445	109066597
OP10/8830XT	188.300	1592,100	KFA446	109066605
OP10/8825XT	188.250	1592,523	KFA447	109066613
OP10/8820XT	188.200	1592,946	KFA448	109066621
OP10/8815XT	188.150	1593,369	KFA449	109066639
OP10/8810XT	188.100	1593,793	KFA450	109066647
OP10/8805XT	188.050	1594,217	KFA451	109066654
OP10/8800XT	188.000	1594,641	KFA452	109066662
OP10/8795XT	187.950	1595,065	KFA453	109066670
OP10/8790XT	187.900	1595,489	KFA454	109066688
OP10/8785XT	187.850	1595,914	KFA455	109066696
OP10/8780XT	187.800	1596,339	KFA456	109066704
OP10/8775XT	187.750	1596,764	KFA457	109066712
OP10/8770XT	187.700	1597,189	KFA458	109066720
OP10/8765XT	187.650	1597,615	KFA459	109066738
OP10/8760XT	187.600	1598,041	KFA460	109066746
OP10/8755XT	187.550	1598,467	KFA461	109066753
OP10/8750XT	187.500	1598,893	KFA462	109066761
OP10/8745XT	187.450	1599,320	KFA463	109066779
OP10/8740XT	187.400	1599,746	KFA464	109066787
OP10/8735XT	187.350	1600,173	KFA465	109066795
OP10/8730XT	187.300	1600,600	KFA466	109066803
OP10/8725XT	187.250	1601,028	KFA467	109066811
OP10/8720XT	187.200	1601,455	KFA468	109066829
OP10/8715XT	187.150	1601,883	KFA469	109066837
OP10/8710XT	187.100	1602,311	KFA470	109066845
OP10/8705XT	187.050	1602,740	KFA471	109066852

FUNCTIONAL	Nominal central frequencies (THz) for spacings of 50 GHz	Nominal central wavelengths (nm)	APP. CODE	COMCODE
OP10/8700XT	187.000	1603,168	KFA472	109066860
OP10/8695XT	186.950	1603,597	KFA473	109066878
OP10/8690XT	186.900	1604,026	KFA474	109066886
OP10/8685XT	186.850	1604,455	KFA475	109066894
OP10/8680XT	186.800	1604,885	KFA476	109066902
OP10/8675XT	186.750	1605,314	KFA477	109066910
OP10/8670XT	186.700	1605,744	KFA478	109066928
OP10/8665XT	186.650	1606,174	KFA479	109066936
OP10/8660XT	186.600	1606,605	KFA480	109066944
OP10/8655XT	186.550	1607,035	KFA481	109066951
OP10/8650XT	186.500	1607,466	KFA482	109066969

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FUNCTIONAL	Nominal central frequencies (THz) for spacings of 100 GHz	Nominal central wavelengths (nm)	APP. CODE	COMCODE
OM2G5/921PWDM	192,10	1560,61	OM2G5A921	109154658
OM2G5/922PWDM	192,20	1559,79	OM2G5A922	109154666
OM2G5/923PWDM	192,30	1558,98	OM2G5A923	109154674
OM2G5/924PWDM	192,40	1558,17	OM2G5A924	109154682
OM2G5/925PWDM	192,50	1557,36	OM2G5A925	109154690
OM2G5/926PWDM	192,60	1556,55	OM2G5A926	109154708
OM2G5/927PWDM	192,70	1555,75	OM2G5A927	109154716
OM2G5/928PWDM	192,80	1554,94	OM2G5A928	109154724
OM2G5/931PWDM	193,10	1552,52	OM2G5A931	109154732
OM2G5/932PWDM	193,20	1551,72	OM2G5A932	109154740
OM2G5/933PWDM	193,30	1550,92	OM2G5A933	109154757
OM2G5/934PWDM	193,40	1550,12	OM2G5A934	109154765
OM2G5/935PWDM	193,50	1549,32	OM2G5A935	109154773

FUNCTIONAL	Nominal central frequencies (THz) for spacings of 100 GHz	Nominal central wavelengths (nm)	APP. CODE	COMCODE
OM2G5/936PWDM	193,60	1548,51	OM2G5A936	109154781
OM2G5/937PWDM	193,70	1547,72	OM2G5A937	109154799
OM2G5/938PWDM	193,80	1546,92	OM2G5A938	109154807
OM2G5/942PWDM	194,20	1543,73	OM2G5A942	109154815
OM2G5/943PWDM	194,30	1542,94	OM2G5A943	109154823
OM2G5/944PWDM	194,40	1542,14	OM2G5A944	109154831
OM2G5/945PWDM	194,50	1541,35	OM2G5A945	109154849
OM2G5/946PWDM	194,60	1540,56	OM2G5A946	109154856
OM2G5/947PWDM	194,70	1539,77	OM2G5A947	109154864
OM2G5/948PWDM	194,80	1538,98	OM2G5A948	109154872
OM2G5/949PWDM	194,90	1538,19	OM2G5A949	109154880
OM2G5/952PWDM	195,20	1535,82	OM2G5A952	109154898
OM2G5/953PWDM	195,30	1535,04	OM2G5A953	109154906
OM2G5/954PWDM	195,40	1534,25	OM2G5A954	109154922
OM2G5/955PWDM	195,50	1533,47	OM2G5A955	109154930
OM2G5/956PWDM	195,60	1532,68	OM2G5A956	109154948
OM2G5/957PWDM	195,70	1531,9	OM2G5A957	109154955
OM2G5/958PWDM	195,80	1531,12	OM2G5A958	109154963
OM2G5/959PWDM	195,90	1530,33	OM2G5A959	109154971



