Part No. 313074-C Rev 00
September 2002

4655 Great America Parkway
Santa Clara, CA 95054

Installing and Maintaining the 8003 Chassis and Components

NORTEL NETWORKS™

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Preface

The Nortel Networks* 8003 Chassis provides the physical enclosure for the 8600 switch modules. When switch modules are installed in the chassis, the resulting 8600 Switch provides a range of data speeds and high-performance switching and routing features.

This guide provides instructions on how to install the 8003 Chassis in an equipment rack and how to install and replace power supplies, modules, gigabit interface converters, media dependent adapters, and the fan tray. This guide also describes some of the routine tasks of operating the 8600 Switch and includes technical specifications for the chassis and modules.

For a list of related publications, see the release notes that accompany your software.

Before you begin

This guide is intended for qualified service personnel who are installing the 8003 Chassis for the first time or who need to install or replace any of the customer-replaceable units (CRUs) in the chassis.

Before you install the 8003 Chassis, be sure that all network wiring has been installed on the premises using standard cable-system practices.

Text conventions

This guide uses the following text conventions:

italic text	Indicates new terms and book title.

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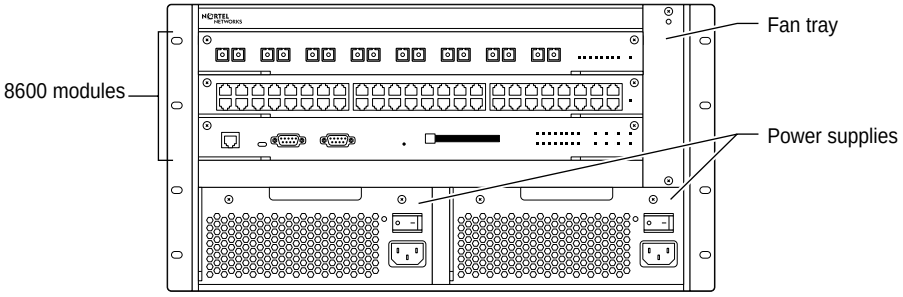
Chapter 1
8003 Chassis hardware components

The 8003 Chassis provides the physical enclosure for 8600 modules. When 8600 modules are installed in the chassis, the resulting 8600 Switch provides high-performance switching and routing functions for the network.

The 8003 Chassis consists of a sheet metal enclosure, a backplane, a power backplane, two bays for AC power supplies, and a fan tray for cooling.

Figure 1 shows the location of customer-replaceable components in the chassis.

Figure 1 8003 Chassis and components



Chassis

The 8003 Chassis provides two slots for installing input/output (I/O) modules and one slot for installing a 8690SF or 8691SF Switch Fabric Module. Slots are numbered from the top down. Slots 1 and 2 allow you to install 8600 I/O modules. Slot 3 is reserved for the 8690SF or 8691SF Switch Fabric Module.

Power supplies

The chassis provides two bays for installing 8003PS AC power supplies.

Each power supply provides 500 watts (W) of output power for the switch. Two power supplies constitute a redundant power configuration for most installed module configurations in the chassis.

Fan tray

A fan tray containing three high-capacity, multispeed fans provides cooling for the chassis. A control/monitor board in the fan tray reports temperature and fan operating status to the network management software. An LED indicates operating status for the fan.

Chapter 2
8600 modules

The 8600 modules provide a full complement of core routing and switching capabilities in a 8003 Chassis. The 8600 modules include a switch fabric module and input/output (I/O) modules. A 8003 Chassis with installed 8600 modules constitutes a 8600 Switch with distributed management and full redundancy that delivers wire-speed routing and layer 2 switching.

The 8600 modules support different types of interfaces with different speeds and port types, including:

- 10/100 megabit per second (Mb/s) autonegotiating twisted pair Ethernet ports
- 100 Mb/s fiber Ethernet ports
- 1000 Mb/s fiber and copper Ethernet ports
- 10,000 Mb/s fiber Ethernet ports
- ATM OC-3c/STM-1, OC-12c/STM-4, and DS-3 ports
- POS OC-3c/STM-1 and OC-12c/STM-4 ports

This chapter includes the following topics:

Table 1 lists the maximum port densities available with each type of 8600 I/O module in the 8003 Chassis.

Table 1 Maximum port densities for 8600 modules

Module type	Port type	Maximum number of ports
8608GBE or 8608GBM	1000BASE-SX	16
	1000BASE-LX	16
	1000BASE-ZX	16
	1000BASE-XD	16
	1000BASE-CWDM	16
8608GTE or 8608GTM	1000BASE-T	16
8608SXE	1000BASE-SX	16
8616GTE	1000BASE-T	32
8616SXE	1000BASE-SX	32
8624FXE	100BASE-FX	48
8632TXE or 8632TXM	10BASE-T/100BASE-TX	64
	1000BASE-SX	4
	1000BASE-LX	4
	1000BASE-ZX	4
	1000BASE-XD	4
	1000BASE-CWDM	4
8648TXE or 8648TXM	10/100 Mb/s	96
8672ATME or 8672ATMM[1]	OC-3c MDA	16
	OC-12c MDA	4
	DS-3 MDA	8
8681XLR	10GBASE-LR	2
8681XLW	10GBASE-LW	2
8683POSM[2]	OC-3c MDA	12
	OC-12c MDA	6

1 For information about MDA choices for the 8672ATME/8672ATMM Modules, see “8672ATME and 8672ATMM Modules” on page 49.

2 For information about MDA choices for the 8683POSM Module, see “8683POSM Module” on page 56.

Local storage of forwarding data allows the forwarding engine to resolve addresses and to forward packets through the switch fabric without CPU intervention. The forwarding engine also filters packets against current prioritization policies and can set prioritization information in the internal packet header.

