iPasolink Installation and Commissioning Guide

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Warning and Disclaimer

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Technical Support Information

NEC Corporation customers can contact NEC Corporation Support Center (TSC) 24x7x365 for any assistance through helpline, fax or email.

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Revision History

Version	Date	Modifications Made
0.1	24 May 2011	Alpha Draft
0.2	25 May 2011	Preliminary Draft
0.3	21 June 2011	Beta Draft

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Your opinion is of great value and will help us improve the quality of our product documentation and offer better services to you. Please take few moments to provide us your opinion of this document.

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<tr><td rowspan="6">Your evaluation of this document</td><td colspan="6">Presentation: (Introductions, Procedures, Illustrations, Completeness, Level of Detail, Organization, Appearance)</td></tr>
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<tr><td rowspan="5">Your suggestions for improving this document</td><td>☐ Improve the overview/introduction</td><td colspan="2">☐ Make it more concise/brief</td><td colspan="3">☐ Improve the Contents</td></tr>
<tr><td>☐ Add more step-by-step procedures/ tutorials</td><td colspan="2">☐ Improve the organization</td><td colspan="3">☐ Add more troubleshooting information</td></tr>
<tr><td>☐ Include more figures</td><td colspan="2">☐ Make it less technical</td><td colspan="3">☐ Add more examples</td></tr>
<tr><td>☐ Add more/better quick reference aids</td><td colspan="2">☐ Add more detail</td><td colspan="3">☐ Improve the index</td></tr>
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If you wish to be contacted regarding your comments, please provide your contact details:

Name:		**Company:**	
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NOTE: THE NEC iPASOLINK 5.8 GHz RADIOS MUST BE PROFESSIONALLY INSTALLED AND ARE THEREFORE EXEMPT FROM THE ANTENNA RESTRICTIONS (FCC PART 15.203).

NOTE: THE NEC iPASOLINK 5.8 GHz RADIOS USE QAM MODULATED SIGNALS AND IT IS CERTIFIED FOR OPERATION UNDER PART 15.247 OF THE FCC REGULATIONS. THE NEC iPASOLINK 5.8 GHz RADIO IS DESIGNED TO OPERATE IN A POINT-TO-POINT COMMUNICATIONS LINK USING THE 5.725 – 5.850 GHz BAND. THE RADIO WILL PROVIDE A TRAFFIC CAPACITY OF 155 MBP/S USING 128 OR 256 QAM MODULATION. THE NEC iPASOLINK 5.8 GHz RADIOS ARE NOT DESIGNED TO BE INSTALLED OR USED BY THE GENERAL PUBLIC, THE INSTALLATION REQUIREMENTS ARE SUCH THAT CONSUMERS OR BUSINESS PERSONS DO NOT HAVE THE TECHNICAL SKILLS TO PROPERLY INSTALL AND COMMISION THE iPASOLINK RADIO. NOTE: THE NEC iPASOLINK 5.8 GHz RADIO WILL BE SOLD NY NEC CORPORATION OF AMERICA AND IT'S SALESPERSONS OR AUTHORIZED AGENTS ONLY, AND WILL BE INSTALLED BY TRAINED PROFESSIONAL PERSONNEL.

NOTE: THE NEC iPASOLINK 5.8 GHz RADIOS WILL BE USED FOR FIXED POINT TO POINT APPLICATIONS. THE iPASOLINK RADIO UTILIZES A PARABOLIC ANTENNA THAT REQUIRES PROFESSIONAL INSTALLERS FOR PATH ALIGNMENT.

WARNING: THE MAXIMUM RF TRANSMIT POWER OF THE NEC iPASOLINK 5.8 GHz RADIO IS 1.0 WATT (+30.0 dBm). THE TECHNICIAN CAN SET THE OUTPUT POWER FROM +10 dBm TO +30 dBm DURING INSTALLATION. THE METHOD OF ADJUSTING THE OUTPUT POWER IS DESCRIBED IN SECTION III OF THE INSTALLATION MANUAL AND REQUIRES THE USE OF A LAPTOP COMPUTER. THE NEC iPASOLINK 5.8 GHz RADIO IS SOLD WITHOUT ANTENNAS AND SUPPORTING HARDWARE.

WARNING: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTE: This equipment complies with the FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 187.93 centimeters between the radiator and your body.

NOTE: The antennas used for this transmitter must be installed to provide a separation distance of at least 187.93cm from all persons and must not be located or operating in conjunction with any other antenna or transmitter.

NOTE: To comply with FCC RF exposure compliance requirements, a separation distance of at least *187.93cm* must be maintained between the user and antenna when the product is used with a parabolic 31dBi antenna in point-to-point applications.

Chapter 1

Using this Guide

This section describes who should read this guide, how it is organized, and what conventions are used in the document.

Who This Guide Is For

This document is intended for Technician or Field engineers who install and commission hardware or software on the customer premises.

What This Guide Covers

This document provides information to install the product and to initially configure the product to the point of verifying proper operation of the product in the network. The information provided in this document includes hardware/software installation, provision specific protocols, user accounts, services, interfaces, and related items to support the design of the network, and/or the network application in which the product is installed. This document does not cover installation of racks, electrical wiring, raceways, and other supporting equipments.

What You Should Already Know

Before you read this Guide you need to be comfortable installing and commissioning hardware or software on the customer premises. You must have prior experience handling equipment under variety of circumstances.

Personnel working directly on equipment must be:

- Trained, authorized, and qualified to carry out the tasks required.
- Able to follow safety guidelines specific to the product and all local customer-specific safety procedures.

Safety Signs Conventions

To prevent personal injury, equipment damage, and service interruptions, you must follow all precautionary messages given in the document in addition to all the local safety standards required by your company. The following symbols inserted in the document at various places represent important situations.

Symbols	Meaning	Represents
	Caution	Situations that could result in equipment damage or loss of data.
	Danger	Situation that could cause bodily injury. Failure to observe this precaution may result in personal injury, death, or equipment damage.
	Hot Surface	Situation that could result in bodily burns.
	Optical Safety	Staring directly into the optical connector output beam may cause irreparable damage to your eyes and even leading to loss of eye sight.
	Electric Shock Risk	Failure to observe this precaution may result in personal injury, death, or equipment damage.
	Static Discharge Warning	Handle the equipment wearing a grounding wrist strap to discharge the static buildup. Failure to observe this precaution may result in equipment damage.

Typographical Conventions

Before you start using this guide, it is important to understand the terms and typographical conventions used in the document. The following kinds of formatting in the text identify special information.

Formatting Convention	Type of Information
▶ *Procedures*	Step-by-step procedures. You can follow these instructions to complete a specific task.
Special Bold	Items you must select, such as menu options, command buttons, or items in a list.
Emphasis	Use to emphasize the importance of a point or for variable expressions such as parameters.
CAPITALS	Names of keys on the keyboard, for example, SHIFT, CTRL, or ALT.
KEY+KEY	Key combinations for which the user must press and hold down one key and then press another, for example, CTRL+P, or ALT+F4.
NOTE:	Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

Mouse Operation Conventions

Convention	Description
Click	Refers to pressing and releasing a mouse button to select a screen object.
Double-click	Refers to pressing and releasing a mouse button twice in succession while the cursor is positioned over an object on-screen.
Drag	Refers to the function of the mouse by which an element on the screen of a monitor is moved with the cursor, while holding down the mouse button and moving the mouse.
Right-click	Refers to pressing the right button on a two-button mouse.
Wheel button	Refers to the third (middle) button on the mouse.

Chapter Organization

The rest of this document is organized as follows:

Chapter	Scope
Understanding Installation and Commissioning Process see "**Understanding Installation, Commissioning, and Testing Process**" on page 17	This chapter provides an overview of the Installation, Commissioning, and Testing process flow of iPasolink network element.
Observing Safety Guidelines on page 21	This chapter contains safety guidelines that you must follow for personal safety and to operate the iPasolink network element correctly. It also describes about the site environment and instructions to be followed during site preparation and equipment rack configuration.
Receiving and Unpacking Network Element on page 31	This chapter describes the procedures to be followed during receiving and unpacking of the iPasolink network element. It includes shipment verification, handling packages, and unpacking the equipment.
Installing the Network Element on page 37	This chapter describes procedures to be followed when installing iPasolink network element. It includes preparing site for installation, installation guide lines, installing network element into the rack, connecting power cables and grounding cables.
Installing OAM Interfaces on page 41	This chapter describes the OAM interface configuration supported in iPasolink network element.
Installing PDH Cards on page 45	This chapter describes the PDH card configuration supported in iPasolink network element.
Installing Optical Cards on page 49	This chapter describes the optical card configuration which includes STM-1/4 connections.
Installing Ethernet Card on page 51	This chapter describes the Ethernet configuration which includes GbE connection.
Node Commissioning on page 53	This chapter describes the commissioning procedures that have to be performed on a newly installed iPasolink network element. It includes logging into a uncommissioned network element, downloading software from SLAT page, setting Ethernet parameters, setting network element date and time, and nominating synchronization clock reference for the network element.
Recording Data and Test Results on page 61	This appendix provides various forms to record system data and test results during the commissioning process.
General Configuration on page 67	This appendix describes the general procedures for configuring iPasolink network element. It includes switching ON the node and PC configuration, logging into the network element, configuring optical ports, OSPF, Ethernet ports, VCG ports, timing manager, and checking alarms.

General Procedures on page 75	This chapter describes the procedures to be followed when cleaning and inspecting optical and fiber connectors. It also describes the procedure to be followed during inserting and ejecting of cards.
Connector Pin Assignment on page 85	This appendix provides connector pin details used for installing the network element.

Using NEC Corporation Product Documentation

The following NEC Corporation product documentation set helps you use the range of NEC Corporation products:

▶ The *Hardware Description Guide* explains hardware configuration, functions, capabilities, limitations, and physical characteristics of the product.

▶ The *Installation and Commissioning Guide* provides information on installing the product and to initially configuring it to the point of verifying its proper operation in the network.

▶ The *User Interface Guide* introduces and orients service providers to the content, function, and organization of the user interface that support the network elements.

▶ The *Planning guide* provides information about the features, configurations, engineering guidelines and applications of NEC Corporation products.

All documents for the shelf are referred to as NEC Corporation technical publications. Each document has a unique thirteen-digit identification number called NEC Corporation Part Number (TPN). This number is used to identify each document, and assist in cross-referencing from one document TPN to another.

The TPN is found on the cover page and at the top of every even page in a document.

Related Documents

This document needs to be used in conjunction with the following documents.

Document Name	NEC Corporation Part Number	Description
iPasolink Hardware Description Guide	141-DOC000007-E	This document provides information to install the product and to initially configure the product to the point of verifying proper operation of the product in the network.
iPasolink User Interface Guide	141-DOC000009-E	This document introduces and orients service providers to the content, function, and organization of the user interface that support the network elements.
iPasolink L2 Services User Interface Guide	141-DOC000010-E	This document introduces and orients service providers to the content, function, and organization of the L2 services user interface that support the network elements.

Chapter 2

Understanding Installation, Commissioning, and Testing Process

This chapter describes procedure followed during installation and commissioning process of iPasolink network element.

IN THIS CHAPTER

Installation and Commissioning Process Overview

The flowchart below shows the installation and commissioning process.

Figure 1: Installation and Commissioning Process Flow
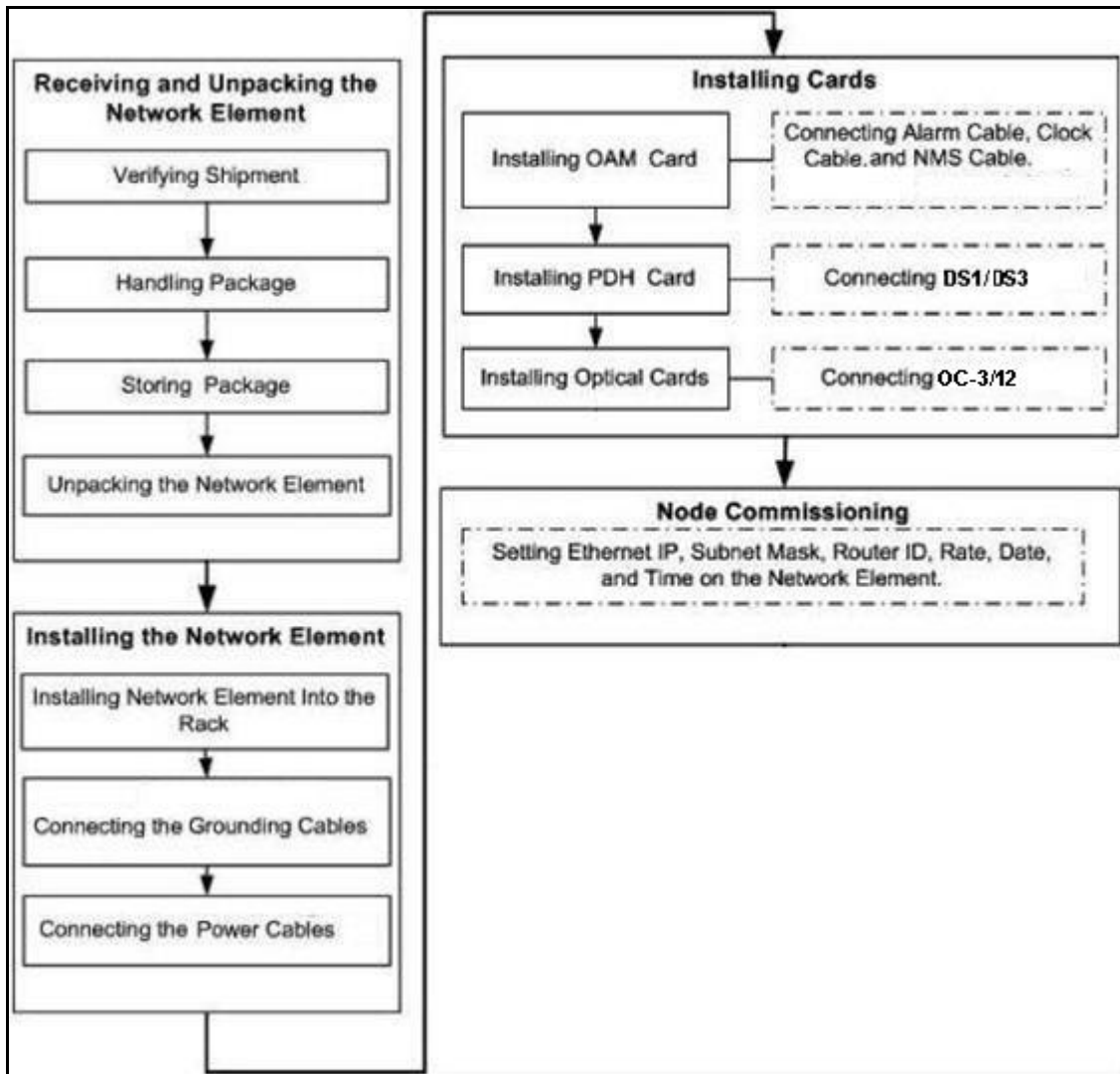
Understanding Installation Procedure

Installation procedure comprises of:

▶ Receiving and unpacking the network element
▶ Installing the chassis on the rack
▶ Cabling of 48 V earthing cable and DC power supply cables.