Spare parts

Available spare parts

Spare part	DC code	Comcode
Fiber Guide RT-RB	1001516	848879243
Fiber Guide LT-RB	1001517	848879235
Rack Fiber Guide	1001518	848879227
PWB for rack alarms	1002705	848879250
PWB for EEPROM	1003323	848880886





Appendix D: Passive DWDM (OEM equipment)

Overview

Purpose This appendix provides information about all interested facts related to the DWDM equipment.

Contents

DWDM materials	D-2
DWDM technical data	D-3
DWDM mounting	D-4
DWDM arrangements	D-8
DWDM cabling	D-9



DWDM materials

Material Passive-DWDM kits

Quantity	Description — Comcode
1	16-Channel MUX unit — 109164665 which includes: <ul style="list-style-type: none"> • Shell Holder Unite • MUX unit • 19” and 23” mounting bracket
1	16-channel DMUX unit — 109164673 which includes: <ul style="list-style-type: none"> • Shell Holder Unite • DMUX unit • 19” and 23” mounting bracket

Additional installation material

Quantity	Description — Comcode
4	Bracket — DC1005065
4	Fiber Clip — DC1000680
2	Fiber-Routing Guides (corner) — DC1001518
2	Guide Bracket — DC1005064
6	Screw, Tapping Thread-Forming, M6x16 — CC901331421

Optional grounding material

Quantity	Description — Comcode	Remarks
1	Ground Wire (2000 mm [6,562 ft]) — CC848828174 (incl. green M5 bolt and tooth lock)	Installed in the upper part of the rack
1	Ground Wire (3000 mm [9,843 ft]) — CC848828182 (incl. green M5 bolt and tooth lock)	Installed in the lower part of the rack

□

DWDM technical data

Specifications

Item	Range/Size
Operating temperature	-5°C to +60°C
Maximum Dimensions (D x W x H)	3784 mm [14.907 "] x 498 mm [19.606 "] x 74 mm [2.913 "]



DWDM mounting

Before you begin Check the materials before installation.

Installation procedure

- 1 Mount the 19” or 23” mounting bracket (item 2) on the Shell Holder (item 1) as shown in the next figure. The type of rack frame defines whether a 19” or 23” mounting bracket is used.

- 2 Mount the Guide Bracket — DC1005064 (item 6) with the assembled Shell Holder on the rack frame using the Screw, Tapping Thread-Forming, M6x16 — CC901331421.

- 3 Click the Fiber-Routing Guides (corner) — DC1001518 (item 7) to Guide Bracket — DC1005064 (item 6) as shown in the next figure for both configurations.

- 4 If applicable, connect the grounding cables from the Shell Holder at the rear side with Screw, Tapping Thread-Forming, M6x16 — CC901331421 to the grounding point of the rack frame.

IF the Passive DWDM is positioned	THEN
above the the middle of the rack (<i>Upper part</i>).	use the ground wire (2000 mm [6,562 ft]) — CC848828174
below the the middle of the rack (<i>Bottom part</i>).	use the ground wire (3000 mm [9,843 ft]) — CC848828182

- 5 Open the Shell Holder Unit by pushing simultaneously at both sides the buttons on the front door.

- 6 Slide the passive DWDM (item 3) into the Shell Holder until the PWDM locks. It can be released by pushing the buttons on each side simultaneously.

-
- 7** Mount the bracket — DC1005065 (item 4) and Fiber Clip — DC1000680 (item 5) in a position that is close to the passive DWDM so that the cables are laid properly within the racks.

