1645 Access Multiplexer Compact AMC

Release 9.0

Installation Guide

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Notice

Every effort has been made to ensure that the information in this document was complete and accurate at the time of printing. However, information is subject to change.

Release notification

This document describes 1645 AMC release 9.0.

Safety

Always observe the Safety Instructions given in Chapter 1 when operating the system.

Please note that Alcatel-Lucent warranty is contingent upon the use of Alcatel-Lucent specified SFPs for AMC. Use of other SFPs is not approved by Alcatel-Lucent and is fully at the customer's own risk. Any warranty obligation of Alcatel-Lucent is extinguished when non-Alcatel-Lucent specified SFPs are used.

Ordering information

The order number of this document is 365-313-103R9.0.

Technical support

Please contact your Alcatel-Lucent Local Customer Support Team for technical questions about the information in this document.

Information product support

To comment on this information product online, go to *http://www.lucent-info.com/comments* or email your comments to *comments@alcatel-lucent.com*.

Contents

List of tables

List of figures

About this document

Purpose

This manual provides information on the installation and configuration of 1645 AMC units. Furthermore, all steps for putting the system into operation are also described.

Safety information

For your safety, this document contains safety statements. Safety statements are given at points where risks of damage to personnel, equipment, and operation may exist. Failure to follow the directions in a safety statement may result in serious consequences.

Intended audience

This manual is intended for users who wish to install, configure and cable 1645 AMC units including all accessories.

This requires that the installation staff has a basic knowledge of SDH and Ethernet technology. Working on the equipment described in this manual requires also special training of the personnel.

How to use this information product

This manual is divided into the following sections with a brief description of the contents of each major part/chapter/appendix:

About this document describes the purpose, intended audience, reason for reissue, and organization of this document. This section references related documentation and explains how to order, make comments or recommend changes to this document.

Part I – Physical and power installation

- *Chapter 1, Safety*
  This chapter provides all relevant information and safety guidelines to safeguard against personal injury. Furthermore, this chapter may be useful to prevent material damage to the equipment.
- *Chapter 2, General information*
  This chapter provides all facts which must be known before the system can be installed, such as environmental requirements, ITM-CIT requirements, EMC/ESD information, etc.
- *Chapter 3, Mechanical installation*
  This chapter provides all information needed to install 1645 AMC units.
- *Chapter 4, System cabling*
  This chapter provides all tasks for a complete system cabling.
- *Chapter 5, Powering*
  This chapter describes the system powering and some final tests which should be performed to end the physical installation part.

Part II – NE provisioning and stand alone installation test

- *Chapter 6, ITM-CIT installation and NE provisioning*
  This chapter describes the ITM-CIT and NE software installation and the initial NE provisioning via ITM-CIT.
- *Chapter 7, Stand alone test procedures*
  This chapter provides all tests which must be performed to verify the proper working of the units/NEs.

Part III – Link testing

- *Chapter 8, Link testing*
  This chapter provides link acceptance tests which are necessary to verify the functionality of the overall system.
- *Chapter 9, Conclusion*
  This chapter provides a final checklist and a signoff sheet to be sure that all required tasks described in this manual have been done.

Appendices

- *Appendix A, Mounting rules*
  This chapter provides rules which have to be observed during physical installation.
- *Appendix B, Installation Troubleshooting*
  This chapter provides basic installation troubleshooting information.
- *Appendix C, Cable assembly instructions*
  This chapter provides general cable assembly instructions.

Glossary provides definitions for telecommunication acronyms and terms.

Index supplies users with specific subjects and corresponding page numbers to find necessary information.

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.

Codes

The codes (CC, DC and SC) in this manual are used to define a hardware item owned by the Alcatel-Lucent Development Systems. The code consists of a letter combination followed by a combination of numbers (Example: CC123456789).

Related documentation

This section briefly describes the documents that are included in the 1645 AMC documentation set.

- **Installation Guide**
  The 1645 AMC 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 1645 AMC Applications and Planning Guide (APG) is for use by network planners, analysts and managers. It is also for use by the Alcatel-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 1645 AMC 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 ITM-CIT.
- **Alarm Messages and Trouble Clearing Guide**
  The 1645 AMC 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.
- **OMS Provisioning Guide (Application 1645 AMC)**
  The OMS Provisioning Guide gives instructions on how to perform system provisioning, operations, and administrative tasks by use of OMS.

The following table lists the documents included in the 1645 AMC documentation set.

Document title	Document code
1645 AMC Applications and Planning Guide	109660936 (365-313-102R9.0)
1645 AMC User Operations Guide	109660993 (365-313-104R9.0)
1645 AMC Alarm Messages and Trouble Clearing Guide	109660928 (365-313-105R9.0)
1645 AMC Installation Guide	109660969 (365-313-103R9.0
1350 OMS Provisioning Guide (Application 1645 AMC)	109660977 (365-313-106R9.0)
CD-ROM Documentation 1645 AMC (all manuals on a CD-ROM)	109660944 (365-313-107R9.0)

Technical support

Alcatel-Lucent provides the following Technical Support Services:

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

Note: Technical Support Services are available 24 hours a day, 7 days a week.

When additional technical assistance is needed, use the appropriate contact information in the table below:

Customer location	Initial Alcatel-Lucent contact location
Inside the United States and Canada	Technical Support Services can be reached at **0 866-582-3688** *Prompt#1*.
Outside the United States	Technical Support Services can be reached at **+1-630-224-4672**: *Prompt#2*.
Web Site	For additional information regarding Worldwide Services, refer to the Alcatel-Lucent web site at **http://www.alcatel-lucent.com/solutions/lws.html**

How to order

For all questions concerning ordering of 1645 AMC documentation, for a complete list of the marketable items and their comcodes, and for ordering the equipment please contact your Account Executive or your Alcatel-Lucent local customer team.

How to comment

Because customer satisfaction is extremely important to Alcatel-Lucent, every attempt is made to encourage feedback from customers about our information products. Thank you for your feedback.

Part I: Physical and power installation

Overview

Purpose

This part of the 1645 AMC Installation Guide contains the physical installation of the 1645 AMC units including the system cabling and the system powering.

Contents

This part of the document contains the following chapters:

- Chapter 1
  Safety
- Chapter 2
  General information
- Chapter 3
  Mechanical installation
- Chapter 4
  System cabling
- Chapter 5
  Powering.

Entry checklist

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

Procedure	Completed	Initials	Notes
Are the needed 1645 AMC units available?			
Are all needed option cards available?			
Is a fan unit available (if required)?			

Procedure	Completed	Initials	Notes
Is an AC/DC converter available (if required)?			
Are all needed SFPs available?			
Is the EMC bracket available?			
Are all needed cables available?			
Are there any obstacles that will affect the physical installation or cabling?			
Are the required fuse/breaker positions available?			
Is an ESD wrist strap available?			
Are **metric** tools available?			
Is a torque wrench available?			
Is a soldering iron available?			
Are the needed crimping tools available?			
Is a multimeter available?			
Is an ohmmeter available?			

Contents

1 Safety

Overview

Purpose

The aim of this chapter on safety is to provide users of 1645 AMC system 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 1645 AMC system has been developed in line with the present state-of-the-art and fulfils the current national and international safety requirements. They are 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 connection
- installation or removal of SFPs

through possible contact with the following:

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

Contents

General notes on safety

Overview

Purpose

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

Contents

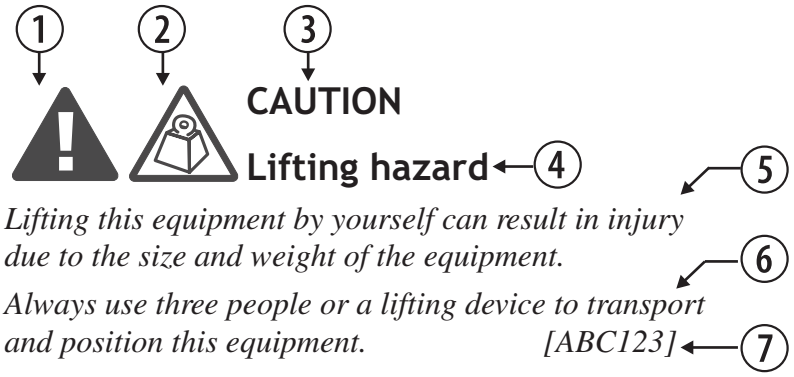
Structure of safety statements

Overview

Safety statements describe the safety risks relevant while performing tasks on Alcatel-Lucent products during deployment and/or use. Failure to avoid the hazards may have serious consequences.

General structure

Safety statements include the following structural elements:



Item	Structure element	Purpose
1	Safety alert symbol	Indicates the potential for personal injury (optional)
2	Safety symbol	Indicates hazard type (optional)
3	Signal word	Indicates the severity of the hazard
4	Hazard type	Describes the source of the risk of damage or injury
5	Safety message	Consequences if protective measures fail
6	Avoidance message	Protective measures to take to avoid the hazard
7	Identifier	The reference ID of the safety statement (optional)

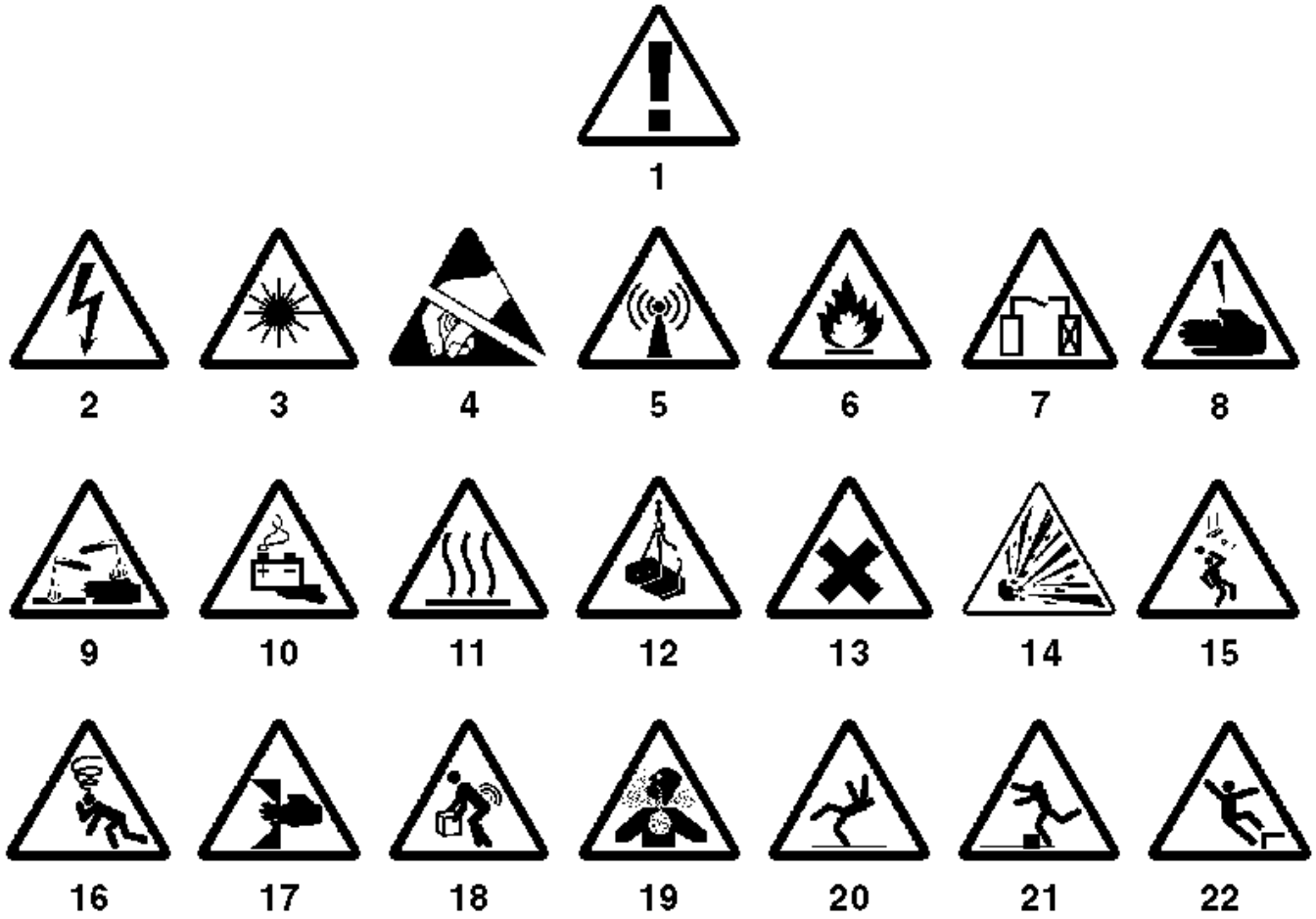
Signal words

The signal words identify the hazard severity levels as follows:

Signal word	Meaning
DANGER	Indicates an extremely hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a hazardous situation not related to personal injury.

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	Components sensitive to electrostatic discharge (ESD)
5	Electromagnetic radiation
6	Flammable material/Risk of fire
7	Service disruption hazard
8	Laceration hazard
9	Corrosive substance
10	Hazard caused by batteries

11	Hot surface
12	Heavy overload load
13	Noxious substance
14	Explosion hazard
15	Falling object hazard
16	Risk of suffocation
17	Pinch hazard
18	Lifting hazard, heavy object
19	Inhalation hazard
20	Slip hazard
21	Trip hazard
22	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 authorized 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 Alcatel-Lucent personnel or by expert personnel authorized by Alcatel-Lucent.
  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, …).

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 1645 AMC equipment. Therefore, the key safety instructions for these subjects are summarized in the following.

Contents

Laser safety

Overview

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

Conventional lasers can produce an intense beam of monochromatic light. The term monochromaticity means a single wavelength output of pure color that may be visible or invisible to the eye. A conventional laser produces a small-size beam of light, and because the beam size is small the power density (also called irradiance) is very high. Consequently, lasers and laser products are subject to federal and applicable state regulations as well as international standards for their safe operation.

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

Lasers and eye damage

The optical energy emitted by laser and high-radiance LEDs in the 400-1400 nm range may cause eye damage if absorbed by the retina. When a beam of light enters the eye, the eye magnifies and focuses the energy on the retina magnifying the irradiance. The irradiance of the energy that reaches the retina is approximately 10^5 or 100,000 times more than at the cornea and, if sufficiently intense, may cause a retinal burn.

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

Classification of lasers

Manufacturers of lasers and laser products in the U.S. are regulated by the Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) under 21 CFR 1040. These regulations require manufacturers to certify each laser or laser product as belonging to one of four major Classes I, II, lla, IIIa, lllb, or IV. The International Electro-technical Commission is an international standards body that writes laser safety standards under IEC-60825. Classification schemes are similar with Classes divided into Classes 1, 1M, 2, 2M, 3B, 3R and 4. Lasers are classified according to the accessible emission limits and their potential for causing injury. Optical fiber telecommunication systems are generally classified as Class I/1, because, under normal operating conditions, all energized laser transmitting circuit packs are terminated on optical fibers which enclose the laser energy with the fiber sheath forming a protective housing. Also, a protective housing / access panel is typically installed in front of the laser circuit pack shelves. The circuit packs themselves, however, may be FDA/CDRH Class I or IIIb or IEC Class 1, 1M, 3B, 3R or 4. State of the art Raman and EDFA optical amplifiers have now extended into the Class IV/4 designations.

Lightwave safety precautions for optical fiber telecommunication systems

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

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

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

Laser safety precautions for enclosed systems

Under normal operating conditions, optical fiber telecommunication systems are completely enclosed; nonetheless, the following precautions shall be observed:

1. Because of the potential for eye damage, technicians should not stare into optical connectors or broken fibers.
2. Under no circumstance shall laser/fiber optic operations be performed by a technician before satisfactorily completing training in laser safety.
3. Since viewing laser emissions directly in excess of Class I/1 limits with an optical instrument such as an eye loupe greatly increases the risk of eye damage.

Laser safety precautions for unenclosed systems

During service, maintenance, or restoration, an optical fiber telecommunication system is considered unenclosed. Under these conditions, follow these practices:

1. Only authorized, trained personnel shall be permitted to do service, maintenance and restoration. Avoid exposing the eye to emissions from unterminated, energized optical connectors at close distances. Laser modules associated with the optical ports of laser circuit packs are typically recessed, which limits the exposure distance. Optical port shutters, Automatic Power Reduction (APR), and Automatic Power Shut Down

(APSD) are engineering controls that are also used to limit the emissions. However, technicians removing or replacing laser circuit packs should not stare or look directly into the optical port with optical instruments or magnifying lenses. (Normal eyewear or indirect viewing instruments such as Find-R-Scopes are not considered magnifying lenses or optical instruments).

2. Only authorized, trained personnel shall use optical test equipment during installation or servicing since this equipment contains semiconductor lasers. (Some examples of optical test equipment are Optical Time Domain Reflectometers (OTDRs), Hand-Held Loss Test Sets).
3. Under no circumstances shall any personnel scan a fiber with an optical test set without verifying that all laser sources on the fiber are turned off.
4. All unauthorized personnel shall be excluded from the immediate area of the optical fiber telecommunication systems during installation and service.

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

Optical circuit pack specifications

1645 AMC

Alcatel-Lucent 1645 AMC comply with FDA/CDRH 21 CFR 1040.10 and 1040.11 as Class I and IEC 60825-1 as a Class 1 Laser Product.

All optical interfaces are available as “Small Form-Factor Pluggable Optics” (SFPs). The technical specifications of the optical interfaces are given in chapter 4, section “Optical interfaces (X5IP card)” (p. 4-39).

Power supply safety instructions

Overview

The 1645 AMC units can be powered as follows:

- **DC** (unit contains a 6-pin terminal block DC connector)
- **AC** (unit contains a protected 3-pin IEC 60320 connector).

Electrical safety

The installation must be compliant with IEC 60950–Ed3, 1999-04.

The equipment must be grounded (connected to protective earth) (Class I equipment).

DC power supply

Each equipment must be fitted when the equipment is installed, with an external, marked and easily-identifiable protection device of 3 A maximum.

The equipment must be supplied with a Safety Extra-Low Voltage (SELV) of –48 V and the positive terminal of this source correctly connected to the protective earth.

The equipment can also be connected to a Telecommunication Network Voltage (TNV) of –24 V to –60 V. No specific requirements are necessary for this type of source.

The user interfaces are of the SELV type and must only be connected to circuits with the same type of interface.

The following power range must be observed: –18 VDC ... –72 VDC.

AC power supply

An external AC power distribution system classified IT cannot be used. (For IT classification, see: IEC 60950–Ed3, 1999-04, Annex V: Power system isolated from earth or one point connected to earth through an impedance and direct electrical connection of the equipment to earth).

An external protection device is not necessary: the building installation is considered as providing short-circuit backup protection (IEC 60950–Ed3, 1999-04, paragraph 2.7.3).

The user interfaces are of the SELV type and must only be connected to circuits with the same type of interface.

The following power range must be observed: 90 VAC ... 264 VAC.

WARNING

: Exposure to voltages

Ensure that power is turned off when the cover of the AMC-AC is off because dangerous voltages are exposed.

When inserting option cards, ensure the cover is on before powering on the unit.

Protection against short-circuits

Important! Ensure that the 1645 AMC units have reached room temperature and are dry before taking them into operation.

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

The following *ESD instructions* must be observed when handling option cards and/or SFPs:

- Wear working garment made of 100% cotton to avoid electrostatic charging.
- Touch the option cards/SFPs at the edges only.
- Ensure that the 1645 AMC units are grounded.
- Wear conductively connected wrist straps and connect them to an ESP bonding point.
- Work in an area which is protected against electrostatic discharge. Use conducting floor and bench mats which are conductively connected to an ESP bonding point.
- Conductively connect all test equipment and trolleys to an ESP bonding point.
- Store and ship the option cards/SFPs in their shipping packing. The option cards/SFPs 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%.

Conformity statements

CE mark

The CE mark indicates that the product conforms to the relevant European Community (EC) Directives.

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

- EU Directive 2004/108/EC - Electro Magnetic Compatibility (EMC)
- EC73.23/EEC - Low-Voltage Directive (LVD).

Material content compliance

European Union (EU) Directive 2002/95/EC, “Restriction of the use of certain Hazardous Substances” (RoHS), restricts the use of lead, mercury, cadmium, hexavalent chromium, and certain flame retardants in electrical and electronic equipment. This Directive applies to electrical and electronic products placed on the EU market from 1 July 2006, with various exemptions, including an exemption for lead solder in network infrastructure equipment. Alcatel-Lucent products shipped to the EU from 1 July 2006 will comply with the RoHS Directive.

2 General information

Overview

Purpose

The purpose of this chapter is to provide important information before performing any procedure.

Contents

Hardware description

Description

The 1645 AMC units are compact and cost-effective STM-1 and STM-4 multiplexer designed to be installed at the customer's premises for fiber-to-the business applications for fiber-to-the curb applications. The space-efficient design allows wall, rack or desk mounting within controlled or uncontrolled environment locations according to ETSI 300 019-1-3 Class 3.2.

The 1645 AMC units can also act as an SHDSL Line Termination Unit (LTU) when equipped with the SHDSL option card. Several third party Network Termination Units (NTUs) can be connected to the LTU.

Powering

The 1645 AMC units can be ordered either as DC or as AC powered versions. The power ranges are given in chapter 3.

Table 2-1 Technical specifications (AC/DC converter)

Item	DR-120-48 converter	DR-75-48 converter
AC input	88 ... 132 VAC or 176 ... 264 VAC (selectable by switch)	85 ... 264 VAC
DC output	48V, 0 ... 2.5A	48V, 0 ... 1.6A
Temperature range	–10°C ... +60°C	–10°C ... +60°C
Dimensions (H × W × D)	125.2 mm × 65.5 mm × 100 mm	125.2 mm × 55.5 mm × 100 mm

Remote power supply

The 1645 AMC units, as SHDSL LTUs, are connected to third-party NTUs and SHDSL Regenerator Units (SRUs). To enable the remote powering of an SRU, an external power box called the Fernspeisemodul (FSP) box or the External SHDSL Power Supply (ESPS) box is delivered alongwith the unit.

This external power supply box is managed through the MDI/MDO interfaces located on the NE. The power box is monitored by manually setting the DIP switch on the box to *"Managed"* and setting the NE to the managed mode. There are also individual DIP switches to monitor each port on the box. The management system displays the status, *"FSP on/off"*, of the DIP switches per port.

The MDI/MDO interfaces on the power box can be used by the 1645 AMC units as the MDI/MDO interfaces for external signalling.

Figure 2-1 Remote Power Supply box

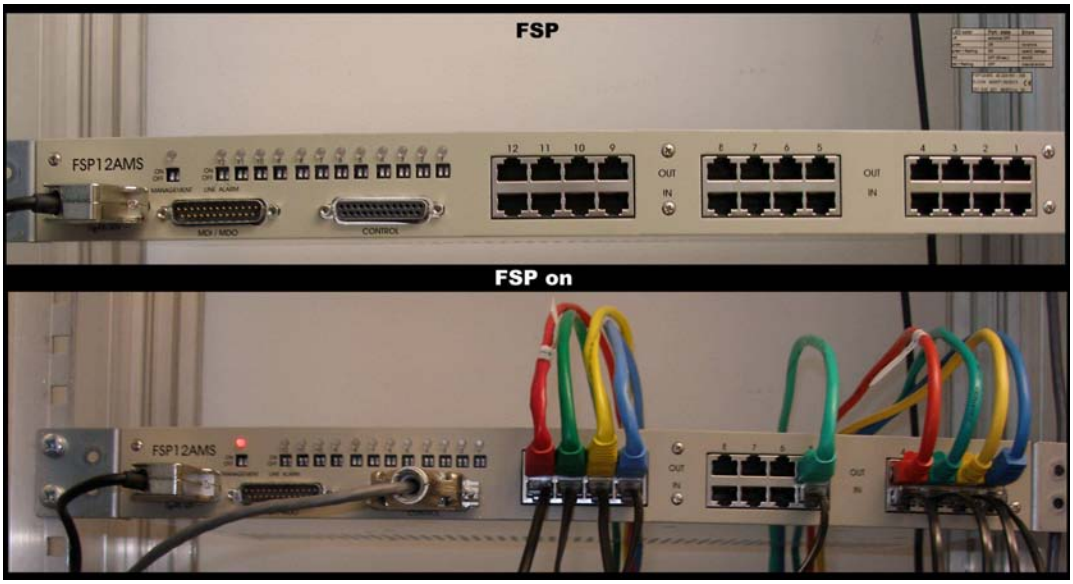


Table 2-2 Technical specifications (FSP12AMS)

Item	FSP12AMS
Operating voltage range	40.5 ... 75.0 VDC
Operating temperature range	-5°C ... +45°C
Relative humidity	10 ... 93 % (non condensing)
Power consumption	< 125 W
Weight	3.4 kg
Dimensions (H × W × D)	45 mm × 445 mm × 235 mm

External power converter

The system can be installed in together with an external power converter.

The power converter can be mounted on a DIN-rail in the same rack. For example, a MeanWell DR-120-48.

Features of the external power converter include the following:

- Accepts input power in the 100-120 VAC and 200-240 VAC ranges at 50/60 Hz and converts it to 48 V DC. The 48 V output can be connected to the system.
- The option to let the battery return floating is available.
- The fuses protecting the system cannot be replaced at the field. Replacement must be done at a repair center.

1645 AMC main board assembly

The main board has the following characteristics:

- Two STM-1 electrical/optical aggregate line interface pairs (transmit/receive) for SFP usage
- Two STM-1/ STM-4 optical aggregate line interface pairs (transmit/receive) for SFP usage
- Sixteen 2 Mbit/s electrical tributary interfaces (E1). The impedance of 75 -120 Ω is automatically set through the cable
- Supports 33 × 33 / 16 × 16 VC-4s HO/LO non-blocking cross connection capacity.
- E1/E2/F1 access
- Connection facility for tributary interface extensions such as option cards, with a maximum of 22 × VC-4s HOCC connection capacity
- F-interface (RJ45) complying with V.10/RS-232 for the Craft Interface Terminal (ITM-CIT)
- Q-LAN interface to connect to the EMS or to other NEs is available with an RJ-45 (LAN-10BaseT) connector
- LAN interface 10/100BASE-T (G-LAN)
- Four Miscellaneous Discrete Inputs (MDIs) to read the status of external alarm points, and four Miscellaneous Discrete Outputs (MDOs) to drive external devices are available from a 25 pin male Sub-D connector.
- Station clock input and output interfaces (RJ-45). (2MHz with 75/120 Ω impedance)
- Hardware reset button
- Power and failure LEDs support.
- A green LED located close to the F type interface connector. The green LED is lit when the CIT is connected to the NE.
- System controller for software control of the transmission hardware on the board (including optional interface extensions)
- Necessary hardware for power supply and processing of transmission signals
- The power supply of the equipment is DC or AC power supply.
- Reset button on faceplate for controller reset:
  The reset button can be used to soft reboot the unit. The soft reboot does not affect transmission.
- Manual controller reset via NE managers

Other hardware features include:

- An external and approved 110-230 VAC to -48 VDC converter is available as an option to supply the system with a suitable input voltage.
- On the AMC system, all optical connectors are LC types.
- A separate socket on the main board for mounting STC -2MB timing option card

V.11 contra-directional interface

The V.11 contra-directional interface on 1645 AMC has the following signals:

- Transmit clock (64 kbit/s)
  This signal from the system to the external equipment is derived from the received clock in the corresponding transmission source interface.
- Transmit data (64 kbit/s)
  This signal from the system to the external equipment is synchronous with the received clock of the corresponding transmission source interface.
- Transmit byte sync (8 kbit/s)
  This signal from the system to the external equipment is synchronous with received clock of the corresponding transmission source interface.
- Receive clock (64 kbit/s)
  This signal from the system to the external equipment is derived from the transmitted clock in the corresponding transmission sink interface.
- Receive data (64 kbit/s)
  This signal from the external equipment to the system is synchronous with the transmitted clock of the corresponding transmission sink interface.
- Receive byte sync (8 kbit/s)
  This signal from the system to the external equipment is synchronous with the transmitted clock of the corresponding transmission sink interface.

Pluggable SFPs

The optical/electrical line interfaces of the 1645 AMC unit can be equipped with various SFPs (Small Form-Factor Pluggable). Please note that the GE SFPs are only applicable to the X5IP/X10IP option cards.

The following SFPs are available:

- STM-1, S1.1 (CC109469809), short haul, 1310 nm, 15 km
- STM-1, L1.1 (CC109469825), long haul, 1310 nm, 40 km
- STM-1, L1.2 (CC109469817), long haul, 1550 nm, 80 km
- STM-1, 155E (CC109543561), electrical
- STM-1/4 BiDi (CC109559500), 1310 nm, upstream 15 km
- STM-1/4 BiDi (CC109559492), 1490 nm, downstream 15 km
- STM-4, S-4.1, (CC109509687) short haul, 1310 nm, 15 km
- STM-4, L-4.1, (CC109509695) long haul, 1310 nm, 40 km
- STM-4, L-4.2, (CC109509703) long haul, 1550 nm, 80 km
- GE SX (CC109526483), 850 nm, multi-mode 550 m
- GE LX (CC109526491), 1310 nm, single-mode 5–10 km
- GE ZX (CC109534347), 1550 nm, single-mode 70 km

- STM-1/4 BiDi (CC109671446), 1310 nm upstream 40 km
- STM-1/4 BiDi (CC109671438), 1550 nm downstream 40 km
- 100Base-FX SFP (CC109643809), 1310 nm TX, 2 km

Figure 2-2 Optical SFP module

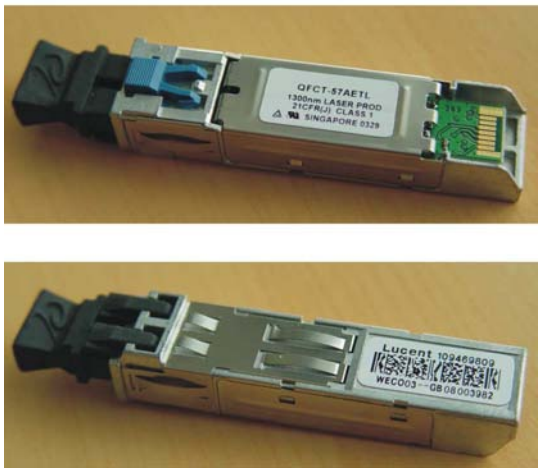
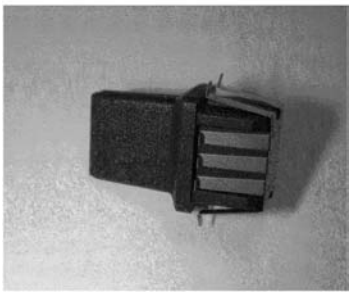


Figure 2-3 SFP155E module

NOTES:

- **Please note that Alcatel-Lucent warranty is contingent upon the use of Alcatel-Lucent specified SFPs for the 1645 AMC. Use of other SFPs is not approved by Alcatel-Lucent and is fully at the customer's own risk. Any warranty obligation of Alcatel-Lucent is extinguished when non-Alcatel-Lucent specified SFPs are used.**
- It is not mandatory to have an LBO (Lightguide Build-Out) between the SFP and the connected optical cable. However, in the case of measurements with optical loops and/or connecting power meters an LBO (15 dB) can be required. An LBO can also be necessary to ensure the correct input power (see chapter 8, section "Connecting the fiber cables" (p. 8-2)).
- If no SFPs are used, the optical/electrical line interfaces must be equipped with "Dust Plugs" (LPN: 700159437) to prevent dust and EMC emission. The dust plugs are part of the 1645 AMC delivery.

Figure 2-4 Dust plug



Upgrade with option cards

The main board can be upgraded with option cards. The table below lists all available option cards.