The backplane forwarding module is equipped with eight priority queues per port. You can use either of the following two prioritization schemes:

- Strict priority
- Weighted Round Robin (WRR)

Strict priority guarantees the highest priority. WRR gives priority based on a round robin algorithm. For more information on prioritization schemes see *Network Design Guidelines*.

Output buffer memory consists of 8 MB of memory allocated to each Gigabit Ethernet port or shared among eight 10/100 ports.

For the 8681XLR and the 8681XLW Modules, output buffer memory consists of 64 MB of memory allocated to the port.

The front end of the module contains the physical layer devices, including the optical transceivers and the MAC controllers.

8608GBE and 8608GBM Modules

The 8608GBE Module is a 32K records module.

Note: If one, or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode (128K records mode). For instructions on enabling or disabling MMode, see *Platform and System Management*.

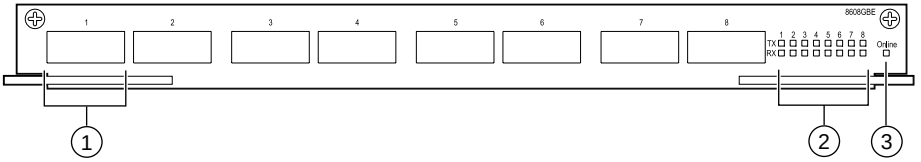
The 8608GBM Module is a 128K records module which allows support for large layer 2 and layer 3 configurations. The 8608GBM module will only operate with 8000 Series software release 3.3 and later.

For 128K record support the following configurations are required:

- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults back to 32K mode.
- All modules installed in the chassis must support 128K records (M modules) running 3.3 and later software.
- MMode (128K records mode) must be enabled. If one or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode. For instructions on enabling MMode, see *Platform and System Management*.

Both the 8608GBE and 8608GBM Modules (Figure 2) provide eight bays for installing any of five types of gigabit interface converters (GBICs). The fiber ports on the GBICs allow you to make riser connections, server attachments, or interswitch links.

Figure 2 8608GBE/8608GBM Module



1 = GBIC bay
2 = Port link LEDs
3 = Module Online LED

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The following five types of GBICs are available:

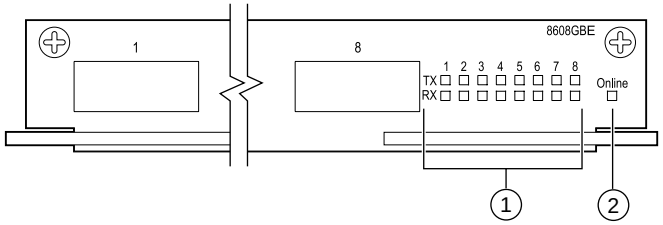
- 1000BASE-CWDM
- 1000BASE-SX
- 1000BASE-LX
- 1000BASE-ZX
- 1000BASE-XD

Note: Only GBICs qualified by Nortel Networks are supported for use in the 8608GBE or 8608GBM modules. For specific model numbers, refer to the Nortel Networks price list.

For more information about the GBICs and instructions to install them, refer to Chapter 6, “Installing gigabit interface converters,” on page 99.

Figure 3 shows the location of the LEDs on the 8608GBE/8608GBM Module.

Figure 3 8608GBE/8608GBM Module LEDs



1 = Port TX and RX LEDs
2 = Module Online LED

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Table 2 describes the operation of the LEDs on the 8608GBE/8608GBM Module.

Table 2 8608GBE/8608GBM Module LEDs

Type	Label	Color/State	Meaning
Module	Online	Green/Steady	The module has completed its power-on self-test and software initialization and is operating normally.
		Amber/Steady	The module failed its power-on self-test.
		Off	The switch power is off. or The power has been turned on and the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.
Port	TX	Green/Blinking	The port is transmitting data.
		Amber/Steady	A fault condition exists on the line or attached remote device.
		Off	The port has not detected a fault condition.
	RX	Green/Steady	The port has established a link and is enabled.
		Green/Blinking	The port is receiving data.
		Amber/Steady	The port has either no optical signal or no link synchronization.
		Off	The port has signal but no link.

8608GTE and 8608GTM Modules

The 8608GTE Module is a 32K records module.

Note: If one, or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode (128K records mode). For instructions on enabling or disabling MMode, see *Platform and System Management*.

The 8608GTM Module is a 128K records module which allows support for large layer 2 and layer 3 configurations. The 8608GTM module will only operate with 8000 Series software release 3.3 and later.

For 128K record support the following configurations are required:

- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults back to 32K mode.
- All modules installed in the chassis must support 128K records (M modules) running 3.3 and later software.
- MMode (128K records mode) must be enabled. If one or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode. For instructions on enabling MMode, see *Platform and System Management*.

Both the 8608GTE and 8608GTM Modules provide eight 1000BASE-T, copper gigabit ports (Figure 4). Each port operates in 1000 Mb/s full-duplex mode and supports the IEEE 802.3 1998 Clause 28 autonegotiation and remote fault identification when the connected device also supports autonegotiation.