IF the configuration (*1) is ...	Then ...
Top Access	mount the brackets above the Shell Holder
Bottom Access	mount the brackets below the Shell Holder

-
- 8** Connect the fiber cables as required by the configuration.
-

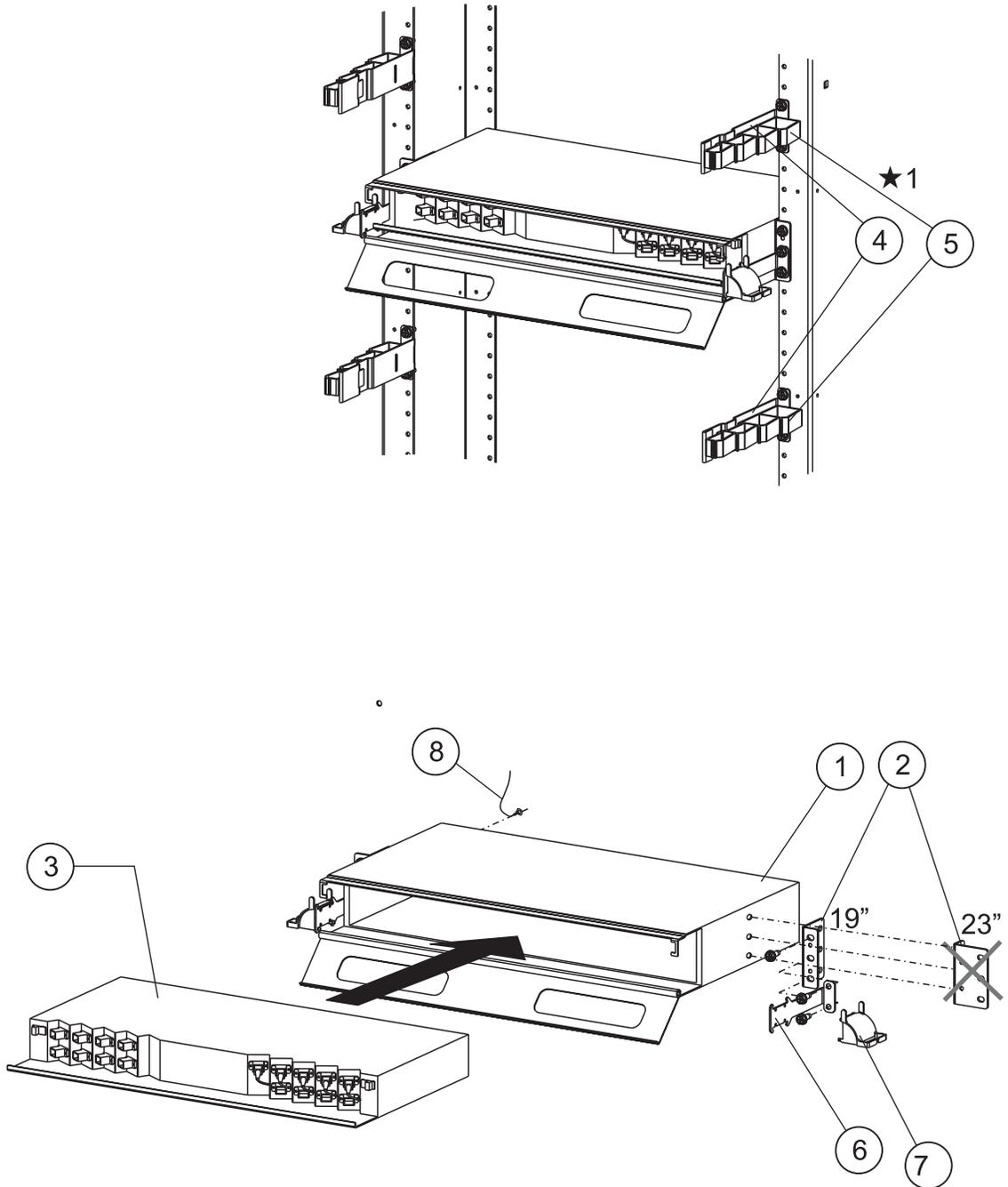
- 9** Close the door of the Shell Holder.

END OF STEPS

.....

Results

Figure D-1 Mounting the passive DWDM



Legend:

1 Shell Holder (Avanex)

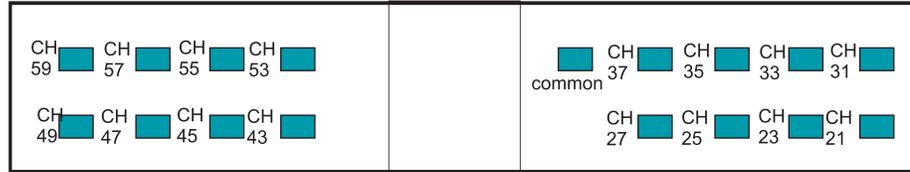
- 2 19" Bracket or 23" Bracket (Avanex)
- 3 DMUX *or* MUX (Avanex)
- 4 Bracket — DC1005065
- 5 Fiber Clip — DC1000680
- 6 Guide Bracket — DC1005064
- 7 Fiber-Routing Guides (corner) — DC1001518
- 8 Ground Wire (2000 mm [6,562 ft]) — CC848828174 or Ground Wire (3000 mm [9,843 ft]) — CC848828182