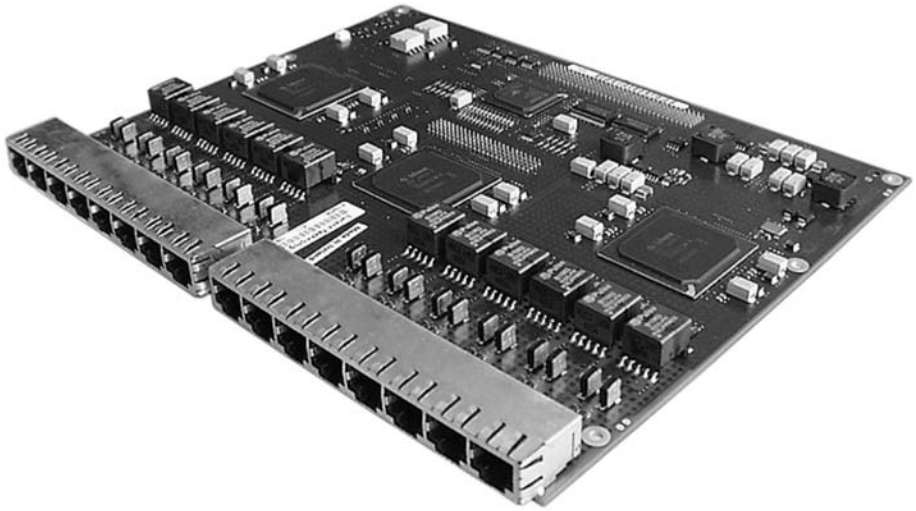
Table 2-3 Available option cards

Option card	Function	Comcode
X16E1-V3	Provides sixteen 2048 kbit/s signals (dual impedance, 75/120 Ω) for a total combination of thirty-two E1s.	109011528
X16DS1	Provides sixteen 1544 kbit/s signals for a total combination of sixteen E1s and sixteen DS1s.	108756081
X12SHDSL-V2	Provides twelve SHDSL interfaces with R6.1 features for obtaining an LTU.	109579912

Table 2-3 Available option cards (continued)

Option card	Function	Comcode
X5IP	Provides one 10/100/1000 Base-T channel, three Ethernet 10/100 Base-T channels and one Gigabit Ethernet optical SFP-based channel for a combination of sixteen E1s, three 10/100 Base-T channels, one 10/100/1000 Base-T channel, and one 10/100/1000 optical SFP-based channel to be used with the AM1+ / AMS / AMC motherboard. The *TransLAN*™ (X5IP) option card supports flexible bandwidth assignment per LAN port (3 × 10/100 Mbit/s, 1 × 10/100/100 Mbit/s, and 1 × GbE SFP). It also can be used as an integrated layer 2 switch for point to multi-point LAN bridging applications.	109599845
X5IP-V2	Provides one 10/100/1000 Base-T channel, three Ethernet 10/100 Base-T channels and one Gigabit Ethernet optical SFP-based channel for a combination of sixteen E1s, three 10/100 Base-T channels, one 10/100/1000 Base-T channel, and one 10/100/1000 optical SFP-based channel to be used with the AMC motherboard. **Note:** The X5IP-V2 card supports all the HW and SW features of X5IP card. The board is not SW compatible with X5IP.	109667931
X8PL	Provides eight Ethernet interfaces in Private Line mode for a combination of sixteen E1s and eight Ethernet channels in Private Line mode. The X8PL option card supports a flexible allocation of SDH bandwidth to LAN ports.	109480707
X10IP	Provides eight LAN ports with auto-negotiated 10/100BASE-T and two LAN ports switchable between 10/100/1000Base-T and 1000Base-X/100Base-FX optical SFPs.	109660910
X6STM1	Provides six STM-1 interfaces to be used with the AMC main board. Each interface is SFP based. The option card supports STM-1 optical or electrical bidirectional interfaces.	109642314
X3E3DS3	Provides three E3/DS3 interfaces. The option card provides three 34 Mbit/s or three 45 Mbit/s interfaces to be used with the AMC main board. The unit can be configured as either E3 or DS3 mode at one time. Mixed configuration is not supported.	109642306
STC-2MB	Provides a 2 Mbit timing input and output signal processing system.	109657411

Figure 2-5 Example of an option card



Environmental considerations

General

The 1645 AMC units must have room temperature and must be dry before they can be taken into operation.

Environmental conditions

The environmental conditions for the 1645 AMC units are as follows:

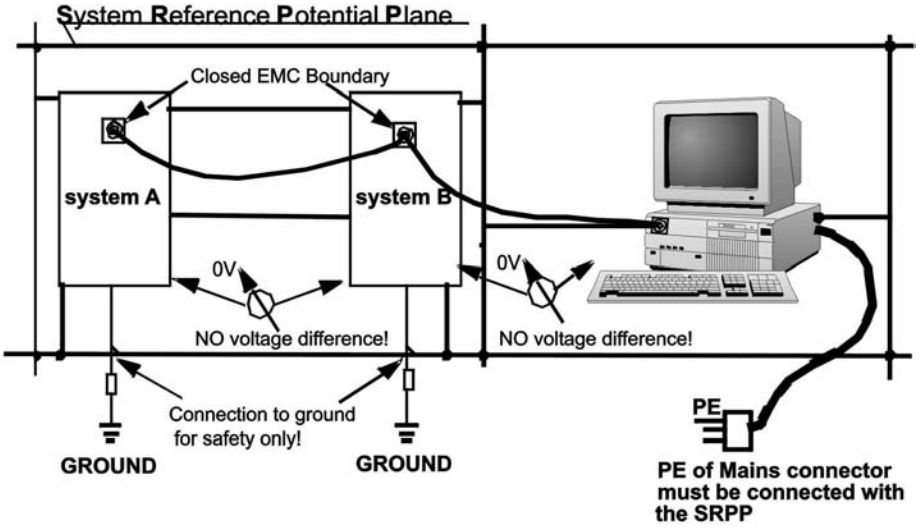
- Storage compliant with ETSI 300 019-1-1 Class 1-2, February 1992:
  – Temperature range –5°C to +45°C
  – Humidity of 5 to 95% without condensation
- Transport compliant with ETSI 300 019-1-2 Class 2-3, February 1992:
  – Temperature range –5°C to +45°C
  – Humidity of 5 to 95% without condensation
- The system operates with convection cooling.
- CE marking compliant with 73/23/EEC and 89/336/EEC
- ETSI EMC - The system meets the requirements of EN 300 386-2 V.1.1.3 (December 1997) for equipment installed in locations other than telecom centers.
- IEC 60950 -Ed3, 1994-04
- Optical safety compliant with IEC 60825-1 Ed 1.1 (1998/01) and IEC 60825-2 Ed 2 (2000/05)

EMC/ESD information

Required connections

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 unit level. The principle is based on the “Faraday Cage” theory. If there are covers, then the covers must be closed.

Every rack provides an ESP bonding point to which a wrist strap can be connected.

Option card and SFP handling

The following *ESD instructions* must be observed when handling option cards and/or SFPs:

- Wear working garment made of 100% cotton to avoid electrostatic charging.
- Touch the option cards/SFPs at the edges only.
- Ensure that the 1645 AMC units are grounded.
- Wear conductively connected wrist straps and connect them to an ESP bonding point.
- Work in an area which is protected against electrostatic discharge. Use conducting floor and bench mats which are conductively connected to an ESP bonding point.
- Conductively connect all test equipment and trolleys to an ESP bonding point.

- Store and ship the option cards/SFPs in their shipping packing. The option cards/SFPs 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%.

ITM-CIT requirements

Requirements

For the ITM-CIT a personal computer is necessary which fulfils the following minimum requirements:

- *Pentium*® processor with 450 MHz or higher
- 128 MB RAM or higher
- Keyboard
- Mouse
- 300 MB of free hard-disk drive space
- CD-ROM drive
- Display with 1024 × 768, 16 million colors recommended
- RS-232 communication port (serial asynchronous port)
- *Microsoft*® *Windows*® 2000 or *Windows XP*® operating system
- ITM-CIT connector (F-interface) cable (one end RS-232 and the other end RJ-45 modular jack), CC848069795.

The performance can be enhanced by using a higher performance personal computer. Independent of the requirements listed above the minimum requirements of the operating system must be fulfilled. A CD-ROM containing the ITM-CIT software must be available.

Required tools and test equipment

Tools

A variety of tools is required to carry out the installation procedures. The following table provides an overview of the required tools.

Table 2-4 Required tools

Quantity	Description	Comments
1	Metric tool set	to be used for physical installation
1	Torque wrench	to be used when tightening the AMC units to the rackframe
1	ESD wrist strap	to be worn when handling option boards and SFPs
1	Soldering iron	to be used for soldering cables
1	RJ45 crimping tool	to be used for terminating RJ45 cables
1	1.6/5.6 coax crimping tool	to be used for terminating 1.6/5.6 coax cables
1	PC (Laptop)	to be used for NE provisioning via ITM-CIT
	Isopropanol, compressed air and wipes	to be used for fiber cleaning

Test equipment

A variety of test equipment is required to carry out the individual tests. The following table provides an overview of the required test equipment.

Table 2-5 Required test equipment

Quantity	Description	Comments
1	SDH Analyser (STM-1/STM-4)	to be used for performing some installation tests
1	Optical power meter	to be used for measuring the optical output power
1	Multimeter	to be used for measuring power supplies
1	Adjustable optical attenuator	to be used for measuring the receiver sensitivity. A 15 dB LBO must be used for optical test loops or for testing the individual ports.

Sequence of steps

Overview

This manual is structured according to the sequence of steps that should be observed when installing 1645 AMC units. The table below gives an overview of all needed installation steps which are described in detail in the following chapters.

Note: The manual also contains background information needed for performing some procedures. These sections are not reflected in the table below.

Sequence

The following table shows the sequence of steps for installing a 1645 AMC system:

Main task	Subtask (chapter/page)
Mechanical installation	"1645 AMC installation" (p. 3-2)
External cable installation	• "Ground wiring" (p. 4-5) • "Fan alarm and LED interface" (p. 4-8) • "MDI/MDO interface" (p. 4-10) • "Timing interface" (p. 4-17) • "Q-LAN interface (OMS)" (p. 4-19) • "ITM-CIT interface" (p. 4-21) • "EOW interfaces" (p. 4-23)
Option card cable installation	• "E1 interfaces (Main board/X16E1-V3 card)" (p. 4-25) • "DS1 interfaces (Main board/X16DS1 card)" (p. 4-27) • "SHDSL interfaces (X12SHDSL-V2 card)" (p. 4-28) • "E3/DS3 interfaces (X3E3DS3 card)" (p. 4-31) • " LAN interfaces (X8PL, X5IP and X10IP cards)" (p. 4-32)
Fiber cabling	• "Aggregate interfaces (Main board)" (p. 4-42)
Power initialization	• "Switching on and testing supply voltage" (p. 5-3) • "Fan unit test" (p. 5-5)
Physical installation check	• "AMC unit installation" (p. 5-6) • "Cable connections" (p. 5-7)

Main task	Subtask (chapter/page)
Software installation	• "Installing ITM-CIT" (p. 6-3) • "Installing the fast download application" (p. 6-7) • "Preparation and test of the main unit" (p. 7-5) • "Fast NE software download" (p. 6-8) • "Connecting the ITM-CIT to the NE" (p. 6-10)
NE provisioning	• "NE date and time" (p. 6-16) • "Node creation" (p. 6-18) • "Slot provisioning" (p. 6-22) • "Confirm/Update the MIB" (p. 6-24)
Stand alone tests (NE tests)	• "E1 tributary ports distribution wiring test" (p. 7-6) • "Line port connection to optical distribution frame test" (p. 7-9) • "PDH option card test" (p. 7-13) • "Optical X6STM1 option card test" (p. 7-17) • "X8PL and X5IP option card test" (p. 7-20) • "X12SHDSL-V2 option card test" (p. 7-26)
Link acceptance tests	• "Connecting the fiber cables" (p. 8-2) • "Remote login test" (p. 8-4) • "BER test" (p. 8-6)

3 Mechanical installation

Overview

Purpose

The purpose of this chapter is to explain the hardware installation of 1645 AMC units.

This chapter describes the installation procedure for the 1645 AMC .

Contents

1645 AMC installation

Overview

Purpose

The purpose of this chapter is to provide all needed instructions for installing a 1645 AMC unit.

Contents

Technical data for AMC unit

Specifications

A 1645 AMC unit has the specifications as given in the table below.

Table 3-1 Technical specifications

Item	Quantity/Value
AMC-DC	.
Nominal power supply	–24 V, –48 V and –60 V
Voltage min./max.	–18 V / –72 V
AMC-AC	.
Nominal power supply	100 V – 240 V
Voltage min./max.	90 V / 264 V
Frequency range	50 Hz – 60 Hz
Maximum current	0.3 A
Power feed	Two DC power feed (A,B) or one AC power connector

Table 3-1 Technical specifications (continued)

Item	Quantity/Value
Power consumption	20 W without an option card 50 W with any option card
Weight	5 kg [10.57 lbs] with an option card
Dimensions (H × W × D)	70 mm [2.756"] × 448 mm [17.638"] × 204 mm [8.04"] (without mounting brackets)

Layout

The following figure shows a DC powered 1645 AMC unit. The front view can be different depending on the used option card. The front views of the option cards are shown in Figure 3-2.

Figure 3-1 AMC unit DC version front view

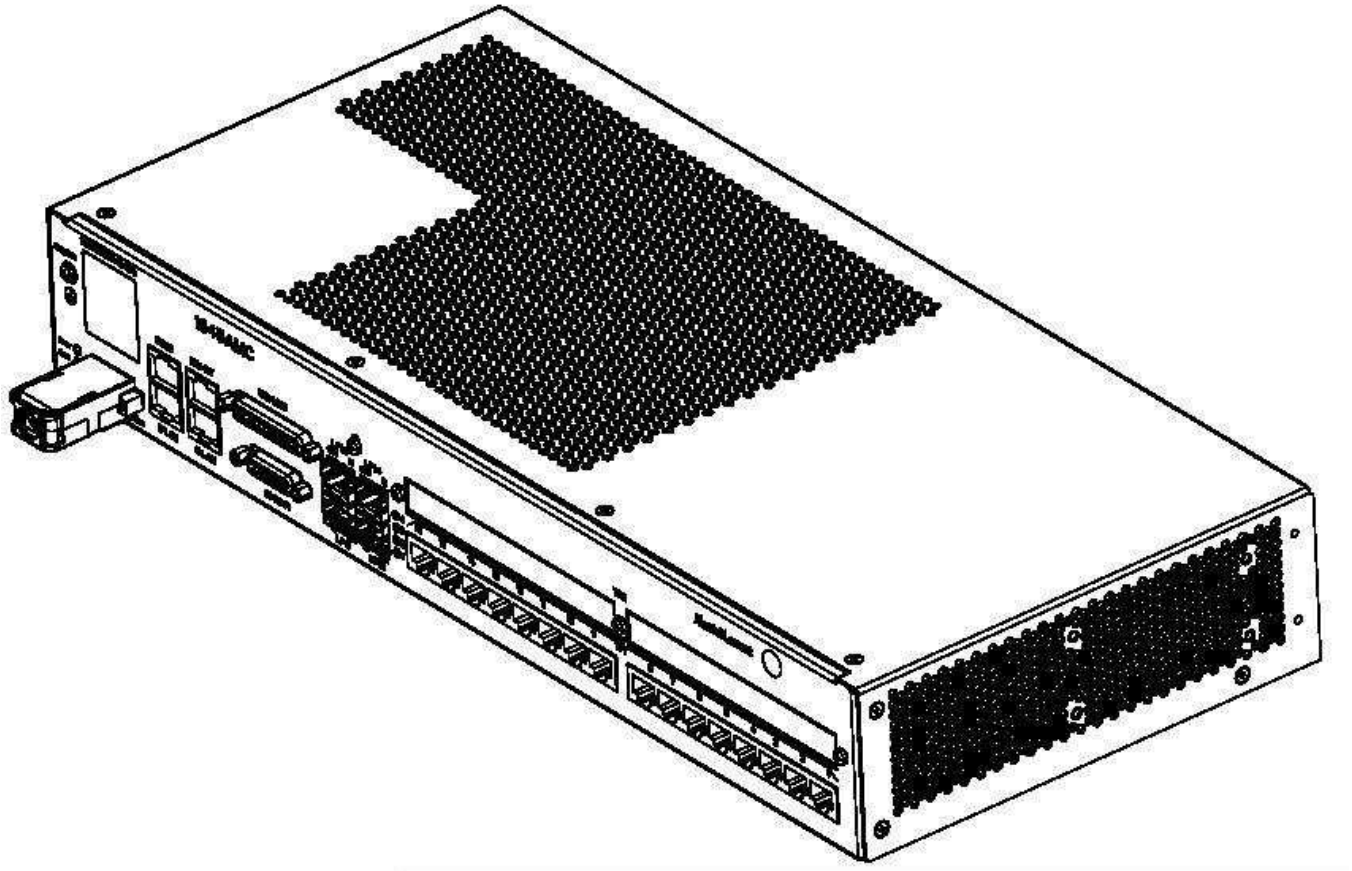
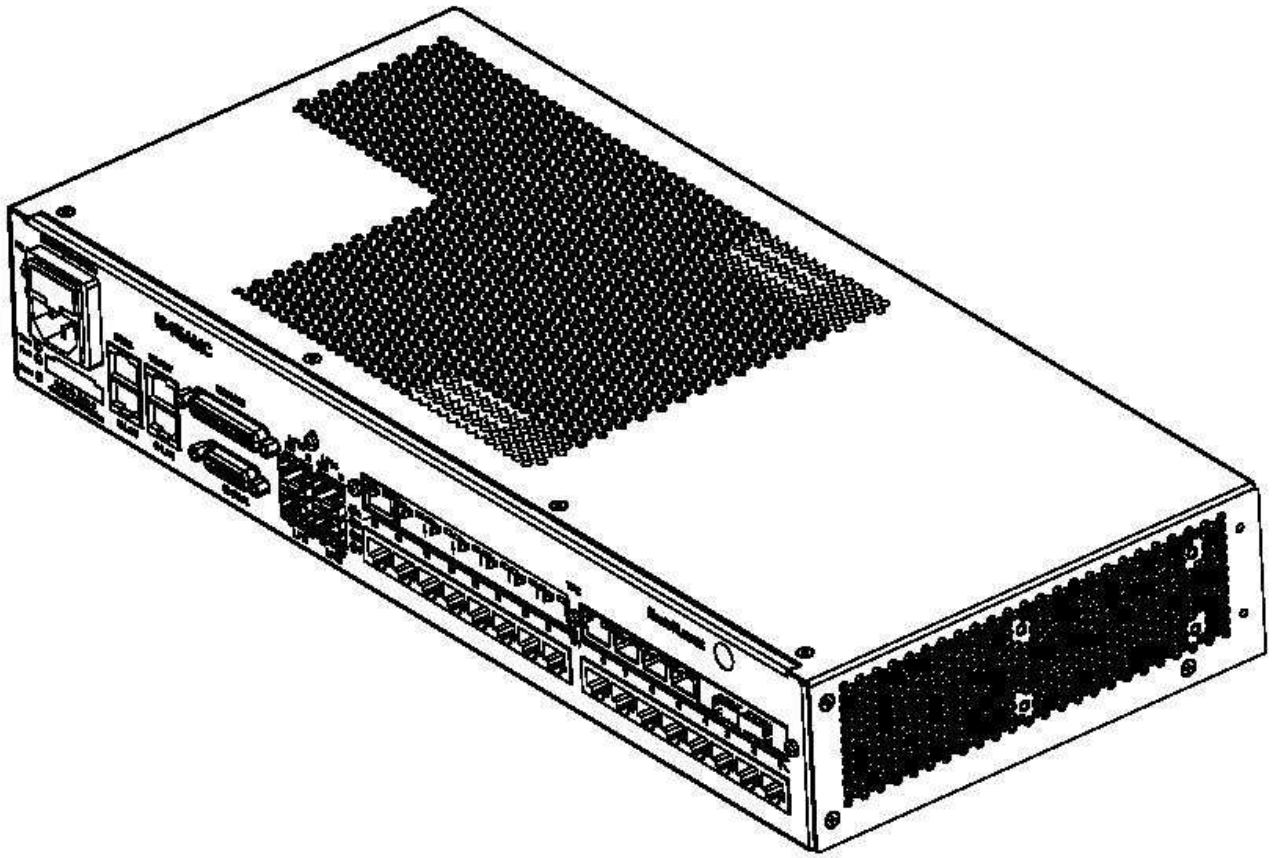


Figure 3-2 AMC unit AC version front view



Installation of an option card

Overview

This section provides a procedure for upgrading the 1645 AMC with one of the option cards. An overview about all available option cards is given in chapter 2, section "Upgrade with option cards" (p. 2-7).

Before you begin

Please read section "Option card and SFP handling" (p. 2-10) before performing the procedure described below.

Procedure

Proceed as follows to mount an option card:

1 Remove the top cover.

2 Remove the dummy panel fixed on the front.

3 Insert the option card (item 1) into P1 and/or P2 connectors. Make sure the connectors are properly engaged and seated.

Important! Fit the X5IP option card by inserting at an angle the faceplate of the card to the back of the AMC faceplate. Gently push the card towards the AMC faceplate to slowly move the connectors into position.

4 Secure the option card with seven M3 × 6 screws as shown in Figure 3-3, "Installation of an AMC option card" (p. 3-6).

5 Align and stick the function label delivered with the option card on the front plate.

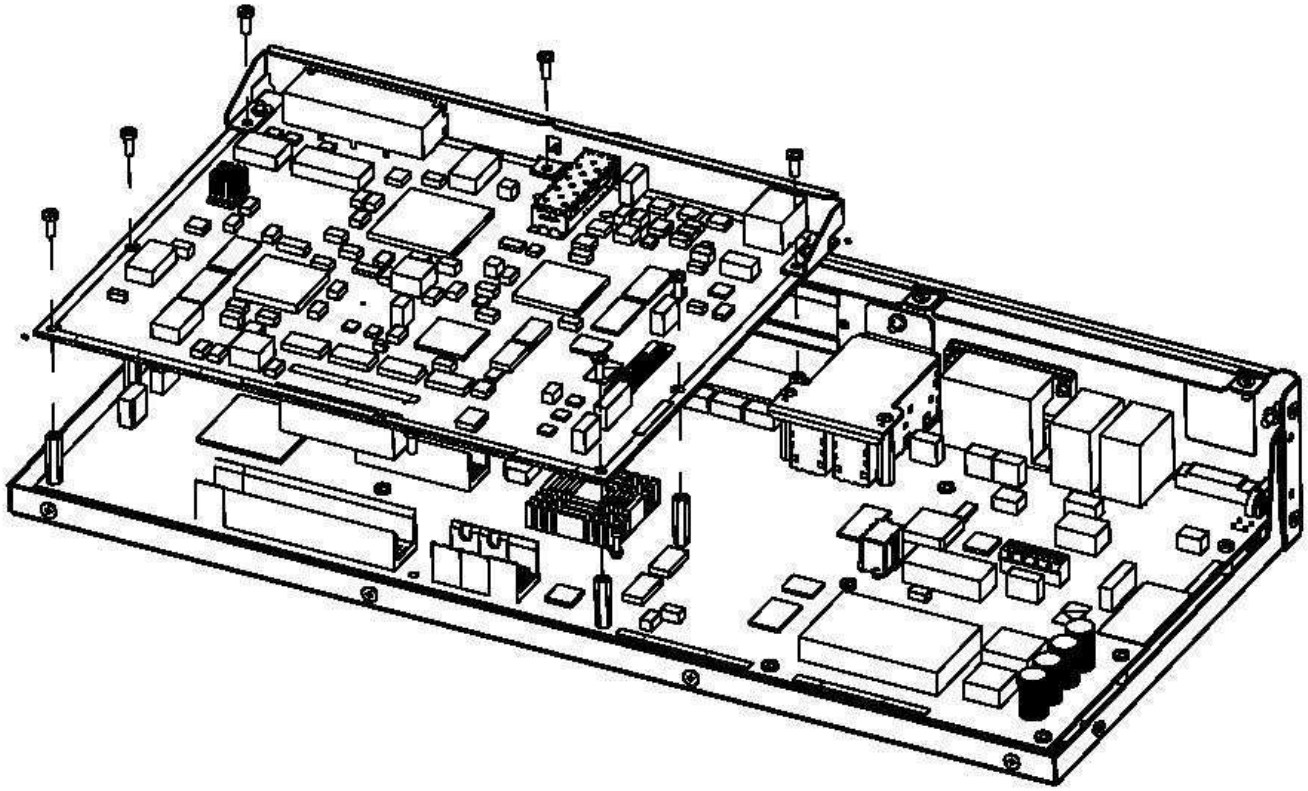
6

IF ...	THEN ...
an X16E1-V3, X16DS1 or X12SHDSL-V2 option card has been installed,	proceed with section "Mounting the EMC bracket" (p. 3-7).
any other option card type has been installed,	reinstall the top cover.

END OF STEPS

Result

Figure 3-3 Installation of an AMC option card



Mounting the EMC bracket

When to use

Mount this EMC bracket after you have installed one of the following option cards:

- X16E1-V3
- X16DS1
- X12SHDSL-V2.

This bracket must be mounted to comply with the EMC requirements.

Procedure

Proceed as follows to mount the EMC bracket:

1 Insert the EMC bracket in the right position as shown in the figure below.

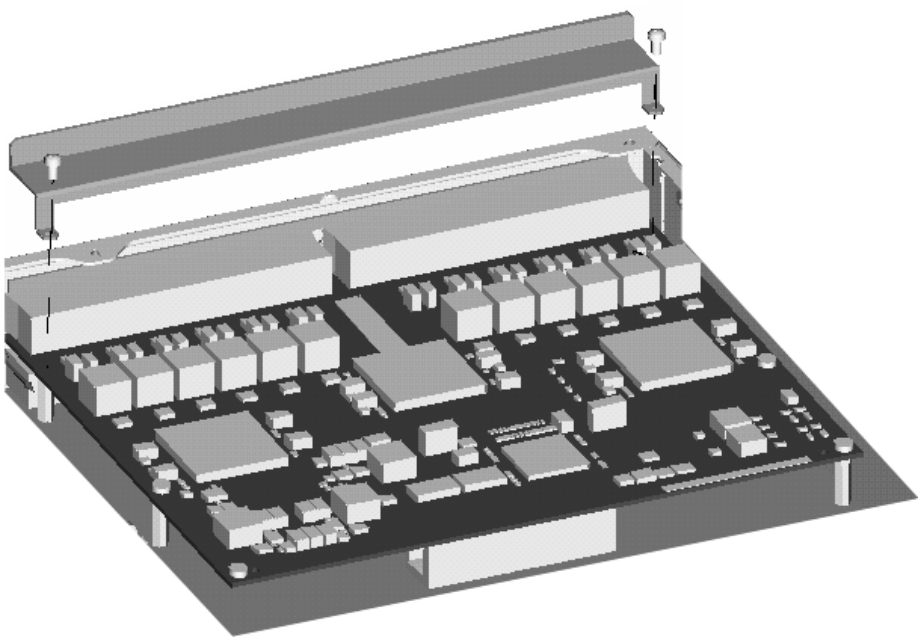
2 Fix the bracket to the option card with screws on both ends.

3 Reinstall the top cover.

END OF STEPS

Result

Figure 3-4 Mounting the EMC bracket



Technical data for fan unit

Overview

The usage of a fan unit (CC848949657) is recommended, if sufficient air flow for cooling the 1645 AMC unit cannot be guaranteed. A fan unit provides sufficient air flow to cool the unit in a thermally hostile environment. Proper cooling is ensured as long as one fan is still working. The fan unit has no air filter.

Specifications

The following table lists the specifications of the fan unit:

Table 3-2 Technical specifications (fan unit)

Size (H × W × D)	69 mm [2.716"] × 47 mm [1.850"] × 242 mm [9.527"]
Nominal voltage	48 VDC
Operating voltage range	36 to 60 VDC
Air flow	> 1.44 m^3/min
Static air pressure	70 Pa

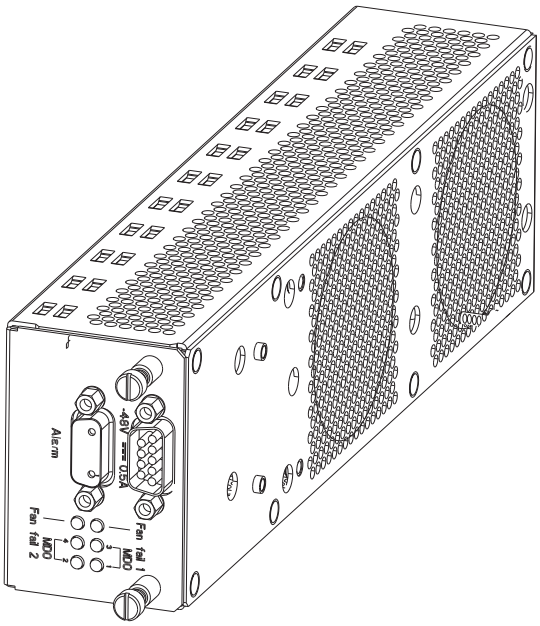
Table 3-2 Technical specifications (fan unit) (continued)

Nominal power	10.8 W
Operating temp. range	–20 ºC ... +70 ºC
Relative humidity	10 ... 95 % (non condensing)
Absolute humidity	1 ... 29 g/m^3
Expected life time	7 years
Fuses F1 and F2, marked on circuit board of the Fan unit	0.5 A, 125 V, fast

Layout

A fan unit has a power and an alarm interface.

Figure 3-5 Fan unit



AMC unit installation

Overview

There are the following five possibilities of 1645 AMC unit mounting:

- Table top mounting
- Wall mounting
- Horizontal rack mounting
- Vertical rack mounting

Table top mounting

Before installing the 1645 AMC unit on a table top, it is necessary to fix the four supplied self-adhesive pads below the unit.

Wall mounting

Proceed as follows to mount the 1645 AMC unit on a flat, vertical surface:

1 Fix both wall mounting brackets (items 1 and 2) to the bottom of the 1645 AMC unit with four M3 × 8 screws (see Figure 3-6, “Fixing wall mounting brackets (AMC unit)” (p. 3-11)).

2 After deciding where the unit is to be mounted, hold it against the wall, align it vertically, and mark the four drill holes.

Recommendations:

- The vertical wall mounting should be preferred due to better air cooling.
- It is suggested to drill the two top holes first. Then an alignment check should be performed again. If the alignment is correct, the two bottom holes can be drilled.

