



PRODUCT DOCUMENTATION

BTI 7000 Series Common Equipment Installation Guide

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Contents

Preface	ix
1.0 Safety information	1-1
1.1 Critical safety warnings	1-2
1.2 Recommended safety precautions	1-3
1.3 Power warnings	1-5
1.4 Safety symbol and label	1-6
1.5 Electrostatic discharge warning	1-7
1.6 Standards compliance	1-8
1.6.1 Canada and U.S. standards	1-8
1.6.2 Telcordia standards	1-8
1.6.3 Telcordia physical electrical requirements	1-8
1.6.4 ETSI standards	1-8
1.6.5 FCC compliance	1-9
2.0 BTI 7000 Series overview	2-1
2.1 BTI 7000 Series shelves	2-2
2.1.1 BTI 7060	2-2
2.1.2 BTI 7060 expansion shelf	2-2
2.1.3 BTI 7030 shelf	2-3
2.1.4 BTI 7020	2-3
2.1.5 BTI 7200	2-4
2.1.6 BTI 7200 expansion shelf	2-5
2.1.7 Shelf covers	2-5
2.2 Common equipment	2-7
2.2.1 Common equipment for the BTI 7060 main shelf	2-7
2.2.2 Common equipment for the BTI 7060 expansion shelf	2-9

2.2.3 Common equipment for the BTI 7030	2-10
2.2.4 Common equipment for the BTI 7020	2-12
2.2.5 Common equipment for the BTI 7200 main shelf	2-12
2.2.6 Common equipment for the BTI 7200 expansion shelf	2-14
2.2.7 Additional common equipment	2-16
2.3 BTI 7000 Series supported interfaces	2-17
2.4 Operating temperature ranges	2-18

3.0 Planning and preparing the site **3-1**

3.1 Physical requirements	3-2
3.1.1 BTI 7060 physical specifications	3-2
3.1.2 BTI 7020 and BTI 7030 physical specifications	3-2
3.1.3 BTI 7200 physical specifications	3-3
3.1.4 BTI 7000 Series 40-channel DWDM Mux/Demux physical specifications	3-3
3.1.5 BTI 7000 Series 96-channel DWDM Mux/Demux physical specifications	3-4
3.1.6 BTI 7000 Series shelf environmental specifications	3-4
3.1.7 Recommended access clearances	3-5
3.1.8 Heat dissipation characteristics	3-5
3.1.9 Air flow and ventilation requirements	3-6
3.1.10 Floor or mounting area requirements	3-7
3.2 Rack selection for BTI 7000 Series shelves	3-8
3.2.1 Network bay requirements for BTI 7000 Series shelves	3-8
3.2.2 Cabinet requirements for BTI 7000 Series shelves	3-8
3.3 Shelf stacking options	3-9
3.3.1 Using WECC frames for BTI 7000 Series shelves	3-9
3.3.1.1 Installing mounting brackets to a BTI 7020 or BTI 7030 for a WECC frame	3-9
3.3.1.2 Installing mounting brackets to a BTI 7060 for a WECC frame	3-10
3.3.1.3 Installing mounting brackets to a BTI 7200 for a WECC frame	3-10
3.3.2 Using EIA frames for BTI 7000 Series shelves	3-11
3.3.2.1 Installing mounting brackets to a BTI 7020 or BTI 7030 for an EIA frame	3-11
3.3.2.2 Installing mounting brackets to a BTI 7060 for an EIA frame	3-12
3.3.2.3 Installing mounting brackets to a BTI 7200 for an EIA frame	3-13
3.4 Power requirements	3-14
3.4.1 DC power distribution and protection requirements	3-14
3.4.2 AC power distribution and protection requirements	3-14
3.4.3 Power consumption of modules, SFPs and XFPs	3-16
3.5 Fiber and cable routing requirements	3-20
3.5.1 Fiber management spool for BTI 7060	3-20
3.6 Communications requirements	3-21
3.6.1 Main Shelf Interface modules	3-21
3.6.2 Office alarms communication on the MSI module	3-22
3.6.3 Environmental alarms on the MSI module	3-22
3.6.4 Office and environmental alarm pin assignments	3-22
3.7 Alarm cables available from BTI	3-24
3.7.1 Office and environmental alarm cables	3-24
3.7.2 Office alarm cable color coding	3-25
3.7.3 Environmental alarm cable color coding	3-26

3.8 Ethernet LAN communications	3-28
3.8.1 Management LAN port to an Ethernet hub or switch	3-28
3.8.2 Craft LAN port to a PC or laptop	3-28
3.9 RS-232 serial communications	3-30
3.9.1 DB-9 to RJ-45 adapter kit	3-31

4.0 Before installing the BTI 7000 Series **4-1**

4.1 Required tools and materials	4-2
4.1.1 Tools required to install BTI 7000 Series shelves	4-2
4.1.2 Supplied materials for the BTI 7060	4-2
4.1.3 Supplied materials for the BTI 7030	4-3
4.1.4 Supplied materials for the BTI 7020	4-4
4.1.5 Supplied materials for the BTI 7200	4-4
4.1.6 Customer supplied materials	4-6
4.1.6.1 Optical connector cleaning tools	4-6
4.2 Equipment weights	4-7
4.3 Unpacking the equipment	4-10
4.3.1 Unpacking a BTI 7000 Series shelf	4-10
4.3.2 Unpacking the modules	4-10

5.0 Assembling the shelf **5-1**

5.1 Shelf configuration requirements	5-2
5.2 Shelf engineering considerations	5-3
5.3 Preparing the slot configuration of a shelf	5-4
5.3.1 BTI 7060 configuration	5-4
5.3.2 BTI 7030 slot configuration	5-9
5.3.3 BTI 7020 configuration	5-10
5.3.4 BTI 7200 configuration	5-10
5.3.5 How to remove the center supports	5-12
5.3.5.1 Removing the center supports from a BTI 7060	5-12
5.3.5.2 Removing the center support from an unpowered BTI 7030	5-14
5.3.5.3 Removing the center support from a BTI 7020	5-15
5.3.5.4 Removing the center supports and EMI plates from a BTI 7200	5-16
5.3.6 Replacing the center supports in a BTI 7060	5-17
5.3.7 Replacing the EMI plates and center supports in a BTI 7200	5-19
5.3.8 Module installation recommendations	5-20
5.3.8.1 BTI 7060 slot recommendations	5-20
5.3.8.2 BTI 7030 slot recommendations	5-20
5.3.8.3 BTI 7020 slot recommendations	5-21
5.3.8.4 BTI 7200 slot recommendations	5-21
5.4 How to install the AC power modules	5-22
5.4.1 How to install a BTI 7060 AC power module	5-22
5.4.2 How to install a BTI 7030 AC power module	5-26
5.5 Installing BTI 7000 Series shelves	5-29
5.5.1 Installing a BTI 7000 Series shelf in an equipment rack	5-29
5.6 Attaching the fiber management spool to a BTI 7060	5-39

5.7 Inserting or replacing an air filter in the BTI 7060	5-40
5.8 Inserting or replacing an air filter in the BTI 7200	5-41
5.9 Installing an air deflector on the BTI 7200	5-43
5.10 Using the padlock loop on a BTI 7060 or BTI 7030	5-44
5.11 Using the padlock loop on a BTI 7200	5-46

6.0 Ground and power the shelf **6-1**

6.1 Frame grounding a BTI 7000 Series shelf	6-2
6.2 Powering up a BTI 7000 Series shelf	6-6
6.2.1 Connecting the power feeds to a BTI 7060	6-6
6.2.2 Connecting the power feeds to a BTI 7030 shelf	6-7
6.2.3 Connecting the power feeds to a BTI 7200	6-9
6.2.4 Powering up a BTI 7000 Series shelf and verifying the power	6-11
6.2.5 Powering off a BTI 7000 Series shelf	6-11

7.0 Install common equipment modules **7-1**

7.1 BTI 7060 common equipment modules	7-2
7.1.1 BTI 7060 common equipment module locations	7-2
7.1.2 Install the BTI 7060 Cooling Unit module	7-2
7.1.3 Install the BTI 7060 Main Shelf Interface module	7-4
7.1.4 Install the BTI 7060 Expansion Shelf Interface module	7-5
7.1.5 Install the System Control Processor module in a BTI 7060	7-6
7.2 BTI 7030 common equipment modules	7-9
7.2.1 BTI 7030 common equipment module locations	7-9
7.2.2 Install the BTI 7030 Cooling Unit module	7-9
7.2.3 Install the BTI 7030 Main Shelf Interface module	7-10
7.2.4 Install the BTI 7030 System Control Processor module	7-12
7.3 BTI 7200 common equipment modules	7-14
7.3.1 BTI 7200 common equipment module locations	7-14
7.3.2 Install the Cooling Unit module in the BTI 7200	7-16
7.3.3 Install the BTI 7200 Main Shelf Interface module	7-17
7.3.4 Install the BTI 7200 Common Communications Module	7-18
7.3.5 Install the System Control Processor module in a BTI 7200	7-20
7.4 Filler modules and panels	7-22

8.0 Attach fibers, cables and test LEDs **8-1**

8.1 Connector types and accessories	8-2
8.1.1 Connectors available on modules	8-2
8.2 Connecting expansion shelves	8-5
8.2.1 Connecting BTI 7060 local expansion shelves	8-7
8.2.2 Connecting BTI 7200 local expansion shelves	8-10
8.2.2.1 Removing the electrical expansion shelf cable from a CCM module	8-13
8.2.3 Connecting BTI 7060 remote expansion shelves	8-14
8.2.4 Connecting BTI 7200 remote expansion shelves	8-16
8.2.5 Moving expansion shelves to a different port or to a different main shelf	8-19

8.3 LC-SC DCM patch cord kit	8-20
8.4 Y-cable for client protection	8-21
8.4.1 Connecting the y-cables for client protection	8-22
8.5 Maintaining Fiber Optic Connectors	8-23
8.5.1 Inspecting fiber optic connectors	8-23
8.5.2 Cleaning fiber optic connectors	8-23
8.5.3 Cleaning transceivers	8-25
8.6 Managing optical fibers	8-26
8.6.1 Cabling sequence	8-26
8.6.1.1 Recommendations for fiber optic cables with long boots	8-26
8.6.1.2 Recommendation for SCP and ESI modules	8-26
8.6.1.3 Recommendation for optical attenuators	8-27
8.6.1.4 Recommendations for fiberling a BTI 7200	8-27
8.7 Testing the LEDs	8-31
8.7.1 Verify the LEDs	8-31
8.7.2 Alarm Cutoff and Lamp Test Button	8-31

9.0 Install the shelf cover 9-1

9.1 Installing the shelf cover on a BTI 7060	9-2
9.2 Installing the shelf cover on a BTI 7200	9-5

10.0 Connecting to the BTI 7000 Series 10-1

10.1 Establishing a TL1 session using RS-232	10-2
10.1.1 RS-232 serial communications	10-4
10.2 Establishing a proNX 900 session using Ethernet	10-6
10.2.1 Method One: Connecting through the management LAN	10-7
10.2.2 Method Two: Connecting through the craft LAN port	10-8
10.3 Establishing a TL1 session using a modem	10-10
10.4 Connecting management systems to BTI 7000 Series ports	10-12
10.4.1 BTI 7000 Series SNMP support	10-12
10.4.2 Modes of TL1 operation	10-12

11.0 Installing proNX 900 software 11-1

11.1 Installation overview	11-2
11.1.1 proNX 900 computer requirements	11-2
11.2 Uninstalling proNX 900 on Microsoft Windows	11-3
11.3 Installing proNX 900 on Microsoft Windows	11-4
11.4 Uninstalling proNX 900 on Linux	11-6
11.5 Installing proNX 900 on Linux	11-7
11.6 Uninstalling proNX 900 on MAC OS X	11-9
11.7 Installing proNX 900 on MAC OS X	11-10
11.8 Troubleshooting installation problems	11-11
11.9 Using the proNX 900	11-12
11.9.1 Starting proNX 900	11-12
11.9.2 Logging on to the BTI 7000 Series using proNX 900 over IP network	11-12

11.9.3 Changing default IP address on the BTI 7000 Series	11-13
11.9.4 Logging off the proNX 900	11-13
11.10 Setting up the BTI 7000 Series using the proNX 900	11-14
11.10.1 The System ID name	11-14
11.10.2 Time and date	11-14
11.11 Adding user accounts and changing passwords	11-16
11.11.1 Creating a user profile	11-16
11.11.2 Modifying passwords and privilege levels	11-17

Preface

This preface explains who should read this guide, related documentation, and documentation conventions.

Audience

This guide is primarily intended for site planners, planning engineers, and installers.

Features of the BTI 7000 Series

For detailed information about this release, see the *BTI 7000 Series Release Notes* for this release.

BTI 7000 Series common equipment

The following table lists the shelves and other common equipment introduced as part of the BTI 7000 Series. For detailed information, see the *BTI 7000 Series Product Guide* and the *BTI 7000 Series Common Equipment Installation Guide*.

BTI 7000 Series common equipment

Equipment	PEC
BTI 7060	BT7A50AA
BTI 7060 with rear access -48V	BT7A50AR
BTI 7060 Cooling Unit (CU)	BT7A52DA, BT7A52EA
BTI 7060 Main Shelf Interface (MSI)	BT7A53BA, BT7A53BB
BTI 7060 Expansion Shelf Interface (ESI)	BT7A54BA
BTI 7060/BTI 7200 System Control Processor (SCP)	BT7A20CA
BTI 7060 AC Power Assembly Kit	BT7A50BA
BTI 7060 AC Power Module	BT7A58AA
BTI 7060 Filler Panel Kit	BT7A55EA

BTI 7000 Series common equipment (Continued)

Equipment	PEC
2U Cover – ANSI	BT7A5070
2U Cover – ETSI	BT7A5071
BTI 7030	BT7A56AA
BTI 7030 Cooling Unit (CU)	BT7A57BA
BTI 7030 Main Shelf Interface (MSI)	BT7A53CA, BT7153CB, BT7A53BB
BTI 7030 System Control Processor (SCP)	BT7A21BA
BTI 7030 AC Power Assembly Kit	BT7A56CA
BTI 7030 AC Power Module	BT7A58BA
1U Cover – ANSI	BT7A5670
1U Cover – ETSI	BT7A5671
BTI 7020	BT7A56BA
BTI 7200	BT7A51AA
BTI 7200 with rear access -48V	BT7A51AR
BTI 7200 Cooling Unit (CU)	BT7A52EA
BTI 7200 Main Shelf Interface (MSI)	BT7A53EA
BTI 7200 Common Communication Module (CCM)	BT7A54EA
BTI 7200 ANSI shelf cover	BT7A5180
BTI 7200 ETSI shelf cover	BT7A5181
BTI 7200 Air Deflector	BT7A59EA
BTI 7200 Installation kit	BT7A5034
BTI 7200 Pack of 5 Mounting Bracket Pairs (7200)	BT7A5035
BTI 7200 Pack of 5 Center Guides	BT7A5036
Single Expansion Shelf Kit (2x 1310 SFP, 1x Dual SM Patch Cord 1.5m)	BP1A58LA-01.5
Single Expansion Shelf Kit (2x 1310 SFP, 1x Dual SM Patch Cord 2m)	BP1A58LA-02

The BTI 7000 Series shelves support a wide range of modules. For the list of modules supported, see the *BTI 7000 Series Product Guide*.

The following table lists the BTI graphical user interface management software suite. For detailed information about each application, refer to the documentation set for the application.

Management software suite

proNX Management Suite
proNX Service Manager (PSM)
proNX 900 Node Controller (proNX 900)

Equipment compliance

The following table provides agency-compliance information for BTI 7000 Series equipment.




Agency	Compliance information
FDA	This equipment is classified by the FDA under IEC 60825, parts 1 and 2, as a Class 1 laser product with a Class 1 hazard rating.
FCC	This equipment complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.
Industry Canada	This Class A digital apparatus complies with Canadian ICES-003.

Organization of the BTI 7000 Series documentation

The following guides are contained in the BTI 7000 Series documentation suite.

- *BTI 7000 Series Alarm and Troubleshooting Guide*
- *BTI 7000 Series Command Line Interface Reference Guide*
- *BTI 7000 Series Common Equipment Installation Guide*
- *BTI 7000 Series Dynamic Optical Layer Engineering Guideline*
- *BTI 7000 Series Management Communications Channel Solutions Guide*
- *BTI 7000 Series Multiplexing Solutions Guide*
- *BTI 7000 Series Muxponder Solutions Guide*
- *BTI 7000 Series Operations Solutions Guide*
- *BTI 7000 Series Optical Amplifier and DCM Solutions Guide*
- *BTI 7000 Series packetVX Solutions Guide*
- *BTI 7000 Series Product Guide*
- *BTI 7000 Series SNMP Overview Guide*
- *BTI 7000 Series Test and Turn-up Guide*
- *BTI 7000 Series TLI Reference Guide*
- *BTI 7000 Series Transceiver InformationGuide*
- *BTI 7000 Series Transponder Solutions Guide*
- *BTI 7000 Series Upgrade Guide*
- *BTI 7000 Series Release Notes*
- *BTI 7000 Series Quick Installation Notes (various)*

Documentation conventions

Convention	Description
Note	Means reader take note. Notes contain helpful suggestions or background information.
 Caution	Means reader be careful. Equipment damage or loss of data can result from your actions.
 Warning	Means reader be careful. Harm to yourself or others can result from your actions.
 Laser Warning	Invisible laser radiation can be emitted from the aperture ports of amplifier circuit packs when no fiber cable is connected. Avoid exposure and do not stare into open apertures to avoid permanent eye damage.

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1.0 Safety information

This chapter provides safety considerations for operating the BTI 7000 Series.

- 1.1, “Critical safety warnings”
- 1.2, “Recommended safety precautions”
- 1.3, “Power warnings”
- 1.4, “Safety symbol and label”
- 1.5, “Electrostatic discharge warning”
- 1.6, “Standards compliance”

1.1 Critical safety warnings

Warning	BTI 7000 Series equipment is only suitable for connection to intrabuilding wiring.
Warning	BTI 7000 Series equipment is suitable for installation in a common bonding network.
Warning	Do not install power cabling on an electrically live system. Ensure that all power is removed from the shelf before continuing with this procedure. Actual wire gauge should be determined based on local engineering standards and practices.
Warning	Before connecting power to the BTI 7000 Series shelf, remove the fuses or circuit breakers from both the A and B sides of the battery distribution bay (BDB) and power distribution panel (PDP). Failure to do so can cause serious injury or death.
Warning	Touching electrical connectors or other exposed electrical circuitry inside the BTI 7000 Series shelf or other provisioned circuit packs when they are energized can cause serious injury or death.
Caution	Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
Note	There are no user-servicable parts inside of any BTI Systems modules or chassis.

1.2 Recommended safety precautions

The precautions listed below are recommended when working on the BTI 7000 Series shelf.

Physical precautions

- Do not lift an object alone that could be too heavy for one individual (that is, greater than 16 kg or 35 lbs).
- Keep your work area tidy and free of obstructing objects at all times.
- Do not wear loose clothing, jewelry, or other items that could be caught in the components during installation or use.
- Do not work alone if hazardous conditions may exist in your workplace.

Electrical precautions

- Use the equipment only in accordance with the electrical power rating.
- Install the BTI 7000 Series components in compliance with the following local and national electrical codes:
 - In the United States: National Fire Protection Association (NFPA) 70; US National Electrical Code
 - In Canada: Canadian Electrical Code, Part I, CSA C22.1
 - Elsewhere: International Electrotechnical Commission (IEC) 364, Part 1-7
- Properly ground the equipment chassis.
- Connect only a DC power source that complies with the Safety Extra-Low Voltage (SELV) requirements inclusive of UL1950, CAN/CSA 22.2 No. 60950, EN60950 or IEC 60950 to a BTI 7000 Series DC input power supply unit.
- Install DC power supplies used in restricted access areas in accordance with Articles 110-16, 110-17, and 110-18 of the National Electric Code, ANSI/NFPA 70.

Optical precautions

- Measure optical power levels to ensure that they are within expected limits. Attenuate optical power levels as needed before connecting laser inputs.
- Terminate all laser and SFP or XFP transceiver outputs properly before connecting laser inputs.
- Disconnect the input end of an optical fiber jumper cable before disconnecting the output end.
- Handle glass fiber with care. Glass fiber can be broken if mishandled.
- Protect skin from exposed glass fiber. It can penetrate the skin.
- System equipment should be used in a controlled access area. Limit the number of personnel that have access to the optical transmission systems. Personnel should be properly trained on laser safety and authorized, if access to laser emissions is required.

- Limit the use of laser test equipment to authorized, trained personnel during installation and service. This precaution includes using optical loss test (OLT) set, optical spectrum analyzer (OSA), and optical time domain reflectometer (OTDR) equipment.
- Exclude any unauthorized personnel from the immediate laser radiation area during service and installation when there is a possibility that the system may become energized. Consider the immediate service area to be a temporary laser-controlled area.
- The system functions in the 850-nm to 1620-nm wavelength window that is considered invisible radiation. Laser light being emitted by a fiber, a pigtail, or a bulkhead connector cannot be seen by the naked eye. Use appropriate eye protection during fiber-optic system installation or maintenance whenever there is potential for laser radiation exposure, as recommended by the company's health and safety procedures. Observe this precaution whether or not warning labels have been posted.
- During installation or service, a broken optical fiber or non-terminated connector should only be viewed with an indirect image converter or with a filtered optical instrument of optical density sufficient to reduce the exposure levels below the appropriate maximum permissible exposure, unless it has been verified that all optical transmitters are turned off and will remain off during the installation or service operation.
- During all splicing operations that require viewing the end of a fiber of an SG3a, SG3b or SG4 optical-fiber communication systems, the laser source on the fiber involved shall be de-energized or viewing the systems incorporating personal protection shall be employed. A responsible person(s) shall verify that the system is de-energized before splicing proceeds. Where applicable, ensure compliance with lockout/tagout requirements of OSHA Standard 29 CFR Part 1910.147.

1.3 Power warnings

A readily accessible disconnect device must be incorporated in the installation wiring. For optimum system power performance, BTI recommends that a power distribution panel with line-conditioning filtering capabilities be used.

1.4 Safety symbol and label

All BTI 7000 Series products are classified by the FDA as a class 1 laser product with a class 1 hazard rating.

BTI 7000 Series equipment has a caution label located on each laser circuit pack. The caution consists of caution text and a laser warning symbol.

Read and understand all caution labels before working with the equipment.

Laser Safety Warning Label



Laser Safety Warning Label



1.5 Electrostatic discharge warning

Use an ESD wrist strap whenever you open the BTI 7000 Series equipment, particularly when you are handling modules, SFPs and XFPs. To work properly, the wrist strap must make good contact at both ends (that is, with your skin at one end, and with the shelf at the other). ESD plug-in is on the right side of the BTI 7000 Series shelf.

1.6 Standards compliance

The following sections indicate the primary standards and protocols supported by the BTI 7000 Series.

1.6.1 Canada and U.S. standards

The BTI 7000 Series supports the following Canadian and U.S. standards:

- CSA22.2 No. 60950-00/UL 60950 Third Edition, 2000-12
- FDA-21 CFR Chapter 1, Subchapter J, 4-1-00 Edition

1.6.2 Telcordia standards

The BTI 7000 Series conforms to Telcordia GR-1312-CORE, Generic Requirements for Optical Fiber Amplifiers and Proprietary Dense Wavelength-Division Multiplexed Systems.

1.6.3 Telcordia physical electrical requirements

The system is tested to the following Telcordia standards:

Table 1-1 Telcordia physical standards

Standard	Description
GR-63-CORE	Physical Protection; identifies minimum generic spatial and environmental criteria
GR-1089-CORE	Electromagnetic Compatibility and Electrical Safety Generic Criteria for Network Telecommunications Equipment; identifies the minimum generic criteria for Electromagnetic Compatibility (EMC) and electrical safety
TR-NWT-000078	Generic Physical Design Requirements for Telecommunications Products and Equipment; identifies the minimum generic physical design criteria

1.6.4 ETSI standards

The BTI 7000 Series supports the following European Telecommunications Standards Institute (ETSI) standards:

- ETSI EN 300 019 - Equipment Engineering (EE); Environmental Conditions and Environmental Tests for Telecommunications Equipment: 2-1, Class T1.2-Storage; 2-2, Class T2.3-Public Storage; 2-3, Class T3.1&3.1E
 - IEC 60068-2-1: Storage, Air Temperature Low - covered by NEBS testing
 - IEC 60068-2-1: Storage, Air Temperature High - covered by NEBS testing
 - IEC 60068-2-56: Storage, Humidity, High - covered by NEBS testing
 - IEC 60068-2-6: Storage, Sinusoidal Vibration - covered by NEBS testing
 - IEC 60068-2-64: Storage, Random Vibration - covered by Public Transportation testing below

- ETSI 300 019-2-2:1994 - Transportation (Class T2.3 Public Transportation)
 - IEC 60068-2-1: Public Transportation, Temperature Low
 - IEC 60068-2-2: Public Transportation, Air Temperature High
 - IEC 60068-2-56: Public Transportation, Humidity, High
 - IEC 60068-2-14 - Public Transportation, Air Temperature, Change - Evaluated in the BTI 7060
 - IEC 60068-2-30: Public Transportation, Rapid Temperature Change - Evaluated in the BTI 7060
 - IEC 60068-2-64: Public Transportation, Random Vibration - Evaluated in the BTI 7060
 - IEC 60068-2-29: Public Transportation, Shocks - Evaluated in the BTI 7060
 - IEC 60068-2-32: Public Transportation, Free Fall
- ETSI 300 019-2-3:1994 - In use Weather Protected (Class T3.IE Temperature Controlled)
 - IEC 60068-2-1: Stationary Use, Air Temperature Low - IEC 60068-2-2: Stationary Use, Air Temperature High
 - IEC 60068-2-14: Stationary Use, Air Temperature Change - Evaluated in the BTI 7030
 - IEC 60068-2-14: Stationary Use, Air Temperature Change
 - IEC 60068-2-56: Stationary Use, High Humidity - Evaluated in the BTI 7060
 - IEC 60068-2-27: Stationary Use, Mechanical Tests, Shocks - Evaluated in the BTI 7060

1.6.5 FCC compliance

The BTI 7060, BTI 7030, and BTI 7200 are fully FCC part 15 class A compliant. With the use of an optional Ferrite shielding kit, the BTI 7060 shelf is also compliant to FCC part 15 class B emissions.

For further information about FCC part 15 class B compliance, contact BTI.

2.0 BTI 7000 Series overview

This chapter describes the BTI 7000 Series system.

- [2.1, “BTI 7000 Series shelves”](#)
- [2.2, “Common equipment”](#)
- [2.3, “BTI 7000 Series supported interfaces”](#)
- [2.4, “Operating temperature ranges”](#)

2.1 BTI 7000 Series shelves

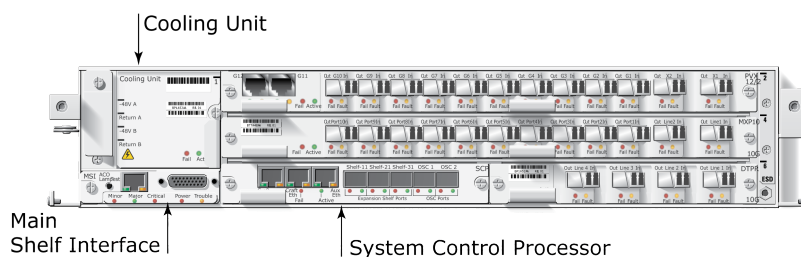
Table 2-1 BTI 7000 Series shelves

Shelf	PEC	System software introduced
BTI 7060	BT7A50AA	7.1.0
BTI 7060 with rear access -48V	BT7A50AR	7.1.0
BTI 7030	BT7A56AA	7.1.0
BTI 7020	BT7A56BA	7.1.0
BTI 7200	BT7A51AA	8.1
BTI 7200 with rear access -48V	BT7A51AR	8.1

2.1.1 BTI 7060

The BTI 7060 is a modular and scalable shelf-level system designed to Telcordia and ETSI standards. A single shelf is 2U-high and accommodates five single-width modules or a combination of single- and double-width modules, as well as one double-width, double-height module. The shelf's compact physical size requires minimal rack mounting space.

Figure 2-1 BTI 7060



The shelf can be configured as a main shelf, an expansion shelf, or a passive shelf:

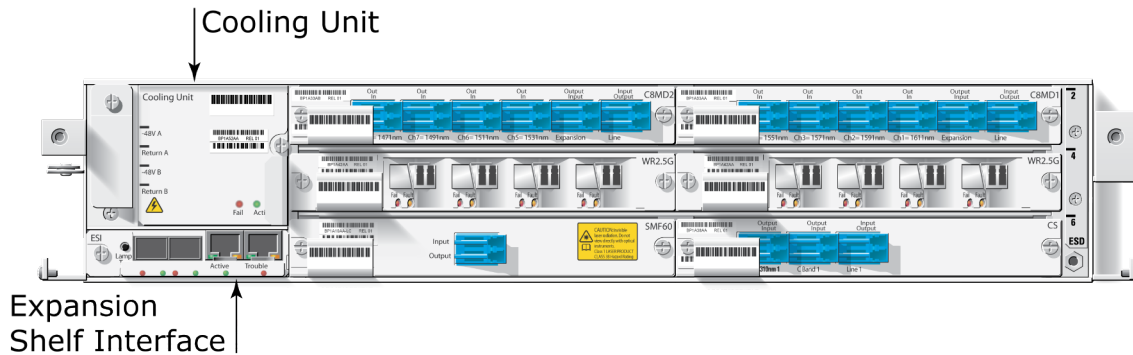
- **Main shelf:** Requires a Main Shelf Interface (MSI) module, a System Control Processor (SCP) module, and a Cooling Unit (CU).
- **Expansion shelf:** Physically the same as the BTI 7060 main shelf. This requires an Expansion Shelf Interface (ESI) module and a Cooling Unit (CU). Refer to [2.1.2, “BTI 7060 expansion shelf”](#) for more information.
- **Passive shelf:** Configured and installed as normal, except no power is required, and the shelf is not equipped with an MSI, cooling unit, or SCP. A filler kit (BT7A55EA - 7060 FILLER PANEL KIT) can be installed, which provides filler panels for the MSI and cooling unit slots in the shelf.

2.1.2 BTI 7060 expansion shelf

The BTI 7060 expansion shelf is physically the same as the BTI 7060 main shelf. The same shelf can be configured as either a main shelf or an expansion shelf. Whether to configure the shelf as a main shelf or an expansion shelf is determined automatically by software.

A single shelf is 2RU-high and accommodates six single-width modules or a combination of single- and double-width modules, as well as one double-width, double-height module. The shelf's compact physical size requires minimal rack mounting space.

Figure 2-2 Expansion Shelf



Up to three expansion shelves can be connected to a main shelf.

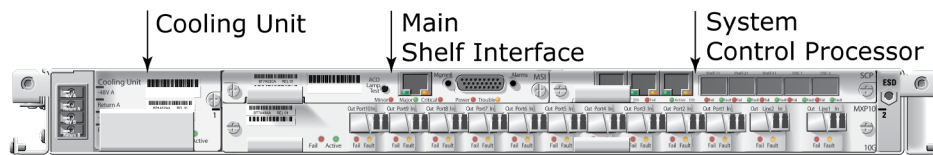
The expansion shelf requires an Expansion Shelf Interface (ESI) module and a Cooling Unit (CU). A System Control Processor (SCP) module is not required because the shelf uses the SCP in the Main Shelf and is part of the NE.

2.1.3 BTI 7030 shelf

The BTI 7030 is a modular and scalable shelf-level system designed to Telcordia and ETSI standards. A single shelf is 1U-high and accommodates two single-width modules or one double-width module. The shelf's compact physical size requires minimal rack mounting space.

The BTI 7030 requires a Main Shelf Interface module, a System Control Processor module, and a cooling unit, as shown in the following figure.

Figure 2-3 BTI 7030 shelf



2.1.4 BTI 7020

The BTI 7020 is a non-powered, auxiliary shelf that can operate with other shelves in the system. The shelf is 1RU-high and accommodates two single-width, non-powered modules, or one double-width, non-powered module.

Figure 2-4 BTI 7020

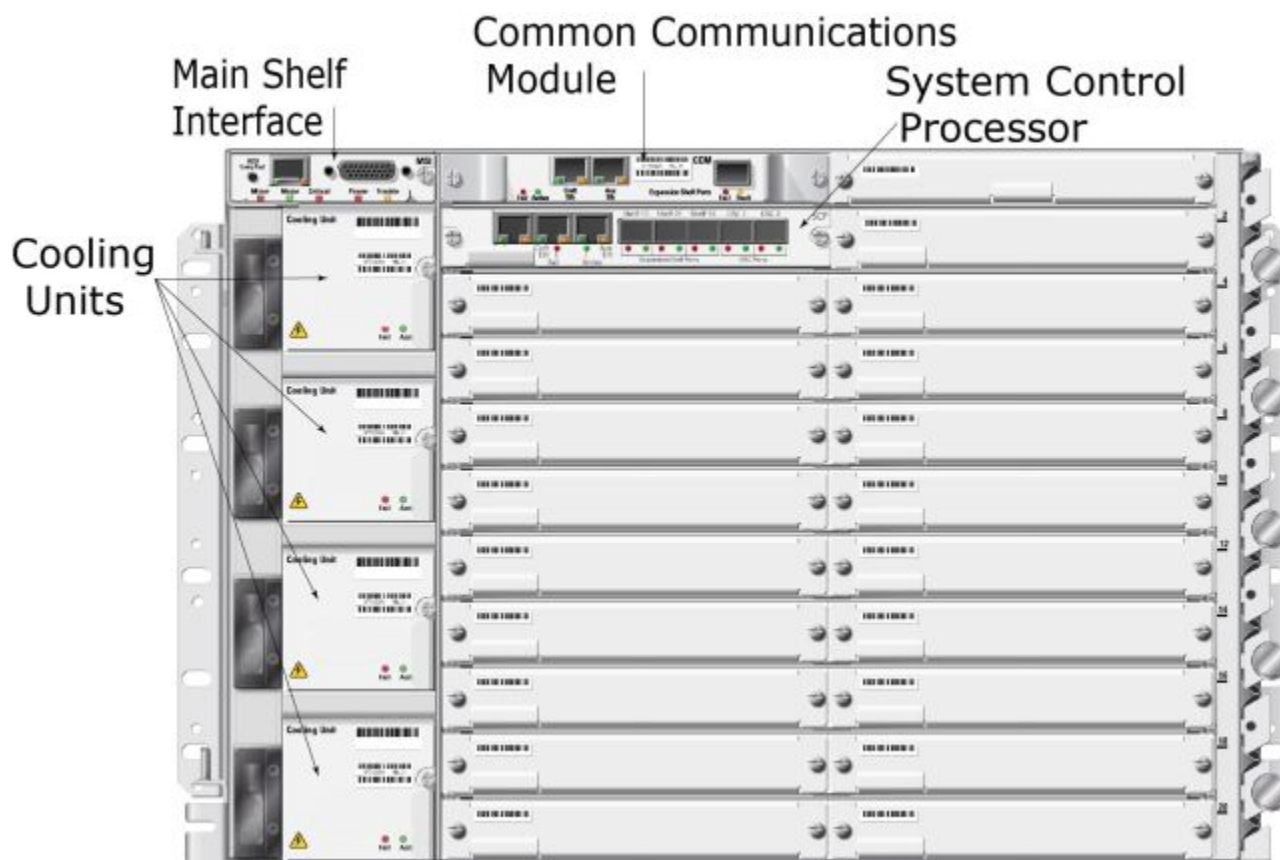


The BTI 7020 does not require any common equipment modules.

2.1.5 BTI 7200

The BTI 7200 is a modular and scalable shelf-level system designed to Telcordia and ETSI standards. A single shelf is 7RU-high and accommodates 20 single-width modules or a combination of single- and double-width modules, as well as double-width, double-height modules.

Figure 2-5 BTI 7200 main shelf



Configuring a BTI 7200 as a main shelf requires a Main Shelf Interface (MSI) module, a System Control Processor (SCP) module, a Common Communications Module (CCM), and up to four Cooling Units (CU), depending on how many slots are equipped with service modules.

The BTI 7200 main shelf fully supports one BTI 7200 shelf as an expansion shelf without restrictions, and up to two BTI 7200 shelves as expansion shelves with some restrictions (refer to [5.3.4, “BTI 7200 configuration”](#)). It supports up to 40 Transponders, up to nine Muxponders, up to nine packetVX modules, and up to nine ROADM-on-a-blade modules. Muxponders can be substituted with amplifiers, and passive modules. The BTI 7200 main shelf does not support the BTI 7060 shelf as an expansion shelf.

For more information about the BTI 7200, contact BTI.

2.1.6 BTI 7200 expansion shelf

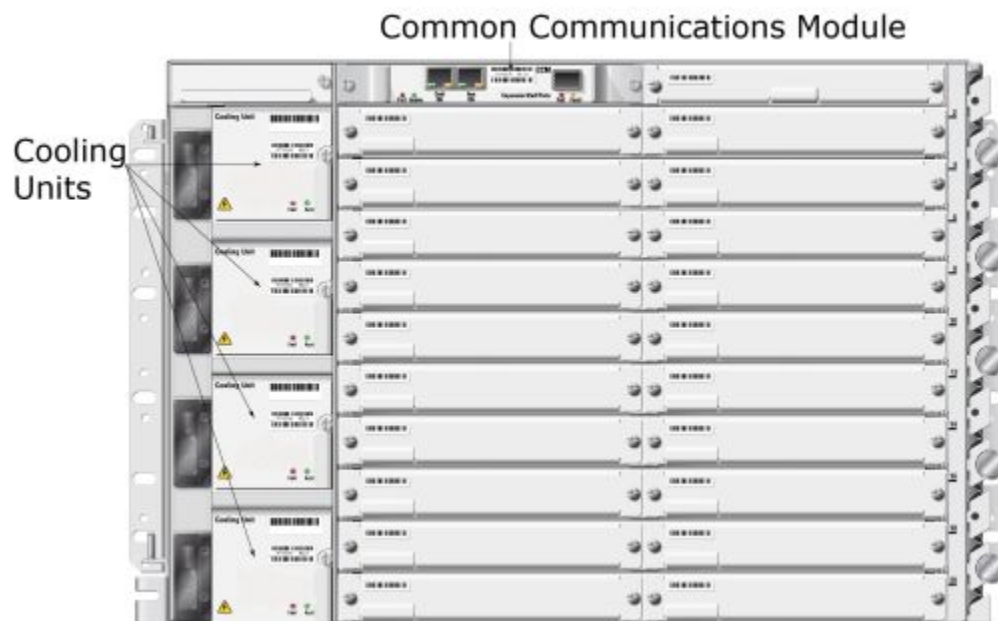
The BTI 7200 expansion shelf is a modular and scalable shelf-level system designed to Telcordia and ETSI standards. A single shelf is 7RU-high and accommodates 20 single-width modules or a combination of single- and double-width modules, as well as double-width, double-height modules. The BTI 7200 expansion shelf can be connected to a BTI 7200 or to a BTI 7060 main shelf.

The BTI 7200 main shelf fully supports one BTI 7200 shelf as an expansion shelf without restrictions, and up to two BTI 7200 shelves as expansion shelves with some restrictions. It does not support the BTI 7060 shelf as an expansion shelf. It supports up to 40 Transponders, up to nine Muxponders, and up to nine packetVX modules. Muxponders can be substituted with amplifiers, and passive modules. For more information, contact BTI.

The BTI 7200 expansion shelf requires a Common Communications Module (CCM), and up to four Cooling Units (CU) depending on how many slots are equipped with service modules. A System Control Processor (SCP) module is not required.

For information on connecting BTI 7200 expansion shelves in a system, see [8.2, “Connecting expansion shelves”](#).

Figure 2-6 BTI 7200 Expansion Shelf



2.1.7 Shelf covers

Shelf covers provide lockable protection for any BTI 7000 Series shelf.

Two sizes of shelf covers are available, designed for either ANSI or ETSI deployment:

- BTI 7020 shelf cover:
 - ANSI version (BT7A5670)

- ETSI version (BT7A5671)
- BTI 7060 shelf cover:
 - ANSI version (BT7A5070)
 - ETSI version (BT7A5071)
- BTI 7200 shelf covers are not mandatory, and are ordered separately from the shelf. If you order the shelf cover and the shelf under the same purchase order, the shelf cover is installed onto the shelf before the shelf is shipped. If you order the shelf cover under a different purchase order than the shelf, the cover and its associated mounting hardware is shipped separately and must be installed by the customer. Refer to [9.2, “Installing the shelf cover on a BTI 7200”](#) for the procedure to install the BTI 7200 shelf cover.
There are two versions of the BTI 7200 shelf cover:

- ANSI - BT7A5180
- ETSI - BT7A5181

BTI 7200 main shelf covers allow you to view the shelf alarm, power, and fault indicator LEDs from the MSI when the cover is closed. LED indicators are located in the upper left hand corner of the shelf cover. LED indicators are not available on the expansion shelves.

2.2 Common equipment

This section provides information about common equipment used in the BTI 7000 Series.

Table 2-2 Common Equipment

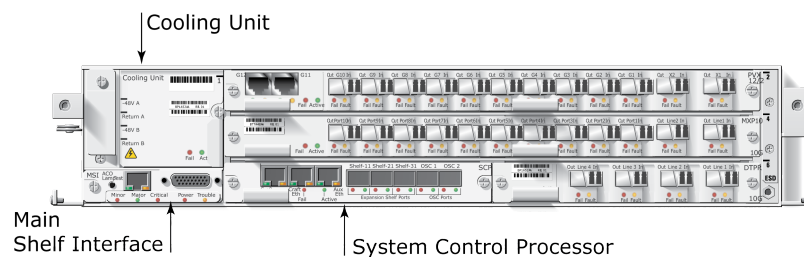
Module	PEC	System software introduced
BTI 7060 Cooling Unit	BT7A52DA	7.1.0
	BT7A52EA	8.1
BTI 7060 Main Shelf Interface	BT7A53BA	7.1.0
BTI 7060 Main Shelf Interface	BT7A53BB	8.2
BTI 7060 Expansion Shelf Interface	BT7A54BA	7.1.0
BTI 7060 System Control Processor (Common with the BTI 7200)	BT7A20CA	7.1.0
BTI 7030 Cooling Unit	BT7A57BA	7.1.0
BTI 7030 Main Shelf Interface	BT7A53CA	7.1.0
BTI 7030 Main Shelf Interface	BT7A53CB	8.2
BTI 7030 System Control Processor	BT7A21BA	7.1.0
BTI 7200 Cooling Unit	BT7A52EA	8.1
BTI 7200 MSI	BT7A53EA	8.1
BTI 7200 CCM	BT7A54EA	8.1
Filler module	BP1A55AA	7.1.0

2.2.1 Common equipment for the BTI 7060 main shelf

The BTI 7060 main shelf supports both common equipment and optional modules. The common equipment for the main shelf includes:

- BTI 7060 Cooling Unit module
- BTI 7060 Main Shelf Interface module
- BTI 7060 System Control Processor module

Figure 2-7 Main Shelf Common Equipment



Cooling Unit (CU) module

The cooling unit (BT7A52DA, BT7A52EA) consists of two independent, multispeed fans. During startup, the fans are programmed to initialize one after the other. As a result, you will hear the fans come up to speed independently.

The fans draw air from the right-side of the shelf across the modules and exhaust the air to the left rear. The cooling unit has two LEDs - failed and active - to indicate its state.

The BTI 7060 cooling unit supports outside plant operations.

Note	Do not use earlier vintage cooling units (that is, BP1A52AA, BP1A52BA or BP1A52CA) in a BTI 7060.
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Should one fan fail, replace the failed cooling unit in the next available maintenance window.

The cooling unit features a local air temperature monitor that checks the temperature in the cooling unit itself. The fans of the cooling unit run at full speed at approximately 45°C and turn off at approximately 5°C.

Faster fan speeds at higher temperatures generate more noise than slower fan speeds at lower temperatures.

Main Shelf Interface (MSI) module

The BTI 7060 main shelf supports two types of MSI modules.

MSI module PEC	Description
BT7A53BA	Provides communication and alarm indicators. An IP addressable Ethernet port using an RJ-45 connector provides communication to a management Ethernet LAN. A 26-pin HD-subminiature connector provides alarm indications to the central office or network operations center.
BT7A53BB	Provides the same capabilities as the BT7A53BA . Also supports environmental alarm and condition indicators through six pinouts on the 26-pin HD-subminiature connector.

Both MSI modules have several LEDs to provide a visible indication of alarms. The MSI module has three system alarm indicators - critical (red), major (red) and minor (yellow). The MSI also has two shelf status indicators - trouble (red) and power (green). The MSI module also has an alarm cutoff (ACO)/Lamp Test switch to test the LEDs.

System Control Processor (SCP) module

The SCP module (BT7A20CA) controls the operation of the BTI 7000 Series. For external communication, the SCP has three RJ-45 connectors - one IP addressable, one RS-232 serial, and one auxiliary, which is reserved for future use. These ports can be directly connected to a craft person's computer. For connectivity to a LAN, the Ethernet port on the MSI module should be used.

The SCP also includes three SFP cages for SFP transceivers that are used for communications with expansion shelves.

For OSC communications, there are two additional SFP cages for SFP transceivers. For details about OSC operation, see the *Management Communications Channel Solutions Guide*.

The SCP supports TL1, SNMP and CLI. The SCP runs a TL1 agent to support management and configuration. TL1 commands can be sent to the SCP using Telnet through the Ethernet interface or using a VT100 terminal emulator through the RS-232 serial interface.

The SCP has two LEDs - fail (red) and active (green) - to indicate its status. Additionally, there are two LEDs per SFP cage to indicate the status of the port - fail (red) and fault (yellow).

BTI 7060 with rear access -48V power

The BTI 7060 with rear access -48V power (BT7A50AR) is a factory installed version of the BTI 7060. This shelf allows users to power their shelf from the rear rather than from the front in 23-inch racks only.

Optional BTI 7060 AC power module

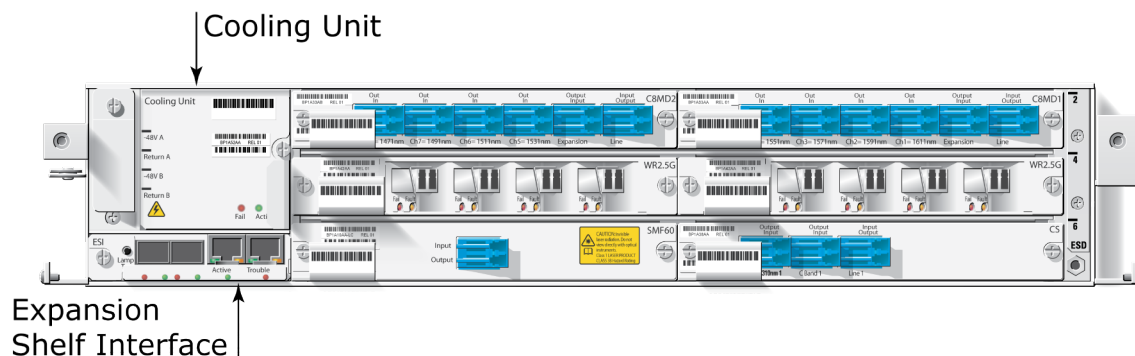
The optional BTI 7060 AC power module (BT7A58AA) permits the operation of the BTI 7060 with either 115V or 230V AC power. The BTI 7060 AC plug-in modules are attached to the rear of the BTI 7060 using the BTI 7060 AC power assembly kit (BT7A50BA).

2.2.2 Common equipment for the BTI 7060 expansion shelf

The BTI 7060 expansion shelf supports both common equipment and optional modules. The common equipment for the expansion shelf includes:

- BTI 7060 Cooling Unit module
- BTI 7060 Expansion Shelf Interface module

Figure 2-8 Expansion Shelf Common Equipment



Cooling Unit (CU) module

The cooling unit (BT7A52DA, BT7A52EA) consists of two independent, multispeed fans. During startup, the fans are programmed to initialize one after the other. As a result, you will hear the fans come up to speed independently.

The fans draw air from the right-side of the shelf across the modules and exhaust the air to the left rear. The cooling unit has two LEDs - failed and active - to indicate its state.

Note Do not use earlier model cooling units (that is, BP1A52AA, BP1A52BA or BP1A52CA) in an expansion shelf.

Should one fan fail, replace the failed cooling unit in the next available maintenance window.

The cooling unit features a local air temperature monitor that checks the temperature in the cooling unit itself. The fans of the cooling unit run at full speed at approximately 45°C and turn off at approximately 5°C.

Faster fan speeds at higher temperatures generate more noise than slower fan speeds at lower temperatures.

Expansion Shelf Interface (ESI) module

The ESI module (BT7A54BA) connects the expansion shelf to the System Control Processor module of the main shelf. The ESI houses SFP-based inter-shelf connectors in addition to RJ-45 Craft Serial and Ethernet ports.

BTI 7060 with rear access -48V power

The BTI 7060 with rear access -48V power (BT7A50AR) is a factory installed version of the BTI 7060. This shelf allows users to power their shelf from the rear rather than from the front in 23-inch racks only.

Optional BTI 7060 AC power module

The optional BTI 7060 AC power module (BT7A58AA) supports the operation of the BTI 7060 with 100 to 240 VAC, 1.5 A, 50/60 Hz power. The AC power module is intended for deep cabinet enterprise racks with the capability to house equipment that is 18 inches in depth. To install the BTI 7060 AC power module, use the BTI 7060 AC power assembly kit (BT7A50BA).

2.2.3 Common equipment for the BTI 7030

The BTI 7030 supports both common equipment and optional modules. The common equipment for the shelf includes:

- BTI 7030 Cooling Unit module
- BTI 7030 Main Shelf Interface module
- BTI 7030 System Control Processor module

As shown in the following figure, the BTI 7030 contains the Cooling Unit, Main Shelf Interface, and the System Control Processor.

Figure 2-9 BTI 7030 Common Equipment



Cooling Unit (CU) module

The BTI 7030 contains a cooling unit consisting of independent fans. The fans draw air from the right-side of the shelf across the modules and exhaust the air to the left rear. The cooling unit has two LEDs - failed and active - to indicate its state.

The BTI 7030 cooling unit supports outside plant operations.

This cooling unit features a local air temperature monitor that checks the temperature in the cooling unit itself. The fans of the cooling unit run at full speed at approximately 45°C and turn off at approximately 5°C.

Should one fan fail, replace the failed cooling unit in the next available maintenance window.

Main Shelf Interface (MSI) module

The function of the MSI module is to provide communication and alarm indicators. An IP addressable Ethernet port using an RJ-45 connector provides communication to a management Ethernet LAN. A 26-pin HD-subminiature connector provides alarm indications to the central office or network operations center.

The MSI has several LEDs to provide a visible indication of alarms. The MSI has three system alarm indicators - critical (red), major (red) and minor (yellow). The MSI also has two shelf status indicators - trouble (red) and power (green). The MSI also has an alarm cutoff (ACO)/Lamp Test switch to test the LEDs.

Main Shelf Interface (MSI) module

The BTI 7030 shelf supports three types of MSI modules.

MSI Module PEC	Description
BT7A53CA	Provides communication and alarm indicators. An IP addressable Ethernet port using an RJ-45 connector provides communication to a management Ethernet LAN. A 26-pin HD-subminiature connector provides alarm indications to the central office or network operations center.
BT7A53CB	Supports communication and alarm indicators. Also supports environmental alarm and condition indicators through six pinouts on the 26-pin HD-subminiature connector.
BT7A53BB	Provides the same capabilities as the BT7A53CA . Also supports environmental alarm and condition indicators through six pinouts on the 26-pin HD-subminiature connector.

Both MSI modules have several LEDs to provide a visible indication of alarms. The MSI has three system alarm indicators - critical (red), major (red) and minor (yellow). The MSI also has two shelf status indicators - trouble (red) and power (green). The MSI also has an alarm cutoff (ACO)/Lamp Test switch to test the LEDs.

System Control Processor (SCP) module

The SCP module controls the operation of the BTI 7000 Series. For external communication, the SCP has three RJ-45 connectors - one IP addressable, one RS-232 serial, and one auxiliary, which is reserved for future use. These ports can be directly connected to a craft person's computer. For connectivity to a LAN, the Ethernet port on the MSI module should be used.

The SCP also includes three SFP cages for SFP transceivers that are used for communications with expansion shelves.

For OSC communications, there are two additional SFP cages for SFP transceivers. For details about OSC operation, see the *Management Communications Channel Solutions Guide*.

The SCP supports TL1, SNMP, and CLI. TL1 commands can be sent to the SCP using Telenet through the Ethernet interface or using a VT100 terminal emulator through the RS-232 serial interface.

The SCP has two LEDs - fail (red) and active (green) - to indicate its status. Additionally, there are two LEDs per SFP cage to indicate the status of the port - fail (red) and fault (yellow).

Optional BTI 7030 AC power module

The optional BTI 7030 AC power module (BT7A58BA) permits the operation of the BTI 7030 with either 115V or 230V (50 Hz or 60 Hz) AC power. The 7030 AC plug-in modules are attached to the rear of the BTI 7030 using the BTI 7030 AC power assembly kit (BT7A56CA).

2.2.4 Common equipment for the BTI 7020

As shown in the following figure, the BTI 7020 supports either two single-width passive modules or one double-width passive module. No common equipment or front cover options are required.

Figure 2-10 BTI 7020

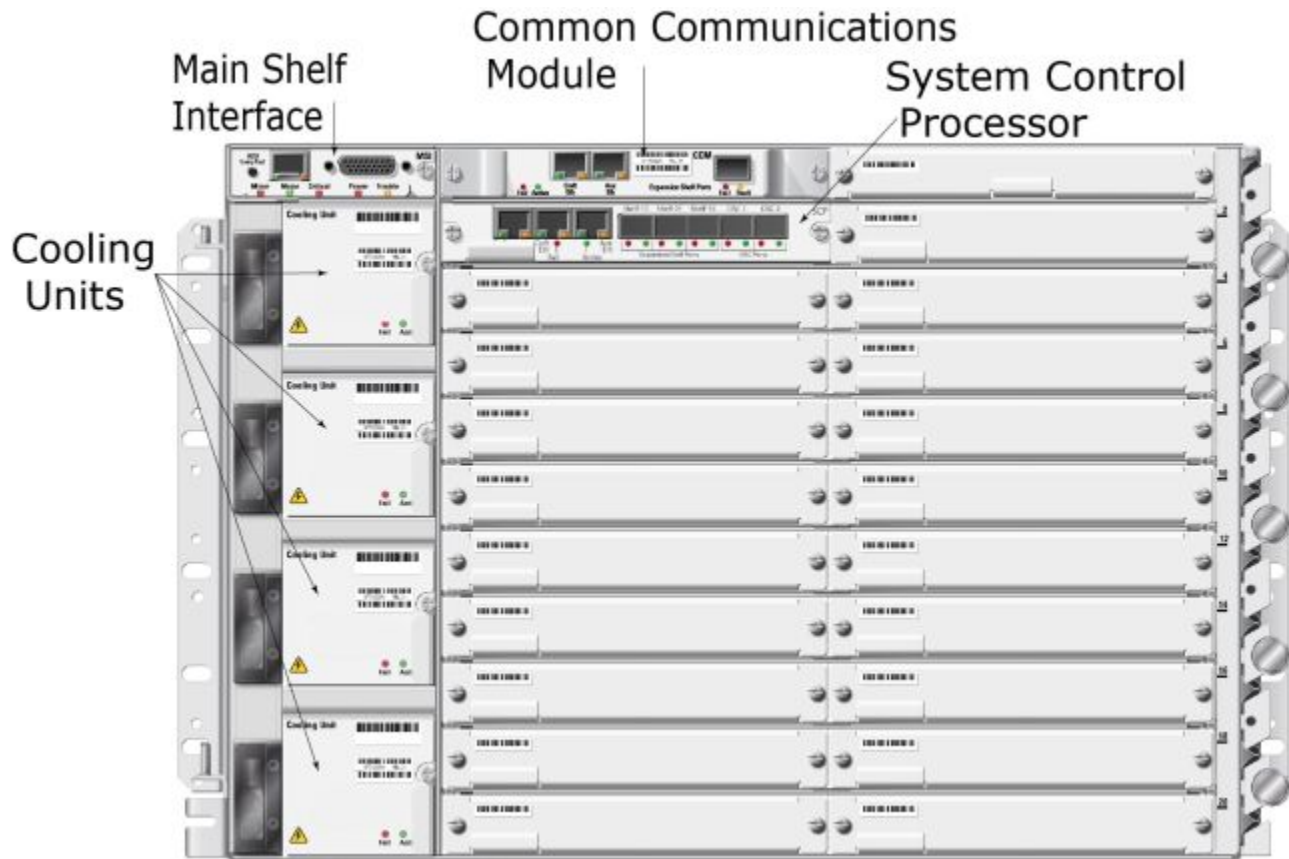


2.2.5 Common equipment for the BTI 7200 main shelf

The BTI 7200 main shelf supports both common equipment and optional modules. The common equipment for the main shelf includes:

- Up to four Cooling Units (CU) depending on how many slots are equipped with service modules (common with the BTI 7060)
- Main Shelf Interface module
- Common Communication module
- System Control Processor module (common with the BTI 7060)

Main Shelf Common Equipment Module Locations



Cooling Unit (CU) modules

The BTI 7200 requires up to four cooling unit modules depending on how many slots are equipped with service modules. Each cooling unit (BT7A52EA or later) consists of two independent, multispeed fans. During startup, the fans are programmed to initialize one after the other. As a result, you will hear the fans come up to speed independently.