DWDM arrangements

Layout

Figure D-2 Layout of front panel for the passive DWDM



Optical-Channel Allocations

Frequency [THz]	Wavelength in vacuum [nm]	Channel port [-]
195.900	1530.334	CH 59
195.700	1531.898	CH 57
195.500	1533.465	CH 55
195.300	1535.036	CH 53
194.900	1538.186	CH 49
194.700	1539.766	CH 47
194.500	1541.349	CH 45
194.300	1542.936	CH 43
193.700	1547.715	CH 37
193.500	1549.315	CH 35
193.300	1550.918	CH 33
193.100	1552.524	CH 31
192.700	1555.747	CH 27
192.500	1557.363	CH 25
192.300	1558.983	CH 23
192.100	1560.606	CH 21



DWDM cabling

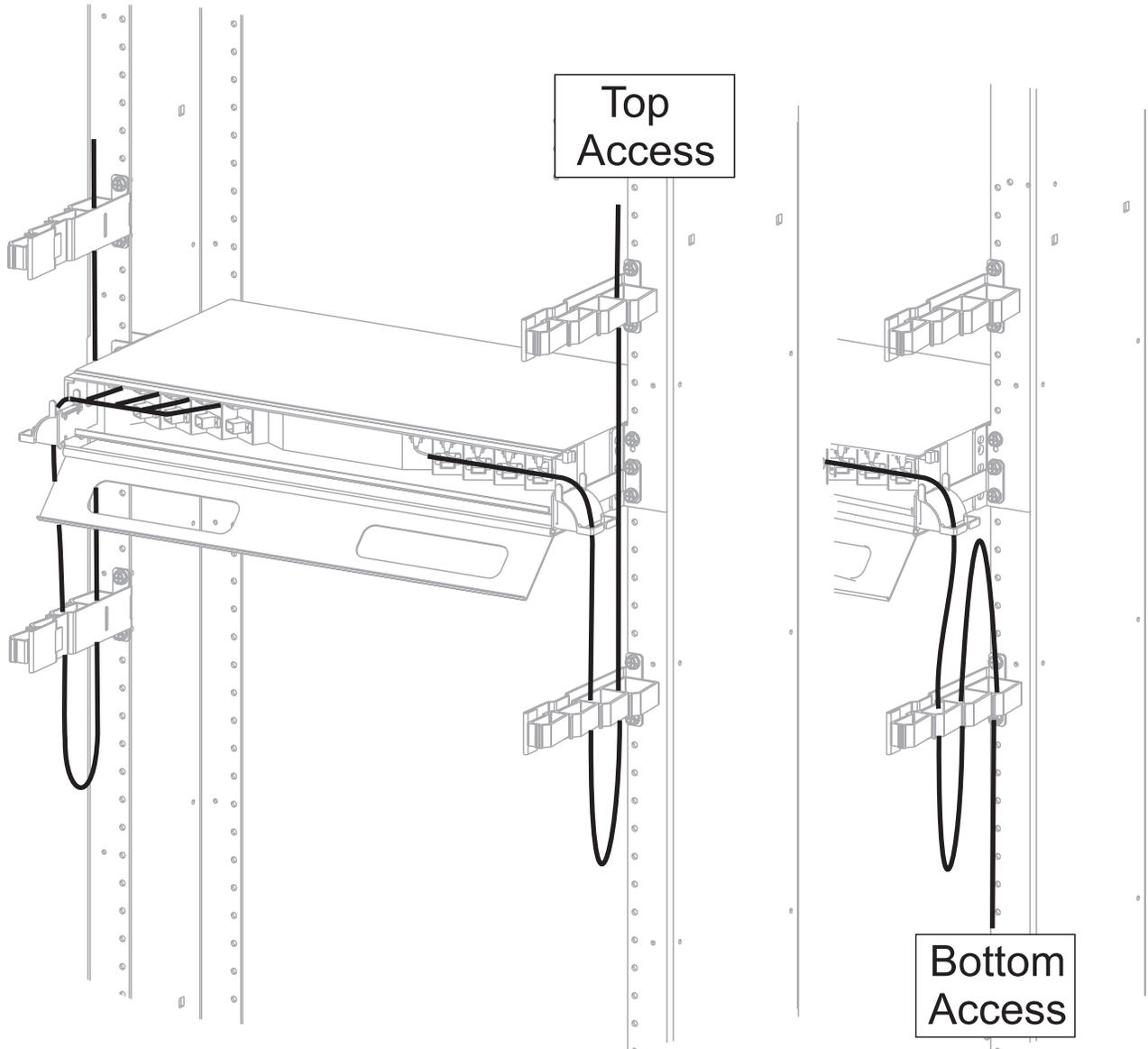
Cables **Important!** Only the fiber cables with listed comcode are allowed to be used, otherwise the proper functioning of the system can not be guaranteed.

The [“Single Mode 9/125 fiber-optic cables” \(C-2\)](#) that are used for the passive DWDM on the DMUX/MUX connector plate should connect with the following connectors:

- SC connector with a 45° cable entry booth
- SC connector with a short straight booth.