3 Mount the 1645 AMC unit to the wall with four M3 × 8 screws.

END OF STEPS

Results

Figure 3-6 Fixing wall mounting brackets (AMC unit)

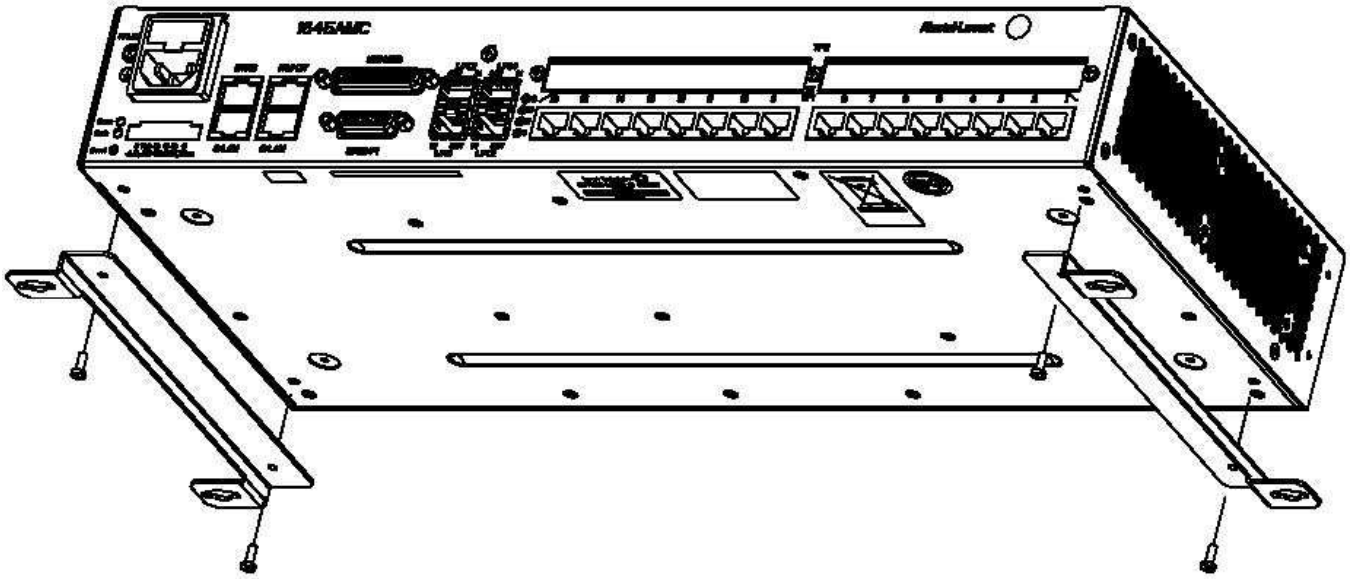


Figure 3-7 Vertical wall mounting (AMC unit)

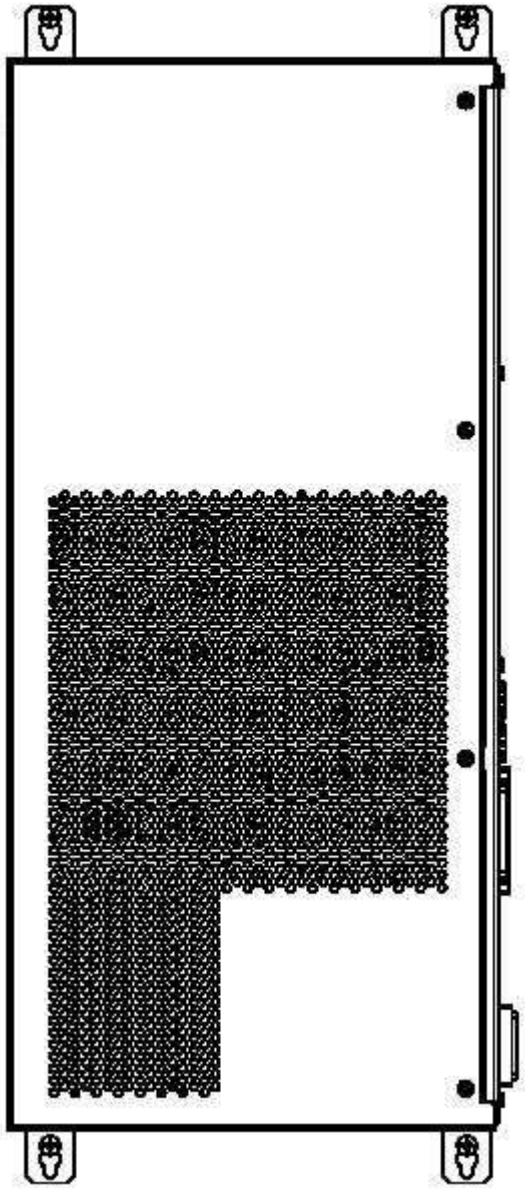
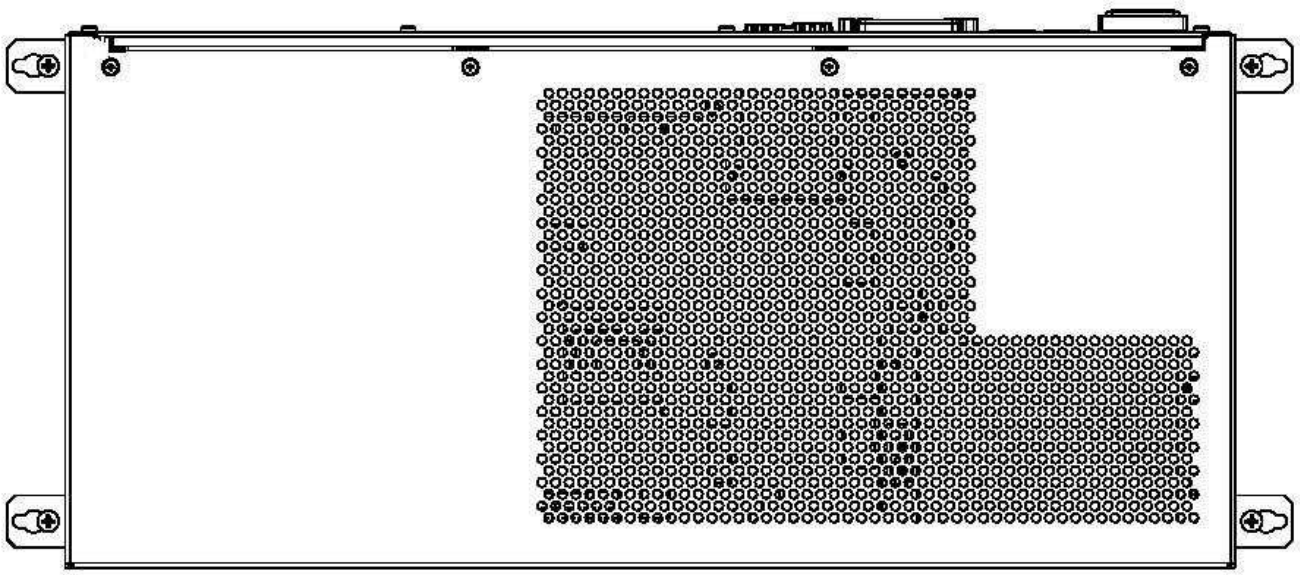


Figure 3-8 Horizontal wall mounting (AMC unit)



Horizontal rack mounting

Important! There are important mounting rules which must be observed during the installation process (see Appendix A, “Mounting rules”).

Proceed as follows to mount the 1645 AMC unit into a rack horizontally:

1 Fix the additional brackets with two screws as shown in Figure 3-9, “Fixing additional brackets to the AMC unit (if required)” (p. 3-14).

Important! This step is not necessary if the 1645 AMC unit is to be mounted into a 19-inch rack.

2 Fix both brackets (left and right) with six M3 × 8 screws (three at each side) to the 1645 AMC unit as shown in the figures below.

Note: The mounting positions depend on the type of the rack.

3 Mount the 1645 AMC unit to the rack with four hexagonal bolts M6 × 16.

END OF STEPS

Results

Figure 3-9 Fixing additional brackets to the AMC unit (if required)

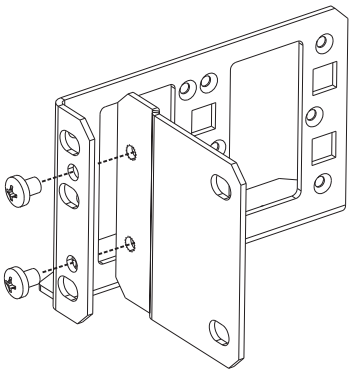


Figure 3-10 Mounting position for 19-inch racks

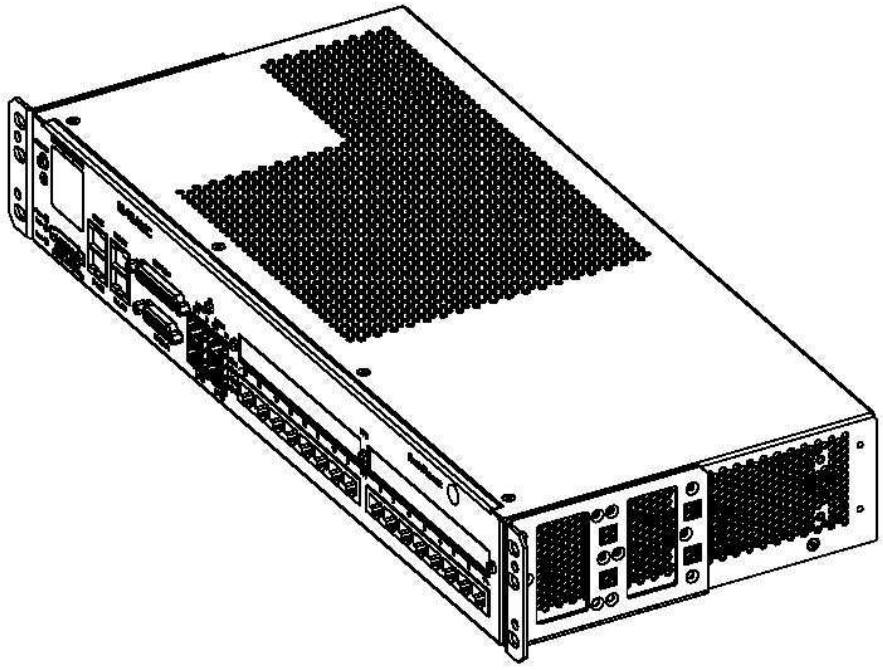
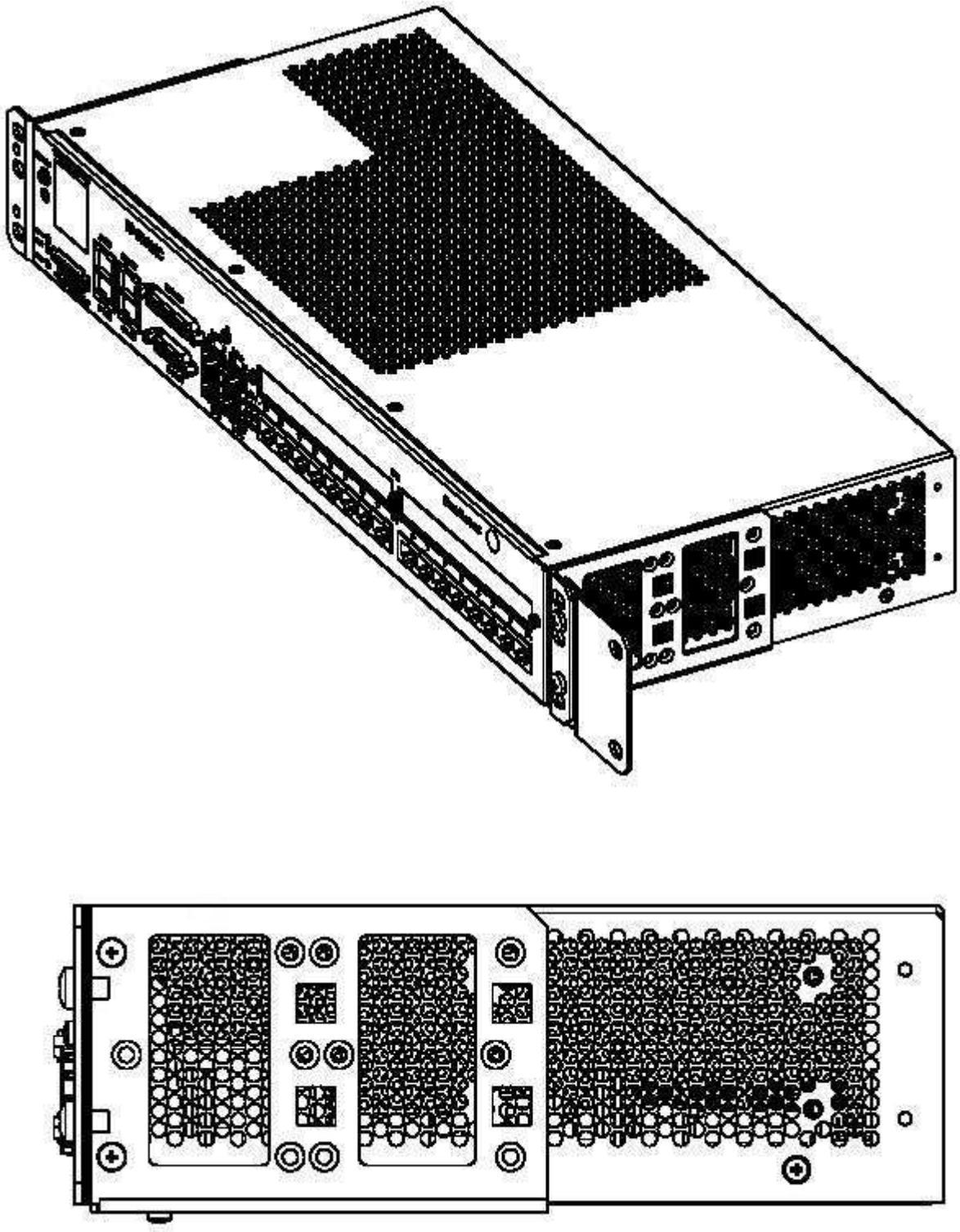


Figure 3-11 Mounting position for ETSI-2 (LambdaUnite) racks (back-to-back, depth 600 mm)



Vertical rack mounting (with bars)

Important! There are important mounting rules which must be observed during the installation process (see Appendix A, “Mounting rules”).

Proceed as follows to mount 1645 AMC units into a rack vertically:

1 Mount two bars to the rack with four hexagonal bolts M6 × 16 as shown in Figure 3-13, “Vertical AMC mounting (with bars)” (p. 3-17). The distance must be 450 mm.

2 Fix both brackets (left and right) to the 1645 AMC unit with six M3 × 8 screws (three at each side) as shown in Figure 3-12, “Mounted AMC brackets” (p. 3-16).

3 Mount the 1645 AMC unit to the installed bars with four M4 screws as shown in Figure 3-13, “Vertical AMC mounting (with bars)” (p. 3-17). The power interface must show to the bottom.

END OF STEPS

Results

Figure 3-12 Mounted AMC brackets

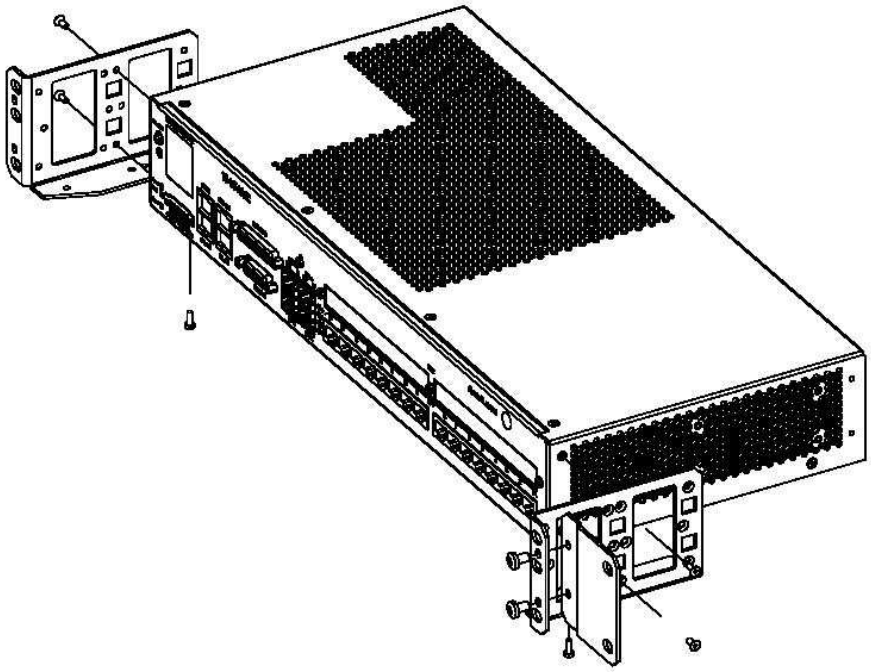
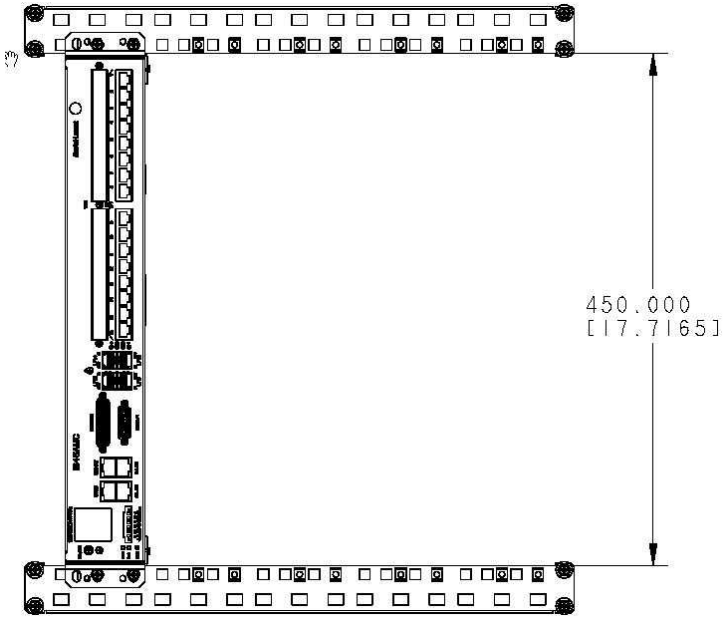


Figure 3-13 Vertical AMC mounting (with bars)



4 System cabling

Overview

Purpose

The purpose of this chapter is to provide the pin assignments of the unit interfaces and the cabling instructions for a proper system cabling. For cable assembly instructions, please refer to Appendix B.

Contents

Power and ground cable installation

Overview

Purpose

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

Contents

Power interfaces

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/or on a Power Distribution Panel (PDP) are in the **OFF** position.

Important! The power cables should be connected later (see section "Switching on and testing supply voltage" (p. 5-3)).

DC connector data

The DC connector is a 6-pin terminal block connector with screw down contacts.

Figure 4-1 DC connector

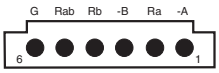


Table 4-1 Pin assignment (power cables)

Point on connector	Signal name	Color
1	–24/–48/–60 VDC, feed A	blue
2	DC RTN (return), feed A	red
3	–24/–48/–60 VDC, feed B	blue
4	DC RTN (return), feed B	red

Table 4-1 Pin assignment (power cables) (continued)

Point on connector	Signal name	Color
5	DC common return for feed A+B	red
6	GND (common ground)	yellow/green

AC connector data

The AC connector is a 3-pin IEC 60320 universal connector (input power range: 90 to 264 VAC).

Cable data

Preferably stranded 1.3 mm² wires with proper insulation should be used.

Cable connection

The power cables must be connected as shown in the figures below:

Note: If an AC/DC converter is used, the DC side needs to be connected to the 1645 AMC and the AC side needs to be connected to a power outlet.

Figure 4-2 DC connection

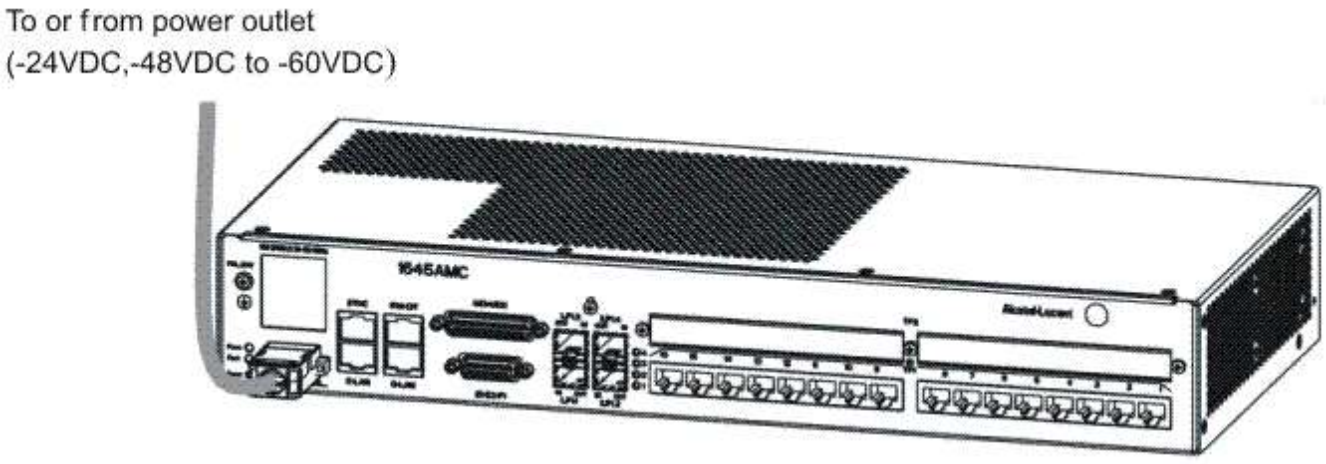
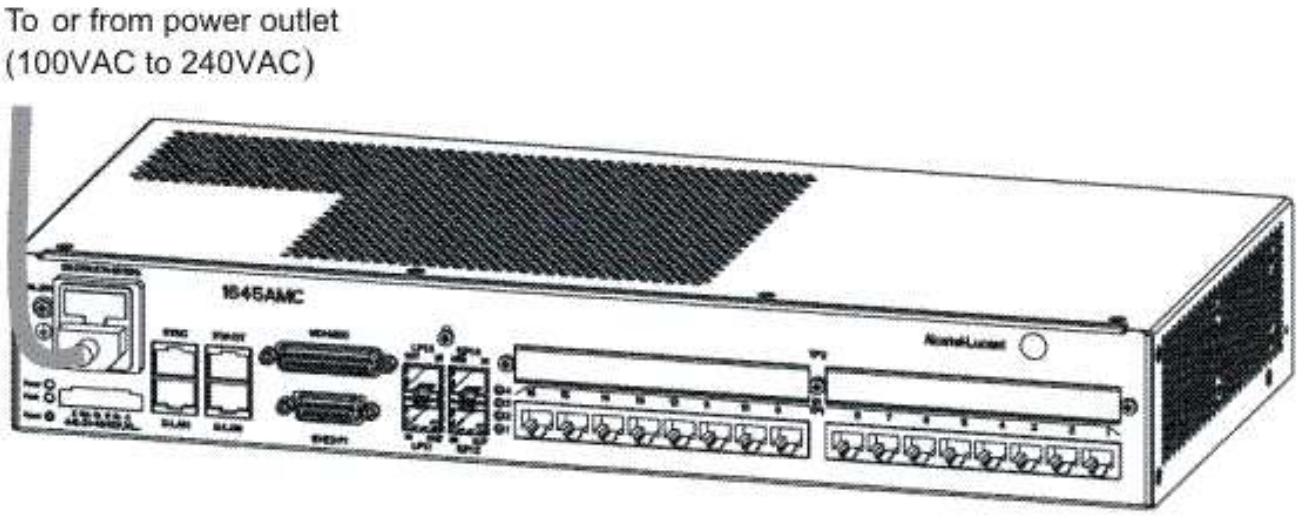


Figure 4-3 AC connection



Ground wiring

DC grounding

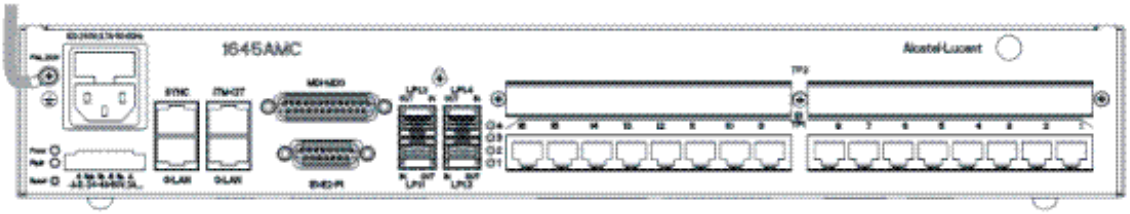
When powering the unit with DC power supply, a short green/yellow cable with a diameter of at least 2 mm² must be connected between the protective earth and the faston clip (earth ground symbol) which is located on the connector side of the unit.

AC grounding

When powering the unit with AC power supply, a power cord must be connected between the socket located on the connector side of the unit and the external plug.

Important! Ensure that the protective earth is connected to the unit via the power cord.

Ground wiring



External cable installation

Overview

Purpose

This section provides information about the external system cabling.

Contents

Fan power interface

Before you begin

Before connecting any power cables, ensure that all circuit breakers located in the external Battery Distribution and Fuse Bay (BDFB) and/or on a Power Distribution Panel (PDP) are in the **OFF** position.

Important! The fan power cables should be connected later (see section "Switching on and testing supply voltage" (p. 5-3)).

Connector data

The fan power connector located on the fan unit is a 9-pin SUB-D male connector.

Figure 4-4 Fan power connector

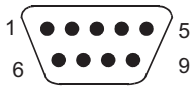


Table 4-2 Pin assignment (fan power cable)

Point on connector	Signal name	Color
1	–48 VDC, feed A	blue
2	nc	
3	DC RTN (return), feed A	red
4	nc	
5	–48 VDC, feed B	blue
6	nc	
7	DC RTN (return), feed B	red
8	DC common return for feed A+B	red
9	GND	yellow/green

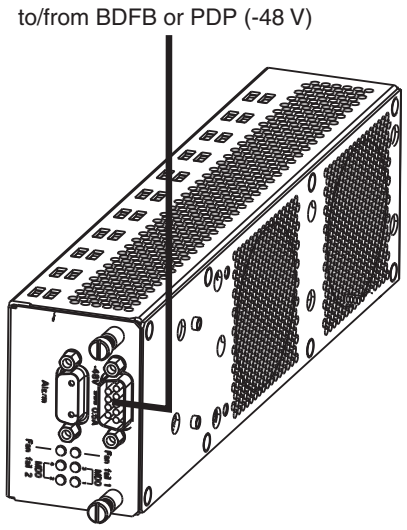
Cable data

Preferably stranded 20 AWG (0.51 mm²) wires with proper insulation should be used. The total length of the wires between the unit power and the fan power connector must be less than 2 meters.

Cable connection

The fan power cable must be connected as shown in the figure below:

Figure 4-5 Fan power cable



Fan alarm and LED interface

Purpose

An external alarm equipment can be connected to this interface.

Connector data

The fan alarm and LED connector which is located on the fan unit is a 9-pin SUB-D male connector. The alarm contacts can withstand a maximum voltage of 72 VDC and a maximum current of 0.5 A. The operating LED voltage is in the range of 36...60 VDC.

Figure 4-6 Fan alarm and LED connector

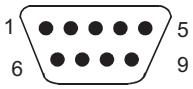


Table 4-3 Pin assignment (fan alarm cable)

Point on connector	Signal name	Description
1	FANFAIL_C	FANFAIL connection to common point of fan failure relay

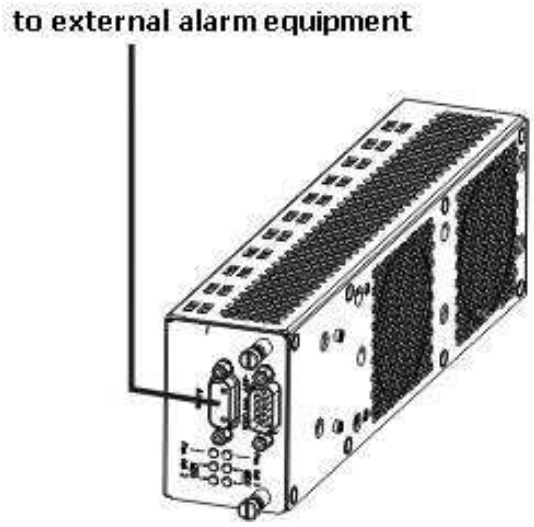
Table 4-3 Pin assignment (fan alarm cable) (continued)

Point on connector	Signal name	Description
2	FANFAIL_NO	FANFAIL return connection to normally open contact of fan failure relay (closes in case of failure)
3	MDO1_LED	Cathode for MDO 1 LED
4	MDO2_LED	Cathode for MDO 2 LED
5	MDO3_LED	Cathode for MDO 3 LED
6	FANFAIL_C	FANFAIL connection to common point of fan failure relay
7	FANFAIL_NC	FANFAIL return connection to normally closed contact of fan failure relay (opens in case of failure)
8	LED_COMMON	LED anodes
9	MDO4_LED	Cathode for MDO 4 LED

Cable connection

Please connect the fan alarm cable as shown in the figure below:

Figure 4-7 Fan alarm cable



MDI/MDO interface

General

The four Miscellaneous Discrete Inputs (MDIs) are intended for customer usage. The inputs can be used to collect status information from the 1645 AMC itself or from other transmission or non-transmission equipment like power supply systems, intruder detectors or fire detectors. The external remote power supply (FSP) box is managed through this interface.

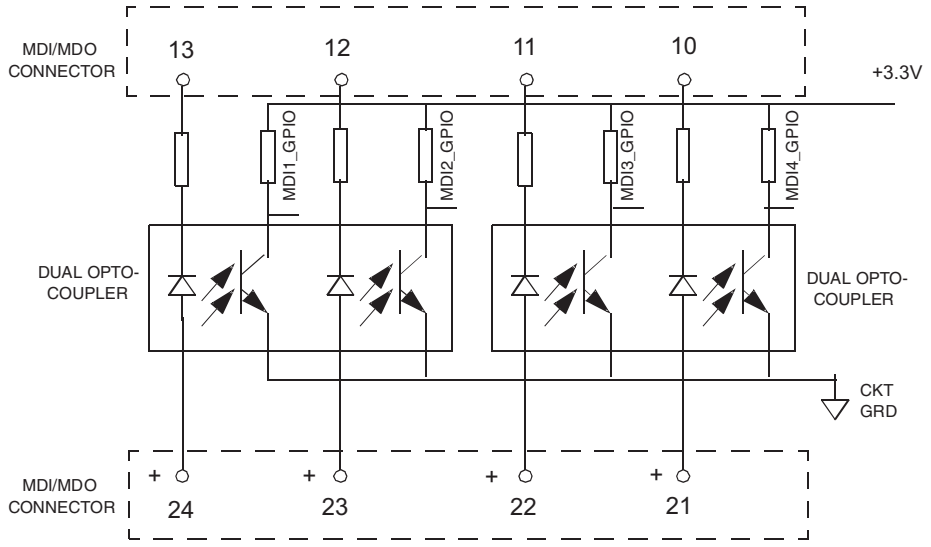
An MDI shall be considered active when resistance between external voltage source and input is less than 100 Ω. An MDI shall be considered inactive when resistance between external voltage source and input is more than 500 kΩ.

Floating MDIs and non-floating MDIs

The external physical interface supports four floating MDIs and four non-floating MDIs simultaneously. The non-floating MDIs are not connected to ground. There is also no pin sharing between the floating MDIs and the non-floating MDIs.

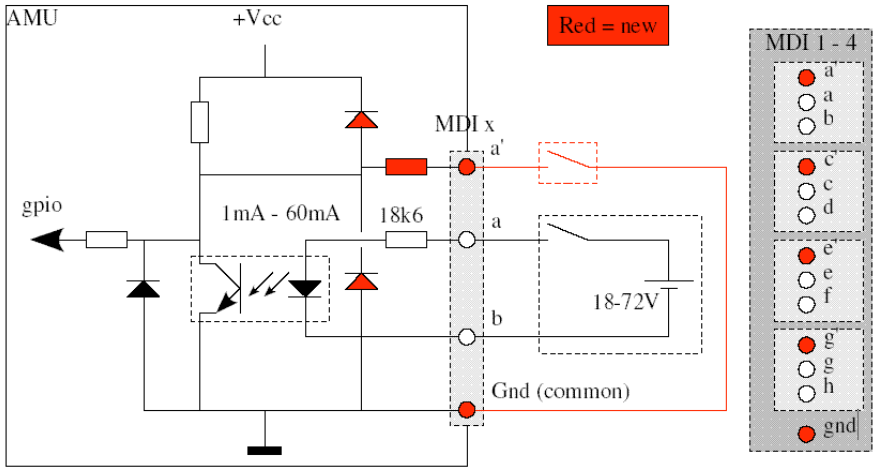
An MDI is active when it is supplied by an external nominal 24 or 48 VDC voltage. This causes current to flow through the diode part of the optocoupler and causes the opto transistor to saturate. The saturated transistor pulls the GPIO signal to a logic “0”. Each MDI anode and cathode of the optocoupler are connected to the 25-pins Sub-D connector.