If a cooling unit other than a BT7A52EA is inserted into the BTI 7200, an “Unknown Cooling Unit” alarm is raised.

The fans draw air from the right-side of the shelf across the modules and exhaust the air to the left rear. The cooling unit has two LEDs - failed and active - to indicate its state.

Note Do not use earlier vintage cooling units (that is, BP1A52AA, BP1A52BA, BP1A52CA, or BP1A52DA) in a BTI 7200.

Should one fan fail, replace the failed cooling unit in the next available maintenance window.

The cooling unit features a local air temperature monitor that checks the temperature in the cooling unit itself. The fans of the cooling unit run at full speed at approximately 45°C and turn off at approximately 5°C.

Faster fan speeds at higher temperatures generate more acoustic noise than slower fan speeds at lower temperatures.

Main Shelf Interface (MSI) module

The function of the MSI module (BT7A53EA) is to provide communication and alarm indicators. An IP addressable port using an RJ-45 connector provides communication to a management LAN. A 26-pin HD-subminiature connector provides alarm indications to the central office or network operations center.

The MSI also supports environmental alarm and condition indicators through six pinouts on the 26-pin HD-subminiature connector.

The MSI has several LEDs to provide a visible indication of alarms. The MSI has three system alarm indicators - critical (red), major (red) and minor (yellow). The MSI also has two shelf status indicators - trouble (red) and power (green). The MSI also has an alarm cutoff (ACO)/Lamp Test switch to test the LEDs.

Common Communication Module (CCM)

The CCM module (BT7A54EA) manages the system communications to the 20 service slots. The CCM houses one SFP-based intershelf port for connection to the main shelf when the CCM is used in an expansion shelf. The two RJ-45 ports on the CCM are reserved for future use.

System Control Processor (SCP) module

The SCP module (BT7A20CA) controls the operation of the BTI 7000 Series. For external communication, the SCP has three RJ-45 connectors - one IP addressable, one RS-232 serial, and one auxiliary, which is reserved for future use. These ports can be connected, directly, to a craft port on a personal computer or laptop computer. The Ethernet port on the MSI module should be used, for connectivity to a LAN.

The SCP also includes three SFP cages for SFP transceivers that are used for communications with expansion shelves.

For OSC communications, there are two additional SFP cages for SFP transceivers. For details about OSC operation, see the *Management Communications Channel Solutions Guide*.

The SCP supports TL1, SNMP and CLI. The SCP runs a TL1 agent to support management and configuration. TL1 commands can be sent to the SCP using Telnet through the Ethernet interface or using a VT100 terminal emulator through the RS-232 serial interface.

The SCP has two LEDs - fail (red) and active (green) - to indicate its status. Additionally, there are two LEDs per SFP cage to indicate the status of the port - fail (red) and fault (yellow).

Optional BTI 7200 with rear access -48V power

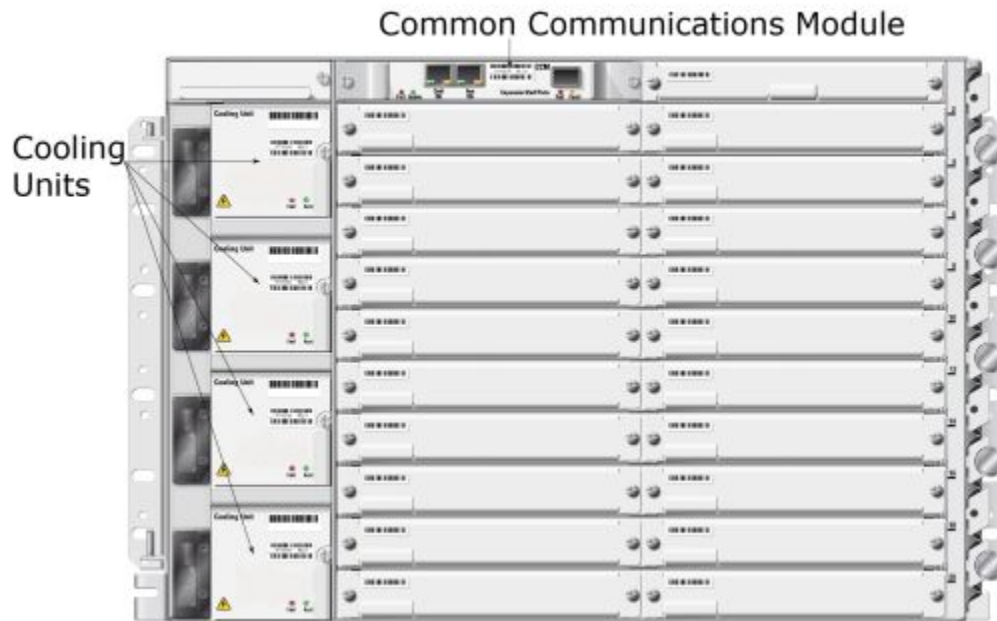
The optional BTI 7200 with rear access -48V power (BT7A51AR) is a factory installed version of the BTI 7200. This shelf allows users to power their shelf from the rear rather than from the front, and fits in all 19, 21, and 23-inch racks except for ETSI 300x600 mm racks.

2.2.6 Common equipment for the BTI 7200 expansion shelf

The BTI 7200 expansion shelf supports both common equipment and optional modules. The common equipment for the expansion shelf includes:

- Up to four Cooling Units (CU) depending on how many slots are equipped with service modules (common with the BTI 7060)
- Common Communication module

Figure 2-12 Expansion Shelf Common Equipment Module Locations



Cooling Unit (CU) modules

The BTI 7200 requires up to four cooling unit modules depending on how many slots are equipped with service modules.. Each cooling unit (BT7A52EA or later) consists of two independent, multispeed fans. During startup, the fans are programmed to initialize one after the other. As a result, you will hear the fans come up to speed independently.

If a cooling unit other than a BT7A52EA is inserted into the BTI 7200, an “Unknown Cooling Unit” alarm is raised.

The fans draw air from the right-side of the shelf across the modules and exhaust the air to the left rear. The cooling unit has two LEDs - failed and active - to indicate its state.

Note Do not use earlier model cooling units (that is, BP1A52AA, BP1A52BA, BP1A52CA, or BP1A52DA) in an expansion shelf.

Should one fan fail, replace the failed cooling unit in the next available maintenance window.

The cooling unit features a local air temperature monitor that checks the temperature in the cooling unit itself. The fans of the cooling unit run at full speed at approximately 45°C and turn off at approximately 5°C.

Faster fan speeds at higher temperatures generate more acoustic noise than slower fan speeds at lower temperatures.

Common Communication Module (CCM)

The CCM module (BT7A54EA) manages the system communications to the 20 service slots. The CCM houses one SFP-based intershelf port for connection to the main shelf when the CCM is used in an expansion shelf. The two RJ-45 ports on the CCM are reserved for future use.

Optional BTI 7200 with rear access -48V power

The optional BTI 7200 with rear access -48V power (BT7A51AR) is a factory installed version of the BTI 7200. This shelf allows users to power their shelf from the rear rather than from the front, and fits in all 19, 21, and 23-inch racks except for ETSI 300x600 mm racks.

2.2.7 Additional common equipment

The following additional common equipment is available:

- Filler module (BP1A55AA) for the BTI 7060 and BTI 7030
- Fiber management spool for the BTI 7060 in a 23-inch ANSI rack only
- Filler panels (BT7A55AA) for the BTI 7200 - The BTI 7200 is shipped with filler panels pre-installed in slots 2-20, including empty common equipment slots.

A filler module or a filler panel must be installed in each empty slot in a BTI 7060 or a BTI 7200 or a BTI 7030. The filler ensures adequate air flow to cool the system; otherwise, unfilled slots may cause overheating. An alarm is not generated if a slot remains empty (that is, no module or filler module is plugged in and seated) so it is very important to visually verify that all filler modules and panels are installed before operating the shelf. To provision alarms for missing filler modules for the BTI 7060 and BTI 7030, refer to the *Operations Solutions Guide*.

2.3 BTI 7000 Series supported interfaces

The BTI 7000 Series is designed to be managed using any of the following interfaces:

- proNX 900 Node Controller
- Simple Network Management Protocol (SNMP)
- TL1 command line interface

The BTI 7000 Series management is easily integrated into existing element management systems (EMS) and network management systems (NMS) using TL1 and SNMP. In addition, proNX 900 Node Controller is designed to simplify configuration and management of the BTI 7000 Series and requires minimal training to use.

proNX 900 Node Controller connects to the BTI 7000 Series through either the craft or management LAN ports only. RS-232 serial communication supports TL1 access only.

Configuration management, fault management and performance monitoring of the optical modules in the system are handled by the System Control Processor (SCP).

The SCP provides communication interfaces for local craft and management system access.

2.4 Operating temperature ranges

The BTI 7000 Series is intended to be installed in network telecommunications facilities.

The following tables provide information about the ranges of operating temperature that shelves, common equipment, and modules for the BTI 7000 Series support.

Table 2-3 Operating temperature ranges for shelves and common equipment

Module	0°C to +40°C long term	-5°C to +50°C short term	-20°C to +65°C long term	-40°C to +65°C long term
BTI 7060 Shelf	X	X	X	X
BTI 7060 Shelf with Rear Access -48V	X	X		
BTI 7060 /BTI 7200 System Control Processor	X	X	X	
BTI 7060 Main Shelf Interface	X	X	X	X
BTI 7060 /BTI 7200 Cooling Unit	X	X	X	X
BTI 7060 Expansion Shelf Interface	X	X		
BTI 7060 AC power assembly kit (BT7A50BA)	X	X		
BTI 7060 AC power module (BT7A58AA)	X	X		
2U Cover - ANSI	X	X	X	X
2U Cover - ETSI	X	X	X	X
Filler Module	X	X	X	X
BTI 7030 Shelf	X	X		
BTI 7030 System Control Processor	X	X		
BTI 7030 Main Shelf Interface	X	X		
BTI 7030 Cooling Unit	X	X		
BTI 7030 AC Power Assembly Kit	X	X		
BTI 7030 AC Power Unit	X	X		
1U Cover - ANSI	X	X		
1U Cover - ETSI	X	X		
BTI 7020 Passive Shelf	X	X	X	X
BTI 7200 Shelf	X	X		
BTI 7200 Shelf with Rear Access -48V	X	X		
BTI 7200 Main Shelf Interface	X	X		
BTI 7200 Common Communication Module	X	X		
7U Cover	X	X	X	X

Note At -20°C to +65°C and -40°C to +65°C operating ranges, startup is at -20°C.

Table 2-4 Optical Amplifier module operating temperature ranges

Module	0°C to +40°C long term	-5°C to +50°C short term
DWDM C-Band Pre-Amplifier (OPA)	X	X
DWDM C-Band Booster Amplifier (OBA)	X	X
DWDM Optical Line Amplifier (OLA)	X	X
DWDM Optical Line Amplifier with Mid-Stage Access (OLAM)	X	X
Single-Channel/Sub-Band Booster Amplifier (SBA)	X	X
Single-Channel/Sub-Band Pre-Amplifier (SPA)	X	X
DWDM C-Band Low Gain Amplifier (LGA)	X	X
DWDM C-Band Mid Gain Amplifier (MGA)	X	X
DWDM C-Band Mid Gain Amplifier with Mid-Stage Access (MGM)	X	X

Table 2-5 Dispersion Compensation modules operating temperature ranges

Module	0°C to +40°C long term	-5°C to +50°C short term
DCF-type		
SMF Dispersion Compensation Module 20 km - UC	X	X
SMF Dispersion Compensation Module 40 km -SC	X	X
SMF Dispersion Compensation Module 60 km-SC	X	X
SMF Dispersion Compensation Module 80 km -SC	X	X
C-band FBG-type		
SMF 100 GHz C-Band DCM 40 km - UC	X	X
SMF 100 GHz C-Band DCM 60 km - UC	X	X
SMF 100 GHz C-Band DCM 80 km - UC	X	X
Dispersion Compensation Modules (Expandable)		
Dispersion Compensation Module - SMF 5 km	X	X
Dispersion Compensation Module - SMF 10 km	X	X
Dispersion Compensation Module - SMF 15 km	X	X

Table 2-5 Dispersion Compensation modules operating temperature ranges (Continued)

Module	0°C to +40°C long term	-5°C to +50°C short term
Dispersion Compensation Module - SMF 20 km	X	X
Dispersion Compensation Module - SMF 30 km	X	X
Dispersion Compensation Module - SMF 40 km	X	X
Dispersion Compensation Module - SMF 50 km	X	X
Dispersion Compensation Module - SMF 60 km	X	X
Dispersion Compensation Module - SMF 70 km	X	X
Dispersion Compensation Module - SMF 80 km	X	X
Dispersion Compensation Module - SMF 90 km	X	X
Dispersion Compensation Module - SMF 100 km	X	X

Table 2-6 Dynamic Optical Layer module operating temperature ranges

Module	0°C to +40°C long term	-5°C to +50°C short term
DWDM Line Amplifier	X	X
2D ROADM-on-a-blade	X	X
4D ROADM-on-a-blade	X	X

Table 2-7 Multiplexing module operating temperature ranges

Module	0°C to +40°C long term	-5°C to +50°C short term	-20°C to +65°C long term	-40°C to +65°C long term
1-Channel CWDM OADM	X	X	X	X
2-Channel CWDM OADM	X	X	X	X
Double 1-Channel CWDM OADM/Double OSC Coupler Splitter	X	X	X	X
4-Channel CWDM Mux/Demux (Ch. 1 – 4)	X	X	X	X
4-Channel CWDM Mux/Demux (Ch. 5 – 8)	X	X	X	X
4-Channel CWDM Mux/Demux (Ch. 9 – 12)	X	X	X	X
4-Channel CWDM Mux/Demux (Ch. 13 – 16)	X	X	X	X
32-Channel DWDM Mux/Demux Module 1	X	X	X	X
32-Channel DWDM Mux/Demux Module 2	X	X	X	X

Table 2-7 Multiplexing module operating temperature ranges (Continued)

Module	0°C to +40°C long term	-5°C to +50°C short term	-20°C to +65°C long term	-40°C to +65°C long term
32-Channel DWDM Mux/Demux Module 3	X	X	X	X
32-Channel DWDM Mux/Demux Module 4	X	X	X	X
32-Channel DWDM Bidirectional Mux/Demux (Mux Band 1, Demux Band 2)	X	X	X	X
32-Channel DWDM Bidirectional Mux/Demux (Mux Band 2, Demux Band 1)	X	X	X	X
32-Channel DWDM Bidirectional Mux/Demux (Mux Band 2, Demux Band 4)	X	X	X	X
32-Channel DWDM Bidirectional Mux/Demux (Mux Band 4, Demux Band 2)	X	X	X	X
1-Channel DWDM OADM	X	X	X	X
2-Channel DWDM OADM	X	X	X	X
4-Channel DWDM OADM	X	X	X	X
1310nm and C-Band Coupler/Splitter	X	X	X	X
DWDM Bidirectional Coupler/Splitter	X	X		
CWDM and DWDM Splitter Combiner	X	X		
Single 50/50 Coupler/Splitter	X	X		
40-Channel DWDM Mux/Demux	X	X		
96-Channel DWDM Mux/Demux	X	X		
Y-cable (single mode)	X	X	X	

Table 2-8 Transponder module operating temperature ranges

Module	0°C to +40°C long term	-5°C to +50°C short term	-20°C to +65°C long term
2.5G Wavelength Manager	X	X	X
2.5G Wavelength Regenerator	X	X	X
Dual 4G Multiprotocol Transponder	X	X	
Dual 10G Multiprotocol Transponder	X	X	
Dual 10G Multiprotocol Transponder Lite	X	X	
10G Multiprotocol Transponder	X	X	

Table 2-9 Muxponder module operating temperature ranges

Module	0°C to +40°C long term	-5°C to +50°C short term	-20°C to +65°C long term
2-Port GbE Muxponder – SONET	X	X	X
2-Port GbE Muxponder – SDH	X	X	X
8-Port Multiprotocol Muxponder – SONET	X	X	

Table 2-9 Muxponder module operating temperature ranges (Continued)

Module	0°C to +40°C long term	-5°C to +50°C short term	-20°C to +65°C long term
8-Port Multiprotocol Muxponder – SDH	X	X	
10-Port Multiprotocol Muxponder – SONET	X	X	
10-Port Multiprotocol Muxponder – SDH	X	X	

Table 2-10 packetVX module operating temperature ranges

Module	0°C to +40°C long term	-5°C to +50°C short term	-20°C to +65°C long term	-40°C to +65°C long term
packetVX 12/2	X	X	X	X
packetVX 24/2	X	X	X	X
packetVX 24/4	X	X	X	X
packetVX 80	X	X	X	X

Note At -20°C to +65°C and -40°C to +65°C operating ranges, startup is at -20°C.

Note Short-term refers to a period of not more than 96 consecutive hours and a total of not more than 15 days during a 1-year period (as detailed in GR-63-CORE).

3.0 Planning and preparing the site

This chapter provides pre-installation requirements for the BTI 7000 Series.

- [3.1, “Physical requirements”](#)
- [3.2, “Rack selection for BTI 7000 Series shelves”](#)
- [3.3, “Shelf stacking options”](#)
- [3.4, “Power requirements”](#)
- [3.5, “Fiber and cable routing requirements”](#)
- [3.6, “Communications requirements”](#)

3.1 Physical requirements

3.1.1 BTI 7060 physical specifications

Table 3-1 BTI 7060 specifications

Parameter	Units
Height x Width x Depth	ANSI 88.9 mm x 439.5 mm x 279.4 mm (without cover) or 304.8 mm (with cover) 3.5 inches x 17.3 inches x 11 inches (without cover) or 12 inches (with cover) ETSI 88.9 mm x 439.5 mm x 279.4 mm (without or without cover)
Weight (empty shelf)	5.9 kg 13 lbs
Weight (fully loaded shelf)	12.6 kg 28 lbs
Mounting options	23-inch or 19-inch frames Note Contact BTI for 19-inch frame engineering rules. ETSI cabinets Note ETSI mounting brackets are shipped with each BTI 7060. 19-inch cabinet
Density	20 shelves per 7-foot rack

3.1.2 BTI 7020 and BTI 7030 physical specifications

Table 3-2 Physical attributes of the BTI 7020 and BTI 7030

Parameter	Units
Height x Width x Depth	ANSI 44.4 mm tall x 439.5 mm wide x 279.4 mm deep (without cover) or 304.8 mm deep (with cover) 1.75 in tall x 17.30 in wide x 11.00 in deep (without cover) or 12.00 in deep (with cover) ETSI 44.4 mm tall x 439.5 mm wide x 279.4 mm deep (with or without cover)
Weight (empty shelf)	2.5 kg 5.5 lbs
Weight (fully loaded shelf)	5.9 kg 13 lbs
Mounting options	23-inch or 19-inch frames

Table 3-2 Physical attributes of the BTI 7020 and BTI 7030 (Continued)

Parameter	Units
	Note Contact BTI for 19-inch frame engineering rules. ETSI cabinets
	Note ETSI mounting brackets are shipped with each BTI 7020 and BTI 7030. 19 in cabinet
Density	40 shelves per 7 foot rack

3.1.3 BTI 7200 physical specifications

Table 3-3 Physical attributes of the BTI 7200

Parameter	Units
Height x Width x Depth	ANSI 310.5 mm tall x 439.5 mm wide x 279.4 mm deep (without cover) or 304.8 mm deep (with cover) 12.22 in tall x 17.30 in wide x 11.00 in deep (without cover) or 12.00 in deep (with cover) ETSI 310.5 mm tall x 439.5 mm wide x 279.4 mm deep (with or without cover)
Weight (empty shelf)	15.8 kg 35 lbs
Weight (fully loaded shelf)	36 kg 80 lbs
Mounting options	23-inch or 19-inch frames ETSI 465mm and 515mm-center racks Note ETSI mounting brackets are shipped with each BTI 7200. 19-inch cabinet
Density	6 shelves per 7 foot rack

3.1.4 BTI 7000 Series 40-channel DWDM Mux/Demux physical specifications

Table 3-4 Physical attributes: 40-channel DWDM Mux/Demux

Parameter	Units
Height x Width x Depth	ANSI 3.5 in tall x 17.4 in wide (for chassis and 19 inches wide for cover) x 12.0 in deep

Table 3-4 Physical attributes: 40-channel DWDM Mux/Demux (Continued)

Parameter	Units
	ETSI
	88.0 mm tall x 442.0 mm wide (for chassis and 483.0 mm wide for cover) x 280.0 mm deep
Weight	6.2 kg
	13.7 lbs

3.1.5 BTI 7000 Series 96-channel DWDM Mux/Demux physical specifications

Table 3-5 Physical attributes: 96 -channel DWDM Mux/Demux

Parameter	Units
Height x Width x Depth	ANSI
	5.25 inches tall x 17.46 inches wide (for chassis and 19 inches wide for cover) x 11.95 inches deep
	ETSI
	133.4 mm tall x 443.5 mm wide (for chassis and 483.0 mm wide for cover) x 303.5 mm deep
Weight	9.3 kg
	20.6 lbs

3.1.6 BTI 7000 Series shelf environmental specifications

Table 3-6 BTI 7000 Series shelf environmental specifications

Parameter	Range
Storage temperature	-40°C to +70°C (-40°F to +158°F)
Temperature for Class 1 and Class 2 equipment	See 2.4, "Operating temperature ranges" .
Humidity	Operating: 5% to 90% non-condensing Short-term ¹ : 5% to 95% non-condensing
	Note Short-term refers to a period of not more than 96 consecutive hours and a total of not more than 15 days during a 1-year period. As detailed in GR-63-CORE.
Mechanical, shock, and vibration	Telcordia NEBS Level 3, Earthquake Zone 4, GR-63-CORE, GR-78-CORE
Electromagnetic compatibility/ Radio Frequency Interference	FCC Part 15 Class A, GR-1089-CORE
Safety	IEC/UL/CSA 60950, IEC 60825

3.1.7 Recommended access clearances

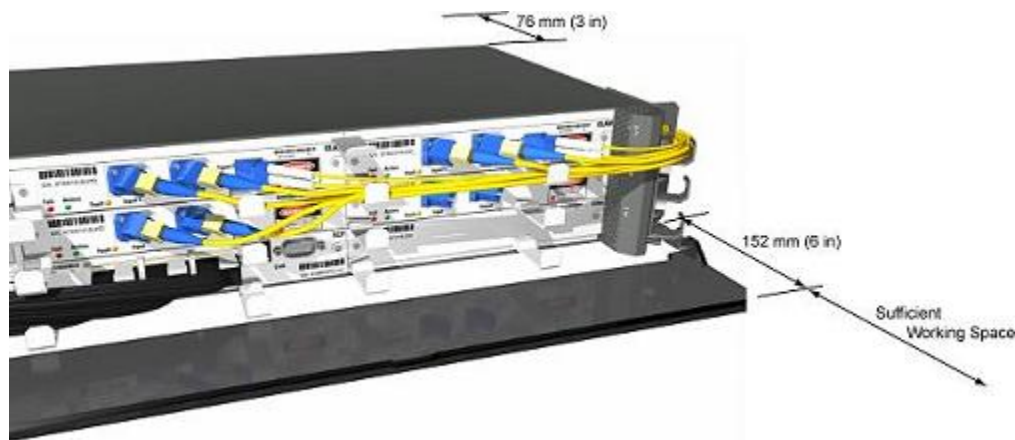
Verify that the minimum clearances can be provided for accessing equipment frames from the front, opening equipment covers, and sufficient clearance for ventilation purposes.

The following table lists the recommended clearances.

Table 3-7 Recommended Clearances

Item	Recommended Clearance
Rack access needed for maintenance	Sufficient space to work comfortably in front of the rack.
Rear clearance to wall	76 mm (3 in) Note If an AC Power Module is installed, ensure that the rear clearance extends from the rear of the AC Power Module.
Clearance to open equipment covers	152 mm (6 in)
Vertical clearance	For ANSI installations, no vertical clearance is required. The BTI 7000 Series shelves are designed to be stacked one on top of each other. For ETSI installations, a minimum space of 25 mm (1 in) is required both above and below the stacked BTI 7000 Series shelves to allow proper ventilation of ETSI vertically cooled equipment.

The following figure shows the recommended shelf clearances.



3.1.8 Heat dissipation characteristics

Verify that the installation location accommodates the heat dissipation requirements of the BTI 7000 Series equipment. The following table lists the shelf characteristics.

Table 3-8 Heat Dissipation characteristics

Equipment Type	Heat Dissipation
BTI 7060 fully equipped	5700 W/m ² per m of vertical rack space

Table 3-8 Heat Dissipation characteristics (Continued)

Equipment Type	Heat Dissipation
	(160 W/ft. ² per ft. of vertical rack space)
BTI 7030 fully equipped	4600 W/m ² per m of vertical rack space (130 W/ft. ² per ft. of vertical rack space)
BTI 7020 fully equipped	0.0 W/m ² per ft. of vertical rack space (0.0 W/ft. ² per ft. of vertical rack space)
BTI 7200 fully equipped	6050 W/m ² per m of vertical rack space (170 W/ft. ² per ft. of vertical rack space)

3.1.9 Air flow and ventilation requirements

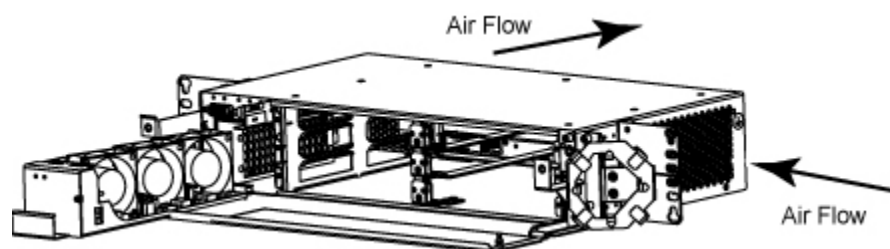
The BTI 7000 Series (except for the BTI 7020) requires adequate air flow and ventilation to dissipate the heat that the equipment generates. The Cooling Unit provides adequate air flow when the ambient temperature is lower than 55°C and the rear-facing ventilation vents of a shelf are not obstructed. The air intake ports are located on the right-side of the shelf. The exhaust ports are located at the rear of the shelf on the left-side for outside plant configurations.

A filler module for the BTI 7060 and BTI 7030, or a filler panel for the BTI 7200, is required in empty slots. The filler is required to ensure adequate airflow to cool the system. Unfilled slots may cause overheating of the system.

Important For outside plant module installations that have extended temperature conditions, use a Phillips screwdriver to remove the side panel located on the left-side of a shelf. By removing the side panel, the air cooling efficiency of the shelf is increased.

The following figure shows the shelf cooling air flow for a BTI 7060. A similar shelf cooling air flow occurs for the BTI 7030. This shelf cooling air flow is applicable to the BTI 7200, except that in the case of the BTI 7200 there are four Cooling Units operating at the same time.

Shelf Cooling Air Flow



The BTI 7020 is designed as a passive device; as such, it dissipates no heat and requires no air flow for cooling.

3.1.10 Floor or mounting area requirements

Verify that the floor or mounting area where you will install the equipment meets the floor loading requirements in *GR-63 NEBS Requirements: Physical Protection*.

Refer to 3.1, “[Physical requirements](#)” for shelf weights.

3.2 Rack selection for BTI 7000 Series shelves

The BTI 7000 Series shelves support a number of mounting options and can be installed in a variety of industry-standard racks. The following racks can be used:

- ANSI 23-inch network bay
- ANSI 19-inch network bay
- 19-inch cabinet with a front mounting flange (may require special engineering)
- ETSI 450-mm or 500-mm rack or cabinet (consult BTI Systems for ETSI engineering rules)

Select a rack type that best suits your installation environment.

Note	Customers are responsible for acquiring and setting up the rack that they select to use.
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3.2.1 Network bay requirements for BTI 7000 Series shelves

Both 19- and 23-inch network bays permit the mid-mounting of the BTI 7000 Series shelf 5 inches from the front of the shelf cover. The shelf is supplied with two sets of mounting brackets to accommodate both sizes of network bays.

Ensure sufficient space is available to use the fiber management spool with the BTI 7060, which is intended for 23-inch network bays only. For further information, see [8.6, “Managing optical fibers”](#).

3.2.2 Cabinet requirements for BTI 7000 Series shelves

A 19-inch cabinet requires front-mounting of the BTI 7000 Series shelf. The fiber management spool cannot be used with the BTI 7060 in a 19-inch cabinet. For further information, see [8.6, “Managing optical fibers”](#).

If using a 19-inch cabinet, please contact your BTI representative to discuss if any modifications may be required to the supplied mounting brackets to meet your specific cabinet requirements.

3.3 Shelf stacking options

This section explains the options that are available to ensure efficient shelf stacking on a frame.

3.3.1 Using WECO frames for BTI 7000 Series shelves

The WECO frames use a 1.0-inch pitch hole pattern. This means that there is a hole available for mounting hardware every 1.0 inch along the frame.

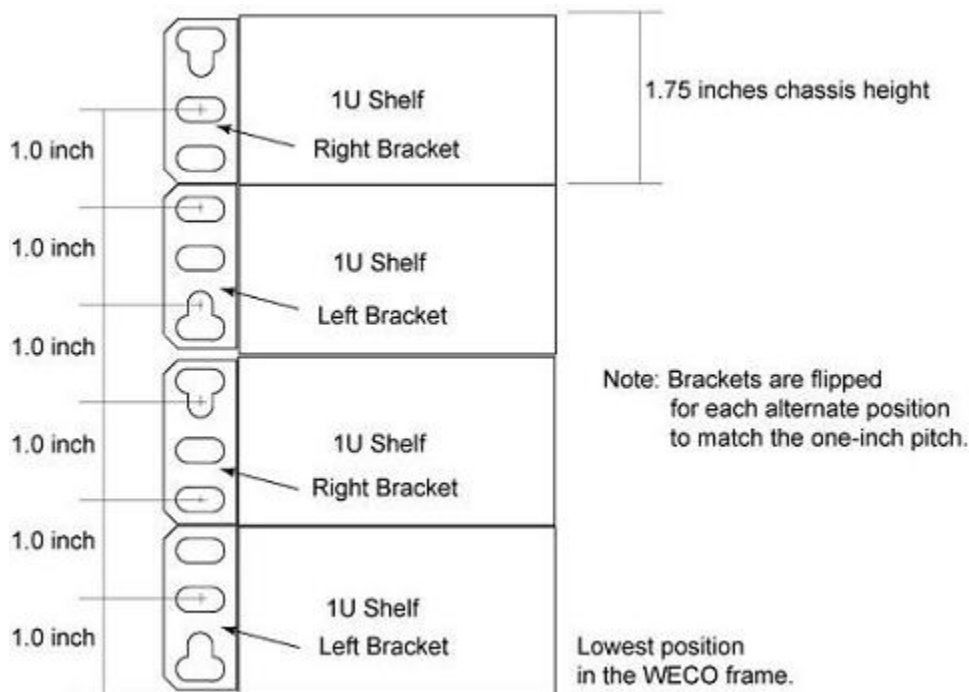
Each WECO frame can support up to:

- 43 1U shelves
- 19 2U shelves
- 6 7U shelves

3.3.1.1 Installing mounting brackets to a BTI 7020 or BTI 7030 for a WECO frame

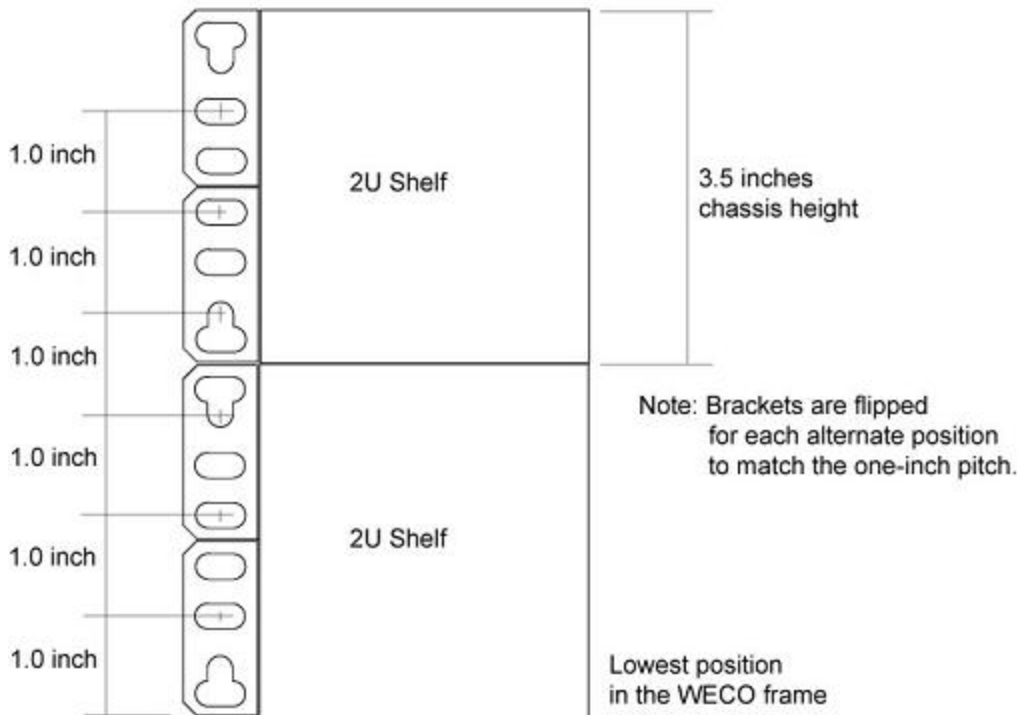
The following illustration shows which of the holes in the mounting bracket align with the 1.00-inch pitch holes of the WECO frame. Use the holes that are indicated to mount the brackets to the frame. Up to 43 1U shelves can be installed in one WECO frame.

To stack and use the mounting holes, every other bracket must be rotated 180 degrees to match the pattern shown in the illustration below.



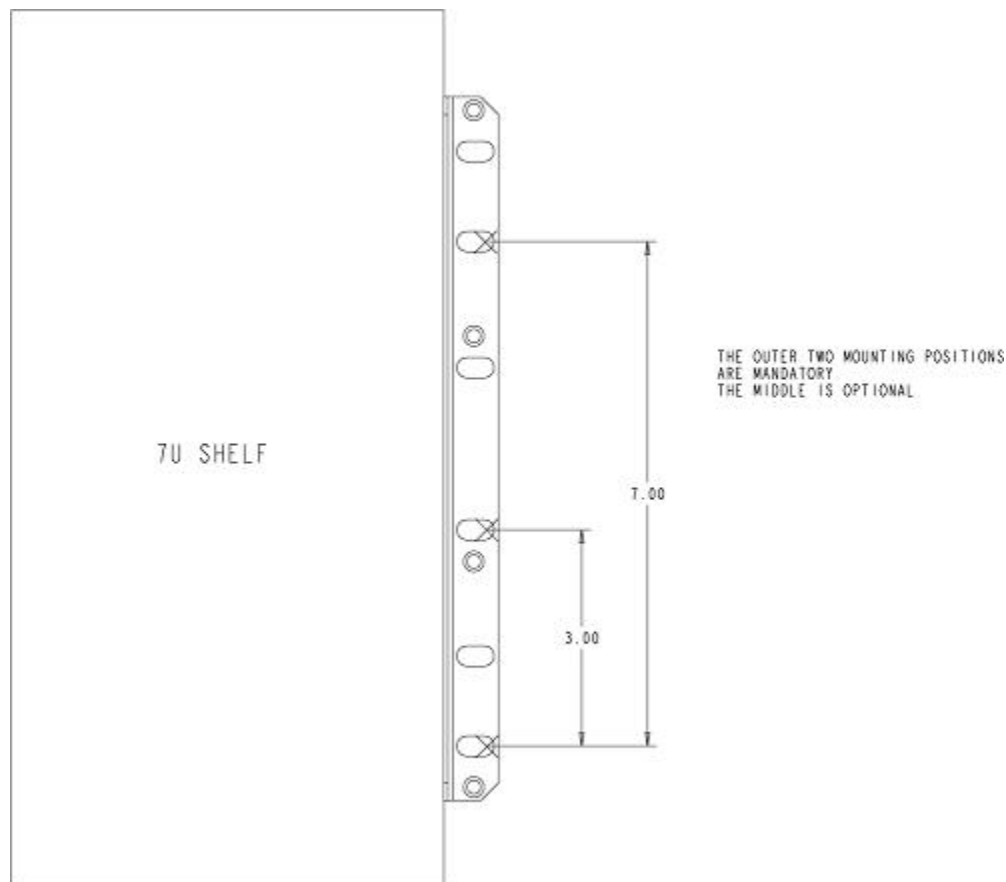
3.3.1.2 Installing mounting brackets to a BTI 7060 for a WECO frame

The following illustration shows which of the holes in the mounting bracket align with the 1.00-inch pitch holes of the WECO frame. Two mounting brackets are required for each side of the BTI 7060. Use the holes that are indicated to mount the brackets to the frame. Up to 19 2U shelves can be installed in one WECO frame.



3.3.1.3 Installing mounting brackets to a BTI 7200 for a WECO frame

The following illustration shows which of the holes in the mounting bracket align with the 1.00-inch pitch holes of the WECO frame. Two mounting brackets are required for each side of the BTI 7200. Use the holes that are indicated to mount the brackets to the frame. Up to 6 7U shelves can be installed in one WECO frame.



3.3.2 Using EIA frames for BTI 7000 Series shelves

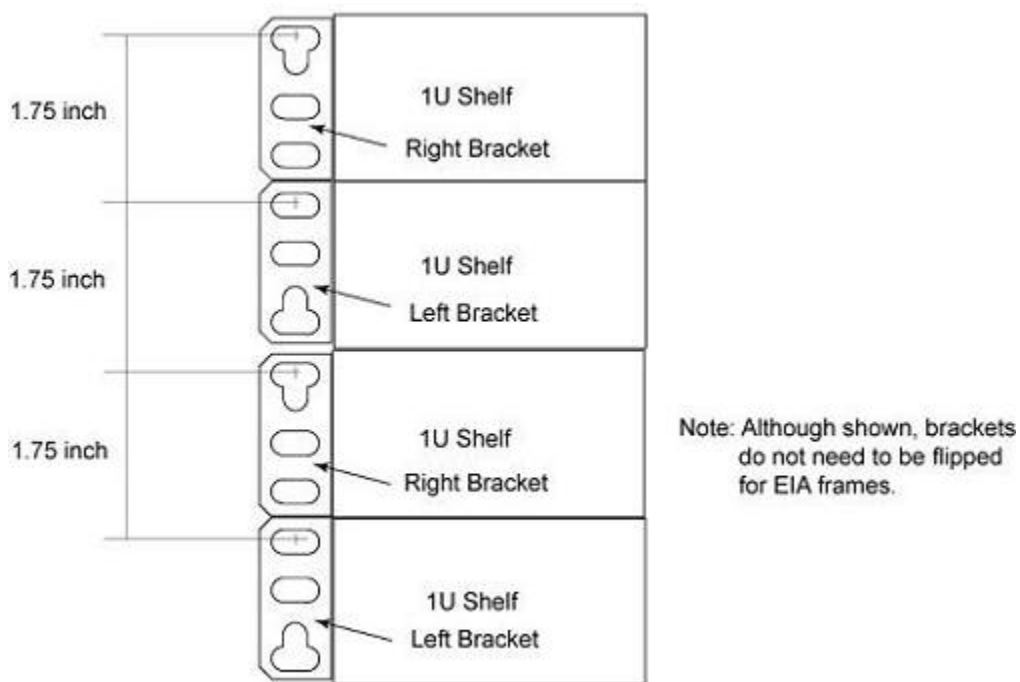
The EIA frames use a 1.75-inch pitch hole pattern. This means that there is a hole available for mounting hardware every 1.75 inches along the frame.

Using the supplied mounting brackets, each EIA frame can support up to:

- 44 1U shelves
- 22 2U shelves
- 6 7U shelves

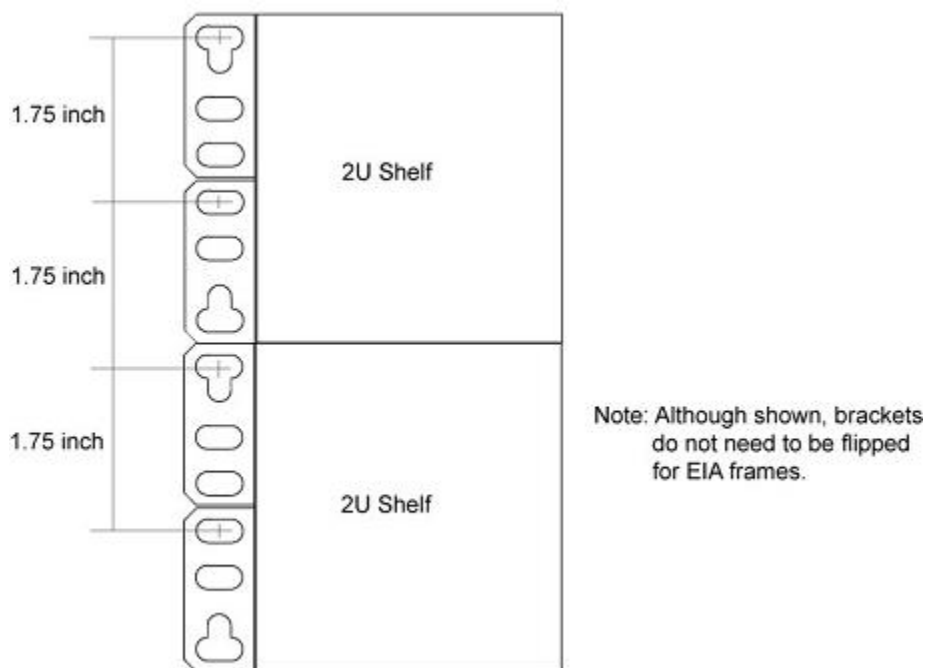
3.3.2.1 Installing mounting brackets to a BTI 7020 or BTI 7030 for an EIA frame

The following illustration shows which of the holes in the mounting bracket align with the 1.75-inch pitch holes of the EIA frame. Use the holes that are indicated to mount the brackets to the frame. Up to 44 1U shelves can be installed in one EIA frame.



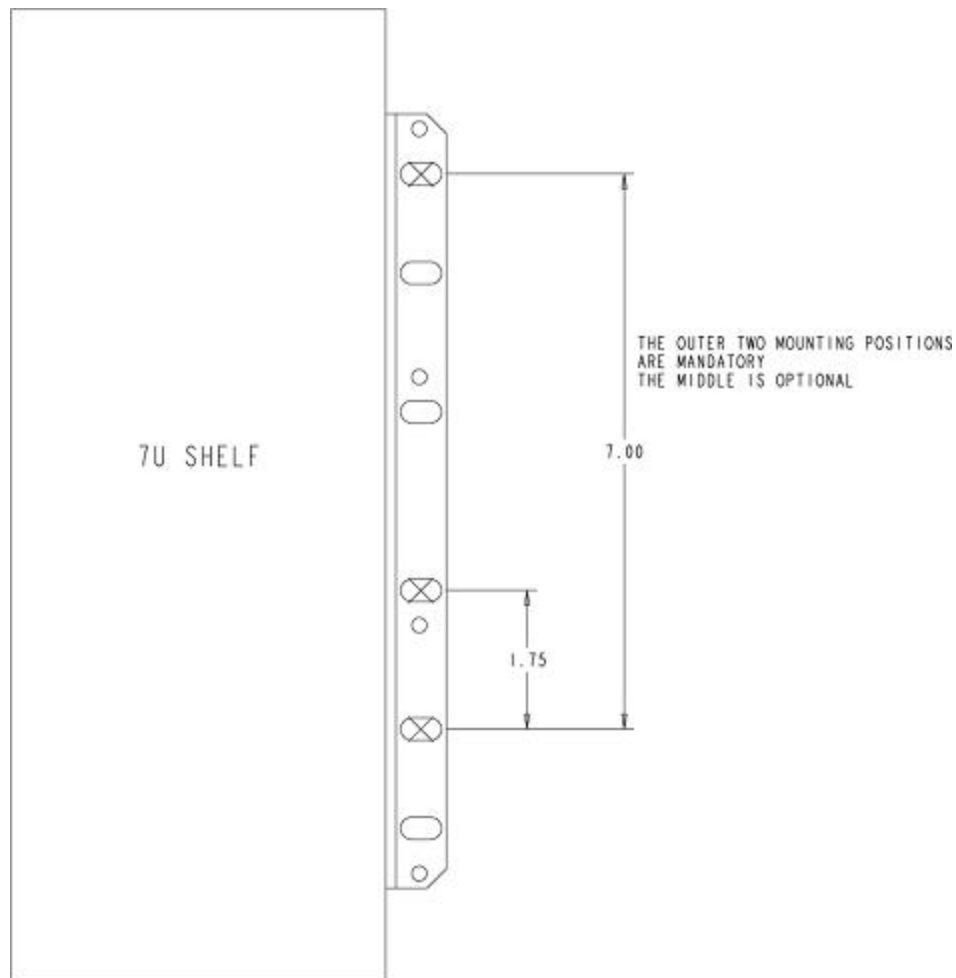
3.3.2.2 Installing mounting brackets to a BTI 7060 for an EIA frame

The following illustration shows which of the holes in the mounting bracket align with the 1.75-inch pitch holes of the EIA frame. Two mounting brackets are required on each side of the BTI 7060. Use the holes that are indicated to mount the brackets to the frame. Up to 22 2U shelves can be installed in one EIA frame.



3.3.2.3 Installing mounting brackets to a BTI 7200 for an EIA frame

The following illustration shows which of the holes in the mounting bracket align with the 1.75-inch pitch holes of the EIA frame. Two mounting brackets are required on each side of the BTI 7200. Use the holes that are indicated to mount the brackets to the frame. Up to 6 7U shelves can be installed in one EIA frame.



3.4 Power requirements

3.4.1 DC power distribution and protection requirements

Verify that the installation site meets the power distribution and protection requirements of the BTI 7000 Series equipment. Power distribution panels are recommended to ensure that there is proper power filtering for battery noise and sufficient circuit breaker or fuse protection for each shelf installed. Additionally, the shelf must be grounded to the frame in which it is mounted.

Determine the length of wire that is required for your site-specific installation.

Note All power measurements are taken at the -48 VDC terminal block.

The following table lists the DC power distribution and protection requirements.

Table 3-9 DC Power Distribution and Power Protection Requirements

Power Feeds A and B	Nominal Voltage	Input Voltage Tolerance	Copper Wire Gauge	Circuit Breaker/Fuse
BTI 7060	-48 VDC	-44 to -56 VDC	14 AWG	10 A
BTI 7030	-48 VDC	-44 to -56 VDC	14 AWG	5 A
BTI 7200	-48 VDC	-44 to -56 VDC	When using a breaker panel that is mounted locally on the frame with the shelf, use 10-12 AWG hook-up wire with the ring lugs that are provided in the installation kit. When using a breaker panel that is located remotely from the shelf, use 6 AWG flexible wire with the single-stud copper crimp lugs that are provided in the installation kit.	35 A

Note The minimum start-up voltage is -44 VDC.

Note If you have a requirement to meet FCC Class B emission requirements, contact BTI.

3.4.2 AC power distribution and protection requirements

To use an AC power source with the BTI 7000 Series equipment, an AC power module is required for the BTI 7060 and the BTI 7030. The power modules, listed in the following table, are available from BTI.

BTI can provide a third-party AC power module for the BTI 7200. Contact your BTI Systems representative for details.

Note The BTI 7000 Series AC power modules are not NEBS compliant.

Table 3-10 AC Power Modules

Equipment	PEC
BTI 7060 AC Power Module	BT7A58AA
BTI 7060 AC Power Assembly Kit (chassis extension)	BT7A50BA
BTI 7030 AC Power Module	BT7A58BA
BTI 7030 AC Power Assembly Kit (chassis extension)	BT7A56CA

The AC power modules use the IEC C14 type of power receptacle.

Note The physical depth of the equipment increases from 12 inches (305 mm) to 18 inches (457 mm) assuming installation on 19-inch (465 mm) mounting centers in a cabinet environment.

Verify that the installation site meets the power distribution and protection requirements of the BTI 7000 Series equipment. Power distribution panels are recommended and sufficient circuit breaker or fuse protection for each shelf installed. Additionally, the shelf must be grounded to the frame in which it is mounted.

Determine the length of wire that is required for your site-specific installation.

Note All power measurements are taken at the AC terminal block.

The following table lists the AC power distribution and protection requirements.

Table 3-11 AC Power Distribution and Power Protection Requirements

Power Feeds A and B	Nominal Voltage	Input Voltage Tolerance	Copper Wire Gauge	Circuit Breaker/Fuse
BTI 7060	115/230 VAC	85 to 264 VAC at 47 to 63 Hz	14 AWG	10 A
BTI 7030	115/230 VAC	85 to 264 VAC at 47 to 63 Hz	14 AWG	5 A

Note For the BTI 7060 and BTI 7030, the minimum start-up voltage is 85 VAC at 63 Hz.

3.4.3 Power consumption of modules, SFPs and XFPs

Note For BTI 7060 and BTI 7200 installations, Dispersion Compensation modules, Mux/Demux modules, and OADM modules draw power from the Main Shelf Interface. However, these modules are passive and require power only for module identification. These modules do not need to be installed in a powered active shelf. For BTI 7030 shelf installations, Dispersion Compensation Fiber modules, Mux/Demux modules, and OADM modules draw power from the System Control Processor.

Table 3-12 Equipment power consumption

Equipment	Power Consumption
Common Equipment	
BTI 7060/BTI 7200 Cooling Unit	< 30 W
BTI 7060 Main Shelf Interface	< 2.5 W
BTI 7060 Expansion Shelf Interface	< 5.0 W
BTI 7060 System Control Processor	< 17 W
BTI 7060 AC Power Module	< 40 W
BTI 7030 Cooling Unit	< 20 W
BTI 7030 Main Shelf Interface	< 2.5 W
BTI 7030 System Control Processor	< 17 W
BTI 7030 AC Power Module	< 20 W
BTI 7200 Main Shelf Interface	< 2 W
BTI 7200 Common Communication Module	< 15 W
Filler module	0 W
Amplifier Modules	
Single-Channel/ Sub-Band Booster Amplifier	< 15 W
Single-Channel/ Sub-Band Pre-Amplifier	< 15 W
DWDM C-band Optical Booster Amplifier	< 15 W
DWDM C-band Optical Pre-Amplifier	< 15 W
Optical Line Amplifier	< 15 W
Optical Line Amplifier with Mid-Stage Access (OLAM)	< 15 W
Dispersion Compensation Modules	
Dispersion Compensating Fiber Module - 20 km	< 0.25 W
Dispersion Compensating Fiber Module - 40 km	< 0.25 W
Dispersion Compensating Fiber Module - 60 km	< 0.25 W
Dispersion Compensating Fiber Module - 80 km	< 0.25 W
SMF ITU-T DCM 40 km	< 0.25 W
SMF ITU-T DCM 60 km	< 0.25 W
SMF ITU-T DCM 80 km	< 0.25 W
Transponder Modules	

Table 3-12 Equipment power consumption (Continued)

Equipment	Power Consumption
Dual 2.5G Multiprotocol Transponders	< 20 W
Dual 4G Multiprotocol Transponder	< 32 W
10G Multiprotocol Transponder	< 30 W
Dual 10G Multiprotocol Transponder	< 37 W
Dual 10G Multiprotocol Transponder Lite	< 32 W
Muxponder Modules	
2-Port GE Muxponder - SONET	< 25 W
2-Port GE Muxponder - SDH	< 25 W
8-Port Multiprotocol Muxponder - SONET	< 72 W
8-Port Multiprotocol Muxponder - SDH	< 72 W
10-Port Multiprotocol Muxponder - SONET	< 80 W
10-Port Multiprotocol Muxponder - SDH	< 80 W
Packet Services Modules (without SFPs/XFPs installed)	
packetVX Integrated Packet Services Module 12/2	< 50 W
packetVX Integrated Packet Services Module 24/2	< 65 W
packetVX Integrated Packet Services Module 24/4	< 70 W
packetVX Integrated Packet Services Module 80	< 150 W
Optical Multiplexing Modules	
1-Channel CWDM OADM	< 0.3 W
2-Channel CWDM OADM	< 0.3 W
4-Channel CWDM Mux/Demux, Modules 1 - 4	< 0.3 W
32-Channel DWDM Mux/Demux, Modules 1 - 4	< 0.3 W
1-Channel DWDM OADM	< 0.3 W
2-Channel DWDM OADM	< 0.3 W
4-Channel DWDM OADM	< 0.3 W
1310 nm & C-Band Coupler/Splitter	< 0.3 W
CWDM and DWDM Splitter/Combiner	< 0.3 W
Double Bidirectional Coupler/Splitter	< 0.3 W
Optical Multiplexing Passive Shelves	
40-Channel DWDM Mux/Demux	< 0 W
96-channel DWDM Mux/Demux	< 0 W
DOL Modules	
DWDM Line Amplifier (DLA)	< 35 W
2D ROADM on a Blade (ROB2)	< 53 W
4D ROADM on a Blade (ROB4)	< 53 W
SMF Dispersion Compensation Module 5km, LC	< 0.25 W
SMF Dispersion Compensation Module 10km, LC	< 0.25 W
SMF Dispersion Compensation Module 15km, LC	< 0.25 W

Table 3-12 Equipment power consumption (Continued)

Equipment	Power Consumption
SMF Dispersion Compensation Module 20km, LC	< 0.25 W
SMF Dispersion Compensation Module 30km, LC	< 0.25 W
SMF Dispersion Compensation Module 40km, LC	< 0.25 W
SMF Dispersion Compensation Module 50km, LC	< 0.25 W
SMF Dispersion Compensation Module 60km, LC	< 0.25 W
SMF Dispersion Compensation Module 70km , LC	< 0.25 W
SMF Dispersion Compensation Module 80km , LC	< 0.25 W
SMF Dispersion Compensation Module 90km , LC	< 0.25 W
SMF Dispersion Compensation Module 100km , LC	< 0.25 W

Table 3-13 SFP power consumption

SFP Type	SFP	Power Consumption
850 nm SFPs	2.5G 850 nm SX	1.0 W
	4 Gigabyte Quad-Rate 850 nm	1.0 W
1310 nm SFPs	2.5G 1310 nm SR	1.0 W
	2.5G 1310 nm IR	1.3 W
	4 Gigabyte Quad-Rate 1310 nm	1.5 W
Bidirectional SFPs	1310nm TX/1550nm RX	1.3 W
	1550nm TX/1310nm RX	1.3 W
	100BX, 1310nm TX/1490nm RX GE, SR	1.3 W
	100BX, 1490nm TX/1310nm RX GE, SR	1.3 W
	100BX, 1310nm TX/1490nm RX GE, IR	1.3 W
	100BX, 1490nm TX/1310nm RX GE, IR	1.3 W
CWDM SFPs	2.5G CWDM LR	1.3 W
	4G CWDM	1.5 W
DWDM SFPs	2.5G Multirate DWDM ER	1.3 W
	4G DWDM	1.5 W
Copper SFPs	10/100/1000BT Copper	1.3 W
	1000BT Copper	1.3 W
SFPs for OSC or multishelf use	1510 XR SFP (for OSC)	1.1 W
	CWDM ER SFP (for OSC)	1.1 W
	Multimode 1310 SR	1.0 W

Table 3-14 XFP power consumption

XFP	Power Consumption
850 nm XFP	1.5 W
1310 nm SR XFP	2.5 W

Table 3-14 XFP power consumption (Continued)

XFP	Power Consumption
1550 nm IR XFP	3.5 W
CWDM XFP	3.5 W
DWDM XFP	4.0 W
Tunable XFP	4.0 W

3.5 Fiber and cable routing requirements

The BTI 7000 Series is designed to keep fibers and cables from overlapping. Handles on individual modules enable easy module insertion and removal and also provide fiber guidance.

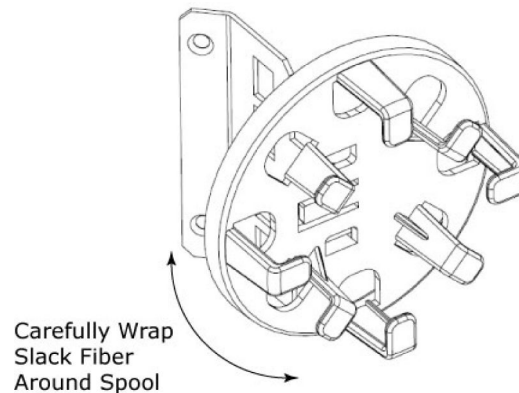
3.5.1 Fiber management spool for BTI 7060

The fiber management spool is an optional device that stores fiber slack for 2.0 mm fiber patch cables. It does not have any operational impact if it is not installed.