Routing The cables can be routed on both sides to the front of the unit (see next figure).

Figure D-3 Cable routing of passive DWDM





Appendix E: DCM (OEM equipment)

Overview

Purpose This appendix provides information about all interested facts related to the DCM equipment.

Contents

DCM mounting	E-2
DCM arrangements	E-3
DCM cabling	E-4
DCF-module interface	E-5



DCM mounting

Installation procedure

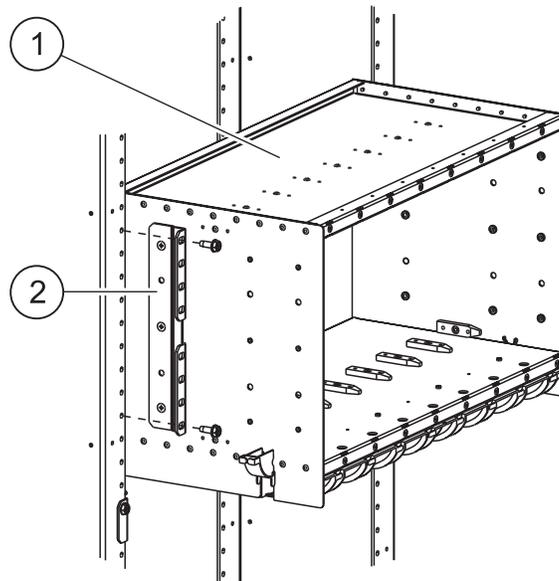
- 1 Mount the Mounting Bracket — NB-00000904 (item 2, which bracket depends on the type of rack frame) on the DCM Carrier — NB-00000902 (item 1) as shown in the next figure.
-
- 2 Mount the Unit Bracket — NB-00000904 (item 2) with the DCM Carrier — NB-00000902 on the rack frame using the Screw, Tapping Thread-Forming, M6x16 — CC901331421.

Important! Two DCM Carriers — NB-00000902 (item 1) could be mounted back-to-back within the rack frame.

END OF STEPS

Results

Figure E-1 Mounting the DCM Carrier

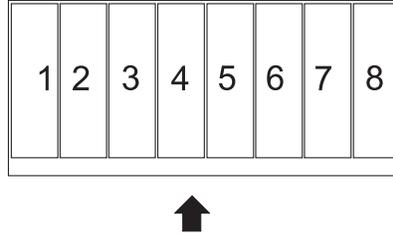


□

DCM arrangements

Layout

Figure E-2 Arrangements of the DCM pack positions



□

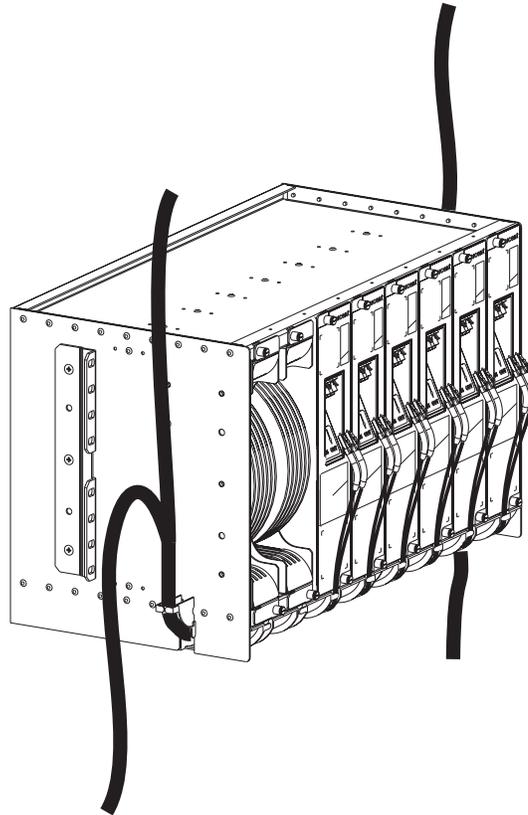
DCM cabling

Cables **Important!** Only the fiber cables with listed comcodes are to be used, otherwise the proper functioning of the system can not be guaranteed.

The [“Single Mode 9/125 fiber-optic cables” \(C-2\)](#) are used for the DCF modules, which should have an LC connector with a 45° boot.

Routing The cables can be routed from both sides of the rack to the front of the unit (see next figure).