Figure 4-8 MDI circuit



The MDIs can be floating and non-floating with respect to system ground. Activation of the floating MDI requires an external voltage in the range of 18-72 V (I_{max} of 4mA by one input). The non-floating MDI (Easy MDI or EMDI) does not require an external electric voltage. It is recommended that the non-floating MDIs (EMDIs) are not externally grounded.

Figure 4-9 MDI implementation



The four Miscellaneous Discrete Outputs (MDOs) can be used to drive signalling devices or to influence the behavior of equipment external to the system. Each GPIO for the MDO interfaces with a relay driver which controls a mechanical relay. All MDOs have their common, normally closed (NC) and normally open (NO) contacts brought to the Sub-D connector. Normally it is the non-energized state of the relay which is shown in the figures. When GPIO becomes active, the relay is energized and the MDO output is activated.

The MDOs shall float with respect to system ground.

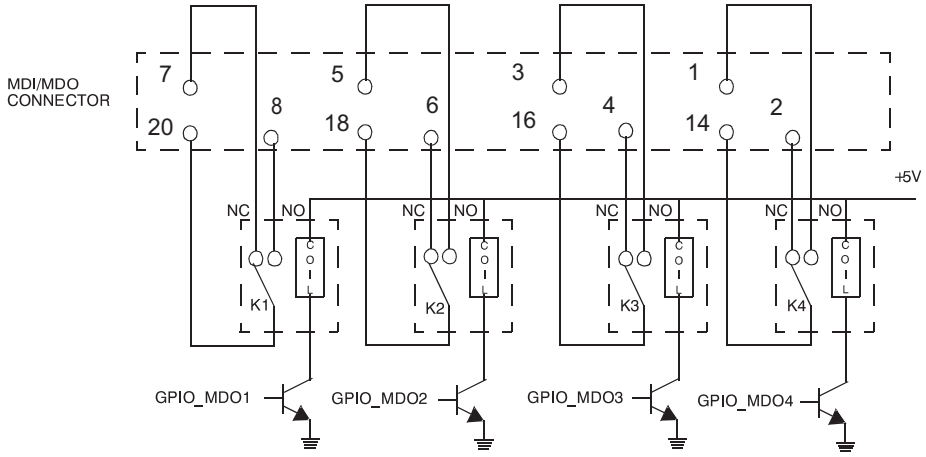
An active MDO shall behave as a voltage free resistance of less than 10 Ω between the output connection and its associated return. It shall be capable of carrying currents of not more than 0.5 A. An inactive MDO shall behave as a voltage free resistance of more than 500 kΩ between the output connection and its associated return. It shall be capable of withstanding voltages of not more than 72 VDC.

The MDO contacts shall be capable of sustaining the product of above mentioned current and voltage during transitions.

The easy MDI contacts of the system do not need external power to function. The system can detect a passive open or closed loop.

In case of accidental wrong usage of a non floating MDI, the system can withstand without damage a permanent high input voltage between input and ground of; -72V to +72V.

Figure 4-10 MDO circuit



Connector data

The MDI/MDO connector is a 25-pin SUB-D male connector (hotshrinked tailed).

Figure 4-11 MDI/MDO connector

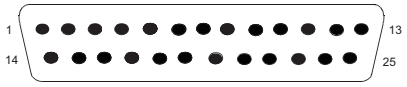


Table 4-4 Pin assignment (MDI/MDO cable)

Point on connector	Signal name	Description
1	MDO 4 return	Miscellaneous Discrete Output 4 return, contact normally open
2	MDO 4 return	Miscellaneous Discrete Output 4 return, contact normally closed
3	MDO 3 return	Miscellaneous Discrete Output 3 return, contact normally open
4	MDO 3 return	Miscellaneous Discrete Output 3 return, contact normally closed

Table 4-4 Pin assignment (MDI/MDO cable) (continued)

Point on connector	Signal name	Description
5	MDO 2 return	Miscellaneous Discrete Output 2 return, contact normally open
6	MDO 2 return	Miscellaneous Discrete Output 2 return, contact normally closed
7	MDO 1 return	Miscellaneous Discrete Output 1 return, contact normally closed
8	MDO 1 return	Miscellaneous Discrete Output 1 return, contact normally open
9	MDI 4A	Miscellaneous Discrete Input 4 connection for easy MDI
10	MDI 4 return	Miscellaneous Discrete Input 4 return
11	MDI 3 return	Miscellaneous Discrete Input 3 return
12	MDI 2 return	Miscellaneous Discrete Input 2 return
13	MDI 1 return	Miscellaneous Discrete Input 1 return
14	MDO 4 common	Miscellaneous Discrete Output 4, common point of relay contact
15	MDI 1A	Miscellaneous Discrete Input 1, connection for easy MDI
16	MDO 3 common	Miscellaneous Discrete Output 3, common point of relay contact
17	MDI 2A	Miscellaneous Discrete Input 2 connection for easy MDI
18	MDO 2 common	Miscellaneous Discrete Output 2, common point of relay contact
19	MDI 3A	Miscellaneous Discrete Input 3, connection for easy MDI
20	MDO 1 common	Miscellaneous Discrete Output 1, common point of relay contact
21	MDI 4 input	Miscellaneous Discrete Input 4 input
22	MDI 3 input	Miscellaneous Discrete Input 3 input
23	MDI 2 input	Miscellaneous Discrete Input 2 input
24	MDI 1 input	Miscellaneous Discrete Input 1 input

Table 4-4 Pin assignment (MDI/MDO cable) (continued)

Point on connector	Signal name	Description
25	GRD	Common GROUND for easy MDI

Note: At a time, only one MDIO mode is supported. Two different cables are provided for normal MDIO and easy MDIO respectively. For normal MDIO, current MDIO cable (FSP12AMS) can be used.

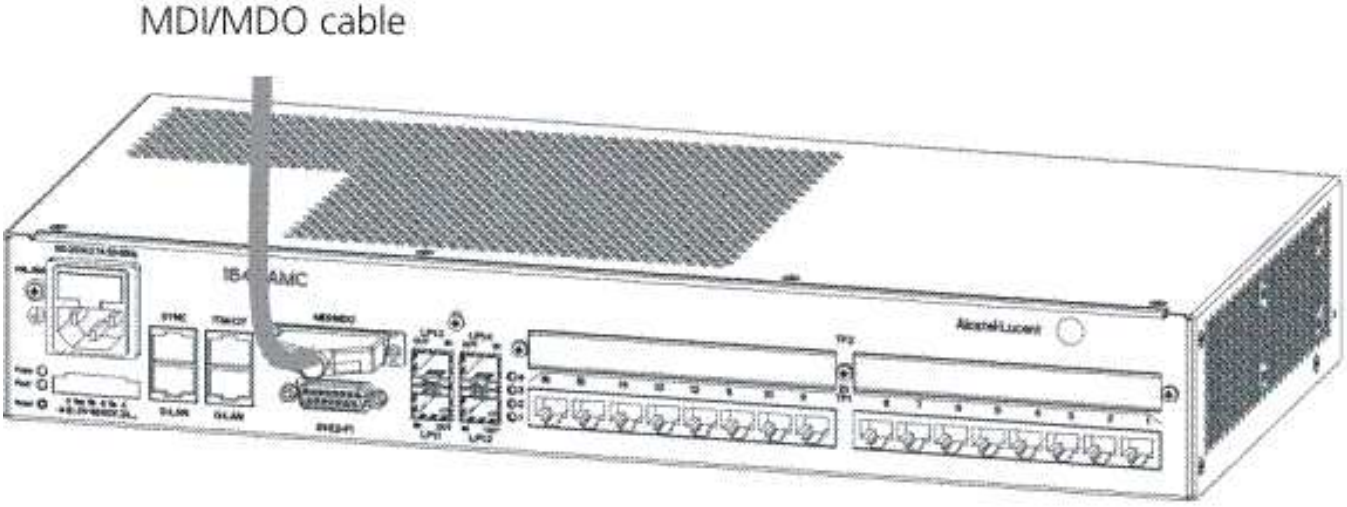
Cable data

Preferably stranded 24 AWG (0.20 mm²) to 20 AWG (0.51 mm²) wires with proper insulation should be used.

Cable connection

Please connect the MDI/MDO cable as shown in the figure below:

Figure 4-12 MDI/MDO cable



Note: The routing of the MDI/MDO cable should be in accordance with the recommended practices of the cable selected. The cable should be strain relieved to prevent any force from being exerted on the connectors.

Synchronization interface

Purpose

The synchronization interface provides input and output connection points for synchronization purposes. The signal format is the G.703-13a compliant 2048 kHz signal . The user can select the impedance of the interfaces (75 Ω coaxial or 120 Ω symmetrical) by wiring the cable appropriately and setting the impedance from CIT.

System clock input

The system equipped with an STC-2MB timing card operates with the following types of input signals:

- 2 MHz, in accordance with ITU-T Rec. G.703.10
- 2 Mbit/s unframed, in accordance with ITU-T Rec. G.703.6
- 2 Mbit/s framed, in accordance with ITU-T Rec. G.703.6 and G.704

The station clock input fulfills the requirements of return loss as specified in the following table:

Table 4-5 Return loss of 30 channel market station clock inputs

Input type	Frequency	Return loss
2 Mbit/s (Framed/Unframed)	51 kHz - 102 kHz	6 dB
	102 kHz - 3072 kHz	8 dB
2 MHz	2048 kHz	8 dB

The values of impedance of the station clock input processes can be set to 75 Ω and 120 Ω by wiring the connector appropriately.

Note:

- When 75 Ω connections are used, the outer conductor of the coaxial pair must be connected to earth.
- When 120 Ω connections are used, the screen of the symmetrical pair must be connected to earth.
- The frequency deviation from nominal of the input signal shall be less than 4.6 ppm.

The station clock input provides tolerance for sinusoidal phase variations as specified in the following table:

Table 4-6 Jitter tolerance at 30 channel market station clock inputs

Peak-peak amplitude	Frequency range
250 ns	1-20 Hz
5000/f ns (f in Hz)	20-50 Hz
100 ns	50-100 kHz

Point on connector	Signal name (120 Ω, symmetrical)	Signal name (75 Ω, coaxial)
1	nc	nc
2	nc	nc
3	nc	nc
4	RX positive (a-wire)	Braid of RX coaxial
5	RX negative (b-wire)	nc
6	nc	Inner conductor of RX coaxial
7	GND	GND
8	GND	GND

System clock output

The system is equipped with one single station clock output process and operates with the following types of output signals:

- 2 MHz, in accordance with ITU-T Rec. G.703.10
- 2 Mbit/s unframed, in accordance with ITU-T Rec. G.703.6
- 2 Mbit/s framed, in accordance with ITU-T Rec. G.703.6 and G.704

The values of impedance of the station clock output processes can be set to 75 Ω and 120 Ω by wiring the connector appropriately.

Note:

- When 75 Ω connections are used, the outer conductor of the coaxial pair must be connected to earth.
- When 120 Ω connections are used, the screen of the symmetrical pair must be connected to earth.

The jitter transfer function between an input and the station clock output for station clock output signals bypassing the system clock process, is given in the following table:

Table 4-7 Jitter transfer of signals bypassing the system clock process

Frequency range	Jitter transfer
0.1 - 100 Hz	Less than 0.5 dB
100 Hz - 10 kHz	Less than −20 log (f/0.1) dB (f in kHz)
above 10 kHz	Less than −40 dB

Return loss requirements

The station clock output fulfills the requirements of return loss as specified in the following table:

Table 4-8 Return loss of 30 channel market station clock outputs

Input type	Frequency	Return loss
2 Mbit/s (Framed/Unframed)	51 kHz - 102 kHz	6 dB
	102 kHz - 3072 kHz	8 dB
2 MHz	2048 kHz	8 dB

Timing interface

Purpose

The timing interface provides one external timing output for ITU-T compliant 2048 kHz timing signals. It does not support timing inputs.

Connector data

The timing output is realized as 8-pin RJ45 connector suitable for symmetrical twisted pair cables with an impedance of 120 Ω or coaxial cables with an impedance of 75 Ω.

Figure 4-13 Timing connector

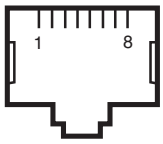


Table 4-9 Pin assignment (timing cable)

Point on connector	Signal name (120 Ω, symmetrical)	Signal name (75 Ω, coaxial)
1	TX positive (a-wire)	Braid of TX coaxial
2	TX negative (b-wire)	nc
3	nc	Inner conductor of TX coaxial
4	nc	nc
5	nc	nc
6	nc	nc
7	GND	GND
8	GND	GND

Cable data (120 Ω, symmetrical)

Preferably a shielded twisted pair cable should be used (22 or 26 AWG).

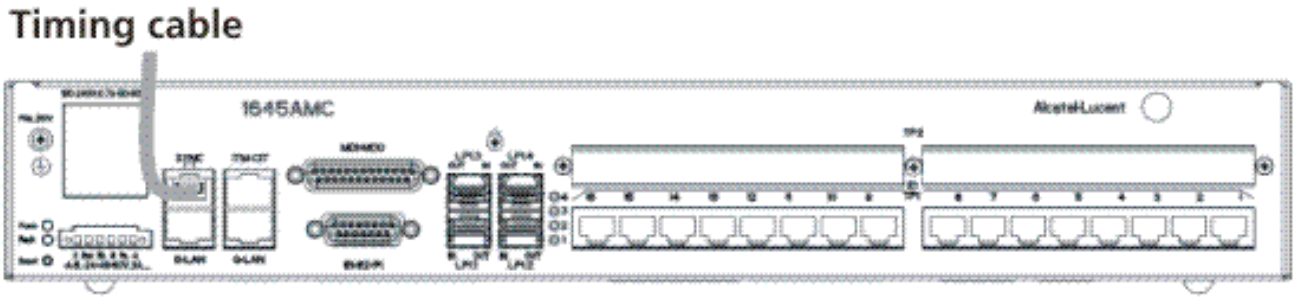
Cable data (75 Ω, coaxial)

Preferably a MiniCoax 75Ω 2.5 mm cable should be used.

Cable connection

Please connect the timing cable as shown in the figure below:

Figure 4-14 Timing cable



Note: The routing of the timing cable should be in accordance with the recommended practices of the cable selected. The cable should be strain relieved to prevent any force from being exerted on the connectors.

Orderable cables

The following cables can be ordered:

- 75 Ω, 10 m [32.808 ft] E1 cable — CC848771721
- 75 Ω, 50 m [164.042 ft] E1 cable — CC848771739
- 75 Ω, 100 m [328.084 ft] E1 cable — CC848771747.

Q-LAN interface (OMS)

Purpose

This interface must be used for connecting an OMS management system and using the "Fast downloading" feature (see Chapter 6, section "Fast download").

Connector data

The Q-LAN connector is an 8-pin RJ45 connector with metal shell for grounding.

Figure 4-15 Q-LAN connector

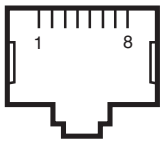


Table 4-10 Pin assignment (Q-LAN cable)

Point on connector	Signal name	Description
1	TX P	Transmit-data positive
2	TX N	Transmit-data negative
3	RX P	Receive-data positive
4	nc	Not connected
5	nc	Not connected
6	RX N	Receive-data negative
7	nc	Not connected
8	nc	Not connected

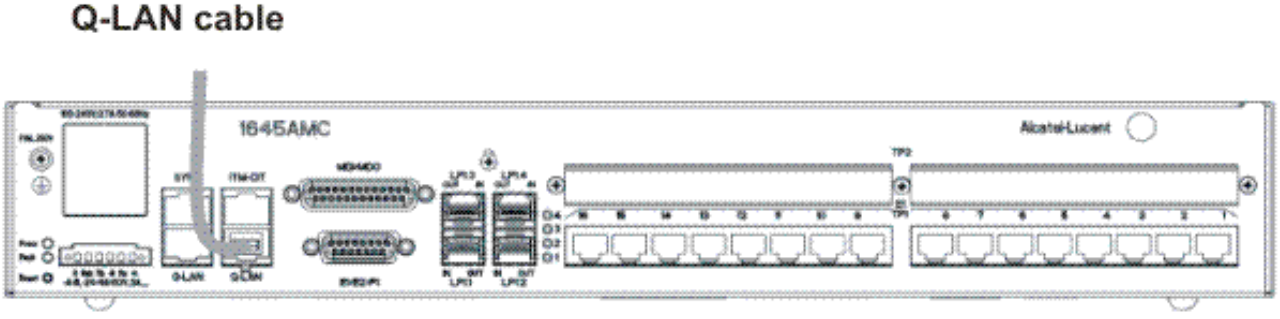
Cable data

A standard LAN cable (CAT5) can be used (100 Ω symmetrical).

Cable connection

Please connect the Q-LAN cable as shown in the figure below:

Figure 4-16 Q-LAN cable



Note: The routing of the Q-LAN cable should be in accordance with the recommended practices of the cable selected. The cable should be strain relieved to prevent any force from being exerted on the connectors.

ITM-CIT interface

Purpose

This interface must be used for connecting a local ITM-CIT management system.

Connector data

The ITM-CIT connector is an 8-pin RJ45 connector with metal shell for grounding.

Figure 4-17 ITM-CIT connector

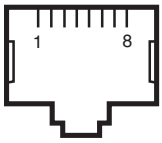


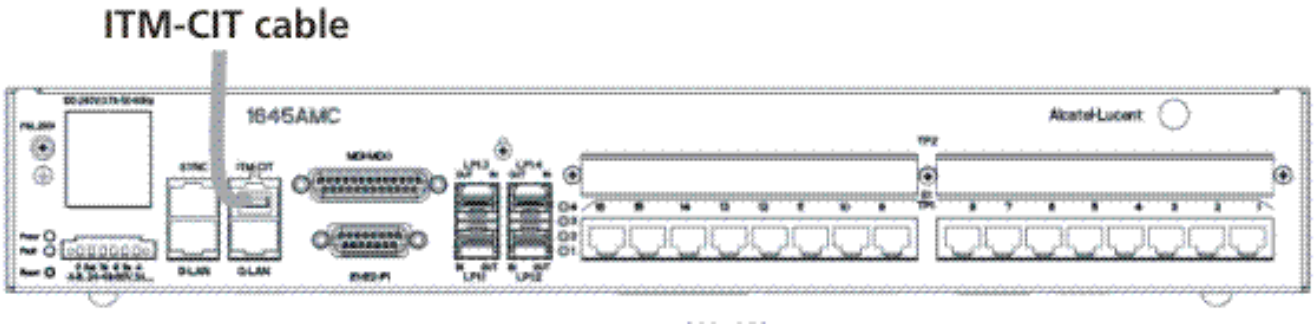
Table 4-11 Pin assignment (ITM-CIT cable)

Point on Connector	Signal Name	Description
1	nc	Not connected
2	CTS_CIT	Clear To Send
3	GRD	Ground
4	TxD	Transmitted Data
5	RxD	Received Data
6	RTS	Request To Send
7	DTR	Data Terminal Ready
8	nc	Not connected

Cable connection

Please connect the ITM-CIT cable as shown in the figure below.

Figure 4-18 ITM-CIT cable



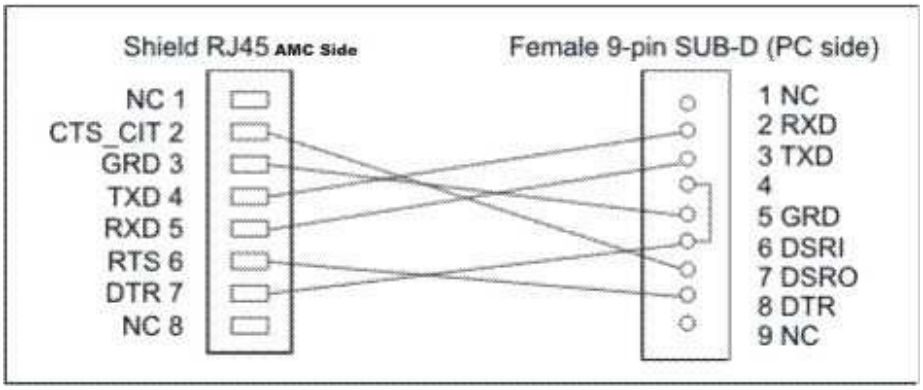
Note: The routing of the ITM-CIT cable should be in accordance with the recommended practices of the cable selected. The cable should be strain relieved to prevent any force from being exerted on the connectors.

Orderable cable

An ITM-CIT cable with a length of 1.5 m [4.921 ft] can be ordered (CC848069795).

Note: A standard RS232 cable can also be used.

Figure 4-19 ITM-CIT cable connection



EOW interfaces

Purpose

An Engineering Order Wire (EOW) can be connected to these interfaces.

Note: The EOW interfaces are only available on 1645 AMC units.

Connector data

The 1 × E1/E2/F1 EOW connectors are 15-pin SUB-D male connectors (hot shrinked, tailed). They provide V.11 data channels with a bit rate of 64 kbit/s.

Figure 4-20 EOW connector

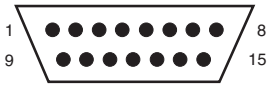


Table 4-12 Pin assignment (EOW cables, valid for both connectors)

Point on connector	Signal name
1	GND
2	V11RCP
3	V11RSP
4	V11RDP
5	V11TCP
6	V11TSP
7	V11TDP
8	GND
9	V11RCN
10	V11RSN
11	V11RDN
12	GND
13	V11TCN
14	V11TSN
15	V11TDN

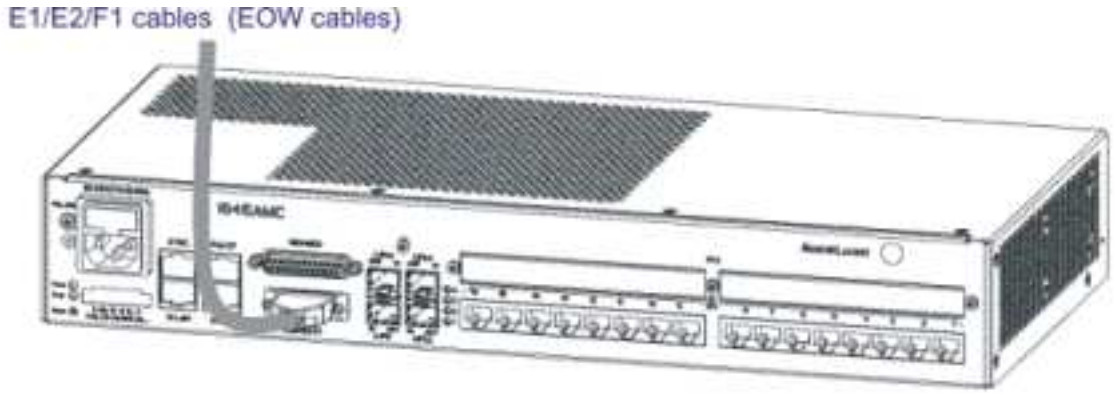
Cable data

Preferably, a symmetrical 100 Ω cable (8 × STP) should be used.

Cable connection

Please connect the EOW cables as shown in the figure below:

Figure 4-21 EOW cables



Note: The routing of the EOW cables should be in accordance with the recommended practices of the cable selected. The cables should be strain relieved to prevent any force from being exerted on the connectors.

Option card cable installation

Overview

Purpose

This section provides information about the cabling of the option cards for 1645 AMC.

Contents

E1 interfaces (Main board/X16E1-V3 card)

Purpose

2048 kbit/s E1 inputs and outputs can be connected to these interfaces either via 120 Ω cables (symmetrical) or 75 Ω cables (coaxial).

Connector data

The E1 connectors located on the main board and/or on the X16E1-V3 option card are RJ45 connectors with metal shell for grounding. It must be ensured that the connector metal shell has good contact with the cable shield.

Figure 4-22 E1 connector

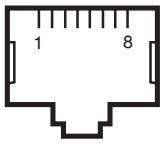


Table 4-13 Pin assignment (E1 cables)

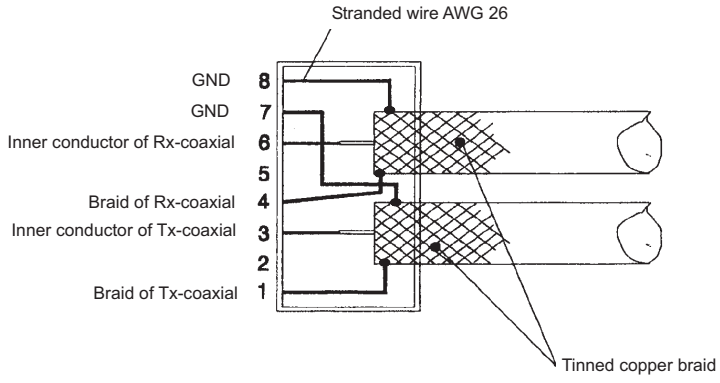
Point on connector	Signal name (120 Ω, symmetrical)	Signal name (75 Ω, coaxial)
1	TX positive (a-wire)	Braid of TX coaxial
2	TX negative (b-wire)	nc
3	nc	Inner conductor of TX coaxial
4	RX positive (a-wire)	Braid of RX coaxial
5	RX negative (b-wire)	nc
6	nc	Inner conductor of RX coaxial
7	GND	GND
8	GND	GND

Cable data (120 Ω, symmetrical)

Preferably shielded twisted pair cables should be used (22 or 26 AWG).

Cable data (75 Ω, coaxial)

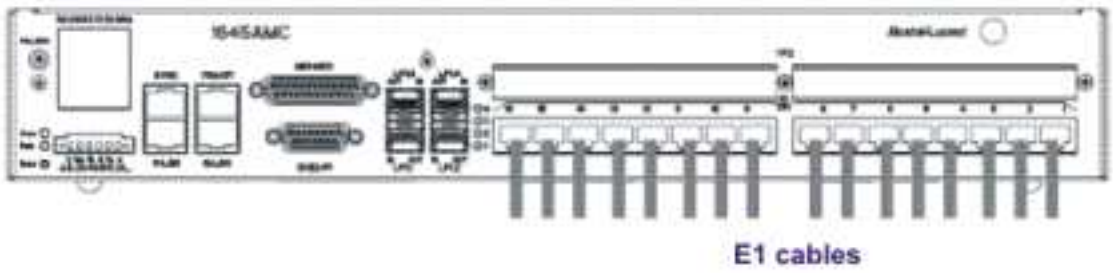
Preferably MiniCoax 75 Ω, 2.5 mm cables should be used.



Cable connection

Please connect the E1 cables as shown in the figure below:

Figure 4-23 E1 cables



Note: The routing of the E1 cables should be in accordance with the recommended practices of the cables selected. The cables should be strain relieved to prevent any force from being exerted on the connectors.

Orderable cables

The following cables can be ordered:

- 75 Ω, 10 m [32.808 ft] E1 cable — CC848771721
- 75 Ω, 50 m [164.042 ft] E1 cable — CC848771739
- 75 Ω, 100 m [328.084 ft] E1 cable — CC848771747.

DS1 interfaces (Main board/X16DS1 card)

Purpose

1544 kbit/s DS1 inputs and outputs can be connected to these interfaces.

Connector data

The DS1 connectors which are located on the main board and/or on the X16DS1 option card are RJ45 connectors with metal shell for grounding. It must be ensured that the connector metal shell has good contact with the cable shield.

Figure 4-24 DS1 connector

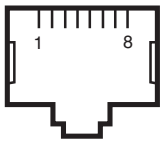


Table 4-14 Pin assignment (DS1 cables)

Point on connector	Signal name
1	TX positive (a-wire)
2	TX negative (b-wire)
3	nc
4	RX positive (a-wire)
5	RX negative (b-wire)
6	nc
7	nc
8	nc

Cable data

Preferably shielded twisted pair cables (CAT5) should be used (100 Ω symmetrical).

SHDSL interfaces (X12SHDSL-V2 card)

Purpose

The 1645 AMC unit can act as an SHDSL LTU when it is equipped with the X12SHDSL-V2 option card. SHDSL tributaries can be connected to these interfaces.

Connector data

The SHDSL connectors which are located on the X12SHDSL-V2 option card are RJ45 connectors.

Figure 4-25 SHDSL connector

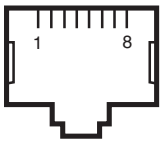


Table 4-15 Pin assignment (SHDSL cables)

Point on connector	Signal name
1	nc
2	nc
3	nc
4	Tip [UKS1/a]
5	Ring [UKS1/b]
6	nc
7	nc
8	nc

Cable data

Standard telephony cables can be used (see table below).

Be aware of the following two cases:

- If the cables are going to a distribution frame, an appropriate breakout cable can be used (e.g. 16 × 2).
- If the cables are connected directly to modems, 2 × 2 cables can be used where only one pair is required.

Available cables

The following table lists the raw cables which can be ordered by Anixter.

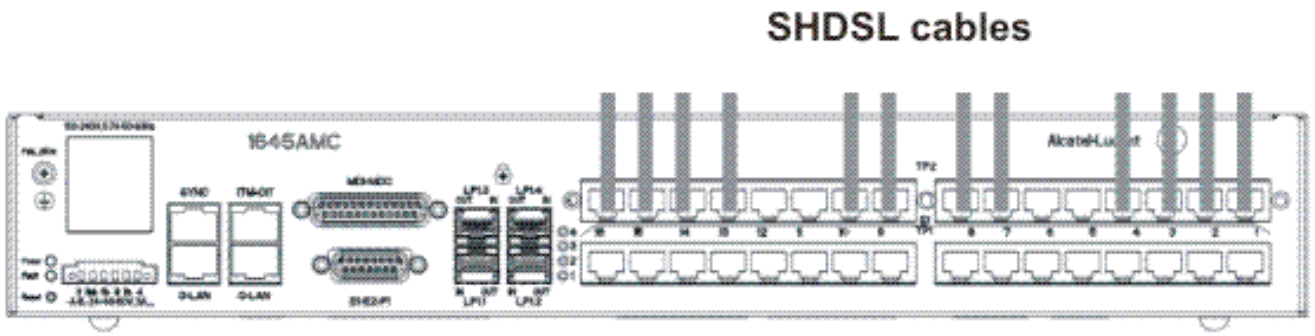
Unscreened twisted pair cables (FNRC)	
8 × 2 × 0.4	Belden b.v 46 190
10 × 2 × 0.4	Belden
Screened twisted pair cables (FNRC)	
8 × 2 × 0.4	Belden b.v 46 191
16 × 2 × 0.4	Belden

LF cable (FNRC)	
128 × 2 × 0.4	Belden Wire & Cable B.V.
LF cables (PVC)	
2 × 2 × 0.5 MM T	Belden Wire & Cable B.V. (43028)
4 × 2 × 0.5+1X0.7	Belden b.v 46 570
5 × 2 × 0.5+1X0.7	Belden Wire & Cable B.V. (46557)
6 × 2 × 0.5+1X0.7	Belden 46571
8 × 2 × 0.5+1X0.7	Belden (46573Grey0)
10 × 2 × 0.5+1X0.7	Belden Wire & Cable B.V. (46558)
16 × 2 × 0.5+1X0.7	Belden (46559)
20 × 2 × 0.5+1X0.7	Belden (46560 0748 242)
25 × 2 × 0.5+1X0.7	Belden (46561)
40 × 2 × 0.5+1X0.7	Belden Wire & Cable B.V. (46563)
64 × 2 × 0.5+1X0.7	Belden Wire & Cable B.V. (46556)

Cable connection

Please connect the SHDSL cables as shown in the figure below:

Figure 4-26 SHDSL cables



The routing of the SHDSL cables should be in accordance with the recommended practices of the cables selected. The cables should be strain relieved to prevent any force from being exerted on the connectors.