Note The fiber management spool is not intended to be used for storing off bay fiber slack due to the spool's limited storage capability. Fiber slack storage for off bay fiber is solved by using a recommended fiber management tray that can be located at the top of the frame.

Note Due to space constraints with ETSI racks, the fiber management spool can be used only on shelves installed in ANSI racks.

Fiber spool for the BTI 7060



Note The fiber management spool is available only with the ANSI cover and does not fit in ETSI or 19-inch network racks. It is not sold separately.

3.6 Communications requirements

When preparing the site for network connections to system shelves, consider the following types of communications requirements:

- Office alarm communications
- Environmental alarm communications
- Ethernet LAN communications
- RS-232 serial communications

Consider these criteria

For each of these types of communications, consider the following:

- Required cabling for each interface type
- Distance limitations for each signal type
- Alarm pin assignments
- Additional interface equipment needed

Prepare for installation

Before installing a BTI 7000 Series shelf, you should have all additional external equipment and cables prepared and available.

3.6.1 Main Shelf Interface modules

The BTI 7000 Series supports two types of Main Shelf Interface (MSI) modules—one supports communication and alarm inputs (office alarms); the other supports six environmental alarm inputs, in addition to the communication and alarms indicators:

Table 3-15 MSI modules and supported alarm inputs

MSI Module	PEC	Communication and alarms (Office alarms) inputs	Environmental alarms inputs
BTI 7060	BT7A53BA	X	—
BTI 7030	BT7A53CB	X	—
BTI 7200	BT7A53EA	X	X
BTI 7060	BT7A53BB	X	X
BTI 7030	BT7A53CB	X	X

For a list of the pin assignments refer to [3.6.4, “Office and environmental alarm pin assignments”](#). For information about alarm cables available from BTI refer to [3.7, “Alarm cables available from BTI”](#)

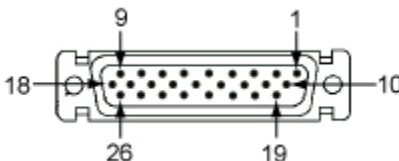
3.6.2 Office alarms communication on the MSI module

The BTI 7000 Series supports office alarms through the alarm connector on the MSI module (BT7A53BA)(BT7A53CA) for the BTI 7000 Series shelves. The alarm connector is a 26-pin HD-subminiature connector that provides alarm indications to the central office alarm system.

Determine the length of cable required to connect the BTI 7000 Series to your office alarm system and prepare a cable with the appropriate male connector.

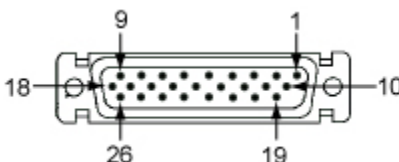
The following figure shows the required male connector that is required to connect to the office alarm system port.

26-pin HD-subminiature Office Alarms Connector (Male Rear View)



3.6.3 Environmental alarms on the MSI module

The MSI modules BT7A53BB/CB/EA support environmental alarms through six inputs (input 1 to 6, pins 19, 20, 21, 23, 25 and 26) on the 26-pin alarms connector shown in the following figure:



These modules can be configured to monitor up to six inputs for externally raised environmental conditions, such as, ancillary equipment failures that can be reported through the management interfaces, including TL1, SNMP, CLI and proNX 900. These interfaces can be used to enable the inputs, to specify their normal state (normally open, normally closed), and to associate them with an alarm that can be selected from a limited set. The BTI 7000 Series reports the appropriate alarms and conditions based on the state of these inputs.

3.6.4 Office and environmental alarm pin assignments

This section lists the office and environmental alarm pin assignments for the following MSI modules:

Table 3-16 MSI modules and supported alarm inputs

MSI Module	PEC	Communication and alarms (Office alarms) inputs	Environmental alarms inputs
BTI 7060	BT7A53BA	X	—
BTI 7030	BT7A53CB	X	—
BTI 7200	BT7A53EA	X	X
BTI 7060	BT7A53BB	X	X
BTI 7030	BT7A53CB	X	X

Table 3-17 Pin Assignment for a 26-pin HD-subminiature DCE Connector

HD26 Pin D-subminiature Connector	DCE Purpose
1	Critical Visual Normally Closed
2	Critical Visual Common
3	Critical Visual Normally Open
4	Major Visual Normally Closed
5	Major Visual Common
6	Major Visual Normally Open
7	Minor Visual Normally Closed
8	Minor Visual Common
9	Minor Visual Normally Open
10	Critical Audible Normally Closed
11	Critical Audible Common
12	Critical Audible Normally Open
13	Major Audible Normally Closed
14	Major Audible Common
15	Major Audible Normally Open
16	Minor Audible Normally Closed
17	Minor Audible Common
18	Minor Audible Normally Open
19	Environmental Alarm Input 1
20	Environmental Alarm Input 2
21	Environmental Alarm Input 3
22	Remote Alarm Cutoff
23	Environmental Alarm Input 4
24	Isolated ground for Environmental Alarm inputs
25	Environmental Alarm Input 5
26	Environmental Alarm Input 6

3.7 Alarm cables available from BTI

The section provides information about the office and environmental cables that are available from BTI and includes the following topics:

- 3.7.1, “Office and environmental alarm cables”
- 3.7.2, “Office alarm cable color coding ”
- 3.7.3, “Environmental alarm cable color coding”

3.7.1 Office and environmental alarm cables

BTI offers wirewrap versions of prepared office alarm cables. Cables for the BTI 7060 and the BTI 7200 and the BTI 7030 are available in 10 m or 30 m lengths.

Table 3-18 Alarm Cables

Product Name	PEC
CO Alarm Cable 10m (wirewrap 24 AWG)	BP1A58CE-10
CO Alarm Cable 30m (wirewrap 24 AWG)	BP1A58CE-30
CO Alarm Cable 10m (wirewrap 24 AWG)	BP1A58CF-10
CO Alarm Cable 30m (wirewrap 24 AWG)	BP1A58CF-30

Main Shelf Interface cables

The following table specifies the BTI office alarm cables to be used with Main Shelf Interface (MSI) modules. Always use the BTI cable associated with the MSI module specified. The wires and wiring pinouts on the BP1A58CE are different than those on the BP1A58CF cable.

Use this cable PEC	With this MSI module PEC
BP1A58CE-10	(BT7A53BA)
	(BT7A53CA)
BP1A58CE-30	(BT7A53BA)
	(BT7A53CA)
BP1A58CF-10	(BT7A53BB)
	(BT7A53CB)
	(BT7A53EA)
BP1A58CF-30	(BT7A53BB)
	(BT7A53CB)
	(BT7A53EA)

Caution Do not connect cable BP1A58CE-10 or BP1A58CE-30 to MSI module BT7A53BB, BT7A53CB, or BT7A53EA. If you connect BP1A58CE-10 or BP1A58CE-30 to one of these MSI modules, it is possible to permanently damage it.

3.7.2 Office alarm cable color coding

The following table lists the color coding that is used for wirewrap office alarm cables (BP1A5ECE series) for the MSI modules BT7A53BA and BT7A53CA.

Pin-outs 19 to 26 on the (BP1A58CE) cable are different than pin-outs 19 to 26 on the (BP1A58CF) cable. On the (BP1A58CF series) cable, pin-outs 19 to 26 are used for Inputs 1 to 6 which provide environmental alarms.

Table 3-19 Office Alarm Cable (BP1A5ECE series) - Wirewrap Color Coding

Pin Number	Signal	Color Code	Pair Number
1	Critical Visual Normally Closed	White-Blue paired with Blue-White	1
2	Critical Visual Common		1
3	Critical Visual Normally Open	White-Orange paired with Orange-White	2
4	Major Visual Normally Closed		2
5	Major Visual Common	White-Green paired with Green-White	3
6	Major Visual Normally Open		3
7	Minor Visual Normally Closed	White-Brown paired with Brown-White	4
8	Minor Visual Common		4
9	Minor Visual Normally Open	White-Slate paired with Slate-White	5
10	Critical Audible Normally Closed		5
11	Critical Audible Common	Red-Blue paired with Blue-Red	6
12	Critical Audible Normally Open		6
13	Major Audible Normally Closed	Red-Orange paired with Orange-Red	7
14	Major Audible Common		7
15	Major Audible Normally Open	Red-Green paired with Green-Red	8
16	Minor Audible Normally Closed		8
17	Minor Audible Common	Red-Brown paired with Brown-Red	9
18	Minor Audible Normally Open		9
19	Contact 2 - Normally Closed	Red-Slate paired with	10
20	No Connection	No Connection	
21	No Connection	No Connection	
22	Contact 1 - Normally Closed	Slate-Red	10
23	Contact 3 - Normally Closed	Black-Blue paired with Blue-Black	11
24	Isolated Ground		11
25	Relay 1 - Common	Black-Orange paired with Orange-Black	12
26	Relay 2 - Common		12

Table 3-19 Office Alarm Cable (BP1A5ECE series) - Wirewrap Color Coding (Continued)

Pin Number	Signal	Color Code	Pair Number
Connector Shield	Frame Ground	Drain Wire	

3.7.3 Environmental alarm cable color coding

The following table lists the color coding that is used for wirewrap environmental alarm for the cable (BP1A58CF series) on MSI module BT7A53BB/CB/EA).

Pin-outs 19 to 26 on the (BP1A58CE) cable are different than pin-outs 19 to 26 on the (BP1A58CF) cable. On the (BP1A58CF series) cable, pin-outs 19 to 26 are used for Inputs 1 to 6 which provide environmental alarms.

The following table lists the color coding that is used for wirewrap office and environmental alarm cables for the MSI modules BT7A53BB and BT7A53EA.

Table 3-20 Office and Environmental Alarm Cable - Wirewrap Color Coding

Pin Number	Signal	Color Code
1	Critical Visual Normally Closed	White-Blue
2	Critical Visual Common	Blue-White
3	Critical Visual Normally Open	White-Orange
4	Major Visual Normally Closed	Orange-White
5	Major Visual Common	White-Green
6	Major Visual Normally Open	Green-White
7	Minor Visual Normally Closed	White-Brown
8	Minor Visual Common	Brown-White
9	Minor Visual Normally Open	White-Slate
10	Critical Audible Normally Closed	Slate-White
11	Critical Audible Common	Red-Blue
12	Critical Audible Normally Open	Blue-Red
13	Major Audible Normally Closed	Red-Orange
14	Major Audible Common	Orange-Red
15	Major Audible Normally Open	Red-Green
16	Minor Audible Normally Closed	Green-Red
17	Minor Audible Common	Red-Brown
18	Minor Audible Normally Open	Brown-Red
19	Environmental Alarm Input 1	Red-Slate
20	Environmental Alarm Input 2	Slate-Red
21	Environmental Alarm Input 3	Black-Blue
22	Remote Alarm Cutoff	Blue-Black
23	Environmental Alarm Input 4	Black-Orange
24	Isolated common ground for all Environmental Alarm inputs	Orange-Black

Table 3-20 Office and Environmental Alarm Cable - Wirewrap Color Coding (Continued)

Pin Number	Signal	Color Code
25	Environmental Alarm Input 5	Black-Green
26	Environmental Alarm Input 6	Green-Black
Connector Shield	Frame Ground	Drain Wire

3.8 Ethernet LAN communications

The BTI 7000 Series shelves have two Ethernet LAN ports—the Management LAN port and the Craft LAN port. In addition, the BTI 7000 Series also has a Craft serial port that uses the RS-232 protocol. Determine the lengths of shielded and grounded CAT 5 Ethernet cabling that are required for your installation.

Typically, the Management LAN is the communication port that is used for day-to-day operations.

IP address

Ensure that you allocate a separate IP address for each BTI 7000 Series shelf that is deployed.

Ethernet cables required for the BTI 7000 Series

The BTI 7000 Series Ethernet LAN ports can automatically determine what device is attached and automatically configure the input and output signals for the Ethernet cable used.

Note	If you have a requirement to meet FCC Class B emission requirements, contact BTI.
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3.8.1 Management LAN port to an Ethernet hub or switch

Use this procedure to connect the Management LAN port on the Main Shelf Interface (MSI) to an Ethernet hub or switch.

- Step 1** Insert one end of the shielded and grounded Ethernet cable in the Management LAN port on the front of the Main Shelf Interface module.
- Step 2** Insert the other end of the shielded and grounded Ethernet cable in the RJ-45 female Ethernet connector of one of the ports on the Ethernet hub or switch.

You have successfully completed this procedure.

3.8.2 Craft LAN port to a PC or laptop

Note	When connecting to the Craft LAN, set the IP address of the PC, or laptop, to be on the same subnet with the default IP address of the Craft LAN port.
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Use this procedure to connect the Craft LAN port to a PC, or laptop, directly.

Note	A three-meter-long Ethernet cable is available from BTI. The part number is BP1A58BA.
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- Step 1** Insert one end of the shielded and grounded Ethernet cable to the Craft LAN port on the BTI 7000 Series shelf.

Step 2 Insert the other end of the shielded and grounded Ethernet cable to the RJ-45 female Ethernet LAN connector on your PC or laptop.

You have successfully completed this procedure.

3.9 RS-232 serial communications

The BTI 7000 Series shelf has a craft serial port that uses the RS-232 protocol.

Cables required

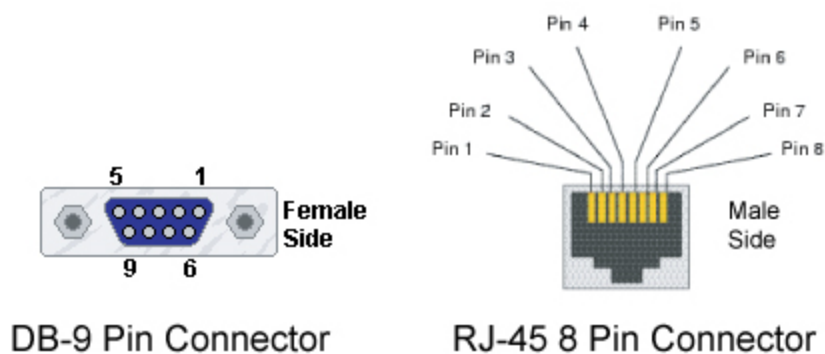
When connecting a PC or laptop to the craft serial port, use a straight-through RS-232 cable with a DB-9 pin male connector.

If you anticipate using the RS-232 serial port, determine the length of cable required to connect the BTI 7000 Series equipment to your PC, and prepare the cable with the appropriate male connector.

RS-232 pin assignment

The following figure shows the RS-232 DB-9 pin DCE connector as well as the RS-232 RJ-45 8 pin connector and the associated pin numbering schemes.

DB-9 Pin Connector and 8 Pin RJ-45 Connector Numbering Schemes



The following table lists the RS-232 pin assignment for the DB-9 pin connector and RJ-45 connector pin numbering schemes.

Table 3-21 Pin Assignments for RS-232 DB-9 Pin Connector and RS-232 RJ-45 Connector

DB-9 Pin Connector	DCE Purpose	RJ-45 Connector	DCE Purpose
1	Data Terminal Ready	1	Request to Send
2	Transmitted Data	2	Data Terminal Ready
3	Received Data	3	Transmitted Data
4	DTE Ready	4	Signal Ground
5	Signal Ground	5	Signal Ground
6	DCE Ready	6	Received Data
7	Clear to Send	7	Data Carrier Detect / Data Set Ready
8	Request to Send	8	Clear to Send
9	Ring Detector		

3.9.1 DB-9 to RJ-45 adapter kit

A DB-9 to RJ-45 adapter kit is available that converts an RS-232 DB-9 serial connection to a standard RJ-45 cable connection for Central Office routing or terminal server connection. The RJ-45 end is a female connector and the DB-9 end is a male connector. Included with the adapter kit is a bracket for attaching the RJ-45 connector to an equipment frame in a vertical position.

4.0 Before installing the BTI 7000 Series

This chapter describes the pre-installation procedures for the BTI 7000 Series shelves.

- 4.1, “Required tools and materials”
- 4.2, “Equipment weights”
- 4.3, “Unpacking the equipment”

4.1 Required tools and materials

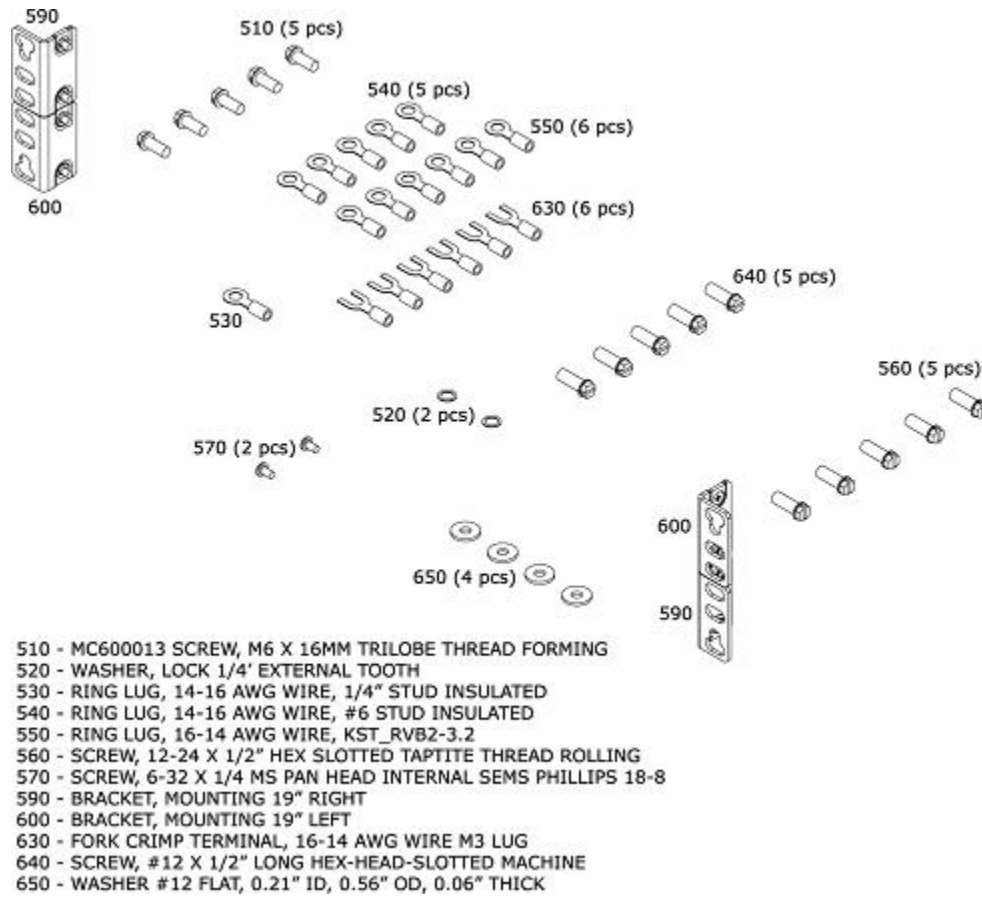
This section lists the tools and materials that are required to install the BTI 7000 Series shelves.

4.1.1 Tools required to install BTI 7000 Series shelves

- #1 and #2 Phillips screwdrivers
- Sockets and socket drivers as required by the customer
- Wire stripping tool
- Ring lug crimping tool
- Multimeter
- ESD grounding strap
- Small blade screwdriver for the shelf dowel pins

4.1.2 Supplied materials for the BTI 7060

- BTI 7060 configured with mounting brackets
- Common equipment modules:
 - BTI 7060 Cooling Unit
 - BTI 7060 Main Shelf Interface or BTI 7060 Expansion Shelf Interface
 - BTI 7060 System Control Processor
- Other ordered modules, such as, amplifier modules, dispersion compensation modules, and multiplexer/demultiplexer modules.
- BT7A5031 Installation Kit that includes:
 - 4 M6 Trilobe screws (mount shelf to unthreaded frame)
 - 1 M6 Trilobe screw (attach ground wire to frame)
 - 2 1/4-inch external tooth lock washers (attach ground wire to frame)
 - 1 ring lug, 14-16 AWG wire 1/4-inch stud insulated (for grounding wire)
 - 6 ring lugs, 14-16 AWG wire #4 stud insulated (for terminal block connectors)
 - 6 fork lugs, 14-16 AWG wire #4 stud insulated (for terminal block connectors)
 - 5 #12-24 Hex-Slotted Taptite screws (for unthreaded frames only)
 - 4 #12-24 Hex-Slotted machine screws (for threaded frames only)
 - 1 #6-32 x 1/4-inch pan head screw (attach ground wire to shelf)
 - 1 #6 internal tooth lock washer (attach ground wire to chassis)
 - 4 #12 flat washers for under-shelf mount screwheads

BT7A5031 Installation Kit**4.1.3 Supplied materials for the BTI 7030**

- BTI 7030 configured with mounting brackets
- Common equipment modules:
 - BTI 7030 Cooling Unit (BT7A57BA)
 - BTI 7030 Main Shelf Interface (BT7A53CA)
 - BTI 7030 System Control Processor (BT7A21BA) for a BTI 7030
- Other ordered modules, such as, amplifier modules, dispersion compensation modules, and multiplexer/demultiplexer modules.
- BT7A5631 Installation Kit that includes:
 - 4 M6 Trilobe screws (mount shelf to frame)
 - 1 M6 Trilobe screw (attach ground wire to frame)
 - 2 1/4-inch external tooth lock washers (attach ground wire to frame)
 - 1 ring lug, 14-16 AWG wire 1/4-inch stud insulated (for grounding wire)

- 5 ring lugs, 14-16 AWG wire #6 stud insulated (for terminal block connectors)
- 6 fork lugs, 14-16 AWG wire #4 stud insulated (for terminal block connectors)
- 5 #12-24 Hex-Slotted Taptite screws (for threaded frames only)
- 4 #12-24 Hex-Slotted machine screws (for threaded frames only)
- 1 #6-32 x 1/4-inch pan head screw (attach ground wire to shelf)
- 1 #6 internal tooth lock washer (attach ground wire to chassis)
- 4 #12 flat washers for under-shelf mount screwheads
- 2 19-inch mounting brackets (right and left)

4.1.4 Supplied materials for the BTI 7020

- BTI 7020 configured with mounting brackets
- Other ordered modules, such as, dispersion compensating modules, and passive multiplexer/demultiplexer modules.
- BT7A5631 Installation Kit that includes:
 - 4 M6 Trilobe screws (mount shelf to frame)
 - 1 M6 Trilobe screw (attach ground wire to frame)
 - 2 1/4-inch external tooth lock washers (attach ground wire to frame)
 - 1 ring lug, 14-16 AWG wire 1/4-inch stud insulated (for grounding wire)
 - 5 ring lugs, 14-16 AWG wire #6 stud insulated (for terminal block connectors)
 - 6 fork lugs, 14-16 AWG wire #4 stud insulated (for terminal block connectors)
 - 5 #12-24 Hex-Slotted Taptite screws (for threaded frames only)
 - 4 #12-24 Hex-Slotted machine screws (for threaded frames only)
 - 1 #6-32 x 1/4-inch pan head screw (attach ground wire to shelf)
 - 1 #6 internal tooth lock washer (attach ground wire to chassis)
 - 4 #12 flat washers for under-shelf mount screwheads
 - 2 19-inch mounting brackets (right and left)

4.1.5 Supplied materials for the BTI 7200

- BTI 7200 configured with mounting brackets
- Common equipment modules:
 - Cooling Unit
 - Main Shelf Interface
 - Common Communication Module

- System Control Processor
- Other ordered modules, such as, amplifier modules, dispersion compensation modules, and multiplexer/demultiplexer modules.
- BT7A5032 Installation Kit that includes:
 - 5 SCREWS, #12 X 1/2" LONG HEX-HEAD-SLOTTED MACHINE (4 to mount shelf to frame, 1 to attach ground wire to frame)
 - 5 SCREWS, M6 X 16MM TRILOBE THREAD FORMING (4 to mount shelf to frame, 1 to attach ground wire to frame (for unthreaded frames only))
 - 5 SCREWS, 12-24 X 1-2" HEX SLOTTED TAPTITE THREAD ROLLING (4 to mount shelf to frame, one to attach ground wire to frame (for threaded frames only))
 - 4 SCREWS, 4-40 X 3/16 MS PAN HEAD INTERNAL SEMS PHILLIPS 18-8 (to hold the lug insulators)
 - 4 SCREWS, 10-32 X 0.375 LG MACHINE PAN HEAD, CRX STEEL ZINC SEMS (for the power lugs)
 - 4 WASHERS #12 FLAT, 0.21" ID, 0.56" OD, 0.06" THICK (for under shelf-mount screwheads)
 - 1 SCREW, 10-32 X 0.25 LG MACHINE PANHEAD, CRX STEEL ZINC SEMS (to attach ground wire to shelf)
 - 2 WASHERS, LOCK 1/4" EXTERNAL TOOTH (to attach ground wire to shelf and frame)
 - 2 RING LUGS, 10-12 AWG WIRE, 1/4" STUD INSULATED (to attach ground wire to shelf)
 - 7 RING LUGS, 10-12 AWG WIRE #10 STUD INSULATED (4 for terminal block connectors, 1 to attach ground wire to frame, two extra)
 - 5 POWER LUGS, 6 AWG WIRE SINGLE HOLE #10 STUDS UNINSULATED (for terminal block connectors)
 - 5 POWER LUGS, 10 AWG WIRE SINGLE HOLE #10 STUDS UNINSULATED (for terminal block connectors)

4.2 Equipment weights

Table 4-1 Equipment Weights

Equipment Type	Metric Weight	Imperial Weight
BTI 7000 Series Common Equipment		
BTI 7060 Shelf	6.4 kg	14 lbs
BTI 7060 Shelf with rear access -48 V	6.8 kg	15 lbs
BTI 7060/BTI 7200 Cooling Unit	0.7 kg	1.5 lbs
BTI 7060 Main Shelf Interface	0.2 kg	0.5 lbs
BTI 7060 Expansion Shelf Interface	0.2 kg	0.5 lbs
BTI 7060/BTI 7200 System Control Processor	0.9 kg	2.0 lbs
BTI 7060 AC Power Assembly Kit	3.2 kg	7.0 lbs
BTI 7060 AC Power Module	1.4 kg	3.0 lbs
2U Cover - ANSI	1.4 kg	3.0 lbs
2U Cover - ETSI	1.4 kg	3.0 lbs
BTI 7030 Shelf	2.9 kg	6.5 lbs
BTI 7030 Cooling Unit	0.6 kg	1.3 lbs
BTI 7030 Main Shelf Interface	0.3 kg	0.7 lbs
BTI 7030 System Control Processor	0.8 kg	1.8 lbs
BTI 7030 AC Power Assembly Kit	1.8 kg	4.0 lbs
BTI 7030 AC Power Module	0.9 kg	2.0 lbs
BTI 7020 Shelf	2.3 kg	5.0 lbs
1U Cover - ANSI	0.7 kg	1.5 lbs
1U Cover - ETSI	0.7 kg	1.5 lbs
BTI 7200 Shelf	20 kg	44 lbs
BTI 7200 Shelf with rear access -48 V	20 kg	44 lbs
BTI 7200 Main Shelf Interface	0.2 kg	0.5 lbs
BTI 7200 Common Communication Module	0.7 kg	1.5 lbs
7U Cover	1.4 kg	3.0 lbs
Filler module	0.1 kg	0.2 lbs
Amplifier Modules		
Single-Channel/Sub-Band Booster Amplifier	0.9 kg	1.9 lbs
Single-Channel/Sub-Band Pre-Amplifier	0.9 kg	1.9 lbs
DWDM C-band Optical Booster Amplifier	0.9 kg	2.0 lbs
DWDM C-band Optical Pre-Amplifier	0.9 kg	2.0 lbs
Optical Line Amplifier	0.9 kg	2.0 lbs
Optical Line Amplifier with Mid-Stage Access	0.9 kg	2.0 lbs
Dispersion Compensation Modules		
Dispersion Compensating Fiber Module - 20 km	0.7 kg	1.5 lbs

Table 4-1 Equipment Weights (Continued)

Equipment Type	Metric Weight	Imperial Weight
Dispersion Compensating Fiber Module - 40 km	0.7 kg	1.6 lbs
Dispersion Compensating Fiber Module - 60 km	0.8 kg	1.7 lbs
Dispersion Compensating Fiber Module - 80 km	0.8 kg	1.8 lbs
SMF ITU-T DCM 40 km	0.7 kg	1.5 lbs
SMF ITU-T DCM 60 km	0.7 kg	1.5 lbs
SMF ITU-T DCM 80 km	0.7 kg	1.5 lbs
Transponder Modules		
Dual 2.5G Multiprotocol Transponder	1.0 kg	2.1 lbs
Dual 4G Multiprotocol Transponder	1.0 kg	2.1 lbs
10G Multiprotocol Transponder	1.35 kg	3.0 lbs
Dual 10G Multiprotocol Transponder	1.0 kg	2.1 lbs
Dual 10G Multiprotocol Transponder Lite	1.0 kg	2.1 lbs
Muxponder Modules		
2-Port GbE Muxponder - SONET	1.0 kg	2.2 lbs
2-Port GbE Muxponder - SDH	1.0 kg	2.2 lbs
8-Port Multiprotocol Muxponder - SONET	2.0 kg	4.5 lbs
8-Port Multiprotocol Muxponder - SDH	2.0 kg	4.5 lbs
10-Port Multiprotocol Muxponder - SONET	2.0 kg	4.5 lbs
10-Port Multiprotocol Muxponder - SDH	2.0 kg	4.5 lbs
Packet Services Modules		
packetVX Integrated Packet Services Module 12/2	2.0 kg	4.5 lbs
packetVX Integrated Packet Services Module 24/2	2.3 kg	5.0 lbs
packetVX Integrated Packet Services Module 24/4	2.6 kg	5.8 lbs
packetVX Integrated Packet Services Module 80	1.0 kg	4.1 lbs
Optical Multiplexing Modules		
1-Channel CWDM OADM	0.7 kg	1.5 lbs
Double 1-Channel CWDM OADM	0.8 kg	1.8 lbs
2-Channel CWDM OADM	0.8 kg	1.8 lbs
4-Channel CWDM Mux/Demux	0.8 kg	1.8 lbs
32 Channel DWDM Mux/Demux	1.3 kg	2.9 lbs
40 Channel DWDM Mux/Demux	6.2 kg	13.7 lbs
96 Channel DWDM Mux/Demux	9.3 kg	20.6 lbs
1-Channel DWDM OADM	0.7 kg	1.5 lbs
2-Channel DWDM OADM	0.7 kg	1.5 lbs
4-Channel DWDM OADM	0.7 kg	1.6 lbs
4-Channel DWDM OADM Channels 53, 55, 57, and 59	0.7 kg	1.5 lbs
1310 nm & C-Band Coupler/Splitter	0.67 kg	1.5 lbs
CWDM and DWDM Splitter/Combiner	0.7 kg	1.5 lbs

Table 4-1 Equipment Weights (Continued)

Equipment Type	Metric Weight	Imperial Weight
Double Bi-Directional Coupler/Splitter	0.68 kg	1.5 lbs
DOL Modules		
DWDM Line Amplifier (DLA)	1.09 kg	2.4 lbs
2D ROADM on a Blade	1.91 kg	4.2 lbs
4D ROADM on a Blade	1.91 kg	4.2 lbs
SMF Dispersion Compensation Module 5km, LC	0.59 kg	1.3 lbs
SMF Dispersion Compensation Module 10km, LC	0.59 kg	1.3 lbs
SMF Dispersion Compensation Module 15km, LC	0.64 kg	1.4 lbs
SMF Dispersion Compensation Module 20km, LC	0.64 kg	1.4 lbs
SMF Dispersion Compensation Module 30km, LC	0.68 kg	1.5 lbs
SMF Dispersion Compensation Module 40km, LC	0.68 kg	1.5 lbs
SMF Dispersion Compensation Module 50km, LC	0.73 kg	1.6 lbs
SMF Dispersion Compensation Module 60km, LC	0.77 kg	1.7 lbs
SMF Dispersion Compensation Module 70km , LC	0.77 kg	1.7 lbs
SMF Dispersion Compensation Module 80km , LC	0.82 kg	1.8 lbs
SMF Dispersion Compensation Module 90km , LC	0.82 kg	1.8 lbs
SMF Dispersion Compensation Module 100km , LC	0.86 kg	1.9 lbs

Note Metric weight: ± 0.05 kg.

Note Imperial weight: ± 0.1 lbs

4.3 Unpacking the equipment

When unpacking the BTI 7000 Series equipment:

- Leave equipment packed until it is needed for immediate installation.
- After unpacking the equipment, save and store the packaging material in case the equipment must be returned.
- If the packaging is damaged and possible equipment damage is present, preserve as much of the packaging as possible to allow Customer Service and the shipper to analyze any possible equipment damage. To report damage to shipped articles, contact BTI at 1-866-431-4967.

The following sections contain specific instructions for unpacking the BTI 7000 Series equipment.

4.3.1 Unpacking a BTI 7000 Series shelf

Caution	When opening the shelf container, use caution to avoid damaging the contents.
----------------	---

Caution	Static electricity can damage electro-optical equipment. While unpacking and handling optical and electrical modules, wear a grounding wrist strap to discharge the static buildup. Before unpacking and installing modules or making system interconnections, connect the grounding wrist strap. The grounding wrist strap is designed to prevent equipment damage caused by static electricity.
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- Step 1** Open the top of the shipping container.
- Step 2** Lift any information sheets and sub-packages out of the shipping container.
- Step 3** Carefully remove the protective packing material from the top of the shelf.
- Step 4** Remove the shelf and place it on a secure horizontal surface.
- Step 5** Perform a visual inspection to verify that the equipment was not damaged during transport. Look for signs of physical damage.

You have successfully completed this procedure.

4.3.2 Unpacking the modules

Caution	When opening a module container, use caution to avoid damaging the contents.
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Caution	Static electricity can damage electro-optical equipment. While unpacking and handling optical and electrical modules, wear a grounding wrist strap to discharge the static buildup. Before unpacking and installing modules or making system interconnections, connect the grounding wrist strap. The grounding wrist strap is designed to prevent equipment damage caused by static electricity.
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- Step 1** Open the containers and remove the module(s) and packing material.

- Step 2** Carefully remove the protective packing material from the module(s).
- Step 3** If any optical adapters are included, remove them and save them for use while installing the module optical fiber cables.
- Step 4** Remove the BTI 7000 Series modules and place them on a secure horizontal surface.
- Step 5** Perform a visual inspection to verify that the equipment was not damaged during transport. Look for signs of physical damage.

You have successfully completed this procedure.

5.0 Assembling the shelf

This chapter describes the installation procedures for the BTI 7000 Series shelves.

- 5.1, “Shelf configuration requirements”
- 5.2, “Shelf engineering considerations”
- 5.3, “Preparing the slot configuration of a shelf”
- 5.4, “How to install the AC power modules”
- 5.5, “Installing BTI 7000 Series shelves”
- 5.6, “Attaching the fiber management spool to a BTI 7060”
- 5.7, “Inserting or replacing an air filter in the BTI 7060”
- 5.8, “Inserting or replacing an air filter in the BTI 7200”
- 5.9, “Installing an air deflector on the BTI 7200”
- 5.10, “Using the padlock loop on a BTI 7060 or BTI 7030”
- 5.11, “Using the padlock loop on a BTI 7200”

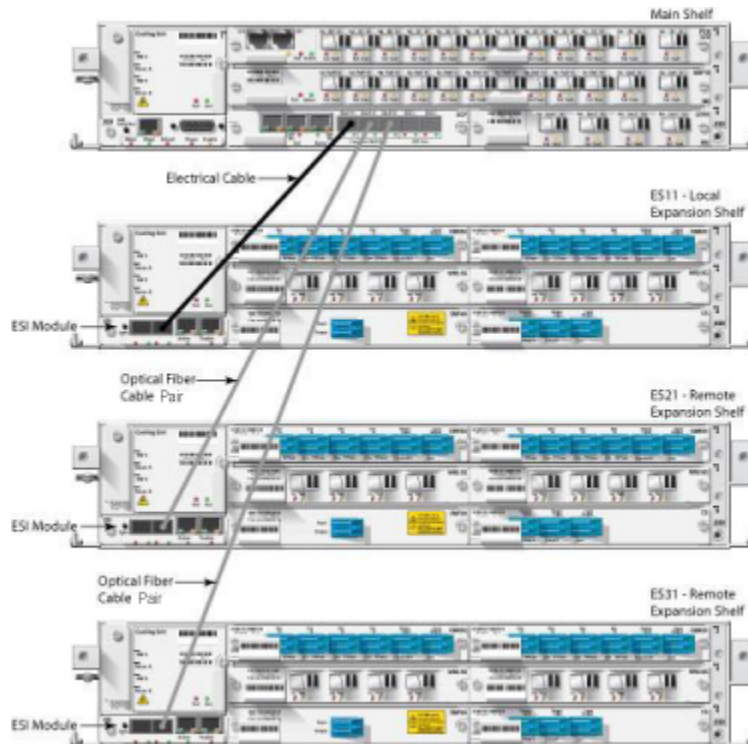
For convenience, assemble the BTI 7060 and its associated equipment on a bench before attempting to lift and mount the configured assembly into the rack in which it is to be mounted.

5.1 Shelf configuration requirements

The BTI 7000 Series shelves support a variety of configurations depending on your specific operational requirements. Before you begin assembling and installing shelves, obtain the shelf configuration requirements that have been planned for your deployment.

The following figure provides examples of shelf configurations.

Main Shelf with Expansion Shelves



5.2 Shelf engineering considerations

To reduce the number of distinct managed elements and to maximize application module density and scalability under a single System Control Processor (SCP), the BTI 7060 can interconnect up to four shelves under common control (1 main shelf and 3 expansion shelves). The BTI 7200 can interconnect up to three shelves under common control (1 main shelf and 2 expansion shelves). Expansion Shelves can be added or removed as required while the system remains in-service.

The shelf interconnect originates from the SCP to extend the backplane across the physical shelf boundary.

Important	To reassign a BTI 7060 or a BTI 7200 main shelf as an expansion shelf, the system must be powered down to update the provisioning information of the main shelf.
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Note	Due to space constraints, fiber optic cables with 40-degree boots are required for interconnecting the SCP module expansion shelf ports and general communication channel ports to other modules (such as, the expansion shelf interface or coupler/splitter modules).
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Note	ETSI equipment provides limited space for fiber management between the front of the rack and the inside of the shelf front cover. Fiber optic cables with shortened strain relief boots are recommended.
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5.3 Preparing the slot configuration of a shelf

The following sections explain how to prepare the various BTI 7000 Series shelves for different slot configurations.

5.3.1 BTI 7060 configuration

The BTI 7060 can be configured to accept double-width modules and double-height modules. To accommodate these modules, the center supports in the shelf must be removed to create double-width slots, and the EMI plates must be removed to create double-height slots.

Note For details about removing the center supports, see [5.3.5, “How to remove the center supports”](#).

Main shelf

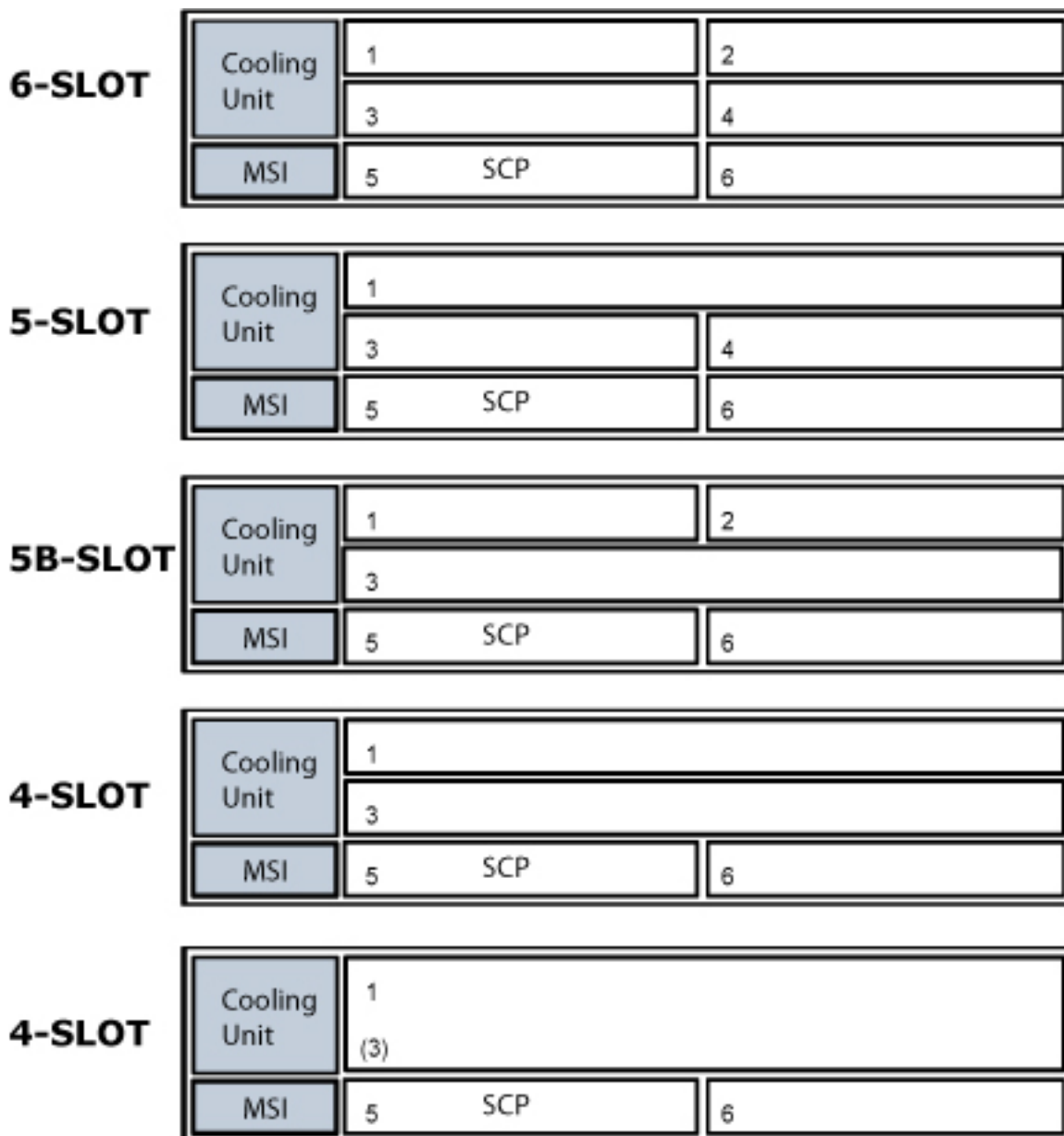
The following table indicates the slot configurations that are available for a main shelf.

Table 5-1 BTI 7060 Main shelf configuration values

Variable	Meaning
2-SLOT	2-slot shelf (BTI 7030 only)
4-SLOT	4-slot shelf with the center support for slots 1 and 2 and slots 3 and 4 removed or 4-slot shelf with the center support for slots 1 and 2 and slots 3 and 4 removed and the EMI plate between slots 1/2 and 3/4 removed to create a double-height slot. In this case, although there are three physical slots (one of which is a double height slot) the system still considers this to be a 4-slot shelf. The system considers that slot 1 is provisioned with the module, and that slot 3 is present but empty.
5-SLOT	5-slot shelf with the center support for slots 1 and 2 removed
5B-SLOT	5-slot shelf with the center support for slots 3 and 4 removed
6-SLOT	6-slot shelf
INVALID	Invalid configuration

The following figure illustrates the BTI 7060 main shelf slot configurations.

Figure 5-2 BTI 7060 – Main Shelf Slot Configurations



Expansion shelf

In addition to the slot configurations supported by a main shelf, the expansion shelf supports the slot configurations listed in the following table.

Table 5-2 BTI 7060 Expansion shelf configuration values

Variable	Meaning
3-SLOT	3-slot shelf with all of the center supports removed or

Table 5-2 BTI 7060 Expansion shelf configuration values (Continued)

Variable	Meaning
	3-slot shelf with all of the center supports removed and the EMI plate between slots 1/2 and 3/4 removed to create a double-height slot. In this case, although there are two physical slots (one of which is a double height slot) the system still considers this to be a 3-slot shelf. The system considers that slot 1 is provisioned with the module, and that slot 3 is present but empty. or 3-slot shelf with all of the center supports removed and the EMI plate between slots 3/4 and 5/6 removed to create a double-height slot. In this case, although there are two physical slots (one of which is a double height slot) the system still considers this to be a 3-slot shelf. The system considers that slot 3 is provisioned with the module, and that slot 5 is present but empty.
4-SLOT	4-slot shelf with the center supports for slots 1 and 2, and slots 3 and 4 removed or 4-slot shelf with the center support for slots 1 and 2 and slots 3 and 4 removed and the EMI plate between slots 1/2 and 3/4 removed to create a double-height slot. In this case, although there are three physical slots (one of which is a double height slot) the system still considers this to be a 4-slot shelf. The system considers that slot 1 is provisioned with the module, and that slot 3 is present but empty.
4B-SLOT	4-slot shelf with the center supports for slots 1 and 2, and slots 5 and 6 removed
4C-SLOT	4-slot shelf with the center supports for slots 3 and 4, and slots 5 and 6 removed or 4-slot shelf with the center support for slots 3 and 4 and slots 5 and 6 removed and the EMI plate between slots 3/4 and 5/6 removed to create a double-height slot. In this case, although there are three physical slots (one of which is a double height slot) the system still considers this to be a 4C-slot shelf. The system considers that slot 3 is provisioned with the module, and that slot 5 is present but empty.
5-SLOT	5-slot shelf with the center support for slots 1 and 2 removed
5B-SLOT	5-slot shelf with the center support for slots 3 and 4 removed
5C-SLOT	5-slot shelf with the center support for slots 5 and 6 removed
6-SLOT	6-slot shelf

The following figures illustrate the BTI 7060 expansion shelf slot configurations

Figure 5-3 BTI 7060 – Expansion Shelf 6- and 5-Slot Configurations

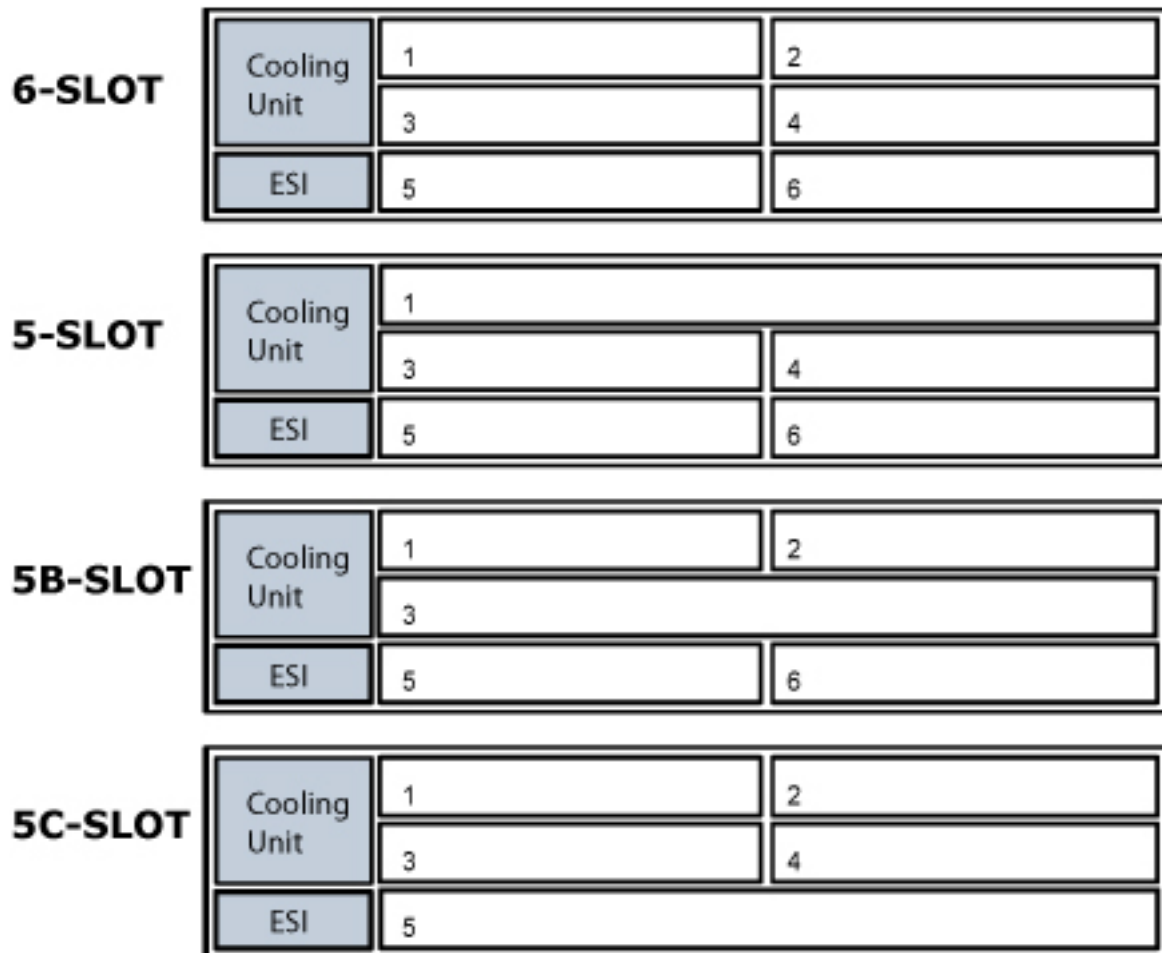


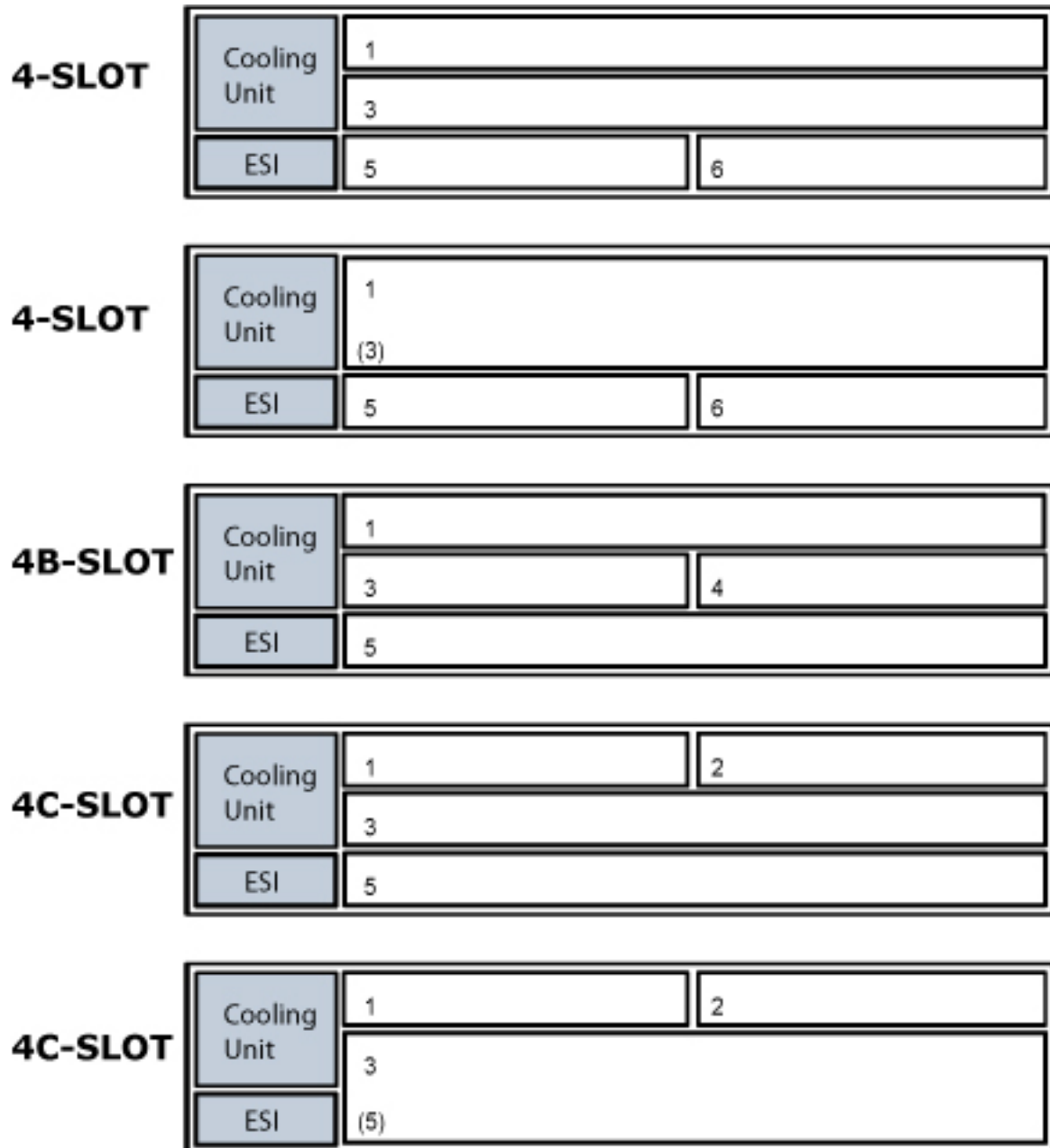
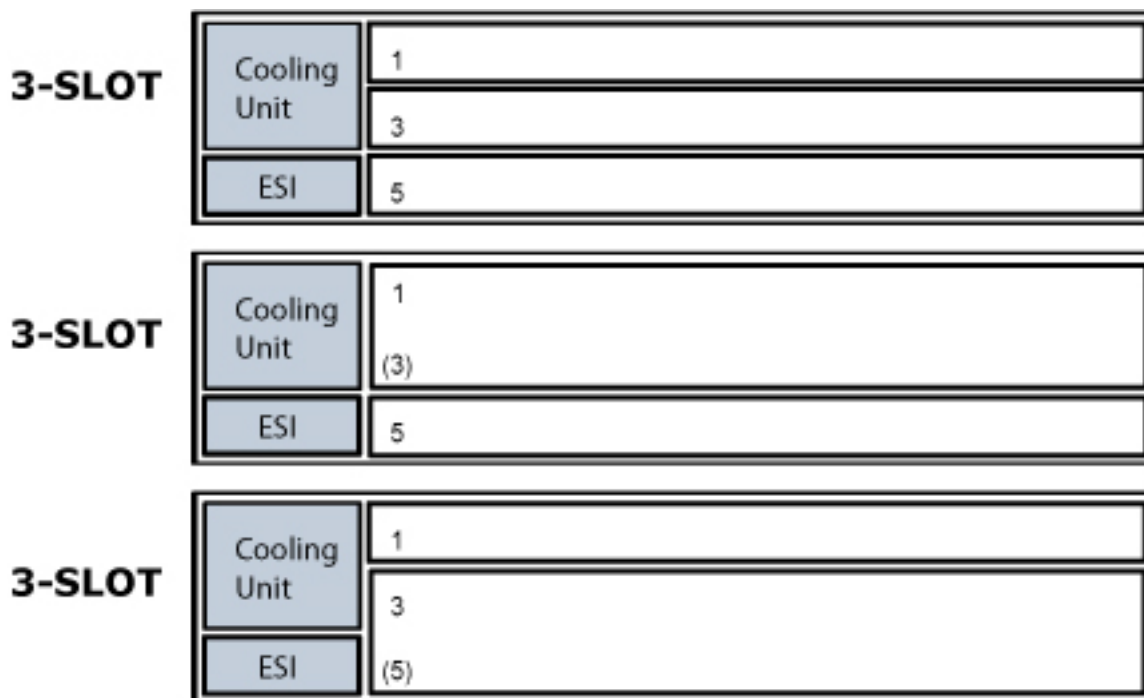
Figure 5-4 BTI 7060 – Expansion Shelf 4-Slot Configurations

Figure 5-5 BTI 7060 – Expansion Shelf 3-Slot Configurations



5.3.2 BTI 7030 slot configuration

The BTI 7030 can be configured to accept a double-width module by removing the center support from the shelf.

Note For details about removing the center supports, see [5.3.5.2, “Removing the center support from an unpowered BTI 7030”](#).

Slot 1 and slot 2 can be combined to create a double-width slot 1. The following figure indicates the various slot configuration that are available for a BTI 7030.

Table 5-3 BTI 7030 Slot Configurations

Slot	4-Slot Configuration	3-Slot Configuration
1	Single-width slot	Double-width slot
2	Single-width slot	

BTI 7030 2-Slot Configuration



Figure 5-7 BTI 7030 1-Slot Shelf Configuration



5.3.3 BTI 7020 configuration

The BTI 7020 can be configured to accept a double-width module by removing the center support from the shelf.

Note For details about removing the center supports, see [5.3.5.3, “Removing the center support from a BTI 7020”](#).

Slot 1 and slot 2 can be combined to create a double-width slot 1. The following table indicates the slot configurations that are available for a BTI 7020.

Table 5-4 BTI 7020 Slot Configurations

Slot	2-Slot Configuration	1-Slot Configuration
1	Single-width slot	Double-width slot
2	Single-width slot	

2-Slot Configuration for the BTI 7020



1-Slot Configuration for the BTI 7020



5.3.4 BTI 7200 configuration

The BTI 7200 can be configured to accept double-width modules and double-height modules. To accommodate these modules, the center supports in the shelf must be removed to create double-width slots and the EMI plates must be removed to create double-height slots.