Understanding Commissioning Procedure

The commissioning is the formal hand over of the operational and maintenance responsibility for the end-product from the vendor to the operator. The process comprises of Operation and Performance qualification and includes environment compliance checks, verification of personnel protection equipment and qualification of containment systems.

Chapter 3

Observing Safety Guidelines

This chapter provides important safety guidelines that you must follow for personnel safety and to operate the equipment correctly. It also describes about the site environment and instructions to be followed during site preparation and network element rack configuration. You must read and follow all the precautionary procedures before starting to operate the network element.

IN THIS CHAPTER

Safety Standard Compliance

The network element complies with the following safety standards:

Specification	Standard Compliance
EMI / EMC	FCC Part-15, Subpart B, Class-A
	ICES-003, Class-A
	EN 300386
	EN 55022 Class-A / CISPR-22 Class-A
	EN 55024 / CISPR-24
	EN 61000-3-2 and EN 61000-3-3 (applicable to AC power supply model only)

Specification	Standard Compliance
Safety	Certified for CB – Scheme
	IEC 60950 / EN 60950
	UL 60950
	CAN/CSA-C22.2 No. 60950
Laser Safety	IEC 60825-1 / EN 60825-1
	IEC 60825-2 / EN 60825-2
	21 Code of Federal Regulations (CFR)1040

Safety Recommendations

This section lists the safety recommendations that need to be followed for safe operation of the network element.

General Safety Guidelines

- Keep the chassis clean and dust-free before, during and after the installation.
- Keep tools away from the area where you and others could fall over them.
- Avoid wearing loose cloths that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves before handling the equipment.
- Wear safety glasses if you are working under any conditions that might hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or make the equipment unsafe.

Maintaining Safety with Electricity

Follow the listed guidelines while working on equipment powered by electricity:

1. Locate the emergency power-off switch for the room in which you are working. Then, if an electrical accident occurs, you can act quickly to turn off the power.

2. Disconnect all power by turning off the power and unplugging the power cord before:

   - Installing or removing a chassis
   - Working near power supplies

3. Do not work alone if potentially hazardous conditions exist.

4. Never assume that power is disconnected from a circuit. Always check the circuit to confirm.

5. Look carefully for possible hazards in your work area, such as cords, and missing safety grounds. If an electrical accident occurs, proceed as follows:

   - Turn off the system.
   - Determine if the person needs rescue breathing or external cardiac compressions, and then take appropriate action.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD damage occurs when electronic components are improperly handled and can result in complete or intermittent failures.

To ensure optimal electrostatic discharge protection:

▸ Always follow ESD-prevention when removing and replacing components.

▸ Ensure that the chassis is electrically connected to earth ground.

▸ Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact.

▸ Connect the grounding clip to an unpainted surface of the chassis frame to safely ground ESD voltages.

▸ The wrist strap and cord must operate effectively to properly guard against ESD damage and shocks. If no wrist strap is available, ground yourself by touching the metal part of the chassis.

▸ For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 Mega Ohms (MOhm).

Site Environment

Network element can be mounted in a rack. The location of the network element, the layout of your network element rack including wiring room is extremely important for proper system operation. Network element placed closer to each other, inadequate ventilation, and inaccessible panels can cause system malfunctions and shutdowns, which calls for unscheduled system maintenance.

While planning your site layout and network element locations, consider the precautions described in the section "***Preventive Site Configuration*** on page 24" to understand how to avoid network element failures and reduce the possibility of environmentally caused shutdowns. If you are currently experiencing shutdowns or unusually high errors with your existing network element, these precautions may help you isolate the cause of failures and prevent potential problems.

General Site Requirements

This section describes the requirements your site must meet for safe installation and operation of the system. Before installation, verify the site for readiness as per the site verification checklist given in "Site Verification Checklist".

Preventive Site Configuration

Take following precautions to plan an acceptable operating environment for your network element and to avoid environmental equipment failures:

▶ Electrical equipment generates heat. Without adequate air circulation, the ambient air temperature might not be adequate to cool equipment to acceptable operating temperatures. Ensure that the room in which you operate your system has proper ventilation.

▶ Damage from static discharge can cause immediate or intermittent equipment failure. Always follow the ESD prevention procedures to avoid damage to equipment.

▶ An open chassis allows air leaks, which may interrupt and redirect the flow of cooling air from internal components. Ensure that the chassis cover is secure to allow cooling air to flow effectively from right to left within it.

> ⚠️ **CAUTION:** Proper hydraulic/pneumatic material handling equipment must be used for mounting the equipment. If the network element is heavy and the hydraulic equipment is not available then ensure that at least two installers are at the installation site.

Configuring Equipment Racks

While planning an acceptable equipment rack configuration, ensure that:

▶ The enclosed racks have adequate ventilation and are not overly congested.

▶ The enclosed rack should have lowered sides and a fan to provide cooling air, since each unit generates heat.

▶ The rack frame does not block the intake or exhaust ports while chassis is mounted in an open rack.

▶ Chassis is placed at the right position into the rack, if the chassis is installed on slides.

▶ Adequate ventilation is available for equipment at the bottom of the rack. In an enclosed rack with a ventilation fan in the top, excessive heat generated by equipment near the bottom of the rack can be drawn upward and intake ports of the equipment.

▶ Baffles helps isolating exhaust air from intake air, which also helps to draw cooling air through the chassis. The best placement of the baffles depends on the airflow patterns in the rack. Experiment with different arrangements to position the baffles effectively.

Working with Power Supply Unit

When you install power feeds to the product input terminals or if you perform routine power maintenance, make sure that you do the following:

▶ Read the power procedures before you perform any function.

▶ Use appropriate insulated tools to perform any tasks.

The green LED continuously lit at the faceplate on the base card indicating that the card is powered up and is functioning correctly. If the green LED on the PSU is ON, the power at the associated feeder is present and the conditions can be assumed to be normal. Some of the possible cases when the green LED on the base card is not ON are:

▶ Power supply unit is damaged or non-functional.

▶ Base card is damaged or non-functional.

▶ Feeder low voltage or power failure

▶ Over-current failure

▶ Blown fuse in the power supply unit due to the reverse polarity condition at the input terminals.

The circuit breaker on the power supply unit is an electronic circuit breaker that cuts off the power to the card on over-current condition.

> **RISK OF ELECTRICAL SHOCK:** The battery feeds can be at a high enough potential to constitute a shock hazard. Use the appropriate insulated tools when working with power unit.

> **RISK OF PERSONAL INJURY, ENERGY HAZARD:** The battery feeds are capable of supplying very high current which, during an unintentional short, can cause burns. Use the appropriate insulated tools when working with power unit.

Preventing Damage to Card and Pluggable Module

In this section, the generic term 'card' is used to refer to cards or pluggable modules as applicable. These cards are shipped to the customer premises in shielded containers. All cards are subject to damage by rough handling or by electrostatic discharges.

> **NOTE:** Follow precautions for handling electrostatic sensitive devices.

While handling, installing, storing or replacing cards, take the following necessary precautions:

▶ Wear an antistatic wrist-strap, a heel grounder, or another personal grounding device before you remove a module from its package or from the shelf.

▶ Follow installation and removal procedures for each module. Make sure to understand and perform each precautionary message in these procedures (for example, opening or closing the latches of the card simultaneously).

▶ Do not touch the solder side of the module, the pin connector, or the components.

- ▶ Inspect all pin connectors for damage before using them on each module.
- ▶ Inspect each module for damage before inserting the component into the shelf.
- ▶ Store uninstalled cards separately in a shielded box.
- ▶ Do not stack cards on or against each other.
- ▶ Do not force cards into their packaging material.
- ▶ Do not store several cards in the same container.
- ▶ Allow each module to reach room temperature before you insert the module into the shelf.
- ▶ When not in use store pluggable modules in their protective static-dissipative containers to prevent damage to the exposed connector terminals.
- ▶ Leave spare cards in the original shielded containers until you need the cards.
- ▶ To prevent damage to cards in storage, follow procedures that prevent accumulation of dirt or dust on the pin connectors and damage to the printed-circuit board or its components wrapage. This situation is typical for printed-circuit boards stored in areas where the humidity can exceed 95% and the temperature can exceed 70 °C.
- ▶ While transporting cards, pack each module in its original shielded container and padding, or in an electrostatically shielded bag. In case the original packing material is lost, place the module in a shielded bag and use another container with sufficient padding.
- ▶ Air filters have to be replaced once in 6 months.

Dissipating Static Electricity

The static electricity level in your body increases when you move around or come into contact with other charged surfaces. Excessive levels of static electricity can damage the equipment. You must either wear a properly functioning heel grounder (that attaches to your leg and foot) and/or an antistatic wrist-strap, or another grounding device when you work on any of the following:

- ▶ Network element chassis (including the metal frame and cover)
- ▶ Cables connected to cards
- ▶ Cards

Any one of the previously mentioned grounding devices dissipates electrostatic charges to the ground quickly and safely. Use grounding devices correctly to eliminate the ESD threat you pose to the equipment.

When you wear an antistatic wrist-strap or a heel grounder, you must make sure the grounding straps are in contact with a moist part of your skin. Connect the grounding cord to the grounding plug on a grounded fixture of the product you are working on, such as the shelf ESD jack, grounded fixtures are accessible on most of the products.

⚠️ **CAUTION:** Heel grounders or similar worn footwear attachments work when the floor is designed to dissipate static electricity. Also check for the ESD foot wear attachment connectivity to ground using suitable ESD tester. If the properties of the floor are unknown or in doubt, use a wrist-strap and make sure it is connected to a piece of electrostatic discharge (ESD) grounding equipment before proceeding with any maintenance or installation activity.

The following guidelines provide an optimal electrostatic discharge protection:

▸ Install bays on conductive floor coverings.

▸ Provide conductive shoes, antistatic wrist-straps and heel grounders to all personnel working on the equipment.

▸ Maintain local environmental conditions so that relative humidity around equipment to be serviced is in excess of 20% (preferably higher than 40%). This lowers the threat of developing damaging electrostatic levels.

▸ Implement an ESD training and control program that educates personnel on the hazards of ESD and simple mitigation procedures that can easily be applied.

Controlling Equipment Environment

The maximum operational long-term ambient temperature of the system location is 40 °C. A temperature above 40 °C is permissible (according to ETSI EN 300 019-1-3 V2.1.2 Edition 2003-04 for Environmental Class 3.1: Temperature controlled locations and ETSI EN 300 019-2-3 V2.1.2 for Environmental Class T3.1 and T3.1E: Temperature controlled locations) provided the probability of occurrence is less than 1%. A temperature of 50 °C is permissible but the duration should not exceed 72 continuous hours.

Using Optical Fibers

Optical fibers are either single mode or multiple modes. The information in the following sections applies to all optical fibers.

Handling Optical Fibers

When handling optical fibers:

▸ Wear safety glasses when you install optical fibers.

▸ Do not look into the opening of an optical fiber, or the opening of an optical fiber connector, if the optical fiber is active or the unit has the power turned on.

▸ Avoid direct exposure to optical fiber ends or optical connector ends where you can access the laser signal directly.

> ⚠ **LASER RADIATION EXPOSURE RISK:** Do not look directly into the optical beam. Invisible light can severely damage your eyes. Keep all optical connectors capped.

Splicing Optical Fibers

Before looking at a spliced optical fiber with a magnifier:

▸ Power off all laser sources to the optical fiber or disconnect the remote optical fiber end from the laser sources before you start splicing. The laser sources can be in a central office, on subscriber premises, or in a remote location.

▸ Disconnect all optical test sets from the optical fiber before you start splicing. The connections can be local or remote.

▸ Use only the optical instruments approved by your company.

When splicing optical fibers:

▸ Clean your hands after you handle optical fibers. Small pieces of glass are not always visible and can damage your eyes.

▸ Do not handle pieces of optical fiber with your fingers. Use tweezers (preferably non metallic) or adhesive tape to lift and discard any loose optical fiber ends.

▸ Wear rubber gloves when you clean optical connectors. The gloves prevent direct contact with the isopropyl alcohol and prevent contamination of the ferrules with skin oils.

▸ Place all optical fiber clippings in a plastic container provided for that purpose.

▸ Handle optical fibers with caution. Place the optical fibers in a safe location during installation.

▸ Protect all optical fiber connectors with clean dust caps at all times.

▸ Follow the manufacturer instructions when you use an optical test set. Incorrect calibration or control settings can create hazardous levels of radiation.

> ⚠ **EYE INJURY RISK:** If you have a piece of a glass in your eye, get medical assistance immediately.

Repairing Optical Fibers

When an accidental break occurs in the optical fiber:

▸ Report the location of the damaged optical fiber to both the central office and the field repair personnel.

▸ Power-off all laser sources to the optical fiber or disconnect the remote optical fiber end from the laser sources. The laser sources can be in a central office, on subscriber premises, or in a remote location.

Chapter 4

Receiving and Unpacking Network Element

This chapter describes the procedures to be followed during receiving and unpacking of the iPasolink network element. These procedures must be followed when a iPasolink network element is delivered to the customer as part of a supply-only contract.

IN THIS CHAPTER

Receiving and Unpacking Network Element Process

The flowchart below shows the receiving and unpacking process.

Figure 2: Receiving and Unpacking Process

31
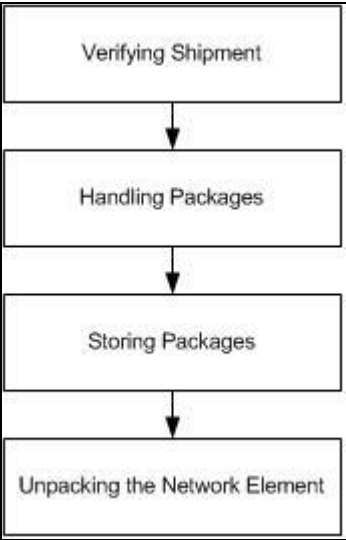
Handling Package

Identify the top face of the container, (identifiable by packing labels) and keep the top face uppermost at all times. The package contents are to be considered fragile at all times. Apply sufficient water-proofing if packages are to be handled in wet weather conditions.

Verifying Shipment

The network element and the corresponding accessories are delivered in two different cartons. Compare the package list information with the alphanumeric information provided on the shipping labels. The package list and shipping labels should contain the same information. If any discrepancies found between the shipping label information and the package list information, contact the Technical Support Center.

Storing Packages

Follow the below instructions when storing the packages:

▶ Unpack the network element only during installation.
▶ Preserve the packaging materials (after unpacking the network element) for future use.
▶ If the network element is damaged during shipment, preserve as much of the packaging as possible to allow customer service and the shipper to analyze the damage. To report damage shipped articles, contact the Technical Support Center to open a Return Materials Authorization (RMA).

Unpacking the Network Element

Before unpacking the iPasolink network element, make sure that you have the following tools:

▶ Sharp pointed blade or knife
▶ Conductive bonded wrist strap

To unpack the system:

1. Place the packing box in the direction as per shown in the warning logo sticker pasted on the packing box. Figure below shows warning logo.