Note: The NTU ports can be connected to the LTU ports in any order, as long as newly connected ports are adjacent to the already used port (or group of ports) on the LTU, and numerically incrementing port numbers on the NTU are connected to numerically incrementing port numbers on the LTU. Typical wiring errors are shown in the “1645 AMC Alarm Messages and Trouble Clearing Guide”.

E3/DS3 interfaces (X3E3DS3 card)

Purpose

34368 kbit/s E3 and 44736 kbit/s DS3 inputs and outputs can be connected to these interfaces.

Connector data

The E3/DS3 connectors which are located on the X3E3DS3 option card are DIN 1.6/5.6 coaxial connectors (75 Ω, male).

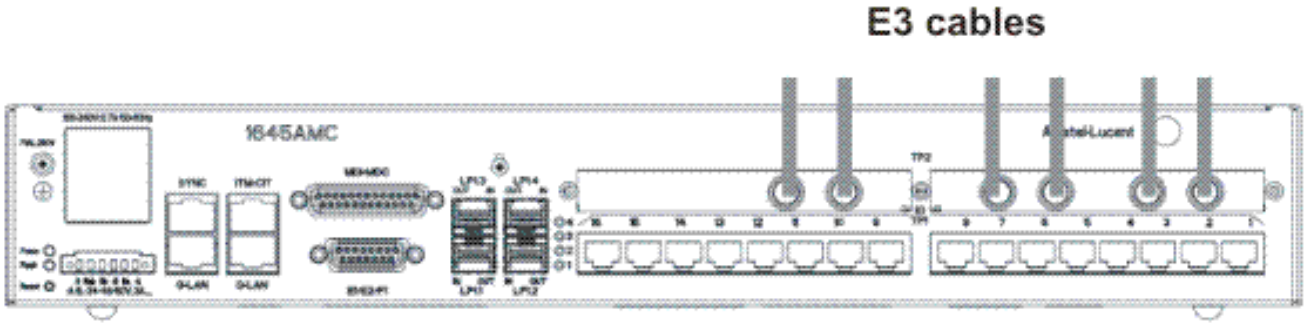
Cable data

Preferably 75 Ω coax cables should be used (4.1 mm).

Cable connection

Please connect the E3 cables as shown in the figure below:

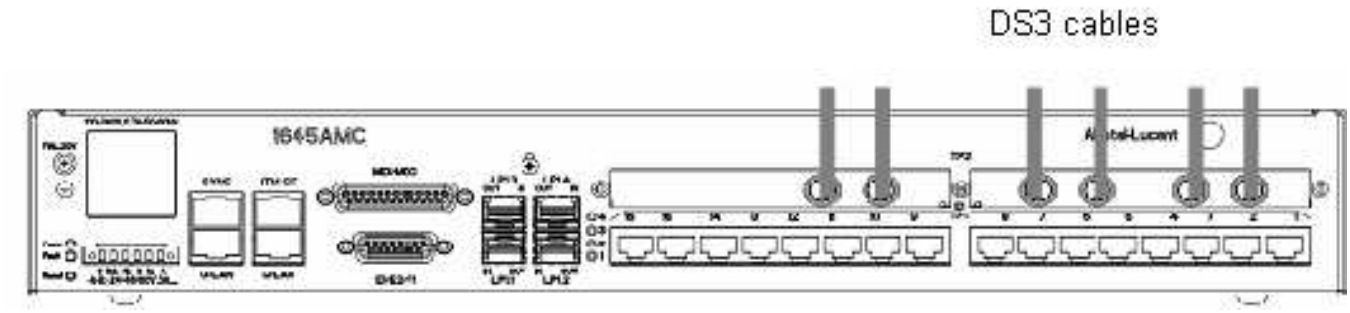
Figure 4-27 E3 cables



Note: The routing of the E3 cables should be in accordance with the recommended practices of the cables selected. The cables should be strain relieved to prevent any force from being exerted on the connectors.

Connect the DS3 cables as shown in the figure below:

Figure 4-28 DS3 cables



Note: The routing of the DS3 cables should be in accordance with the recommended practices of the cables selected. The cables should be strain relieved to prevent any force from being exerted on the connectors.

LAN interfaces (X8PL, X5IP and X10IP cards)

Purpose

Ethernet LAN cables (10/100/1000Base-T) can be connected to these interfaces.

Connector data

The LAN connectors which are located on the X8PL, X5IP and X10IP option cards are 8-pin RJ45 connectors with metal shell for grounding.

Figure 4-29 LAN connector

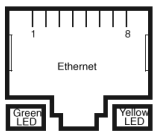


Table 4-16 Pin assignment (LAN cables - E/FE)

Point on connector	Signal name	Description
1	TX P	Transmit-data positive
2	TX N	Transmit-data negative
3	RX P	Receive-data positive
4	nc	Not connected
5	nc	Not connected

Table 4-16 Pin assignment (LAN cables - E/FE) (continued)

Point on connector	Signal name	Description
6	RX N	Receive-data negative
7	nc	Not connected
8	nc	Not connected

Cable data - GE

The following figure displays the cable desgin for the Gigabit Ethernet (GE) LAN cable. As GE interfaces are bidirectional, the MDI wiring conforms to the IEEE 802.3-2002 standard. Based on this standard, the MDI-X (cross-over) functions for bidirectional GE interfaces are not compatible with the MDI-X functions for E/FE interfaces.

The following figure displays the MDI connector for MDI-X functions and is denoted with the symbol 'X'.

Figure 4-30 Cable design (LAN cable - GE)

Table 4-17 Pin assignment (LAN cable - GE)

Point on connector	Signal name	MDI connector signal name	Description
1	BI_DA +	BI_DB +	Bidirectional data, poistive
2	BI_DA -	BI_DB -	Bidirectional data, negative
3	BI_DB +	BI_DA +	Bidirectional data, positive
4	BI_DC +	BI_DD +	Bidirectional data, positive
5	BI_DC -	BI_DD -	Bidirectional data, negative
6	BI_DB -	BI_DA -	Bidirectional data, negative
7	BI_DD +	BI_DC +	Bidirectional data, positive

Table 4-17 Pin assignment (LAN cable - GE) (continued)

Point on connector	Signal name	MDI connector signal name	Description
8	BI_DD -	BI_DC -	Bidirectional data, negative

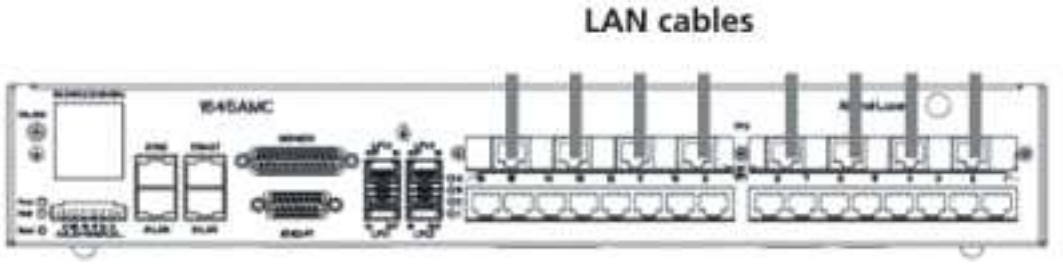
Cable data

A standard LAN cable (CAT5) can be used (100 Ω symmetrical).

Cable connection

Please connect the LAN cables as shown in the figure below:

Figure 4-31 LAN cables



The X5IP option card is cabled in the same manner as the X8PL option cards.

Note: The routing of the LAN cables should be in accordance with the recommended practices of the cable selected. The cable should be strain relieved to prevent any force from being exerted on the connectors.

Fiber cabling

Overview

Purpose

This section provides information on cabling SFPs.

Contents

Optical interfaces

Overview

There are four aggregate STM-n interfaces, 2 × STM-1 and 2 × STM-1/STM-4 (located on the main board) and six tributary STM-1 interfaces (located on the X6STM1 option card).

Optical connectors

All ports are SFP based. When equipped with optical SFPs, they provide LC connectors. When equipped with electrical SFPs, they provide 1.0/2.3 coaxial connectors.

Specifications

The following types of interfaces are available:

- Aggregate interfaces:
  – STM-1 short haul (S1.1)
  – STM-1 long haul (L1.2)
  – STM-1 middle range (L1.1)
  – STM-4 short haul (S4.1)
  – STM-4 long haul (L4.1)
  – STM-4 long haul (L4.2)
- Tributary interfaces:
  – STM-1 short haul (S1.1).
  – STM-1 middle range (L1.1)
  – STM-1 long haul (L1.2)

The characteristics of the optical interfaces are summarized in the table below:

Table 4-18 Optical specifications

	S1.1	L1.1	L1.2	S4.1	L4.1	L4.2
Transmitter						
Wavelength	1270...1360 nm	1270...1360 nm	1530...1565 nm	1273...1355 nm	1280...1335 nm	1530...1565 nm
Max. output power	–8...–15 dBm	+0...–5 dBm	+0...–5 dBm	–8...–15 dBm	+2...–3 dBm	+2...–3 dBm
Eye mask pattern	see G.957	see G.957	see G.957	see G.957	see G.957	see G.957
FDA class/IEC hazard level	Class I/1	Class I/1	Class I/1	Class I/1	Class I/1	Class I/1
Maximum dispersion	185 ps/nm	246 ps/nm	not applicable	74 ps/nm	not applicable	not applicable
Attenuation range	0...12 dB	10...28 dB	10...28 dB	0...12 dB	10... 24 dB	10...24 dB
Optical path penalty	< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB
Receiver						
Sensitivity	–28 dBm min.	–34 dBm min.	–34 dBm min.	–28 dBm min.	–28 dBm min	–28 dBm min.
Overload	–8 dBm max.	-10 dBm max	–8 dBm max.	–8 dBm max.	–8 dBm max.	–8 dBm max.
Connector/Fiber type						
Connector type	LC	LC	LC	LC	LC	LC

Table 4-18 Optical specifications (continued)

	S1.1	L1.1	L1.2	S4.1	L4.1	L4.2
Fiber type core/cladding diameter (µm)	SM (9/125)	SM (9/125)	SM (9/125)	SM (9/125)	SM (9/125)	SM (9/125)

Note: It is not mandatory to have an LBO (Lightguide Build-Out) between the optical interfaces of the 1645 AMC unit and the connected optical cable. However, in the case of measurements with optical loops and/or connecting power meters an LBO (15 dB) can be required. An LBO can also be necessary to ensure the correct input power (see chapter 8, section "Connecting the fiber cables" (p. 8-2)).

SFP-155E cable

Purpose

The SFP-155E cable is used for connecting the 155 Mbit/s STM-1 electrical inputs and outputs to the 1645 AMC NE.

Cable data (75 Ω, coaxial)

Figure 4-32 Cable design (STM-1e cable)

Table 4-19 Components (STM-1e cable)

Component	Part Number	
1.0/2.3 straight crimp plug, push pull	ITT Canon: D55-F24-3035GDA	ITT Canon: D55-F24-3080GDA
1.0/2.3 75 ohm coax	Belden: BT3002 (H133T03)	Nexans: NCX1

Cables available for order (75 Ω)

The following pre-configured cables can be ordered:

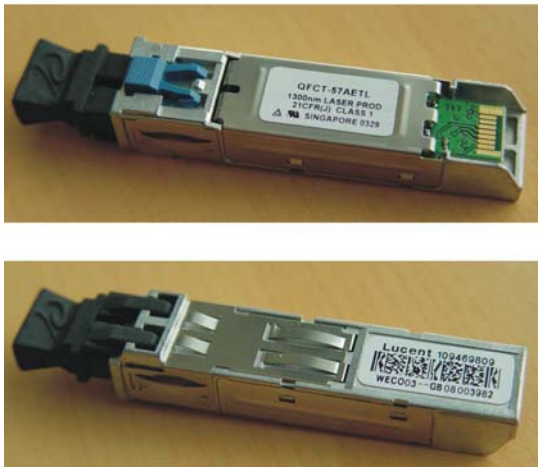
- STM-1e coax cable 5 m — CC408939205
- STM-1e coax cable 10 m — CC408939213

- STM-1e coax cable 15 m — CC408939221
- STM-1e coax cable 20 m — CC408939239

Optical connectors

The optical interfaces can be equipped with various SFPs (Small Form-Factor Pluggable Optics). All SFPs are equipped with LC connectors. The following figure shows the variable SFP module system.

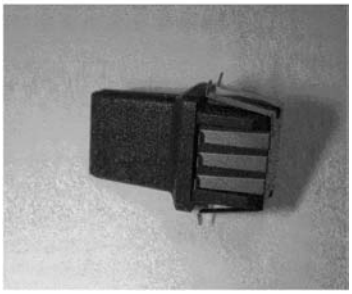
Figure 4-33 Optical SFP module



NOTES:

- **Please note that Alcatel-Lucent warranty is contingent upon the use of Alcatel-Lucent specified SFPs for 1645 AMC. Use of other SFPs is not approved by Alcatel-Lucent and is fully at the customer's own risk. Any warranty obligation of Alcatel-Lucent is extinguished when non-Alcatel-Lucent specified SFPs are used.**
- It is not mandatory to have an LBO (Lightguide Build-Out) between the SFP and the connected optical cable. However, in the case of measurements with optical loops and/or connecting power meters an LBO (15 dB) can be required. An LBO can also be necessary to ensure the correct input power (see chapter 8, section “Connecting the fiber cables” (p. 8-2)).
- If no SFPs are used, the optical line interfaces must be equipped with “Dust Plugs” (LPN: 700159437) to prevent dust and EMC emission. The dust plugs are a part of the 1645 AMC delivery.

Figure 4-34 Dust plug



Optical interfaces (X5IP card)

Overview

A Gigabit interface is available on the X5IP option card.

Optical connectors

The optical interfaces can be equipped with various SFPs (Small Form-Factor Pluggable Optics). All SFPs are equipped with LC connectors.

Specifications

The following SFPs are available:

- GE SX (CC109526483), 850 nm, multi-mode 550 m
- GE LX (CC109526491), 1310 nm, single-mode 5–10 km
- GE ZX (CC109534347), 1550 nm, single-mode 70 km

Optical interfaces (X10IP card)

Overview

Two Gigabit interfaces are available on the X10IP option card.

Optical connectors

The optical interfaces can be equipped with various SFPs (Small Form-Factor Pluggable Optics). All SFPs are equipped with LC connectors.

Specifications

The following SFPs are available:

- Gigabit Ethernet SFP, SX 850 nm (CC: 109526483)
- Gigabit Ethernet SFP, LX 1300 nm (CC: 109526491)
- Gigabit Ethernet SFP, ZX 1550 nm (CC: 109534347)
- 100Base-FX SFP, 1310 nm TX, 2 km (CC: 109643809)

Optical interfaces (X6STM1 card)

Purpose

X6STM1 supports 6 x SFP cages and each can be equipped with various optical STM-1 SFP or electrical STM-1 SFP.

Connector data

All ports are SFP based (S1.1, L1.1, L1.2, and 155E).

Specifications

The following optical SFPs are available:

- S1.1 (CC109469809), short haul, 1300 nm, 15 km
- L1.1 (CC109469825), long haul, 1300 nm, 40 km
- L1.2 (CC109469817), long haul, 1500 nm, 80 km
- 155E (CC109543561), electrical
- SWF 1-1, (CC109559500), 1480/1500 nm, single fiber bidirectional
- SWF 1-2, (CC109559492), 1490/1310 nm, single fiber bidirectional.

The characteristics of the SFPs are summarized in the table below:

Table 4-20 Optical SFP specifications

	S1.1	L1.1	L1.2
Transmitter			
Wavelength	1270...1360 nm	1270...1360 nm	1530...1565 nm
Max. output power	–8...–15 dBm	+0...–5 dBm	+0...–5 dBm
Eye mask pattern	see G.957	see G.957	see G.957
FDA class/IEC hazard level	Class I/1	Class I/1	Class I/1
Maximum dispersion	185 ps/nm	246 ps/nm	not applicable
Attenuation range	0...12 dB	10...28 dB	10...28 dB
Optical path penalty	< 1 dB	< 1 dB	< 1 dB
Receiver			
Sensitivity	–28 dBm min.	–34 dBm min.	–34 dBm min.
Overload	–8 dBm max.	–10 dBm max.	–10 dBm max.
Connector/Fiber type			
Connector type	LC	LC	LC
Fiber type core/cladding diameter (µm)	SM (9/125)	SM (9/125)	SM (9/125)

Cable connection

The routing of the fiber away from the equipment should be in accordance with the specifications for the selected fiber. Take care not to exceed the bending radius when placing the fiber (nominal minimum 2.54 cm bending radius). Exceeding the recommended radius may cause distortion and poor signal quality. Strain relieve the cables to prevent any force from being exerted on the connectors. Clean all connections, as required, before attaching.

Aggregate interfaces (Main board)

Purpose

There are four aggregate interfaces (located on the main board). Both LP1.1 and LP1.2 can equip an STM-4 SFP or an STM-1 SFP. LP1.3 and LP1.4 can only equip STM-1 SFPs.

Connector data

The aggregate fiber connectors which are located on the main board are equipped with LC connectors (SFPs necessary).

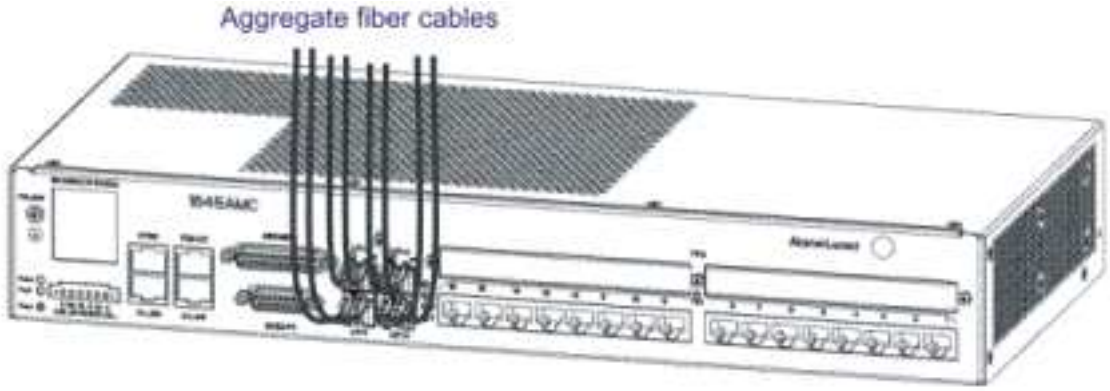
Cable data

Single Mode (SM) fibers must be used.

Cable connection

Please connect the aggregate fiber cables as shown in the figure below:

Figure 4-35 Aggregate fiber cables



Note: The routing of the fibers should be in accordance with the specifications for the selected fiber. Care should be taken not to exceed the bending radius of about 30 mm when placing the fibers. Exceeding the recommended radius may cause distortion and poor signal quality. All fibers should be strain relieved to prevent any force from being exerted on the connectors. Clean all connections, as required, before attaching (see Appendix A, "Fiber cleaning" (p. B-8)).

Multiplex section protection

Linear MSP applications

For linear MSP applications, 4 × STM-1 or 2 STM-1 + 2 × STM-4 can be grouped into 2 × MSP groups. These groups can support linear MSP connections with east and west NEs.

Terminal MSP applications

In terminal applications, between two optical STM-4 interfaces a 1+1 MSP protection relation can be set up by the user. The protection switching can be configured revertive and non-revertive and unidirectional and bi-directional (i.e. both directions of transmission are, respectively, switching separately or jointly), provided the other end of the MSP link supports the necessary features.

Support for forced, manual and lock-out switch commands is available. The MSP implementation is compliant with G.841/Clause 7.1 and ETS 300417-3-1 (i.e. APS protocol optimized for 1:N protection). The ETSI failure of protocol applies. Under this protocol, an alarm-free interworking mode with SONET defined MSP is supported.

5 Powering

Overview

Purpose

This chapter describes the powering of the 1645 AMC system and some final tests which should be performed to complete the physical installation tasks.

Assumption

All units/network elements (NEs) must be mounted and cabled correctly (see Chapters 3 and 4).

Contents

Power initialization

Overview

Purpose

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

Pre-cautions

DANGER

Laser hazard

1645 AMC 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" (p. 1-8)).

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 power is switched to "OFF" before removing or inserting the power supply plug.

CAUTION

Condensation causes malfunctioning.

Condensation can occur in the 1645 AMC units during transport, especially on moving from outside to closed rooms; this can cause malfunctioning of the units.

Ensure that the units have reached room temperature and are dry before taking them into operation.

Contents

Switching on and testing supply voltage

Overview

This section describes the procedure for powering the system. Please observe the order of steps described below.

Procedure

Proceed as follows to switch on and test the power supply:

1 Check the voltage at the external Battery Distribution and Fuse Bay (BDFB) or at the Power Distribution Panel (if available) and enter the measured value in the result table (see chapter 9, "Power supply measurements" (p. 9-1)).

Result: The voltage must be in the range as given below.

DC power supply: –18 V ... – 72 V

AC power supply: 90 V ... 264 V.

Note: Do not proceed if the voltage is outside the range.

2 Switch off the power.

3 Connect the power cable between the power interface of the 1645 AMC unit and the BDFB (or PDP).

Note: If an AC/DC converter is used, it has to be connected to the DC connector of the 1645 AMC unit first and then to the BDFB (or PDP).

4 Connect the fan power cable between the power interface of the fan unit and the BDFB (or PDP).

5 Switch on the power.

6 Check that the green "Power" LED of the 1645 AMC unit is illuminating.

END OF STEPS

Power failure

If the powering procedure described above was unsuccessful, please refer to Appendix A, section “Power failure” (p. B-2).

Fan unit test

Overview

The test described below checks the correct working of the fan unit.

Procedure

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

1 Check that no failures are indicated.

2 Check that:

- the fans of the unit are running
- the air flow direction is from in to out

END OF STEPS

Physical installation check

Overview

Purpose

A complete physical installation check should be done to ensure that all components are complete and the cables are connected correctly.

Checks

The following units should be checked:

- unit installation
- cable connections.

The tests mentioned above are described in more detail in the following topics.

Contents

AMC unit installation

Overview

This test checks the correct unit installation.

Checks

Check that:

- there are no visible defects
- the mechanical parts are secured
- the optical couplings (or SFPs) are affixed to the optical interfaces
- the NE is up and running

Cable connections

Overview

This test checks the correct cable installation. The cables mentioned below must be connected for a proper system working. All the other cables are optional depending on the used option cards and external equipment.

Checks

Check that the following cables are connected:

- Unit power cables
- Grounding cables
- Fan power cables (if fan unit is available)
- Fan alarm cables (if fan unit is available)
- MDI/MDO cable (optional)
- Timing cable (optional)
- EOW cables (optional)
- Tributary cables (optional)
- Fiber cables (optional)

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
Optional card mounting (incl. labels)			
EMC bracket mounting			
AMC unit mounting			
Fan unit mounting			
AMC unit power cabling			
Ground cabling			
Fan power cabling			

Procedure	Result (Passed, Failed, N/A)	Initials	Notes
Fan alarm cabling			
MDI/MDO cabling			
Timing output cabling			
Q-LAN cabling			
EOW cabling			
E1 cabling			
DS1 cabling			
SHDSL cabling			
E3 cabling			
DS3 cabling			
STM-1e cabling			
LAN cabling			
Fiber cabling			
Powering			
Fan unit test			
Physical installation check			

Part II: NE provisioning and stand-alone installation test

Overview

Purpose

This part of the 1645 AMC Installation Guide contains the ITM-CIT and NE software installation, the NE provisioning, and the stand-alone test procedures.

Contents

This part of the document contains the following chapters:

- Chapter 6:
  ITM-CIT installation and NE provisioning
- Chapter 7:
  Stand-alone test procedures

Entry checklist

The following checklist provides tasks to be completed prior to performing the ITM-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" (p. 5-7))?			
Is the ITM-CIT and NE software available?			
Is a laptop or desktop PC available meeting the minimum requirements (see section "Requirements" (p. 2-11))?			
Is a crossed LAN cable CAT5 with 4-wire RJ-45/RJ-45 connectors available?			

Procedure	Completed	Initials	Notes
Is the required test equipment available (see section "Test equipment and accessories" (p. 7-2))?			

Contents

6 ITM-CIT installation and NE provisioning

Overview

Purpose

This chapter describes the ITM-CIT and NE software installation and the initial NE provisioning via ITM-CIT.

Assumption

The person setting up the system is familiar with 1645 AMC, the SDH functionality and ITM-CIT.

Contents

Software installation

Overview

Purpose

This section describes the ITM-CIT and NE software installation and how to perform an NE login.

Contents

Installing ITM-CIT

Purpose

Use this procedure to install the ITM-CIT software onto a new system.

Note: This installation procedure is valid only for the current ITM-CIT release. This procedure might change in future releases of ITM-CIT even if there are no updates to the NE software.

Required equipment

For the ITM-CIT, a personal computer fulfilling the following minimum requirements is necessary:

- *Pentium*® processor with 450 MHz or higher
- 128 MB RAM or higher
- Keyboard
- Mouse
- 300 MB of free hard-disk drive space
- CD-ROM drive
- Display with 1024 × 768, 16 million colors recommended
- RS-232 communication port (serial asynchronous port)
- *Microsoft*® *Windows*® 2000 or *Windows XP*® operating system
- ITM-CIT connector (F-interface) cable (one end RS-232 and the other end RJ-45 modular jack), CC848069795

The performance can be enhanced by using a higher performance personal computer. Independent of the requirements listed above, the minimum requirements of the operating system must be fulfilled. A CD-ROM containing the ITM-CIT software must be available.

Before you begin

Before installing the software, the software release number must be known.

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

Installation procedure

Complete the following steps to install the ITM-CIT software on your PC:

1 On the *Windows*® desktop, click on **Start**.

Result: The **Start** menu appears.

2 Click on the **Run** item.

Result: The **Run** window appears.

3 Click on the **Browse** button.

Result: The **Browse** window appears.

4 Insert the CD-ROM containing the ITM-CIT application into the CD-ROM drive and click on the CD-ROM item.

5 Select the required directory and click on the executable file **SETUP.exe**.

6 Click **Open**.

7 Click **OK** to run the executable file on the CD-ROM.

Result: The **InstallShield Wizard** window appears.

8 Click **Next** to continue with the installation of the ITM-CIT software.

Result: The ITM-CIT files are extracted. This will take a few minutes and the **Welcome** window appears after the ITM-CIT files are extracted.

9 Click **Next**.

Result: The **Software License Agreement** window appears.

10 If you agree, click **Yes**.

Result: The **Select Language** window appears. Here, the language of the Online Help is defined.

11

If	then
you want to install ITM-CIT with default setting **English** (English Online Help)	click **Next**. **Result:** The **Select Components** window appears.
you want to install a different language	run **SETUP.exe** again and select the required language (right now in English available only). **Result:** The **Select Components** window appears.

12 Select the component(s) you wish to be installed. It is recommended to leave the default setting and install the ITM-CIT including the Online Help files.

13 Click **Next** to install the ITM-CIT software in the default directory (C:\..\ITM-CIT) or click on the **Browse** button to select or create a different directory for the ITM-CIT software.

Additionally, you can check the available disk space for all available drives by clicking on **Disk Space...** .Leave the window **Available Disk Space** by clicking **OK** or **Cancel**.

Important! Activating **Disk Space...** may change the default directory to another drive.

Result: The **Provide password** window appears.

14 It is optional to define a password. Fill in a password, if required and confirm it. Then, click **Next**.

Result: The **Select Program Folder** window appears.

15 Leave the default setting, select or create a folder in which the program icons will be installed. Click **Next**.

Result: The ITM-CIT is installed. This will take a few minutes. Then, the **Restarting Windows** window appears.

16 Choose one of the given options and click **OK** to finish the setup.

Important!

- It is recommended to reboot the PC before starting up the ITM-CIT.
- Ensure that you have closed all *Windows*® programs before you restart the computer.
- The MIB Upload and Download (MUD) tool and the latest version of WinPcap is installed alongwith ITM-CIT. Certain applications do not support the latest WinPcap. For example, the older versions of the Fast Download Tool do not support the latest version of WinPcap. Therefore, replace the older version of the Fast Download Tool with the latest version available on the NE software CD-ROM.

END OF STEPS

Installing the fast download application

Overview

The “Fast download” application permits to download the current software in the equipment in about five minutes. The “Fast download” is realized from a PC connected to the Q-LAN interface of the 1645 AMC unit.

The “Fast download” application is installed in the Windows environment using the program supplied. It is a simple process during which on-screen guidance is provided.

Note: Always use the *Fast Download Tool* that has been delivered with the system.

Procedure

Proceed as follows to install the “Fast download” application:

1 Insert the CD-ROM which includes the “Fastdownload.exe” file in the CD-ROM drive of the PC.

2 Select the **Run...** command from the Windows *Start menu*, type *d:\fastdownload.exe* (where *d:* is the CD-ROM drive indicator) and click **OK**.

Result: The screen of the *WinZip Self-Extractor – FastDownload.exe* is displayed.

3 Select the directory to which the files shall be extracted and press the **Unzip** button.

Result: The files will be extracted.

4 Select the **Run...** command from the Windows *Start menu*, type *C:\TEMP\setup.exe* (where *C:\TEMP* is the used directory) and click **OK**.

Result: The *Fastdownload Installer dialog box* appears. Follow the instructions and accept the license agreement.

5 Install, as requested, the “Fast Download Tool”. When the installation is complete, a message appears indicating that the installation has been successful.

6 Reboot the PC to allow for the tool to connect to the present Ethernet Adapters.

END OF STEPS

Fast NE software download

Assumptions

Ensure that all assumptions listed below are fulfilled before carrying out the fast software download:

- The 1645 AMC unit is powered on.
- The “Fast download” application is installed on the PC.
- An Ethernet cable is installed between the Ethernet access of the PC and the Q-LAN interface (RJ45 connector) of the NE. A **crossed** cable must be used.
  NOTE: This connection can also be realized through a HUB. In that case, **straight** cables must be used between the PC and the HUB and between the HUB and the NE.