Figure E-3 Cable routing for the DCM Carrier



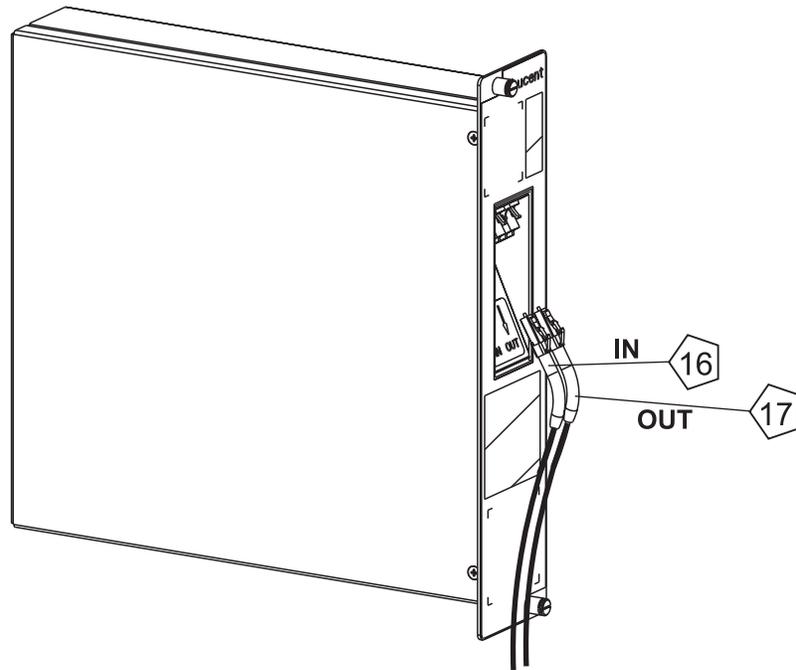
DCF-module interface

DCF modules

The different types of DCF module are:

- DCF CPL, 5.0 — CC848814315/DC1002400
- DCF CPL, 10.0 — CC848814323/DC1002401
- DCF CPL, 20.0 — CC848814331/DC1002402
- DCF CPL, 30.0 — CC848814349/DC1003628
- DCF CPL, 40.0 — CC848814356/DC1002403
- SMF module DK-S — CC848814943 or DCM CPL, -S (15 km SSMS) — DC1003629.

Figure E-4 DCF CPLs

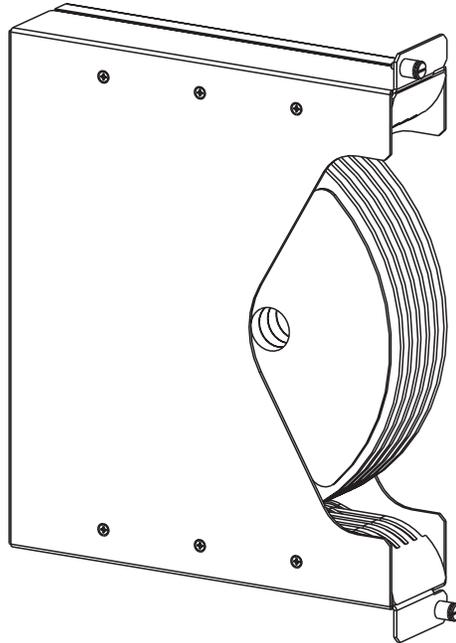


Fiber-overlength, box

The fiber-overlength box is:

- STG Unite cable-overlength — CC848840096 or fiber-overlength, box — DC1002918.

Figure E-5 STG CPL





Glossary

A AID (Access Identifier)

A technical specification for explicitly naming entities (both physical and logical) of an NE using a grammar comprised of ASCII text, keywords, and grammar rules.

Alarm Severity

An attribute defining the priority of the alarm message. The way alarms are processed depends on the severity.

Assembly

Gathering together of payload data with overhead and pointer information (an indication of the direction of the signal).

AUTO (Automatic)

One possible state of a port or slot. When a port is in the AUTO state and a good signal is detected, the port automatically enters the IS (in-service) state. When a slot is in the AUTO state and a circuit pack is detected, the slot automatically enters the EQ (equipped) state.

AWG

American Wire Gauge

B BDFB

Battery Distribution and Fuse Bay

BER (Bit Error Rate)

The ratio of error bits received to the total number of bits transmitted.

C CC

Cross Connect

CE

The CE marking indicates that the products conform to relevant European Community (EC) Directives

CH SCR

Chees Head Screw

Channel

A sub-unit of transmission capacity within a defined higher level of transmission capacity.

CI-CTL

Customer Interface of the Controller

Circuit

A set of transmission channels through one or more network elements that provides transmission of signals between two points, to support a single communications path.

CIT or *LambdaUnite*[™] CIT (Craft Interface Terminal)

The user interface terminal used by craft personnel to communicate with a network element.

CP

Circuit Pack

CTL

System Controller

CTS

Customer Technical Support within Lucent Technologies

D D-SUB

D-Subminiature

dB

Decibels

DC

Direct Current

DCC (Data Communications Channel)

The embedded overhead communications channel in the synchronous line, used for end-to-end communications and maintenance. The DCC carries alarm, control, and status information between network elements in a synchronous network.

DCM (Dispersion Compensation Module)

A device used to compensate the dispersion, the pulse spreading properties of an optical fiber. DCMs are necessary for very-long-haul applications and high bit rates.

DCN

Data Communications Network

DCrtn

Direct Current return

Default

An operation or value that the system or application assumes, unless a user makes an explicit choice.