Figure 3: Warning Logo

Warning Logo
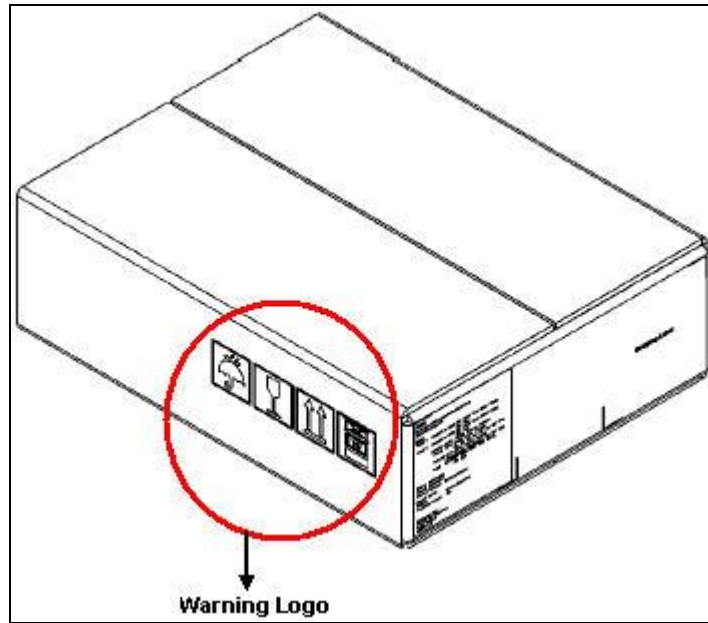
2. Use sharp pointed blade or knife to cut the starps shown in Figure from the packing box.

Figure 4: Starps on the Packing Box

½" wide straps shown at 2 places
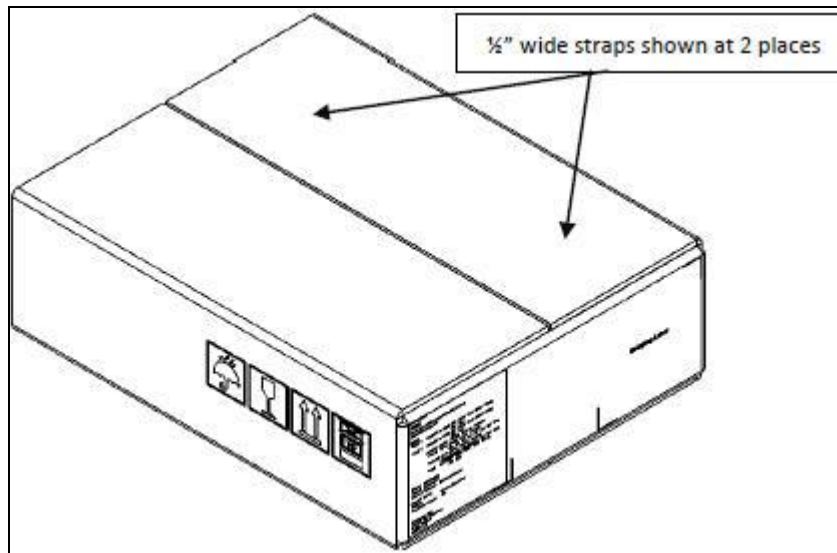
3. Use sharp pointed blade or knife to cut the shown in Figure from the packing box.

Figure 5: Reinforced Packing Tape
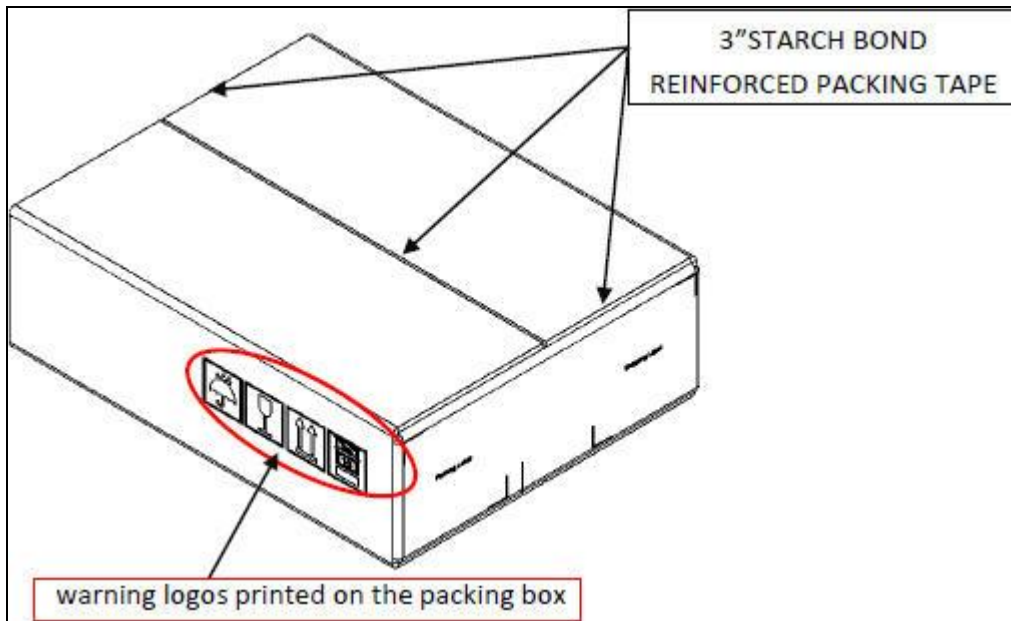
4. Remove the silica gel bag shown in the Figure from the packing box.

Figure 6: Silica Gel in the Packing Box
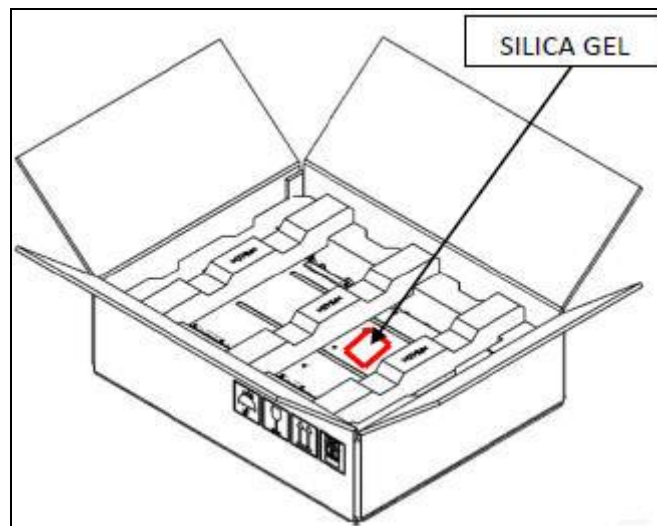
5. Take the equipment along with packing cushion from the packing box, as shown in Figure below.

Figure 7: Taking Packing Cushion and Equipment
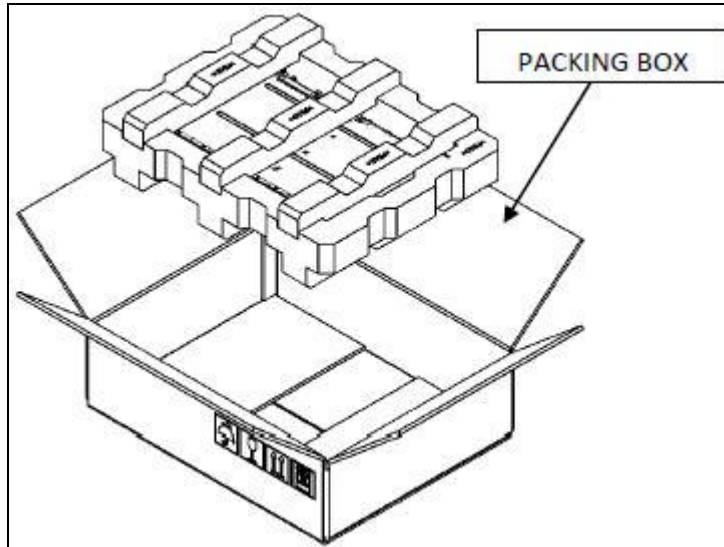
6. Remove the top and bottom cushions from the packing box, as shown in Figure below.

Figure 8: Removing Cushions from the Packing Box
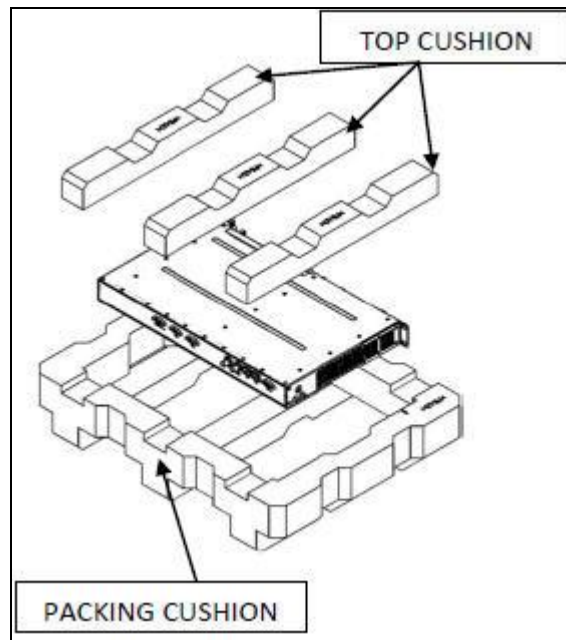
7. Remove the equipment from the antistatic bag, as shown in Figure below.

Figure 9: Antistatic Bag
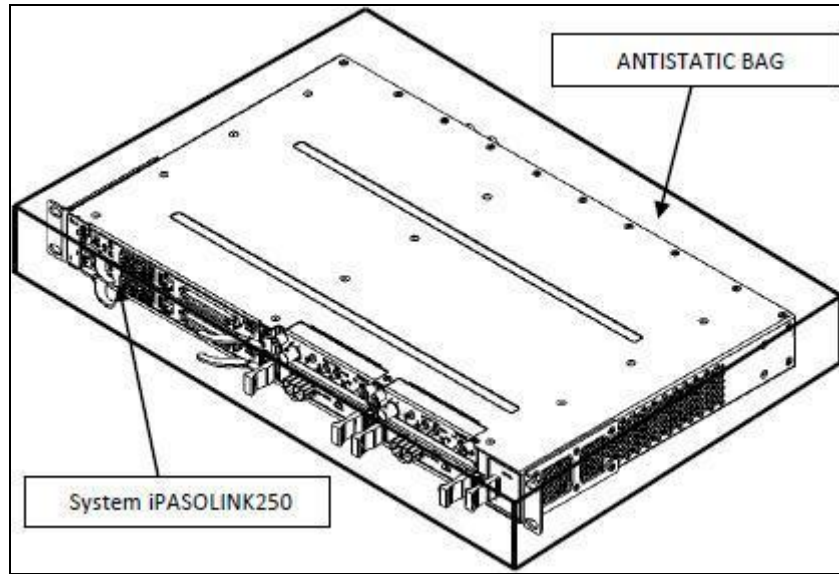
STATIC DISCHARGE WARNING: Static charge can damage the equipment. While unpacking and handling cards, or making network element interconnections, wear a grounding wrist strap to discharge the static buildup.

Chapter 5

Installing the Network Element

This chapter describes procedures to be followed when installing iPasolink network element. These instructions are limited to address the installation of the iPasolink network element and the supporting cards. The installation of racks, electrical wiring, raceways, and other equipment are not covered in this guide. The relevant local/state/federal or international (if applicable) codes and regulations should be followed during the installation process.

Site Preparation

The installation site should meet the following criteria:

▸ Power supply requirements: 40 V to 72 V DC
▸ Circuit breaker requirements: 10 A Fast Acting Fuse

> **NOTE:** The instructions in this chapter primarily address the installation of the iPasolink network element and supplied cards. The installation of racks, electrical wiring, raceways, and other equipment are not covered in this guide. The relevant local/state/federal or international (if applicable) codes and regulations should be followed when assembling the same.

Installation Guidelines

The guidelines for iPasolink network element installation are as follows:

▸ Consider the effect of additional electronic equipment and its generated heat on the iPasolink network element and if more than 1 NE is to be installed in the same rack following spacing should be considered

2UI (Approx 9 cm) should be left between 2 NEs if the air flow due to FANs is sideways.

4UI (Approx 18 cm) should be left between 2 NEs if the air flow is bottom to top or if there is a FAN less operation supported in the NE being installed.

▸ Make sure the equipment rack is properly bolted to the ground.

▸ Install the first network element on the rack in the lowest possible position.

▸ Ensure that the wire size and dimension requirements are based on cable length and local engineering standards and practices.

> **NOTE:** iPasolink network element must only be installed in a Restricted Access Location (RAL) in accordance with IEC 60950. In this context, restricted access locations are defined as locations where access can be restricted to suitably trained personnel and where unsupervised members (of the general public) are not allowed.
>
> iPasolink must be properly installed in a rack with brackets or in other ways properly connected to a safety ground. The iPasolink 48V DC must not be powered on from a source external to the RAL. All the electrical interfaces used must be limited to Safety Extra-Low Voltage (SELV).
>
> During installation, do not use the handle of the FRU to lift or align the shelf. In an unlikely event of fan not rotating while installing the FTUs, though the power supply cord is working, it is recommended to remove those specific FTUs.

Installing Network Element into the Rack

In addition to the standard installer tool kit, the following items are also required for installation:

▸ Phillips screwdriver (PH3) to install the iPasolink network element into the rack.

▸ Phillips screwdriver (PH1) to install the earth cable to the iPasolink network element.

▸ Four M6 screws and nuts for fixing the chassis to the rack.

▸ Power cable

▸ Grounding cable

▸ Plugs for optical adapters

▸ Cable ties

> **NOTE**: Before locating the chassis in the rack earthing cable should be fixed to the chassis. As there will not be enough space to fix the earthing cable after installing the chassis on the rack.

To install the chassis into the rack, perform the following steps:

1. Depending on the access requirements, decide which side you want to use as the front side in the rack.

2. Move the iPasolink network element to the desired rack position.

3. Affix the iPasolink network element to the rack with four M6 screws and nuts. Figure below shows the installation of the chassis to the rack.

Figure 10: Installing Chassis into the Rack
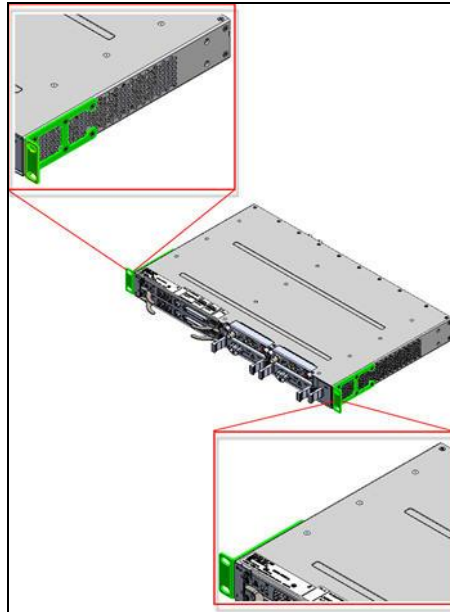
Connecting the Grounding Cables

iPasolink network element is grounded through the 48 V power connector to the rack ground. iPasolink network element is grounded through an external screw terminal to the building earth. This option is also mandatory even if the network element is installed in a rack. The location of the main earthing cable is connected to the screws on the rear side of the network element. For additional safety, grounding facility is also provided as a part of the power cord.