Note For details about removing the center supports, see [5.3.5, “How to remove the center supports”](#).

BTI 7200 shelf restrictions

The slot restrictions for the BTI 7200 shelf are as follows:

- The Common Communication Module (CCM) slot accepts only a CCM module, or a CCM filler panel.
- The MSI slot accepts only an MSI module or an MSI filler panel.
- Where a BTI 7200 is used as a stand-alone main shelf, slot 1 is dedicated for the system control processor (SCP) module. All of the remaining slots can be provisioned with any provisionable module.
- Where a BTI 7200 is used as a main shelf in a 2-shelf configuration, slot 1 of the main shelf is dedicated for the system control processor (SCP) module. All of the remaining slots in both shelves can be provisioned with any provisionable module.
- Where a BTI 7200 is used as a main shelf in a 3-shelf configuration with restrictions, slot 1 of the main shelf is dedicated for the system control processor (SCP) module. All of the remaining slots in all of the shelves can be provisioned with up to 40 10G Transponders, up to nine 10G Muxponders, up to nine packetVX modules, and up to nine ROADM-on-a-blade modules. Muxponders can be substituted with amplifiers, and passive modules.
- Where a BTI 7060 is used as a main shelf with a BTI 7200 as an expansion shelf, slot 5 of the BTI 7060 main shelf is dedicated for the system control processor (SCP) module. All of the remaining slots in both shelves slots can be provisioned with any provisionable module.
- As seen in the following table, each cooling unit in a BTI 7200 shelf provides cooling for a specific set of slots on the shelf. When a module is inserted into a slot, a cooling unit must be installed to provide cooling for that set of slots. Some slots require the installation of two cooling units. A “Circuit Pack Missing” alarm is raised against the specific cooling unit slot when any of the corresponding slots have a module installed, but the cooling unit for that set of slots is not installed. If there are no modules installed in any of the slots in a specific set, then the associated cooling unit for that set of slots is not required.

Table 5-5 BTI 7200 cooling unit deployment

Slot numbers	Cooling unit(s) required
1-4	CU1
5-6	CU1 and CU2
7-10	CU2
11-14	CU3
15-16	CU3 and CU4
17-20	CU4

Figure 5-10 BTI 7200 block diagram (front power version)

MSI		CCM	Reserved for future use
Power	Cooling Unit 1	1 SCP	2
		3	4
		5	6
Power	Cooling Unit 2	7	8
		9	10
Power	Cooling Unit 3	11	12
		13	14
		15	16
Power	Cooling Unit 4	17	18
		19	20

5.3.5 How to remove the center supports

The center supports of BTI 7000 Series shelves are removed to install double-width modules, and double-width double-height modules.

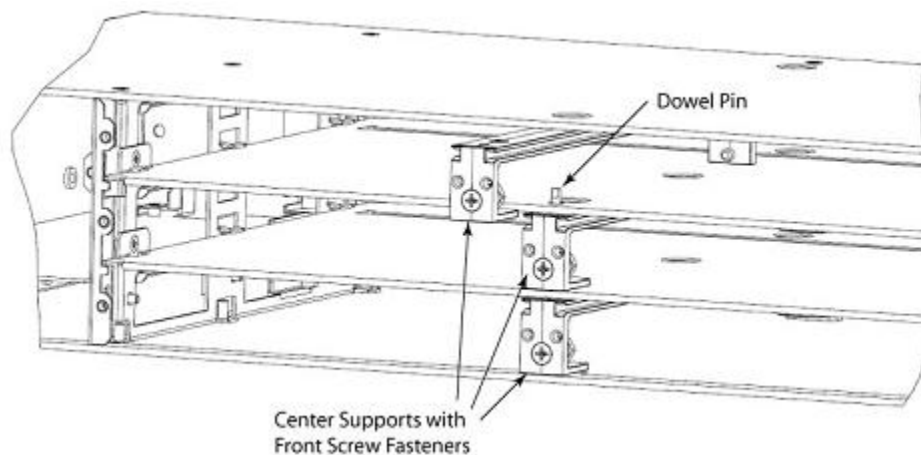
5.3.5.1 Removing the center supports from a BTI 7060

To remove the center supports from a BTI 7060, use the following procedure.

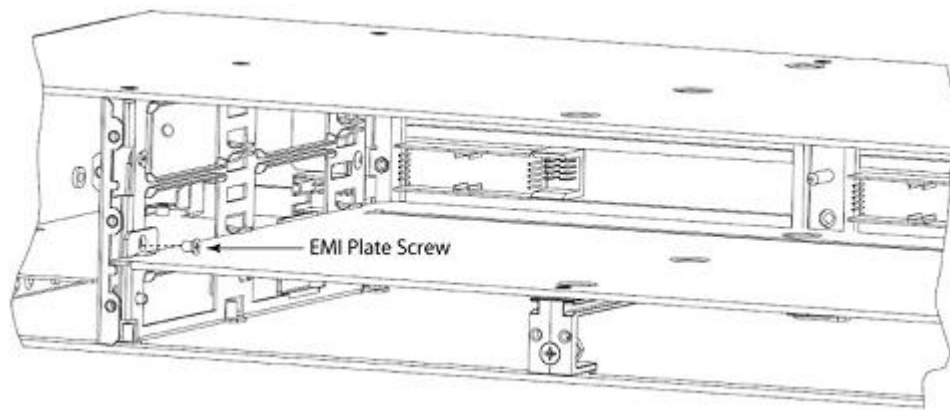
Note Do not use this procedure for removing center supports from earlier versions of BTI equipment.

Note Center supports can be removed from an in-service (powered) system and from any position in the shelf.

Step 1 Locate the center supports.



- Step 2** Using a Phillips screwdriver, loosen the front screw while holding its locking nut from behind with your finger to prevent the nut from rotating.
- With the screw loosened, pull the center support forward approximately 1/8" and move it sideways to the right about 1/2-inch until the support clears the dowel pin.
- Step 3** With the center support clear of the dowel pin, pull the guide out of the shelf completely.
- Step 4** Unscrew the removable dowel pin with your fingers or a small blade screwdriver. Save or discard the dowel pin and center support. A kit for replacing the guide and pin can be purchased if in the future the shelf configuration needs to be changed back to a single-slot configuration. Otherwise, store the removed hardware in a safe place in case you need to reconfigure the shelf in the future.
- Step 5** With the upper center support removed, the EMI plates can be removed to provide a double-width, double-height slot space. The EMI plates are held in place by two screws on both sides of the shelf.
- a) Use a Phillips screwdriver to remove the EMI plate screws.
 - b) With both EMI plate screws removed, slide the EMI plate out of the shelf.
 - c) Store the removed hardware in a safe place in case you need to reconfigure the shelf in the future.



- Step 6** If you require a double-width, double-height slot, remove a second center support by repeating steps 2 through 4.
- Step 7** If you are performing this procedure on a shelf that is not powered up, or that does not have an SCP installed, then this procedure is complete. If the shelf is powered up and has an SCP installed, continue at the next step.
- Step 8** Re-initialize the SCP:
- a) Log on to the shelf using the proNX 900, and right-click on Slot 5: SCP (SCP) in the left navigation tree.
 - b) Select Restart Module > Cold Restart.
A popup window appears with the following message:
You will lose connection to the SCP. Are you sure you want to continue?
 - c) Click Yes.
The system restarts.
- Step 9** Log on to the shelf again and verify that the software recognizes the new configuration.

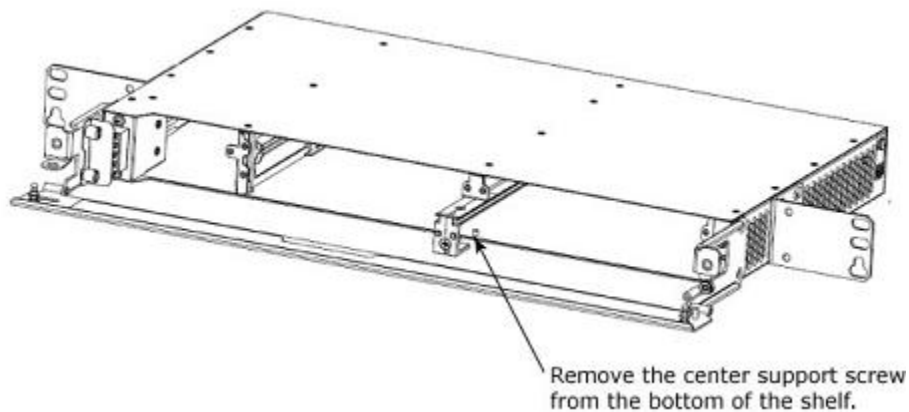
You have successfully completed this procedure.

5.3.5.2 Removing the center support from an unpowered BTI 7030

To remove the center support from an unpowered BTI 7030, use the following procedure.

Note	Do not use this procedure for removing center supports from earlier versions of BTI equipment.
-------------	--

- Step 1** The center support can be only removed from an unpowered system.
Locate the center support, as shown in the illustration.



Step 2 Using a #1 Phillips screwdriver, loosen the front screw located on the bottom front of the shelf.

With the screw removed, pull the center support forward.

Step 3 With the center support free, pull the guide out of the shelf completely.

Step 4 To re-initialize the SCP, do the following:

a) In the proNX 900, right-click on Slot 4: SCP (SCP) in the left navigation tree.

b) Select Restart Circuit Pack > Cold Restart.

A popup window appears with the following message:

You will lose connection to the SCP. Are you sure you want to continue?

c) Click Yes.

The system restarts.

Step 5 Log on to the shelf and verify that the software finds the new configuration.

You have successfully completed this procedure.

5.3.5.3 Removing the center support from a BTI 7020

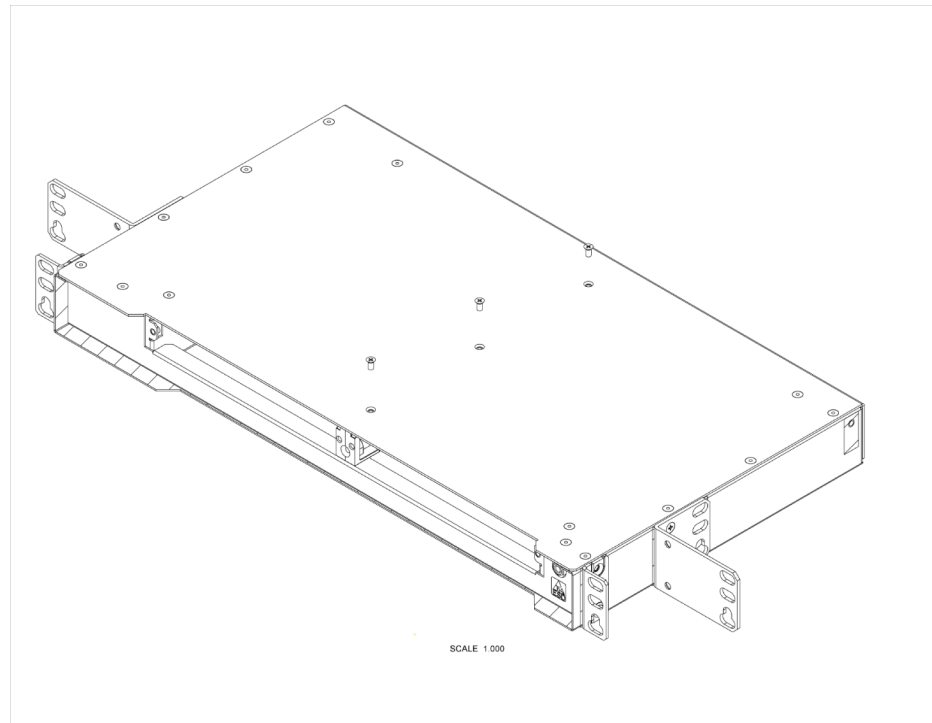
By removing the center support, a double-width module slot is created.

Note You must remove the center support before installing the shelf into the rack.

To remove the center support from a BTI 7020, use the following procedure.

Step 1 Locate the center support.

As shown in the following illustration, there are three screws located on the top of the shelf.



Step 2 Use a Phillips screwdriver to loosen the three screws.

Step 3 Once the screws are fully loosened, pull the center support straight out.

Step 4 Store the removed hardware in a safe place in case you need to reconfigure the shelf to another configuration in the future.

You have successfully completed this procedure.

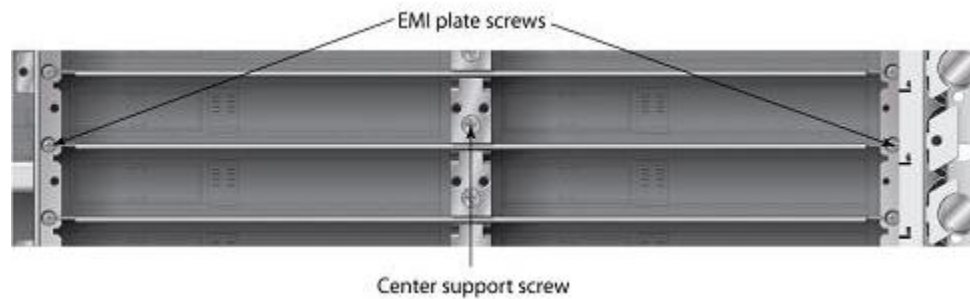
5.3.5.4 Removing the center supports and EMI plates from a BTI 7200

To remove the center supports from a BTI 7200, use the following procedure.

Note	Do not use this procedure for removing center supports from earlier versions of BTI equipment.
-------------	--

Note	Center supports can be removed from an in-service (powered) system and from any position in the shelf.
-------------	--

Step 1 Use the following illustration to locate the center support screws and the EMI plate screws.



- Step 2** Using a Phillips screwdriver, loosen the center support screw while holding its locking nut from behind with your finger to prevent the nut from rotating.
- With the screw loosened, pull the center support forward approximately 1/8" and move it sideways to the right about 1/2-inch until the support clears the dowel pin.
- Step 3** With the center support clear of the dowel pin, pull the guide out of the shelf completely.
- Step 4** Unscrew the removable dowel pin with your fingers or a small blade screwdriver. Save or discard the dowel pin and center support. A kit for replacing the guide and pin can be purchased if in the future the shelf configuration needs to be changed back to a single-slot configuration. Otherwise, store the removed hardware in a safe place in case you need to reconfigure the shelf in the future.
- Step 5** With the center support removed, the EMI plate can be removed to provide a double-width, double-height slot space. The EMI plates are held in place by two screws, one on each side of the shelf.
- a) Use a Phillips screwdriver to remove the EMI plate screws.
 - b) With both EMI plate screws removed, slide the EMI plate out of the shelf.
 - c) Store the removed hardware in a safe place in case you need to reconfigure the shelf in the future.
 - d) Remove a second center support by repeating steps 2 through 4.

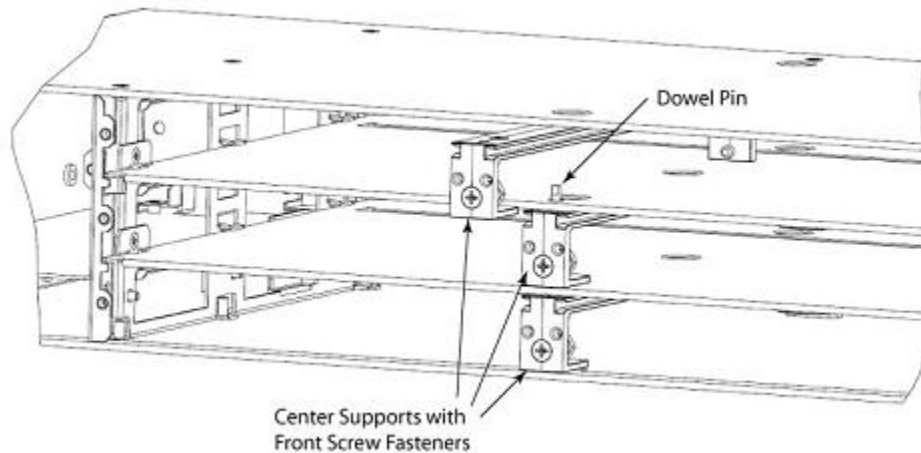
You have successfully completed this procedure.

5.3.6 Replacing the center supports in a BTI 7060

To replace a center support in a BTI 7060, use the following procedure.

- | | |
|-------------|---|
| Note | Do not use this procedure for replacing center supports from earlier versions of BTI equipment. |
| Note | The shelf center supports can be replaced in an in-service (powered) system. |
| Note | Center supports must be replaced in the same order and position in which they were removed from the shelf. Refer to 5.3.1, "BTI 7060 configuration" for supported shelf configurations. |

Step 1 Locate the center supports, as shown in the illustration.



Step 2 Locate the threaded inset, and screw in the dowel pin that was previously removed from the shelf. Use your fingers, or, if necessary, a small pair of pliers. If parts are missing, a kit for replacing the guide and pin can be purchased from your support representative.

Step 3 Slide the previously removed center shelf support in on the right side of the dowel pin. Slide it gently toward the small round opening in the center rear of the slot. The center shelf support has a rubber bushing guide to help locate the rubber bushing guide in the opening. Push it into the opening until it engages. Stop about 1/8 of an inch from being fully engaged.

Step 4 Slide the center shelf support to the left until it slides over the previously installed guide dowel pin. Using a Philips screwdriver tighten the screw on the front of the center shelf support. A small pair of needle-nose pliers may be required to hold rear nut to prevent it from spinning.

Step 5 To re-initialize the SCP, do the following:

- a) In the proNX 900, right-click on Slot 5: SCP (SCP) in the left navigation tree.
- b) Select Restart Circuit Pack > Cold Restart.

A popup window appears with the following message:

You will lose connection to the SCP. Are you sure you want to continue?

- c) Click **Yes**.

The system restarts.

Step 6 Log on to the shelf and verify that the software finds the new configuration.

You have successfully completed this procedure.

5.3.7 Replacing the EMI plates and center supports in a BTI 7200

To replace an EMI plate or center support in a BTI 7200, use the following procedure.

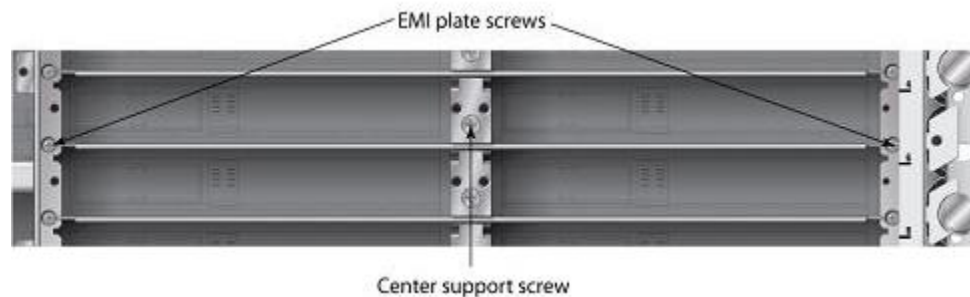
Note Do not use this procedure for replacing center supports from earlier versions of BTI equipment.

Note The shelf center supports can be replaced in an in-service (powered) system.

Important Use a center support that was supplied with the BTI 7200. Center supports that are supplied with the BTI 7200 are not equipped with a ground pin. If you use a center support that is equipped with a ground pin you risk damaging the BTI 7200.

Refer to 5.3.4, “BTI 7200 configuration” for supported shelf configurations.

Step 1 Use the following illustration to locate the EMI plate and center support screws.



Step 2 To replace an EMI plate:

- a) Remove the EMI plate screws from the shelf. Notice that there are slots in the screw holes.
- b) Slide the EMI plate into the slots in the EMI plate screw holes (be careful not to use the slots that are located below the screws holes). Look inside the slot and find the EMI plate guides inside the shelf. The EMI plate rides on top of these guides.
- c) Push the EMI plate all the way into the shelf.
- d) Replace and tighten the EMI plate screws.

Step 3 To replace a center support:

- a) Locate the dowel pin that was previously removed from the shelf, and then locate the threaded inset into which the dowel pin screws. Using your fingers, or, if necessary, a flat-head screwdriver, screw in the dowel pin. If parts are missing, a kit for replacing the guide and pin can be purchased from your support representative.
- b) Slide the previously removed center shelf support in past the right side of the dowel pin. Slide it gently toward the small round opening in the center rear of the slot, aiming for the shelf guide pin holes. Push it into the opening until it engages. Stop about 1/8 of an inch from being fully engaged.

- c) Ensuring that the rear locking nut is loose so that there is clearance for the dowel pin between the nut and the center shelf support, slide the center shelf support to the left until it slides over the dowel pin. Using a Philips screwdriver tighten the screw on the front of the center shelf support. A small pair of needle-nose pliers may be required to hold rear locking nut to prevent it from spinning.

You have successfully completed this procedure.

5.3.8 Module installation recommendations

The following sections explain the slot/module provisioning recommendations.

5.3.8.1 BTI 7060 slot recommendations

The left side of the BTI 7060 accepts the main shelf interface (MSI) and cooling unit (CU) modules when used as a main shelf.

The remaining module slots are located to the right:

- Where a BTI 7060 is used as a main shelf, slot 5 is dedicated for the system control processor (SCP) module. All of the remaining slots can be provisioned with any provisionable module.
- Where a BTI 7060 is used as an expansion shelf, all of the slots can be provisioned with any provisionable module.

For illustrations of the slot configurations that are possible, refer to [5.3.1, “BTI 7060 configuration”](#).

To optimize optical fiber management, use the following configuration recommendations:

6-Slot Configuration Recommendations

With a 6-slot configuration, start installing optional single-width modules in slot 6, then slots 4 and 2. Finally, use slots 3 and 1.

2-, 3-, 4- and 5-Slot Configurations Recommendations

With 2-, 3-, 4- and 5-slot configurations, there is no preferable installation scheme. Use slot 6 for a single-width module, if required.

5.3.8.2 BTI 7030 slot recommendations

The left side of the BTI 7030 accepts the cooling unit (CU) module.

The remaining slots are located to the right:

- the two upper slots are dedicated for the BTI 7030 system control processor (SCP) module to the right and the BTI 7030 main shelf interface (MSI) module to the left.
- The two remaining lower slots can be used for any provisionable module.

For illustrations of the slot configurations that are possible, refer to [5.3.2, “BTI 7030 slot configuration”](#).

To optimize optical fiber management in a 2-slot configuration, use slot 2 and then slot 1.

5.3.8.3 BTI 7020 slot recommendations

For illustrations of the slot configurations that are possible, refer to [5.3.3, “BTI 7020 configuration”](#).

To optimize optical fiber management in a 2-slot configuration, use slot 2 and then slot 1.

5.3.8.4 BTI 7200 slot recommendations

The left side of the BTI 7200 accepts the main shelf interface (MSI) and cooling unit (CU) modules when used as a main shelf.

The remaining module slots are located to the right:

- Where a BTI 7200 is used as a main shelf in a two-shelf configuration, slot 1 is dedicated for the system control processor (SCP) module. All of the remaining slots can be provisioned with any provisionable module.
- Where a BTI 7200 is used as an expansion shelf in a two-shelf configuration, all of the slots can be provisioned with any provisionable module.
- Where a BTI 7200 is used in a restricted three-shelf configuration, main shelf slot 1 is dedicated for the system control processor (SCP) module. All of the remaining slots can be provisioned with up to 40 10G Transponders, up to nine 10G Muxponders, up to nine packetVX, and up to nine ROADMs-on-a-blade modules. Muxponders can be substituted with amplifiers, and passive modules.

5.4 How to install the AC power modules

The following AC power modules are available:

- BTI 7060 AC power module
- BTI 7030 AC power module

BTI can provide a third-party AC power module for the BTI 7200 (BT7A58DA/DB). Contact your BTI representative for details.

Note The BTI 7000 Series AC power modules are not NEBs compliant.

BTI 7060 AC power module

The optional BTI 7060 AC power module (BT7A58AA) permits the operation of the BTI 7060 shelf with 100 to 240 VAC, 1.5A, 50/60Hz power. To attach the BTI 7060 AC power module, use the BTI 7060 AC power chassis extension (BT7A50BA).

BTI 7030 AC power module

The optional BTI 7030 AC power module (BT7A58BA) permits the operation of the BTI 7030 shelf with 100 to 240 VAC, 1.5A, 50/60Hz power. To attach the BTI 7030 AC power module, use the BTI 7030 AC power chassis extension (BT7A56CA).

5.4.1 How to install a BTI 7060 AC power module

The BTI 7060 AC power module is intended for installation into cabinet frames.

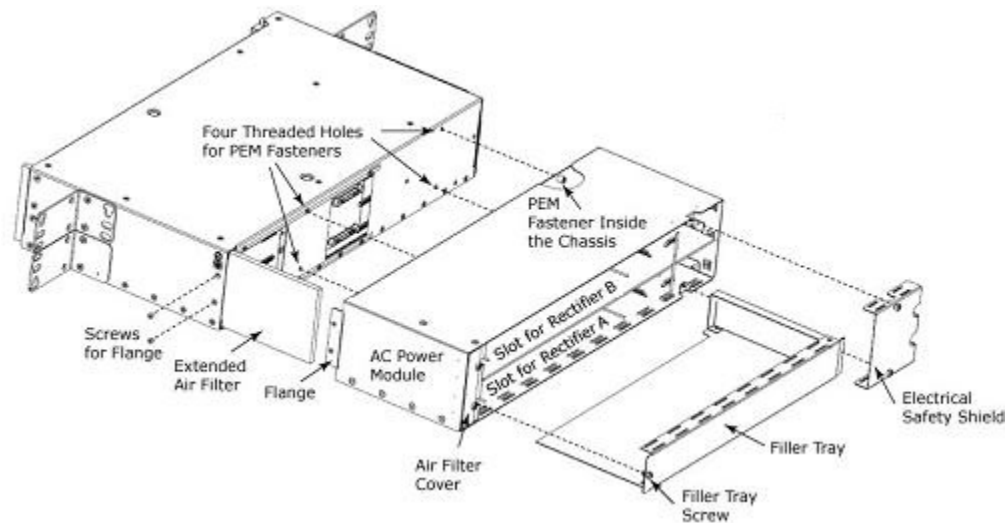
Note The BTI 7060 AC power module is not NEBs compliant.

Use this procedure to install a BTI 7060 AC power module.

Note The BTI 7060 AC power module supports dual power modules (A and B) to ensure uninterrupted service should one power module fail. However, if you are installing only a single power module, it can be installed as either power module A (lower slot) or power module B (upper slot).

Step 1 Lay out the AC power module components

Place the AC power module components on a workbench with the BTI 7060 shelf.



Step 2 Visually inspect the shelf AC connector

- a) Visually inspect the shelf to ensure that the AC connector is physically present, and that the BTI 7060 revision is appropriate for installing the AC power module (revision 7 or higher).
- b) Visually inspect the AC connector to ensure that the guide bushings and connector pins are undamaged. If the visual inspection shows that the AC connector is undamaged, proceed to the next step.

Step 3 Remove the air filter cover from the BTI 7060 shelf

The air filter cover is secured at the rear of the BTI 7060 shelf by two cover fasteners.

- a) Using a slot-head or Phillips screwdriver, loosen and remove the two fasteners to the air filter cover.
- b) If an air filter is present, remove the existing air filter.
- c) Store the removed hardware in a safe place in case you need to reconfigure the BTI 7060 shelf back to a non-AC powered configuration in the future.

Step 4 Remove the cover shield from the BTI 7060 shelf

The cover shield is secured at the rear of the BTI 7060 shelf by six cover fasteners.

- a) Using a slot-head or Phillips screwdriver, loosen and remove the six fasteners from the cover shield.
- b) Store the removed hardware in a safe place in case you need to reconfigure the BTI 7060 shelf back to a non-AC powered configuration in the future.

Step 5 Align the AC power module chassis with the BTI 7060 shelf

The AC power module chassis has an extended flange on the air filter side and four PEM fasteners located inside the AC power module chassis.

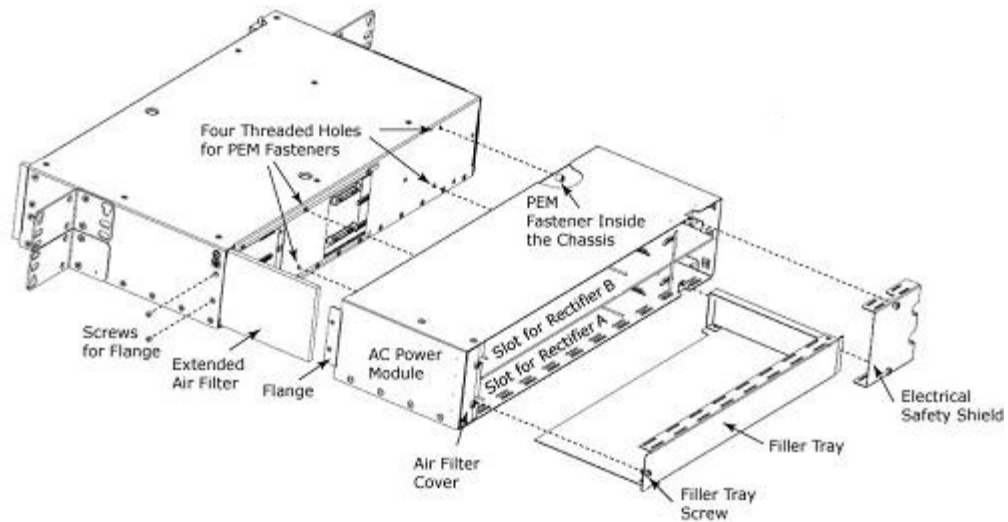
- a) Align the AC power module chassis with the BTI 7060 shelf.

- b) Once aligned, the holes in the extended flange should match holes on the left side of the BTI 7060 shelf and the four PEM fasteners inside the AC power module chassis should match four holes in the rear of the BTI 7060 shelf.

Step 6 Fasten the AC power module chassis to the BTI 7060 shelf

The BTI 7060 AC power assembly kit includes two screws for fastening the extended flange of the AC power module to the left side of the BTI 7060 shelf.

- a) Partially tighten the two flange screws.
 - b) Partially tighten the four PEM fasteners from inside the AC power module chassis.
 - c) Fully tighten the two flange screws.
 - d) Fully tighten the four PEM fasteners from inside the AC power module chassis.
- The AC power module chassis should now be firmly attached to the BTI 7060 shelf.



Step 7 Insert and fasten the power module(s) in place

Warning Do not insert or remove a power module unit with its power cord attached. Only insert or remove a power module unit with its power cord disconnected.

Each power module is mounted to its own tray.

- a) Align a power module tray with the slot for power module A.
- b) Carefully slide the power module tray straight into the slot until the power module faceplate is flush with the chassis extension. Failure to keep the power module straight during insertion could damage the pins, causing the connectors not to mate correctly.
- c) Once in position, tighten the screw on the left side of the power module tray to the AC power module chassis.
- d) If installing a second power module, repeat sub-steps a) through c) to fasten power module B into its slot.

- e) If you are not installing a second power module, align the filler tray with the slot for power module B.
- f) Carefully slide the filler tray straight into the slot.
- g) Once in position, tighten the screw on the left side of the filler tray to the AC power module chassis.
The power module(s) should now be firmly attached to the AC power module chassis.

Step 8 Connect the AC power cord(s) to the power module(s)

The AC power cord (IEC60320 C14 type is recommended) is not supplied with the power module. You must supply your own AC power cord.

- a) Connect the D-shaped female power connector to the matching D-shaped male power connector on the power module tray.
- b) Once the power connector is attached, switch the associated power module power switch to the ON position.
- c) With a pair of wire cutters, remove the male power connector at the far end of the power cord and install a country-specific power connector that meets local electrical standards.
- d) If a second power module is installed, repeat sub-steps a) through c) for the second AC power cord.

Step 9 Attach the electrical safety shield

As shown in the illustration, an electrical safety shield is attached to the AC power module chassis.

- a) Thread the power cord through the power cord aperture in the electrical safety shield.
- b) If a second power module is installed, repeat sub-step a) for the second AC power cord.
- c) Align the electrical safety shield with its two matching fastener positions on the AC power module chassis.
- d) Partially tighten the two fasteners.
- e) Fully tighten the two fasteners.

Step 10 Insert the extended air filter and attach the air filter cover

An air filter of extended length is supplied with each BTI 7060 AC power module.

- a) Facing the rear of the BTI 7060 AC power module, align the extended air filter to its slot.
- b) Carefully push the air filter straight into its slot.
- c) Using a slot-head or Phillips screwdriver, carefully tighten the air filter cover.

You have successfully completed this procedure.

5.4.2 How to install a BTI 7030 AC power module

The BTI 7030 AC power module is intended for installation into cabinet frames.

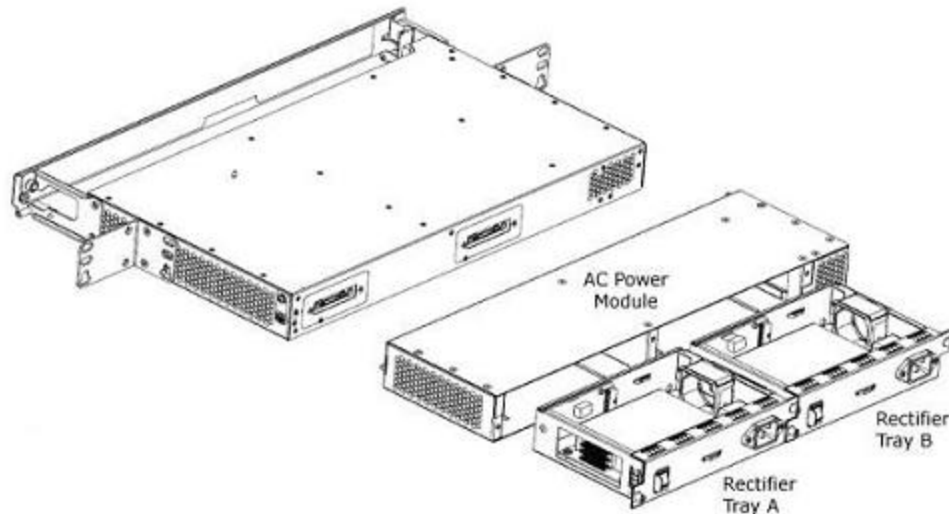
Note The BTI 7030 AC power module is not NEBs compliant.

Use this procedure to install a BTI 7030 AC power module.

Note The BTI 7030 AC power module supports dual power modules (A and B) to ensure uninterrupted service should one power module fail. However, if you are installing a single power module only, it can be installed as either power module A or power module B.

Step 1 Lay out the AC power module components

Place the AC power module components on a workbench with the BTI 7030 shelf.



Step 2 Visually inspect the shelf AC connector

- a) Visually inspect the shelf to ensure that the AC connector is physically present, and that the BTI 7030 revision is appropriate for installing the AC power module (revision 7 or higher).
- b) Visually inspect the AC connector to ensure that the guide bushings and connector pins are undamaged and free of any debris. If the visual inspection shows that the AC connector is undamaged and debris-free, proceed to the next step.

Step 3 Remove the cover shield from the BTI 7030 shelf

The cover shield is secured at the rear of the BTI 7030 shelf by four cover fasteners.

- a) Using a slot-head or Phillips screwdriver, loosen and remove the four fasteners to the cover shield.
- b) Store the removed hardware in a safe place in case you need to reconfigure the BTI 7030 shelf back to a non-AC powered configuration in the future.

Step 4 Align the AC power module chassis with the BTI 7030 shelf

The AC power module chassis has five PEM fasteners located inside the AC power module chassis.

- a) Align the AC power module chassis with the BTI 7030 shelf.
- b) Once aligned, the five PEM fasteners inside the AC power module chassis should match five holes in the rear of the BTI 7030 shelf.

Step 5 Fasten the AC power module chassis to the BTI 7030 shelf

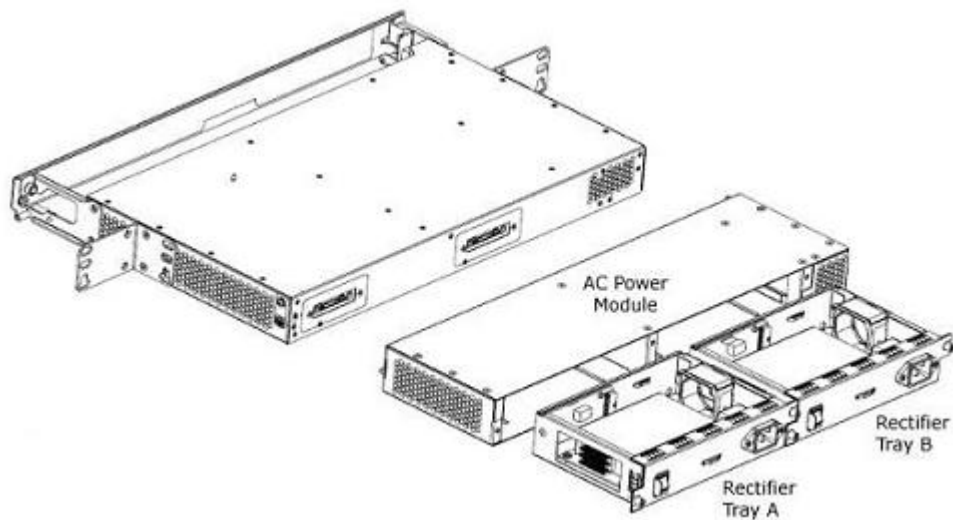
- a) Partially tighten the five PEM fasteners from inside the AC power module chassis.
- b) Fully tighten the five PEM fasteners from inside the AC power module chassis.
The AC power module chassis should now be firmly attached to the BTI 7030 shelf.

Step 6 Insert and fasten the power module(s) in place

Warning Do not insert or remove a power module unit with its power cord attached. Only insert or remove a power module unit with its power cord disconnected.

Each power module is mounted to its own tray.

- a) Align a power module tray with the slot for power module A.
- b) Carefully slide the power module tray straight into the slot until the power module faceplate is flush with the chassis. Failure to keep the power module straight during insertion could damage the pins, causing the connectors not to mate correctly.
- c) Once in position, tighten the screws on each side of the power module tray to the AC power module chassis.
- d) If installing a second power module, repeat sub-steps a) through c) to fasten power module B into its slot.
- e) If you are not installing a second power module, align the filler tray to the slot for power module B.
- f) Carefully push the filler tray straight into the slot.
- g) Once in position, tighten the screws on each side of the filler tray to the AC power module chassis.
The power module(s) should now be firmly attached to the AC power module chassis.



Step 7 Connect the AC power cord(s) to the power module(s)

The AC power cord (IEC60320 C14 type is recommended) is not supplied with the power module. You must supply your own AC power cord.

- a) Connect the D-shaped female power connector to the matching D-shaped male power connector on the power module tray.
- b) Once the power connector is attached, switch the associated power module power switch to the ON position.
- c) If the power module is to be plugged into a non-North-American AC plug system, consult a local electrician for the proper plug termination and ground connection rules.
- d) If a second power module is installed, repeat sub-steps a) through c) for the second AC power cord.

You have successfully completed this procedure.

5.5 Installing BTI 7000 Series shelves

The following section explains how to install a BTI 7000 Series shelf.

5.5.1 Installing a BTI 7000 Series shelf in an equipment rack

The BTI 7000 Series shelves support eight installation configurations and can be installed with or without a cover. The BTI 7000 Series shelves are shipped with the mounting brackets attached to the shelf to support a 23-inch ANSI rack mid-mount installation. The same brackets can be used in a 500-mm (21-inch) ETSI rack installation. For 19-inch racks, the brackets are supplied in the shelf installation kit. For ETSI rack installations with a cover, the mounting brackets are part of the cover assembly. The following installation configurations are supported:

- 23-inch ANSI rack, mid-mount position with no cover (shipped in this configuration)
- 23-inch ANSI rack, mid-mount position with cover
- 500-mm (21-inch) ETSI rack, front-mount position with no cover
- 500-mm (21-inch) ETSI rack, front-mount position with cover and bracket assembly
- 19-inch ANSI rack, mid-mount position with no cover
- 19-inch ANSI rack, mid-mount position with cover
- 465-mm (19-inch) ETSI rack, front-mount position with no cover
- 465-mm (19-inch) ETSI rack, front-mount position with cover and bracket assembly

Use the following procedure to install a BTI 7000 Series shelf in an equipment rack.

Note	Before proceeding, refer to 3.3, “Shelf stacking options” in this document to understand the supported mounting positions for efficient stacking of shelves in an equipment rack.
-------------	---

Step 1 Choose one of the supported mounting configurations, and ensure that you have the required hardware or installation kit that is supplied with the shelf.

Step 2 If necessary, remove the fiber management spool by unscrewing the two mounting fasteners.

Step 3 Attach the mounting hardware as follows:

- a) For installations with no cover, attach the brackets to each side of the shelf chassis using the screws provided. Use four screws for each mounting bracket on the shelf. Tighten to a torque that is no more than 65 in-lbs.
 - The 23-inch brackets are shipped pre-attached to the shelf.
 - For 21-inch brackets, remove the 23-inch brackets, turn each bracket so that the long edge is aligned with the side of the shelf, and re-attach the brackets to the shelf.

- For 19-inch brackets, remove the 23-inch brackets and attach the 19-inch brackets provided in the installation kit.
- b) For ETSI rack installations with a cover, attach the cover and bracket assembly to the front of the shelf using the screws provided in the cover installation kit. Use four screws to attach each side of the cover assembly to the shelf. Tighten to a torque that is no more than 65 in-lbs.
- c) For ANSI rack installations with a cover, attach the cover to the front of the shelf, and attach the brackets to the sides of the shelf as instructed in step 3.a., using the screws provided in the cover installation kit. Use four screws to attach each side of the cover assembly to the shelf. Tighten to a torque that is no more than 65 in-lbs.
- Step 4** With one person at each side of the shelf, lift the shelf into position in the equipment rack.
- Step 5** Align the mounting holes in the mounting bracket with the mounting holes in the equipment rack.
- Step 6** From the selection of mounting bolts shipped with the shelf installation kit, choose the bolts to mount the shelf in the equipment rack. Use one mounting bolt for each mounting bracket on the shelf. Tighten to a torque that is no more than 65 in-lbs.

You have successfully completed this procedure.

The following figures show a completed installation of a BTI 7060 in each of the eight supported configurations.

Figure 5-11 BTI 7060 23-inch ANSI rack, mid-mount position with no cover

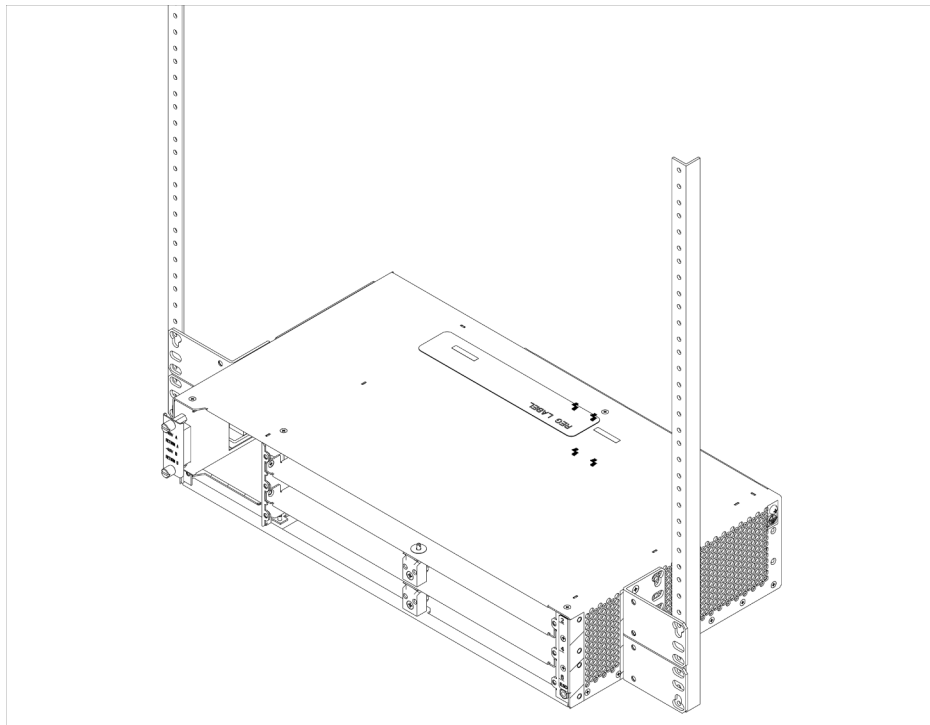


Figure 5-12 BTI 7060 23-inch ANSI rack, mid-mount position with cover

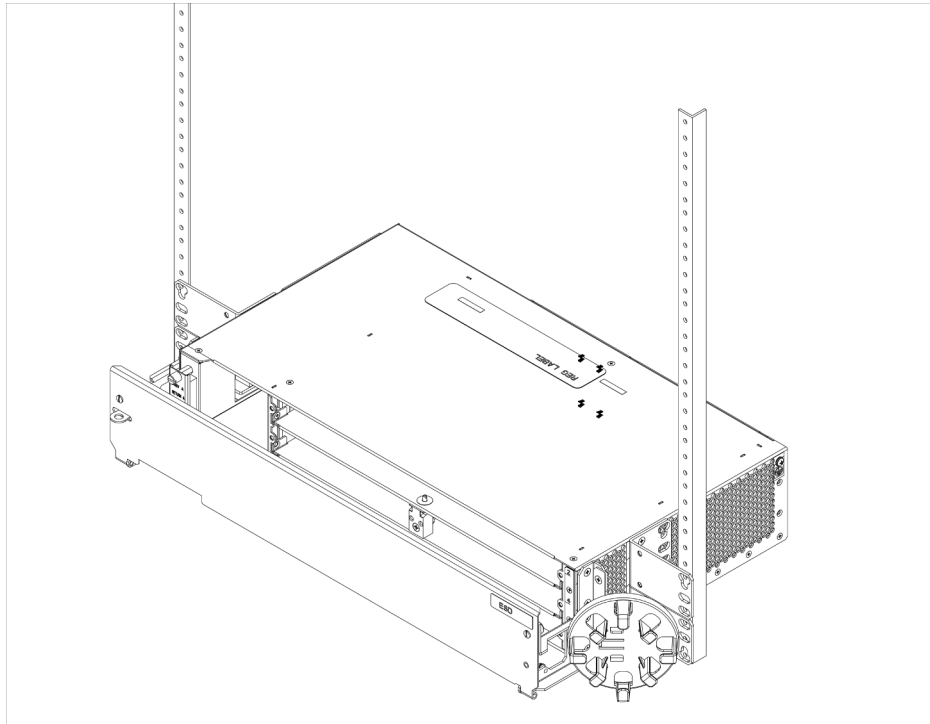


Figure 5-13 BTI 7060 500-mm (21-inch) ETSI rack, front-mount position with no cover

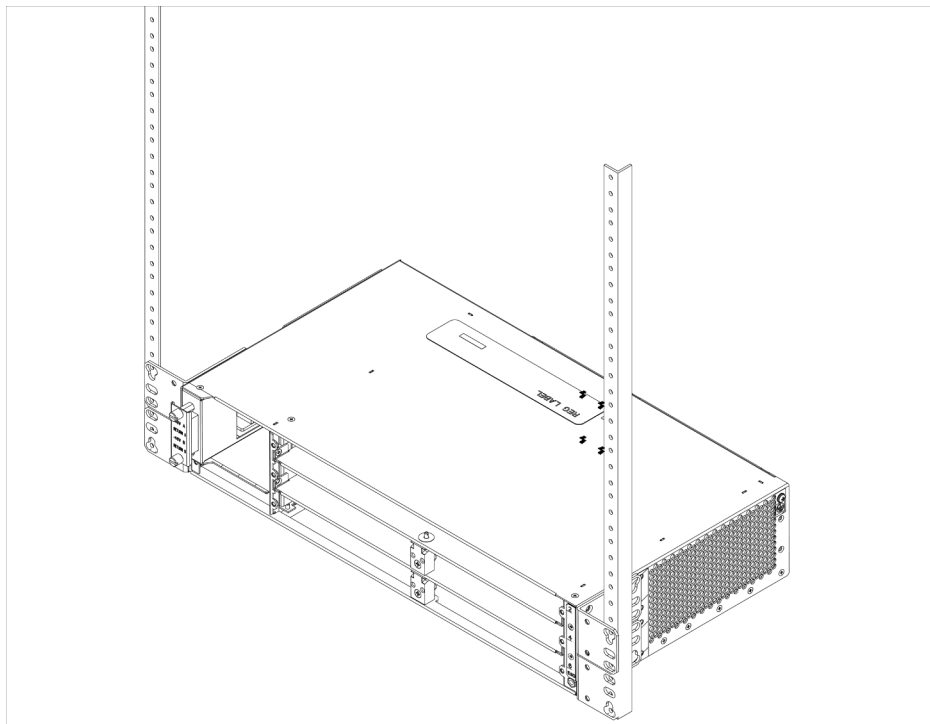


Figure 5-14 BTI 7060 500-mm (21-inch) ETSI rack, front-mount position with cover and bracket assembly

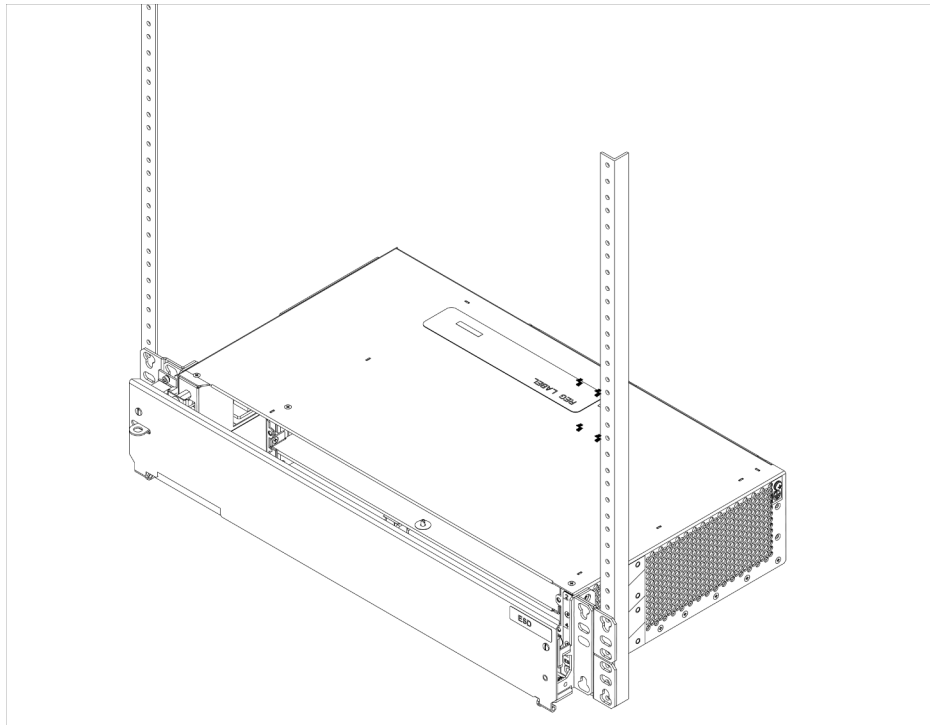


Figure 5-15 BTI 7060 19-inch ANSI rack, mid-mount position with no cover

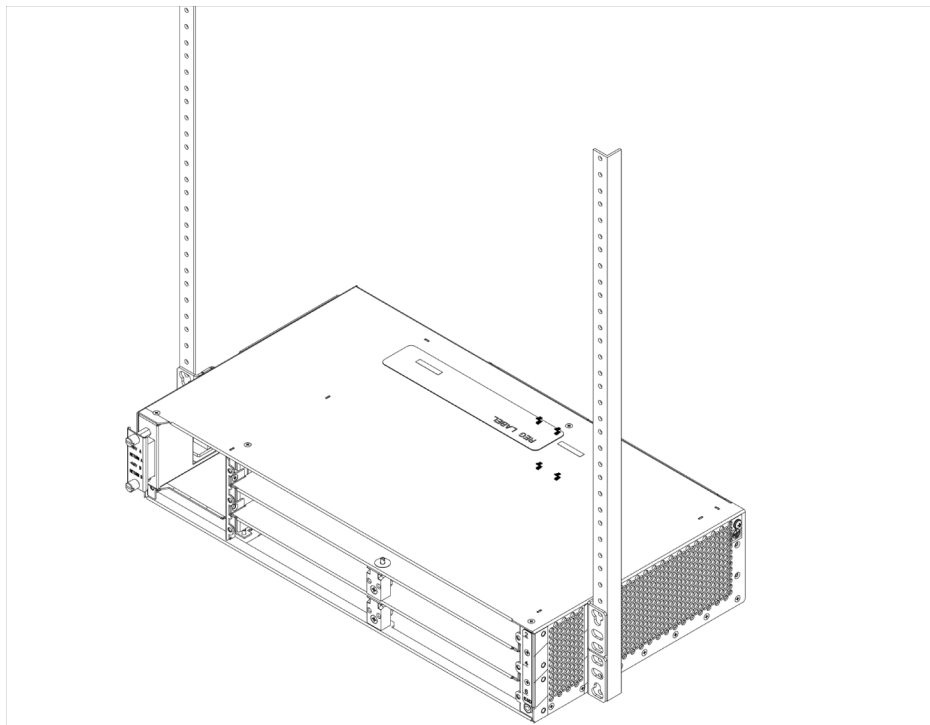


Figure 5-16 BTI 7060 19-inch ANSI rack, mid-mount position with cover and fiber spool

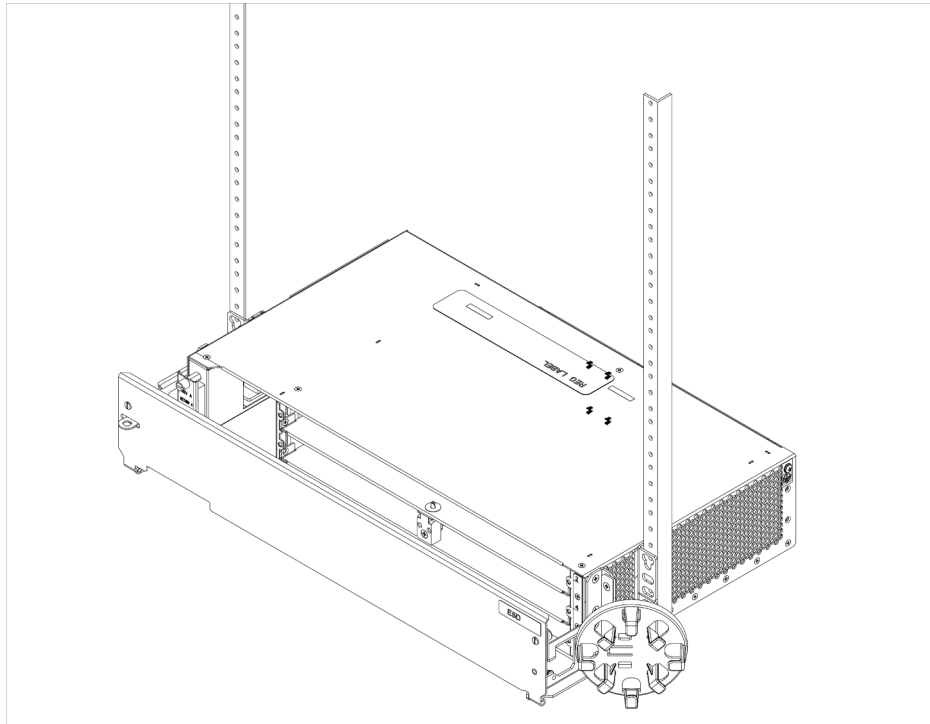


Figure 5-17 BTI 7060 465-mm (19-inch) ETSI rack, front-mount position with no cover

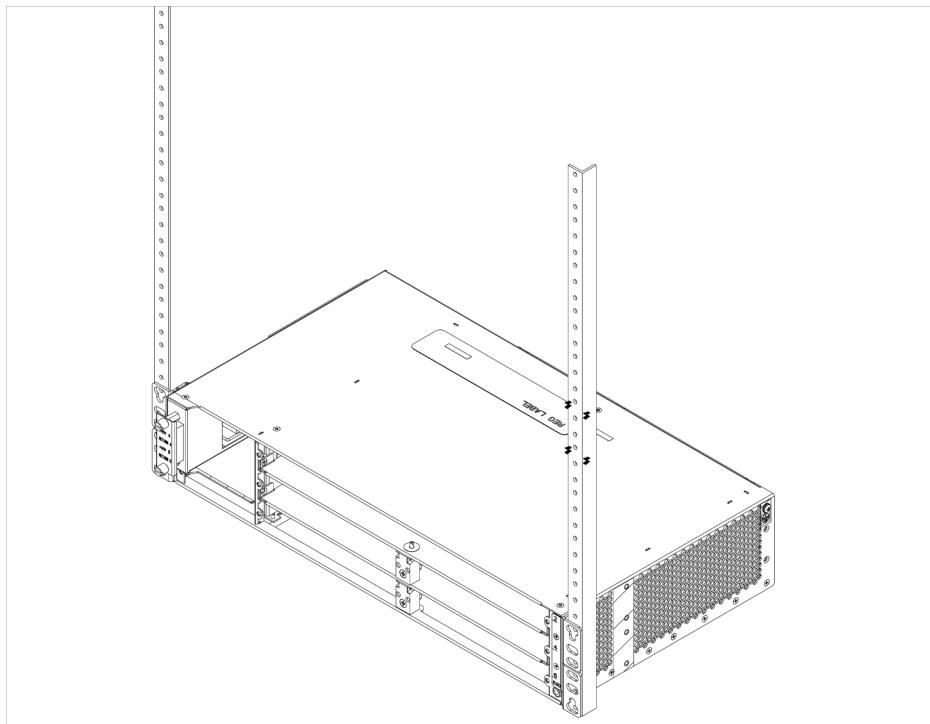
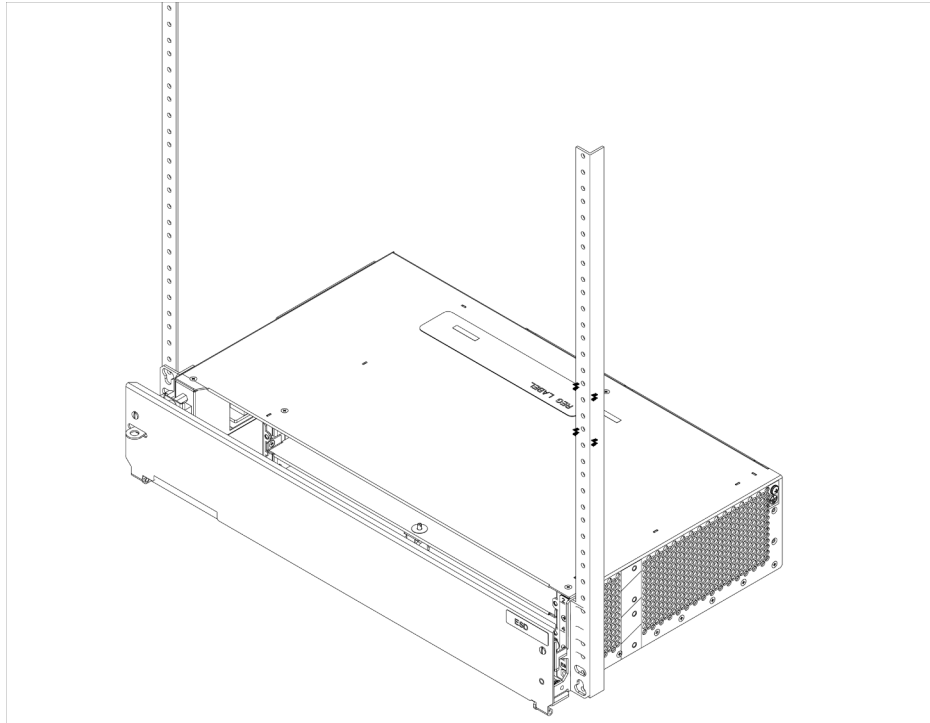


Figure 5-18 BTI 7060 465-mm (19-inch) ETSI rack, front-mount position with cover and bracket assembly



The following figures show a completed installation of a BTI 7200 in each of the supported configurations.