Disassembly

Splitting up a signal into its constituents as payload data and overhead (an indication of the direction of a signal).

Dispersion

Time-broadening of a transmitted light pulse.

Dispersion Shifted Optical Fiber

1330/1550 nm minimum dispersion wavelength.

Drop-Down Menu

A menu that is displayed from a menu bar.

DS1

1.5 Mbps interface

DUR

Dual Unit Row

DWDM

Dense Wavelength Division Multiplexing

E EMC

Electro-Magnetic Compatibility

EMS

Element Management System

EPROM

Erasable Programmable Read-Only Memory

ESD

Electrostatic Discharge

ESP

Electrostatic Protection

F Free Running

An operating condition of a clock in which its local oscillator is not locked to an internal synchronization reference and is using no storage techniques to sustain its accuracy.

G GB

Gigabytes

Gbit/s

Gigabits per second

GE

Gigabit Ethernet

GHz

Gigahertz

Global Wait to Restore Time

Corresponds to the time to wait before switching back to the timing reference. It occurs after a timing link failure has cleared. This time applies for all timing sources in a system hence the name global. This can be between 0 and 60 minutes, in increments of one minute.

GND

Ground

GNE (Gateway Network Element)

A network element that passes information between other network elements and management systems through a data communication network.

H Holdover

An operating condition of a clock in which its local oscillator is not locked to an external reference but is using storage techniques to maintain its accuracy with respect to the last known frequency comparison with a synchronization reference.

HW

Hardware

Hz

Hertz

I I/O

Input/Output

IAO LAN

Intraoffice Local Area Network

ID

Identifier

IEC

International Electrotechnical Commission

IEEE

Institute of Electrical and Electronics Engineers

IN

Receive

Insert

To physically insert a circuit pack into a slot, thus causing a system initiated restore of an entity into service and/or creation of an entity and associated attributes.

ITU

International Telecommunication Union (formally known as CCITT)

K kbit/s

Kilobits per second

KFA XX

Apparatus code of circuit packs

L LAN (Local Area Network)

A communications network that covers a limited geographic area, is privately owned and user administered, is mostly used for internal transfer of information within a business, is normally contained within a single building or adjacent group of buildings, and transmits data at a very rapid speed.

LAPD (Link Access Procedure D-bytes)

Protocol used on Data Link Layer (OSI layer two) according to ITU-T Q.921.

LBO (Lightguide Build-Out)

An attenuating (signal-reducing) element used to keep an optical output signal strength within

desired limits.

LCS

Local Customer Support

LED

Light-Emitting Diode

LH

Long Haul

Line Timing

Refers to a network element that derives its timing from an incoming STM-N signal.

LL

Lucent Learning (former CTIP)

Location

An identifier for a specific circuit pack, interface module, interface port, or communications link.

LOS (Loss of Signal)

The complete absence of an incoming signal.

M Maintenance Condition

An equipment state in which some normal service functions are suspended, either because of a problem or to perform special functions (copy memory) that can not be performed while normal service is being provided.

MB

Megabytes

Mbit/s

Megabits per second

MDI

Miscellaneous Discrete Input

MDO

Miscellaneous Discrete Output

MM

Multi Mode

MMF

Multi-Mode Fiber

MS

Multiplexer Section

ms

Millisecond

MS-SPRing (Multiplexer Section Shared Protection Ring)

A protection method used in Add-Drop Multiplexer Network Elements.

MSP (Multiplexer Section Protection)

Provides capability for switching a signal from a working to a protection section.

N N/A

Not Applicable

Navis™ Optical NMS

Optical Network Management System

NE (Network Element)

A node in a telecommunication network that supports network transport services and is directly manageable by a management system.

NEBS

Network Equipment-Building System requirements, U.S. Telecom Requirements dealing with EMC/EMI, Environmental, Electrical safety.

nm

Nanometer (10^{-9} meters)

Node

A network element in a ring or, more generally, in any type of network. In a network element supporting interfaces to more than one ring, node refers to an interface that is in a particular ring. Node is also defined as all equipment that is controlled by one system controller. A node is not always directly manageable by a management system.

NSAP Address (Network Service Access Point Address)

Network Service Access Point Address (used in the OSI network layer 3). An automatically assigned number that uniquely identifies a Network Element for the purposes of routing DCC messages.

O OA
Optical Amplifier

OC, OC-n
Optical Carrier

OC-12
Optical Carrier, Level 12 Signal (622.08 Mbit/s)

OC-192
Optical Carrier, Level 192 (9953.28 Mbit/s) (10 Gbit/s)

OC-3
Optical Carrier, Level 3 Signal (155 Mbit/s)

OC-48
Optical Carrier, Level 48 (2488.32 Mbit/s) (2.5 Gbit/s)

OC-768
Optical Carrier, Level 768 (39813.12 Mbit/s) (40 Gbit/s)

OP
Optical Pack

OSI (Open Systems Interconnection)
Referring to the OSI reference model, a logical structure for network operations standardized by the International Standards Organization (ISO).