> **NOTE:** All the cables used for connectivity must be labeled according to the site engineering practices.

Before grounding the network element, ensure that the following tools and meters are available:

- Standard installer tool kit
- Grounding cable
- Philips screw driver (PH3, PH1)
- Multimeter

Connecting the Power Cables

Power Supply Unit (PS-A card) is plugged in at the front side of the network element. For cable color coding details, refer to "Power Cable" in Appendix "Cable Color Coding". Each PS-A card should be separately powered and fed through independent circuit breaker.

> ⚠️ **CAUTION**: To avoid damage to PS-A card, do not jack out the card when power cable is connected to the card. This equipment might have more than one power supply connection. All connection must be removed to de-energize the equipment.

To connect DC Power Supply Unit:

1. Ensure that the circuit breaker feeding power to the iPasolink network element is switched off.

2. Plug in the power cable to the power supply connector.

3. Secure the connector with screws to the network element.

4. Route the power cable securely along the left and right sides of the rack. Figure below shows DC Power Supply Unit connections to the subrack.

Figure 11: Connecting Power Cables (PS-A Card)
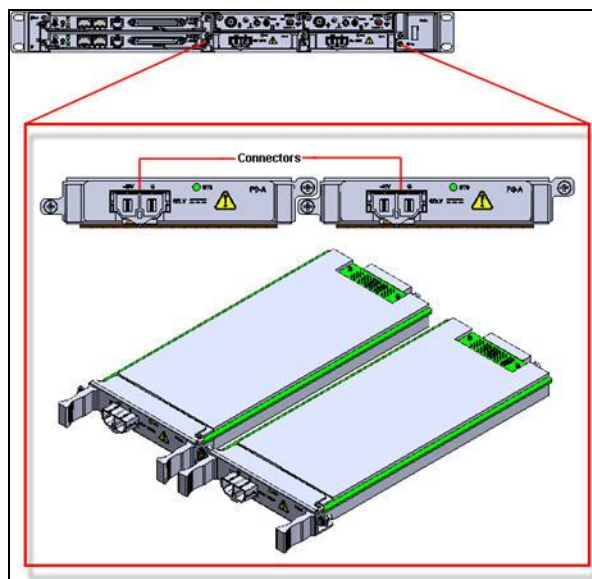
Chapter 6

Installing OAM Interfaces

This chapter describes the OAM interface configuration supported in iPasolink network element.

Alarm Cable Connection

The alarm cable connection is made through ALM I/O D-SUB9 Female connector on the rear side of the network element.

To connect alarm cable, perform the following steps:

1. Identify and label the cables.

2. Connect the cable to D-SUB9 Female connector accordingly as indicated by the arrow-heads marked against the connectors.

3. Route the alarm-in cable to the ALM I/O port.

4. Route the alarm cable from the ALM I/O port securely along the left side or right side of the rack and connect it to the audio/visual unit. Figure below shows the Alarm connections of the chassis to the subrack.

Figure 12: Alarm Connection
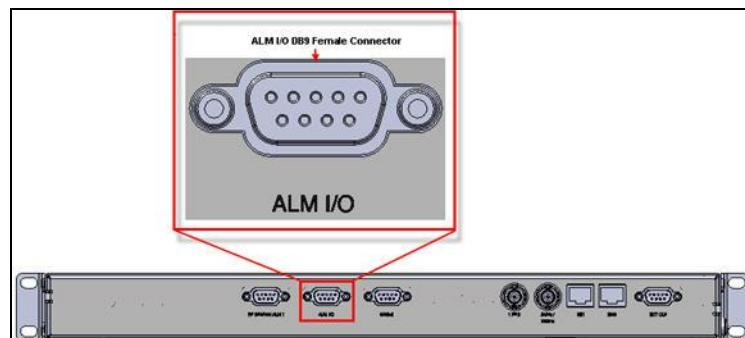
RF SW/FAN Cable Connection

The RF SW/FAN ALM Cable connection is made through RF SW/FAN ALM D-SUB9 Female connector on the rear side of the network element.

To connect alarm cable, perform the following steps:

1. Identify and label the cables.

2. Connect the cable to D-SUB9 Female connector accordingly as indicated by the arrow-heads marked against the connectors.

3. Route the RF SW/FAN ALM cable from the RF SW/FAN ALM port securely along the left side or right side of the rack and connect it to the TRP unit. Figure below shows the RF SW/FAN ALM Cable Connection connections of the chassis to the subrack.

Figure 13: FAN Alarm Connection
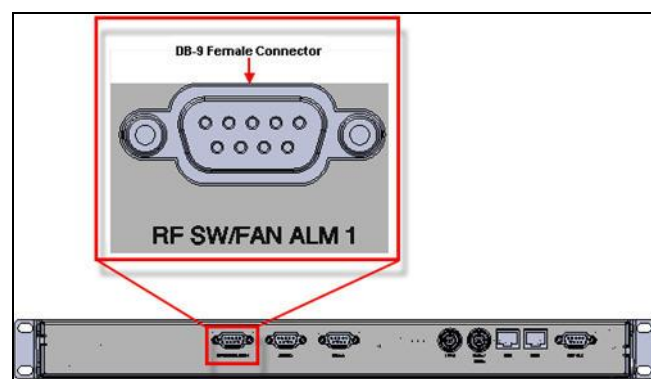
Clock Cable Connection

The clock terminal communicate to iPasolink using D-SUB9 Female connector on EXT CLK interface on OAM card.

To connect clock cable:

1. Identify and label the cable.

2. Connect the clock cable to the D-SUB9 Female connector.

3. Route the clock cable securely along the left side or right side of the rack. Figure below shows the clock cable connection of the chassis to the rack.

Figure 14: Clock Connection
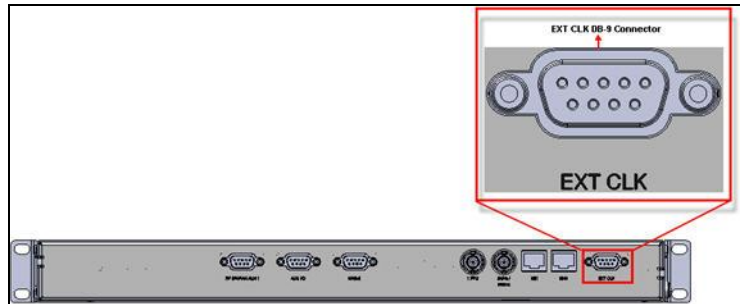
NMS Cable Connection

NMS/NE1 access terminals communicate to iPasolink using an RJ-45 connector on NMS/NE1 interfaces.

To connect NMS/NE1 cable:

1. Identify and label the cables.

2. Connect the cable to RJ-45 connector.

3. Route the NMS/NE1 cable securely along the left side or right side of the rack. Figure below shows the NMS connection of the chassis to the rack.

Figure 15: NMS Cable Connection
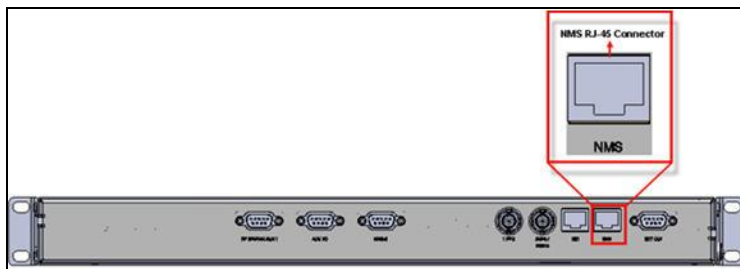
Figure below shows the NE1 connection of the chassis to the rack.

Figure 16: NE1 Cable Connection
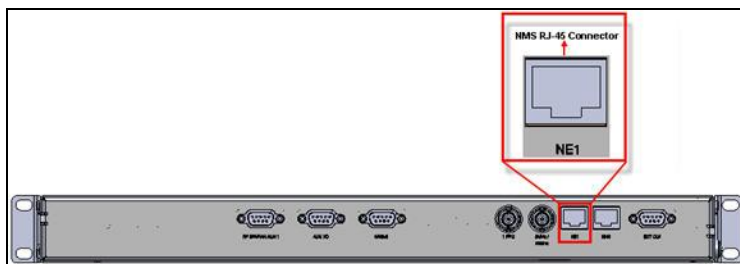
GPS Clock Cable Connection

The GPS clock terminal communicate to iPasolink using BNC 50E connector on 1PPS (Pulse Per Second) / 5 MHz/10 MHz interfaces.

To connect clock cable:

1. Identify and label the cable.

2. Connect the clock cable to the BNC 50E connector.

3. Route the clock cable securely along the left side or right side of the rack and connect it to the GPS receiver or any equipment that can produce 1 PPS or 5 MHz/10 MHz clock. Figure below shows the GPS clock cable connection of the chassis to the rack.

Figure 17: GPS Clock Connection
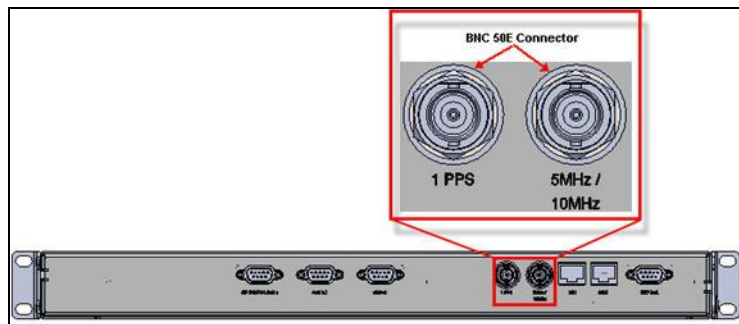
Chapter 7

Installing PDH Cards

This chapter describes the PDH card configuration which includes DS1/DS3 connections.

DS1 Connection

DS1 card provides line interface to 63 DS1 channels in both add and drop directions. DS1 traffic is received and transmitted from the network element through an LFH connector. This connectivity is available on the DS1 interface of DS1 card. DS1s can be directly connected to a Digital Distribution Frame (DDF). For connecting DS1s directly to a DDF, use the cable with DS1 connector on both sides.

> **NOTE:** Use fillers for unused slots.

> **NOTE:** Use only shielded DS1 cable.

To connect DS1 cable:

1. Identify and label the DS1 cables.

2. Connect the cable to LFH connector, and secure the connector with screws to the network element.

3. Route the DS1 cables securely along the left side or right side of the rack. Figure below shows DS1 cable connection using DS1 card.

Figure 18: DS1 Connection (DS1 Card)
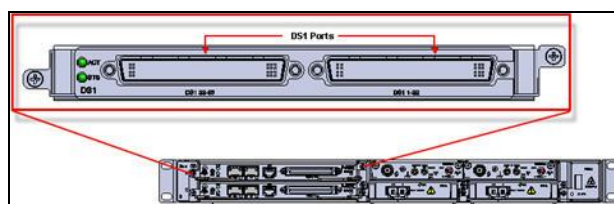
E3/DS3 Connection

DS3 card provides line interface to six DS3 Connection channels in both add and drop directions. DS3 interface is provided through SFP connector.

To connect DS3 cable:

1. Identify and label the DS3 (RG-59) cable.

2. Connect each cable in turn to the transmit and receive ports.

3. Route the DS3 cable securely along the right side or left side of the rack depending on the position of the card. Figure below shows the DS3 connection of the chassis to the rack.

Figure 19: DS3 Connection (ST6E3 Card)
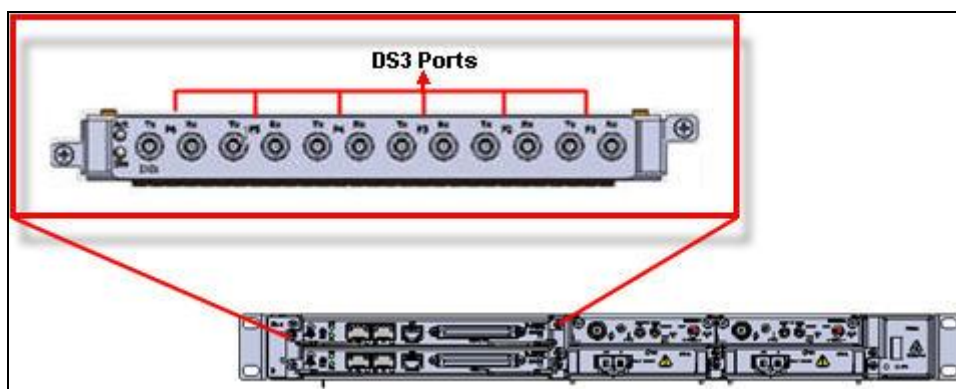
MODEM-A Connection

Modem cards work in redundant mode and support various stand by configurations. There are 2 modem slots providing radio uplink. Each of the modem card connects through backplane to a GE L2 switch and 2.5G worth of TDM fabric on MAIN-A card. Each modem card supports a dedicated bandwidth of STM-4.

Follow the given procedure for MODEM-A card connection:

1. Identify and label the coaxial cables.

2. Connect the cable in turn to the transmit and receive ports.

3. Route the cable securely along the right side of the rack. Figure below shows the MODEM-A card connection.
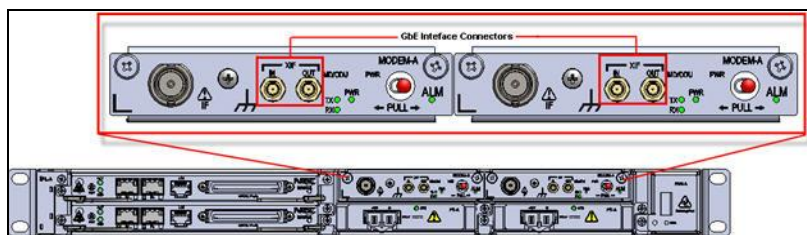
MAIN-A Card Connection

MAIN-A is the Cross-Connect and Aggregate card for the product. The card consists of the cross-connect sub-system and the timing sub-system. The MAIN-A card is a 2.5G TDM cross connect, timing and 6Gbit Layer 2 Ethernet switch card with 2GbE ports and 16xDS1 ports interface. The 16xDS1 interface on the MAIN-A card supports 16 DS1 100 ohms ports.

Follow the given procedure for MAIN-A card connection:

1. Identify and label the cables.

2. Connect the cable to MDR connectors and ensure that retention slide operates to hold the connector in place.

3. Route the cables securely along the right side of the rack. Figure below shows MAIN-A card connection of the chassis to the subrack.

Figure 20: MAIN-A Card Connection (DS1 Connector)
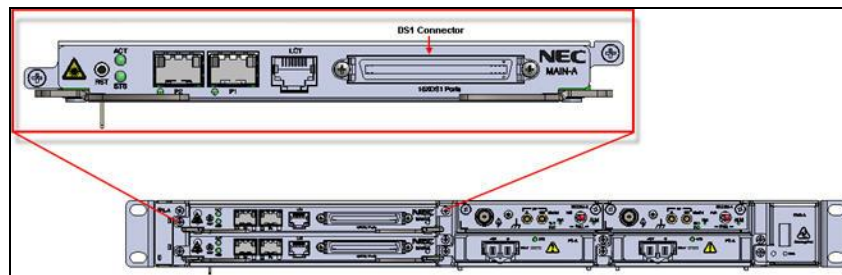
Chapter 8

Installing Optical Cards

This chapter describes the optical card configuration which includes OC-3/12 connections.