Figure 6-1 Connection with crossed Ethernet cable (AMC unit)

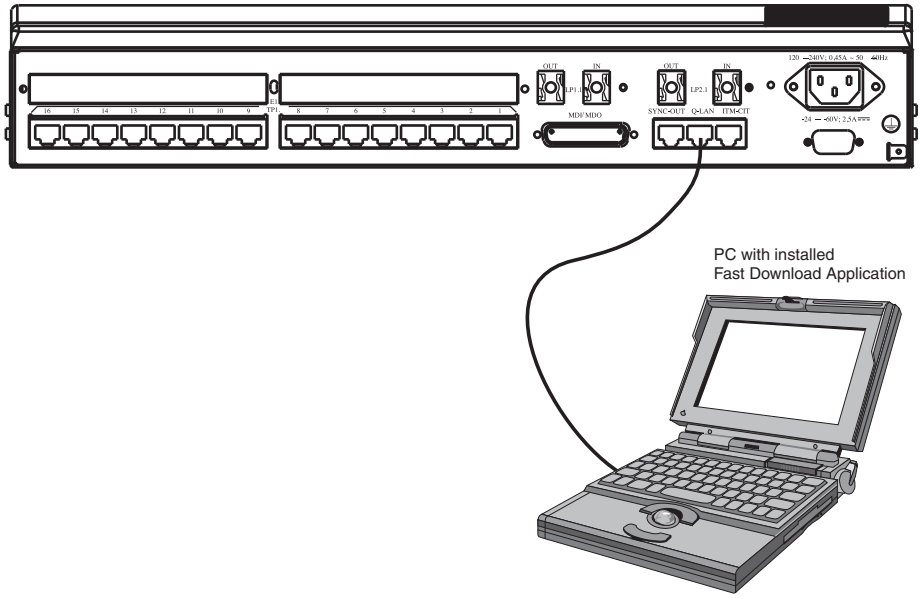
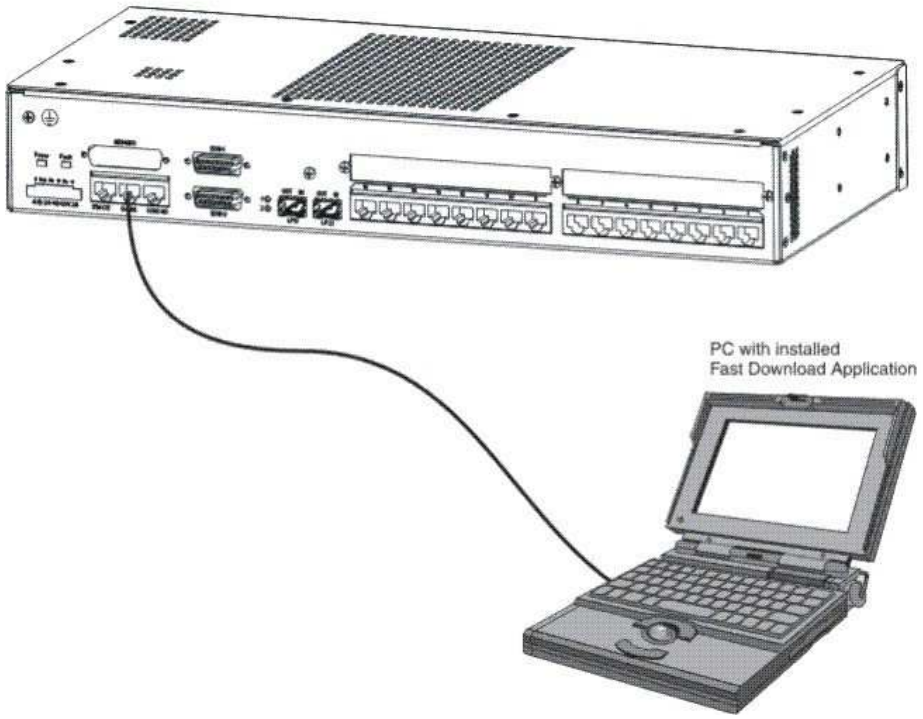


Figure 6-2 Connection with crossed Ethernet cable (AMC unit)



Procedure

Proceed as follows to install the NE software via the "Fast download" application:

1 Select **Start → Programs → Fast download tool**.

Result: The screen *Fast Download Tool* is displayed.

2 Select the correct Ethernet Adapter.

3 Select the load with the extension **.ISD** or **.S3** to be downloaded to the 1645 AMC unit or to be downloaded to an external unit like an SHDSL modem.

If a ".S3" file is selected for download, then the tool will do a conversion to ".ISD". Click **OK** to the displayed "Attention" message.

4 Select the correct **ISD Group** for the load to be downloaded. Select **Network Element** to download to the software stores of the NE and select **External Equipment** to download to the software stores of the external unit.

5 Select the NE Node Name of the Network Element you want to download to.

6 Click on the **Download** button to start the software download to the NE. Confirm the selected ISD group.

Result: The download starts and the following steps are observed: “Connecting”, “Erasing” and “Downloading” (the progress of the download is indicated).

7 When the download is completed successfully, a pop up window appears with the question whether to activate the new isd.

Click on **Yes** to activate the downloaded software.

Click on **No** to keep the downloaded software in the backup store. If you select **No**, the software can be activated later through a management system.

8 When Yes is chosen in Step 7, the user can select one of the following options:

1. `Erase the MIB and commit the new ISD.`
2. `Erase the MIB but not commit the new ISD.`
3. `Not erase the MIB but commit the new ISD.`
4. `Not erase the MIB and not commit the new ISD.`

Note: When the user is logged in to the Network Element with ITM-CIT management system, then the default option `Not erase the MIB but commit the new ISD` is selected automatically.

9 Click on **Exit**.

Important! It is recommended to reboot the PC after downloading the NE software using the *Fast Download Tool* and before connecting the ITM-CIT to the NE.

END OF STEPS

Software download failure

If the “Fast download” application doesn't work or in case of a software download failure (red FAULT LED is illuminating), perform an NE software download as described in Appendix A, section “Installing the NE software” (p. B-4).

Connecting the ITM-CIT to the NE

Overview

To perform software tests and provision the system with local configuration parameters, an Integrated Transport Management – Craft Interface Terminal (ITM-CIT) must be connected to the 1645 AMC unit locally.

Connecting the ITM-CIT

Connect the ITM-CIT to the 1645 AMC unit as shown in the figures below. The provided ITM-CIT cable (CC848069795) should be used.

Figure 6-3 ITM-CIT cable connection (AMC unit)

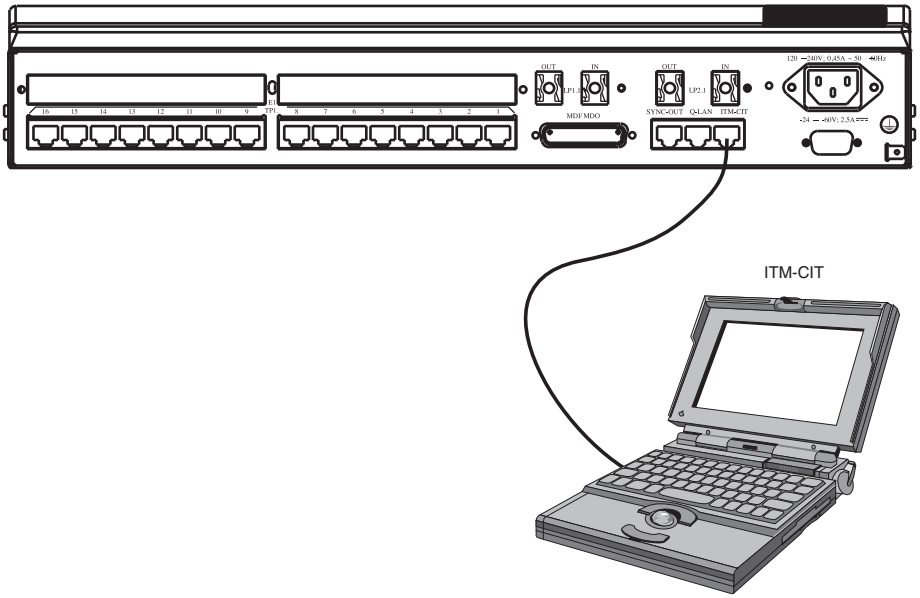
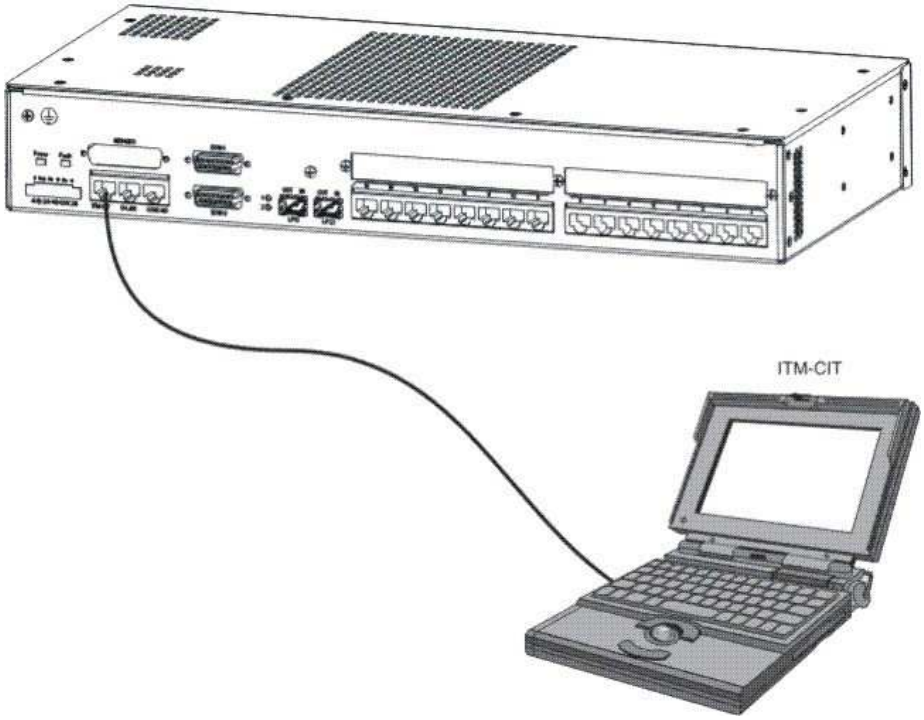


Figure 6-4 ITM-CIT cable connection (AMC unit)



NE login procedure

Overview

This section describes the login procedure to an NE.

Before you begin

Before starting the application, ITM-CIT, and login to an NE, make sure that

- the PC is connected to the NE (see section "Connecting the ITM-CIT to the NE" (p. 6-10))
- the PC is rebooted at least once after software installation.

Initial login procedure

Complete the following steps to login to an NE:

1 Start the ITM-CIT application.

Result: The main ITM-CIT window appears.

2 Select **`File`** → **`NE Login`** → **`Login`** in the main menu.

Result: The *NE Login* window appears.

3 Select the correct **`COM port.`** Usually, this is COM1.

4 Select **`Edit`** to set the correct baudrate.

1645 AMC operates on a baudrate of 115k.

5 Select **`Login`**.

Result: The *Password Required* window appears.

6 Select the user role from the capability field.

Selectable user roles are:

- Admin (for ITM-CIT administration and configuration of an NE)
- Config (to configure an NE)
- View (only to view NE configuration).

Fill in the required password (if configured) and click **OK**.

Result: The ITM-CIT is logged into the 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 1645 AMC related tasks is given in the “1645 AMC User Operations Guide”.

Contents

NE date and time

Overview

This section provides a procedure for setting or changing the NE date and time.

Before you begin

The current date and time information must be known. If there is an association with OMS, then the date and time are automatically set when the association is established and will be repeated every 24 hours (at night).

Procedure

Complete the following steps to set the NE date and time:

1 Select **Management** → **Time** in the main menu.

Result: The *NE Date and Time* window appears.

2 Click **Edit**.

Result: The *Edit Date and Time* window appears.

3 Select the desired *Edit Mode*. Fill in the date and time (when the manual setting is chosen) and click **OK**.

Result: The *Edit Date and Time* window disappears.

END OF STEPS

Parameters

Date

This field is used to set the date when the manual setting edit mode is chosen.

Edit mode

There are two edit modes which provide a choice of methods by which the date and time can be changed. The possible values are described in the table below.

Edit mode	Description
Sync to CIT time	The date and time are set automatically by using the local time and date from the CIT (PC). This information is sent to the NE and the time and date are set.
Manual set	The date and time must are set manually.

Time

This field is used to set the time when the manual setting edit mode is chosen.

Node creation

Overview

Creating a node that provides the basic information necessary to place an NE into service.

Before you begin

Before starting to create a node, determine the following:

- the name, address, and location of the node are known
- the location and type of units physically present in the NE are known
- the main unit must be assigned before the interfaces associated with this unit can be assigned. For example, a tributary port unit must be assigned before the ports for this unit can be assigned.
- For the 1645 AMC , the only slot which may be user assigned is TS2.
  NOTE: Any mistake in provisioning the slots will result in a failure when attempting to create the node. When a mistake has been made, after clicking **`Finish`**, the error message “Slot configuration conflict” appears. The node creation has failed, and the entire node creation process must be repeated.
- To create an association with the OMS, the NE cannot be in an isolated state (as a default condition, each NE arrives from the factory in an isolated state). To view if the NE is in the isolated state, select *Management → Overlay Comms Network → DCN*. If the NE is in the isolated state, click **`Edit`**. The window, *Edit Provisioned DCN Information* then appears. In this window, change (or reselect) any of the displayed parameters and click **`OK`**. Doing so will remove the NE from the isolation state and an association with the OMS will now be possible. A detailed procedure on provisioning DCN information for the 1645 AMC is given under the chapter, “Management communication setup”, under the section, “Configuring a Data Communication Network (DCN)” in the “1645 AMC User Operations Guide”.

Procedure

Complete the following steps to create an NE:

1 Select **`Management → Node Creation`**.

Result: The *Node Creation – Parameters* window appears.

2 Enter the **`NE Name`** and **`NE Location`**.

Result: The NE name and location appear, respectively, in the fields *NE Name* and *NE Location*.

3 Click **Next**.

Result: The window *Node Creation – Provisioned Slots* appears.

4 Complete the procedure "Slot provisioning" (p. 6-22).

Important! For the 1645 AMC , the only slot which may be user assigned is TS2.

Result: The slots of the NE are properly assigned.

5 Complete the procedure "Confirm/Update the MIB" (p. 6-24).

Result: The MIB is now confirmed, and after re-establishing the connection between the NE and the ITM-CIT, the MIB status in the window *Node Details* should be *Filled*.

6 Click **Close**.

END OF STEPS

Parameters

NE name

The NE's name is listed. The name must be unique across management domains. If the NE is not managed by the OMS, then the name may be up to 20 characters in length. If the NE will be managed by the OMS, then the name must be 3 to 10 characters long with the last three characters a slash and two digits.

NE location

The location of the NE is given. The location may have up to 20 uppercase or lowercase characters, digits, and spaces.

Slot

The slot position is given here.

Assigned unit

The type of unit provisioned in the listed slot is shown.

State

Displays the status of the listed slot. The different slot states are described in the table below.

Slot state	Description
Assigned	Slot is assigned
Unassigned	Slot is unassigned
Auto	Slot is provisioned but waiting for unit. Once the provisioned unit is present, the slot state will automatically change to *Assigned*.

Operation

When assigning units, an operation must be chosen. The choices are described in the table below:

Operation	Description
Assigned	Assigns the unit to the slot
Unassigned	The slot is configured to be empty. The NE will not expect any unit to be present in this slot.
Auto	Automatically assigns the unit to the slot once the NE establishes the presence of a unit of the correct type. Until this time, the slot acts as *Unassigned*.

Main unit

The unit provisioned or to be provisioned in the selected slot.

Upper/lower interface

The interfaces directly associated with the displayed *Main Unit*.

MIB state

The status of the MIB is indicated. The possible values are described in the table below:

MIB state	Description
Empty	An empty System Controller (SC) has been inserted or the MIB was cleared after starting an MIB download automatically by the management system. If the MIB state is empty, the management system can proceed with the MIB download.
Filled	The NE possesses a valid MIB which has been confirmed.
Filled Unknown	The NE has a MIB, however, it is of unknown validity. This can occur, for instance, if one SC is replaced by another SC having a MIB.

MIB state	Description
Filled Not Confirmed	The NE has a MIB, however, it has not yet been confirmed by the ITM-CIT. The procedure "Confirm/Update the MIB" (p. 6-24) gives the steps necessary to confirm the MIB. Once confirmed, the state will become *Filled*.

Slot provisioning

Overview

The slot TS2 must be provisioned for a node in the process of creation.

Before you begin

Before provisioning slots, determine the following:

- Before provisioning the NE slot configuration, it is assumed that the new configuration of the NE is known. This includes the exact types of units to be provisioned and the corresponding slot positions for these units.
- For the 1645 AMC , the only slot which may be user assigned is TS2.
- The main unit must be assigned before its corresponding interface units are assigned.

Procedure

Proceed as follows to provision the slots of an NE (this procedure includes both assigning and unassigning units):

1 Select **`Provisioning → Equipment → Provisioned NE Components`**.

Result: The *Provisioned NE Components* window appears.

2 Select the slot TS2 from the list in the window, and click **`Assign/Unassign`**.

Result: The *Assign NE Units to Slot* window appears with information concerning the selected slot and its associated slots.

3 Select the desired operation from the selections at the top of the window.

Result: The correct operation is selected.

4 If assigning units, use the pull-down menu for **`Main Unit`** and select the correct unit corresponding to the displayed slot.

Result: The correct unit appears as the new *Main Unit*.

5 Click **`OK`**.

Important! When assigning units during node creation, instead of the *Provisioned NE Components* window, the window *Node Creation - Provision Slots* will reappear.

Result: The desired operation for this slot is performed, and the window *Provisioned NE Components* appears again.

6 If creating a node, then click **`Finish`**. Otherwise, click **`Close`**.

Result: The window *Provisioned NE Components* (or in the case of node creation, *Node Creation - Provision Slots*) disappears.

END OF STEPS

Parameters

Slot

The slot position is given here.

Expected unit

The type of unit provisioned in the listed slot is shown.

Slot state

Displays the status of the listed slot. The different slot states are described in the table below.

Slot state	Description
Assigned	Slot is assigned
Unassigned	Slot is unassigned
Auto	Slot is provisioned but waiting for unit. Once the provisioned unit is present, the slot state will automatically change to *Assigned*.

Operation

When assigning units, an operation must be chosen. The choices are described in the table below.

Operation	Description
Assigned	Assigns the unit to the slot.
Unassigned	The slot is configured to be empty. The NE will not expect any unit to be present in this slot.
Auto	Automatically assigns the unit to the slot once the NE establishes the presence of a unit of the correct type. Until this time, the slot acts as *Unassigned*.

Confirm/Update the MIB

Overview

A MIB confirmation should be performed during node creation or in any other situation where the MIB status is “Filled, not confirmed”.

Before you begin

Before confirming or updating the MIB, determine the following:

- Performing a MIB confirmation will cause the NE to reset. A new login, after waiting several minutes for the reset to take place, will have to be performed.
- Confirming the MIB for an existing NE can result in traffic disruptions.

Procedure

Proceed as follows to confirm the MIB of a NE:

1 Select **Management → Node Details**.

Result: The *Node Details* window appears. This window allows confirmation or update of a NE MIB.

CAUTION: Confirming the MIB will result in an NE reset. The current login session will be terminated. Also, while overwriting the older MIB, traffic can be affected.

2 Click **Confirm MIB**.

Result: A confirmation window appears.

3 Click **Yes**.

Result: The operation will be started. Confirming the MIB should take several minutes. During this time, the connection between the ITM-CIT and the NE will be lost. To re-establish this connection, a login must once again be performed after waiting for the operation to complete.

4 Login again.

5 Select **Management → Node Details**.

Result: The *Node Details* window appears. In this window, the MIB state can be viewed. It should now be *Filled*.

6 Click **Close**.

Result: The *Node Details* window disappears.

END OF STEPS

Parameters

NE type

The NE type is indicated.

NE name

The NE's name is listed. The name must be unique across management domains. If the NE is not managed by the OMS, then the name may be up to 20 characters in length. If the NE will be managed by the OMS, then the name must be 3 to 10 characters long with the last three characters a slash and two digits.

NE location

The location of the NE is given. The location may have up to 20 uppercase or lowercase characters, digits, and spaces.

MIB state

The status of the MIB is indicated. The possible values are described in the table below:

MIB state	Description
Empty	An empty System Controller (SC) has been inserted or the MIB was cleared after starting an MIB download automatically by the management system. If the MIB state is empty, the management system can proceed with the MIB download.
Filled	The NE possesses a valid MIB which has been confirmed.
Filled Unknown	The NE has a MIB, however, it is of unknown validity. This can occur, for instance, if one SC is replaced by another SC having a MIB.
Filled Not Confirmed	The NE has a MIB, however, it has not yet been confirmed by the ITM-CIT or OMS. The procedure "Confirm/Update the MIB" (p. 6-24) gives the steps necessary to confirm the MIB. Once confirmed, the state will become *Filled*.

MIB state	Description
Waiting for Upload	This state is only possible when the NE is managed by the OMS. After confirmation of the MIB, the NE performs a reset and loses its association with the OMS. When the NE restarts, the MIB state becomes *Waiting for Upload*. When the OMS reassociates with the NE and detects this MIB state, a MIB upload is performed, and the state will then become *Filled*.

Management state

The state of the association with the OMS is displayed. The possible states are described in the table below:

Management state	Description
Normal	*Normal* will be displayed whenever the automated management operations have been completed. In other words, the OMS has completed the MIB upload, MIB download, MIB resynchronization, or reevaluation of fault status. The state can also be *Normal* when the association between the ITM-CIT/OMS and the NE has been lost.
Uploading	The OMS is performing an MIB upload.
Resyncing	If the MIB of the NE and the MIB image on the OMS are out of synchronization, then the OMS invokes a resynchronization. The management state shows the progress of this operation. If executed properly, it should display, in order: *Normal*, *Resyncing*, *Normal*, *ReEvaluatingFaultStatus*, *Normal*.
ReEvaluating FaultStatus	After a resynchronization, the OMS initiates a reevaluate fault status operation.
Downloading	A MIB download has been started by the OMS. The management state is set to *Normal* during the downloading process. If the MIB download is in progress when a loss of association occurs, then the management state will remain *Downloading*.

EMS connection state

Indicates wether an active connection (CMISE association) exist to the element manager (OMS).

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.

Before you begin

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 battery voltages are connected to the power connector and checked (see chapter 5). An earth connection has been made.
- The correct software has been installed (see chapter 6).
- The area address must be available to enter into the DCN parameters. This is required to get the unit out of the (OSI) isolated state.
- The people carrying out the tests are familiar with 1645 AMC , the SDH functionality, the ITM-CIT software and the handling of the test equipment.

Additional remarks

The following should also be observed:

- If the acceptance involves a 1645 AMC NE without an option card and without the DDF cabling, then the test is very limited, as all ports are factory tested.
- If a DDF is involved the connected cabling needs to be tested for each interface. This is done by executing the port test on the DDF.
- If an option card is involved then each port of this card has to be tested on the outlet of the 1645 AMC or, if applicable, on the DDF, to prove a proper function.

Contents

Test equipment and accessories

To be able to perform the tests described in this chapter, the following test equipment and accessories are required:

1645 AMC main unit		
	No DDF	**With DDF**
ITM-CIT cable	X	X
PDH analyzer		X
Measuring cables (E1 120 Ω UTP or 75 Ω coax depending on the configuration)		X
Two single mode fibers with applicable connectors		X
Optical attenuator, single mode, 1310/1550 nm		X
Cleaning set for optical fibers		X

If the 1645 AMC has an option card installed, then the following test equipment and accessories are required per option card:

1645 AMC with an option card											
	Option cards										
Accessories	**E1**	**E3**	**DS1**	**DS3**	**STM-1 Optical**	**Trans LAN X8PL**	**Trans LAN X5IP**	**X5IP-V2**	**X12 SHDSL**	**X10IP**	**STC-2MB**
1x single mode fiber, 1x 10 dB attenuator for long haul laser (L11, L12, L41, or L42)	X	X	X	X							
2x single mode fibers, 2x 10 dB attenuator for long haul laser (L11, L12, L41, or L42)					X						
PDH BER test set with E1 option	X				X						
2x E1 cables	X										
PDH BER test set with E3 option		X									
2x E3 cables		X									
PDH BER test set with DS1 option			X								
2x DS1 cables, refer to note 1			X								
PDH BER test set with DS3 option				X							
2x DS3 cable, refer to note 1				X							

1645 AMC with an option card											
Option cards											
Accessories	**E1**	**E3**	**DS1**	**DS3**	**STM-1 Optical**	**Trans LAN X8PL**	**Trans LAN X5IP**	**X5IP-V2**	**X12 SHDSL**	**X10IP**	**STC-2MB**
2x optical fibers, single/multi mode depending on the used SFP					X		X	X			
1x Ethernet CAT 5 crossed UTP cable						X	X	X			
1x SHDSL cable (see chapter 4, section "SHDSL interfaces (X12SHDSL-V2 card)" (p. 4-28)									X		
SHDSL E1 modem									X		
Network Performance Analysis						X	X	X		X	
Waveform Generator											X
Frequency Counter											X

Note

Since the pulse shape for DS1 and DS3 signals is defined at the DDF, the cable length between the port and the DDF must be compensated for each port output (Menu: *Port Provisioning*, *Cable length*). By default the cable compensation is set to 0-131 feet (DS1) or 0-120 feet (DS3). Because the PDH analyzer is connected close to the DDF, the receiver will deal with the cable loss. However for each port the length between port and DDF should be estimated and compensated by selecting the proper length range before the other side is connected.

Preparation and test of the main unit

Overview

This section describes the preparation and test of a 1645 AMC main unit.

Estimated duration

15 minutes

Procedure

Proceed as follows to perform the main unit test:

1 Connect the ITM-CIT to the NE.

2 Create the node. If available, use the operator specified name of the NE.

3 Provision the DCN parameter Area ID; set it to the operator specified value.

Note: If the Area Address is not available then we suggest leaving the unit isolated until the value is available. The reason for this is that value 0000 is reserved for newly installed units and should not be used in live networks. An NE in the isolated state if the OSI protocol has not been activated. Getting the NE out of the isolated state is done by editing the area address.

4 Verify that the requirements mentioned in the table below are met:

Result:

Requirements	
Node isolated:	No
LEDs on the 1645 AMC :	
Power:	On
Fault:	Off

END OF STEPS

E1 tributary ports distribution wiring test

Overview

This test verifies the following:

- Checks the cabling with connections of all PDH ports with complementary wiring according to the ODM
- Verifies that the labeling on the DDF matches the correct port number.

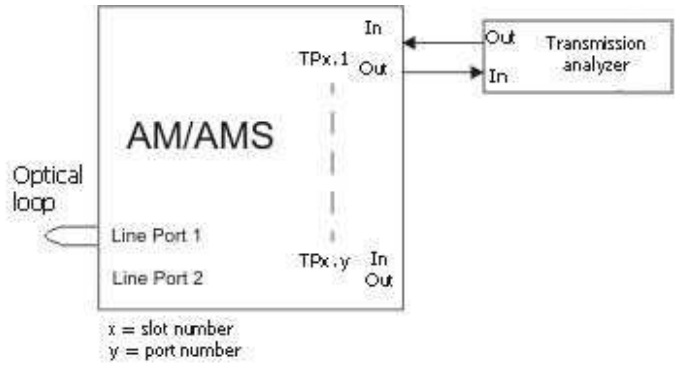
Estimated duration

20 minutes

Test setup

The following figure illustrates a possible test setup:

Figure 7-1 E1 tributary ports distribution wiring test



Note: For a long haul laser (L11, L12, L41 or L42) a 10 dB attenuator with applicable connector is required in the loop.

Start condition

Ensure that the following start condition is fulfilled:

- The procedure in section "Preparation and test of the main unit" (p. 7-5) must have been performed and the test results are correct.
- The ITM-CIT must be connected and logged-in to the NE.
- Test setup as shown in the figure above.

Procedure

Proceed as follows to perform the test:

1 Provision for each TP a cross-connection to LP1.

2 Set the Alarm Reporting/Severity of E12cNES (2 Mbit/s Not Expected Input Signal) alarm from reported "No" to "**Yes**".

3 Set the PDH analyzer to 2 Mbit/s, 2^{15-1} **PRBS** pattern. Connect the PDH analyzer to the first tributary port. Start a BER test.

4 To check for bad contacts of the installed cable move each separate cable gently (or tap on it with your fingers) near the connector at both ends, while monitoring the analyzer for error free transmission.

5 Display the raised alarm list on the ITM-CIT, and verify that the requirements mentioned in the table below are met.

Result:

Requirements	
LEDs on the 1645 AMC :	
Power:	On
Fault:	Off
PDH analyzer:	No errors detected
Alarms reported on the ITM-CIT:	"E12cNES", 2 Mbit/s Not Expected Input Signal

6 Check if the slot and port number of the NES alarm source corresponds with the physical position on the DDF to which the analyzer is connected.

7 Disconnect the incoming signal from the port under test.

8 Repeat this test for all present E1 tributary ports.

END OF STEPS

Cleaning up

The following tasks must be performed to clean up the system:

- Reset the alarm reporting settings of E12cNES (2 Mbit/s Not Expected Input Signal) to default (Not Reported)
- Delete all cross-connections.

Line port connection to optical distribution frame test

Overview

This test checks the connections of the optical (STM-1 or STM-4) Line Ports. The correct labeling on the ODF is checked by monitoring the source of the reported alarm. The quality of the physical optical connections to the ODF is checked by measuring the optical power and by performing a receiver sensitivity test.

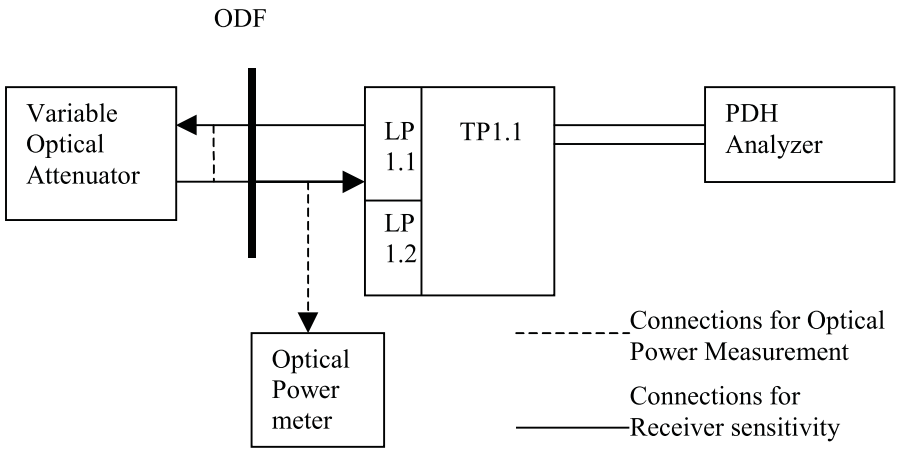
Estimated duration

10 minutes per port

Test setup

The following figure illustrates a possible test setup:

Figure 7-2 Line port connection to optical distribution frame test



Procedure

Proceed as follows to perform the test:

1 Provision a cross-connection from the first tributary port TP1.1 to Line Port 1.

2 Set the Line Ports to "**Not Monitored**".

3 Set the Alarm Reporting/Severity of STM*cNES (STM* Not Expected Input Signal) alarm from reported “No” to “**Yes**”. (* stands for “1” or “4”, depending on the port type under test).

4 Install a fiber loop on LP1.1 on the ODF.

5 Set the PDH analyzer to 2 Mbit/s, 2^{15}-1 PRBS pattern. Connect the PDH analyzer to TP1.1. Start a BER test.

6 Display the raised alarm list on the ITM-CIT, and verify that the requirements mentioned in the table below are met.

Result:

Requirements	
PDH analyzer:	No errors
Alarms reported on the ITM-CIT:	“STM*cNES”, STM* Not Expected Input Signal

7 Check if the slot and port number of the NES alarm source corresponds with the physical position on the ODF to which the optical loop is connected.

8 Set the Line Ports to “**Monitored**”.

9 Connect the optical power meter to the fiber returning from the ODF (LP1.1 input) (refer to Figure 7-2, “Line port connection to optical distribution frame test” (p. 7-9)).

10 Measure the optical transmit power level.

11 Verify that the requirements mentioned in the table below are met.

Result:

Power ranges:

Interface	Wavelength [nm]	Power range [dBm]
S1.1	1310	–15 ... –8
S4.1	1310	–15 ... –8
L1.1	1310	–5 ... 0
L1.2	1550	–5 ... 0
L4.1	1310	–3 ... +2
L4.2	1550	–3 ... +2

Note: Subtract 0.50 dB per optical connection (for the suggested set-up 1.5 dB (3 connections)) and subtract 0.2 dB per fiber segment (0.4 dB for 2 fiber segments).