Figure 4 8608GTE/8608GTM Module

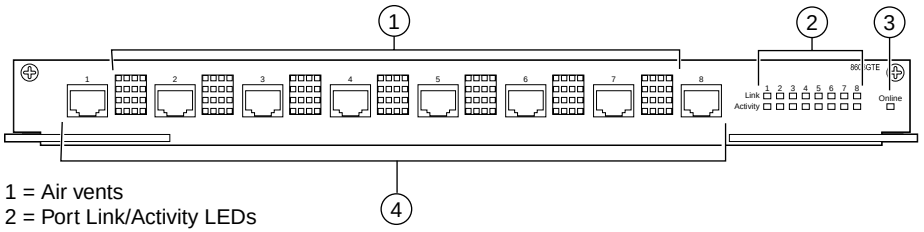
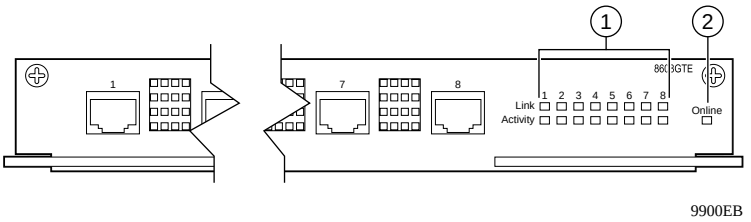


Figure 5 shows the location of the 8608GTE/8608GTM Module LEDs.

Figure 5 8608GTE/8608GTM Module LEDs



1 = Port Link and Activity LEDs
2 = Module Online LED

Table 3 describes the operation of the LEDs on the 8608GTE/8608GTM Module.

Table 3 8608GTE/8608GTM Module LEDs

Type	Label	Color/State	Meaning
Port	Link	Off	The port is disabled or has no link.
		Green/Steady	The port has established a link and is enabled.
		Amber/Steady	This port is connected, but an error condition is detected.
	Activity	Green/Blinking	The port is receiving data. NOTE: As port utilization increases this LED may blink so fast that it appears to be steady.
Module	Online	Off	The module power is off., or the power has been turned on, and the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.
		Green/Steady	The module has completed its power-on self-test and software initialization and is operating normally.
		Amber/Steady	The module failed its power-on self-test.
		Amber/Blinking	The module has been inserted into the chassis, and diagnostics are running.

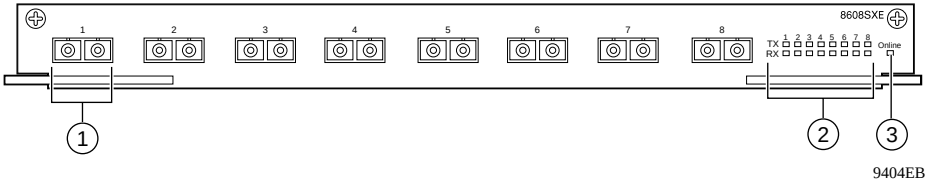
8608SXE Module

The 8608SXE Module (Figure 6) is a 32K records module.

Note: If one, or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode (128K records mode). For instructions on enabling or disabling MMode, see *Platform and System Management*.

The 8608SXE Module provides eight 1000BASE-SX (850 nm, shortwave, Gigabit Ethernet) ports for riser connections, server attachments, or interswitch links. The shortwave optical transceivers provide transmission ranges up to 260 meters (m) using 62.5 µm multimode fiber cable or up to 440 m using 50 µm multimode fiber cable.

Figure 6 8608SXE Module

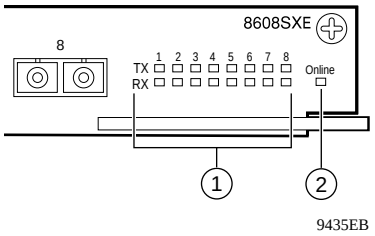


1 = 1000BASE-SX port
2 = Port TX and RX LEDs
3 = Module Online LED

The 8608SXE Module supports standards-based full-duplex operation only.

Figure 7 shows the location of the 8608SXE Module LEDs.

Figure 7 8608SXE Module LEDs



1 = Port TX and RX LEDs
2 = Module Online LED

Table 4 describes the operation of the LEDs on the 8608SXE Module.

Table 4 8608SXE Module LEDs

Type	Label	Color/State	Meaning
Port	TX	Green/Blinking	The port is transmitting data.
		Amber/Steady	A fault condition exists on the line or attached remote device.
		Off	The port has not detected a fault condition.
	RX	Green/Steady	The port has link and is enabled.
		Green/Blinking	The port is receiving data.
		Amber/Steady	The port has either no optical signal or no link synchronization.
		Off	The port has signal but no link.
Module	Online	Green/Steady	The module has completed its power-on self-test and software initialization and is operating normally.
		Amber/Steady	The module failed its power-on self-test.
		Off	The switch power is off, or the power has been turned on and the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.

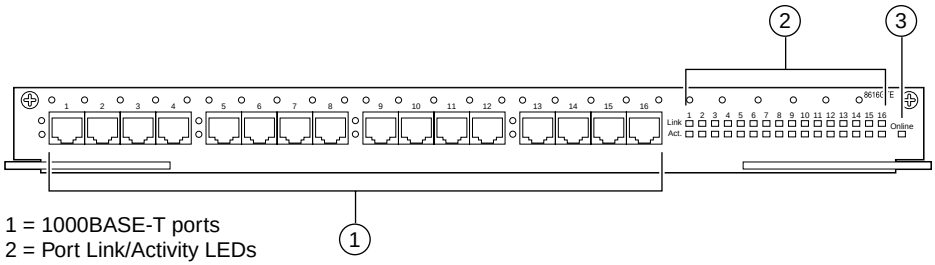
8616GTE Module

The 8616GTE Module (Figure 8) is a 32K records module.