OC-3 Connection

OC-3/12 card provides OC-3 line interfaces in both transmit and receive directions. The connectivity is made through an LC connector.

To connect OC-3 interface, perform the following steps:

1. Identify and label the LC connector cables.

2. Connect the cable to LC connectors, and ensure that retention slide operates to hold the connector in place.

3. Route the cables securely along the right side or left side of the rack depending on the position of the card. Figure below shows OC-3 connection using OC-3/12 card.

Figure 21: OC-3 Connection
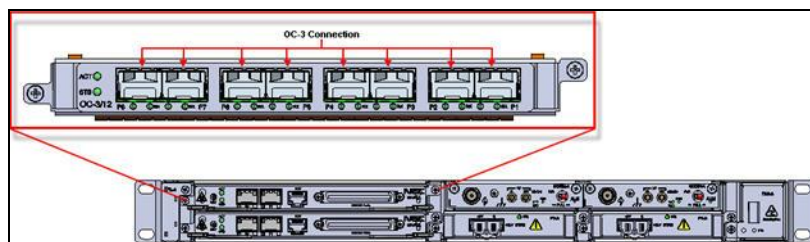
OC-12 Connection

OC-3/12 card provides OC-12 line interfaces in both transmit and receive directions. The connectivity is made through an LC connector. In OC-12 mode, SFPs of OC-12 capacity is plugged in at ports 1 and 5.

To connect OC-12 interface, perform the following steps:

1. Identify and label the LC connector cables.

2. Connect the cable to LC connectors, and ensure that retention slide operates to hold the connector in place.

3. Route the cables securely along the right side or left side of the rack depending on the position of the card. Figure below shows OC-12 connection using OC-3/12 card.

Figure 22: OC-12 Connection
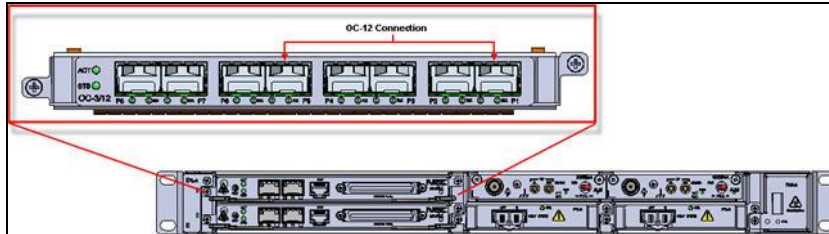
Chapter 9

Installing Ethernet Card

This chapter describes the Ethernet configuration which includes GbE connection.

GbE Connection

MAIN-A is the Cross-connect and Aggregate card for the product. The card consists of the cross-connect sub-system and the timing sub-system. The MAIN-A card is a 2.5G TDM cross connect, timing and 6Gbit Layer 2 Ethernet switch card with 2GbE ports and 16xDS1 ports interface. The 16xDS1 interface on the MAIN-A card supports 16 DS1 100 ohms ports.

Follow the given procedure for GbE connection:

1. Identify and label the Ethernet cables.

2. Connect the cable to RJ-45 connectors and ensure that retention slide operates to hold the connector in place.

3. Route the cables securely along the right side of the rack. Figure below shows MAIN-A card connection of the chassis to the subrack.

Figure 23: GbE Connection (MAIN-A Card)
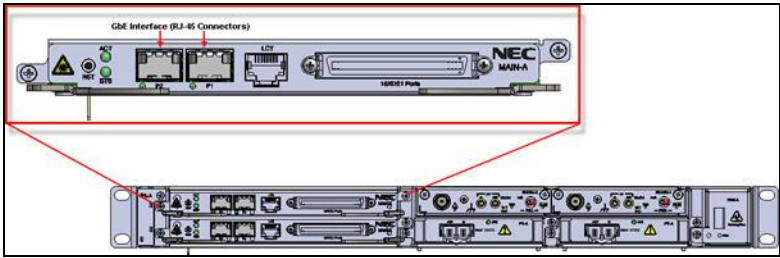
Chapter 10

Node Commissioning

This chapter describes the node commissioning procedures you must perform on a newly installed network element. Nodal commissioning is performed using the web user interface by providing the commissioning data of the network element. The "***Commissioning and Testing Report*** on page 63" is used to record the commissioning data of a network element.

Connecting the PC to the NMS interface of the Network Element

Before connecting the PC to the NMS interface of the Network Element,

▸ Ensure that you have a PC and an Ethernet crossover cable with an RJ-45 connector.

▸ Ensure you have the network element IP address information, if the network element has already been commissioned.

> **NOTE:** After powering up the network element you have to wait for approximately 7 minutes for the network element software to be up. The Status/Active LED indicates the up status of the network element. The IP address of the PC should be in the same IP subnet as that configured on the node. If the node is getting commissioned for the 1st time then use any address of PC other than 192.168.1.254 in 192.168.1.0 subnetwork.

Follow the procedure for connecting the PC to the NMS interface of the network element.

1. Connect the LAN port of the network element and the PC terminal with an Ethernet cable of RJ-45 connector type.

2. Configure the IP address of the PC to be in the same sub net as the network element.

3. If the above steps fail, check whether that you have used correct cables.

> **NOTE:** While connecting to an uncommissioned network element, your PC IP address must be 192.168.1.xxx where xxx is between 1 and 253. While connecting to a commissioned network element, your PC IP address must reside in the same subnet as the network element. Also, configure the PC subnet mask to match the network element's subnet mask and the PC default gateway must be in the same NMS, where gateway is there.

Logging into an Uncommissioned Network Element

Before logging into an uncommissioned Network Element, ensure that the PC is connected to the NMS interface of the network element through a crossover cable with RJ-45 connectors.

To Login to an uncommissioned network element,

1. Launch your browser (Netscape 4.75/ Internet Explorer 6.0 / Mozilla 1.7.15 preferred) and enter the URL http://192.168.1.254:20080/ which is the default IP address of the NMS interface and can be changed. If the network element does not respond, check the physical connection. Otherwise, contact your next level of support.

2. Enter the following default user id and password at the login prompt:

   - Username: default
   - Password: default0

3. The Navigation menu of the network element is displayed. Node View is the default page of the WUI. If the default page of the WUI does not appear or login failed, check whether the user id and password entered are correct. The user id and the password rules are given below:

User name	▶ is unique
	▶ can be alphabetic/numeric/alphanumeric
	▶ supports special characters except space
	▶ supports up to 32 characters
	▶ is case sensitive
Password	▶ is unique
	▶ at least be eight characters long
	▶ can be alphabetic/numeric/alphanumeric
	▶ supports special characters except space
	▶ is case sensitive
	▶ and the user ID cannot be identical

> **NOTE:** Change the default username and for the default user account on the network element. The default user accounts and passwords are widely known.

Configuring Parameters in SLAT Page

Before downloading software from SLAT page, ensure that you have

▸ PC and an Ethernet crossover cable with RJ-45 connector.

▸ Network element IP address information if the network element has already been commissioned.

To download software from SLAT page, ensure the following:

1. Connect the laptop with static IP 192.168.1.x to the node so that, it can be accessed.

2. Launch the Netscape 4.75/Internet Explorer 6.0/ Mozilla 1.7.15 browser and enter the URL `http://192.168.1.254:20080`

   - Restore from a previous back up configuration.

   - Initialize node parameters.

   - Please install the software to proceed.

3. Click **Please install the software to proceed**.

4. Select the software download options

   - Deliver release from local machine

   - Deliver release from remote machine

5. If local machine is selected, provide the file path.

6. If a remote machine is selected, provide the following:

   - User name

   - Password

   - IP of remote machine

   - FTP (optional)

   - Directory

7. Click **Submit**. The new software gets downloaded to the NE. On completing the download, the system will prompt you to initialize the node parameters like Node Name, Router ID, Ethernet IP, and location.

On initializing the node parameters, node will go for warm reboot and while the node is coming up the software gets initialized on the NE. Once the node is up, issue a service disruptive reboot for the FPGAs to get programmed on the NE.

NOTE: After restoring the new database, the network element requires a hard reboot for the new configuration to take effect. You can verify the software Version from the description field of the default WUI page. The software version is in the format x.y, where 'x' and 'y' represents major and minor release respectively.

Setting Ethernet IP, Subnet Mask, Router ID, and Port Rate on the Network Element

Ethernet IP

Each network element has a network management system (NMS) interface which is a 10/100 Mbps network interface controller (NIC) port. Ethernet IP is the IP address with which the network element communicates with the external world.

Subnet mask length

The subnet mask length is an optional parameter that corresponds to the Ethernet IP address. Subnetting is used to set the subnet mask parameters.

> **NOTE:** The subnet mask for a point-to-point connection (that is, a direct Ethernet connection between the WUI host and the network element) should be set to 32.

Router ID

Network element communicate in the network over the embedded communication channel (ECC), using the router ID. A network element can be configured either as a gateway element (interconnecting two networks) or just a pass-through network element.

Before setting the Ethernet IP, Subnet Mask, Router ID, and Port Rate on the Network Element:

‣ Log into network element WUI using the NMS port.

‣ Ensure your PC is correctly connected to the network element through the NMS interface.

‣ Ensure that you have the Ethernet IP address, router ID, sub net mask and static route IP of the network element to be configured.

‣ Ensure the PC is configured in the same NMS as the network element.

To set the Ethernet IP, Subnet Mask, Router ID, and Port Rate on the Network Element,

1. Connect the laptop with static IP 192.168.1.x to the node so that, it can be accessed.

2. Launch the Internet Explorer 8.0/ Firefox 3.6 browser and enter the URL http://192.168.1.254:20080

   ▪ Restore from a previous back up configuration.

   ▪ Initialize Node Parameters.

   ▪ Please install the software to proceed.

3. Click **Initialize Node Parameters**.

4. Enter the network element name in the name field.

5. Enter the functional router ID of the network in the router ID field of the NE information page. Network element uses same entered ID for communication over ECC path.

6. In the Ethernet IP field the IP address must be entered. The Ethernet IP of each network element in the network must be in different networks and unique.

7. Select the SDH/SONET mode in which the network element needs to function.

8. Click **Submit**. A confirmation page is displayed.

9. Click **Accept Valid Modifications**. A network element reboot warning is displayed.

> **NOTE:** The network element name can be alphabetic/numeric/alphanumeric consisting of 1-20 characters. Special characters can also be used, except space.

> **NOTE:** The default router ID displayed is 192.168.1.254. The node IP is to be set as 192.168.1.xxx, where xxx must be between 1 to 253. The last octet of the router ID and Ethernet IP must not be provisioned as 0 and 255 as they are reserved addresses and therefore should not be provisioned,

> **NOTE:** The default Ethernet IP displayed is 192.168.1.254

> **NOTE:** The network element reboots after the Ethernet IP, subnet mask and the router ID are entered. After the network element is up, verify whether all the changes are reflected. If the changes are not reflected correctly, contact your next level of support. The PC IP configuration must be updated to ensure reachability to the newly provisioned IP address for the network element. Software Version is displayed in the description field of the default WUI page. The software Version is in the format x.y, where "x" is the major release and "y" is the minor release.

Verifying the Serial Numbers of Cards and Pluggable Modules of the Network Element

To verify the serial numbers of the chassis and the cards present in the network element.

1. Click **Inventory** in the Navigation menu.

2. Click on **Node inventory** link. The **Node inventory** page is displayed.

3. View the serial numbers of all the cards in the network element in the Node Inventory page.

4. Verify the serial numbers of all the cards with the shipment report.

5. Verify whether all the cards present in the chassis are listed with the correct information in the WUI Inventory application.

6. Verify whether the Power LED is turned on with green color for all the cards.

Setting Network Element Date and Time

Use the following procedure to edit Network Element date and time:

Setting date and time for a network element

1. Click **System Time** in the Navigation menu.

2. Click **Set time link**. Set Node Time page is displayed.

3. Set date and time by selecting appropriate values from the drop-down menu.

4. Click **Submit**. The changes are applied and a confirmation message is displayed.

Setting time zone for a network element

1. Click **System Time** in the Navigation menu.

2. Click **Set time zone link**. Set Time Zone page is displayed.

3. Set the **time zone** by selecting appropriate value from the drop down menu.

4. Click **Submit**.

5. The changes are applied and a confirmation message is displayed. In case the drop down menu does not display the desired time zone, click **Other Time Zones**. The **Other Time Zones** page is displayed.

6. Enter the name of the time zone, the offset value, Enable Day light saving from drop down menu. Set the Day light saving time parameters as:

    - **Month**
    - **Week**
    - **Day**
    - **Hour**
    - **Minute**

7. Click **Submit**. Changes are applied and a confirmation message is displayed.

Setting time server for a network element

1. Click **System Time** in the Navigation menu.

2. Click **Set time server** link. Set Time Server page is displayed

3. Enable the field NTP Client Enable.

4. Enter the IP address of the server from which the network element is to derive the date and time.

5. Select the **Synchronization** interval from the drop-down menu.

6. Click **Submit**. Changes are applied and a confirmation message is displayed.

> **NOTE:** Set the timing server of stratum level to 14 or less than 10. The network element will not synchronize to the server if the stratum level is not within the specified range. NTP servers provisioned may take five minutes to update current NTP server parameter.

Nominating a Synchronization Reference Clock Source for the Network Element

To nominate a synchronization reference clock source for the network element:

1. Click **Configuration** in the Navigation menu.

2. Click **Synchronization** > **Nominate Timing Reference**. The Nominate Timing Reference page is displayed.

3. Select the **clock reference** type for a network element. Set the clock reference port and the priority for the clock reference selected.

4. Click **Submit**. Changes are applied and a confirmation message is displayed.

If the clock source is not nominated as expected, contact your next level of support.

Backing Up or Restoring Network Element Configuration Data

Before backing up or restoring the network element configuration data, ensure that:

▶ PC/Laptop is connected to the FTP server.
▶ IP address of the source/destination for the restore or backup operation is correct.
▶ Directory path from where the configuration file will be restored from or saved to is correct.
▶ Username and password of the FTP account is correct.

> **NOTE:** If you have a Linux or Unix machine, enable the FTP server that comes along with it. If you are using a Windows machine, you must install FTP server such as 3Com. The FTP server for Windows can be downloaded from the following location: http://support.3com.com/software/utilities for windows 32 bit.htm

To restore configuration,

1. Click **Maintenance > Configuration management > Restore Configuration** in the navigation menu. The Restore Configuration preview pane is displayed.

2. Edit required values referring to the below table.

3. Click **Submit**. You are connected to the PC from which you want to restore configuration.

4. Locate the configuration file and click it. The configuration is restored on the network element.

5. Click **Commit** for the restored configuration to take effect.

> **NOTE:** The remote server should have an FTP server installed on it to carry out the Restore configuration data command. For a Linux system, FTP server is inbuilt. For Windows system, install any third party server such as 3com server along with the provided IIS server.