Figure 5-19 BTI 7200 23-inch ANSI rack, mid-mount position with cover

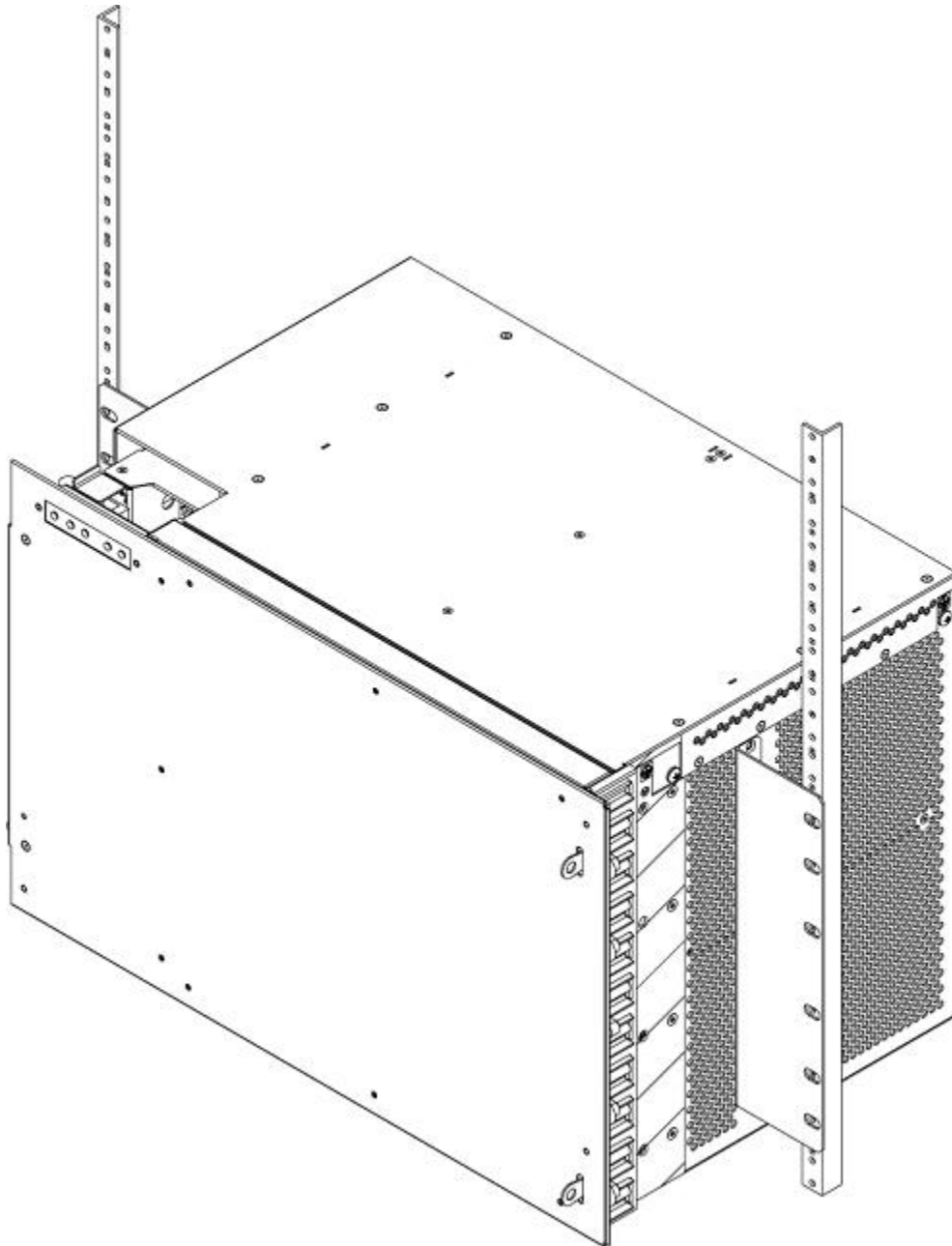


Figure 5-20 BTI 7200 500-mm (21-inch) ETSI rack, front-mount position with cover

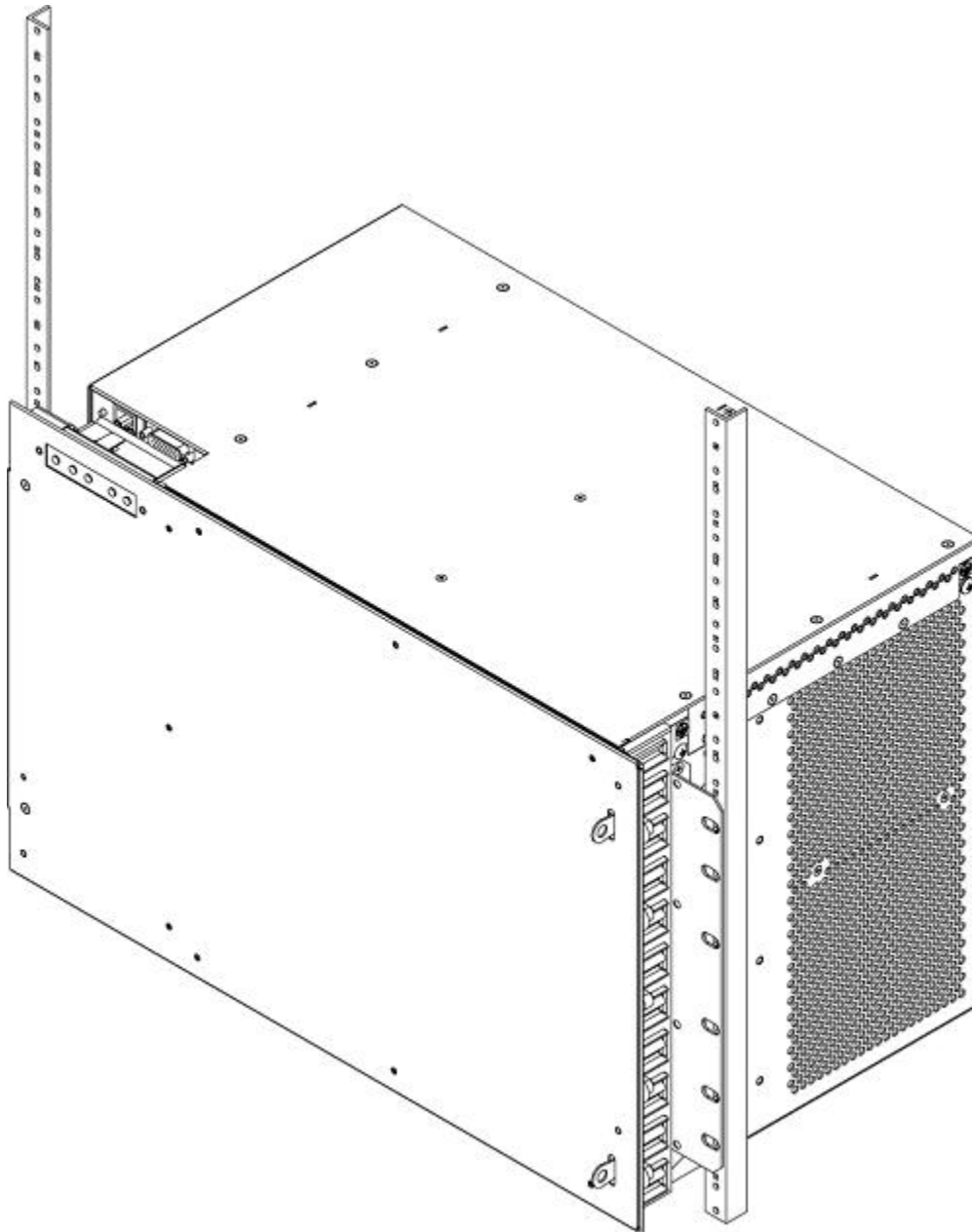


Figure 5-21 BTI 7200 19-inch ANSI rack, mid-mount position with cover

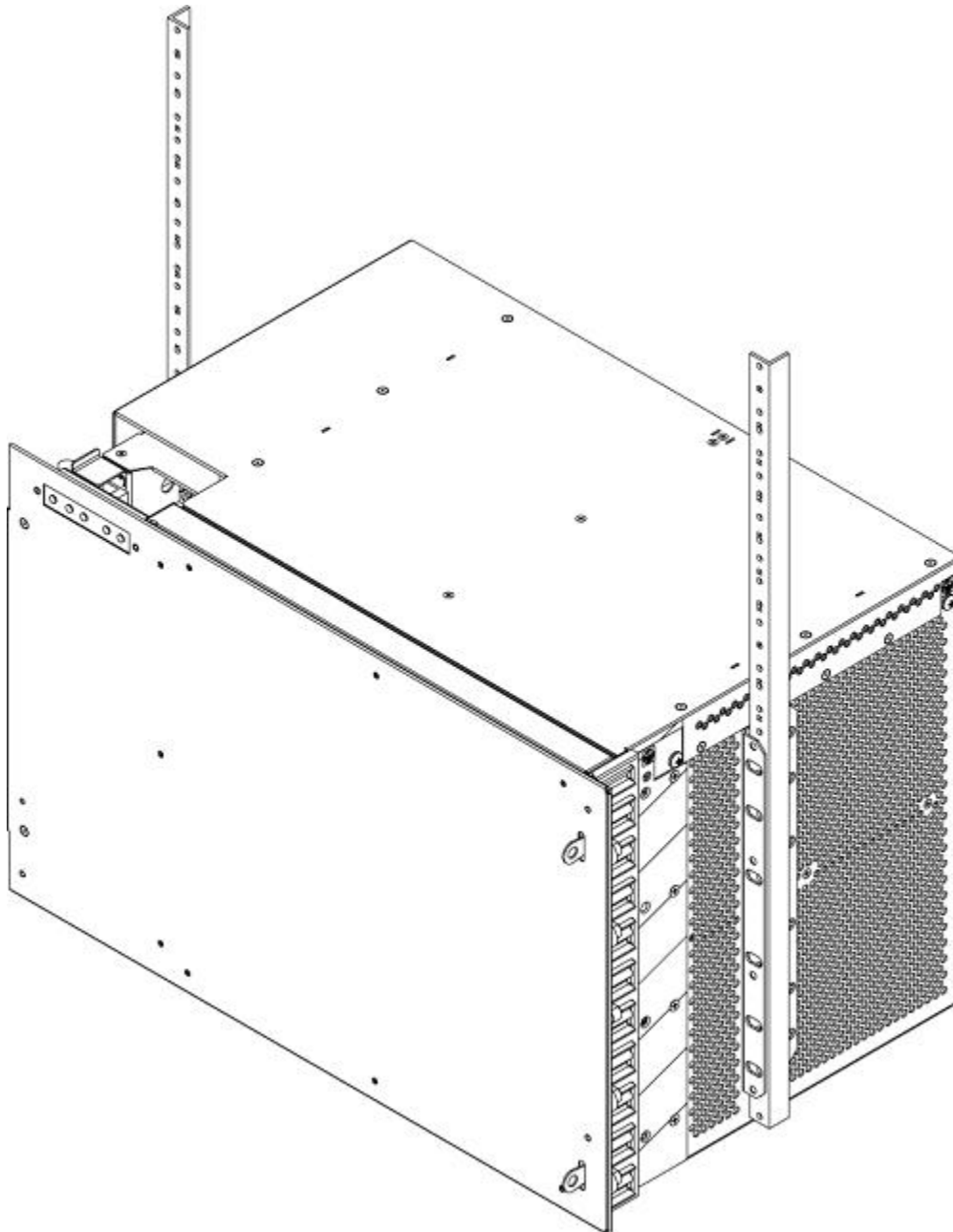
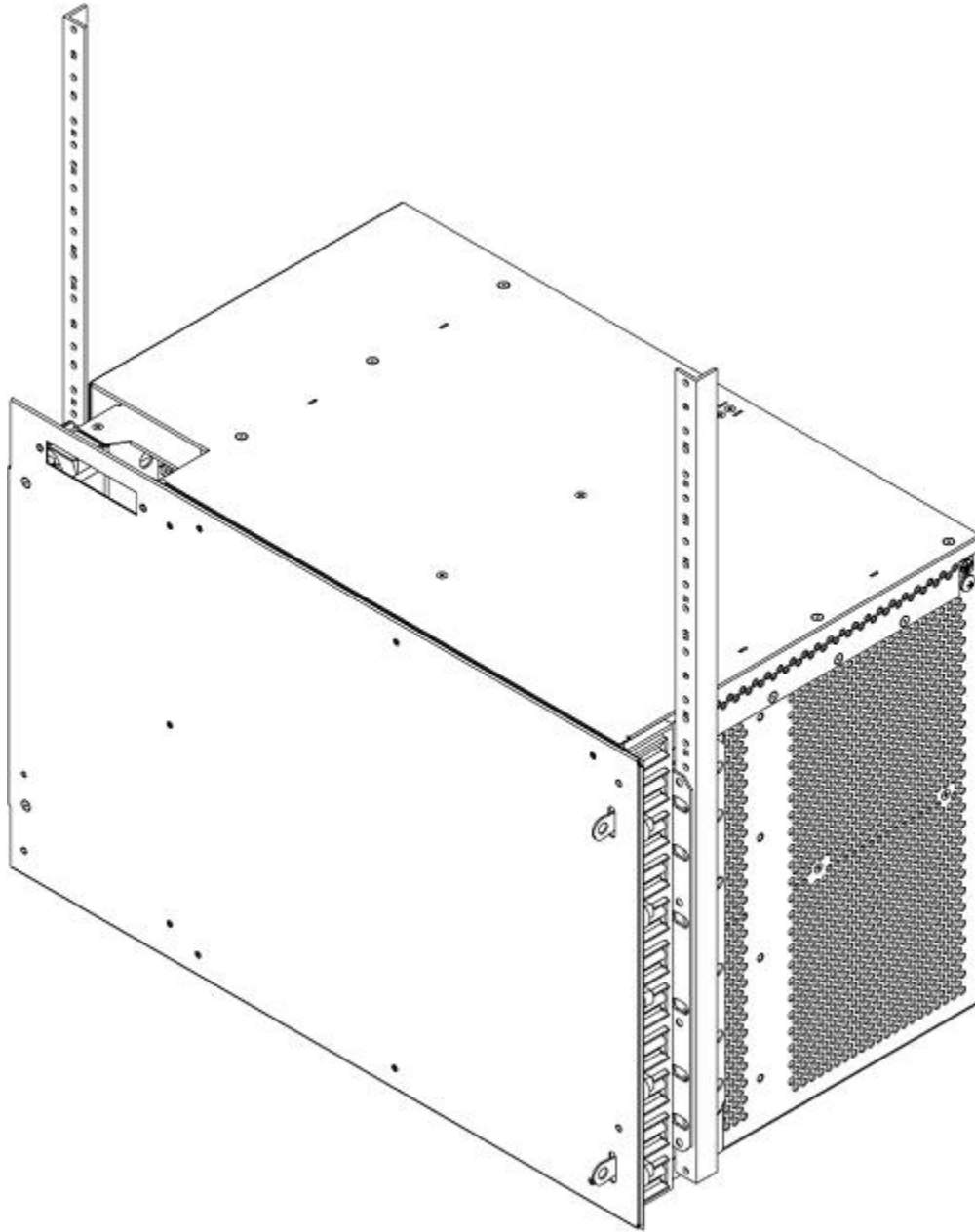


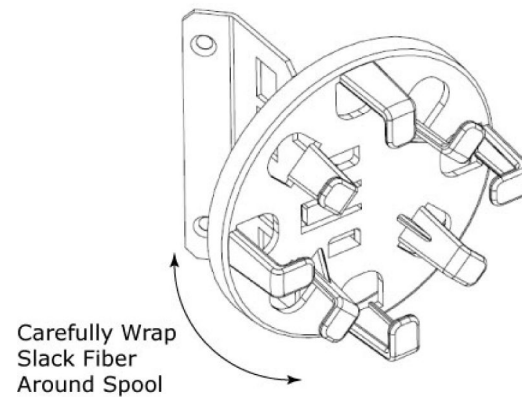
Figure 5-22 BTI 7200 465-mm (19-inch) ETSI rack, front-mount position with cover



5.6 Attaching the fiber management spool to a BTI 7060

Note Due to space constraints with ETSI racks, the fiber management spool can be used only on shelves installed in ANSI racks. Installation of this device is optional.

Fiber management spool



To attach the current fiber management spool, use the following procedure.

Step 1 Attach the fiber management spool to the shelf

The fiber management spool attaches to the right side of the shelf. Align the fiber management spool to the mounting positions and tighten the two screw fasteners.

You have successfully completed this procedure.

5.7 Inserting or replacing an air filter in the BTI 7060

The BTI 7060 is a fully NEBS compliant system that includes a replaceable air filter (MP500857).

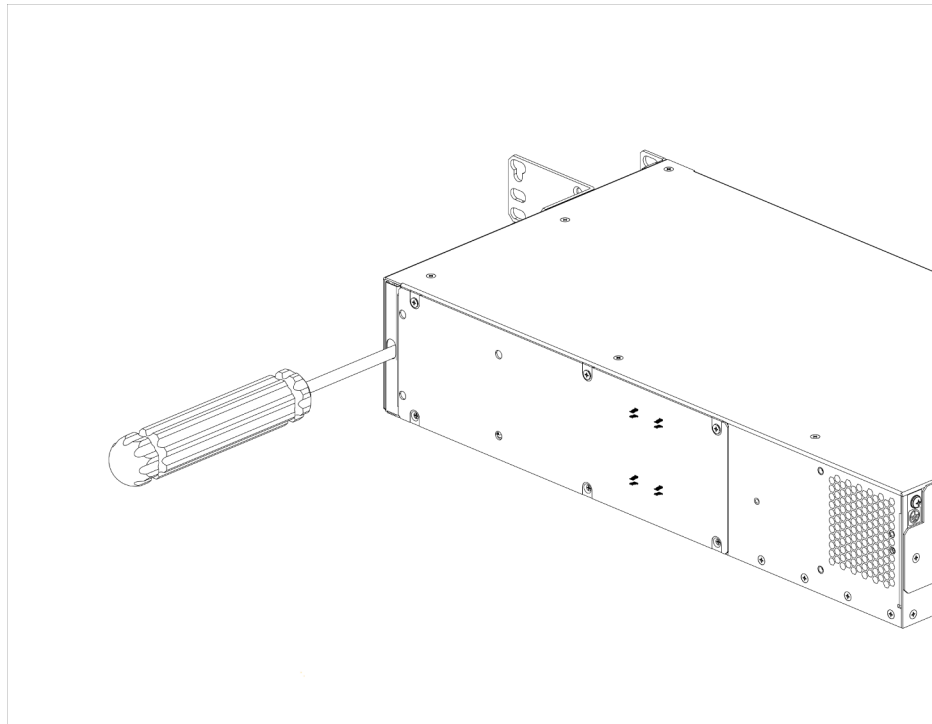
Note If the BTI 7060 AC power module is attached to the BTI 7060 shelf, a longer air filter is required. Contact your BTI representative for ordering details.

BTI recommends a visual inspection of the air filter at least once every three months. If dust is observed in the filter, replace the air filter. An air filter replacement kit is available from BTI.

To insert a new air filter, or to replace an existing air filter, use the following procedure.

Step 1 The air filter cover is located at the rear of the BTI 7060 and is secured by a snap-on cover.

Using a slot-head or Phillips screwdriver, remove the snap-on cover.



Step 2 If there is already an air filter in the slot, remove and discard it.

Step 3 Facing the shelf, align the new air filter with the slot.
Carefully slide the air filter straight into the slot.

Step 4 Re-install the cover by snapping it into place.

You have successfully completed this procedure.

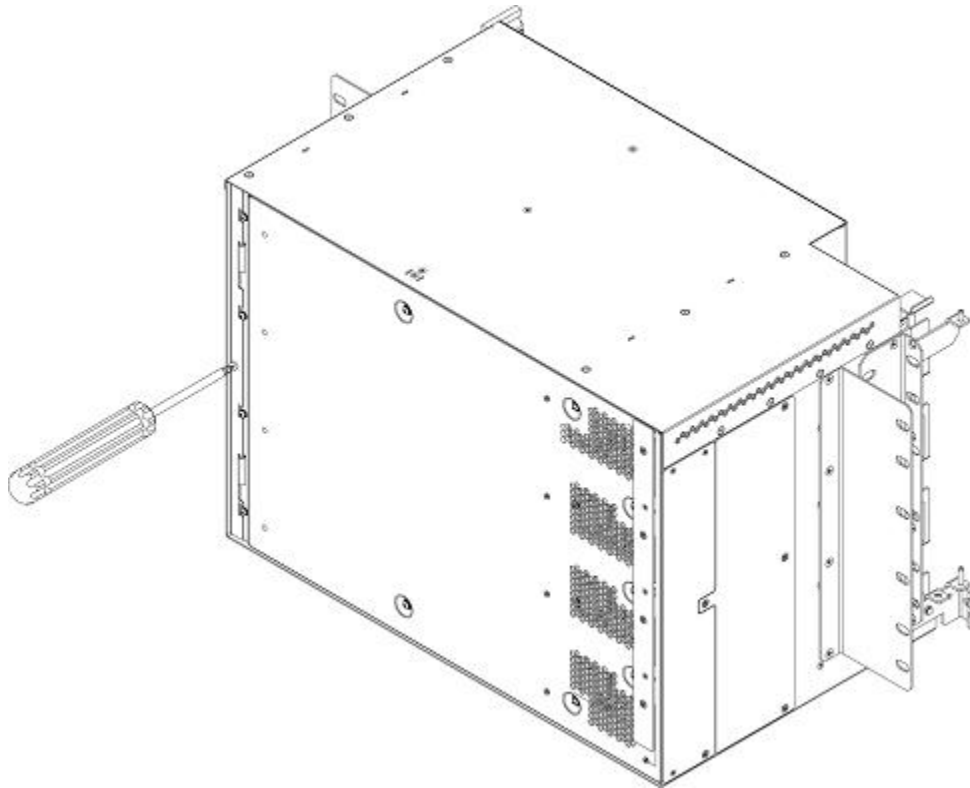
5.8 Inserting or replacing an air filter in the BTI 7200

The BTI 7200 is a fully NEBS compliant system that includes two replaceable air filters.

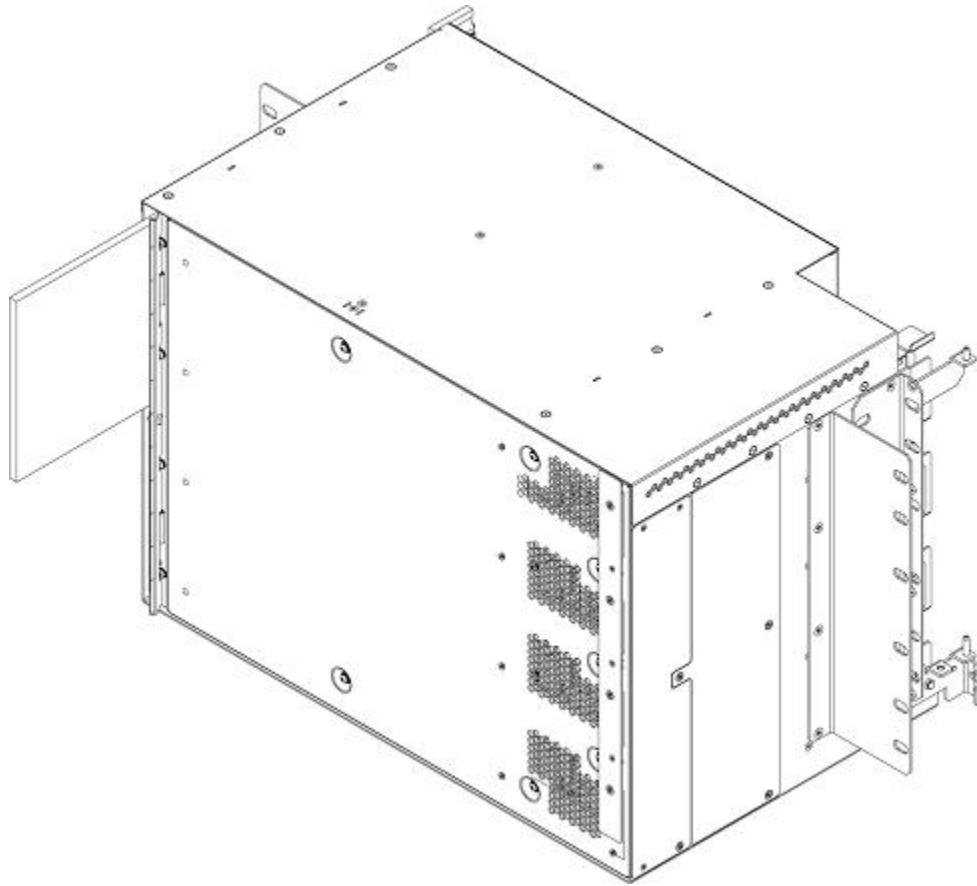
BTI recommends a visual inspection of the air filters at least once every three months. If dust is observed in the filters, replace the air filters. An air filter replacement kit is available from BTI.

To insert a new air filter, or to replace existing air filters, use the following procedure.

- Step 1** The air filter cover is located at the left rear of the BTI 7200 and is secured by a Phillips screw in the middle of the cover. The air filter may be covered by an air deflector. If so, remove it. See 5.9, “[Installing an air deflector on the BTI 7200](#)”.
- Step 2** Using a Phillips screwdriver, loosen the screw on the air filter cover until it is free to open.



- Step 3** Facing the shelf, note that there are two air filter slots, upper and lower. If there is an air filter in either slot, remove and discard it.
- Step 4** Align a new air filter with one of the the slots.
Carefully slide the air filter straight into the slot.



Carefully slide another air filter straight into the other slot.

Step 5 Close the air filter cover and screw it into place.

Step 6 If you removed an air deflector to access the air filters, replace it. See [5.9, “Installing an air deflector on the BTI 7200”](#).

You have successfully completed this procedure.

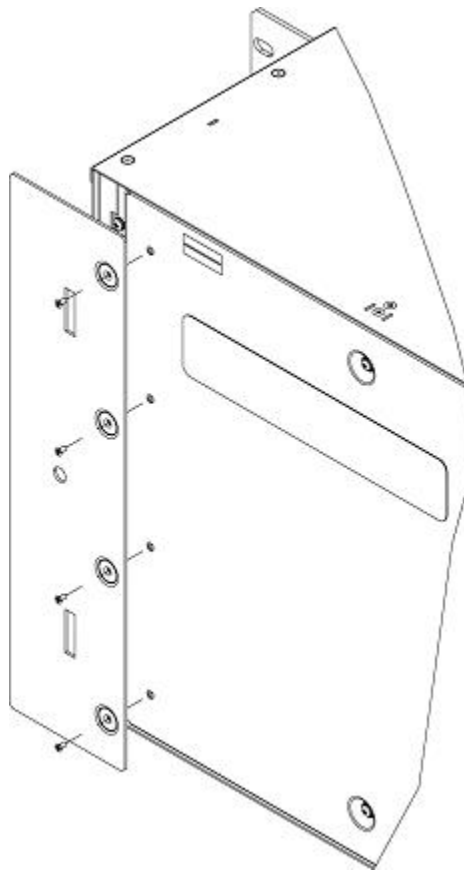
5.9 Installing an air deflector on the BTI 7200

In certain situations involving back-to-back equipment in close proximity, or in situations with restricted air flow, the BTI 7200 may require the installation of an air deflector to assist in cooling.

To install an air deflector, use the following procedure.

Step 1 The air deflector is located at the left rear of the BTI 7200 and is secured by four screws.

Using a Phillips screwdriver, attach the air deflector using the screws provided. The air deflector covers the air filter cover.



You have successfully completed this procedure.

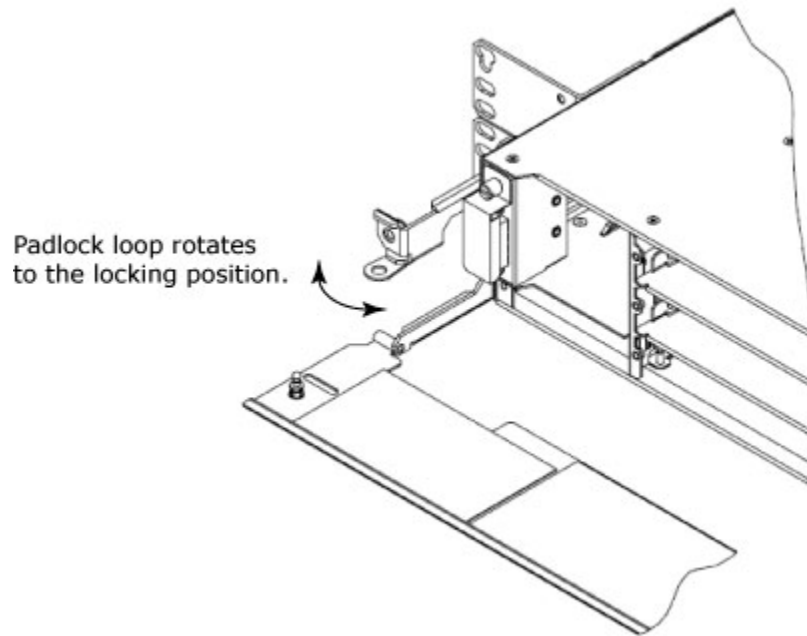
5.10 Using the padlock loop on a BTI 7060 or BTI 7030

The BTI 7060 and BTI 7030 are equipped with a padlock loop that is used to lock the shelf cover.

Note The padlock loop is only applicable to shelves with covers.

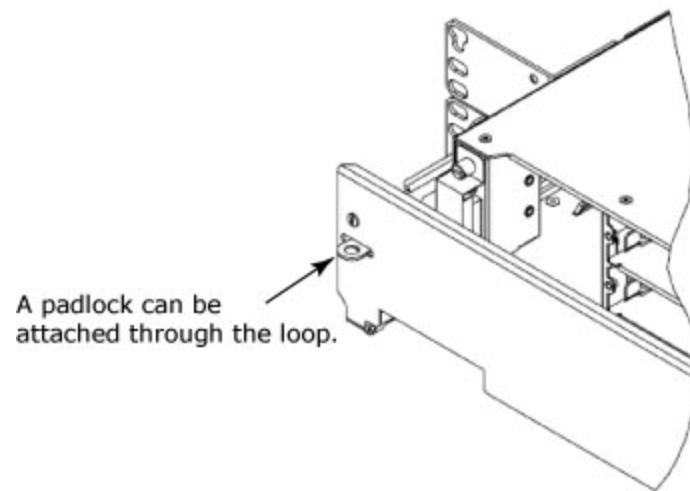
The following figure shows the location of the padlock loop.

Padlock Loop with Shelf Cover Open



Once the shelf cover is in the closed position, a padlock can be attached through the padlock loop.

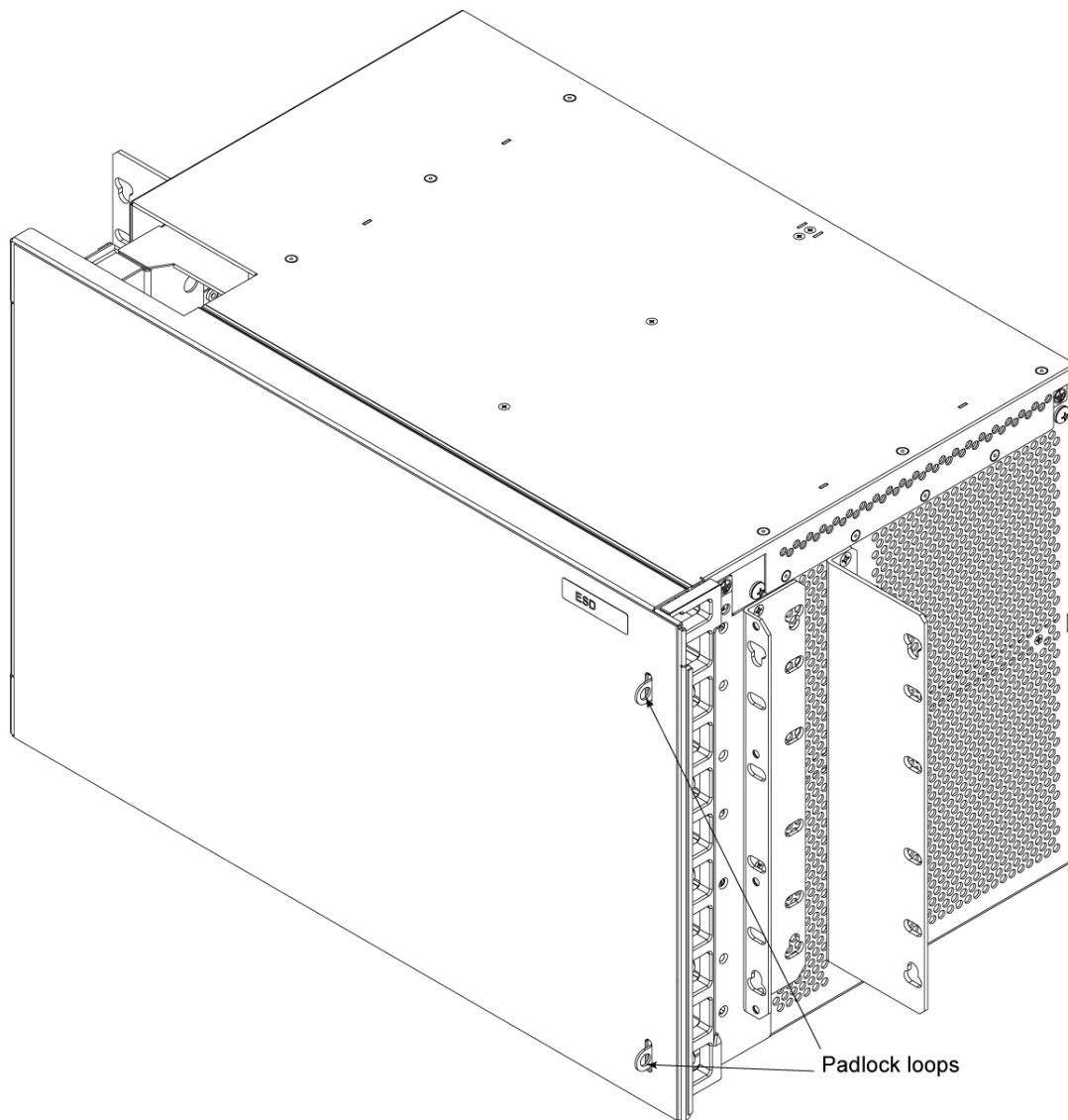
Figure 5-25 Padlock Loop with Shelf Cover Closed



5.11 Using the padlock loop on a BTI 7200

The BTI 7200 is equipped with two padlock loops that are used to lock the shelf cover (these are available only with the ANSI cover kit (BT7A5180)). The padlock loops extend through slots on the shelf cover, as seen in the following illustration.

Figure 5-26 BTI 7200 Padlock Loops with Shelf Cover Closed



Once the shelf cover is in the closed position, padlocks can be attached through the padlock loops.

6.0 Ground and power the shelf

This chapter describes the grounding and powering procedures for the BTI 7000 Series shelves.

- [6.1, “Frame grounding a BTI 7000 Series shelf”](#)
- [6.2, “Powering up a BTI 7000 Series shelf”](#)

Important BTI equipment should be powered in accordance with DC-I equipment installation criteria, in which the return ground is isolated from the frame ground.

6.1 Frame grounding a BTI 7000 Series shelf

Important You must complete this procedure before connecting system power, or powering up the shelf.

The BTI 7000 Series uses DC-I grounding configuration in which the return ground is isolated from the frame ground.

To frame ground a BTI 7000 Series shelf, use the following procedure.

The BTI 7060, BTI 7030, and BTI 7020 use 14 or 16 AWG 105°C grounding wire.

The BTI 7200 uses 10 AWG 105°C grounding wire.

- Step 1** Use a wire stripper tool to strip the end of the ground wire to the correct length (5.0 mm, 0.2 inch) for crimping the supplied ring lugs.
- Step 2** Insert the stripped end of the grounding wire into the open end of the grounding ring connector.
- Step 3** Use a ring lug crimping tool (do not use pliers) to secure the grounding wire in place in the grounding connector.
- Step 4** Use the supplied screw and lock washer to attach the grounding ring connector to a grounding position on the side of the shelf.

Grounding positions on the shelf are marked with a ground symbol, and are located as follows:

- BTI 7060 and BTI 7030 - two on the left side and two on the right side of the shelf. For ETSI shelves, only the two rear grounding positions can be used.
- BTI 7020 - one at the rear left and one at the rear right side of the shelf.
- BTI 7200 - two on the right side of the shelf, one at the front and one at the back. For ETSI shelves, only the rear grounding position can be used.

Figure 6-1 Frame grounding position for a BTI 7060

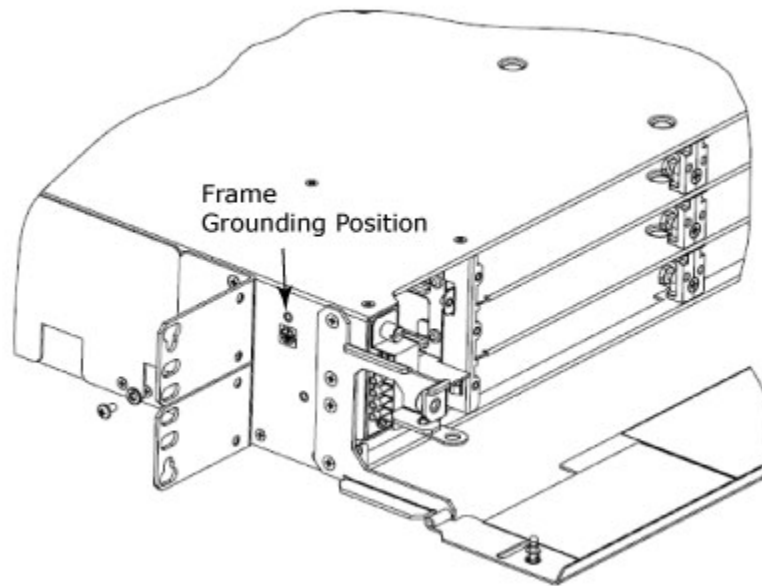
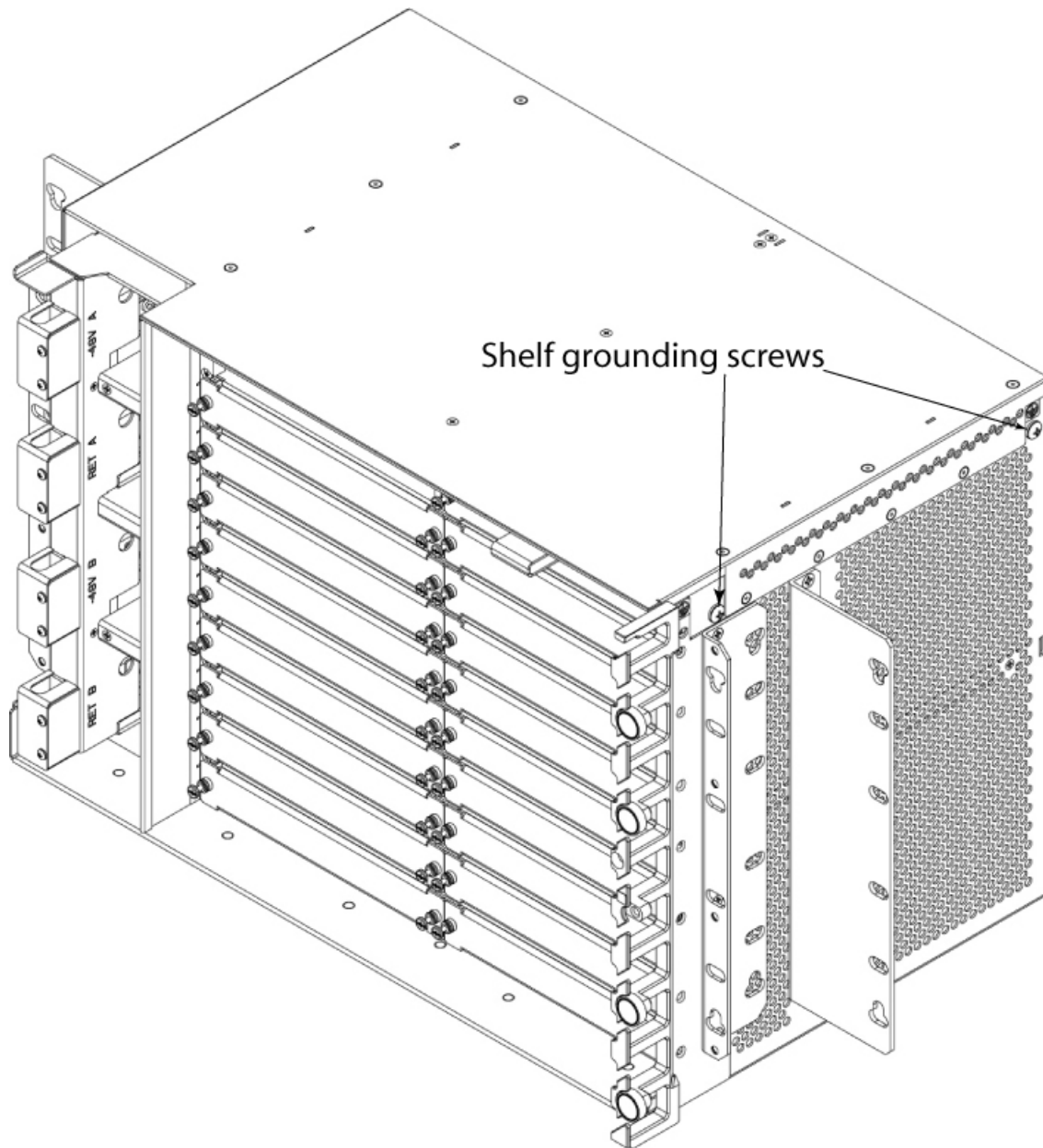
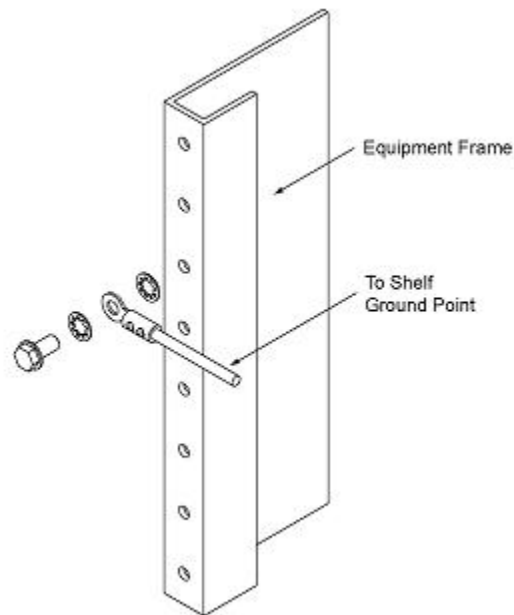


Figure 6-2 Frame grounding position for a BTI 7200



Step 5 Prepare the other end of the grounding wire with a grounding ring connector, and connect it to the equipment frame with the two lock washers and bolt supplied in the installation kit. To ensure proper grounding practice, follow the hardware installation sequence shown in the illustration below.



Step 6 Check the connectivity of the grounding by using a multimeter to measure the resistance between the shelf and the frame. Put one test lead in contact with an unpainted zone of the BTI 7000 Series shelf and the other test lead in contact with the equipment frame. The measured resistance should be less than 1 ohm.

You have successfully completed this procedure.

6.2 Powering up a BTI 7000 Series shelf

This section provides procedures for:

- connecting the power feeds to a BTI 7000 Series shelf
- powering up a shelf
- powering down a shelf

6.2.1 Connecting the power feeds to a BTI 7060

The BTI 7060 uses two redundant -48 VDC power feeds—Power Feed A and Power Feed B.

Warning A readily accessible disconnect device must be incorporated in the installation wiring. It is recommended that a power distribution panel that has line conditioning filter capabilities is used for optimum system power performance.

The A-side DC terminal block next to the Cooling Unit module is designed to connect to a power distribution panel that is, in turn, connected to a -48 VDC power supply. It is recommended to use 10 Ampere breakers or fuses for each feed. Use the supplied ring-lug terminal connectors for the connections to the terminal block.

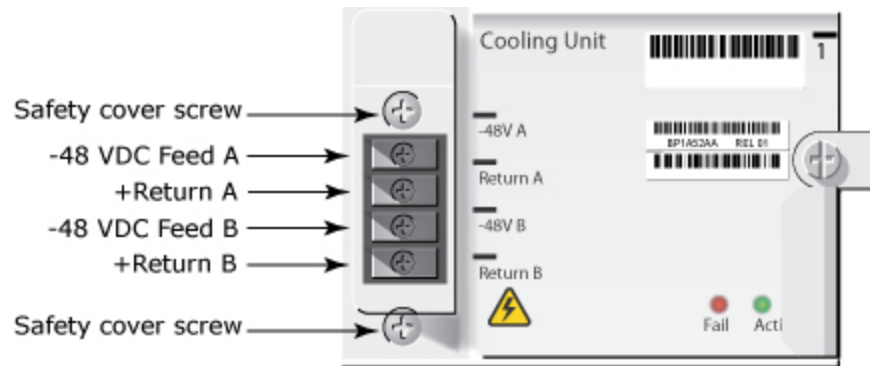
The terminal block consists of six screws. The top and bottom screws (1 and 6) are special double-threaded screws that are used to attach the terminal block to the shelf, and to secure a safety plastic cover over the terminal block. The second screw from the top is for -48 V (Feed A), the third screw is Return A (Feed A), the fourth screw is for -48 V (Feed B), and the fifth screw is Return B (Feed B).

Note Some shelves are shipped with captive screws (that is, screws that are not intended to be fully removed) for the power connections in the power terminal block (the safety cover screws are not affected). You cannot tell by looking at the shelf or terminal block whether it is equipped with captive screws. The only way to tell is to try to remove the screws. If you encounter resistance when trying to remove the screws, stop. If you force a screw out of its hole you risk damaging the screw hole to the point where it will no longer hold a screw. If your shelf is equipped with captive screws, you must use the fork lugs provided with the installation kit. Fork lugs and ring lugs can both be used with non-captive screws.

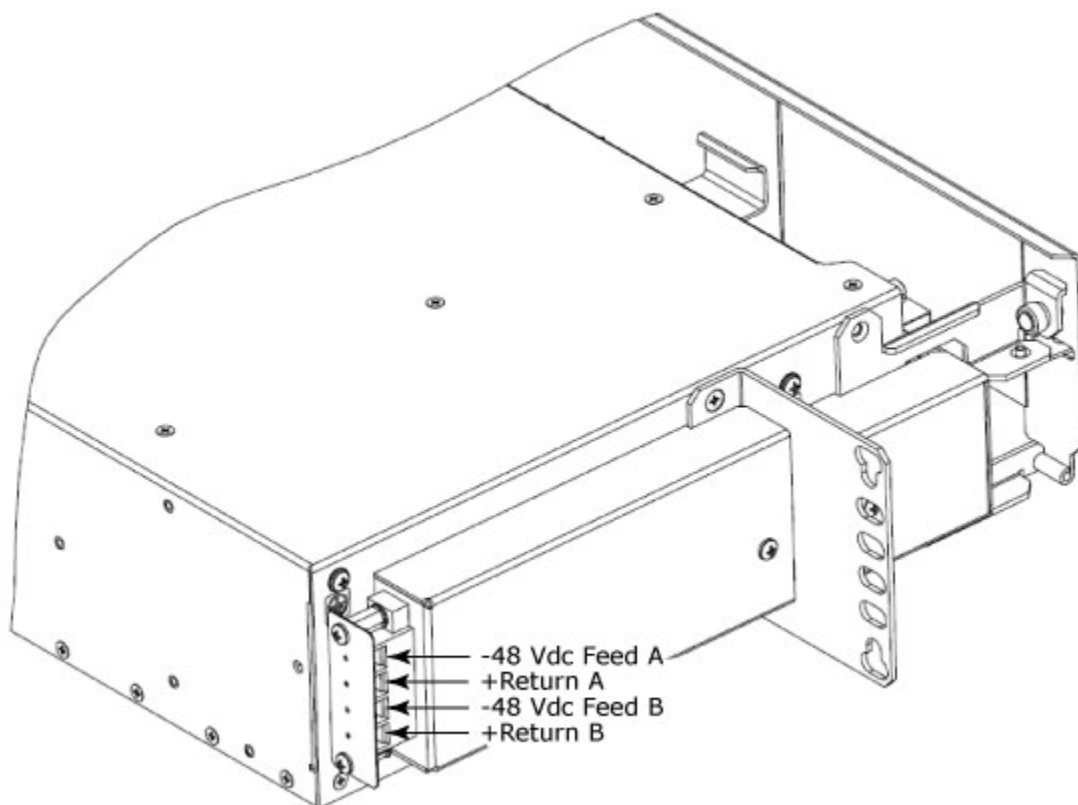
Note The A and B Returns are common. Both the A Feed and B Feed are reverse polarity protected.

Warning Ensure the safety cover is installed over the power terminal connectors during shelf operation.

The following figure shows the BTI 7060 A-side terminal block with the cover in place.

BTI 7060 A-side Terminal Block**Rear access power**

Customers can order a -48 VDC Rear Access Power kit or shelf assembly to provide the option of powering their BTI 7060 from the rear. The following figure shows the rear terminal block with the cover in place.

BTI 7060 Rear Access Power Terminal Block**6.2.2 Connecting the power feeds to a BTI 7030 shelf**

The BTI 7030 uses two redundant -48 VDC power feeds—Power Feed A and Power Feed B.

Warning A readily accessible disconnect device must be incorporated in the installation wiring. It is recommended that a power distribution panel that has line conditioning filter capabilities is used for optimum system power performance.

Note The DC terminal block next to the Cooling Unit is designed to connect to a power distribution panel that is, in turn, connected to a -48 VDC power supply. It is recommended to use 5 A breakers or fuses for each feed. Use the supplied ring-lug terminal connectors for the connections to the terminal block.

The terminal block consists of six screws. The top and bottom screws (1 and 6) are special double-threaded screws that are used to attach the terminal block to the shelf, and to secure a safety plastic cover over the terminal block. The second screw from the top is for -48 V (Feed A), the third screw is Return A (Feed A), the fourth screw is for -48 V (Feed B), and the fifth screw is Return B (Feed B).

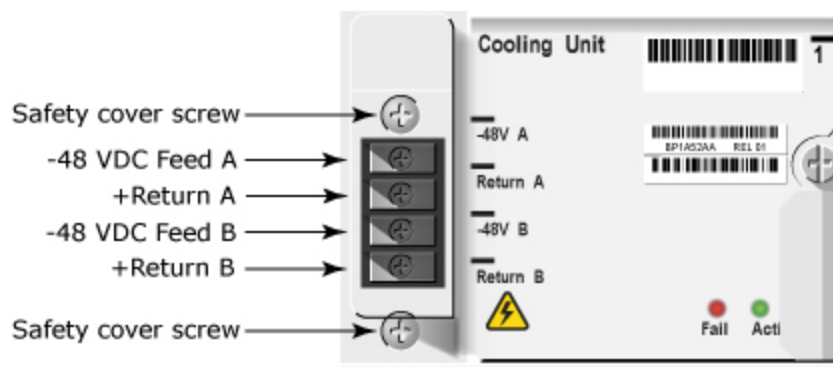
Note Some shelves are shipped with captive screws (that is, screws that are not intended to be fully removed) for the power connections in the power terminal block (the safety cover screws are not affected). You cannot tell by looking at the shelf or terminal block whether it is equipped with captive screws. The only way to tell is to try to remove the screws. If you encounter resistance when trying to remove the screws, stop. If you force a screw out of its hole you risk damaging the screw hole to the point where it will no longer hold a screw. If your shelf is equipped with captive screws, you must use the fork lugs provided with the installation kit. Fork lugs and ring lugs can both be used with non-captive screws.

Note The A and B Returns are common. Both the A Feed and B Feed are reverse polarity protected.

Warning Ensure the safety cover is installed over the power terminal connectors.

The following figure shows the BTI 7030 terminal block.

BTI 7030 Power Connectors



6.2.3 Connecting the power feeds to a BTI 7200

The BTI 7200 uses two redundant -48 VDC power feeds—Power Feed A and Power Feed B.

Warning A readily accessible disconnect device must be incorporated in the installation wiring. It is recommended that a power distribution panel that has line conditioning filter capabilities is used for optimum system power performance.

There are four DC terminal blocks, one next to each of the four Cooling Unit module, and these are designed to connect to a power distribution panel that is, in turn, connected to a -48 VDC power supply. It is recommended to use 35 Ampere breakers or fuses for each feed. Use the supplied lug terminal connectors for the connections to the terminal blocks.