Note: If one, or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode (128K records mode). For instructions on enabling or disabling MMode, see *Platform and System Management*.

The 8616GTE Module provides sixteen 1000BASE-T, copper gigabit ports. Each port operates in 1000 Mb/s full-duplex mode and supports the IEEE 802.3 2000 standard.

Figure 8 8616GTE Module

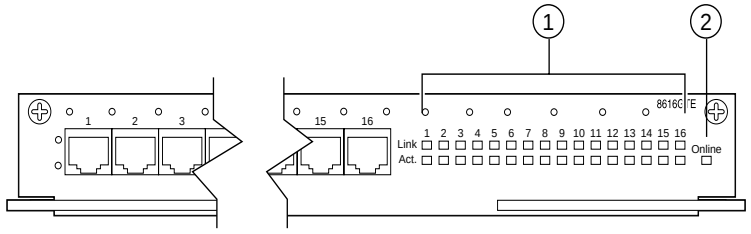


1 = 1000BASE-T ports
2 = Port Link/Activity LEDs
3 = Module Online LED

10528EB

Figure 9 shows the location of the 8616GTE Module LEDs.

Figure 9 8616GTE Module LEDs



1 = Port Link/Activity LEDs
2 = Module Online LED

10529EB

Table 5 describes the 8616GTE Module LEDs.

Table 5 8616GTE Module LEDs

Type	Label	Color/State	Meaning
Port	Link	Green/Steady	The port has established a link and is enabled.
		Amber/Steady	The port is connected, but an error condition is detected.
		Off	The port is disabled or has no link.
	Activity	Green/Blinking	The port is receiving data. NOTE: As port utilization increases this LED may blink so fast that it appears to be steady.
Module	Online	Green/Steady	The module has completed its power-on self-test and software initialization and is operating normally.
		Amber/Steady	The module failed its power-on self-test.
		Amber/Blinking	The module has been inserted into the chassis and diagnostics are running.
		Off	The module power is off, or the power has been turned on, and the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.

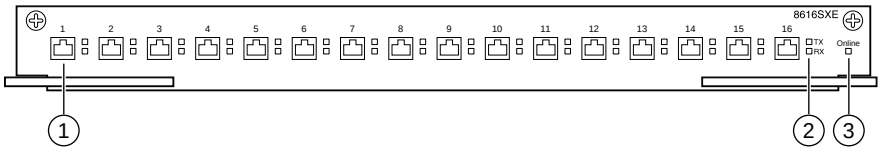
8616SXE Module

The 8616SXE Module (Figure 10) is a 32K records module.

Note: If one, or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode (128K records mode). For instructions on enabling or disabling MMode, see *Platform and System Management*.

The 8616SXE Module provides 16 1000BASE-SX ports (850 nm, short wavelength, Gigabit Ethernet) for riser connections, server attachments, or interswitch links. The shortwave optical transceivers provide transmission ranges up to 275 meters (m) using 62.5 µm multimode fiber cable or up to 550 m using 50 µm multimode fiber cable.

Figure 10 8616SXE Module



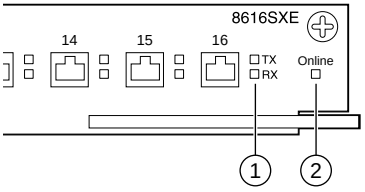
10049EA

1 = 1000BASE-SX port
2 = Port TX and RX LEDs
3 = Module Online LED

The 8616SXE Module supports standards-based 1000 Mb/s full-duplex operation only.

Figure 11 shows the location of the 8616SXE Module LEDs.

Figure 11 8616SXE Module LEDs



10052EA

1 = Port TX and RX LEDs
2 = Module Online LED

Table 6 describes the operation of the 8616SXE Module LEDs.

Table 6 8616SXE Module LEDs

Type	Label	Color/State	Meaning
Port	TX	Green/Blinking	This port is transferring data.
		Off	There is no port activity.
	RX	Green/Steady	The port has established a link and is enabled.
		Green/Blinking	The port is receiving data.
		Amber/Steady	The port has either no optical signal or no link synchronization.
		Off	The port has a signal but no link.

Table 6 8616SXE Module LEDs

Type	Label	Color/State	Meaning
Module	Online	Green/Steady	The module has completed its power-on self-test and software initialization and is operating normally.
		Amber/Steady	The module failed its power-on self-test.
		Off	The switch power is off. or The power has been turned on and the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.

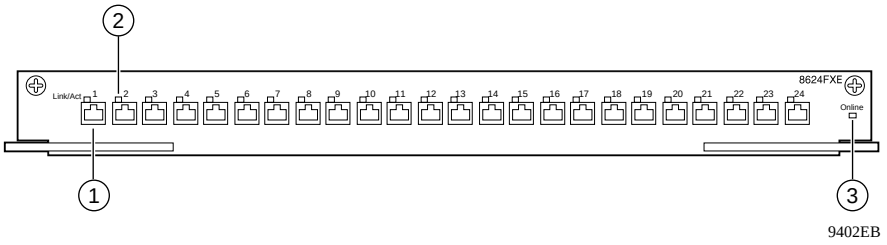
8624FXE Module

The 8624FXE Module (Figure 12) is a 32K records module.

Note: If one, or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode (128K records mode). For instructions on enabling or disabling MMode, see *Platform and System Management*.

The 8624FXE Module provides 24 100BASE-FX ports that can operate in full-duplex mode. The optical transceivers used in the module provide transmission ranges of up to 6562 ft (2 km) using 62.5 µm multimode fiber cable.