12 Disconnect the optical power meter and reconnect the fiber to the receive port of LP1.1.

13 Remove the optical loop from the ODF and install a variable optical attenuator.

14 Increase the attenuation until the PDH analyzer reports single bit errors.

15 Decrease the attenuation a little until no errors are reported.

16 Wait for approximately 5 minutes (no errors may occur).

17 Disconnect the fiber from the Line Port “input” at the physical NE port and measure the optical output level (refer to Figure 7-2, “Line port connection to optical distribution frame test” (p. 7-9)).

18 Verify that the requirements mentioned in the table below are met.

Result:

Receiver sensitivity ranges:

Interface	Wavelength [nm]	Receiver sensitivity [dBm]
S1.1	1310	≤ –28

Interface	Wavelength [nm]	Receiver sensitivity [dBm]
S4.1	1310	≤ –28
L1.1	1310	≤ –34
L1.2	1550	≤ –34
L4.1	1310	≤ –28
L4.2	1550	≤ –28

19 Repeat test for Line Port 1.2, LP 1.3, LP1.4 , if applicable.

END OF STEPS

Cleaning up

The following tasks must be performed to clean up the system:

- Disconnect the PDH analyzer
- Disconnect the optical attenuator
- Set the STM*cNES to “Not Reported”
- Delete the cross-connection(s).

PDH option card test

Overview

This test verifies that the option card has been installed properly and that its function is correct.

If a DDF is applicable then the cabling and connections of the option card ports with complementary wiring is tested according to the site depending information, and the port labeling is tested on the DDF whether it matches the correct port number.

This test includes a BER test for each option card tributary port, and a port alarm test.

Estimated duration

20 minutes.

Remarks

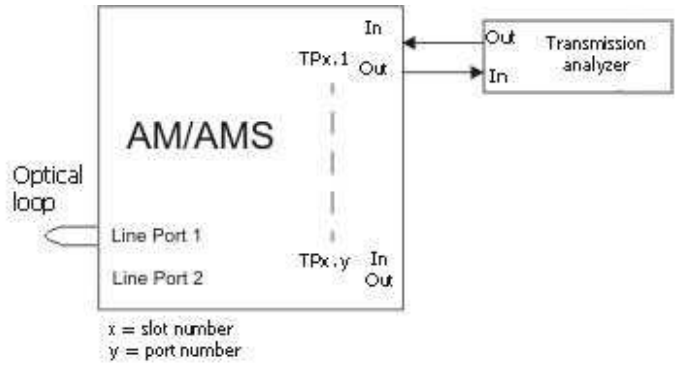
If the installation includes a DDF then the interface test must be done from the DDF.

For 1.5 Mbit/s (DS1) and 45 Mbit/s (DS3) ports: since the pulse shape for these signals is defined at the DDF, the cable length between the port and the DDF can be compensated for each port output (menu: *Port Provisioning*, *Cable length*). By default the cable compensation is set to 0-131 feet (DS1) or 0-120 feet (DS3). In this test the PDH analyzer receiver will deal with the cable loss, only because it is connected close to the DDF. However for each port the length between port and DDF should be estimated and compensated by selecting the proper length range before the other side is connected.

Test setup

The following figure illustrates a possible test setup:

Figure 7-3 PDH option card test



Note: For a long haul laser (L11, L12, L41 or L42) a 10 dB attenuator with applicable connector is required in the loop

Start condition

Be sure the following start condition is fulfilled:

- The procedure in section "Preparation and test of the main unit" (p. 7-5) must have been performed and the test results are correct.
- The ITM-CIT must be connected and logged-in to the NE.
- Test setup as shown in the figure above

Procedure

Proceed as follows to perform the PDH option card test:

1 Assign the installed option card.

2 If an X3E3DS3 option card is installed, then provision the TUG structure of CC1,1 to two times TU-3.

3 Provision for each port of the option card tributary a cross-connection to LP1.

4 Change the default Alarm Reporting/Severity settings of the applicable NES alarm from reported "No" to "**Yes**".

E1 option card:	E12cNES (2 Mbit/s Not Expected Input Signal)
DS1 option card:	E11cNES (1.5 Mbit/s Not Expected Input Signal)
E3 option card:	E31cNES (34 Mbit/s Not Expected Input Signal)
DS3 option card:	E32cNES (45 Mbit/s Not Expected Input Signal)

5 Set the PDH analyzer to the appropriate PDH bit rate (and line code) and select for 1.5 or 2 Mbit/s the $2^{15\ -1}$ **PRBS** pattern, for all other bit-rates the $2^{23\ -1}$ **PRBS** pattern. Connect the PDH analyzer to the first option card tributary port. Start a BER test.

6 Monitor the analyzer for correct transmission. If a DDF is applied then check for bad contacts of the installed cable by moving each separate cable gently (or tap on it with your fingers) near the connector at both ends, while monitoring the analyzer for error free transmission.

7 Display the raised alarm list on the ITM-CIT, and verify that the requirements mentioned in the table below are met.

Result:

Requirement	
LEDs on the 1645 AMC :	
Power:	On
Fault:	Off
PDH analyzer:	No errors detected
Alarms reported on the ITM-CIT:	"xxcNES", y Mbit/s Not Expected Input Signal[1]

Notes:

1. Not Expected Input Signal alarm refer to Step 4.

8 Check if the slot and port number of the NES alarm source corresponds with the physical position on the DDF to which the analyzer is connected.

9 Disconnect the incoming signal from the port under test.

10 Repeat this test for all present option card tributary ports.

END OF STEPS

Cleaning up

The following tasks must be performed to clean up the system:

- Reset the Alarm Reporting/Severity of the applicable NES alarm to default (Not Reported).
- If an X3E3DS3 option board is installed and the TUG structure of CC1,1 has been modified, then return it to VC-12.
- Delete all cross-connections

Optical X6STM1 option card test

Overview

This test verifies whether the installation of the optical STM-1 option card is done correctly and the proper function by testing the port.

This test includes a BER test for each option card tributary port, and a port alarm test.

Estimated duration

10 minutes.

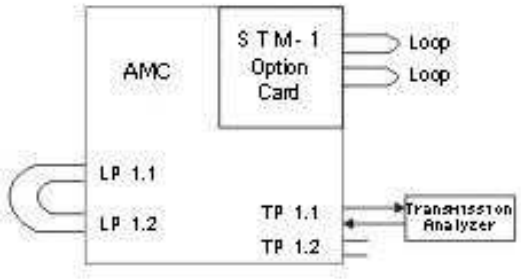
Remarks

This test requires two STM-4 SFPs.

Test setup

The following figure illustrates a possible test setup:

Figure 7-4 Optical STM-1 option card test



Note: Install in port LP1.1 and LP1.2 an STM-4 SFP. For Long Haul lasers a 10 dB optical attenuator must be installed in both connections between LP1 and LP2.

Start condition

Ensure that the following start condition is fulfilled:

- The procedure in section "Preparation and test of the main unit" (p. 7-5) must have been performed and the test results are correct.
- The ITM-CIT must be connected and logged-in to the NE.
- Test setup as shown in the figure above

Procedure

Proceed as follows to perform the optical STM-1 option card test:

1 Assign the installed option card.

2 Change the default Alarm Reporting/Severity of the STM1cNES (STM-1 Not Expected Input Signal) alarm from reported "**No**" to "**Yes**".

3 Provision the following cross-connections:

Result:

Port under test	Required cross-connections
TP2.1	TP2.1 – LP1.1,1 CC1,1.111 – TP1.1 CC1,1 – LP1.2,1
TP2.2	Change from TP2.1 – LP1.1,1 to TP2.2 – LP1.1,1
TP2.3	Change from TP2.2 – LP1.1,1 to TP2.3 – LP1.1,1
TP2.4	Change from TP2.3 – LP1.1,1 to TP2.4 – LP1.1,1
TP2.5	Change from TP2.4 – LP1.1,1 to TP2.5 – LP1.1,1
TP2.6	Change from TP2.5 – LP1.1,1 to TP2.6 – LP1.1,1

4 Set the PDH analyzer to 2 Mbit/s, 2^{15-1} PRBS pattern. Connect the analyzer to TP1.1.

5 Monitor the analyzer for correct transmission.

6 Display the raised alarm list on the ITM-CIT, and verify that the requirements mentioned in the table below are met.

Result:

Requirements	
LEDs on the 1645 AMC:	
Power:	On
Fault:	Off
PDH analyzer:	No errors
Alarms reported on the ITM-CIT:	"STM1cNES" (STM-1 Not Expected Input Signal) on TP2.* (* is port under test)

7 Repeat the test for each trib port by changing the cross connection as indicated in Step 3.

8 Disconnect the incoming signal from the port in use.

END OF STEPS

Cleaning up

The following must be performed to clean up the system:

- Reset the Alarm Reporting/Severity of the STM1cNES (STM-1 Not Expected Input Signal) alarm to default (Not Reported).
- Delete all cross-connections.

X8PL and X5IP option card test

Overview

This test verifies that the Ethernet option card under test is properly installed and that it functions correctly. In case of a DDF, the connections are tested by generating a port alarm. This procedure applies to X8PL and X5IP Ethernet option cards.

Estimated duration

10 minutes

Start condition

Make sure the following start conditions are fulfilled:

- The procedure in section "Preparation and test of the main unit" (p. 7-5) must have been performed and the test results are correct.
- The ITM-CIT must be connected and logged-in to the NE.
- Ethernet Ports in Auto Negotiation Mode: **Enabled** (Default)

Procedure

Proceed as follows to perform the X8PL and X5IP option card test:

1 Assign the installed option card.

2 Set the alarm LANcNES (LAN Not Expected Input Signal) to "**Reported**".

3 Connect LAN2.1 to LAN2.2 using CAT5 crossed UTP Ethernet cables.

4 Check on the alarm list, and verify that the requirements mentioned in the table below are met.

Result:

Requirements	
LEDs on the 1645 AMC :	
Power LED:	On
Fault LED:	Off
Link LEDs of related LAN ports:	On (green)

Requirements	
Alarms reported on the ITM-CIT:	"LANcNES" reported on LAN2.1 and LAN2.2

Conclusion: If the Fault LED is OFF, then the option card is accepted and the option card software is correctly loaded. If the Link LED comes on and the alarms are reported, then the option card is correctly installed.

5 If a DDF is applicable, then proceed with Step 6. If no DDF is applicable, then proceed with Step 11.

6 Connect LAN2.1 to LAN2.3.

7 Check on the alarm list, and verify that the requirements mentioned in the table below are met.

Result:

Requirements	
Link LEDs of related LAN ports:	On (green)
Alarms reported on the ITM-CIT:	"LANcNES" reported on LAN2.1 and LAN2.3

Conclusion: Results of Step 4 and Step 7 prove that the DDF labeling of LAN2.1, LAN2.2, and LAN2.3 is correct.

8 Connect LAN2.1 to the next LAN port.

9 Check on the alarm list, and verify that the requirements mentioned in the table below are met.

Result:

Requirements	
Link LEDs of related LAN ports:	On (green)
Alarms reported on the ITM-CIT:	"LANcNES" reported on related LAN

10 Repeat Step 8 and Step 9 for all other LAN ports.

11 Disconnect the LAN cable from the LAN ports. Wait until all LANcNES alarms have cleared.

12 Insert a GbE SFP in the SFP slot of the X5IP.

13 Loop the in and out port of the GbE port with a fiber at the Optical Distribution Frame (ODF). Use the correct type. Check the type of SFP (Single mode or multi mode).

14 Check on the alarm list, and verify that the requirements mentioned in the table below are met.

Result:

Requirements	
Link LED of related LAN port:	On (green)
Alarms reported on the ITM-CIT:	“LANcNES” reported on the related LAN

15 Remove the loop fiber from the ODF.

END OF STEPS

Cleaning up

Reset the Alarm Reporting/Severity of the LANcNES alarm type to default (Not Reported).

X10IP option card test

Overview

This test verifies that the Ethernet option card under test is properly installed and that it functions correctly. In case of a DDF, the connections are tested by generating a port alarm. This procedure applies to X10IP Ethernet option card.

Estimated duration

10 minutes

Start condition

Make sure the following start conditions are fulfilled:

- The procedure in section "Preparation and test of the main unit" (p. 7-5) must have been performed and the test results are correct.
- The ITM-CIT must be connected and logged-in to the NE.
- Ethernet Ports in Auto Negotiation Mode: **Enabled** (Default)

Procedure

Proceed as follows to perform the X10IP option card test:

1 Assign the installed option card.

2 Set the alarm LANcNES (LAN Not Expected Input Signal) to "**Reported**".

3 Connect LAN2.1 to LAN2.2 using CAT5 crossed UTP Ethernet cables.

4 Check on the alarm list and verify that the requirements mentioned in the table below are met.

Result:

Requirements	
LEDs on the 1645 AMC :	
Power LED:	On
Fault LED:	Off
Link LEDs of related LAN ports:	On (green)

Requirements	
Alarms reported on the ITM-CIT:	"LANcNES" reported on LAN2.1 and LAN2.2

Conclusion: If the Fault LED is OFF, then the option card is accepted and the option card software is correctly loaded. If the Link LED comes on and the alarms are reported, then the option card is correctly installed.

5 If a DDF is applicable, then proceed with Step 6. If no DDF is applicable, then proceed with Step 11.

6 Connect LAN2.1 to LAN2.3.

7 Check on the alarm list, and verify that the requirements mentioned in the table below are met.

Result:

Requirements	
Link LEDs of related LAN ports:	On (green)
Alarms reported on the ITM-CIT:	"LANcNES" reported on LAN2.1 and LAN2.3

Conclusion: Results of Step 4 and Step 7 prove that the DDF labeling of LAN2.1, LAN2.2, and LAN2.3 is correct.

8 Connect LAN2.1 to the next LAN port.

9 Check on the alarm list, and verify that the requirements mentioned in the table below are met.

Result:

Requirements	
Link LEDs of related LAN ports:	On (green)
Alarms reported on the ITM-CIT:	"LANcNES" reported on related LAN

10 Repeat Step 8 and Step 9 for all other LAN ports.

11 Disconnect the LAN cable from the LAN ports. Wait until all LANcNES alarms have cleared.

12 Insert a GbE SFP in the SFP slot of the X10IP.

13 Loop the in and out port of the GbE port with a fiber at the Optical Distribution Frame (ODF). Use the correct type. Check the type of SFP (Single mode or multi mode).

14 Check on the alarm list, and verify that the requirements mentioned in the table below are met.

Result:

Requirements	
Link LED of related LAN port:	On (green)
Alarms reported on the ITM-CIT:	“LANcNES” reported on the related LAN

15 Remove the loop fiber from the ODF.

END OF STEPS

Cleaning up

Reset the Alarm Reporting/Severity of the LANcNES alarm type to default (Not Reported).

X12SHDSL-V2 option card test

Overview

This test verifies that the X12SHDSL-V2 option card is properly installed and that it functions correctly. In case of a DDF, the correct DDF labeling is checked by means of port alarming.

Estimated duration

12 minutes

Remarks

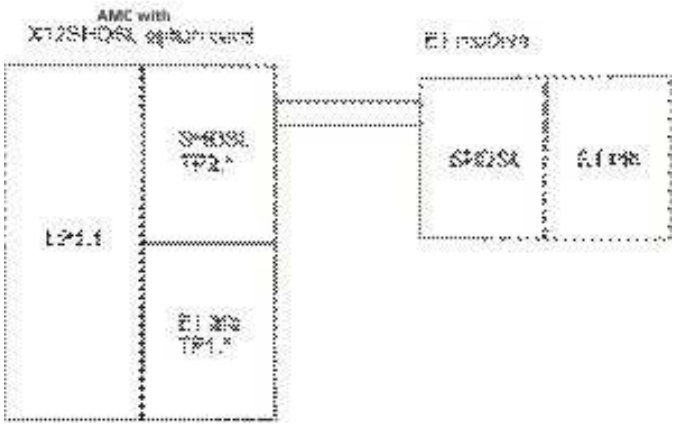
For this test, an SHDSL E1 Modem (TU12/E1) is required. Do not connect it until asked in the procedure.

SHDSL is the same as SDSL. SHDSL refers to the ITU-T standard and SDSL refers to the ETSI standard.

Test setup

The following figure illustrates a possible test setup:

Figure 7-5 X12SHDSL-V2 option card test



Note: For a long haul laser (L12 or L42), a 10 dB attenuator with applicable connector is required in the loop.

Start condition

Ensure that the following start condition is fulfilled:

- The procedure in section "Preparation and test of the main unit" (p. 7-5) must have been performed and the test results are correct.
- X12SHDSL-V2 option card is installed.
- the ITM-CIT is connected and logged-in to the NE
- SHDSL E1 modem power is on.
- Test setup as shown in the figure above.

  Note: The X12SHDSL-V2 option card has 12 ports and 16 connectors, meaning that 4 ports are not used. Connectors 1…4, 7…10, and 13…16 are used for SHDSL ports 1…12.

Procedure

Proceed as follows to perform the X12SHDSL-V2 option card test:

1 Assign the installed option card.

2 Verify that the requirements mentioned in the table below are met.

Result:

Requirements	
LEDs on the 1645 AMC :	
Power LED:	On
Fault LED:	Off
Alarms reported on the ITM-CIT:	No alarms

Conclusion: If the Fault LED is OFF, then the option card is accepted and the option card software is correctly loaded.

3 Set the transport mode of the X12SHDSL-V2 option card. For connecting an E1 modem, select "SHDSL Transport Mode E1" (Go to menu: *Provisioning, Transmission, SHDSL, Transport Mode*, select *Slot TS2*, press *EDIT*, select the correct *Transport Mode*, OK, CLOSE).

4 Set SHDSL tributary port TP2.1 to "Monitored".

5 Connect an E1 modem with an SHDSL cable to TP2.1 or to the related port on the DDF.

6 After a while, an NTU_NDD alarm will raise, indicating a new modem has been detected. Select “Synchronise” from the “NTU (QD2) Node Information” window to align the MIB with this new device.

7 Wait until all alarms are cleared.

8 Set the SHDSL Tributary Port TP2.1 to “Not Monitored”.

9 If a DDF is applicable for this installation, then you have to check the labeling for all ports, repeat Step 4 through Step 8 for all ports.

10 Disconnect the E1 modem from the SHDSL port.

END OF STEPS

NE provisioning and stand alone installation test exit checklist

Checklist

Verify that applicable procedures have been completed and fill-in the results. If a procedure is not applicable, indicate “N/A”.

Procedure	Result (Passed, Failed, N/A)	Initials	Notes
ITM-CIT installation			
NE software installation			
NE login			
Provisioning of the system parameters			
Main unit test			
E1 tributary ports distribution wiring test			
Line port connection to optical distribution frame test			

Procedure	Result (Passed, Failed, N/A)	Initials	Notes
PDH option card test			
Optical STM-1 option card test			
X8PL and X5IP option card test			
X10IP option card test			
X5IP-V2 option card test			
STC-2MB option card test			
X12SHDSL-V2 option card test			

Part III: Link testing

Overview

Purpose

This part of the 1645 AMC Installation Guide contains the physical network installation and the recommended link test procedures.

Contents

This part of the document contains the following chapters:

- Chapter 8:
  Link testing
- Chapter 9:
  Conclusion.

Entry checklist

The following provides a checklist to be completed prior to perform the link 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" (p. 7-28))?			
Is the Element Management System OMS available?			
Is the following test equipment available? • Optical power meter • SDH Analyser			

Contents

8 Link testing

Overview

Purpose

This chapter describes the link acceptance tests.

Contents

Connecting the fiber cables

Related information

The fiber cabling within an NE is described in chapter 4, section "Fiber cabling" (p. 4-35) .

Background information

The 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" (p. B-8).

Procedure

DANGER

Laser hazard

1645 AMC 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" (p. 1-8)).

Proceed as follows to establish a network:

1 Connect an optical fiber to the OUT port of interface LP1.1 or LP1.2.

2 Move to the next NE. At the IN port of the respective optical interface (LP1.1 or LP1.2) 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 input power ranges" (p. 8-3)).

IF...	THEN...
the measured value is within the range,	END OF STEPS
the measured value is not within the range,	choose an appropriate attenuator.

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

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 input power ranges

The following table provides the allowed input power ranges:

Interface	Wavelength [nm]	Allowed range [dBm]
S1.1	1310	–28 ... –8
S4.1	1310	–28 ... –8
L1.1	1310	–34 ... –10
L1.2	1550	–34 ... –8
L4.1	1310	–28 ... –8
L4.2	1550	–28 ... –8

Remote login test

Overview

This test checks whether the management communication channel via the DCC bytes is operational on the link.

Estimated duration

5 minutes

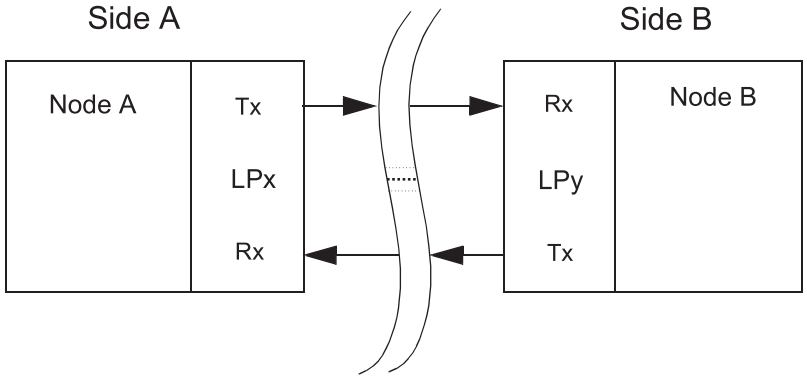
Test setup

Establish a test setup similar to Figure 8-1, “Remote login test” (p. 8-4) .

Be sure that the MS DCC on the line ports of both nodes is set to **Enabled**. For the 1645 AMC node this is default.

(Go to menu: *Management, Overlay Comms Network, DCC,* select **LP1.1 MS**, EDIT)

Figure 8-1 Remote login test



Remark: Node A is expected to be a 1645 AMC node.

Procedure

Proceed as follows to test the DCC communication:

1 With the ITM-CIT login to node A.

2 Check whether you can see the remote node B on the DCC Neighbor list.

(Go to menu: *File*, *NE Login*, *DCC Neighbors List*, click OK.)

3 Do a remote login to node B, and watch the name of node B appear on top of the ITM-CIT window. (Select **LP1.x**, click Login, OK)

4 Verify that the requirement mentioned below is met.

Result:

Requirement
Successfully logged in to Node B

5 Repeat this test for node B (B becomes A, X becomes Y and vice versa).

END OF STEPS

BER test

Overview

This test proves the transmission quality of the link by monitoring one VC channel over a longer period of time.

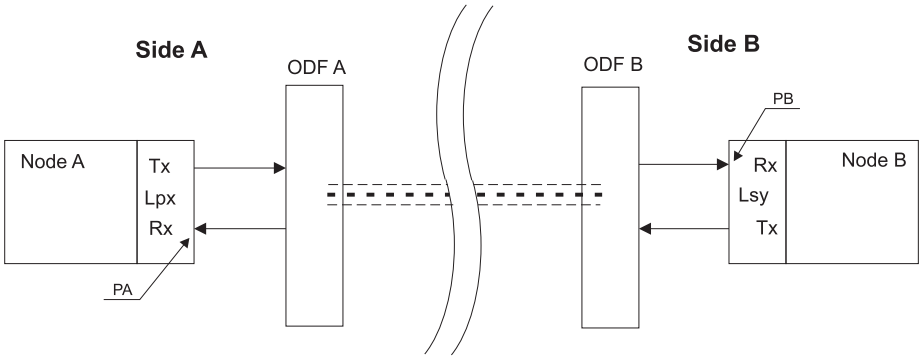
Estimated duration

Preparation time: 5 minutes, test duration: 1 hour.

Test setup

The figure below shows a possible test setup:

Figure 8-2 BER test



Remark: Node A is expected to be a 1645 AMC node.

Procedure

Proceed as follows to perform a BER test:

1 Connect the SDH/PDH analyzer to 2 Mbit/s tributary port TP1.1. Select a 2^{15}-1 PRBS test pattern.

2 Make on node A a bi-directional VC-12 cross-connection from TP1.1 to LP1.x,q (x = physical port, q = VC-4 number).

3 Make on node B a bi-directional VC-12 cross-connection from LPy.1,q to a 2 Mbit/s port. Provision an outloop on this 2 Mbit/s port.

4 Start a bit error performance test for 1 hour.

5 Verify that the requirement mentioned below is met.

Result:

Requirement	
SDH/PDH analyzer:	`No errors` for 1 hour

END OF STEPS

Cleaning up

Perform the following to clean up the system:

- Remove the cross connections made in Step 2 and Step 3.
- Disconnect the SDH/PDH analyzer.

Link testing exit checklist

Checklist

Verify that applicable procedures have been completed and fill-in the results. If a procedure is not applicable, indicate “N/A”.

Procedure	Result (Passed, Failed, N/A)	Initials	Notes
Fiber connection			
Remote login test			
BER test			

9 Conclusion

Overview

Purpose

This chapter provides result tables for entering all measured values, a final checklist and a signoff sheet to be sure that all required tasks described in this manual have been done.

Contents

Power supply measurements

Measured values

	Measured voltage
DC	
AC	

Optical output power measurements

Measured values

AMC unit number	Interface type	Port number	Mean launched power [dBm]	Receiver sensitivity [dBm]

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.

Appendix A: Mounting rules

Overview

Purpose

This chapter provides important mechanical mounting rules which must be observed during physical installation.

General rules

The following rules must be observed in general:

- If any other equipment than AMC unit is mounted within the same rack, it is highly recommended that a heat baffle (408905057) is mounted between the AMC unit and the other equipment to assure thermal separation of the units.
- If the installation cannot guarantee proper air flow for cooling, it is recommended to use AMC units with mounted fan units.
- The unit ventilation holes must not be covered.
- In the case of vertical unit mounting, the power connectors of the units must show always to the bottom due to thermic requirements.

Contents

AMC units (DC powered)

Horizontal rack mounting

Please observe the following rules for horizontal rack mounting:

- The units should be distributed equally within the rack.
- The minimum distance between two units must be 330 mm [12.992"] (measured from top of the lower unit to bottom of the upper unit).
- A maximum of 5 units can be mounted within one rack.

Vertical rack mounting

Please observe the following rules for vertical rack mounting:

- A maximum of 10 units (2 blocks - 5 units) can be mounted within one rack. In that case a heat baffle should be placed in the middle of the rack as shown in the figures below.
- The minimum distance between two blocks must be 400 mm [15.748"] if no heat baffle is used (measured from top of the lower block to bottom of the upper block).

AMC units (AC powered)

Horizontal mounting

Please observe the following rules for horizontal rack mounting:

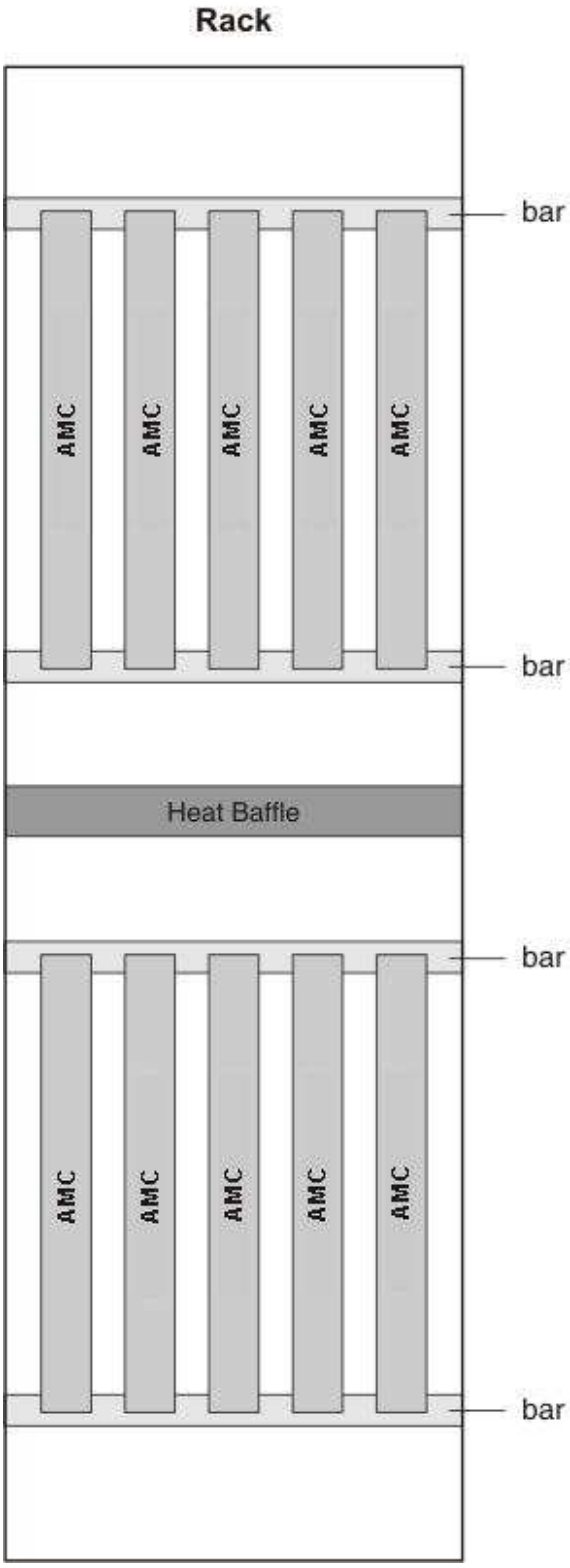
- The units should be distributed equally within the rack.
- The minimum distance between two units must be 330 mm [12.992"] (measured from top of the lower unit to bottom of the upper unit).
- A maximum of 5 units can be mounted within one rack.

Vertical rack mounting

Please observe the following rules for vertical rack mounting:

- A maximum of 10 units (2 blocks - 5 units) can be mounted within one rack. In that case, a heat baffle must be placed in the middle of the rack as shown in the figure below.

Figure A-1 Vertical mounting (AMC, AC)



Appendix B: Installation trouble shooting

Overview

Purpose

This chapter provides basic installation troubleshooting information for the 1645 AMC system.

Contents

Power failure

Overview

The procedures described below should be performed if the 1645 AMC powering procedure was unsuccessful (see chapter 5, section “Switching on and testing supply voltage” (p. 5-3)).

Procedure 1 should be used if the “Power” LED does not light up on the 1645 AMC unit.

Procedure 2 should be used if the fans in the fan unit are not running.

Procedure 1

Follow the steps below if the “Power” LED does not light up on the 1645 AMC unit:

1 Switch the power off.

2 Replace all affected power cables between the BDFB (or PDP) and the 1645 AMC unit. Make sure that the cables are tight afterwards.

3 Switch the power on.

IF ...	THEN ...
the “Power” LED does not light up on the unit,	switch the power off and replace the unit.
the “Power” LED lights up on the unit,	END OF STEPS

END OF STEPS

Procedure 2

Follow the steps below if the fans of the fan unit are not running:

1 Switch the power off.

2 Replace all affected power cables between the BDFB (or PDP) and the fan unit. Make sure that the cables are tight afterwards.

3 Switch the power on.

IF ...	THEN ...
the fans of the fan unit are not running,	switch the power off and replace the fan unit.
the fans of the fan unit are running,	END OF STEPS

END OF STEPS

Installing the NE software

Overview

The procedures described below must be performed in case of a software download failure occurred with the fast download application or if the fast download application cannot be used.

For installing the NE software manually, the following two procedures must be performed:

- NE software download into an NE
- Switch the Software Stores of the NE.

These procedures can also be performed separately.