The terminal block assignments are as follows:

- Top terminal block - -48 V Feed A
- Second terminal block - Return A
- Third terminal block - -48 V Feed B
- Bottom terminal block - Return B

Each terminal block has three screw holes:

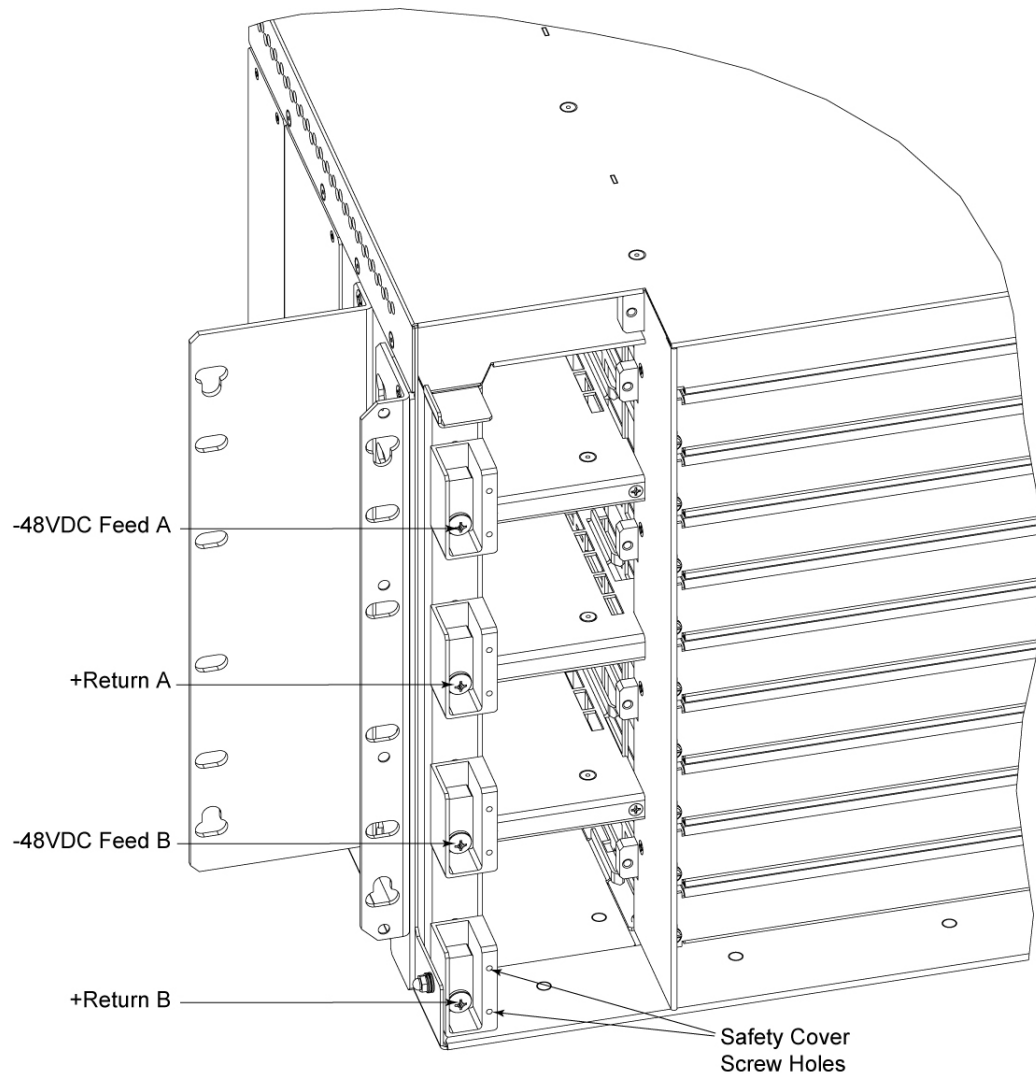
- One screw-hole on the left-side which is used for attaching the ring lug terminal connector to the terminal block.
- Two right-side screw holes which are used to secure a safety plastic cover over the terminal block.

Note The A and B Returns are common. Both the A Feed and B Feed are reverse polarity protected.

Warning Ensure the safety cover is installed over the power terminal connectors during shelf operation.

The following figure shows the BTI 7200 front access power terminal blocks.

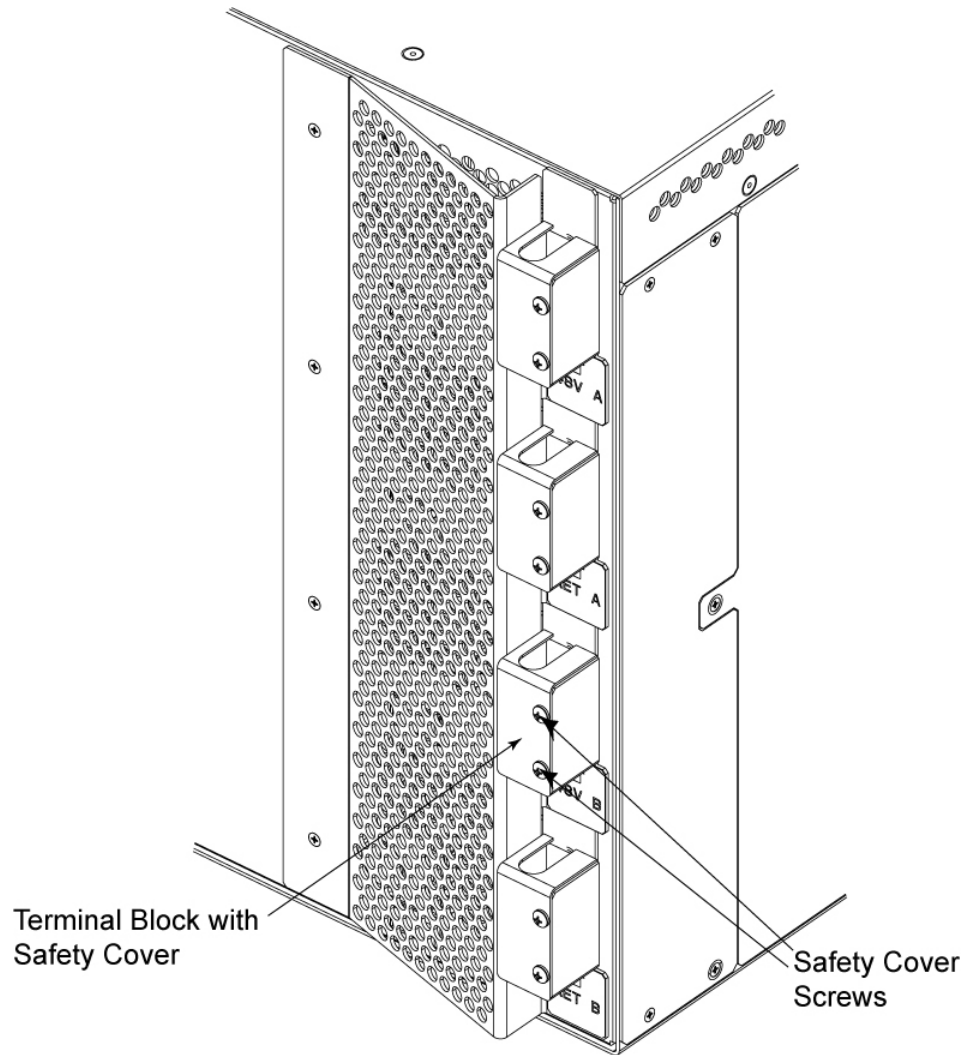
BTI 7200 Front Access Power Terminal Blocks



Rear access power

Customers can order a -48 VDC Rear Access Power shelf assembly (BT7A51AR) to provide the option of powering their BTI 7200 from the rear. The following figure shows the rear access power terminal blocks with the covers in place.

BTI 7200 Rear Access Power Terminal Blocks



6.2.4 Powering up a BTI 7000 Series shelf and verifying the power

Important BTI equipment should be powered in accordance with DC-I equipment installation criteria, in which the return ground is isolated from the frame ground.

With a portable multimeter that is isolated from the electrical grid, measure the voltage between power Feed A (-) and Return A (+). It is recommended to be within -45 VDC and -53 VDC of the nominal -48 V.

Repeat the voltage measurements for power Feed B (-) and Return B (+). It is recommended to be within -45 VDC and -53 VDC of the nominal -48 V.

6.2.5 Powering off a BTI 7000 Series shelf

To power off a BTI 7000 Series shelf, turn the power off at the power distribution panel.

7.0 Install common equipment modules

This chapter explains where and how to install the common equipment modules for the BTI 7000 Series.

- [7.1, “BTI 7060 common equipment modules”](#)
- [7.2, “BTI 7030 common equipment modules”](#)
- [7.3, “BTI 7200 common equipment modules”](#)
- [7.4, “Filler modules and panels”](#)

7.1 BTI 7060 common equipment modules

This section provides information and procedures for locating and installing common equipment modules for the BTI 7060.

7.1.1 BTI 7060 common equipment module locations

The following figures show the location of each common equipment module for the main shelf and the expansion shelf.

The left side of the BTI 7060 accepts either the main shelf interface (MSI), or the expansion shelf interface (ESI), and the cooling unit (CU) modules. All of these modules have dedicated slots that are configured for them.

The remaining module slots are located to the right of the MSI, or ESI, and CU. In the main shelf, slot 5 is configured to accept the System Control Processor (SCP) module only, and the remaining slots can be provisioned to accept other modules. In the expansion shelf, all slots to the right of the ESI and CU can be provisioned to accept modules.

Main Shelf Common Equipment Module Locations

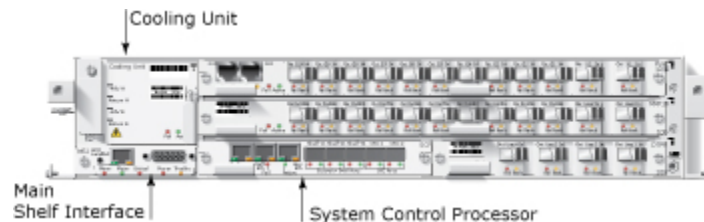
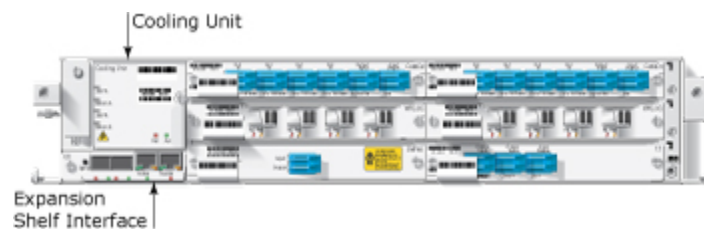


Figure 7-2 Expansion Shelf Common Equipment Module Locations



7.1.2 Install the BTI 7060 Cooling Unit module

Use this procedure to install the BTI 7060 Cooling Unit module.

What you need

- Slot-head or Phillips screwdriver
- Electrostatic discharge (ESD) wrist strap with banana plug jack
- Cooling Unit module

Prerequisites

- None

Installation procedure

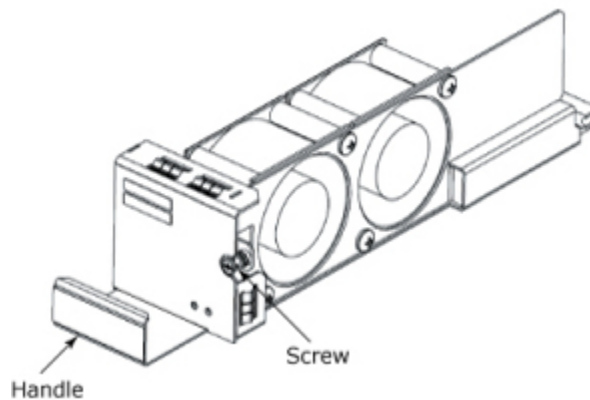


Caution

Use an ESD wrist strap whenever you open the equipment, particularly when you are handling modules as well as SFP and XFP transceivers. To work properly, the wrist strap must make good contact at both ends (that is, with your skin at one end and with the chassis at the other).

The following figure shows a BTI 7060 Cooling Unit module and its key features for this procedure.

Figure 7-3 BTI 7060 Cooling Unit module



Note The Cooling Unit must be installed in its dedicated slot in the shelf.

Note Install the Cooling Unit module before installing the System Control Processor module.

To install a Cooling Unit module, use the following procedure.

Step 1 Insert module

- a) Align the cooling unit to the guides of the slot in which the module is being inserted.
- b) Carefully push the module straight into the slot.

Step 2 Tighten faceplate screw

- a) Facing the front of the shelf, align the cooling unit with its mounting hole.
- b) Using a slot-head or Phillips screwdriver, carefully tighten the faceplate screw.

Caution Tighten to a torque that is no more than 4.7 in-lbs.

You have successfully completed this procedure.

7.1.3 Install the BTI 7060 Main Shelf Interface module

Use this procedure to install the BTI 7060 Main Shelf Interface (MSI) module (BT7A53BA/BT7A53BB).

What you need

- Slot-head or Phillips screwdriver
- Electrostatic discharge (ESD) wrist strap
- MSI module

Prerequisites

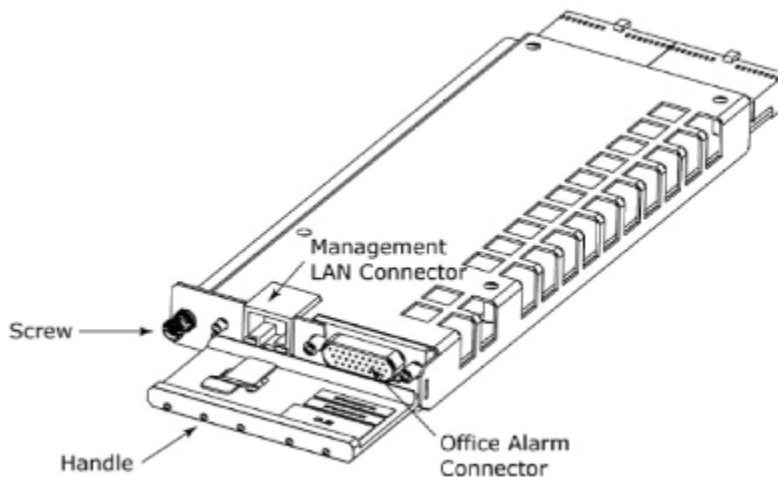
- None

Installation procedure

Caution ESD Use an ESD wrist strap whenever you open the equipment, particularly when you are handling modules as well as SFP and XFP transceivers. To work properly, the wrist strap must make good contact at both ends (that is, with your skin at one end and with the chassis at the other).

The following figure shows a BTI 7060 MSI module and its key features for this procedure.

Figure 7-4 BTI 7060 MSI module



Note The MSI module must be installed in its dedicated slot in a main shelf.

Note Install the MSI module before installing the System Control Processor module.

Step 1 Insert module

- a) Align the MSI to the guides of the slot in which the module is being inserted.
- b) Carefully push the module straight into the slot.

Step 2 Tighten faceplate screw

- a) Facing the front of the shelf, align the MSI with its mounting hole.
- b) Using a slot-head or Phillips screwdriver, carefully tighten the faceplate screw.

Caution Tighten to a torque that is no more than 4.7 in-lbs.

You have successfully completed this procedure.

7.1.4 Install the BTI 7060 Expansion Shelf Interface module

Use this procedure to install the BTI 7060 Expansion Shelf Interface (ESI) module.

What you need

- Slot-head or Phillips screwdriver
- Electrostatic discharge (ESD) wrist strap
- ESI module

Prerequisites

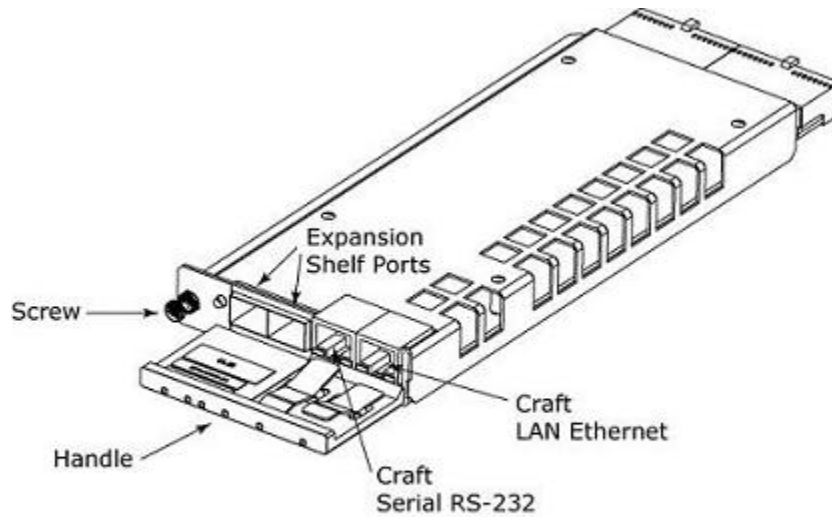
- None

Installation procedure**Caution**

Use an ESD wrist strap whenever you open the equipment, particularly when you are handling modules as well as SFP and XFP transceivers. To work properly, the wrist strap must make good contact at both ends (that is, with your skin at one end and with the chassis at the other).

The following figure shows a BTI 7060 ESI module and its key features for this procedure.

Figure 7-5 BTI 7060 ESI module



Note The ESI module must be installed in its dedicated slot in an expansion shelf.

Step 1 Insert module

- a) Align the ESI to the guides of the slot in which the module is being inserted.
- b) Carefully push the module straight into the slot.

Step 2 Tighten faceplate screw

- a) Facing the front of the shelf, align the ESI with its mounting hole.
- b) Using a slot-head or Phillips screwdriver, carefully tighten the faceplate screw.

Caution Tighten to a torque that is no more than 4.7 in-lbs

You have successfully completed this procedure.

7.1.5 Install the System Control Processor module in a BTI 7060

Use this procedure to install the BTI 7060 System Control Processor (SCP) module.

What you need

- Slot-head or Phillips screwdriver
- Electrostatic discharge (ESD) wrist strap
- BTI 7060 SCP module

Prerequisites

- The BTI 7060 MSI module and the BTI 7060 Cooling Unit module are already installed.

Installation procedure

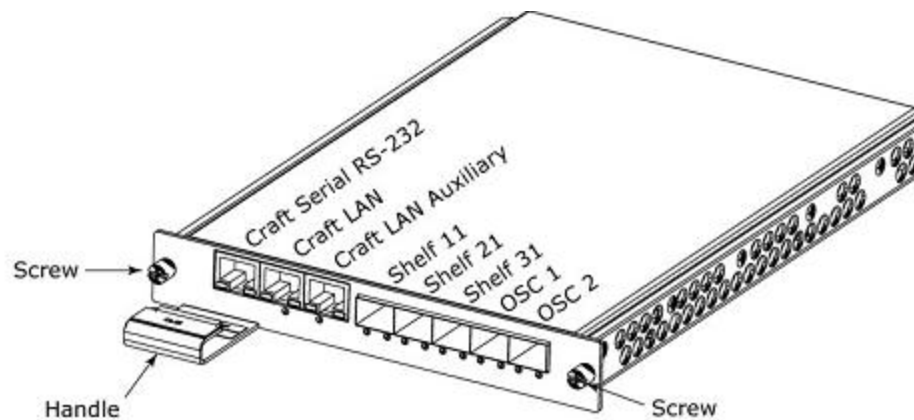


Caution

Use an ESD wrist strap whenever you open the equipment, particularly when you are handling modules as well as SFP and XFP transceivers. To work properly, the wrist strap must make good contact at both ends (that is, with your skin at one end and with the chassis at the other).

The following figure shows an SCP module and its key features for this procedure.

Figure 7-6 SCP module



Note The SCP module must be installed in slot five of the main shelf.

Follow these steps to install an SCP module:

Step 1 Insert module

- a) Align the SCP module with the guides in slot five.
- b) Slide the module straight into the slot.

Step 2 Tighten faceplate screws

- a) Facing the front of the shelf, align the module with its two mounting holes.
- b) Using a slot-head or Phillips screwdriver, carefully tighten the faceplate screws in sequence:
- c) Partially tighten one screw.
- d) Partially tighten the other screw.

- e) Fully tighten the first screw.
- f) Fully tighten the remaining screw.

Caution Tighten to a torque that is no more than 4.7 in-lbs.

You have successfully completed this procedure.

7.2 BTI 7030 common equipment modules

This section provides information and procedures for locating and installing common equipment modules for the BTI 7030.

7.2.1 BTI 7030 common equipment module locations

The following figure shows the location of the common equipment circuit packs for the BTI 7030.

The far left slot of the BTI 7030 shelf is provisioned to accept the cooling unit (CU) only.

The remaining slots, located to the right of the CU, accept modules. Two slots are provisioned to accept the BTI 7030 main shelf interface (MSI) module and the BTI 7030 system control processor (SCP) module. The two remaining slots can be provisioned to accept other modules.

BTI 7030 Shelf

BTI 7030 Shelf Common Equipment Module Locations



7.2.2 Install the BTI 7030 Cooling Unit module

Use this procedure to install the BTI 7030 Cooling Unit module.

What you need

- Slot-head or Phillips screwdriver
- Electrostatic discharge (ESD) wrist strap
- BTI 7030 Cooling Unit module (BT7A57BA)

Prerequisites

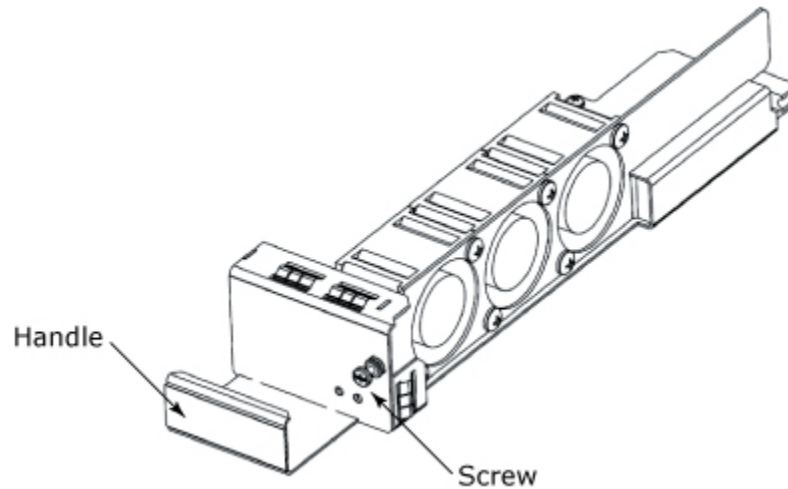
- None

Installation procedure

caution ESD Use an ESD wrist strap whenever you open the equipment, particularly when you are handling modules as well as SFP and XFP transceivers. To work properly, the wrist strap must make good contact at both ends (that is, with your skin at one end and with the chassis at the other).

The following figure shows a BTI 7030 Cooling Unit module and its key features for this procedure.

Figure 7-8 BTI 7030 Cooling Unit module



Note The BTI 7030 Cooling Unit module must be installed in its dedicated slot in a BTI 7030 shelf.

Note Install the BTI 7030 Cooling Unit module before installing the BTI 7030 System Control Processor module.

To install a BTI 7030 Cooling Unit module, use the following procedure.

Step 1 Insert module

- a) Align the cooling unit to the guides of the slot in which the module is being inserted.
- b) Carefully push the module straight into the slot.

Step 2 Tighten faceplate screw

- a) Facing the front of the shelf, align the cooling unit with its mounting hole.
- b) Using a slot-head or Phillips screwdriver, carefully tighten the faceplate screw.

You have successfully completed this procedure.

7.2.3 Install the BTI 7030 Main Shelf Interface module

Use this procedure to install the BTI 7030 Main Shelf Interface (MSI) module (BT7A53CA) (BT7A53CB).

What you need

- Slot-head or Phillips screwdriver
- Electrostatic discharge (ESD) wrist strap
- BTI 7030 MSI module (BT7A53CA)(BT7A53CB)

Prerequisites

- None

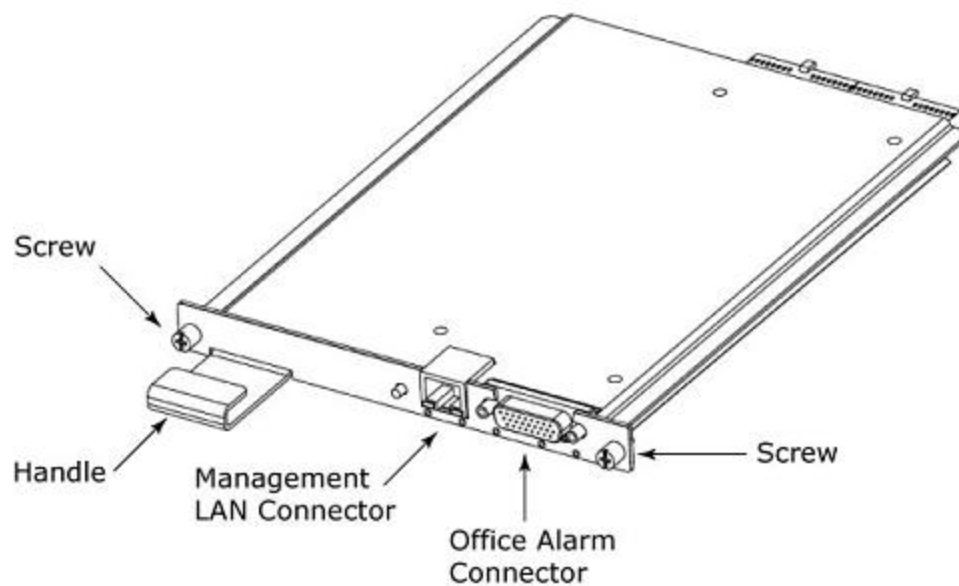
Installation procedure



Use an ESD wrist strap whenever you open the equipment, particularly when you are handling modules as well as SFP and XFP transceivers. To work properly, the wrist strap must make good contact at both ends (that is, with your skin at one end and with the chassis at the other).

The following figure shows a BTI 7030 MSI module and its key features for this procedure.

Figure 7-9 BTI 7030 MSI module



Note The BTI 7030 MSI module must be installed in its dedicated slot in a BTI 7030 shelf.

Note Install the BTI 7030 MSI module before installing the BTI 7030 System Control Processor module.

To install a BTI 7030 MSI module, use the following procedure.

Step 1 Insert module

- a) Align the BTI 7030 MSI to the guides of the slot in which the module is being inserted.
- b) Carefully push the module straight into the slot.

Step 2 Tighten faceplate screw

- a) Facing the front of the shelf, align the MSI with its mounting hole.
- b) Using a slot-head or Phillips screwdriver, carefully tighten the faceplate screw.

You have successfully completed this procedure.

7.2.4 Install the BTI 7030 System Control Processor module

Use this procedure to install the BTI 7030 System Control Processor (SCP) module.

What you need

- Slot-head or Phillips screwdriver
- Electrostatic discharge (ESD) wrist strap
- BTI 7030 SCP module (BT7A21BA)

Prerequisites

- The BTI 7030 MSI module and the BTI 7030 Cooling Unit module are installed.

Installation procedure

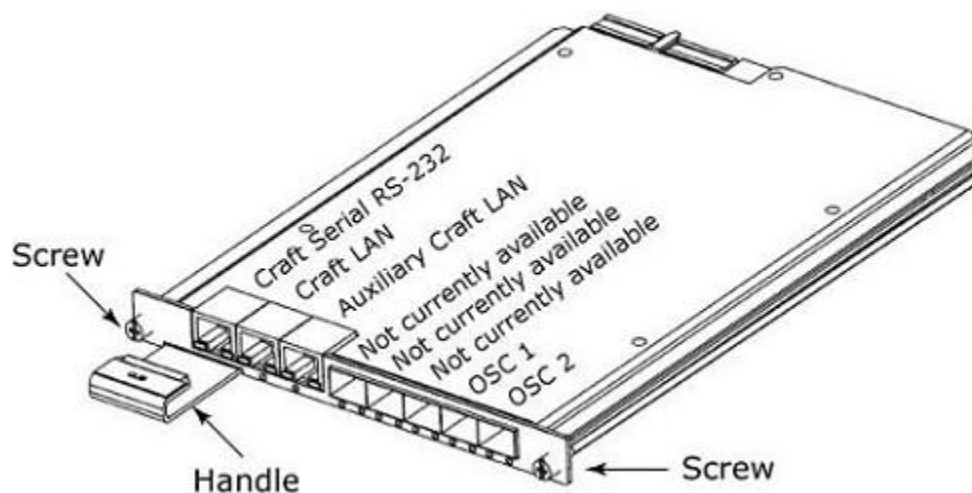


Caution

Use an ESD wrist strap whenever you open the equipment, particularly when you are handling modules as well as SFP and XFP transceivers. To work properly, the wrist strap must make good contact at both ends (that is, with your skin at one end and with the chassis at the other).

The following figure shows a BTI 7030 SCP module and its key features for this procedure.

Figure 7-10 BTI 7030 SCP module key features



Note

The BTI 7030 SCP module must be installed in its dedicated slot in a BTI 7030 shelf.

To install a BTI 7030 SCP module, use the following procedure.

Step 1 Insert module

- a)** Align the SCP module with the guides in the slot.
- b)** Slide the module straight into the slot.

Step 2 Tighten faceplate screws

- a)** Facing the front of the shelf, align the module with the two mounting holes.
- b)** Using a slot-head or Phillips screwdriver, carefully tighten the faceplate screws in sequence:
 - c)** Partially tighten one screw.
 - d)** Partially tighten the other screw.
 - e)** Fully tighten the first screw.
 - f)** Fully tighten the remaining screw to a torque that is no more than 4.7 in-lbs.

You have successfully completed this procedure.

7.3 BTI 7200 common equipment modules

This section provides information and procedures for locating and installing common equipment modules for the BTI 7200.

7.3.1 BTI 7200 common equipment module locations

The following figures show the location of each common equipment module for the main shelf and the expansion shelf.

The BTI 7200 accepts the Main Shelf Interface (MSI), the Common Communications Module (CCM) and the Cooling Unit (CU) modules. All of these modules have dedicated slots that are configured for them.

- Where a BTI 7200 is used as a main shelf in a two-shelf configuration, slot 1 is dedicated for the system control processor (SCP) module. All of the remaining slots can be provisioned with any provisionable module.
- Where a BTI 7200 is used as an expansion shelf in a two-shelf configuration, all of the slots can be provisioned with any provisionable module.
- Where a BTI 7200 is used in a restricted three-shelf configuration, main shelf slot 1 is dedicated for the system control processor (SCP) module. All of the remaining slots can be provisioned with up to 40 10G Transponders, up to nine 10G Muxponders, up to nine packetVX, and up to nine ROADMs-on-a-blade modules. Muxponders can be substituted with amplifiers, and passive modules.

Main Shelf Common Equipment Module Locations

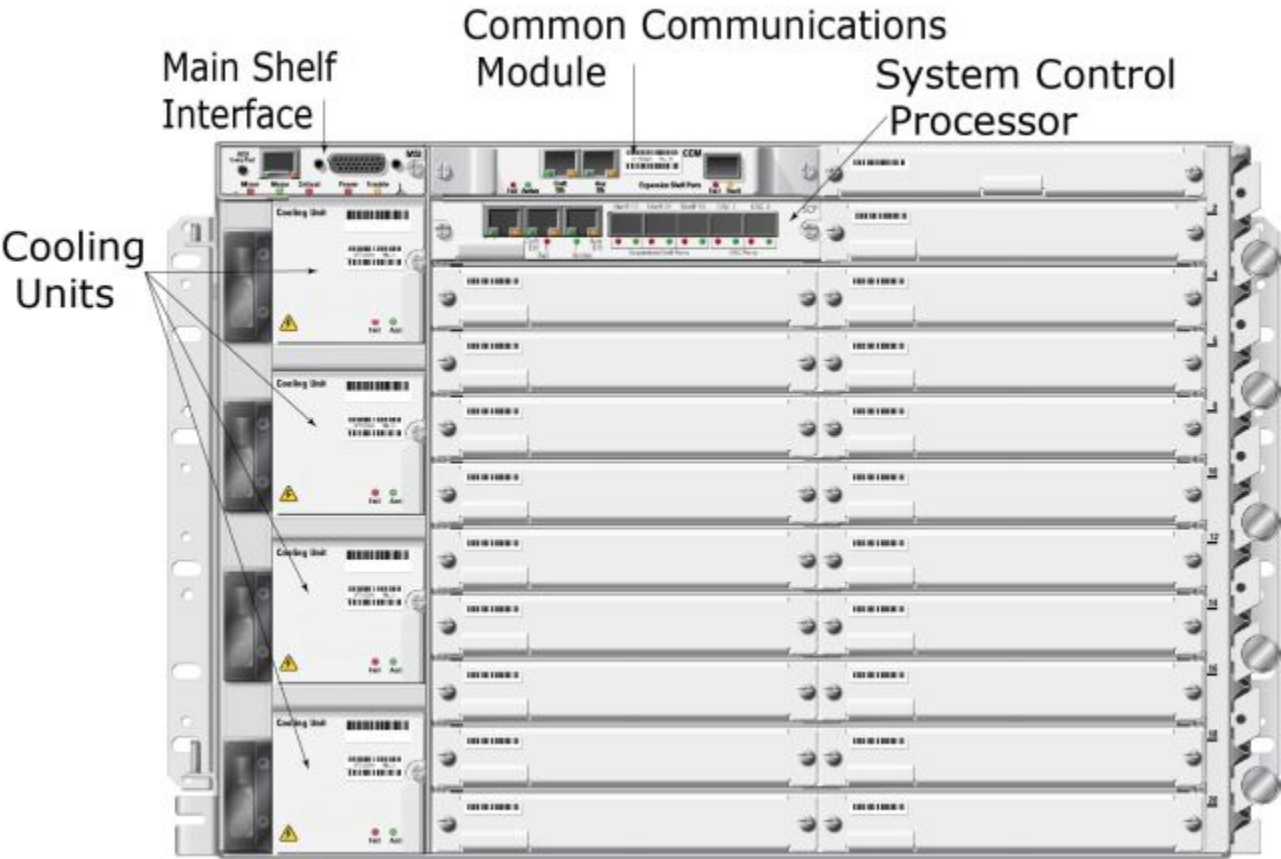
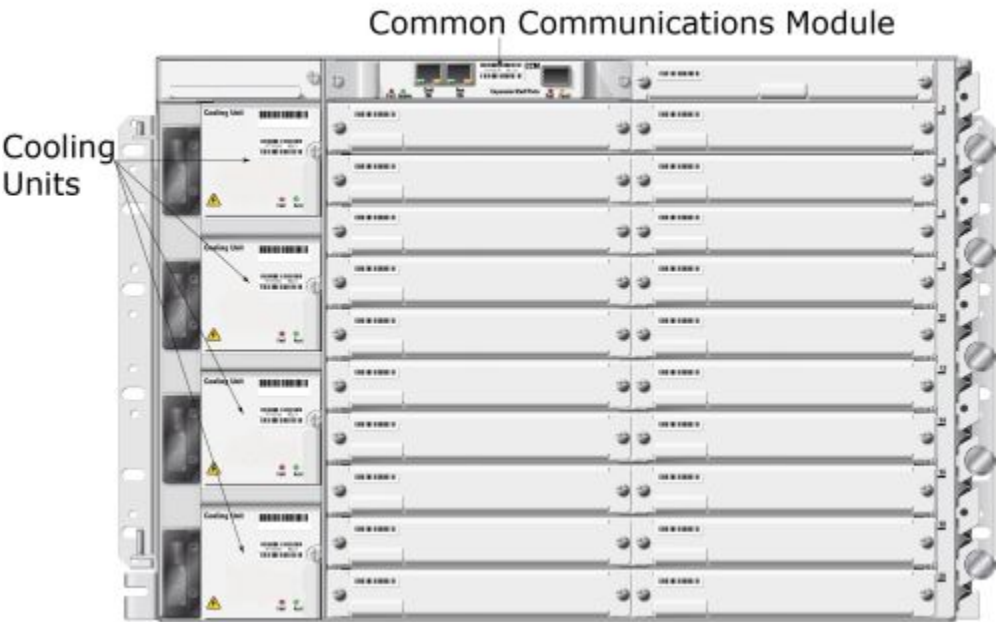


Figure 7-12 Expansion Shelf Common Equipment Module Locations



7.3.2 Install the Cooling Unit module in the BTI 7200

Use this procedure to install a Cooling Unit module in a BTI 7200 .The BTI 7200 requires up to four cooling unit modules depending on how many slots are equipped with service modules.

What you need

- Slot-head or Phillips screwdriver
- Electrostatic discharge (ESD) wrist strap with banana plug jack
- Cooling Unit module(s)

Prerequisites

- None

Installation procedure

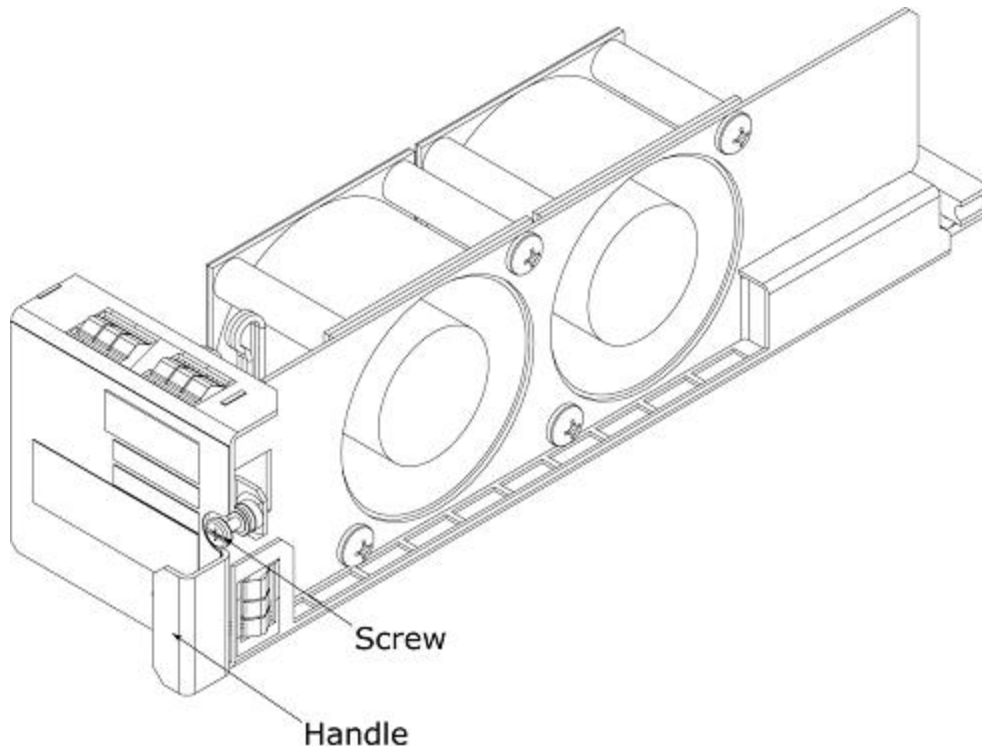


Caution

Use an ESD wrist strap whenever you open the equipment, particularly when you are handling modules as well as SFP and XFP transceivers. To work properly, the wrist strap must make good contact at both ends (that is, with your skin at one end and with the chassis at the other).

The following figure shows a BTI 7060/BTI 7200 Cooling Unit module and its key features for this procedure.

Figure 7-13 BTI 7060/BTI 7200 Cooling Unit module



Note The Cooling Unit must be installed in its dedicated slot in the shelf.

Note Install the Cooling Unit module before installing the System Control Processor module.

To install a Cooling Unit module, use the following procedure.

Step 1 Insert module

- a) Align the cooling unit to the guides of the slot in which the module is being inserted.
- b) Carefully push the module straight into the slot.

Step 2 Tighten faceplate screw

- a) Facing the front of the shelf, align the cooling unit with its mounting hole.
- b) Using a slot-head or Phillips screwdriver, carefully tighten the faceplate screw.

Caution Tighten to a torque that is no more than 4.7 in-lbs.

You have successfully completed this procedure.

7.3.3 Install the BTI 7200 Main Shelf Interface module

Use this procedure to install the BTI 7200 Main Shelf Interface (MSI) module (BT7A53EA).

What you need

- Slot-head or Phillips screwdriver
- Electrostatic discharge (ESD) wrist strap
- MSI module (BT7A53EA)

Prerequisites

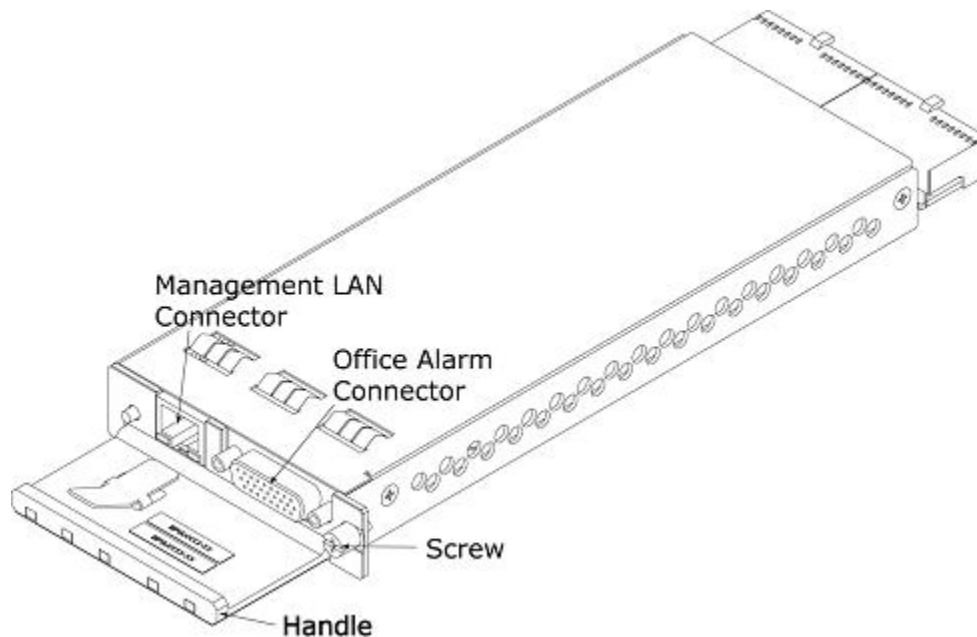
- None

Installation procedure

CautionESD Use an ESD wrist strap whenever you open the equipment, particularly when you are handling modules as well as SFP and XFP transceivers. To work properly, the wrist strap must make good contact at both ends (that is, with your skin at one end and with the chassis at the other).

The following figure shows a BTI 7200 MSI module and its key features for this procedure.

Figure 7-14 BTI 7200 MSI module



Note The MSI module must be installed in its dedicated slot in a main shelf.

Note Install the MSI module before installing the System Control Processor module.

Step 1 Insert module

- a) Align the MSI to the guides of the slot in which the module is being inserted.
- b) Carefully push the module straight into the slot.

Step 2 Tighten faceplate screw

- a) Facing the front of the shelf, align the MSI with its mounting hole.
- b) Using a slot-head or Phillips screwdriver, carefully tighten the faceplate screw.

Caution Tighten to a torque that is no more than 4.7 in-lbs.

You have successfully completed this procedure.

7.3.4 Install the BTI 7200 Common Communications Module

Use this procedure to install the BTI 7200 Common Communications Module (CCM) (BT7A54EA).

What you need

- Slot-head or Phillips screwdriver
- Electrostatic discharge (ESD) wrist strap
- CCM (BT7A54EA)

Prerequisites

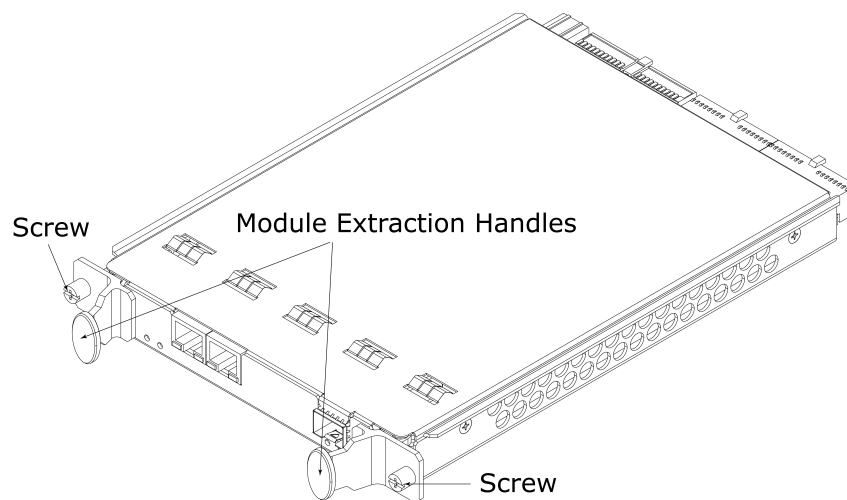
- None

Installation procedure

CautionESD Use an ESD wrist strap whenever you open the equipment, particularly when you are handling modules as well as SFP and XFP transceivers. To work properly, the wrist strap must make good contact at both ends (that is, with your skin at one end and with the chassis at the other).

The following figure shows a BTI 7200 CCM.

Figure 7-15 BTI 7200 CCM



Note The CCM must be installed in its dedicated slot in a main shelf or an expansion shelf.

Note Install the CCM before installing the System Control Processor module.

Step 1 Insert module

- Align the CCM to the guides of the slot in which the module is being inserted.
- Carefully push the module straight into the slot, and seat it firmly and fully. Push on the latches on the CCM with your thumbs to seat the module. Ensure that the module is firmly seated in the slot before attempting to tighten the faceplate screws.

Step 2 Tighten the faceplate screws which are located on the module extraction handles. When the screws are fully tightened, the extraction handles have no play, and the module cannot be accidentally extracted.

- Facing the front of the shelf, align the CCM with its mounting hole.
- Using a slot-head or Phillips screwdriver, carefully tighten the faceplate screw.

Caution Tighten to a torque that is no more than 4.7 in-lbs.

You have successfully completed this procedure.

7.3.5 Install the System Control Processor module in a BTI 7200

Use this procedure to install the System Control Processor (SCP) module in a BTI 7200 shelf.

What you need

- Slot-head or Phillips screwdriver
- Electrostatic discharge (ESD) wrist strap
- SCP module

Prerequisites

- The Cooling Unit, MSI, and CCM modules are already installed.

Installation procedure

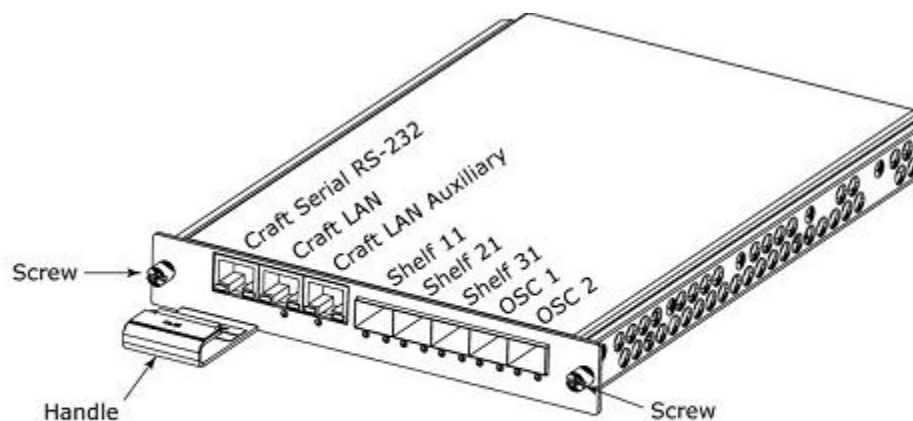


Caution

Use an ESD wrist strap whenever you open the equipment, particularly when you are handling modules as well as SFP and XFP transceivers. To work properly, the wrist strap must make good contact at both ends (that is, with your skin at one end and with the chassis at the other).

The following figure shows an SCP module and its key features for this procedure.

Figure 7-16 SCP module



Note The SCP module must be installed in slot one of the main shelf.

Follow these steps to install an SCP module:

Step 1 Insert module

- a) Align the SCP module with the guides in slot one.
- b) Slide the module straight into the slot.

Step 2 Tighten faceplate screws

- a) Facing the front of the shelf, align the module with its two mounting holes.
- b) Using a slot-head or Phillips screwdriver, carefully tighten the faceplate screws in sequence:
 - c) Partially tighten one screw.
 - d) Partially tighten the other screw.
 - e) Fully tighten the first screw.
 - f) Fully tighten the remaining screw.

Caution Tighten to a torque that is no more than 4.7 in-lbs.

You have successfully completed this procedure. It may take several minutes for the SCP to come fully into service, indicated by a green "Active" LED, and an unlit "Fail" LED.

7.4 Filler modules and panels

Use this procedure to replace a filler module (for the BTI 7060 and BTI 7030) or filler panel (for the BTI 7200).

Note A filler module for the BTI 7060 and BTI 7030 or filler panel (for the BTI 7200) must be inserted in empty module slots to ensure proper cooling of the shelf. The filler is required to ensure adequate airflow to cool the system. Unfilled slots may cause overheating of the system.

Important By default, an alarm is not generated if a slot remains empty (that is, no module or filler is plugged in and seated), so the presence of fillers must be verified visually. An alarm to detect the presence of filler modules for the BTI 7060 and BTI 7030 (but not for the BTI 7200) can be enabled. See the *Operations Solutions Guide* for details.

Note Fillers are not required in empty module slots of the BTI 7020.

What you need

- Slot-head or Phillips screwdriver
- Electrostatic discharge (ESD) wrist strap
- Replacement filler module

Prerequisites

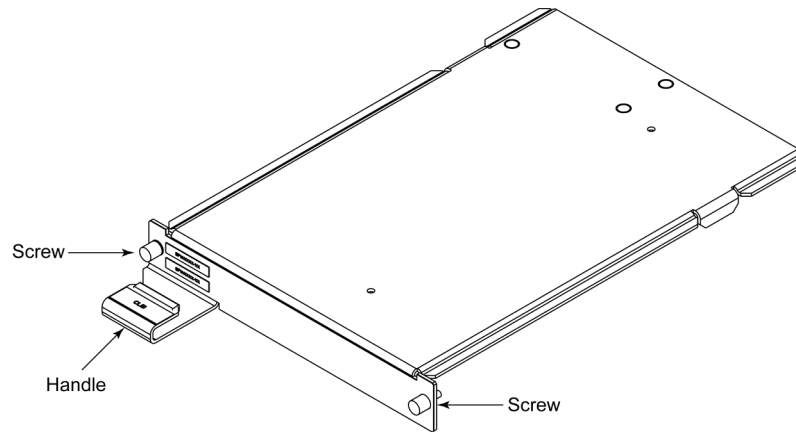
- None



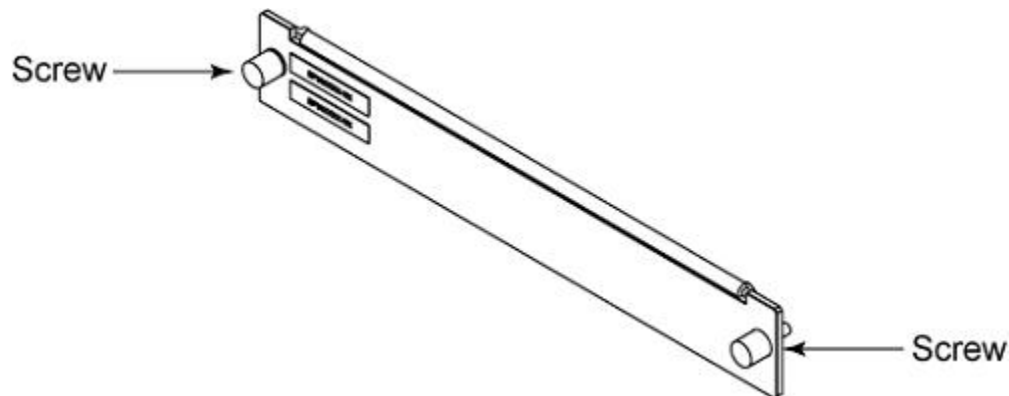
Caution

Use an ESD wrist strap whenever you open the equipment, particularly when you are handling modules as well as SFP and XFP transceivers. To work properly, the wrist strap must make good contact at both ends (that is, with your skin at one end and with the chassis at the other).

A single-width filler module and its key features for this procedure is shown in the following illustration.

Figure 7-17 Single-Width Filler module key features

A single-width filler panel and its key features for this procedure is shown in the following illustration.

Figure 7-18 Single-Width Filler panel key features**Step 1** Move Optical Cables

Depending on the slot in which the filler is located, optical cables may need to be moved aside to get access to the panel. The cables rest on the handles that are at the front of the filler.

Step 2 Remove Screws

- a) Facing the front of the BTI 7000 Series, locate the screws.
- b) Using a slot-head or Phillips screwdriver, loosen the two screws.

Step 3 Remove module

Grasp the handles on the front of the module and firmly pull the module straight out.

Step 4 Replace filler

- a) Align the replacement filler to the guides of the single- or double-width slot.
- b) Carefully push the filler straight into the slot(s).

Step 5 Replace Screws

- a) Facing the front of the BTI 7000 Series, align the filler with its mounting holes.
- b) Using a slot-head or Phillips screwdriver, carefully tighten the two screws:
 - Partially tighten the center support screw.
 - Partially tighten the other screw.
 - Fully tighten the center support screw.
 - Fully tighten the other screw.

Caution Tighten to a torque that is no more than 4.7 in-lbs.

Step 6 Replace Optical Cables

If any optical cables were moved to access the panel, replace the optical cables to their original locations.

8.0 Attach fibers, cables and test LEDs

This chapter describes the installation procedures for the BTI 7060 main shelf.

The chapter topics include the following:

- 8.1, “Connector types and accessories”
- 8.2, “Connecting expansion shelves”
- 8.3, “LC-SC DCM patch cord kit”
- 8.4, “Y-cable for client protection”
- 8.5, “Maintaining Fiber Optic Connectors”
- 8.6, “Managing optical fibers”
- 8.7, “Testing the LEDs”

8.1 Connector types and accessories

Listed below are the various connector types that can be ordered with BTI 7000 Series optical devices. In addition, compatible accessories are also listed.

ST (Straight-tip) connector

The ST connector is a fiber optic bayonet connector that uses a radial track for locking purposes.

FC (Fixed connection) connector

The FC connector has a key-aligned notch that is tightened by a thread locking coupling nut.

SC (Subscriber) connector

The SC connector uses a push to engage, and a pull to disengage technology. The connector was designed to increase the density of connectors on a patch panel.

LC (Lucent) connector

The LC connector is a smaller version of the SC connector.

UC (Universal) connector

The universal connector consists of two distinct parts: a “connector base” that is permanently mounted into the faceplate of a module, and a “connector cap” that serves as the external connector port. Each UC kit contains an FC, ST, and SC cap.

The principal advantage is that the universal connector parts can be easily accessed for cleaning of the optical elements.

In addition, a variety of connector caps are available that permit the use of FC, SC and ST patch cord connectors. All connector caps can be removed and replaced without special tools.

UPC (Ultra Physical Contact) connector

The UPC is a fiber optic connector with a polish style of a ceramic fiber optic ferrule that is used for connection. The ferrule is inside the connector, and the fiber glass from the fiber optic cable plugs into the ferrule for connection. The different polish of the connector ferrule determines the performance on the back reflection. The UPC has at least 50dB of back reflection.

8.1.1 Connectors available on modules

Table 8-1 Modules with Various Connectors

Module	Connector Type
Packet Services	
packetVX 12/2 (2 XFP ports)	LC
packetVX 24/2 (2 XFP ports)	LC
packetVX 24/4 (4 XFP ports)	LC

Table 8-1 Modules with Various Connectors (Continued)

Module	Connector Type
packetVX 80 (8 XFP ports)	LC
packetVX 12/2 (2 XFP ports)-Extended Temperature	LC
packetVX 24/2 (2 XFP ports)-Extended Temperature	LC
packetVX 24/4 (4 XFP ports)-Extended Temperature	LC
Muxponder	
2-Port GbE Muxponder	LC
8-Port Multiprotocol Muxponder	LC
10-port Multiprotocol Muxponder	LC
Transponders	
Dual 2.5G Multiprotocol Transponder	LC
Dual 4G Multiprotocol Transponder	LC
Dual 10G Multiprotocol Transponder	LC
Dual 10G Multiprotocol Transponder Lite	LC
10G Multiprotocol Transponder	LC
Optical Multiplexing modules	
1-Channel CWDM OADM	LC
Double 1-Channel CWDM OADM	LC
2-Channel CWDM OADM	LC
4-Channel CWDM Mux/Demux	LC
32-Channel DWDM Mux/Demux	LC
32-Channel Bidirectional DWDM Mux/Demux - Modules 24, 42, 12, and 21	LC
1-Channel DWDM OADM	LC
2-Channel DWDM OADM	LC
4-Channel DWDM OADM	LC
CWDM and DWDM Splitter/Combiner	LC
1310nm and C-Band Coupler / Splitter	LC
Double Bidirectional Coupler/Splitter	LC
CWDM and DWDM Splitter/Combiner	LC
40-Channel DWDM Mux/Demux	LC
96-Channel DWDM Mux/Demux	LC/UPC
Amplifiers	
DWDM C-Band Booster Amplifier	UC (FC, SC, ST)
DWDM C-Band Pre-Amplifier	UC (FC, SC, ST)
Optical Line Amplifier	SC
Optical Line Amplifier with 0-15 dB Mid-stage Access	SC
Single Channel and Sub-Band Booster Amplifier	UC (FC, SC, ST)
Single Channel and Sub-Band Pre-Amplifier	UC (FC, SC, ST)

Table 8-1 Modules with Various Connectors (Continued)

Module	Connector Type
Dispersion Compensation	
SMF Dispersion Compensation Module 20 km	SC
SMF Dispersion Compensation Module 40 km	SC
SMF Dispersion Compensation Module 60 km	SC
SMF Dispersion Compensation Module 80 km	SC
SMF C-Band DCM 40 km	UC (FC, SC, ST)
SMF C-Band DCM 60 km	UC (FC, SC, ST)
SMF C-Band DCM 80 km	UC (FC, SC, ST)
DOL Modules	
Dispersion Compensation Modules (Expandable)	
Dispersion Compensation Module - SMF 5 km	LC
Dispersion Compensation Module - SMF 10 km	LC
Dispersion Compensation Module - SMF 15 km	LC
Dispersion Compensation Module - SMF 20 km	LC
Dispersion Compensation Module - SMF 30 km	LC
Dispersion Compensation Module - SMF 40 km	LC
Dispersion Compensation Module - SMF 50 km	LC
Dispersion Compensation Module - SMF 60 km	LC
Dispersion Compensation Module - SMF 70 km	LC
Dispersion Compensation Module - SMF 80 km	LC
Dispersion Compensation Module - SMF 90 km	LC
Dispersion Compensation Module - SMF 100 km	LC
DWDM Line Amplifier	
DLA2 (line/pre+booster)	LC
DWDM - ROADM-on-a-blade	
2D ROADM-on-a-blade	LC
4D ROADM-on-a-blade	LC

8.2 Connecting expansion shelves

Expansion shelves can be deployed either locally using electrical cables, or remotely using optical cables, to the main shelf as seen in the following figures. Connecting expansion shelves does not affect service.