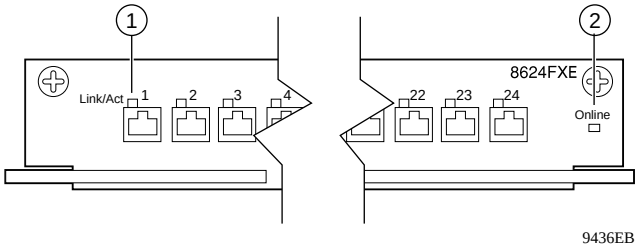
Figure 12 8624FXE Module



1 = 100BASE-FX port
2 = Port LED
3 = Module Online LED

Status LEDs (Figure 13) indicate port and module operating conditions.

Figure 13 8624FXE Module LEDs



1 = Port Link/Activity LEDs
2 = Module Online LED

Table 7 describes the operation of the 8624FXE Module LEDs.

Table 7 8624FXE Module LEDs

Type	Label	Color/State	Meaning
Module	Online	Green/Steady	The module has completed its power-on self-test and software initialization and is operating normally.
		Amber/Steady	The module failed its power-on self-test.
		Off	The switch power is off. or The power has been turned on and the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.
Port	Link/Act	Green/Steady	The port is connected, and the link is good.
		Green/Blinking	Data is passing through this port.
		Amber/Steady	A fault condition exists at the far end of the connection.
		Amber/Blinking	A fault condition exists at the far end of the connection, and the port is sending or receiving.
		Off	The port is not connected, or it is connected but has no link.

8632TXE and 8632TXM Modules

The 8632TXE Module is a 32K records module.

Note: If one, or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode (128K records mode). For instructions on enabling or disabling MMode, see *Platform and System Management*.

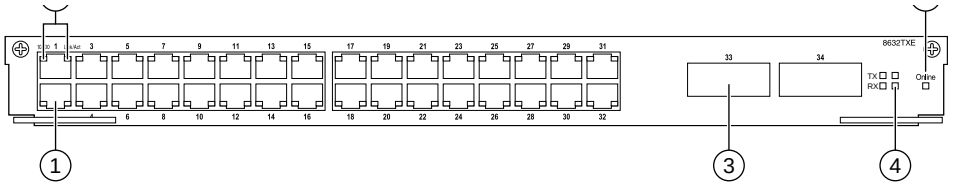
The 8632TXM Module is a 128K records module which allows support for large layer 2 and layer 3 configurations. The 8632TXM module will only operate with 8000 Series software release 3.3 and later.

For 128K record support the following configurations are required:

- The chassis must include at least one 8691SF CPU module.If the chassis includes a 8690SF module, the mode defaults back to 32K mode.
- All modules installed in the chassis must support 128K records (M modules) running 3.3 and later software.
- MMode (128K records mode) must be enabled. If one or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode. For instructions on enabling MMode, see *Platform and System Management*.

Both the 8632TXE and 8632TXM Modules (Figure 14) provide 32 autonegotiating 10BASE-T/100BASE-TX ports with RJ-45 connectors. In addition, two bays allow you to install 1000BASE-X gigabit interface converters (GBICs).

Figure 14 8632TXE/8632TXM Module



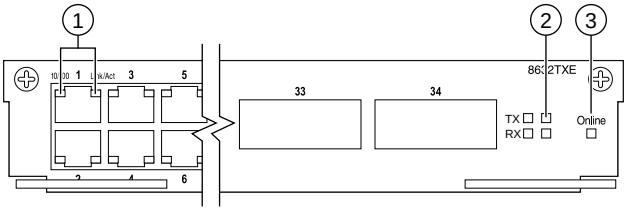
1 = 10/100 Mb/s port
2 = Port LEDs: 10/100 (speed), link/activity
3 = GBIC bay
4 = GBIC TX and RX LEDs
5 = Module online LED

10458EA

The 8632TXE and 8632TXM Module ports support the IEEE 802.3u autonegotiation standard. Each port can operate in full- or half-duplex mode. When a port is connected to another device that also supports the IEEE 802.3u standard, the two devices negotiate the best speed and duplex mode of operation.

Figure 15 shows the location of the 8632TXE/8632TXM Module LEDs.

Figure 15 8632TXE/8632TXM Module LEDs



1 = Port LEDs: 10/100 (speed), link/activity
2 = GBIC TX and RX LEDs
3 = Module online LED

10459EA

Table 8 describes the operation of the LEDs on the 8632TXE/8632TXM Module.

Table 8 8632TXE/8632TXM Module LEDs

Type	Label	Color/State	Meaning
Module	Online	Green/Steady	The module has completed its power-on self-test and software initialization and is operating normally.
		Amber/Steady	The module failed its power-on self-test.
		Off	The switch power is off. or The power has been turned on and the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.
Port	10/100	Green/Steady	This port is operating at 100 Mb/s.
		Off	This port is operating at 10 Mb/s.
	Link/Act	Green/Steady	This port is connected, and the link is good.
		Green/Blinking	Data is passing through this port.
		Off	The port is disabled or has no link.
GBIC	TX	Green/Blinking	The port is transmitting data.
		Amber/Steady	A fault condition exists on the line or attached remote device.
		Off	The port has not detected a fault condition.
	RX	Green/Steady	The port has link and is enabled.
		Green/Blinking	The port is receiving data.
		Amber/Steady	The port has either no optical signal or no link synchronization.

8648TXE and 8648TXM Modules

The 8648TXE Module is a 32K records module.