The following table describes the Restore Configuration Parameters

Parameter	Default Value	Description
Configuration Operation	Restore Configuration from Remote Machine	Parameter to select if the configuration is to be backed up from Remote machine or local machine. **Restore Configuration from Remote Machine:** Configuration is backed up from remote machine. **Restore Configuration from Local Machine:** Configuration is backed up from local machine.
User Name	:	The user name of the system where the backup configuration is present.
Password	-	The password of the system on which the backup is present.
IP Address	-	The IP address of the system where the backup is present.
FTP Port (optional)	-	The FTP port number for establishing connection with system having the configuration backup.
Directory	-	The Directory in which backup configuration file is present.

> **NOTE:** Cold reboot the shelf after committing the configuration. The Node Configuration state is displayed at the bottom of the preview pane.

> ⚠️ **CAUTION**: The restoration of configuration data of a network element is service disruptive. The new configuration data requires backup. Restoration could be done from a system which has an FTP server.

Appendix I

Recording Data and Test Results

This appendix provides various forms to record system data and test results during the commissioning process. These forms must be filled and completed as and when you complete the tests during the network element commissioning process.

Site Verification Checklist

Table 1: Site Verification Checklist

SI.No	Site Verification Checkpoints	Status (Yes/No)	Measurements (Mts)	Remarks
1	Is the Existing Rack width in line with the standard measurements details (19", 21", 23 ")? If yes, is there a Clearance for equipment with existing rack?			
2	Can the existing room accommodate new Racks? If no, has a recommendation been done to the Customer or any alternative method suggested? Has the suggestions /recommendations recorded in the Remarks Column?			
3	Are the Rack and equipments shipped to site? Are these available for installation and commissioning.			Please provide the flooring details ▸ False flooring ▸ Non False flooring
4	Is the DC Power Cable and the Ground Cable extended till the Rack?			

SI.No	Site Verification Checkpoints	Status (Yes/No)	Measurements (Mts)	Remarks
	If no, has a suggestion / recommendation been communicated? This should be recorded in the Remarks Column			
5	Is there adequate distance between DCDB and rack for extension of Power cables If no, has a suggestion or recommendation been communicated? This has to be recorded in the Remarks Column		*<< Record the measurement here >>*	
6	Is there adequate distance between Ground point and the rack? If no, has a suggestion or recommendation been communicated? Has this been recorded in the Remarks Column?		*<< Record the measurement here >>*	
7	Is Rectifier available at Site and is powered on?			
8	Has Type of DS1/DS3 DDF available and verified (Poyet, Krone, Wrapping, RJ45)?			
9	Is there an FDF available at the site?			
10	Is there adequate distance between the FDF and the equipment for fiber patch chords?		*<< Record the measurement here >>*	

Commissioning and Testing Report

Table 2: Commissioning and Testing Report

Product description	
Name of the customer	
Location	
Ethernet IP	
Router ID	
Representative name	
Signature	
Customer representative name	
Signature	
Date	

Receiver Sensitivity Measurements for OC-3

Table 3: Receiver Sensitivity Measurements for OC-3

Parameter	Laser type	Spec	Measured values	
			Port 1	Port 2
Tx output power (dBm)	S1.1	-8 to -15		
	L1.1	0 to -5		
	L1.2	0 to -5		
Receiver sensitivity (dBm)	S1.1	-8 to -28		
	L1.1	-10 to -34		
	L1.2	-10 to -34		

Receiver Sensitivity Measurements for OC-12

Table 4: Receiver Sensitivity Measurements for STM-4/OC-12

Parameter	Laser Type	Spec	Measured Values	
			Port 1	Port 2
Tx output power (dBm)	S4.1	-8 to -15		
	L4.1	2 to -3		
	L4.2	2 to -3		

Parameter	Laser Type	Spec	Measured Values	
			Port 1	Port 2
Receiver Sensitivity (dBm)	S4.1	-8 to -28		
	L4.1	-8 to -28		
	L4.2	-8 to -28		

Receiver Sensitivity Measurements For GbE

Table 5: Receiver Sensitivity Measurements For GbE

Specifications	1x GE LX (~10 Kms)	1x GE LX (~40 Kms)	1x GE LH (~ 80 Kms)	1x GE SX (~ 550 m)
Minimum Output Power	-9.5 (dBm)	--4.5 (dBm)	-2.0 (dBm)	-9.5 (dBm)
Maximum Output Power	-3.0 (dBm)	3.0 (dBm)	3.0 (dBm)	-3.0 (dBm)
Receiver Sensitivity	-20.5 (dBm)	-23 (dBm)	-24 (dBm)	18 (dBm)
Receiver Overload	-3.0 (dBm)	-3.0 (dBm)	-3.0 (dBm)	0
Wavelength (nominal)	1310 nm	1310 nm	1550 nm	850 nm
Connector Type	LC	LC	LC	LC
Fiber Type	Single mode	Single mode	Single mode	Single mode

Synchronization Tests

Table 6: Syncronization Tests

Clock	Status
OC-3/12	
BITS clock, BITS data	
Internal	
Hold over	

BER (BIT Error Rate) Performance

Table 7: BER (BIT Error Rate) Performance

DS1/DS3 ports	Results	DS1/DS3 ports	Results

Appendix II

General Configuration

This appendix describes the general configuration procedures for iPasolink network element.

Switch ON Node and PC Configuration

1. Switch ON the Node, wait for at least 7 minutes for the node to completely come-up (before trying to ping or access the node (through browser).

2. The Factory default IP address for NEC Multiplexer is 192.168.1.254 or the one, which is present on the sticker pasted on the Node.

3. Use a PC/Laptop and configure the PC/laptop

   - IP Address to: Replace the IP address in the 192.168.1.0 network

   - Subnet Mask to: 255.255.255.0

4. Connect the PC to the NMS/LCT interface of the multiplexer using a cross RJ-45 NMS cable.

Logging into the System

To logging into the system, perform the following steps:

1. Connect the Ethernet port of PC/Laptop to the NMS port of the network element using a cross cable. Use straight cable only, if both the Node and PC/Laptop are connected through Hub/Switch.

2. Open the Internet Explorer in the Windows PC. Enter the address in the address space: http://192.168.1.254:20080.

3. Log into the WUI with following user name and password.

   - **User Name**: NEC Corporation

   - **Password**: j72e#05t

4. Configuration:

   - **Name**: Enter the Name of the Site/Location.

   Acceptable Values: combination of alphabets/numeric/special characters

   Value Range: 1-22

   - **Router ID**: Enter the Router ID (Ex:192.168.254.1)

   - **Ethernet IP**: Enter the Ethernet IP of the iPasolink node (Ex:192.168.1.254)

   - **Contact**: Enter the contact details

- **Location**: Enter the location name

5. Submit changes and **Accept the Modifications**. The network element will go for a soft reboot if values of Ethernet IP and Router ID are changed and after 3 minutes, you can login to the system. If you are connecting other vendor Node to the local Node, then set the Remote node with the router ID and Ethernet IP as follows:

- **Router ID**: Enter the Router ID (Ex: 192.168.254.2)
- **Ethernet IP**: Enter the Ethernet IP of the other vendor's node (Ex: 192.168.2.254)

Figure below illustrates PC connected to the node in a network.

Figure 24: PC connected to the Node
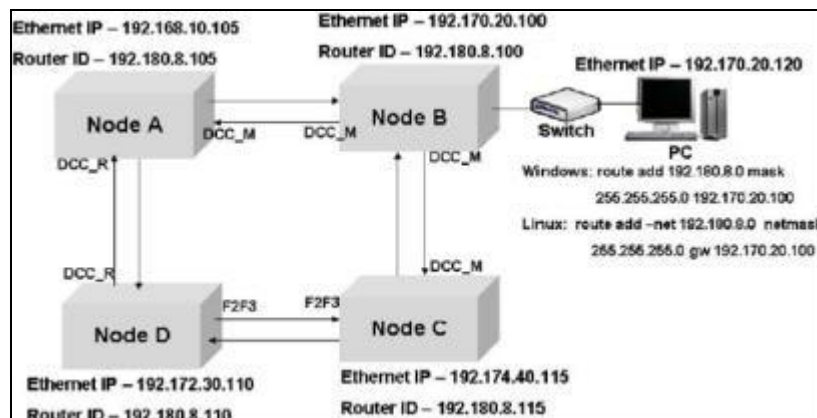
Configuring OSPF Parameters

To configure OSPF parameters:

1. Click **Configuration** > **DCN** > **OSPF** in the navigation menu. OSPF Parameters configuration page is displayed with default Ospf area configured as 0.0.0.1.

2. Enter value for area if different from default area address mentioned above.

3. Click **Submit**. A confirmation page is displayed.

4. Click **Accept Valid Modifications**. A "Successfully Modified" message is displayed.

Configuring E3/DS3 Ports

To provision PDH ports,

1. Click **Configuration** > **Facilities** > **DS1/DS3** in the **Navigation** menu.

2. Click DS1/DS3 in the sub menu. DS1/DS3 Interface configuration preview pane is displayed.

3. Click the desired DS1/DS3 port. Provision interface preview pane is displayed.

4. Select/Enter values referring to the PDH Interface Parameters table.

5. Click **Submit**. A confirmation message is displayed.

6. Click **Accept Valid Modifications**. A "Successfully Modified" message is displayed.

Table 8: PDH Interface Parameters

Parameter	Default Value	Description
Admin Status	Down	The administrative status of the PDH port. ▶ **Up:** Sets the port in service. ▶ **Down:** Sets the port out of service.
Alarm Reporting Status	Report	The alarm reporting status of the PDH port. ▶ **Report:** Reports alarms raised on the port. ▶ **No-Report:** Alarms raised at the port are not reported.
Threshold (for TCA 15min/24-hour)	Disable	Parameter to enable or disable TCAs for 15minutes 24 hours on the PDH ports. ▶ **Enable:** Enables configuring threshold level (for TCA-15min / 1-day) for TCA. ▶ **Disable:** Disables threshold level for TCA-15 min/1-day. ▶ **Default TCA Profile:** The default TCA profile is assigned.
Identifier	-	The identifier for the port. The identifier can be any alphanumeric string. This string can be used to search on list of port.
Line build out type	DS3_0_225ft (for DS3)	The Line build out type. This parameter is not applicable for E1/E3 ports. For DS3: ▶ DS3_0_225ft ▶ DS3_225_450ft
Retiming	Disable	▶ **Enable:** The E1 signal is reconstituted to the primary reference source performance specifications. ▶ **Disable:** The E1 signal is not reconstituted to the primary reference source performance specifications and hence the synchronization information is lost.
Framing Application		The framing application being used.
Framing Type	Unframed	The type of frame.

Configuring VCG Ports

To configure VCG ports:

1. Click **Configuration** > **Facilities** > **VCG** > **VCG Group** and configure following settings:

- **LCAS**: Enable or Disable as required (VCAT should be enabled for LCAS enabling.
- **VCAT**: Enable or Disable as required
- **Operating Granularity**: as required by customer
- **Payload FCS**: Enable or disable as intended.
- **Circuit Identifier**: Any alphanumeric string to identify the interface

2. Click **Submit**. A confirmation page is displayed.

3. Click **Accept Valid Modifications**. A "Successfully Modified" message is displayed.

   Repeat the above steps to configure more VCG ports.

Adding New VC to VCG

To add new VC to VCG, perform the following steps:

1. Click **Configuration** > **Facilities** > **VCG**. VCG interface configuration page is displayed.

2. Click VCG to be configured. Provisioning VCG Interface page is displayed.

3. Click **Add new VC**. Add VC to VCG page is displayed. Configure the following parameters:

   - **Number of connections**: Enter the number of VCs to be created.
   - **Working Port**: select a work port and corresponding K, L, M values
   - **Reversion Mode**: Non-Revertive / Revertive

   The default value is Non-Revertive. The options Revertive and Non-Revertive are available when protection is enabled.
   - **WTR Time**: Select value when Revertive is selected for Reversion Mode.
   - **Protection type on network**: No Protection/50 ms Protection/Slow Protection

4. Click **Submit**. A confirmation page is displayed.

5. Click on **Accept Valid Modifications**. A "Successfully Modified" message is displayed.

   Repeat the above steps to add more VCs.

Configuring Ethernet Ports

To configure Ethernet port, perform the following steps:

1. Click **Configuration** >**Facilities** > **Ethernet** in the navigation menu.
   - **Admin Status**: Up
   - **Alarm Reporting Status**: Report
   - **Auto Negotiation**: Enable or Disable depending on end equipment configuration
   - **LAN Circuit Identifier**: User dependent /Convenient

2. Click the intended Ethernet port.

3. Click **Submit**. A confirmation page is displayed.

4. Click **Accept Valid Modifications**. A "Successfully Modified" message is displayed. Repeat the above steps to configure the more Ethernet ports.

Configuring Timing Manager

To configure Timing Manager:

1. Click **Configuration** > **Synchronization** > **Synchronization Status** in the navigation menu and change QL Mode to **Enable**.

To configure the following parameters:

- **QL Mode**: Enabled/Disabled
- **Output QL mode**: Auto/Manual

Manual should be selected for Output QL mode when QL Mode is disabled.

- **Reversion mode**: Auto/Manual
- **WTR time**: 0 to 12 minutes
- **Node output quality level**: PRC, SSU_A, SSU_B, SEC, DNU, INVALID
- **Node minimum quality level**: PRC, SSU_A, SSU_B, SEC, DNU, INVALID
- **Node minimum quality level (SONET)**
- **Output quality level**: SEC
- **SETG Status**: Hold Over
- **Selected Clock Source**: Internal
- **External Request on Selected source**: No Request

Click **Submit**.

2. Click **Nominate timing reference**. Provide the second reference source and assign the second priority to it.

3. Select a value from the drop-down menu for the following parameters.

- **Clock Reference**: Port/Bits
- **Clock Reference Port**: select the STM port
- **Priority**: 0 to 8

4. Click **View Nominated timing reference** to verify the nominated clock. Repeat the above steps to nominate more than one clock source.

Checking Alarms

To check the alarms:

▶ To view current active alarms, click **Faults** > **Active Alarms** in the navigation menu.

▶ To view all the alarms suppressed on the node, click **Faults** > **Suppressed Alarms** in the navigation menu.

▶ To provision new alarm filters, click **Faults** > **Alarm Filters** in the Navigation menu.

▶ To provision the alarm history, click **Faults** > **Event history** in the Navigation menu.

▶ To view and change the severity of alarms, click **Faults** > **Alarm Severity** in the navigation menu. An asterisk appears before the name of alarms for which severity has been changed.

Appendix III

General Procedures

This chapter describes the procedures to be followed when cleaning and inspecting optical and fiber connectors. It also describes the procedure to be followed during inserting and ejecting of cards and fan trays.

NEC recommends that you always clean fiber-optic connectors before connecting to transmission equipment, test equipment, patch panels, or other connectors.

Cleaning Fiber Connectors

1. Clean the fiber end with a new lint-free cleaning pad, lens tissue, or swab. Move the cleaning pad back and forth across the fiber end several times. If you are using a swab, gently rotate the swab as you wipe across the end face.

2. Clean the ferrules and other parts of the connector with a lint-free, non abrasive cleaning pad or lens tissue. After you finish, discard the used pad or tissue.

3. Aim a filtered, dry compressed-air dust remover at a shallow angle to the fiber end face and blow across the end face from a distance of 6–8 inches.