Figure 8-1 BTI 7060 main shelf with expansion shelves

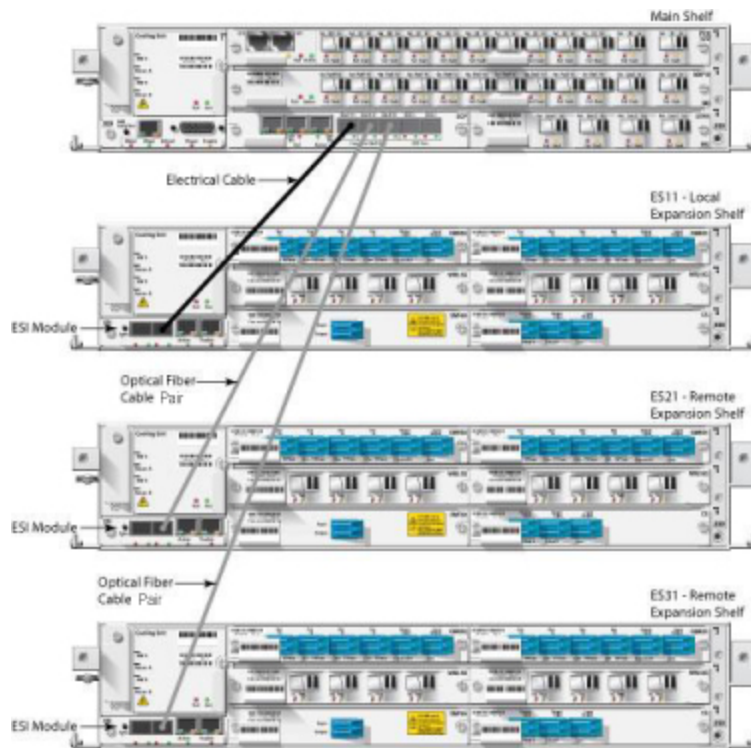


Figure 8-2 BTI 7200 main shelf with expansion shelves

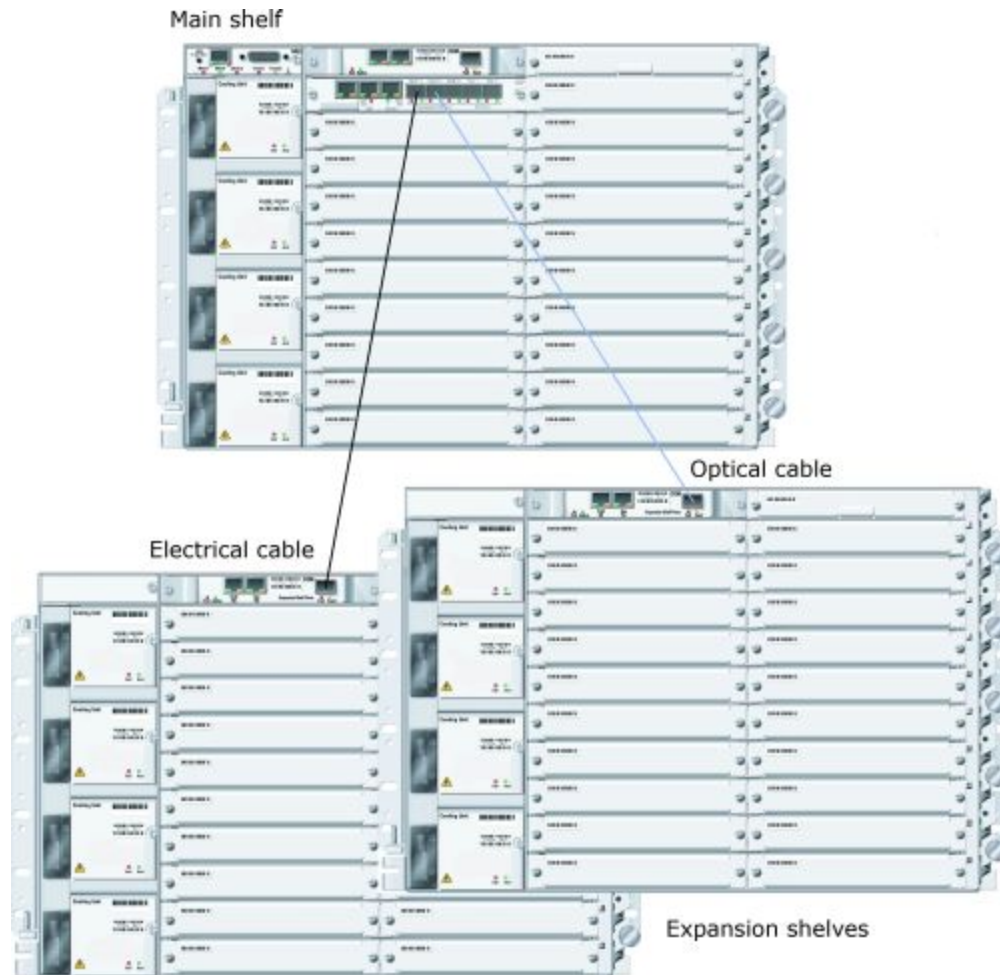
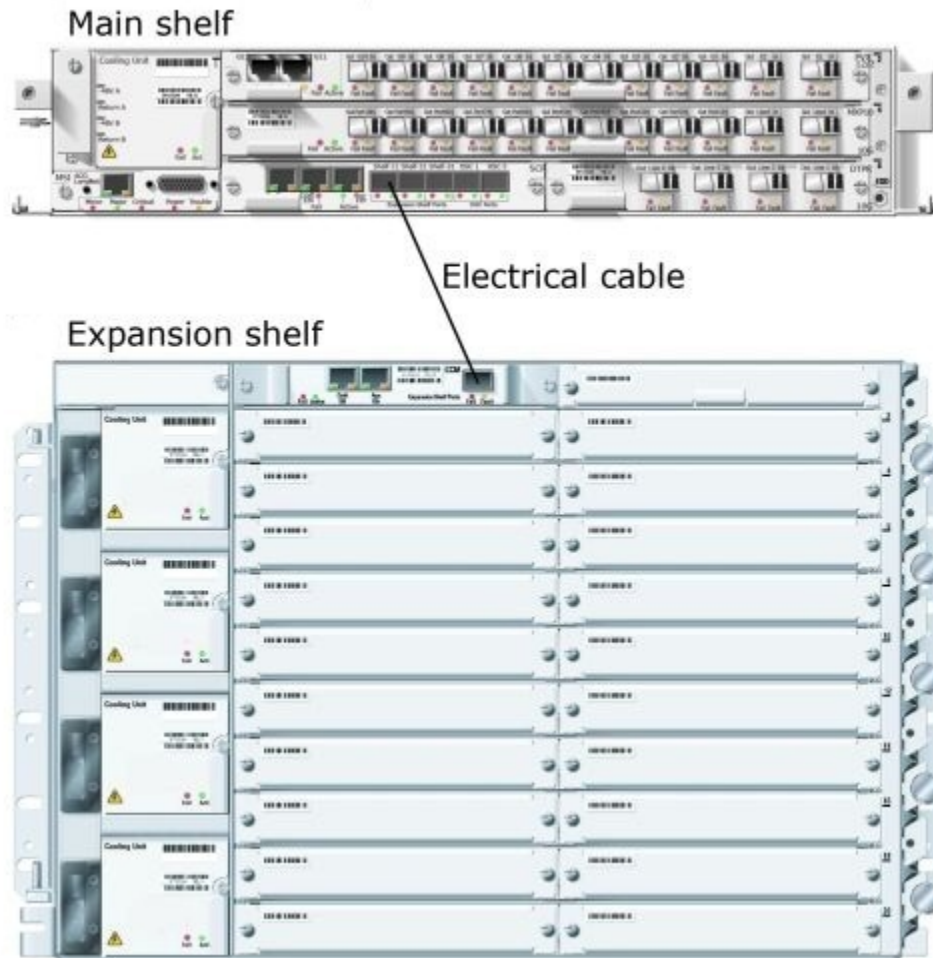


Figure 8-3 BTI 7060 main shelf with a BTI 7200 expansion shelf

The main shelf can be connected to local expansion shelves through an SFP plug style electrical cable that is up to 3 m (10 ft.) in length. For remotely located expansion shelves, they are connected to the main shelf using the 100FX (fast Ethernet) protocol over multimode optical fiber cable.

8.2.1 Connecting BTI 7060 local expansion shelves

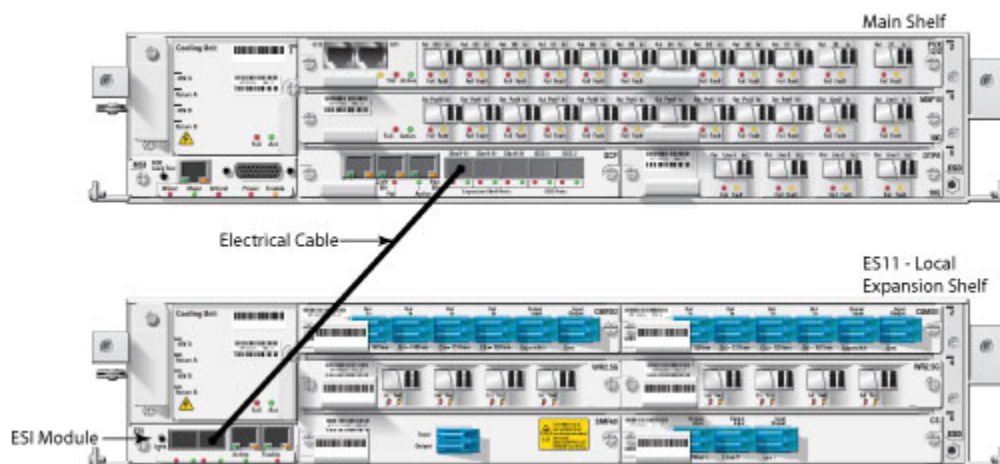
Prerequisites

- The expansion shelf should be put out of service and the entire shelf should be powered down.
- Ensure that there is a system control processor (SCP) module plugged in to the main shelf. The SCP must be product equipment code BT7A20CA.
- Ensure that there is an expansion shelf interface (ESI) module plugged in to the expansion shelf as shown above. The ESI must be product equipment code BT7A54BA.

Local expansion shelves are collocated with the main shelf. This usually means mounting the main shelf with the expansion shelf in close proximity to each other (that is, within 10 m, or 32.8 ft., of each other).

As a result, it is possible to connect the two shelves through an SFP plug style electrical interface cable as shown in the following figure.

Figure 8-4 Connecting a local expansion shelf to the main shelf



Note If you have a requirement to meet FCC Class B emission requirements, contact BTI.

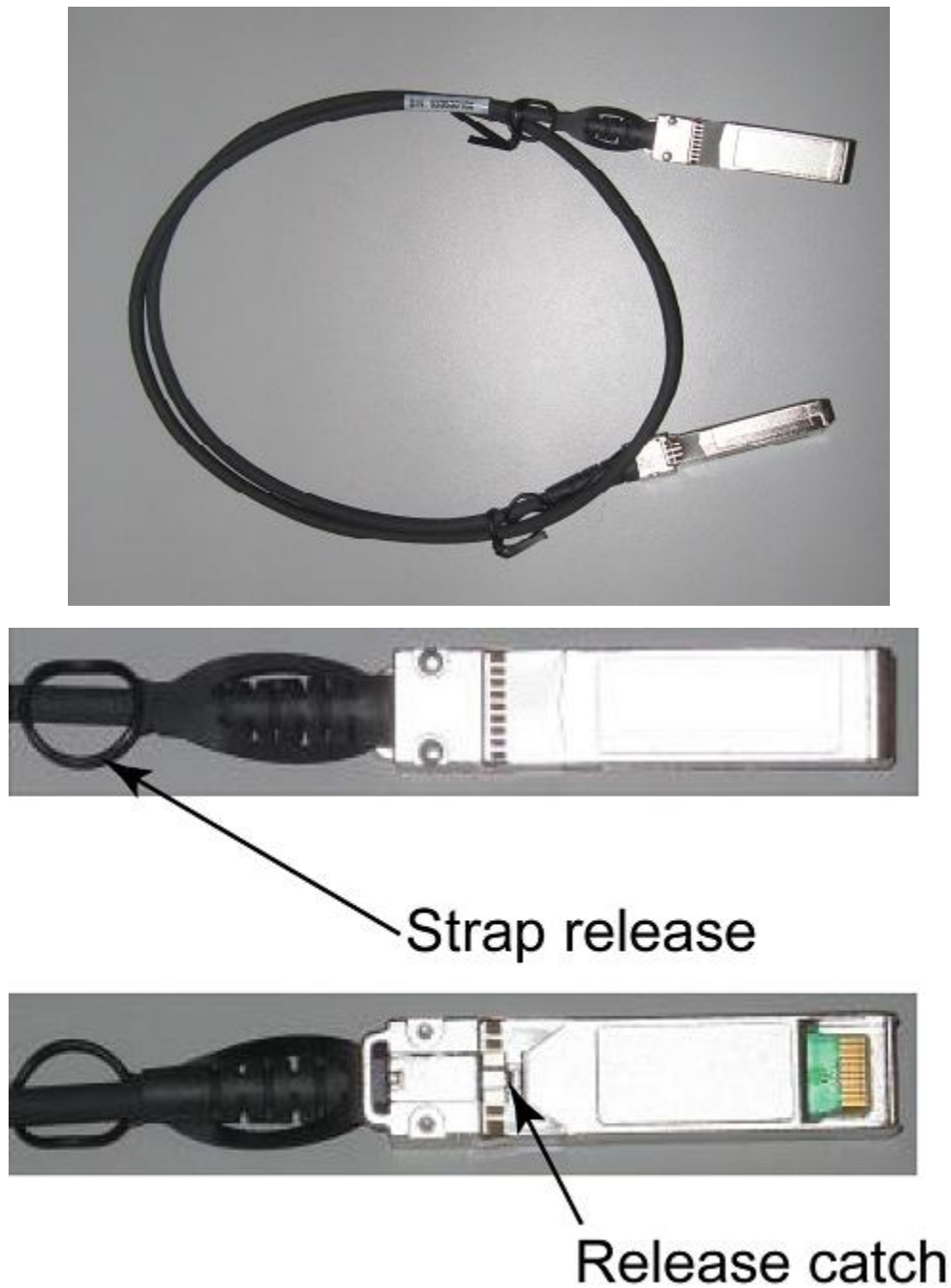
SFP plug style electrical interface cables

The following table lists the SFP plug style electrical interface cables that are available from BTI.

Table 8-2 SFP Electrical Interface Cables

Order Code	Item
BP1A58DD-01	Single Expansion Shelf Cable SFP-SFP, shielded copper - 1 m
BP1A58DD-03	Single Expansion Shelf Cable SFP-SFP, shielded copper - 3 m

The following images are photographs of the 3m version of the single expansion shelf cable.



Step 1 Insert one end of the electrical interface cable into the expansion shelf port that is labeled “To Main” on the ESI module.

- Note** The connector latch must be positioned on the top of the connector. When removing a connector, gently press the latch down and remove the connector. Follow the cabling rules below:
- Route the electrical interface cable to the left side of the shelf.
 - Ensure sufficient slack is left so that there is no strain on the cable.
 - Allow a minimum bending radius for the cable that is no less than three times the diameter of the cable.

Step 2 Insert the other end of the electrical interface cable into one of the three expansion shelf ports on the SCP module in the main shelf.

- Note** The connector latch must be positioned on the bottom of the connector. When removing a connector, gently press the latch up and remove the connector. Follow the cabling rules below:
- Route the electrical interface cable to the left side of the shelf.
 - Ensure sufficient slack is left so that there is no strain on the cable and the cooling unit can be easily removed, if necessary.
 - Allow a minimum bending radius for the cable that is no less than three times the diameter of the cable.

- Note** The expansion shelf ports on the SCP module must be used in numerical sequence. For example, the first expansion shelf is connected to the Shelf 11 port and subsequent expansion shelves are connected to the Shelf 21 and Shelf 31 ports in sequence.

Step 3 Secure any excess electrical cable to either the rack frame, cabling troughs, or fiber management trays, if available.

If long lengths of excessive cable exist, carefully loop the cable back upon itself and secure appropriately.

You have successfully completed this procedure.

8.2.2 Connecting BTI 7200 local expansion shelves

Prerequisites

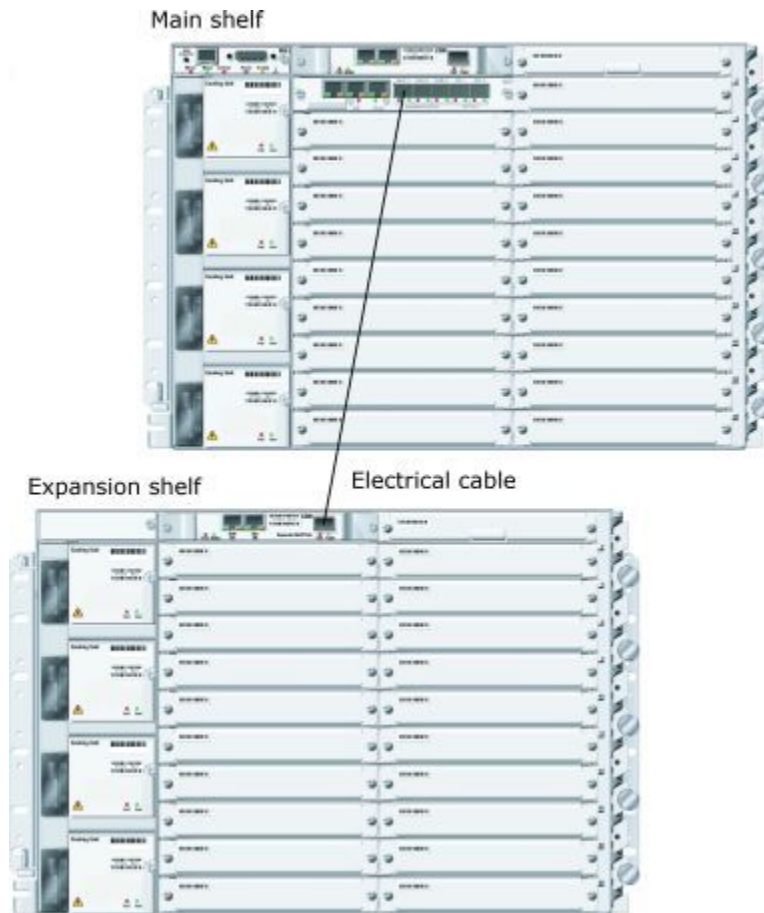
- The expansion shelf should be put out of service and the entire shelf should be powered down.
- Ensure that there is a system control processor (SCP) module plugged in to the main shelf. The SCP must be product equipment code BT7A20CA.
- Ensure that there is a common communications module (CCM) plugged in to the expansion shelf as shown below.

Local expansion shelves are co-located with the main shelf. This usually means mounting the main shelf with the expansion shelf in close proximity to each other (that is, within 3 m, or 10 ft., of each other).

As a result, it is possible to connect the two shelves through an SFP plug style electrical interface cable as shown in the following figure.

Note The expansion shelf ports on the SCP module must be used in numerical sequence. For example, the first expansion shelf is connected to the Shelf 11 port and subsequent expansion shelves are connected to the Shelf 21 and Shelf 31 ports in sequence.

Figure 8-5 Connecting a local BTI 7200 expansion shelf to the main shelf



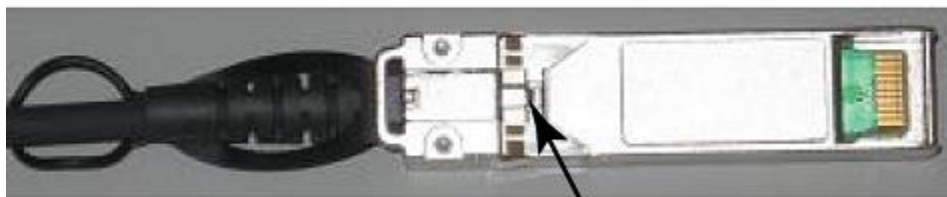
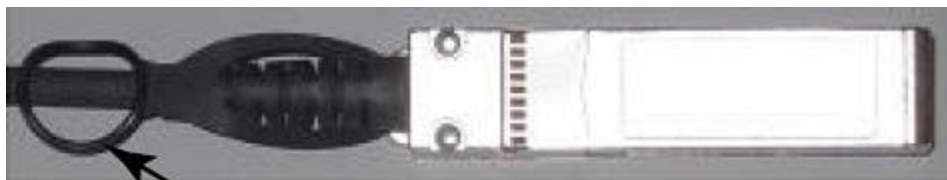
SFP plug style electrical interface cables

The following table lists the SFP plug style electrical interface cables that are available from BTI.

Table 8-3 SFP Electrical Interface Cables

Order Code	Item
BP1A58DD-01	Single Expansion Shelf Cable SFP-SFP, shielded copper - 1 m (This cable is long enough to connect an expansion shelf that is directly above or below the main shelf.)
BP1A58DD-03	Single Expansion Shelf Cable SFP-SFP, shielded copper - 3 m

The following images are photographs of the 3m version of the single expansion shelf cable.



Step 1 Insert one end of the electrical interface cable into the SFP port on the CCM on the expansion shelf.

- Note** The connector latch must be positioned on the top of the connector. When removing a connector, gently press the latch down and remove the connector. Follow the cabling rules below:
- Route the electrical interface cable to the left side of the shelf.
 - Ensure sufficient slack is left so that there is no strain on the cable.
 - Allow a minimum bending radius for the cable that is no less than three times the diameter of the cable.

Step 2 Insert the other end of the electrical interface cable into one of the three expansion shelf ports on the SCP module in the main shelf.

- Note** The connector latch must be positioned on the bottom of the connector. When removing a connector, gently press the latch up and remove the connector. Follow the cabling rules below:
- Route the electrical interface cable to the left side of the shelf.
 - Ensure sufficient slack is left so that there is no strain on the cable and the cooling unit can be easily removed, if necessary.
 - Allow a minimum bending radius for the cable that is no less than three times the diameter of the cable.

Step 3 Secure any excess electrical cable to either the rack frame, cabling troughs, or fiber management trays, if available.

If long lengths of excessive cable exist, carefully loop the cable back upon itself and secure appropriately.

You have successfully completed this procedure.

8.2.2.1 Removing the electrical expansion shelf cable from a CCM module

Use this procedure to remove an electrical expansion shelf cable from a CCM module.

On the CCM module, the springs at the back of the SFP cage may apply pressure on the cable connector release mechanism and as a result, push it against the cage edge at the front. When you pull on the cable connector strap release, it applies more force to the cable connector release mechanism such that the tab cannot overcome the friction and so cannot release.

This procedure describes the technique needed to remove the cable. Refer to the following illustration for suggest hand/finger positioning.



- Step 1** With one hand, push the cable connector firmly into the SFP cage and hold it there. This relieves some of the force on the cable connector release mechanism.
- Step 2** With the other hand, and while still pushing the cable connector into the SFP cage, pull firmly on the cable connector strap release.
- Step 3** While pulling firmly on the strap release, gently stop pushing on the cable connector and remove the cable connector from the SFP cage.

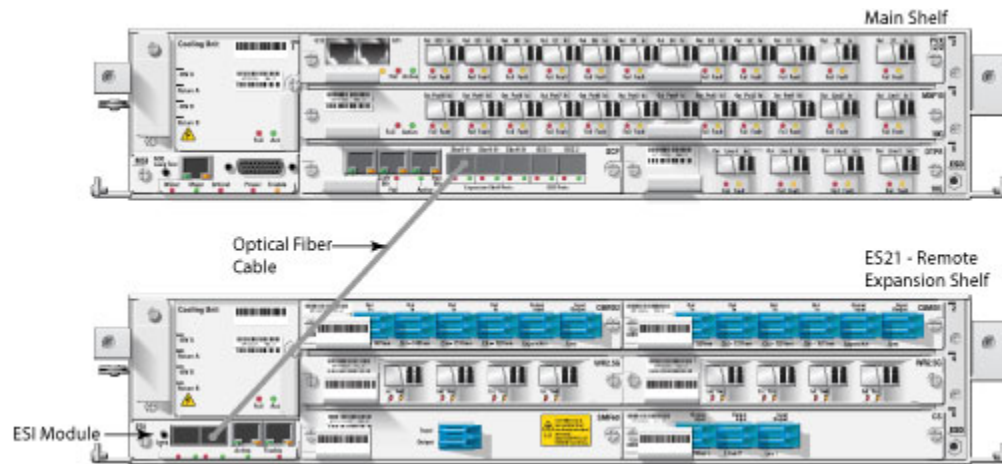
8.2.3 Connecting BTI 7060 remote expansion shelves

The expansion shelf should be put out of service and the entire shelf should be powered down.

Remote expansion shelves are located farther than 10m, or 32.8 ft., from the main shelf. An optical cable using the 100FX protocol must connect the two shelves together as shown in the following figure.

Note	The expansion shelf can be located up to the distance supported by the SFPs used in your equipment. If you wish to connect a remote expansion shelf at a greater distance, please consult with BTI Systems customer support personnel for deployment recommendations.
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Use the following procedure to connect a remote expansion shelf to the main shelf.

Figure 8-6 Connecting a remote expansion shelf to the main shelf

Expansion shelf SFP transceivers for expansion shelf communications

The following table lists the SFP transceivers that are recommended for expansion shelf communications:

Table 8-4 SFP transceivers for expansion shelf communications

Bit Rate	Wavelength	Reach	Product Code	Purpose
125 Mb/s or 100FX	1310 nm multimode	0 to 2 km	BP3AE1MM	Multimode shelf interconnect
125 Mb/s to 2.7 Gb/s	1310 nm single mode	0 to 2 km	BP3AM1MS	Single mode shelf interconnect

Note

This SFP is supported in intershell applications starting in release 8.2.

Fiber optic patch cables for expansion shelf communications

The following table lists the fiber optic patch cables that are recommended for expansion shelf communications:

Table 8-5 Fiber optic patch cables for expansion shelf communications

Order Code	Item
BP1A59EA10	LC-LC UPC Singlemode Expansion Shelf Dual Patch Cords, with 40° Boot - 10 m (for use with BP3AM1MS)
BP1A59EB-10	LC-LC UPC Multimode Expansion Shelf Dual Patch Cords, with 40° Boot - 10 m (for use with BP3AE1MM)

- Step 1** Ensure that there is a system control processor (SCP) module plugged in to the BTI 7060 main shelf as shown above. The SCP must be product equipment code BT7A20CA.
- Step 2** Ensure that there is an expansion shelf interface (ESI) module plugged in to the expansion shelf as shown above. The ESI must be product equipment code BT7A54BA.
- Step 3** Insert an appropriate SFP transceiver into the SFP port on the ESI module that is labeled "To Main" (of the two SFP ports on the ESI module, this is the right-hand port) and another SFP transceiver into an expansion shelf port on the SCP module. Ensure that the SFPs are functioning correctly.
- Step 4** Attach one end of the two fiber optic cables to the SFP port on the ESI module that is labeled "To Main".

Note Use fiber optic cables with 40-degree boots that are available from BTI. For information about working with fiber optic cables, refer to the section "Managing optical fibers," below.

- Step 5** Attach the other end of the two fiber optic cable to the expansion shelf port on the SCP module in the main shelf. Ensure that attenuation is in the range supported by the SFPs.

Note The expansion shelf ports on the SCP must be used in numerical sequence. For example, the first expansion shelf is connected to the Shelf 11 port and subsequent expansion shelves are connected to the Shelf 21 and Shelf 31 ports in sequence.

You have successfully completed this procedure.

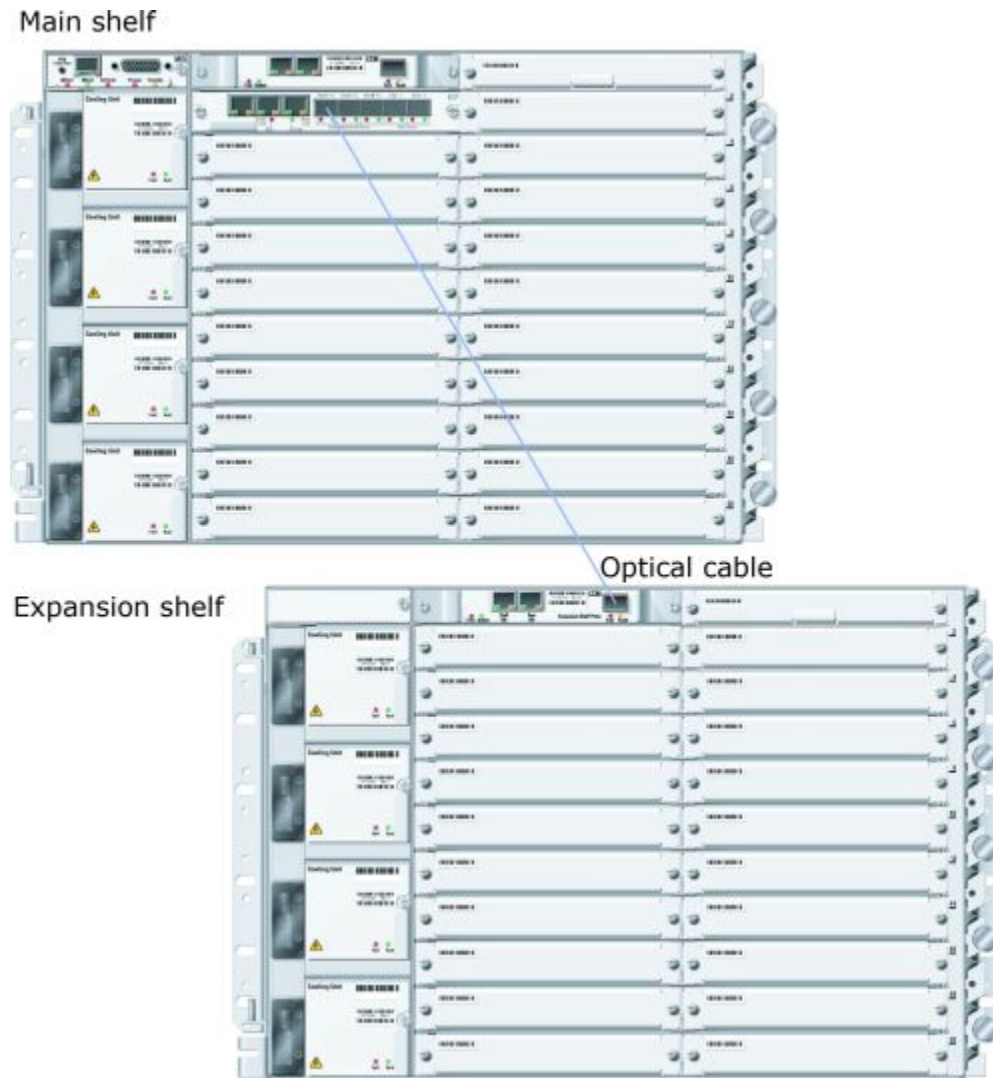
8.2.4 Connecting BTI 7200 remote expansion shelves

The expansion shelf should be put out of service and the entire shelf should be powered down.

Remote expansion shelves are located farther than 10m, or 32.8 ft., from the main shelf. An optical cable using the 100FX protocol must connect the two shelves together as shown in the following figure.

Note The expansion shelf can be located up to the distance supported by the SFPs used in your equipment. If you wish to connect a remote expansion shelf at a greater distance, please consult with BTI Systems customer support personnel for deployment recommendations.

Note The expansion shelf ports on the SCP must be used in numerical sequence. For example, the first expansion shelf is connected to the Shelf 11 port and subsequent expansion shelves are connected to the Shelf 21 and Shelf 31 ports in sequence.

Figure 8-7 Connecting a remote BTI 7200 expansion shelf to the main shelf

Use the following procedure to connect a remote expansion shelf to the main shelf.

Expansion shelf SFP transceivers for expansion shelf communications

The following table lists the SFP transceivers that are recommended for expansion shelf communications:

Table 8-6 SFP transceivers for expansion shelf communications

Bit Rate	Wavelength	Reach	Product Code	Purpose
125 Mb/s or 100FX	1310 nm multimode	0 to 2 km	BP3AE1MM	Multimode shelf interconnect
125 Mb/s to 2.7 Gb/s	1310 nm single mode	0 to 2 km	BP3AM1MS	Single mode shelf interconnect

Table 8-6 SFP transceivers for expansion shelf communications

Bit Rate	Wavelength	Reach	Product Code	Purpose
Note				
This SFP is supported in intershell applications starting in release 8.2.				

Fiber optic patch cables for expansion shelf communications

The following table lists the fiber optic patch cables that are recommended for expansion shelf communications:

Table 8-7 Fiber optic patch cables for expansion shelf communications

Order Code	Item
BP1A59EA10	LC-LC UPC Singlemode Expansion Shelf Dual Patch Cords, with 40° Boot - 10 m
BP1A59EB-10	LC-LC UPC Multimode Expansion Shelf Dual Patch Cords, with 40° Boot - 10 m

Note Due to space constraints, fiber optic cables with 40-degree boots are required for interconnecting the SCP module expansion shelf ports and general communication channel ports to other modules (such as, the expansion shelf interface or coupler/splitter modules).

- Step 1** Ensure that there is a system control processor (SCP) module plugged in to the BTI 7200 main shelf as shown above. The SCP must be product equipment code BT7A20CA.
- Step 2** Ensure that there is an common communications module (CCM) plugged in to the expansion shelf as shown above.
- Step 3** Insert an appropriate SFP transceiver into the SFP port on the CCM module on the expansion shelf.
- Step 4** Insert an appropriate SFP transceiver into an expansion shelf port on the SCP module on the main shelf. Ensure that the SFPs are functioning correctly.
- Step 5** Attach one end of the fiber optic cable to the SFP port on the CCM module .

Note Use fiber optic cables with 40-degree boots that are available from BTI. For information about working with fiber optic cables, refer to the section "Managing optical fibers," below.

Note While you can connect fiber optic cables to the SFP transceiver of the CCM module by hand, there is not enough finger clearance to be able to disconnect the fiber optics from the SFP transceiver. To disconnect fibers from the SFP transceiver on the CCM module, BTI recommends the use of a fiber connector insertion/extraction tool, such as the Skinny Fingers tool, available from fiber optics tool suppliers.

Figure 8-8 Example fiber extraction tool



Step 6 Attach the other end of the fiber optic cable to the expansion shelf SFP port on the SCP module in the main shelf. Ensure that attenuation is in the range supported by the SFPs.

You have successfully completed this procedure.

8.2.5 Moving expansion shelves to a different port or to a different main shelf

The expansion shelf should be put out of service and the entire shelf should be powered down.

Use this procedure to move an existing expansion shelf to a different port on the same SCP, or to a different main shelf.

Step 1 Power down the expansion shelf that is to be moved.

Step 2 Disconnect the expansion shelf communications cable from the expansion shelf port on the SCP.

Step 3 If required, physically move the expansion shelf into its new location.

Step 4 Plug the expansion shelf communications cable into the new expansion shelf port on the same SCP or into the SCP of its new main shelf.

Step 5 Power up the expansion shelf.

You have successfully completed this procedure.

8.3 LC-SC DCM patch cord kit

The LC-SC DCM patch cord kit converts DCMs with LC connectors to accept SC connectors. DCMs with SC connectors are available.

Note	The LC-SC DCM patch cord kit requires one adapter bracket position on the fiber management spool/adapter bracket assembly.
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Note	This procedure applies to a BTI 7060 shelf with a fiber management spool.
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Installation recommendation

To install the LC-SC DCM patch cord, do the following:

- 1 Mount the adapter in the most convenient opening on the adapter bracket.
- 2 Run the patch cord with the SC connector to the amplifier module.
- 3 Carefully wrap the patch cord around the fiber management spool to store any slack in the patch cord.
- 4 Run the patch cord with the LC connector to the DCM module.
- 5 Carefully wrap the patch cord around the fiber management spool to store any slack in the patch cord.

8.4 Y-cable for client protection

To provide client-interface equipment redundancy, two single-mode Y-cables are required to connect the client equipment to the following BTI 10GTransponder modules:

Table 8-8 Module support for the y-cable

Module	PEC
Dual 10G Multiprotocol Transponder	BT7A49AA
	BT7A49AA-I02
10G Multiprotocol Transponder	BT7A49AB

The transmitting and receiving signals from the transponders support the following 50/50 passive optical splitter types:

Table 8-9 Supported wavelength types for client protection

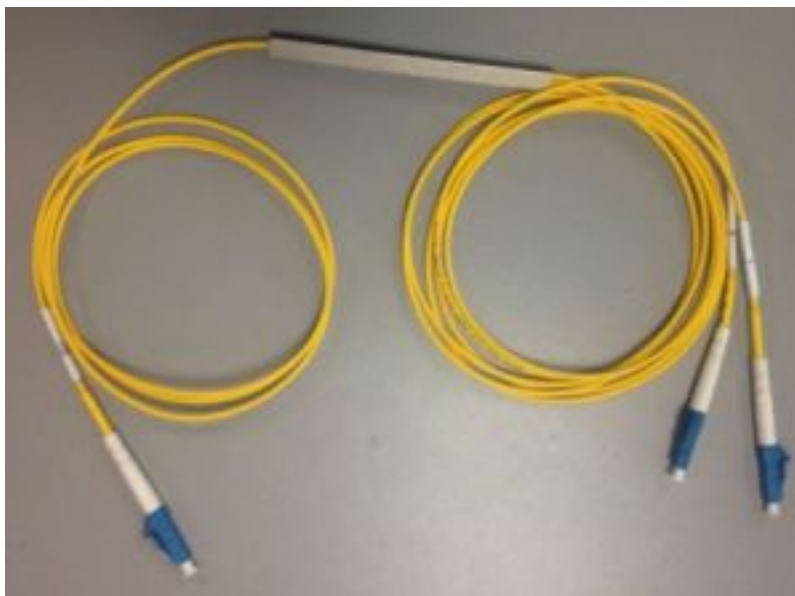
Wavelength type	PEC
1310 nm SR	BP3AM4MS
1550 nm IR	BP3AM4LI

The following y-cable is available through BTI:

Table 8-10 Y-cable ordering information

Order Code	Description
BT7A57AA	Single Patch Cord with coupler/splitter (single mode)

Figure 8-9 Single-mode y-cable



To manage the y-cable, secure it to the fiber management tray.

8.4.1 Connecting the y-cables for client protection

This section describes how to connect the y-cables to the client equipment and the supported BTI transponder modules.



Caution

Before you install modules or connect cables you should be familiar with the safety guidelines, described in [Chapter 1, “Safety information”](#)

Prerequisites

- Two of the same type, supported 10G BTI transponders should be installed in the same BTI shelf.
- Two 1310 nm or 1550 nm 50/50 optical splitters should be on hand.
- Y-cables should be unpacked and ready for connection.
- You should be wearing an electrostatic discharge (ESD) wrist strap that is connected to the shelf.
- Line protocols must be set to OTN.

Port pairing guidelines

Following are the port pairing considerations for connecting the y-cables to working and protecting ports:

- Protection on ports 1, 2 are independent of ports 3, 4. For example, ports 1 and 2 can support a single unprotected optical service supporting one client, and ports 3 and 4 can support a optical service supporting a second client.second
- Ports 1 and 2 can support client protection; conversely, ports 3 and 4 can be unprotected ports.
- If you pair client (Y-cable) protection on ports 1, 2 and/or 3, 4 on the working module, they must also be paired to the protection module in the same matching order.
 - You cannot pair ports 1 and 2 on one module, and ports 3 and 4 on another module.

To connect the y-cables for client protection follow these steps:

Step 1 Connect one end of of the cables to the client transmitter and receiver.

Step 2 Connect one end of the dual cables to the splitters connected to one pair of working and matching protecting ports 1 or 2, 3 or 4.

Step 3 Connect the other end of the dual cables to the splitters connected to the second pair of working and matching protecting ports.

8.5 Maintaining Fiber Optic Connectors

This section contains the following topics:

- 8.5.1, “Inspecting fiber optic connectors”
- 8.5.2, “Cleaning fiber optic connectors”
- 8.5.3, “Cleaning transceivers”

8.5.1 Inspecting fiber optic connectors

Protective dust plugs should be left on connectors when they are not in use. The fiber used on the optical components of the modules has a light carrying core that is less than 10 millionths of a meter in diameter. Therefore, a single microscopic piece of dust on a connector end-face can significantly block the light traveling through the fiber. Accurate and repeatable measurements require clean connections.



Invisible laser radiation can be emitted from the aperture ports of various modules when no fiber cable is connected. Avoid exposure and do not stare into open apertures to avoid permanent eye damage.

Using an optical fiber scope, visually inspect all fiber optic interconnects prior to use. A minimum of 200x magnification is required for proper inspection.

Use the following procedure to inspect a fiber connector.

Use the following guidelines to achieve the best possible performance:

- Using an optical fiber scope, visually inspect fiber ends for signs of damage.
- Use dry connections whenever possible.
- Keep connectors covered when not in use.
- Use care in handling all fiber optic connectors.

The primary hazard of exposure to laser radiation from an optical fiber communications system is damage to the eye by accidental exposure to the beam emitted by a laser source, or from viewing a connector attached to an energized fiber.

Before using an optical scope to examine the fiber, ensure that optical power is not emitted from the fiber. Use of a handheld optical fiber scope (that is, where the output is sent to a video display) prevents accidental exposure to the beam emitted by a laser source.

Keep all interconnects as clean as possible. When cleaning fiber connectors, be sure to use appropriate cleaning methods.

8.5.2 Cleaning fiber optic connectors

Use this procedure to clean a fiber connector.

Important Improper cleaning can result in high attenuation due to dirt or dust, or can cause mechanical damage to the fiber end face, resulting in decreased performance.

- Step 1** Verify that the opposite end of the fiber is disconnected from its laser source.
- Step 2** Using an optical fiber scope, inspect the end of the fiber face.
- Step 3** If the fiber end-face condition is ideal, no further action is required.
If you need to clean or repolish the fiber end-face, use the instructions in the cleaning procedure that follows.
- Step 4** Use a new, lint-free, nonabrasive cleaning pad, lens paper, or swab to clean the fiber end. Move the cleaning pad back and forth across the fiber end several times. If using a swab, gently rotate the swab as you wipe across the end-face. When done, discard the used pad or paper.
- Step 5** Obtain a filtered, dry, compressed air dust remover. Aim the duster at a shallow angle to the fiber end-face and blow across the connector end face from a distance of 6 to 8 inches.
- Step 6** Verify that the opposite end of the fiber is still disconnected from its laser source.
- Step 7** Verify that the fiber optic connector is free from dirt and dust. To inspect the connector, use an optical fiber scope that uses an indirect image converter or a filtered optical instrument of optical density (OD) sufficient to reduce the exposure levels below the appropriate maximum permissible exposure.
- Step 8** Do one of the following:
- If the fiber optic connector is clean, cover the connector with a protective dust cover until ready for use.
 - If the fiber-optic connector is not completely clean, continue with the next step.
- Step 9** Clean the fiber end by moving the cleaning pad back and forth across the fiber end several times. If using a swab, gently rotate the swab as you wipe across the end face.
- Step 10** Immediately dry the fiber end with a clean, dry, lint-free cleaning pad or lens paper.
- Step 11** Discard the optical cleaning pads and lens paper.
- Step 12** Use a filtered, dry, compressed air dust remover. Aim the duster at a shallow angle to the fiber end face and blow across the connector end-face from a distance of 6 to 8 inches.
- Step 13** Verify that the fiber optic connector is free from dirt and dust. To inspect the connector, use an optical fiber scope that uses an indirect image converter or a filtered optical instrument of optical density (OD) sufficient to reduce the exposure levels below the appropriate maximum permissible exposure.

Step 14 Once the fiber is clean, cover the connector with a protective dust cover until ready for use.

You have successfully completed this procedure.

8.5.3 Cleaning transceivers

When cleaning transceivers, use a 1.25 mm cotton-tipped swab to insert into the receptacle. The swabs can be used to clean the optical surface and to clean debris from the inner sleeve. Use extreme care as it is easy to scratch the optical plane.

8.6 Managing optical fibers

The BTI 7000 Series modules are designed with handles that are useful for managing the optical fiber cables. Once the optical fiber cables are connected to their respective modules, run the cables to the right.

8.6.1 Cabling sequence

It is recommended that once the modules are installed in the shelf, to start connecting the fiber optic cables to the modules from the lower right side. This is the easiest place to start given the angle of the optical connectors on the modules.

For convenience of access, complete the cabling on the lowest row of modules first and then move progressively up to the next row, again by starting from the right side and then proceeding to the left.

8.6.1.1 Recommendations for fiber optic cables with long boots

For fiber optic cables that have long boots, the boot can be obstructed by the module handles or the length of the boot can create too small a bending radius for the cable. As a result, some connector positions may not permit the easy management of the fiber using the module handles.

To avoid this situation, carefully position the cable around the outside of the first module handle to the right as indicated in the following figure.

Top View of Optical Fiber Management for Cables with Long Boots



Short-booted fiber optic cables do not generally pose such a problem.

8.6.1.2 Recommendation for SCP and ESI modules

Due to the tight spacing requirements of the system control processor (SCP) and the expansion shelf interface (ESI) modules in ANSI systems, fiber patch cables with 40 degree boots are recommended. The following table lists the special fiber patch cables that are available.

Table 8-11 Fiber patch cables

Order Code	Description
BP1A59EA-10	Dual LC-LC expansion shelf patch cord with 40 degree boot - 10 m in length

In ETSI systems, fiber patch cables with 40 degree boots do not provide enough clearance. Cut-boot fiber patch cables must be used with the SCP and the ESI modules in ETSI systems. Contact your BTI representative for a list of recommended vendors of cut-boot fiber patch cables. Cut-boot fiber patch cables do not comply with NEBS requirements.

8.6.1.3 Recommendation for optical attenuators

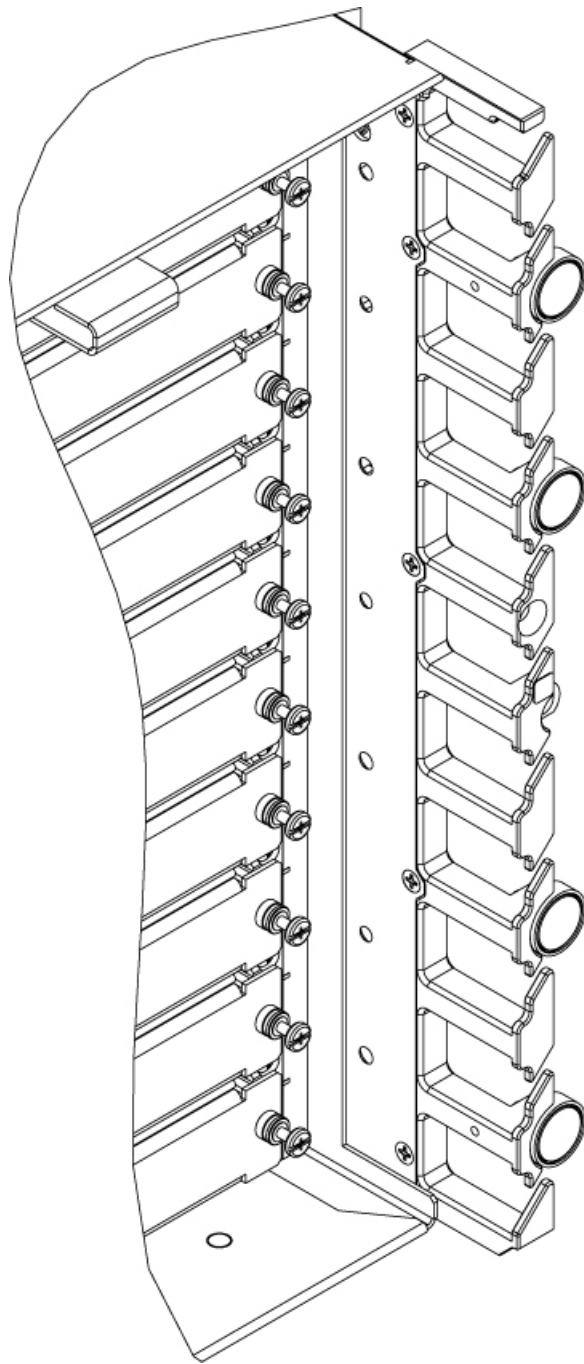
Due to tight spacing requirements, the use of an optical attenuator with a straight-boot fiber patch cable may result in too small of a bending radius for the cable. In this case, fiber patch cables with 40 degree boots are recommended. Listed in the following table are the special fiber patch cables that BTI stocks.

Table 8-12 Fiber patch cables with 40 degree boots

Order Code	Description
BP1A59EA-10	Dual LC-LC expansion shelf patch cord with 40 degree boot - 10 m in length

8.6.1.4 Recommendations for fiberling a BTI 7200

Each row of modules on a BTI 7200 shelf has its own fiber exit point on the right-hand side of the shelf. The fibers exit the shelf through the right-hand shelf cover bracket, as seen in the following illustration.



If you intend to use the padlock loops to lock the shelf cover, extend the loops before you connect fibers to modules in the slots near the loops (slots 2 and 4 for the top loop, and slots 18 and 20 for the bottom loop). Otherwise the padlock loops become obstructed by the fibers and cannot be extended.

Due to tight spacing, the use of an optical attenuator with a straight-boot fiber patch cable may result in too small of a bending radius for the most right-hand fibers on a BTI 7200 shelf. In this

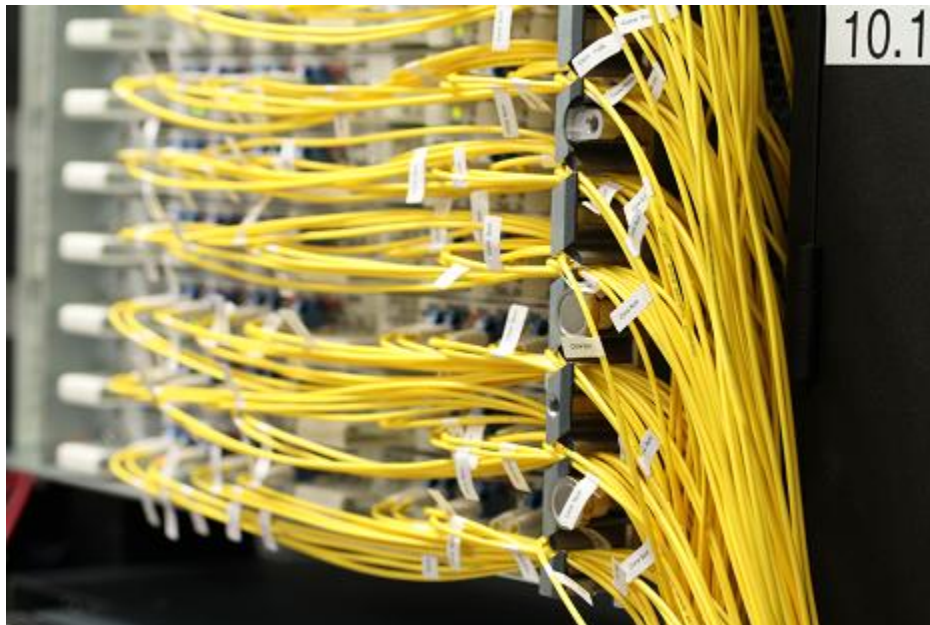
case, fiber patch cables with 40 degree boots are recommended. Listed in the following table are the special fiber patch cables that BTI stocks.

Table 8-13 Fiber patch cables with 40 degree boots

Order Code	Description
BP1A59EA-10	Dual LC-LC expansion shelf patch cord with 40 degree boot - 10 m in length

The following photographs illustrate fibers on a BTI 7200 shelf.





8.7 Testing the LEDs

8.7.1 Verify the LEDs

Once the system is powered, confirm that the cooling unit and main shelf interface modules power up. The fail LED on the cooling unit should turn off after 10 to 15 seconds. The active LED on the cooling unit should be green.

During module initialization, the red and green LEDs on a module will be on for about 90 seconds before the green LED is the only remaining LED that is left on in a no fault situation.

8.7.2 Alarm Cutoff and Lamp Test Button

The alarm cutoff and lamp test button serves two purposes.

First, if an audible alarm is present on the office alarm, the audible part of the alarm can be stopped by pressing the alarm cutoff/lamp test button momentarily.

Second, if no audible alarm is present, pressing the alarm cutoff/lamp test button turns all of the LEDs on, including all of the module LEDs and SFP transceiver LEDs.

Use the following procedure to perform a lamp test.

Note	Failure of the MSI or SCP modules disables the alarm cutoff/lamp test button.
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Step 1 Ensure the shelf is powered and then press and hold the lamp test button for five seconds.

Step 2 All LEDs on all modules should turn on.

If any LEDs do not turn on, replace the module of the affected LED(s).

Note	The RJ45 LEDs for Ethernet connections do not turn on because they are not controlled by the lamp test.
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Step 3 After replacing the module, repeat step one.

- If the LEDs turn on, you have successfully completed this procedure.
- If the LEDs do not turn on, contact your next level of support.

9.0 Install the shelf cover

This chapter explains where and how to install the shelf cover for the BTI 7000 Series.

This chapter provides the following information:

- [9.1, “Installing the shelf cover on a BTI 7060”](#)
- [9.2, “Installing the shelf cover on a BTI 7200”](#)

9.1 Installing the shelf cover on a BTI 7060

To install the shelf cover on a BTI 7060 installed in an ANSI rack only, use the following procedure.

Note Depending on the installation site, the room with which you have to work may be limited. Using an articulated screwdriver or ratchet may facilitate installation of the shelf cover brackets.

Danger Ensure all power is disconnected from the shelf before proceeding.

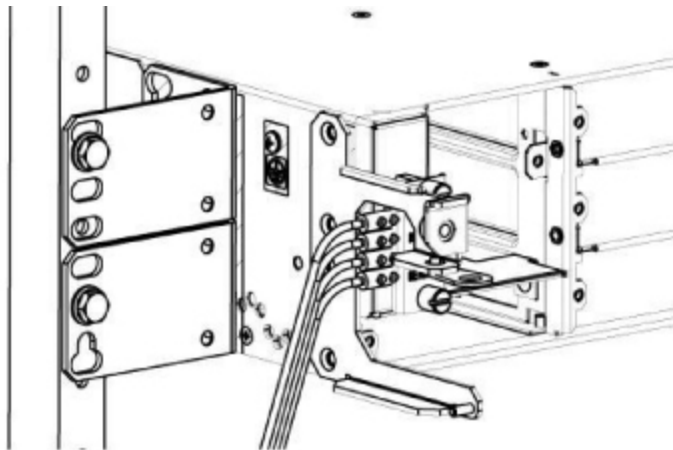
Step 1 Unpack and inspect the shelf cover and hardware. The box should include:

- 1 shelf cover
- 2 left and right mounting brackets
- 3 fiber spool
- 4 screws
- 5 grounding wire

Step 2 Remove the left mounting bracket from the shelf cover.

Step 3 Position the left mounting bracket on the side of the shelf, and screw it into place with the screws provided.

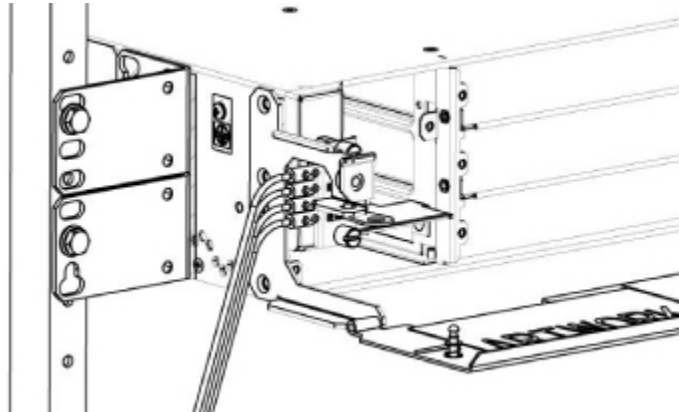
Step 4 Remove the insulating material.



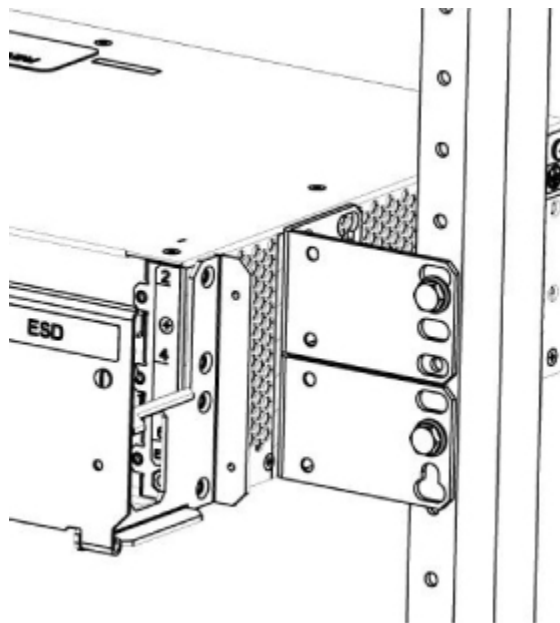
Step 5 Remove the fiber spool and the fiber spool bracket from the right mounting bracket. Keep the right mounting bracket attached to the shelf cover.