Note: If one, or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode (128K records mode). For instructions on enabling or disabling MMode, see *Platform and System Management*.

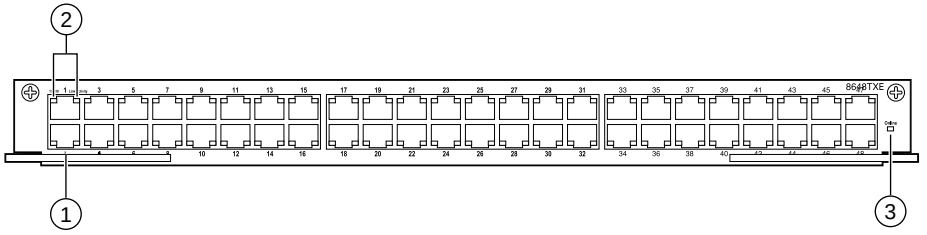
The 8648TXM Module is a 128K records module which allows support for large layer 2 and layer 3 configurations. The 8648TXM module will only operate with 8000 Series software release 3.3 and later.

For 128K record support the following configurations are required:

- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults back to 32K mode.
- All modules installed in the chassis must support 128K records (M modules) running 3.3 and later software.
- MMode (128K records mode) must be enabled. If one or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode. For instructions on enabling MMode, see *Platform and System Management*.

Both the 8648TXE and 8648TXM Modules (Figure 16) provide 48 autonegotiating 10/100 Mb/s ports. Each port can operate in full- or half-duplex mode. Autonegotiation circuitry automatically negotiates the highest possible data rate and the duplex operation possible with the attached device, if the attached device supports IEEE 802.3u autonegotiation.

Figure 16 8648TXE/8648TXM Module



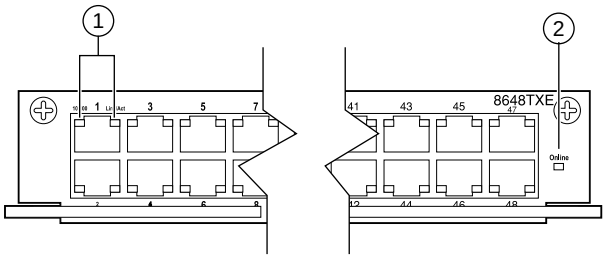
1 = 10/100BASE-T Port
2 = Port LEDs: 10/100 (speed)
Link/Activity
3 = Module Online LED

The port connectors are modular RJ-45 connectors with MDI-X wiring. You can connect these ports to an MDI port (for example, a workstation or server) using a straight-through cable.

Note: For 10 Mb/s connections, you can use Category 3, 4, or 5 copper unshielded twisted pair (UTP) cable. Use only Category 5 UTP cable to connect ports that will operate at 100 Mb/s.

Figure 17 shows the location of the 8648TXE/8548TXM Module LEDs.

Figure 17 8648TXE/8648TXM Module LEDs



1 = Port LEDs: 10/100 (speed)
Link/Activity
2 = Module Online LED

Table 9 describes the operation of the LEDs on the 8648TXE/8648TXM Module.

Table 9 8648TXE/8648TXM Module LEDs

Type	Label	Color/State	Meaning
Module	Online	Green/Steady	The module has completed its power-on self-test and software initialization and is operating normally.
		Amber/Steady	The module failed its power-on self-test.
		Off	The switch power is off. or The power has been turned on and the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.
Port	10/100	Green/Steady	The port is operating at 100 Mb/s.
		Off	The port is operating at 10 Mb/s.
	Link/Act	Green/Steady	The port is connected, and the link is good.
		Green/Blinking	Data is passing through this port.
		Off	The port is disabled or has no link.

8672ATME and 8672ATMM Modules

The 8672ATME Module is a 32K records module.

Note: If one, or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode (128K records mode). For instructions on enabling or disabling MMode, see *Platform and System Management*.

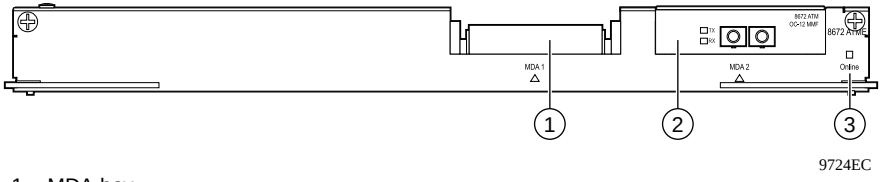
The 8672ATMM Module is a 128K records module which allows support for large layer 2 and layer 3 configurations. The 8672ATMM module will only operate with 8000 Series software release 3.3 and later.

For 128K record support the following configurations are required:

- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults back to 32K mode.
- All modules installed in the chassis must support 128K records (M modules) running 3.3 and later software.
- MMode (128K records mode) must be enabled. If one or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode. For instructions on enabling MMode, see *Platform and System Management*.

Both the 8672ATME and 8672ATMM Modules (Figure 18) have two bays for installing ATM MDAs. These MDAs provide network transmission that supports RFC 1483 routed and bridged PVCs. Both the 8672ATME and 8672ATMM Modules support SONET and SDH frame structures for data.