4. Verify whether the other end of the fiber is disconnected from its laser source.

    - Inspect the fiber-optic connector with an optical fiber scope to verify that it is free of dirt and dust. Then do either of the following:

    - If the connector is clean, cover the connector with a protective dust cover until ready to use it.

    - If the connector is not completely clean, continue with steps 5 to 13 to clean it with alcohol.

5. Apply 99% isopropyl or ethyl alcohol to a lint-free, non-abrasive cleaning pad or lens tissue.

6. Clean the ferrules and other parts of the connector with a lint-free, non abrasive cleaning pad or lens tissue. After you finish, discard the used pad or tissue.

7. Apply alcohol to a new, lint-free cleaning pad, lens tissue, or swab.

8. Clean the fiber end with a new lint-free cleaning pad, lens tissue, or swab. Move the cleaning pad back and forth across the fiber end several times. If you are using a swab, gently rotate the swab as you wipe across the end face.

9. Immediately dry the fiber ends with a clean, dry, lint-free cleaning pad or lens tissue.

10. Discard the used cleaning materials.

11. Aim a filtered, dry compressed-air dust remover at a shallow angle to the fiber end face and blow across the end face from a distance of 150-200 mm.

12. Inspect the fiber-optic connector with an optical fiber scope to verify whether it is free of dirt and dust.

13. Cover the connector with a protective dust cover until it is ready to be used.

Cleaning Optical Connectors

It is important to keep all interconnects as clean as possible. Since the single-mode fiber has a light-carrying core with diameter less than 10 micro meters, even a single microscopic speck of dust on the connector end can significantly attenuate the light traveling through the fiber. Clean connections are required for accurate and repeatable measurements. Leave the protective dust covers on the connectors when they are not in use.

Observe the following guidelines to achieve the best performance:

▶ Visually inspect fiber ends to locate any signs of damage.

▶ Use dry connections whenever possible.

▶ Keep connectors covered when not in use.

For more information on cleaning procedure, refer to "***Cleaning Fiber Connectors*** on page 75".

CAUTION: Improper cleaning may result in high attenuation due to dirt or dust or may cause mechanical damage to the fiber end, resulting in performance degradation. While handling an optical fiber, do not exceed the minimum bed radius (35 mm). Do not over tighten the cable tie wraps while dressing the cable.

DANGER: Do not look into the end of fiber-optic connectors or into faceplate connectors of installed circuit packs. The light source used in fiber-optic devices can damage your eyes.

The following items are recommended for cleaning the optical connectors:

▶ 99% isopropyl or ethyl alcohol

▶ Lint-free, non abrasive optical-quality cleaning pads or lens tissue, or cotton or urethane-foam swabs.

▶ Pressurized dry-air duster.

▶ Optical fiber scope.

Ejecting Cross-Connect Cards

To eject the cross-connect card:

1. Press the RST (Reset) switch till LED status displays 'RED' color and release the switch immediately. Sts (Status) LED displays 'RED' color. During this card goes for booting process.

2. Once the process is complete, Sts (Status) LED displays 'RED BLINKING' color. This indicates that card is ready for Jack-Out. Now slave cross-connect card will become Master cross-connect card.

3. Remove the screws located at either end of the face plate using Philips (PH1) screwdriver.

4. Operate the two ejector levers (outwards) to disengage the card from the backplane.

5. Slide out the card with the ejector levers in horizontal position along the guide ways.

Inserting and Ejecting Cards

This section details the insertion and ejection of the cards in a network element. The cards are provided with ejectors that aid in their insertion and ejection from the chassis.

STATIC ELECTRICITY: Static electricity can damage the equipment. While unpacking and handling cards, or making network element interconnections, wear a grounding wrist strap to discharge the static buildup.

CAUTION: If any of the plug-in units or interface modules need to be inserted or ejected, it is imperative that the following procedures are adopted to avoid possible damages to the connectors or spring fingers.

To insert a card in a network element:

1. Identify the appropriate slot into which the card is to be inserted.

2. Slide in the card along the guide ways provided on the chassis with the ejector levers in the horizontal position to engage the ejectors to the chassis groove.

Figure 25: Inserting Card into the Chassis
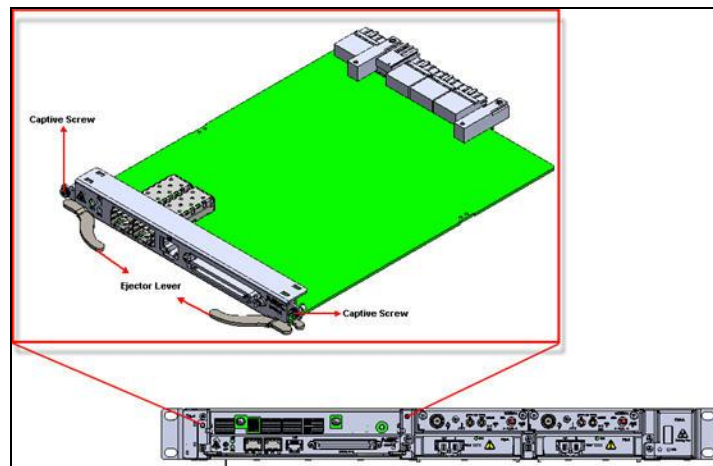
3. Operate the two ejector levers (inwards) simultaneously to engage the card to the backplane.

Figure 26: Pushing Ejector Lever Inwards
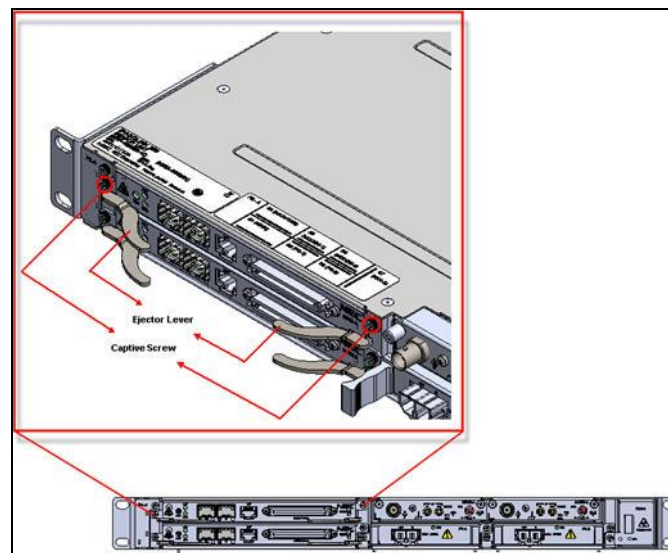
4. Fasten the face plate to the chassis using Philips (PH1) screwdriver. Apply 0.7 N-M torque when tightening the screws with the chassis.

⚠ **RISK OF PERFORMANCE DEGRADATION:** Failure to fasten the face plate to the chassis may result in intermittent failures, because of poor connectivity.

To eject a card from the network element:

1. Identify the card that is to be ejected.

2. Remove both screws located at either end of the card using Philips (PH1) screwdriver. Apply 0.7 N-M torque to remove screws from the chassis.

3. Operate the two ejector levers (outwards) to disengage the card from the backplane.

Figure 27: Pulling Ejector Lever Outwards
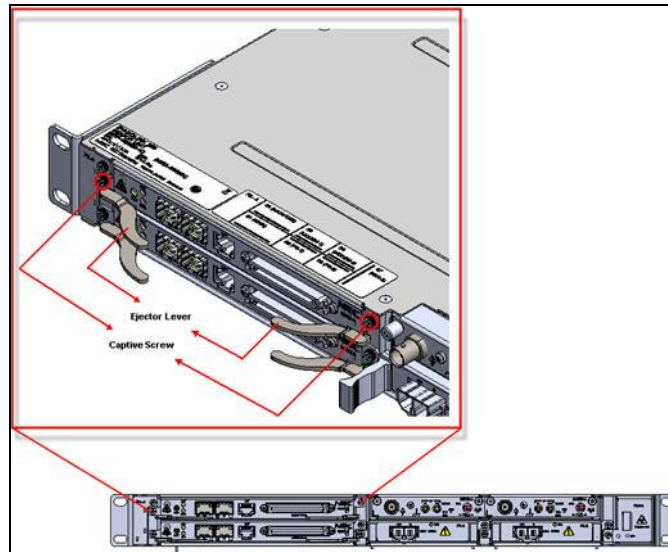
4. Slide out the card with the ejector levers in horizontal position along the guide ways.

Figure 28: Sliding the Card Outwards
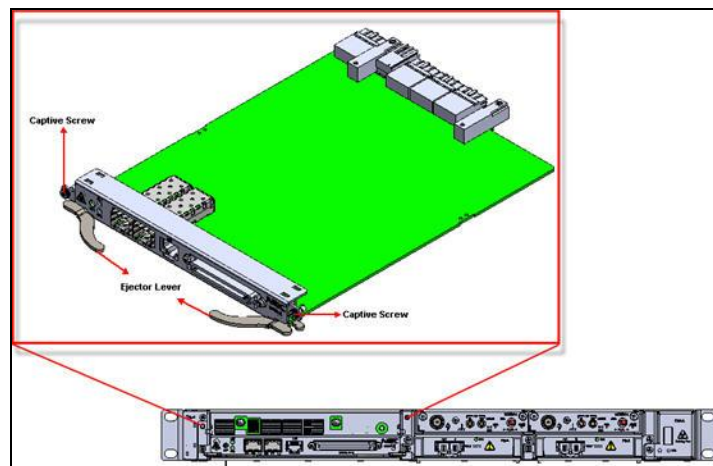
Inserting and Ejecting Fan Tray Unit (FAN-A)

To insert a Fan Tray Unit (FAN-A) in a network element:

1. Identify the correct slot for the FAN-A.

2. Slide the FAN-A with carrier along the guide ways provided on the chassis.

Figure 29: Installing Fan Tray Unit (FAN-A)
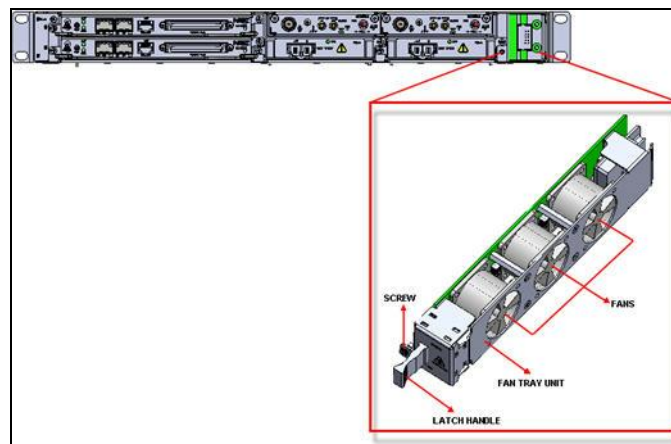
3. To engage the FAN-A to the backplane connector, push the carrier handle.

4. Fasten the screw to the chassis using Philips (PH1) screwdriver. Apply 0.7 N-M torque when tightening the screws with the chassis. Figure below shows FAN-A installed into the chassis.

Figure 30: Installing FAN-A (II)
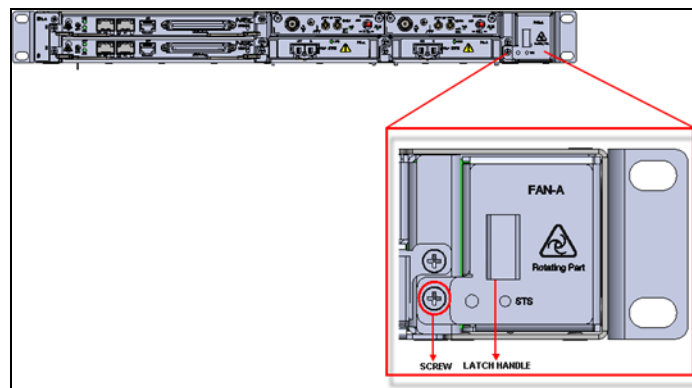
RISK OF PERFORMANCE DEGRADATION: Failure to fasten the face plate to the chassis may result in intermittent failures because of poor connectivity.

ROTATING PARTS: The fan blades may be rotating even after the power is removed, which may cause injury. Be cautious while removing the Fan unit.

To eject a FAN-A from a network element:

1. Remove the screw located at the left-hand side of the FAN-A using Philips (PH1) screwdriver. Apply 0.7 N-M torque to remove screws from the chassis.

2. Pull the carrier handle to disengage the FAN-A from the backplane connector.

3. Slide the FAN-A along the guide way till it comes out of the slot. Figure below shows FAN-A uninstalled from the chassis.

Figure 31: Uninstalling FAN-A from the Chassis
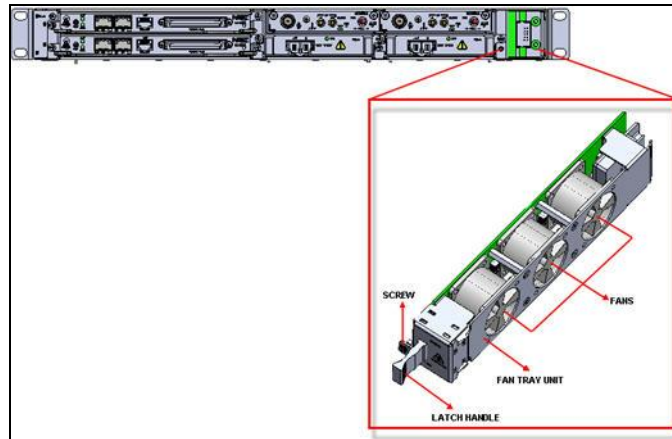
Inserting and Ejecting Air Filter Unit

To insert a fan tray in a network element:

1. Identify the correct slot for the Air Filter Unit.

2. Slide the Air Filter Unit with carrier along the guide ways provided on the chassis.

Figure 32: Installing Air Filter Tray Unit (I)
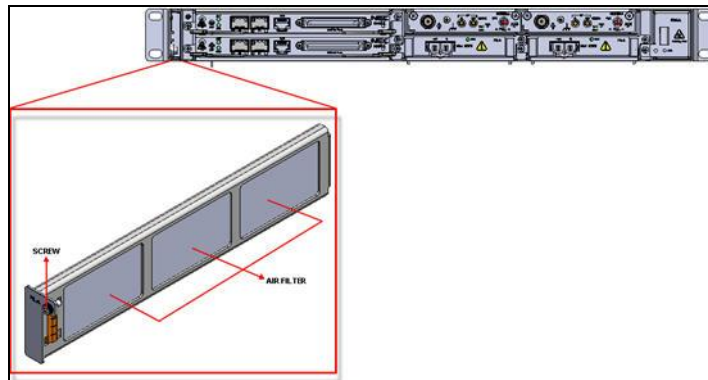
3. Tighten the screws on the Air Filter Unit using Philips (PH1) screwdriver. Apply 0.7 N-M torque when tightening the screws with the chassis. Figure below shows Air Filter Unit installed into the chassis.