Step 6 With the shelf cover still attached to the right mounting bracket, mount the shelf cover onto the left mounting bracket.

Note You cannot mount the cover brackets to the shelf and then mount the cover to the brackets because the brackets and the cover are all rigid parts. The cover must be mounted to the left bracket while still attached to the right bracket and then the right bracket must be positioned. Get assistance with this step if you cannot manage it alone.

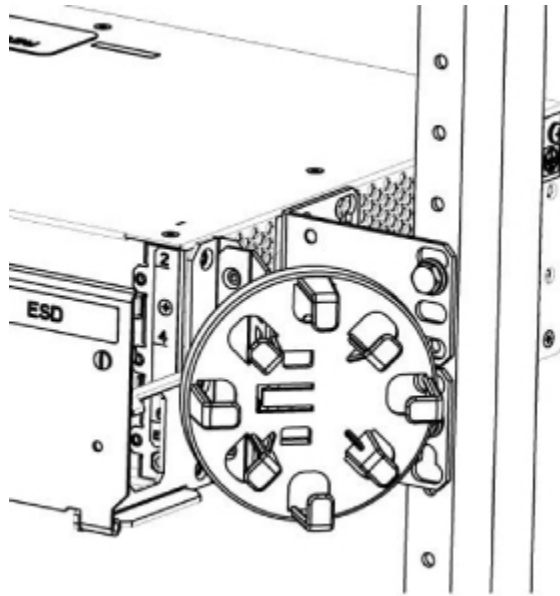


Step 7 Position the right mounting bracket onto the right side of the shelf and screw the right mounting bracket into place.

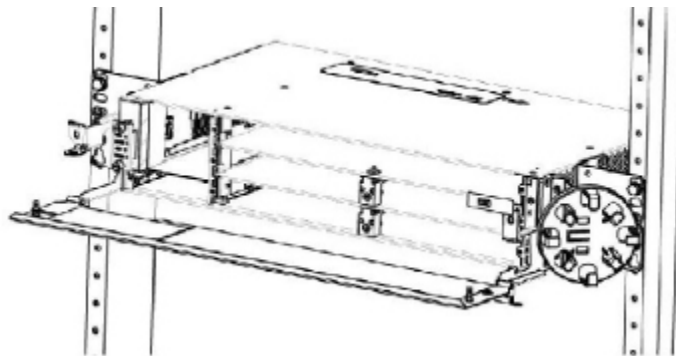


Step 8 Ground the cover to the shelf by screwing one end of the grounding wire on the bottom left-hand corner of the cover to the shelf.

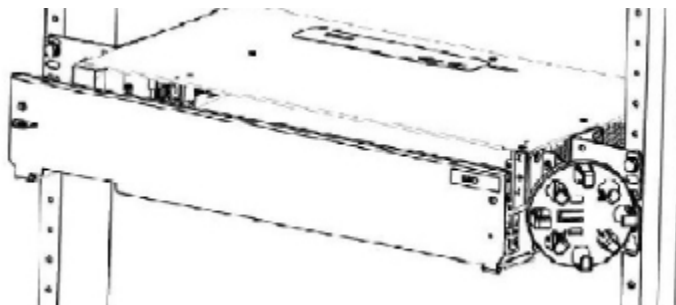
Step 9 Replace the fiber spool bracket and the fiber spool on the right mounting bracket



Step 10 Open and close the shelf cover several times to ensure that it is installed correctly and that no cables are being pinched.



Step 11 Once you are satisfied, close the cover and secure it by turning the fastening screws on the cover 1/4 turn each.



You have successfully completed this procedure.

9.2 Installing the shelf cover on a BTI 7200

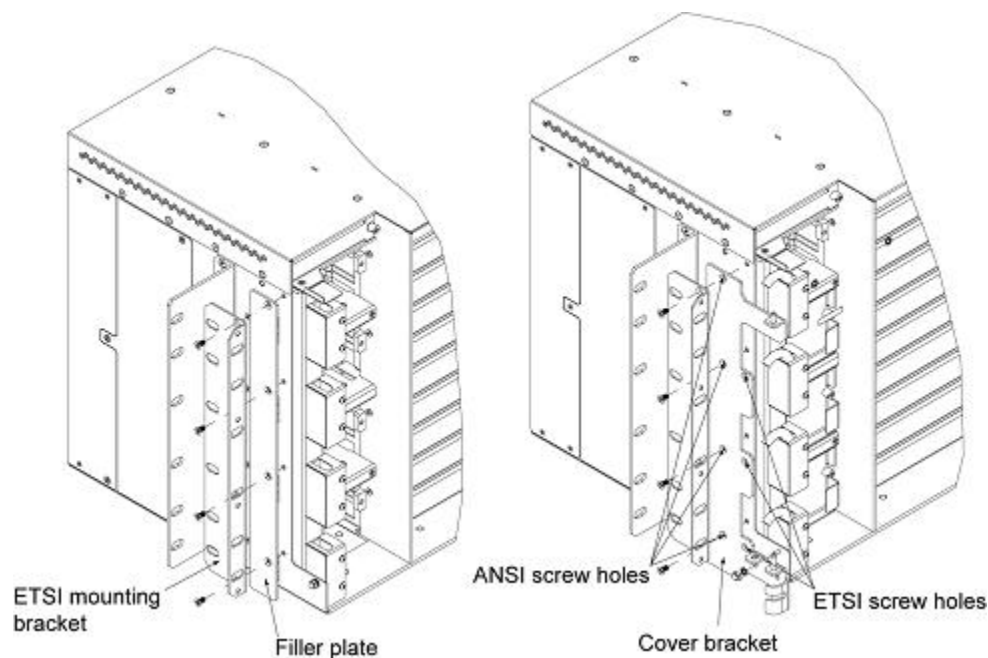
To install the shelf cover on a BTI 7200, use the following procedure.

Note Depending on the installation site, the room with which you have to work may be limited. Using an articulated screwdriver or ratchet may facilitate installation of the grounding wire.

Step 1 Unpack and inspect the shelf cover and hardware. The box includes:

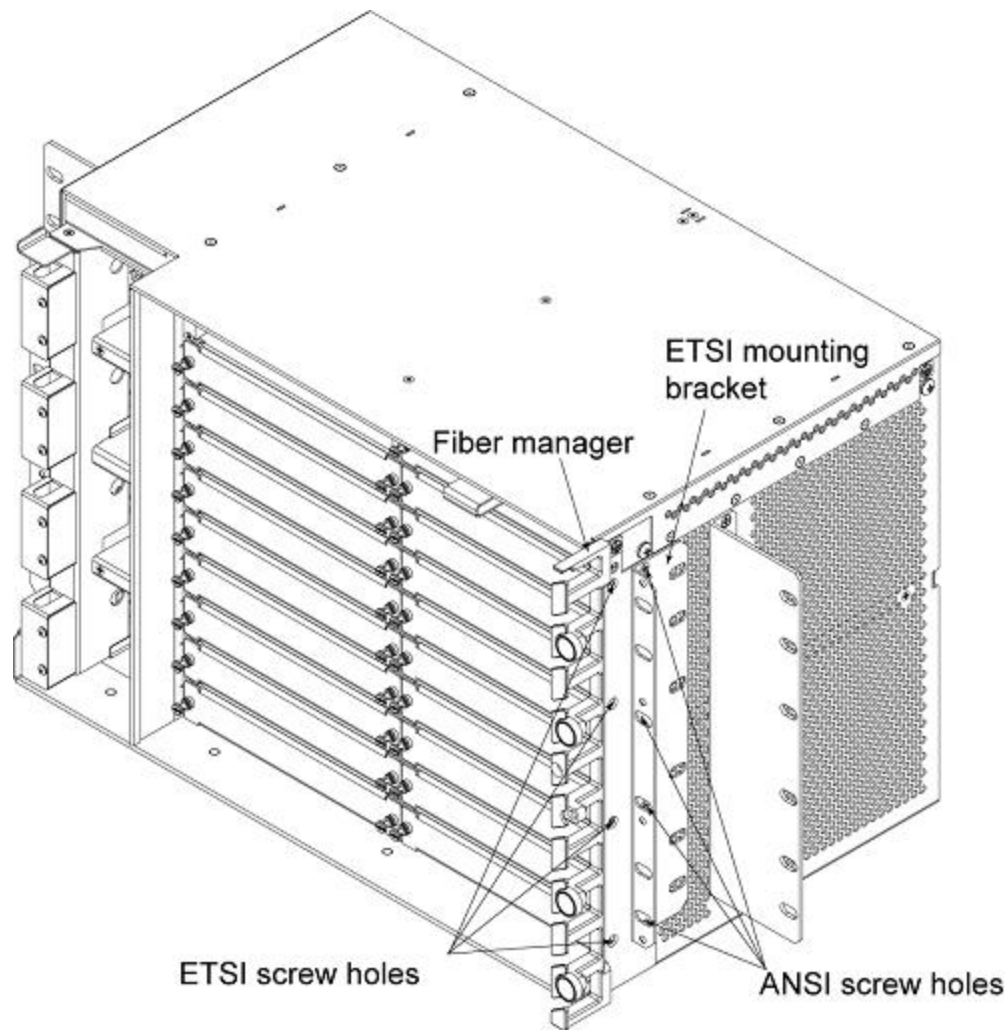
- shelf cover
- left-hand shelf cover bracket
- grounding wire
- padlock loops (these are available only with the ANSI cover kit (BT7A5180))

Step 2 Install the left-hand shelf cover bracket. Unscrew the ETSI mounting bracket and the metal filler plate (which is held in place by four flat-head screws) on the left side of the shelf. Place the shelf cover bracket in place of the metal filler plate. If you are installing the shelf in an ETSI rack, screw the ETSI mounting bracket to the shelf, through the holes in the shelf cover bracket. Refer to the following illustration for the holes to use for ANSI or ETSI shelf mount configuration.

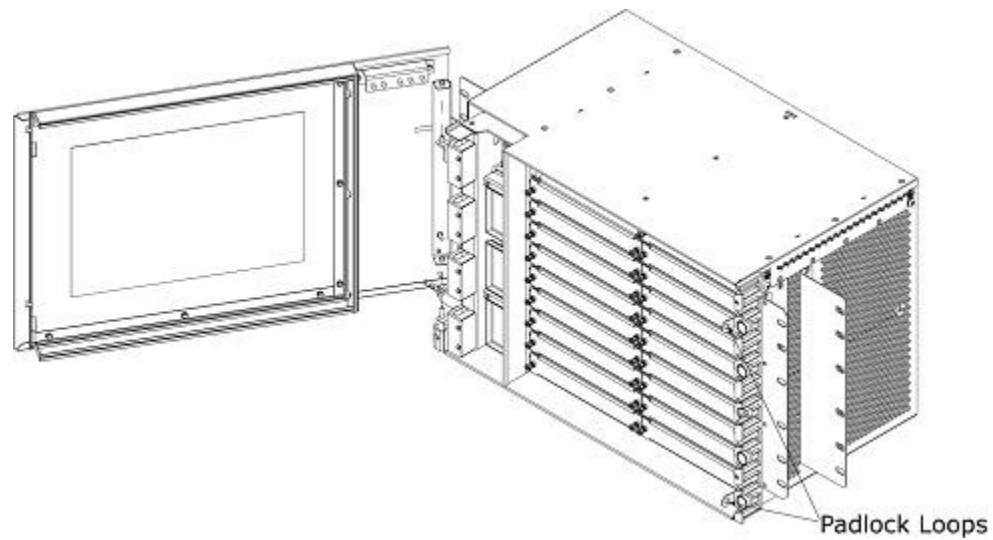


Step 3 If you are installing an ETSI cover, you must move the fiber manager bracket. Unscrew the ETSI mounting bracket and the fiber manager bracket on the right-hand side of the shelf. Move the fiber manager further back on the shelf (approximately 2.5 cm/1 inch to the next mounting position) and screw the ETSI mounting bracket to the shelf, through

the holes in the fiber manager. Refer to the following illustration for the holes to use for ANSI or ETSI shelf mount configuration.

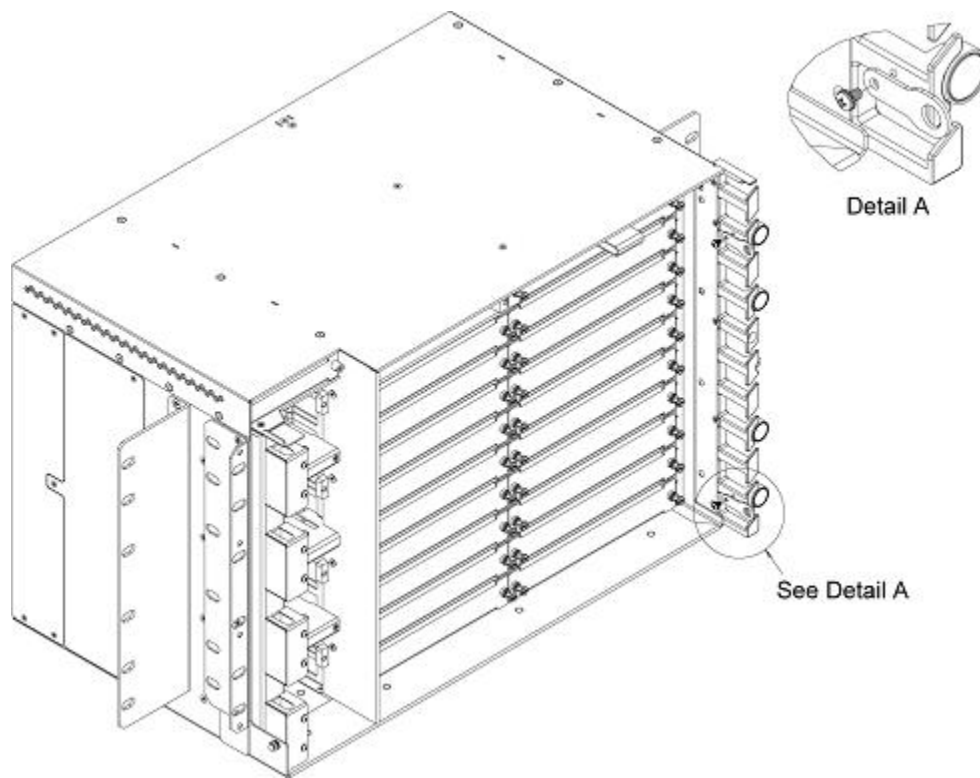


- Step 4** Holding the shelf cover in the open position (slightly over 90° to the shelf), align the mounting holes on the shelf cover to the mounting pins on the bracket on the left side of the shelf, and slide the cover onto the pins.

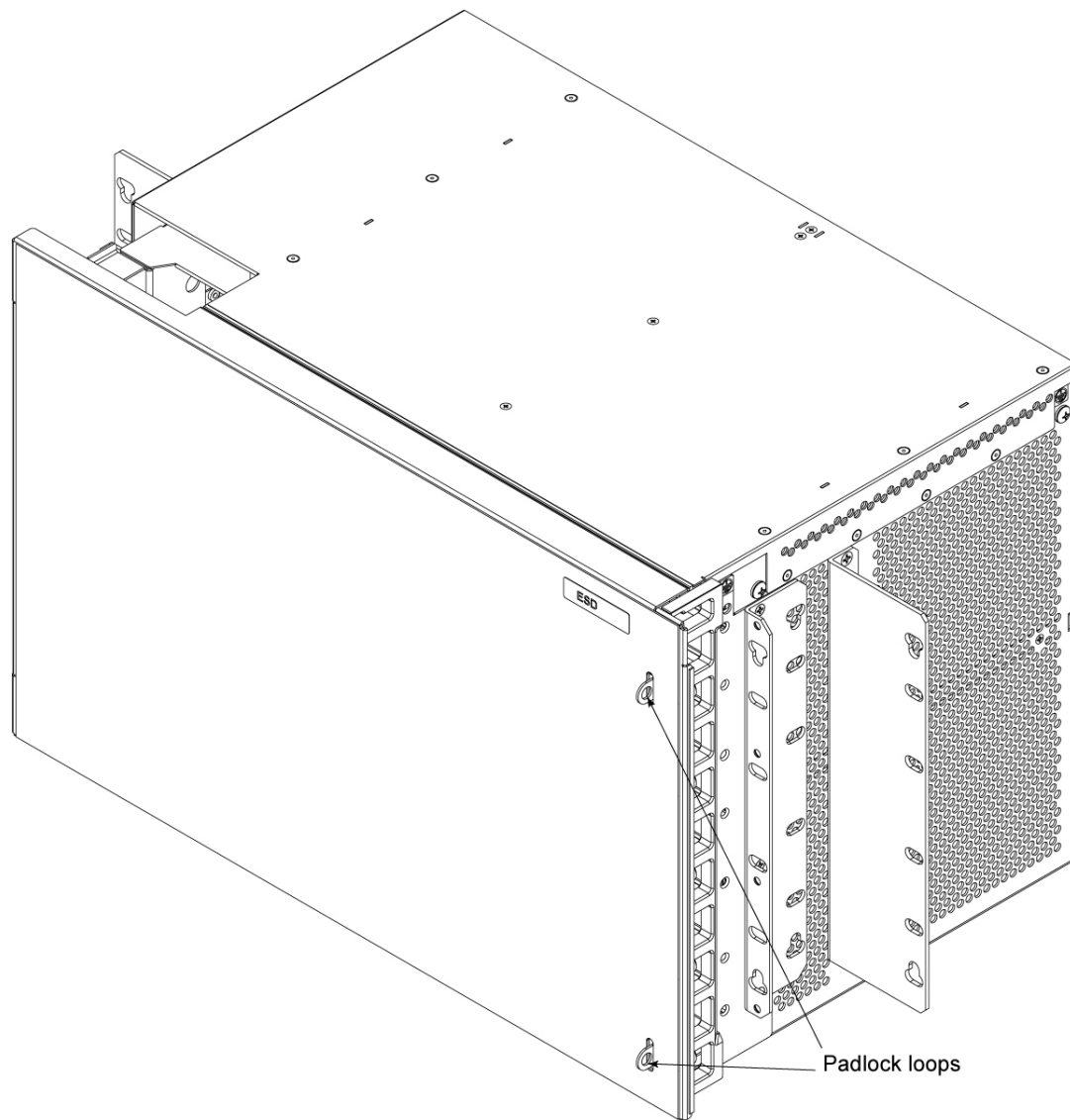


The cover is held in place by gravity. It is not fastened to the shelf, however, if the cover is open at an angle of less than 90° it cannot be removed due to the built-in locking mechanism.

- Step 5** Open and close the shelf cover gently several times to ensure that it is installed correctly and that no cables are being pinched. Once the cover is closed it is held in place by magnets.
- Step 6** Ground the cover to the shelf by screwing one end of the grounding wire on the bottom left-hand corner of the cover to the shelf.
- Step 7** If desired, install the padlock loops on the inside of the fiber manager bracket using the screws provided.



Step 8 To use the padlock loops, open the cover, pull out the padlocks loops, and then close the cover again. The padlock loops extend through slots on the shelf cover, as seen in the following illustration.



Step 9 When installing the shelf in an ETSI rack, remove the ANSI mounting brackets.

You have successfully completed this procedure.

10.0 Connecting to the BTI 7000 Series

This section explains the basic requirements for connecting to the BTI 7000 Series.

- [10.1, “Establishing a TL1 session using RS-232”](#)
- [10.2, “Establishing a proNX 900 session using Ethernet”](#)
- [10.3, “Establishing a TL1 session using a modem”](#)
- [10.4, “Connecting management systems to BTI 7000 Series ports”](#)

10.1 Establishing a TL1 session using RS-232

Authorization required

Authorization Required

Superuser

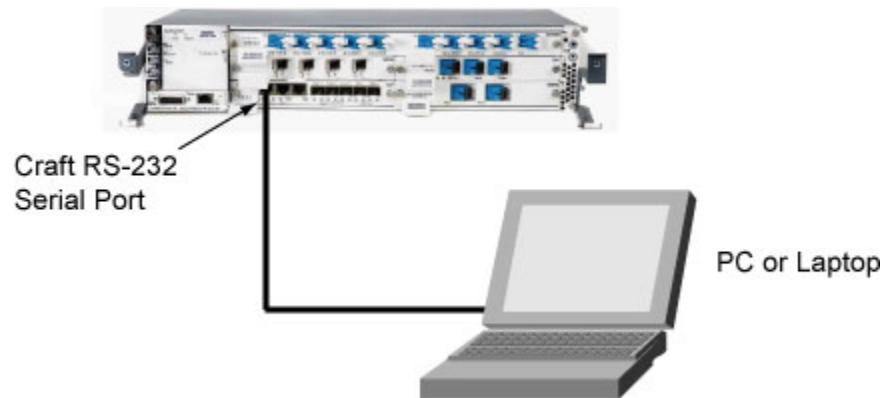
Provisioning

Maintenance

Surveillance

Use this procedure to connect a PC to a BTI 7000 Series shelf through the RS-232 craft serial port on the shelf.

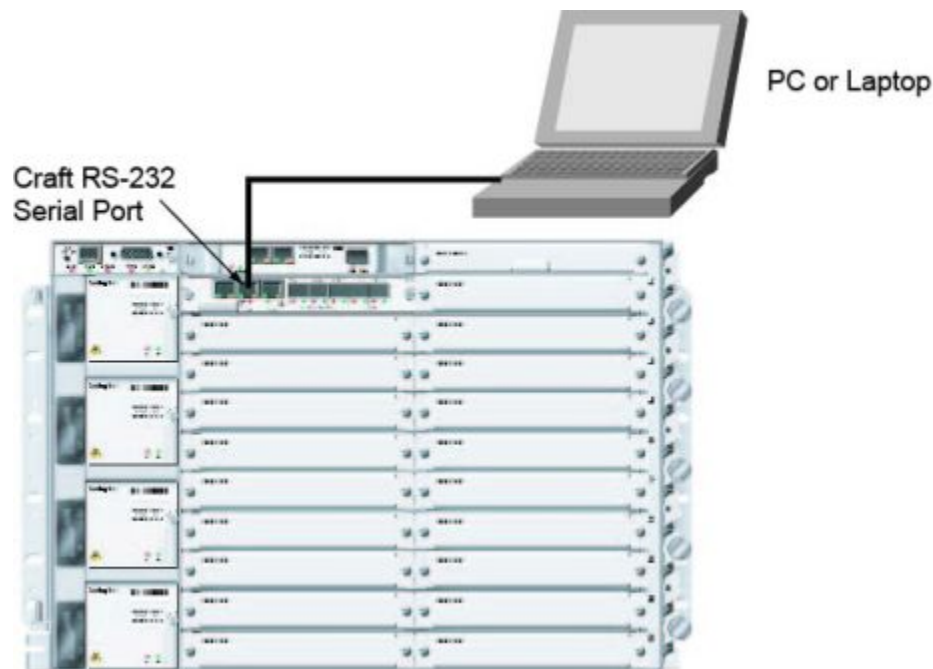
Establishing a TL1 session using the RS-232 Craft serial port on a BTI 7060



Establishing a TL1 session using the RS-232 Craft serial port on a BTI 7030



Establishing a TL1 session using the RS-232 Craft serial port on a BTI 7200



Step 1 Connect the RS-232 Cable

- 1 Insert one end of the RS-232 cable in the craft serial port on the BTI 7000 Series shelf.
- 2 Insert the other end of the RS-232 cable in the RS-232 male connector on your PC or laptop.

Step 2 Set the RS-232 Parameters

Set the default RS-232 parameters for the PC to match the BTI 7000 Series shelf:

Rate: 9600 bps

Data Bits: 8 bits

Parity: None

Stop Bits: 1 bit

Flow Control: None

Step 3 Establish a TL1 Session

From a terminal emulator, establish a TL1 session to the BTI 7000 Series shelf by pressing the Return key.

Response

The system responds with the system prompt.

Step 4 Log on to the BTI 7000 Series

To log on to the BTI 7000 Series, enter the following at the TL1 command line interface:

```
ACT-USER:[TID]:<uid>:<CTAG>::<pid>;
```

where

TID is the target identifier (BTI7000 is the default target identifier)

uid is the user identifier (admin is the default system administrator uid)

CTAG is the correlation tag (100 is the default correlation tag)

pid is the password identifier (admin is the default system administrator pid)

Note	User identifier "admin" and password identifier "admin" are the default system administrator credentials.
-------------	---

Example

```
ACT-USER:BTI7000:admin:100::*****;
```

Response

The BTI 7000 Series sends back a COMPLD message to indicate a successful log on.

You have successfully completed this procedure.

10.1.1 RS-232 serial communications

The BTI 7000 Series has a craft serial port that uses the RS-232 protocol.

Cables required

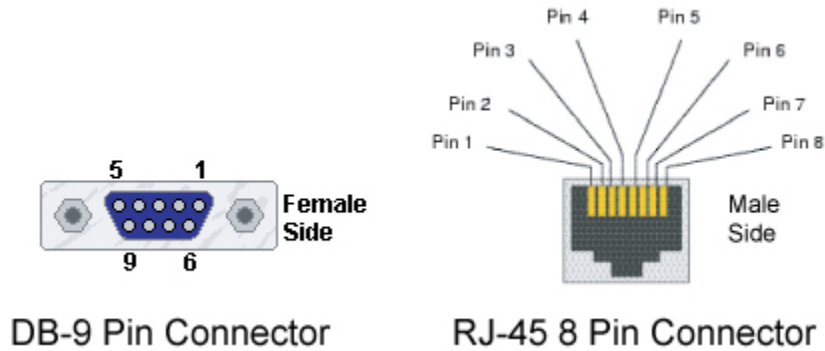
When connecting a PC or laptop to the craft serial port, use a straight-through RS-232 cable with a DB-9 pin male connector.

If you anticipate using the RS-232 serial port, determine the length of cable required to connect the system to your PC, and prepare the cable with the appropriate male connector.

RS-232 pin assignment

The following figure shows the RS-232 DB-9 pin DCE connector as well as the RS-232 RJ-45 8 pin connector and the associated pin numbering schemes.

DB-9 Pin Connector and 8 Pin RJ-45 Connector Numbering Schemes



The following table lists the RS-232 pin assignment for the DB-9 pin connector and RJ-45 connector pin numbering schemes.

Table 10-1 Pin Assignments for RS-232 DB-9 Pin Connectors and RS-232 RJ-45 Connectors

DB-9 Pin Connector	DCE Purpose	RJ-45 Connector	DCE Purpose
1	Data Terminal Ready	1	Request to Send
2	Transmitted Data	2	Data Terminal Ready
3	Received Data	3	Transmitted Data
4	DTE Ready	4	Signal Ground
5	Signal Ground	5	Signal Ground
6	DCE Ready	6	Received Data
7	Clear to Send	7	Data Carrier Detect / Data Set Ready
8	Request to Send	8	Clear to Send
9	Ring Detector		

10.2 Establishing a proNX 900 session using Ethernet

Use 10.2.1, “Method One: Connecting through the management LAN”, or 10.2.2, “Method Two: Connecting through the craft LAN port” to establish an Ethernet connection to the system.

Note The same functions are available through the craft LAN and the management LAN interfaces.

The following table lists the IP addresses for the BTI 7000 Series LAN communication ports.

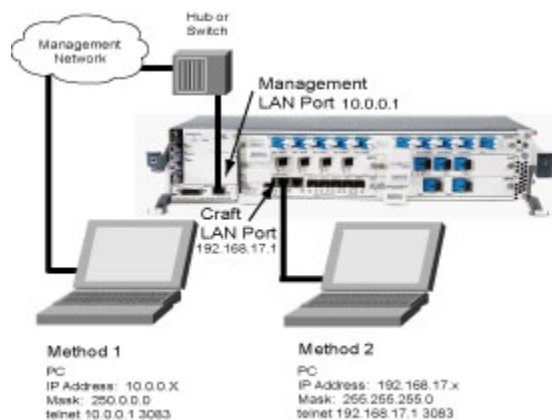
Table 10-2 IP Addresses

Communications Port	Default IP Address	Default IP Mask	Default IP Gateway
Default IP Addresses			
Management LAN Port	10.0.0.1	255.0.0.0	0.0.0.0
Craft LAN Port	192.168.17.1	255.255.255.0	0.0.0.0
For a PC Connected To:			
Management LAN Port	10.x.y.z Where x and y are 0 to 255, and $2 \leq z \leq 254$	255.0.0.0	
Craft LAN Port	192.168.17.z Where $2 \leq z \leq 254$	255.255.255.0	

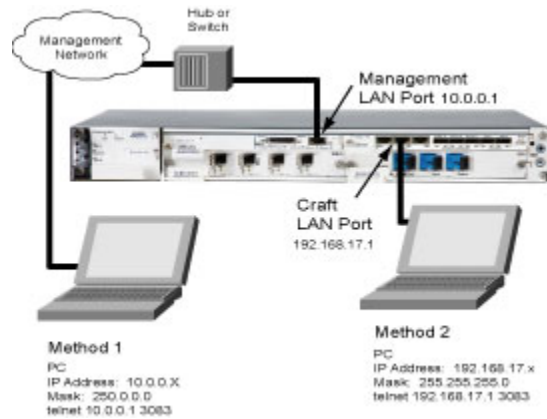
Note The Ethernet ports are set to Auto-Negotiate. To ensure optimum communication between the system and your equipment, we recommend that you set your equipment to Auto-Negotiate, as well.

The following illustrations shows the two methods to use when establishing a TL1 session using Ethernet.

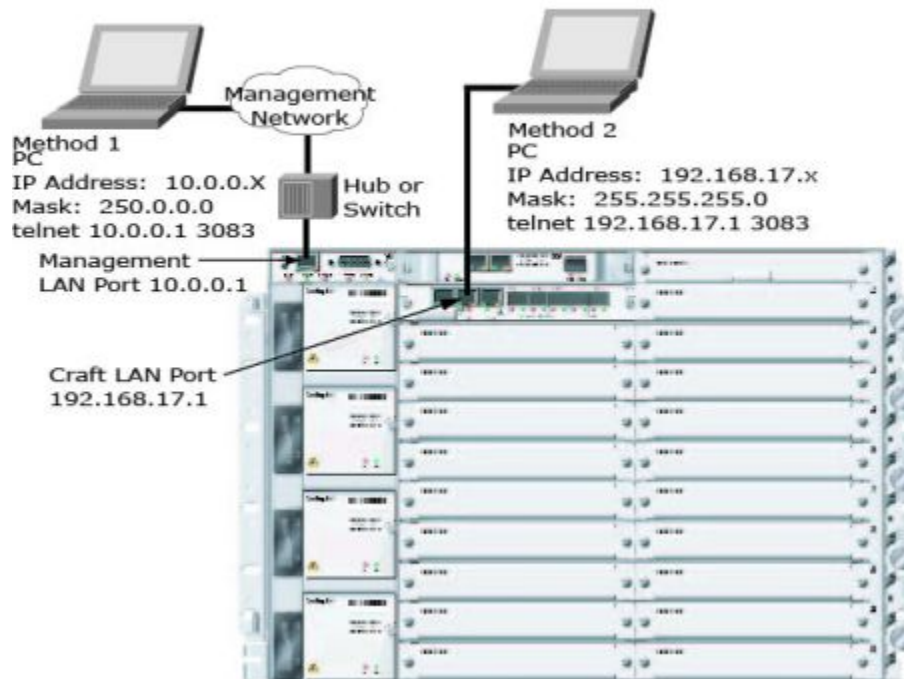
Establishing a proNX 900 session on the BTI 7060 using Ethernet



Establishing a proNX 900 session on the BTI 7030 using Ethernet



Establishing a proNX 900 session on the BTI 7200 using Ethernet



10.2.1 Method One: Connecting through the management LAN

Authorization required

Authorization Required

Superuser

Provisioning

Maintenance

Surveillance

Use this procedure to connect a PC, or router, to the BTI 7000 Series equipment through a hub or switch that is connected to the management LAN port.

To connect a PC directly to the management LAN port on the BTI 7000 Series, you require a CAT 5 shielded, grounded Ethernet cable of sufficient length with RJ-45 male connectors.

The Ethernet LAN ports automatically determine what device is attached and they automatically configure the input and output signals for the Ethernet cable used.

Step 1 Provision the IP Address

If not yet configured, provision the BTI 7000 Series with the IP address of your intended management Ethernet LAN.

Step 2 Connect the BTI 7000 Series Ethernet Cables

- a) Insert one end of a shielded and grounded Ethernet cable in the management LAN port.
- b) Insert the other end of the shielded and grounded Ethernet cable in the RJ-45 female Ethernet LAN connector on your hub or switch.

Step 3 Connect the Computer Ethernet Cables

- a) Insert one end of a shielded and grounded Ethernet cable in the RJ-45 female Ethernet LAN connector on your PC.
- b) Insert the other end of the shielded and grounded Ethernet cable in the RJ-45 female connector of your management LAN.

Step 4 Start a proNX 900 Session

Step 5 Log on to the BTI 7000 Series using the proNX 900

You have successfully completed this procedure.

10.2.2 Method Two: Connecting through the craft LAN port

Authorization required



Use this procedure to connect a PC to a BTI 7000 Series shelf through the craft LAN port.

The BTI 7030 Ethernet LAN ports automatically determine what device is attached and they automatically configure the input and output signals for the Ethernet cable used.

Step 1 Provision the IP Address

If not yet configured, provision the BTI 7000 Series shelf with the IP address of your intended craft Ethernet LAN.

Step 2 Connect the Ethernet Cable

- a) Insert one end of the shielded and grounded Ethernet cable in the craft LAN port.
- b) Insert the other end of the shielded and grounded Ethernet cable in the RJ-45 female Ethernet LAN connector on your PC or laptop.

Step 3 Start a proNX 900 Session

Step 4 Log on to the BTI 7000 Series using the proNX 900

You have successfully completed this procedure.

10.3 Establishing a TL1 session using a modem

Authorization required

Authorization Required

Superuser

Provisioning

Maintenance

Surveillance

Use this procedure to connect a PC to the system through a modem.

The BTI 7000 Series connects from the craft serial port on the SCP to the modem through a null modem cable.

Caution Unprotected modems should not be connected to the BTI 7000 Series craft serial port. The craft serial port does not log users off when the carrier detect is lost, which can leave a security hole. To avoid this, use a secure modem.

Step 1 Configure the modem

Before connecting the modem to the BTI 7000 Series equipment, ensure that the modem is configured for auto-answer by doing the following:

- a) Using a null modem cable, connect the serial port of a PC to the serial port of the modem.
- b) Run HyperTerminal, or another terminal emulation program, on the PC.
- c) Power down and then power up the modem.
- d) In the HyperTerminal program window, type the following string and then press enter:

```
AT&F0S0?
```

The modem should respond with either a single “0”, a series of “000” and or an “OK”.

- e) After receiving the response, type the following string and then press enter:

```
AT&F0S0=1Q1E0&D0&K0&C0&W
```

where

&F0 is the factory settings

S0=1 is the auto-answer function

E0 is the echo off function Q1 is the result codes off function

&D0 is the ignore DTR function

&K0 is the flow control off function

&C0 is the force DCD active function

&W is the store profile function

This time there should not be any response from the modem because the command string disables the output.

- f) Connect a telephone line to the RJ-11 input receptacle of the modem.
- g) Test the modem for auto-answer by dialing in to the modem. The modem should answer the call.
- h) To complete this step, hang up and disconnect the modem from the PC by entering the following string and then press enter:

ATH

Note A DB-9 to DB-25 adapter may be required to connect the null modem cable to the serial port of the modem.

Step 2 Set up the cabling for the modem connection to the BTI 7000 Series equipment

To set up the cabling for the modem connection to the BTI 7000 Series equipment, do the following:

- a) Using a null modem cable, connect the serial port of the modem to the craft serial port on the SCP of the BTI 7000 Series equipment.
- b) If not already connected, connect the telephone line to the RJ-11 input receptacle of the modem.
- c) Configure far-end PCs with HyperTerminal, or another terminal emulation program.
- d) The far-end PCs also require a modem connection to access the modem at the BTI 7000 Series location.

Note A DB-9 to DB-25 adapter may be required to connect the null modem cable to the serial port of the modem.

Step 3 Establish a TL1 session to the BTI 7000 Series

Once all the cabling is completed, establish a TL1 session to the BTI 7000 Series equipment by doing the following:

- a) At the far-end PC, dial-in to the modem.
- b) Once the connection is established, press enter. You should see a TL1 prompt (that is, >) when the connection is established.

You have successfully completed this procedure.

10.4 Connecting management systems to BTI 7000 Series ports

The BTI 7000 Series is designed to be easily integrated into existing networks and managed by third-party element management systems (EMS), network management systems (NMS), and operation support systems (OSS).

The BTI 7000 Series supports standard communication interfaces over serial and IP connections including Telcordia Transaction Language (TL1). In addition, the BTI 7000 Series provides the proNX 900 Node Controller, the craft management interface.

10.4.1 BTI 7000 Series SNMP support

The *Simple Network Management Protocol* (SNMP) is an application-layer protocol designed to facilitate the exchange of management information between network devices. SNMP enables trap-directed notification of events on a device.

BTI's SNMP implementation supports SNMP Version 1 (SNMPv1) as defined in RFCs 1155, 1157, 1212, 1213, and 1215. The SNMP implementation also supports SNMPv2c as defined in RFCs 1901 through 1907. SNMPv3 protocol data unit messages are also supported.

BTI enterprise MIBs, as provided on the Customer Documentation CD, define BTI-specific MIB objects and notifications. These MIBs are available in both SNMPv1 and SNMPv2 versions. In addition, BTI's SNMP agent supports both SNMPv1 and SNMPv2c Protocol Data Unit (PDU) messages.

The *system* and *snmp* group objects in MIB-II, as defined in RFC 1213, are supported for both read and write access. In addition, the BTI 7000 Series MIB includes a group of system-related objects under the *networkElement* branch.

Enterprise-specific fault management trap messages for all alarms and non-alarmed conditions reported by the BTI 7000 Series are supported.

For each alarm, a raise and clear trap is defined. A read-only table is defined, which provides a listing of active conditions and alarms on the BTI 7000 Series equipment.

Performance monitoring of current and historical PM values for optical amplifiers and optical transceivers can be also retrieved.

Additionally supported is full provisioning, configuration, and status monitoring support for optical amplifiers and optical transceivers.

Inventory retrieval is available with this latest release.

Support is provided for the network management interfaces.

For details about setting up and using SNMP, refer to the *SNMP Reference Guide*.

10.4.2 Modes of TL1 operation

The BTI 7000 Series can communicate with EMS, NMS, and OSS in the following modes:

- Raw TL1 (that is, suitable for machine operators)

- Standard TL1 (that is, suitable for verbose manual operators)

Each mode is selectable through separate port numbers in the IP address. The following table lists the port numbers and describes the difference between the two TL1 communication modes.

Table 10-3 Selectable TL1 communication modes

IP Address	TCP Port	Meaning
w.x.y.z	3082	Port 3082 provides raw TL1 protocol that is faster than standard TL1 protocol. No prompts, echoes, or online help are available.
w.x.y.z	3083	Port 3083 provides the standard TL1 protocol that includes prompts, echoes, and online help.

Note For the IP address, use the address that you have assigned to your IP-NMS port.

11.0 Installing proNX 900 software

This chapter explains how to install the proNX 900 Node Controller (proNX 900) for the BTI 7000 Series and how to set up equipment using the proNX 900.

The chapter topics include the following:

- 11.1, “Installation overview”
- 11.2, “Uninstalling proNX 900 on Microsoft Windows”
- 11.3, “Installing proNX 900 on Microsoft Windows”
- 11.4, “Uninstalling proNX 900 on Linux”
- 11.5, “Installing proNX 900 on Linux”
- 11.6, “Uninstalling proNX 900 on MAC OS X”
- 11.7, “Installing proNX 900 on MAC OS X”
- 11.8, “Troubleshooting installation problems”
- 11.9, “Using the proNX 900”
- 11.10, “Setting up the BTI 7000 Series using the proNX 900”
- 11.11, “Adding user accounts and changing passwords ”

Note	For detailed information about using proNX 900 Node Controller, see the proNX 900 Node Controller Online Help.
-------------	--

11.1 Installation overview

The following sections provide instructions on how to install the proNX 900 Node Controller on your PC's local hard drive or on your UNIX/Linux workstation.

11.1.1 proNX 900 computer requirements

To use proNX 900, a PC or UNIX/Linux workstation must meet the following *minimum* requirements:

- Operating system:
 - Windows®2003 Server
 - Windows® XP
 - Windows® 7
 - Solaris 10
- Windows®-supported browser:
 - Internet Explorer version 6.0 or later
 - Mozilla-based browser version 2 or later
- Solaris-supported browser:
 - Mozilla
 - Netscape
 - FireFox
 - Konqueror
 - Opera
 - Epiphany
- Recommended screen resolution: 1024 x 768 pixels
- Color depth: 256 colors
- Processor:
 - For Windows: Intel® Pentium® Processor (2.0 GHz) or equivalent
 - For Solaris: UltraSPARC III CPU
- 76GB Drive - 300MB free disk space
- 3 GB RAM
- Java VM 1.6 update 20 or later. You can install this yourself, or it can be installed automatically as part of the proNX 900 installation.

11.2 Uninstalling proNX 900 on Microsoft Windows

Use this procedure to uninstall proNX 900 on a computer running Microsoft Windows.

Important Do not uninstall your proNX 900 unless instructed to do so in the upgrade procedures. You must use your existing version of proNX 900 to initiate the NE upgrade, and finish it with the new version of the proNX 900. Also, do not uninstall the existing proNX 900 until all the NEs are upgraded.

Prerequisites

- Log out of and exit proNX 900.

Uninstalling proNX 900 on Windows

Follow these steps to uninstall proNX 900:

Step 1 From the **Start** button, click **All Programs**, then click the **Uninstall** icon under proNX 900.

The **Uninstall proNX 900** window displays.

Step 2 Click the **Uninstall** button

proNX 900 uninstaller starts, and displays the message `All items were successfully uninstalled` when the process is completed.

Step 3 Click **Done**.

You have successfully completed this procedure.

11.3 Installing proNX 900 on Microsoft Windows

Use this procedure to install proNX 900 on a computer running Microsoft Windows.

What you need

- proNX 900 CD-ROM

Prerequisites

Ensure that the computer meets the following minimum requirements:

- Operating system: Windows 2003 Server, Windows XP, or Windows 7
- Recommended minimum screen resolution: 1024 x 768 pixels
- Minimum color depth: 256 colors
- 1 GHz AMD/Intel
- 300 MB minimum of available disk space
- 2 GB minimum of RAM
- If Sun/Oracle Java is not already installed, and you do not want to install proNX 900 with Java, make sure Sun/Oracle Java 1.6 update 10 or later is installed before installing proNX 900.

Installing proNX 900 on Windows

Follow these steps to install proNX 900:

Step 1 Place the CD-ROM in your CD-ROM drive.

Step 2 Open **My Computer** or use Windows Explorer to navigate to your CD-ROM drive.

Step 3 Open the installer file located in the `windows` folder.

You can choose to download proNX 900 that includes a Java VM (**bt_i_proNX900_<release_build number>_VM_install**), or without a Java VM (**bt_i_proNX900_<release_build number>_NoVM_install**).

Step 4 Follow the instructions that appear on the **proNX 900** installer screen.

proNX 900 installer guides you through the following steps:

- **Introduction**
- **Check Existing Versions**

Note Do not uninstall the existing version of proNX 900 until all NEs are upgraded.

- **Choose Install Folder**

Note Do not install a new release of proNX 900 into the folder of the existing version. The new proNX 900 release is installed into a new directory by default. If you make an error while specifying the folder, click **Restore Default Folder** to restore the path specifying the default folder.

- **Choose Shortcut Folder**
- **Pre-Installation Summary**
- **Installing**
- **Install Complete**

You have successfully completed this procedure.

11.4 Uninstalling proNX 900 on Linux

Use this procedure to uninstall proNX 900 on a Linux operating system.

Important Do not uninstall your proNX 900 unless instructed to do so in the upgrade procedures. You must use your existing version of proNX 900 to initiate the NE upgrade, and finish with the new version of the proNX 900. Also, do not uninstall your proNX 900 until all NEs are upgraded.

Prerequisites

- Log out of and exit proNX 900.

Uninstalling proNX 900 on Solaris

Follow these steps to uninstall proNX 900:

Step 1 Open a terminal window and navigate to the directory where proNX 900 is installed.

Step 2 Change directory to the folder Uninstaller Data:

```
cd UninstallerData
```

Step 3 Type the following to start the uninstaller application:

```
./Uninstall
```

The proNX 900 uninstaller application displays the message `Uninstall Complete` when the uninstall process is completed.

You have successfully completed this procedure.

11.5 Installing proNX 900 on Linux

Use this procedure to install proNX 900 on a Linux operating system.

What you need

- proNX 900 CD-ROM

Prerequisites

Ensure that the Linux workstation meets the following minimum requirements:

- Operating System: Linux (CentOS, Fedora, RedHat, Ubuntu)
- Recommended minimum screen resolution: 1024 x 768 pixels
- Minimum color depth: 256 colors
- Minimum 1 GHz CPU
- 300 MB minimum of available disk space
- 2 GB minimum of RAM
- Sun/Oracle Java 1.6

Note For convenience, a Sun/Oracle Java 1.6 VM is provided as part of the installation.

Installing proNX 900 on Linux

Step 1 Place the CD-ROM in the CD-ROM drive, and then navigate to the directory where the CD-ROM drive is mounted.

Step 2 Open the installer file (**bti_proNX900_<release_build number>_VM_install.bin**) located in the `Linux` folder. If you are copying the file to the local machine, ensure the permissions are set appropriately for you to run the script.

Step 3 Follow the instructions that appear on the **proNX 900** installer screen. The **proNX 900** installer guides you through the following steps:

- **Introduction**
- **Check Existing Versions**

Note Do not uninstall the existing version of proNX 900 until all NEs are upgraded.

- **Choose Install Folder**

Note Do not install a new version of proNX 900 into the folder of the existing version. The new version of proNX 900 is installed into a new directory by default. If you make an error while specifying the folder, click **Restore Default Folder** to restore the path specifying the default folder.

- **Choose Link Folder**

This is currently not used.

- **Pre-Installation Summary**
- **Installing**
- **Install Complete**

Step 4 If you are using the provided Java VM installation, do the following:

- a)** Set the \$PATH variable to the Java installation.

In the bash shell, you can do this as follows:

```
# export PATH=$PATH:<proNX installation directory>/jre/bin
```

- b)** Change the permissions on the Java binaries to allow execution.

```
# cd <proNX installation directory>/jre/bin
# chmod ugo+x *
```

- c)** Verify the Java version.

```
# java -version
java version "1.6.0_26"
Java(TM) SE Runtime Environment (build_1.6.0_26-b03)
Java HotSpot(TM) Client VM (build 20.1-b02, mixed mode)
```

You have successfully completed this procedure.

Note To launch the proNX 900, run the proNX900 script:

```
# cd <proNX 900 installation directory>
# ./proNX900
```

11.6 Uninstalling proNX 900 on MAC OS X

Use this procedure to uninstall proNX 900 on a computer running MAC OS X.

Important Do not uninstall your proNX 900 unless instructed to do so in the upgrade procedures. You must use your existing version of proNX 900 to initiate the NE upgrade, and then finish it with the new version of the proNX 900. Also, do not uninstall your proNX 900 until you have upgraded all of your NEs.

Prerequisites

- Log out of and exit proNX 900.

Uninstalling proNX 900 on MAC OS X

Follow these steps to uninstall proNX 900:

Step 1 Navigate to /Applications/BTI.

Step 2 Move the folder `proNX900_<release_build number>` to trash.

You have successfully completed this procedure.

11.7 Installing proNX 900 on MAC OS X

Use this procedure to install proNX 900 on a computer running MAC OS X.

What you need

- proNX 900 CD-ROM

Prerequisites

Ensure that the computer meets the following minimum requirements:

- Operating System: OS X 10.7 or later
- Recommended minimum screen resolution: 1024 x 768 pixels
- Minimum color depth: 256 colors
- 300 MB minimum of available disk space
- 2 GB minimum of RAM
- 1 GHz processor or higher
- Java 1.6 (Java for OS X 2012-006 recommended)

Installing proNX 900 on MAC OS X

Step 1 Place the CD-ROM in the CD-ROM drive.

Step 2 Open the **proNX 900 <release number> <build number>.pkg** file located in the **os x** folder.

Step 3 Follow the instructions that appear on the **proNX 900** installer screen. The **proNX 900** installer guides you through the following steps:

- **Introduction**
- **Destination Select**
- **Installation Type**

Note Check that the install location is "Macintosh HD".

- **Installation**
- **Summary**

You have successfully completed this procedure.

Note To launch proNX 900, navigate to the installation folder (typically / Applications/BTI) and double-click on the **proNX <release number> <build number>** executable.

11.8 Troubleshooting installation problems

An installation log file is available in the installation directory for Windows, UNIX and Linux installations. The log file is titled:

`proNX_900_InstallLog.log`

The log file provides information on the software components that installed successfully or failed to install.

Firewall precaution

If you have the Windows Firewall enabled, a firewall exception must be configured to allow the proNX 900 FTP server to function. The firewall exception should be configured with the javaw executable found in the proNX 900 Installation directory ("`<installation directory>\jre\bin\javaw.exe`").

If you are not using Java VM, then a different Installation directory will be used, depending on how the system is configured.

11.9 Using the proNX 900

The proNX 900 provides a representational view of the system configuration. Information regarding the physical configuration of the shelves and modules is retrievable from the proNX 900.

The *proNX 900 Online Help* provides complete documentation for the application.

Note	Change the font size settings in your web browser, if the font size in the proNX 900 Online Help window is too small.
-------------	---

11.9.1 Starting proNX 900

Prerequisites:

- proNX 900 must be installed.

Step 1 Do one of the following:

- On Windows, click the following:
`Start > Programs > proNX 900 > proNX 900`
- On UNIX, navigate to the default path location for proNX 900:
`./proNX 900/proNX 900`

The **proNX 900 Login** pop-up menu appears.

11.9.2 Logging on to the BTI 7000 Series using proNX 900 over IP network

Follow these steps to log on to the system using proNX 900.

Note	proNX 900 connects to the system through either a craft or management LAN port. For more information, see 10.2, “Establishing a proNX 900 session using Ethernet” .
-------------	---

Step 1 Start proNX 900.

Step 2 In the **Login** dialog, enter the IP address that you want to connect to in the **Network Element** field.

The default IP address of the Management LAN on proNX 900 is 10.0.0.1. The default IP address of the Craft LAN port is 192.168.17.1.

Step 3 In the **User ID** field, enter a valid user ID. The default user ID is `admin`.

Step 4 In the **Password** field, enter a valid password. The default password is `admin`.

Step 5 Click **OK**.

proNX 900 starts and establishes a session with the system.

You have successfully completed this procedure.

11.9.3 Changing default IP address on the BTI 7000 Series

Note Changing the Ethernet port settings may result in temporary loss of contact with the BTI 7000 Series network element.

Step 1 Right-click on the BTI 7000 Series NE in the left navigation tree.

Step 2 Select Edit System.

Step 3 Click the Management Interfaces tab.

Step 4 In the IP address field in the Management Ethernet settings, enter a valid IP address. The address must be valid on the subnet to which the BTI 7000 Series is connected.

Note The IP address is made up of four numbers between 0 and 255 separated by periods. For example, 192.168.172.1

Step 5 Click OK to save your changes.

You have successfully completed this procedure.

11.9.4 Logging off the proNX 900

To log off the proNX 900, choose:

File > Exit proNX 900

In the Exiting proNX 900 Node Controller dialog box, click Yes to close the application and disconnect from the system.

11.10 Setting up the BTI 7000 Series using the proNX 900

This section explains how to set up the BTI 7000 Series using the proNX 900 Node Controller.

Note The proNX 900 does not discover Eservices on BTI software releases earlier than 8.2.

11.10.1 The System ID name

The System ID (SID) is used to identify the Network Element (NE) in a network

Prerequisites

None

Step 1 Right-click on the BTI 7000 Series NE in the left navigation tree.

Step 2 Select Edit System.

Step 3 Click the System tab.

Step 4 Enter a name for the BTI 7000 Series NE in the System ID (SID) field.

Step 5 Click OK to save your changes.

You have successfully completed this procedure.

11.10.2 Time and date

The time is adjusted automatically when the time zone is set. However, if the time setting is not correct, you can manually adjust it. Changing time zones may impact the date and time information contained in the BTI 7000 Series logs.

When the system is originally commissioned for service, the time zone setting defaults to USA Eastern time. The settings for date and time are configured at the time of commissioning:

Setting	Parameter	Value
Time Settings	Time	user configurable
	Time Zone	USAEASTERN
	Adjust Time for Daylight Settings	Yes
Date Settings	Year	user configurable
	Month	user configurable
	Day	user configurable

Prerequisites

None

Step 1 Right-click on the BTI 7000 Series NE in the left navigation tree

Step 2 Select Edit System.

Step 3 Click the Time/Date tab.

Step 4 Make the appropriate changes in the Date and Time Settings.

Step 5 Click OK to save your changes.

You have successfully completed this procedure.

11.11 Adding user accounts and changing passwords

This section provides information and procedures for adding user accounts and changing passwords.

11.11.1 Creating a user profile

Each user profile has a password identifier for authentication purposes. The profile is associated with a defined security authorization level governing the access rights available to the user on the BTI 7000 Series. There are four Security Authorization Levels as defined in the table below.

Note The BTI 7000 Series supports up to 500 userids and up to 24 concurrent sessions. One UID can have only one active session at a time.

Userids

The userid is a unique name used to identify each authorized system user. Userids are between 1 and 10 case-sensitive alphanumeric characters.

Passwords

The password is a confidential code to qualify the user to access the account specified by the userid. Passwords are between 6 and 10 case-sensitive alphanumeric characters. Passwords are a combination of alphanumeric (letters A through Z and a through z; numbers 0 through 9) and special characters. All special characters are supported for passwords except the following: - = ; : ‘ “ , ?

When creating new security parameters, the userid and password must not match each other. For example, the userid “george” cannot have a password of “george”.

Note It is recommended that you change the default password on the administrator’s account (userid is "admin"), after you have logged on to the BTI 7000 Series for the first time. Although the default password for the BTI 7000 Series system is five characters in length, it is required for security reasons to change the default password to between six and ten characters in length.

Security Authorization Levels

The BTI 7000 Series supports the standard operator security authorization levels (also known as privileges) that are defined in Telcordia TR-NWT-835. These levels are defined in the following table:

Table 11-2 Authorization Levels

Authorization Level	Access Rights	Default Timeout
Superuser	Full access to all system operations.	15 min.
Provisioning	Full access to all system operations except security operations.	30 min.

Table 11-2 Authorization Levels (Continued)

Authorization Level	Access Rights	Default Timeout
Maintenance	Full access to all system operations except provisioning and security operations.	45 min.
Surveillance	Read only access.	unlimited

Timeouts

The timeout is a timer that closes an open session based on the timeout value that is set. The range of values are from 5 to 60 minutes. Optionally, a 0 minute timeout can be set for surveillance users. If no timeout value is set, the system uses the default timeout values that are noted in the table above.

Prerequisites

None

- Step 1** Select Administration from the View menu.
- Step 2** Click on Users in the left navigation pane/Select Edit System.
- Step 3** Click the Add button.
- Step 4** To add a new BTI 7000 Series user, enter a userid.
- Step 5** Enter a password. See Userids for more information.
- Step 6** Confirm the password by typing it in again. See Passwords for more information.
- Step 7** Assign a security authorization level to the ID. See Security Authorization Levels for more information.
- Step 8** Enter a timeout value. See Timeouts for more information.
- Step 9** By default, the userid is enabled. If you want to disable the userid, ensure that the No button next to the Login Enabled field is selected.
- Step 10** Click Apply to add the new userid.

You have successfully completed this procedure.

11.11.2 Modifying passwords and privilege levels

You can modify the password of a user profile, change security authorization level or temporarily disable the profile so that the user will not be able to log in with that profile. Disabling a user profile does not delete the user information from the system.

Note When creating new security parameters, the userid and password must not match each other. For example, the userid "george" cannot have a password of "george".

- Step 1** Select Administration from the View menu.
- Step 2** Click on Users in the left navigation pane/Select Edit System.
- Step 3** Click on the userid that you want to modify from the list displayed in the window.
- Step 4** Click the Edit button.
- Step 5** To modify the password of a userid, enter the new password in the New Password field.
- Step 6** Confirm the password by typing it in again in the Confirm New Password field.
- Step 7** To modify the security authorization level, select a level from the Privilege drop-down list.
- Step 8** Assign a security authorization level to the ID.
- Step 9** To disable a user profile, click in the No button next to the Login Enabled field.
- Step 10** Click Apply to save the changes to the user profile.

You have successfully completed this procedure.



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