Figure 18 8672ATME/8672ATMM Modules with an OC-12c/STM-4 MDA



1 = MDA bay
2 = Installed MDA
3 = Module Online LED

The modules require at least one of the following MDAs:

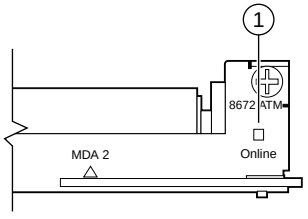
- 1-port OC-12c/STM-4: SMF or MMF using the Synchronous Optical Network (SONET) or Synchronous Digital Hierarchy (SDH) media
- 4-port OC-3c/STM-1: SMF or MMF using SONET or SDH media
- 2-port DS-3

For more information about the MDAs for the 8672ATME and 8672ATMM Modules, see Chapter 7, “Installing media dependent adapters in 8600 modules,” on page 103.

You can use the 8672ATME or 8672ATMM Modules as an edge device for WAN connectivity in the data center to connect a 8600 Switch to public or private ATM networks. In the wiring closet, this module provides interbuilding connections for campus networks where each building is supported by frame-switched networks. You can use up to two 8672ATME or 8672ATMM Modules in one 8003 Chassis.

An Online LED indicates overall module status for the 8672ATME and 8672ATMM Modules (Figure 19). The MDAs have LEDs to indicate port status. For more information about these LEDs, refer to Table 24 on page 105.

Figure 19 8672ATME/8672ATMM Modules LED



1 = Module Online LED

Table 10 describes the Online LED for the 8672ATME/8672ATMM Modules.

Table 10 8672ATME/8672ATMM Module Online LED

Color/State	Meaning
Green	The module is receiving power and ready to receive and transmit traffic.
Amber	The module is initializing and performing diagnostic self-tests.
Off	The module is offline and not receiving power.

See *Using the 8672ATME and 8672ATMM Modules* for a description of how to configure the 8672ATME or 8672ATMM Module using the Command Line Interface (CLI) or Device Manager.

8681XLR Module

The 8681XLR Module is a 128K records module which allows support for large layer 2 and layer 3 configurations. This module only operates with 8000 Series software release 3.3 and later.

For 128K record support the following configurations are required:

- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults back to 32K mode.
- All modules installed in the chassis must support 128K records (M modules) running 3.3 and later software.
- MMode (128K records mode) must be enabled. If one or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode. For instructions on enabling MMode, see *Platform and System Management*.

The 8681XLR Module (Figure 20) consists of a printed circuit board with status LEDs, and one 10GBASE-LR 1310nm 10 gigabit Ethernet serial LAN port. The 10GBASE-LR port (10.3 Gb/s LAN PHY) operates in full-duplex mode and provides transmission ranges of up to 10 km using 9/125 µm single-mode fiber cable.

You can use up to two 8681XLR Modules in one 8003 Chassis.

Figure 20 8681XLR Module

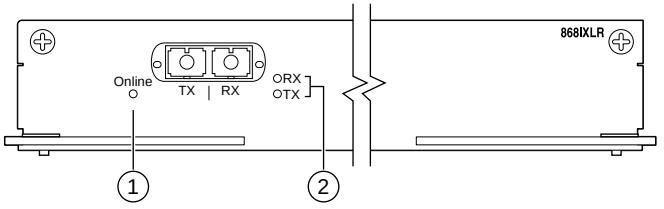
1 = Online LED
2 = 10GBASE LR port
3 = Port RX and TX LEDs

10548EA

Figure 21 shows the location of the LEDs.

Note: Unlike other 8600 Modules, the TX LED for the 8681XLR and 8681XLW Modules is located below the RX LED.

Figure 21 8681XLR Module LEDs



1 = Online LED
2 = Port RX and TX LEDs

10550EA

Table 11 describes the 8681XLR Module LEDs.

Table 11 8681XLR Module LEDs

Type	Label	Color/State	Meaning
Port	TX	Green/Steady	The port is enabled but not transmitting data.
		Green/Blinking	The port is transmitting data.
		Off	The port transmit is disabled.
	RX	Green/Steady	The port has a link and is enabled.
		Green/Blinking	The port is receiving data.
		Amber/Steady	The port has an error.
		Off	The port is disabled or has no link.
Module	Online	Green/Steady	The module has completed its power-on self-test and software initialization and is operating normally.
		Amber/Steady	The module slot is disabled.
		Off	The switch power is off, or the power has been turned on and the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.

8681XLW Module

The 8681XLW Module is a 128K records module which allows support for large layer 2 and layer 3 configurations. This module only operates with 8000 Series software release 3.3 and later.

For 128K record support the following configurations are required:

- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults back to 32K mode.
- All modules installed in the chassis must support 128K records (M modules) running 3.3 and later software.
- MMode (128K records mode) must be enabled. If one or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode. For instructions on enabling MMode, see *Platform and System Management*.

The 8681XLW Module (Figure 22) consists of a printed circuit board with status LEDs, and one 10GBASE-LW 1310nm 10 gigabit Ethernet serial WAN port. The 10GBASE-LW port (9.95 Gb/s WAN PHY) operates in full-duplex mode and provides transmission ranges of up to 10 km using 9/125 µm single-mode fiber cable.

You can use up to two 8681XLW Modules in one 8003 Chassis.

Figure 22 8681XLW Module

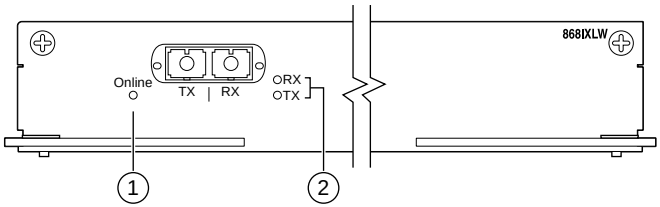
1 = Online LED
2 = 10GBASE LW port
3 = Port RX and TX LEDs

10547EA

Figure 23 shows the location of the 8681XLW Module LEDs.