Figure 33: Installing Air Filter Tray Unit (II)
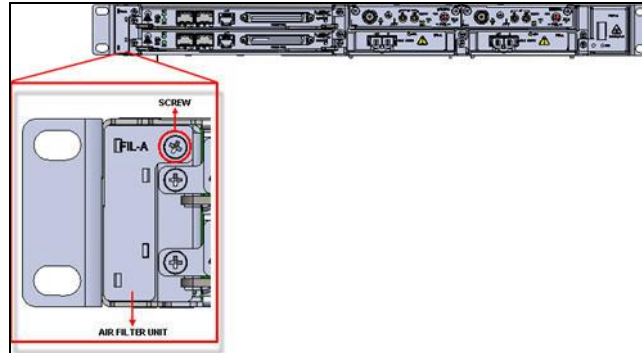
NOTE: Air Filters must be replaced once in six months.

To eject a Air Filter Unit from the network element:

1. Remove the screws located on the Air Filter Unit using Philips (PH1) screwdriver, as shown in Figure below. Apply 0.7 N-M torque to remove screws from the chassis.

Figure 34: Unstalling the Air Filter Unit (I)
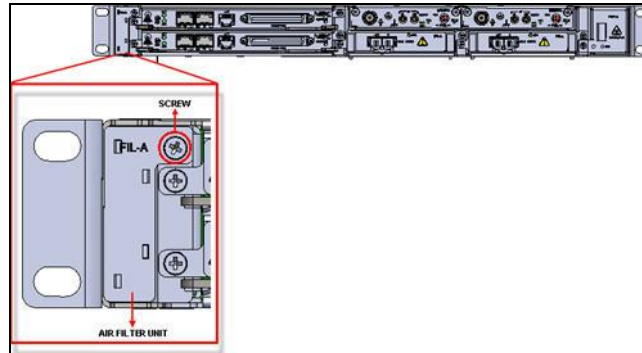
2. Slide the Air Filter Unit along the guide way till it comes out of the slot. Figure below shows FTU uninstalled from the chassis.

Figure 35: Unstalling the Air Filter Unit (II)
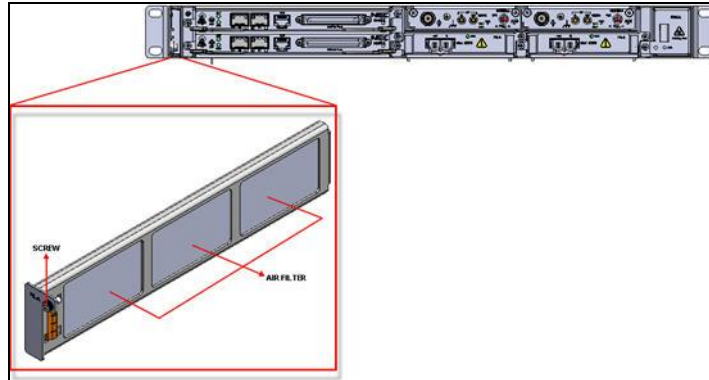
Appendix IV

Connector Pin Assignment

This appendix details connector pin details used for installing the network element.

RF SW/FAN ALM 1 Connector

Table 9: RF SW/FAN ALM 1 Connector

Diagram	Pin	Signal Name	Direction
RF SW/FAN ALM 1	1	FAN_ALM1	I
	2	FAN_ALM2	I
	3	FAN_ALM3	I
	4	FAN_ALM4	I
	5	GND	GND
	6	SW_RF_CTRL1	O
	7	GND	GND
	8	RF SW cable open	I
	9	GND	GND

ALM I/O Connector

Table 10:   ALM I/O Connector

Diagram	Pin	Signal Name	Direction
ALM I/O	1	ALM_OUT_COM	I
	2	ALM_OUT_3_NO	O
	3	ALM_OUT_2_NO	O
	4	ALM_OUT_1_NO	O
	5	ALM_OUT_1_NC	O
	6	ALM_OUT_2_NC	O
	7	ALM_OUT_3_NC	O
	8	ALM_IN_P	I
	9	ALM_IN_N	I

5 MHz/10 MHz

Table 11:   5 MHz/10 MHz Connector

Diagram	Pin	Signal Name	Direction
	1	GPS_CLK_10MHz/5MHz_IN	I
	Body	GND	GND
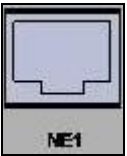
1 PPS Connector

Table 12:   1 PPS Connector

Diagram	Pin	Signal Name	Direction
	1	GPS_CLK_1PPS_IN	I
		1PPS_OUT	O
	Body	GND	GND
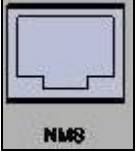
NE1 Connector

Table 13:   NE1 Connector

Diagram	Pin	Signal Name	Direction
	1	ENET_TX_NMS_P	O
	2	ENET_TX_NMS_N	O
	3	ENET_RX_NMS_P	I
	4	75 ohm Bob Smith termination	I
	5	75 ohm Bob Smith termination	I
	6	ENET_RX_NMS_N	I
	7	75 ohm Bob Smith termination	I
	8	75 ohm Bob Smith termination	I

NMS Connector

Table 14:   NMS Connector

Diagram	Pin	Signal Name	Direction
	1	ENET_TX_NMS_P	O
	2	ENET_TX_NMS_N	O
	3	ENET_RX_NMS_P	I
	4	75 ohm Bob Smith termination	I
	5	75 ohm Bob Smith termination	I
	6	ENET_RX_NMS_N	I
	7	75 ohm Bob Smith termination	I
	8	75 ohm Bob Smith termination	I
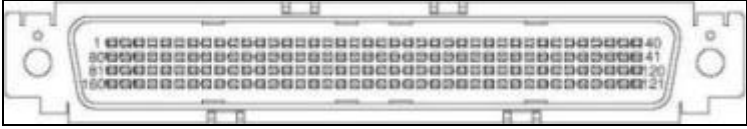
EXT CLK Connector

Table 15:   EXT CLK Connector

Diagram	Pin	Signal	Direction
	1	BITS_DATA_IN_N	I
	2	BITS_DATA_OUT_N	O
	3	BITS_CLK_IN_N	I
	4	BITS_CLK_OUT_N	O
		CLK_1588v2_OUT_N	
	5	GND	GND
	6	BITS_DATA_IN_N	I
	7	BITS_DATA_OUT_N	O
	8	BITS_CLK_IN_N	I
	9	BITS_CLK_OUT_P	O
		CLK_1588v2_OUT_P	

160 PIN LFH DS1 Connector (120 Ohm)

Table 16:   160 PIN LFH Connector (120 Ohm)

Group	Pins on the connector	Signal
Tx Group	156	TIP-Tx32
	85	RING-Tx32
	155	TIP-Tx31
	86	RING-Tx31
	154	TIP-Tx30
	87	RING-Tx30
	153	TIP-Tx29
	88	RING-Tx29
	152	TIP-Tx28
	89	RING-Tx28
	151	TIP-Tx27
	90	RING-Tx27
	150	TIP-Tx26
	91	RING-Tx26
	149	TIP-Tx25
	92	RING-Tx25
	148	TIP-Tx24
	93	RING-Tx24
	147	TIP-Tx23
	94	RING-Tx23
	146	TIP-Tx22
	95	TIP-Tx22
	145	TIP-Tx21
	96	TIP-Tx21
	144	TIP-Tx20
	97	RING-Tx20
	143	TIP-Tx19
	98	RING-Tx19
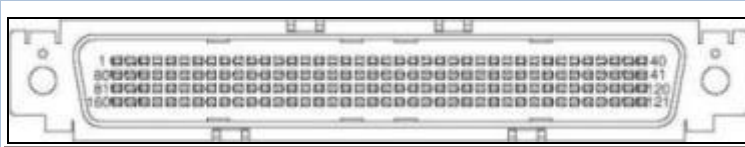
Group	Pins on the connector	Signal
	142	TIP-Tx18
	99	RING-Tx18
	141	TIP-Tx17
	100	RING-Tx17
	140	TIP-Rx16
	101	RING-Rx16
	139	TIP-Rx15
	102	RING-Rx15
	138	TIP-Tx14
	103	RING-Tx14
	137	TIP-Tx13
	104	RING-Tx13
	136	TIP-Tx12
	105	RING-Tx12
	135	TIP-Tx11
	106	RING-Tx11
	134	TIP-Tx10
	107	RING-Tx10
	133	TIP-Tx09
	108	RING-Tx09
	132	TIP-Tx8
	109	RING-Tx8
	131	TIP-Tx7
	110	RING-Tx7
	130	TIP-Tx6
	111	RING-Tx6
	129	TIP-Tx5
	112	RING-Tx5
	128	TIP-Tx4
	113	RING-Tx4
	127	TIP-Tx3
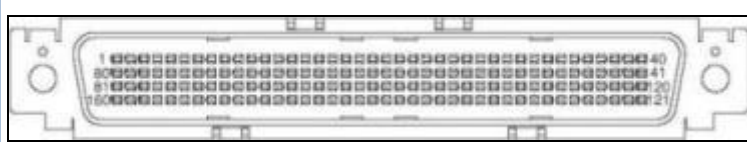
Group	Pins on the connector	Signal
	114	RING-Tx3
	126	TIP-Tx2
	115	RING-Tx2
	125	TIP-Tx1
	116	RING-Tx1
Rx Group	5	TIP-Rx32
	76	RING-Rx32
	6	TIP-Rx31
	75	RING-Rx31
	7	TIP-Rx30
	74	RING-Rx30
	8	TIP-Rx29
	73	RING-Rx29
	9	TIP-Rx28
	72	RING-Rx28
	10	TIP-Rx27
	71	RING-Rx27
	11	TIP-Rx26
	70	RING-Rx26
	12	TIP-Rx25
	69	RING-R25
	13	TIP-Rx24
	68	RING-Rx24
	14	TIP-Rx23
	67	RING-Rx23
	15	TIP-Rx22
	66	RING-Rx22
	16	TIP-Rx21
	65	RING-Rx21
	17	TIP-Rx20
	64	RING-Rx20
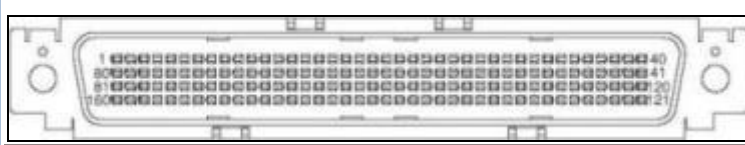
Group	Pins on the connector	Signal
	18	TIP-Rx19
	63	RING-Rx19
	19	TIP-Rx18
	62	RING-Rx18
	20	TIP-Rx17
	61	RING-Rx17
	21	TIP-Rx16
	60	RING-Rx16
	22	TIP-Rx15
	59	RING-Rx15
	23	TIP-Rx14
	58	RING-Rx14
	24	TIP-Rx13
	57	RING-Rx13
	25	TIP-Rx12
	56	RING-Rx12
	26	TIP-Rx11
	55	RING-Rx11
	27	TIP-Rx10
	54	RING-Rx10
	28	TIP-Rx9
	53	RING-Rx9
	29	TIP-Rx8
	52	RING-Rx8
	30	TIP-Rx7
	51	RING-Rx7
	31	TIP-Rx6
	50	RING-Rx6
	32	TIP-Rx5
	49	RING-Rx5
	33	TIP-Rx4
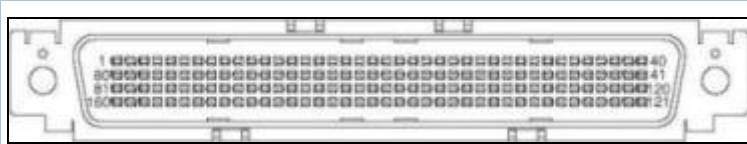
Group	Pins on the connector	Signal
	48	RING-Rx4
	34	TIP-Rx3
	47	RING-Rx3
	35	TIP-Rx2
	46	RING-Rx2
	36	TIP-Rx1
	45	RING-Rx1

MDR Connector

Transmit Port		Receive Port	
Specification	Range	Specification	Range
33	CH1 OUT(P)	32	CH1 IN(P)
67	CH1 OUT(N)	66	CH1 IN(N)
31	CH2 OUT(P)	30	CH2 IN(P)
65	CH2 OUT(N)	64	CH2 IN(N)
29	CH3 OUT(P)	28	CH3 IN(P)
63	CH3 OUT(N)	62	CH3 IN(N)
27	CH4 OUT(P)	26	CH4 IN(P)
61	CH4 OUT(N)	60	CH4 IN(N)
25	CH5 OUT(P)	24	CH5 IN(P)
59	CH5 OUT(N)	58	CH5 IN(N)
23	CH6 OUT(P)	22	CH6 IN(P)
57	CH6 OUT(N)	56	CH6 IN(N)
21	CH7 OUT(P)	20	CH7 IN(P)
51	CH9 OUT(P)	50	CH9 IN(P)
15	CH10 OUT(P)	14	CH10 IN(P)
49	CH10 OUT(N)	48	CH10 IN(N)
13	CH11 OUT(P)	12	CH11 IN(P)
47	CH11 OUT(N)	46	CH11 IN(N)
11	CH12 OUT(P)	10	CH12 IN(P)
45	CH12 OUT(N)	44	CH12 IN(N)
9	CH13 OUT(P)	8	CH13 IN(P)
43	CH13 OUT(N)	42	CH13 IN(N)
7	CH14 OUT(P)	6	CH14 IN(P)
40	CH14 OUT(N)	40	CH14 IN(N)
5	CH15 OUT(P)	4	CH15 IN(P)
39	CH15 OUT(N)	38	CH15 IN(N)
3	CH16 OUT(P)	2	CH16 IN(P)

Glossary of Terms

D

DCN

Data Communication Network is SDH network that enables OAM communication between individual network elements as well as inter network element communication.

DHCP

Dynamic Host Configuration Protocol. A protocol used by networked devices (clients) to obtain various parameters necessary for the clients to operate in an Internet Protocol (IP) network. By using this protocol, system administration workload greatly decreases, and devices can be added to the network with minimal or no manual configurations.

E

ELAN

Emulated Local Area Network. An emulated LAN is a set of clients and servers connected by virtual circuits over a network.

EOW

Engineering Order Wire. An operator's communication channel that supports a 2-wire analog telephone.

F

FRU

Field Replaceable Unit. A circuit board or part that can be quickly and easily removed and replaced by the user or by a technician without having to send the entire product or system to a repair facility.

FTU

Fan Tray Unit.

L

LC CONNECTOR

Lucent Connector. An optical fiber connector terminates the end of an optical fiber, and enables quicker connection and disconnection than splicing. The connectors mechanically couple and align the cores of fibers so that light can pass. LC connectors are replacing SC connectors in corporate networking environment due to its smaller size.

M

MAC ADDRESS

Media Access Control address. An address—typically made up of numbers and letters—assigned to your hardware that uniquely identifies its place on the network.

O

OSPF

Open Shortest Path First. A dynamic routing protocol for use in Internet Protocol (IP) networks.

P

PDH

Plesiochronous Digital Hierarchy (PDH). A technology used in telecommunications networks to transport large quantities of data over digital transport equipment such as fibre optic and microwave radio systems.

S

SLAT

System Line-up And Test.

SNCP

Sub Network Connection Protection. A path protection switching scheme that supports uni-directional and dedicated type of protection.

T

TCP/IP

Transmission Control Protocol/Internet Protocol. A method of packet-switched data transmission used on the Internet.

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