OUT
Transmit

P PCB
Printed Circuit Board

PDP
Power Distribution Panel

PI
Power Interface

Port (also called Line)
The physical interface, consisting of both an input and output, where an electrical or optical transmission interface is connected to the system and may be used to carry traffic between

network elements. The words “port” and “line” may often be used synonymously. “Port” emphasizes the physical interface, and “line” emphasizes the interconnection. Either may be used to identify the signal being carried.

PWB

Printed Wiring Board

PWR

Power

PWR ON

Power On

Q Q-LAN

Thin Ethernet LAN which connects the manager to Gateway Network Elements so that management information between Network Elements and management systems can be exchanged.

R RAM

Random Access Memory

Remote Network Element

Any Network Element that is connected to the referenced Network Element through either an electrical or optical link. It may be the adjacent node on a ring, or N nodes away from the reference. It also may be at the same physical location but is usually at another (remote) site.

Ring

A configuration of nodes comprised of network elements connected in a circular fashion. Under normal conditions, each node is interconnected with its neighbor and includes capacity for transmission in either direction between adjacent nodes. Path switched rings use a head-end bridge and tail-end switch. Line switched rings actively reroute traffic over the protection capacity.

Route

A series of contiguous digital sections.

Router

An interface between two networks. While routers are like bridges, they work differently. Routers provide more functionality than bridges. For example, they can find the best route between any two networks, even if there are several different networks in between. Routers also provide network management capabilities such as load balancing, partitioning of the network, and trouble-shooting.

Rx
Receive/IN

S SCR
Screw

SDH (Synchronous Digital Hierarchy)

A hierarchical set of digital transport structures, standardized for the transport of suitable adapted payloads over transmission networks.

Slot

A physical position in a shelf designed for holding a circuit pack and connecting it to the backplane. This term is also used loosely to refer to the collection of ports or tributaries connected to a physical circuit pack placed in a slot.

SM or SMF (Single-Mode Fiber)

A low-loss, long-span optical fiber typically operating at either 1310 nm, 1550 nm, or both.

Software Download

The process of transferring a generic (full or partial) or provisioned database from a remote entity to the target network element's memory. The remote entity may be the *LambdaUnite* CIT or *Navis* Optical EMS. The download procedure uses bulk transfer to move an un-interpreted binary file into the network element.

Software ID

Number that provides the software version information for the system.

SONET (Synchronous Optical Network)

The North American standard for the rates and formats that defines optical signals and their constituents.

Span

An uninterrupted bidirectional fiber section between two network elements.

SPARE WIRES

Ensure that spare wires have sufficient length to reach all contacts on the connector

Station Clock Input

An external clock may be connected to a Station Clock Input.

STM

Synchronous Transport Module (SDH)

STM-N (Synchronous Transport Module, Level N)

A building block information structure that supports SDH section layer connections, where N represents a multiple of 155.52 Mbit/s. Normally N = 1, 4, 16, 64 or 256.

STS

Synchronous Transport Signal (SONET)

Synchronous Network

The synchronization of transmission systems with synchronous payloads to a master (network) clock that can be traced to a reference clock.

T TBD

To Be Determined

TI

Timing Interface

TID (Target Identifier)

A provisionable parameter that is used to identify a particular Network Element within a network. It is a character string of up to 20 characters where the characters are letters, digits, or hyphens (-).

TL1 (Transaction Language One)

A subset of ITU's human-machine language.

TM (Terminal Multiplexer)

An Add/Drop Multiplexer with only one stream interface.

Tributary

A signal of a specific rate (2 Mbit/s, 34 Mbit/s, 140 Mbit/s, VC12, VC3, VC4, STM-1 or STM-4) that may be added to or dropped from a line signal.

Two-Way Point-to-Point Cross-Connection

A two-legged interconnection, that supports two-way transmission, between two and only two tributaries.

Tx

Transmit/OUT

U UL

UL marking indicates that the products conform to relevant American Directives.

UPL

User Panel

UR

UR marking indicates that the products conform to relevant American Directives.

User Privilege

Permissions a user must perform on the computer system on which the system software runs.

V V

Volts

VAC

Volts Alternating Current

Value

A number, text string, or other menu selection associated with a parameter.

Variable

An item of data named by an identifier. Each variable has a type, such as int or Object, and a scope.

VC (Virtual Container)

Container with path overhead.

VDC

Volts Direct Current

Virtual

Refers to artificial objects created by a computer to help the system control shared resources.

W WTR (Wait to Restore)

Applies to revertive switching operation. The protection group enters the WTR state when all Equipment Fail (EF) conditions are cleared, but the system has not yet reverted back to its working line. The protection group remains in the WTR state until the Wait-to-Restore timer completes the WTR time interval.

X XC

Cross Connect



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