Before you begin

Before starting the NE software download make sure:

- the required controller software is available on the management system or on floppy disk.
- there is sufficient time to complete the procedure. The procedure lasts about one hour.
- not to download software into the backup store while the active store is not committed. As long as the active store is not committed the NE may perform an automatic switch.
- not to forget to commit the software after performing a switch. If this is not done the NE will switch back to the previous active software after 2 hours.

Related information

Parameters used in this procedure can be found in section "Parameters for NE software installation" (p. B-6).

NE software download

Proceed as follows to perform the NE software download:

1 Select **`Provisioning → Equipment → NE Software Configuration`**.

Result: The *NE Software Configuration* window appears with information about the software currently stored in the active and backup store of the NE.

2 Click **`Edit`**.

Result: The *Edit NE Software Configuration* window appears.

3 Click **Download.**

Result: A window appears allowing for the selection of the appropriate file to be downloaded.

4 Browse to the folder where the NE software is stored. The NE software can be downloaded either from floppies or from the hard drive in the PC. Select the file containing the NE software and click **Open**.

Result: The *Software Download Progress Display* window appears and the progress of the software download is displayed.

To abort the NE software download click **Abort**.

END OF STEPS

Switch the software stores of the NE

Proceed as follows to switch the software stores of a NE:

1 Determine whether the MIB (Management Information Base) is compatible with the NE software. If the MIB is not compatible, the MIB cannot be retained and must be provisioned again with new settings after the software switch.

2 Select **Provisioning → Equipment → NE Software Configuration**.

Result: The *NE Software Configuration* window appears with information about the software currently stored in the active and backup store of the NE.

3 Click **Edit.**

Result: The *Edit NE Software Configuration* window appears. Check if the correct software version is stored in the backup store. After the switch, this will be the active software running the NE.

4 Fill in the Retain MIB check box if the information in the MIB should be saved. This is only possible if the MIB is compatible with the NE software. Not retaining the MIB means that the NE must be provisioned again with the new settings.

Click **Switch**.

Result: A confirmation window appears.

5 Click **Yes**.

Result: The active and backup stores are switched. The ITM-CIT loses its connection to the network element. The NE resets. This takes about 10 minutes.

6 Login to the NE again and select **Provisioning** → **Equipment** → **NE Software Configuration** again.

Result: The NE is now using the software that was previously in the backup store. The *NE Software configuration* window shows that the current content of the active and backup store. The *Active Store State* is *Store Active Not Committed*. If the NE software in the active store is not committed within 2 hours, the NE will switch the stores back to its previous settings.

7 Select **Edit** and click **Commit** in the *Edit NE Software configuration* window.

Result: The software in the active store is committed. The *Active Store State* becomes *Store Active*. The NE will not switch back to its previous settings.

END OF STEPS

Parameters for NE software installation

Introduction

The following parameters are used for the NE software installation.

Active store

The software version of the executing code of the software loaded in the NEs active store is described by four codes.

Code	Description
Actual Item Code	A code used to uniquely identify any system component.
Interchangeability Marker	An identification mark to indicate interchangeability among components
Serial Number	A number that indicates the sequence number and the year, date and location of manufacture.
Comcode	A code which identifies the component.

Backup store

Shows the software load that is now stored in the backup store. The same codes are used as in the active store.

Active store state

The following table shows the possible values:

Value	Description
Store Active	Memory contains a valid code that is being executed.
Store Active Not Committed	If no association is made between the management system and the NE after a software switch. The software that was active before the switch is now in the backup store. If the association is not made within 2 hours after the switch, the system will switch the stores back so that the previous active software is made active again. Therefore, it is not wise to download software while the active store is in this state.

Backup store state

The state of the backup store can have the following values:

Value	Description
Store Error	Memory has corrupted data.
Store Clearing	After the download command has been given, the inactive store is cleared first. When the backup store is in this state, the NE software download cannot be aborted. To abort the NE software download, wait until the backup store state is *Store Downloading.*
Store Empty	The clearing of the store has been successful and new software will now be downloaded.
Store Downloading	Code is being downloaded to the memory.
Store Inactive	Memory contains valid code that is not being executed.

Fiber cleaning

Overview

This procedure describes the Alcatel-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 end faces 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 fiber cables please observe the following safety warnings:

DANGER

Laser hazard

Never look into the end of an exposed fiber or plug-in optical connectors as long as the optical source is switched on.

NOTICE

Cable break

To avoid cable break ensure that the bending radius of optical fiber cables is not less than 38 mm [1.5 inches] or 20 times the diameter of the cable (whichever is greater).

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 Allow the connector face to dry in air. (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 through 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 in light.

END OF STEPS

Removing the SFP modules

Overview

The procedures described below provide removal instructions for the following SFP types:

- MSA latch (type 1)
- MSA latch (type 2)
- Bail latch “bottom up” (= type 1)
- Bail latch “top down” (= type 2).

Safety

NOTICE

ESD hazard

Electronic components can be destroyed by electrostatic discharge.

Hold SFPs only at the edges. Always observe the ESD instructions (cf. “Option card and SFP handling” (p. 2-10)).

MSA latch (type 1)

Proceed as follows to remove this type of SFP:

1. Put the fibers away from the transceiver.

2. Slide the bar back by using a screwdriver (see figure below).

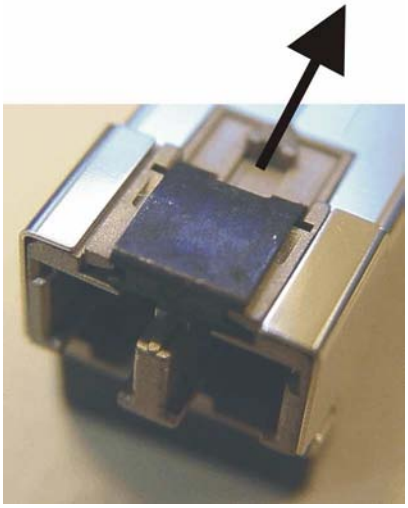
   Result: There should be a small click, or it should be visible that the transceiver was moved a bit out of its latch.

3. Grip the SFP transceiver with your fingers and pull it out.

END OF STEPS

Figure

Figure B-1 Unlocking a MSA latch (type 1) SFP



MSA latch (type 2)

Proceed as follows to remove this type of SFP:

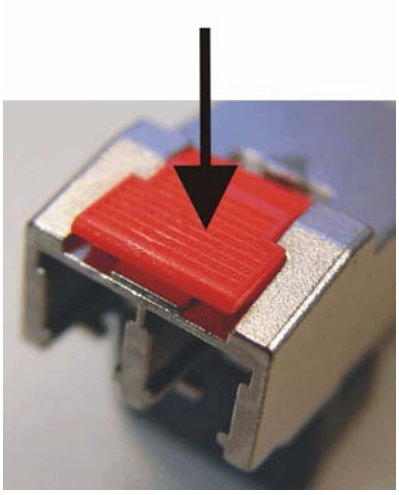
1 Put the fibers away from the transceiver.

2 Press on top of the locking device and pull the SFP out with your fingers (see figure below).

END OF STEPS

Figure

Figure B-2 Unlocking a MSA latch (type 2) SFP



Bail latch (type 1)

Proceed as follows to remove this type of SFP:

1 Put the fibers away from the transceiver.

2 Move the bail downwards (see figure below).

Result: There should be a small click, or it should be visible that the transceiver was moved a bit out of its latch.

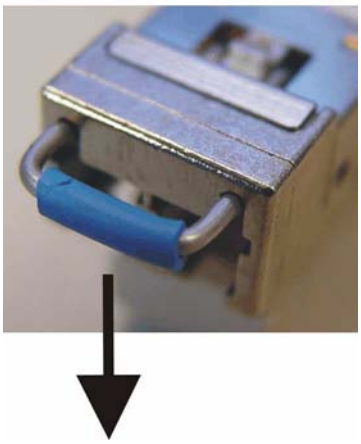
3 Grip the SFP transceiver with your fingers and pull it out.

Important! Do not pull the bail to get the transceiver out, as it might be torn away from the SFP.

END OF STEPS

Figure

Figure B-3 Unlocking a bail latch (type 1) SFP



Bail latch (type 2)

Proceed as follows to remove this type of SFP:

1 Put the fibers away from the transceiver.

2 Move the bail upwards (see figure below).

Result: There should be a small click, or it should be visible that the transceiver was moved a bit out of its latch.

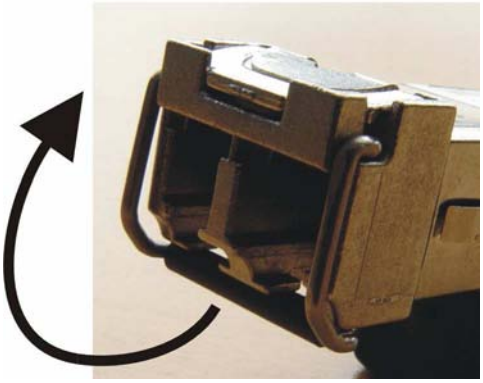
3 Grip the SFP transceiver with your fingers and pull it out.

Important! Do not pull the bail to get the transceiver out, as it might be torn away from the SFP.

END OF STEPS

Figure

Figure B-4 Unlocking a bail latch (type 2) SFP



Appendix C: Cable assembly instructions

Overview

Purpose

This appendix contains general cable assembly instructions.

Contents

SUB-D connector

Description

The amphenol metallic hoods for SUB-D connectors protect cable assemblies from magnetic and radio interferences.

These hoods are easily assembled and suitable for all industrial and telecom applications.

Assembly instructions

Please observe the following SUB-D assembly instructions:

1 **Important!** Protect the braid by stripping.

Strip the cable as necessary.

2 Prepare the braid as shown in Figure C-1, “SUB-D assembly steps” (p. C-3).

3 Solder the wires to the pin contacts.

4 Put the ferrules around the braid on the cable.

Important! Shape the strands of braid into two pigtails and bend these pigtails back 180 degrees over the ferrule.

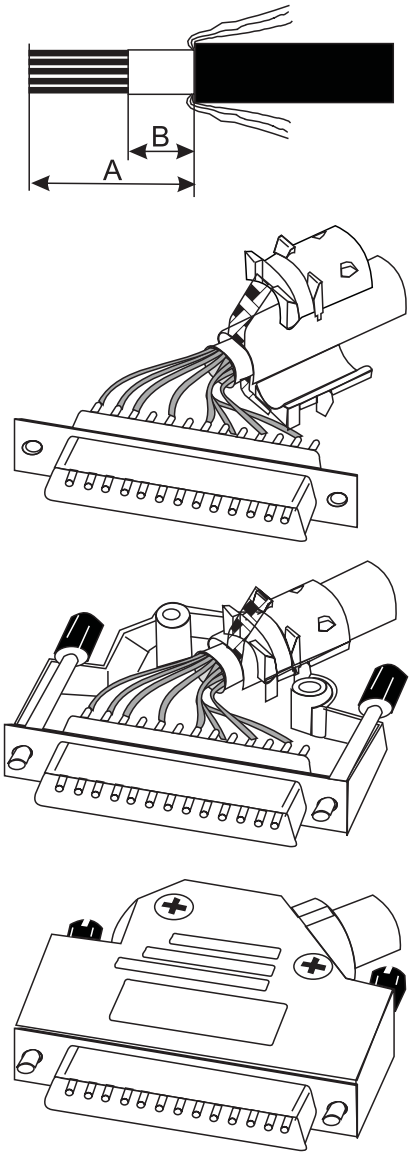
5 Insert the cable with the ferrule into the SUB-D connector.

6 Close the connector by tightening the screws.

END OF STEPS

Figure

Figure C-1 SUB-D assembly steps



Soldering the ground wire

Proceed as follows to solder the ground wire:

1 Turn the stripped end of the ground wire around the braid before soldering the ground wire to the braid.

Refer to "Stripping and connecting a low frequency cable" (p. C-4).

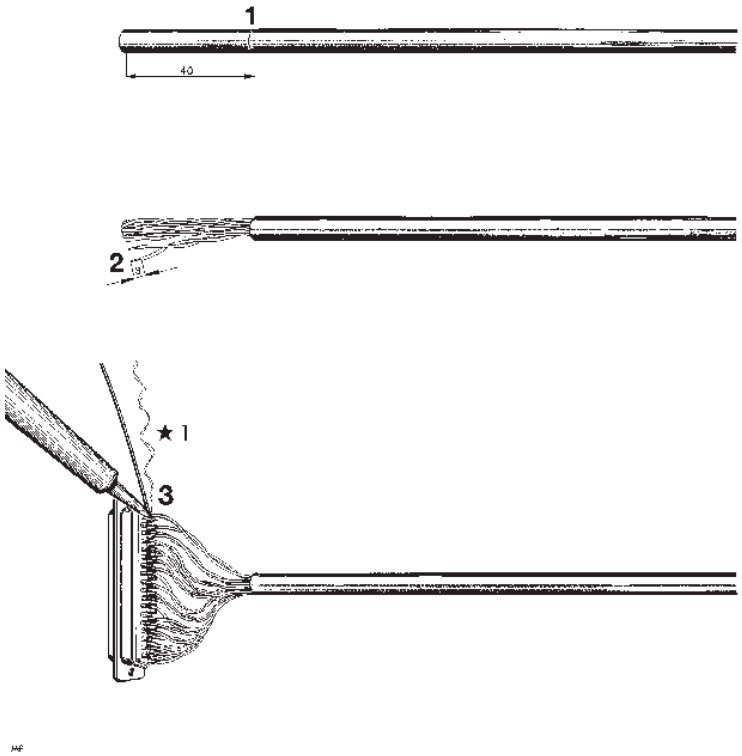
END OF STEPS

Stripping and connecting a low frequency cable

Proceed as follows to strip and connect a low frequency cable:

1 Follow the steps sequentially as shown in the figure below to perform this procedure.

Figure C-2 Low frequency cable



Legend:

*1 The maximum power of the soldering iron is 50 W. If the temperature is adjustable, it should be adjusted to a maximum of 350°.

END OF STEPS

Coax connector (1.6/5.6)

Description

There are the following type of connectors:

- IMS — type 3320.52.1420.0D5 (45°)
- IMS — type 2630.52.1310.0D5 (Straight)

IMS

Important! Use of the correct tools to ensure a proper connection.

Proceed as follows to assemble a coax 1.6/5.6 connector:

1 Strip the cable according to the dimensions indicated in the next figure and tin the center conductor.

Important! The stripping lengths depend on the used connector type.

2 Pull the crimp outer ferrule over the stripped cable.

3 Pull back the cable braid.

4 Push the center conductor and the dielectric into the connector housing until the dielectric stops.

5 Solder the inner conductor to the center contact of the connector housing.

6 After soldering, press the cover into the connector body.

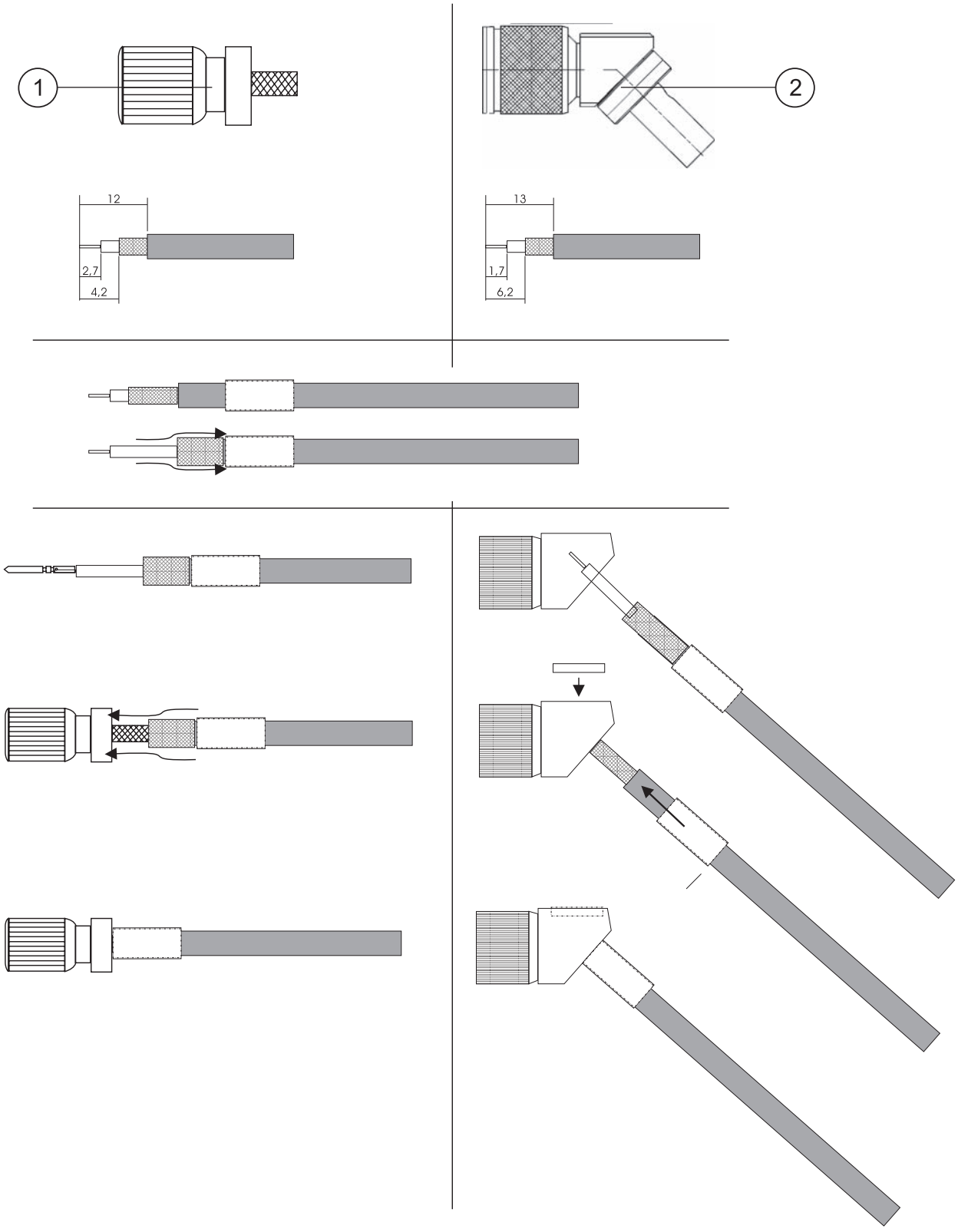
7 First roll the cable braid over the termination part (inner ferrule) of the connector and pull the crimp outer ferrule over that braid.

8 Crimp the outer ferrule with a hexagon die 4.6 — AGK 3068 by using the Crimp Tool — AGK 2365.

END OF STEPS

Result

Figure C-3 IMS assembly procedure

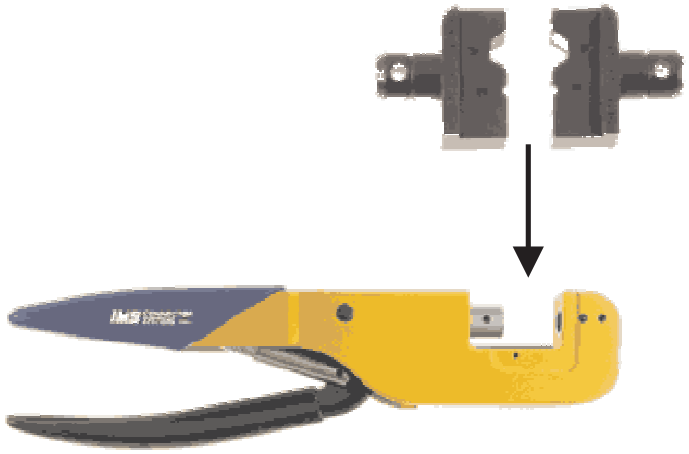


Legend:

1	Coax 1.6/5.6 connector (straight) — CC408663482
2	Coax 1.6/5.6 connector (45°)

Crimp tool

Figure C-4 Crimp tool and die



Legend:

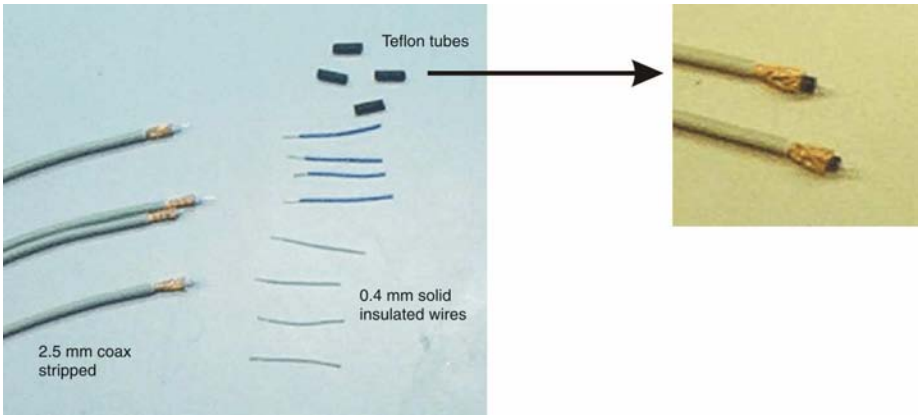
1	Crimp tool — AGK 2365
2	Hexagon die 4.6 — AGK 3068, or square 1.2

Mounting 4 × 2.5mm coax (75 Ω) to RJ45 connector

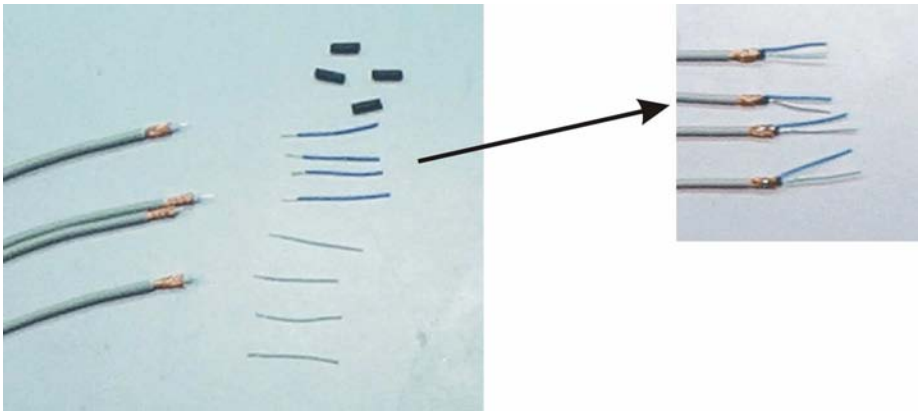
Assembly instructions

Please observe the following assembly instructions:

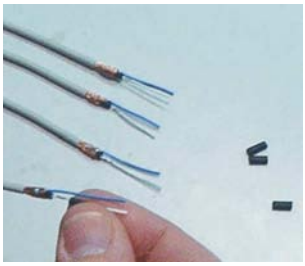
1 Mount the teflon tube under the coax braid.



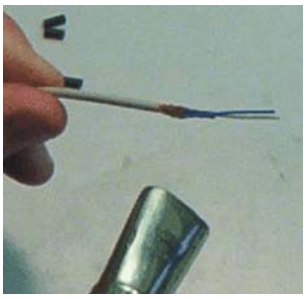
2 Solder wires to the braid and core wire.



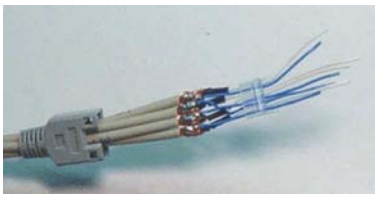
3 Move the shrink tube over the soldered core wire.



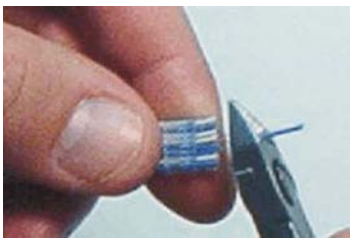
4 Shrink the tube.



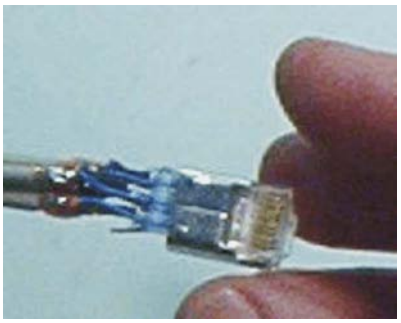
5 Position the wires with a liner block.



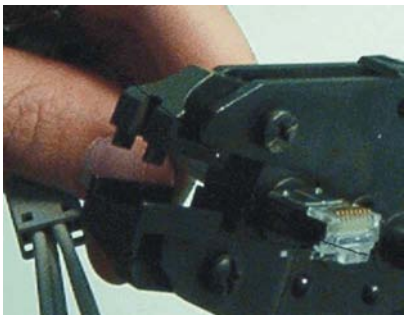
6 Cut the wires to the appropriate length.



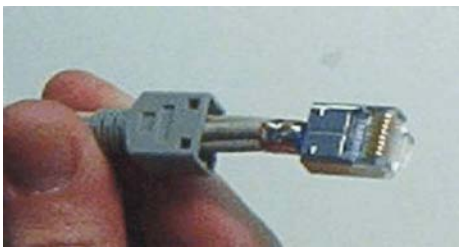
7 Plug the wire ends into a RJ45 housing.



8 Crimp braid.



9 Move the cover forward.

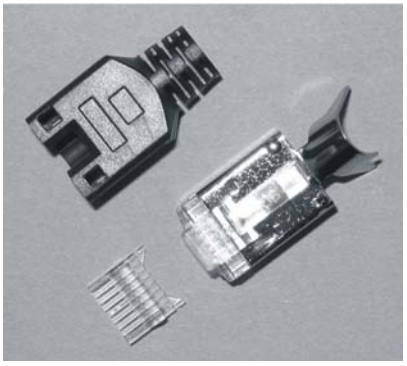


END OF STEPS

RJ45 connector

It is recommended to use an RJ45 connector with EMC shield and strain relief as shown below (CC408899888).

Figure C-5 RJ45 connector



Glossary

Numerics

12 digit Numerical Code (12NC)
Used to as the unique identifier of an item or product. The first ten digits identify an item. The eleventh digit specifies the particular variant of the item. The twelfth digit indicates the revision issue. Items for which the first eleven digits are the same are functionally equal and may be exchanged.

A

AC
Alternating Current

ADM
Add-Drop Multiplexer

Administrator
See OMS System Administrator.

Alarm
The notification (audible or visual) of a significant event. See also Event.

B

BDFB
Battery Distribution and Fuse Bay

Bit Error Ratio (BER)
The ratio of bits received in error to bits sent.

C

CAT
CATastrophic

CC
Cross-Connection, Cross-Connect

CCITT
See ITU-T.

Circuit

A combination of two transmission channels that permits bidirectional transmission of signals between two points to support a single communication.

CIT

Craft Interface Terminal

Client

Computer in a computer network that generally offers a user interface to a server. See also Server.

CO

Central Office

CP

Circuit Pack

Craft Interface Terminal (CIT)

Local manager for SDH network elements.

D

Data Communication Channel (DCC)

The embedded overhead communication channel in the SDH line. The DCC is used for end-to-end communication and maintenance. It carries alarm, control, and status information between network elements in an SDH network.

DC

Direct Current

DCN

Data Communications Network

DDF

Digital Distribution Frame

E

Element Management System (EMS)

See Integrated Transport Management Subnetwork Controller.

EMC

Electromagnetic Compatibility

EMI

Electromagnetic Interference

EOW

Engineering Order Wire

ESD

Electrostatic Discharge

ETSI

European Telecommunication Standardization Institute

G

Gbit/s

Gigabits per second

GUI

Graphical User Interface

I

I/O

Input/Output

IEC

International Electrotechnical Committee

IEEE

Institute of Electrical and Electronic Engineers

Integrated Transport Management Craft Interface Terminal (ITM-CIT)

Local manager for SDH network elements in a subnetwork. Also called the to as Craft Interface Terminal.

ISO

International Standards Organisation

ITU

International Telecommunications Union

ITU-R

International Telecommunications Union - Radio standardization sector. Formerly known as CCIR: Comité Consultatif International Radio; International Radio Consultative Committee.

ITU-T

International Telecommunications Union - Telecommunication standardization sector. Formerly known as CCITT: Comité Consultatif International Télégraphique& Téléphonique; International Telegraph and Telephone Consultative Committee.

L

LAN

Local Area Network

LBO

Line Build Out - An optical attenuator that guarantees the proper signal level and shape at the receiver input.

LED

Light Emitting Diode

Line

Transmission line; refers to a transmission medium, together with the associated high speed equipment, that are required transport information between two consecutive network elements, one of which originates the line signal and the other terminates the line signal.

Line Build Out (LBO)

An optical attenuator that guarantees the proper signal level and shape at the receiver input.

LTU

Line Termination Unit.

M

Manager

Capable of issuing network management operations and receiving events. The Manager communicates with the Agent in the controlled network element.

MDI

Miscellaneous Discrete Input

MDO

Miscellaneous Discrete Output

MIB

The Management Information Base is the database in the node. The MIB contains the configuration data of the node. A copy of each MIB is available in the EMS and is called the MIB image. Under normal circumstances, the MIB and MIB image of one node are synchronized.

MSP

Multiplex Section Protection. Provides capability of switching a signal from a working to a protection section.

MTBF

Mean Time Between Failures

Multiplexer Section Protection (MSP)

Provides capability of switching a signal from a working to a protection section.

Multiplexer Section Shared Protection Ring (MS-SPRING)

A protection method used in multiplex line systems.

N

NE

Network Element. The NE is comprised of telecommunication equipment (or groups/parts of telecommunication equipment) and support equipment that performs network element functions. A Network Element has one or more standard Q-type interfaces.

Node

A node or network element is defined as all equipment that is controlled by one system controller.

Non-revertive switching

In non-revertive switching, there is an active and standby high-speed line, circuit pack, etc. When a protection switch occurs, the standby line, circuit pack, etc., is selected causing the old standby line, circuit pack, etc., to be used for the new active line, circuit pack, etc. The original active line, circuit pack, etc., becomes the standby line, circuit pack, etc. This status remains in effect when the fault clears. Therefore, this protection scheme is “non-revertive” in that there is no switch back to the original status in effect before the fault occurred.

NTU

Network Termination Unit

O

OC-n

Optical Carrier, Level n

ODF

Optical Distribution Frame

OI

Optical Interface

OMS Administrator

See OMS System Administrator.

OMS System Administrator

A user of the OMS application with System Administrator privileges. See also User Privilege.

Operator

A user of the OMS application with Operator privileges. See also User Privilege.

OS

Operations System - A central computer-based system that is used to provide operations, administration and maintenance functions.

OSI

Open Systems Interconnection

OW

(Engineering) Order Wire

P

Path

A logical connection between one termination point at which a standard format for a signal at the given rate is assembled and from which the signal is transmitted, and another termination point at which the received standard frame format for the signal is disassembled.

PC

Personal Computer

PCB

Printed Circuit Board

PDH

Plesiochronous Digital Hierarchy

PDP

Power Distribution Panel

Q

Q-LAN

Thin Ethernet LAN (10BaseT) that connects the manager to gateway network elements so that management information can be exchanged between network elements and management systems.

S

SC

Square coupled Connector

SDH

Synchronous Digital Hierarchy. Definition of the degree of control of the various clocks in a digital network over other clocks.

SDSL

Symmetrical single pair high bit rate Digital Subscriber Line (name used by ETSI)

SFP

Small Form-Factor Pluggable Optics

SH

Short Haul

SHDSL

Single-pair High-speed Digital Subscriber Line (name used by ITU-T)

STM

Synchronous Transport Module Building block of SDH.

Supervisor

A user of the OMS application with Supervisor privileges. See also User Privilege.

System Administrator

A user of the computer system on which the OMS application can be installed. See also User Privilege.

T

TCP/IP

Transmission Control Protocol/Internet Protocol

TMN

Telecommunications Management Network

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.

U

UTP

Unshielded Twisted Pair

Index