Note: Unlike other 8600 Modules, the TX LED for the 8681XLR and 8681XLW Modules is located below the RX LED.

Figure 23 8681XLW Module



1 = Online LED
2 = Port RX and TX LEDs

10549EA

Table 12 describes the 8681XLW Module LEDs.

Table 12 8681XLW Module LEDs

Type	Label	Color/State	Meaning
Port	TX	Green/Steady	The port is enabled but not transmitting data.
		Green/Blinking	The port is transmitting data.
		Off	The port transmit is disabled.
	RX	Green/Steady	The port has a link and is enabled.
		Green/Blinking	The port is receiving data.
		Amber/Steady	The cable is disconnected, the port is disabled, the link is down, or SONET errors are detected.
Module	Online	Green/Steady	The module has completed its power-on self-test and software initialization and is operating normally.
		Amber/Steady	The module slot is disabled.
		Off	The switch power is off, or the power has been turned on and the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.

8683POSM Module

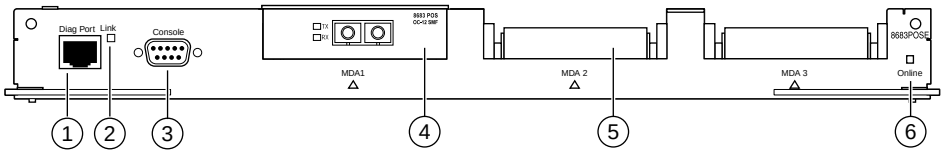
The 8683POSM Module is a 128K records module which allows support for large layer 2 and layer 3 configurations. This module only operates with 8000 Series software release 3.3 and later.

For 128K record support the following configurations are required:

- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults back to 32K mode.
- All modules installed in the chassis must support 128K records (M modules) running 3.3 and later software.
- MMode (128K records mode) must be enabled. If one or more modules installed in the chassis is a 32K records module, these modules will be disabled if the chassis is configured to operate in MMode. For instructions on enabling MMode, see *Platform and System Management*.

The 8683POSM Module (Figure 24) has three bays for installing Packet Over SONET (POS) MDAs. These MDAs provide WAN support to the Passport 8000 Series product line by allowing access to Synchronous Optical Network (SONET) services in the metropolitan area. Where multiple campuses exist in a single metropolitan area, you can connect these campuses without compromising performance or increasing complexity.

Figure 24 8683POSM Module with an OC-12c MDA



1 = Diag port
2 = Link LED
3 = Console port
4 = Installed MDA
5 = MDA bay
6 = Online LED

10352EB

To operate, each module requires at least one of the following MDAs:

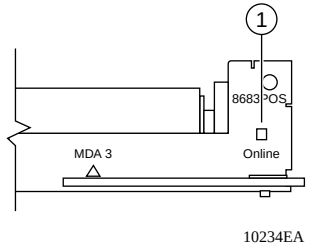
- 1-port OC-12c/STM-4: single-mode fiber or multimode fiber using SONET media
- 2-port OC-3c/STM-1: single-mode fiber or multimode fiber using SONET media

For more information about the MDAs for the 8683POSM Module, see Chapter 7, “Installing media dependent adapters in 8600 modules,” on page 103.

The 8683POSM Module supports a mixture of OC-3c/STM-1 and OC-12c/STM-4 lines. For example, you can put an OC-12c/STM-4 MDA into the first bay and OC-3c/STM-1 MDAs into the two remaining bays. This module supports up to six I/O OC-3c/STM-1 lines and up to three I/O OC-12c/STM-4 lines. You can use up to two 8683POSM Modules in one 8003 Chassis.

An Online LED indicates overall module status for the 8683POSM Module (Figure 25). The MDAs have LEDs to indicate port status. For more information about these LEDs, refer to Table 29 on page 109.

Figure 25 8683POSM Module LED



1 = Module Online LED

Table 13 describes the Online LED on the 8683POSM Module.

Table 13 8683POSM Module LED

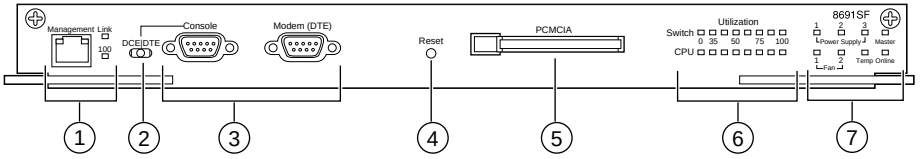
Color/State	Meaning
Green	The module is receiving power and ready to receive and transmit traffic.
Amber	The module is initializing and performing diagnostic self-tests.
Off	The module is offline and not receiving power.

See *Using the 8683POSM Module* for a description of how to configure the 8683POSE Module using the Command Line Interface (CLI) or Device Manager.

8691SF Module

The 8691SF Module (Figure 26) provides the core switching fabric for the 8600 Switch, as well as a CPU subsystem and a real-time clock. The core switching fabric switches all traffic through the 8600 modules. The CPU subsystem manages the switching fabric and the I/O modules.

Figure 26 8691SF Module



1 = Management port and LEDs
2 = DCE/DTE switch
3 = Console and Modem ports
4 = Reset button
5 = PCMCIA card slot
6 = Utilization LEDs
7 = Module status LEDs

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The 8691SF Module fits into slot 3 in the 8003 Chassis. The 8691SF Module hardware features include status LEDs, a Management port, a Console port, a Modem port, a DCE/DTE switch for the Console port, a Reset button, and a PCMCIA card slot.

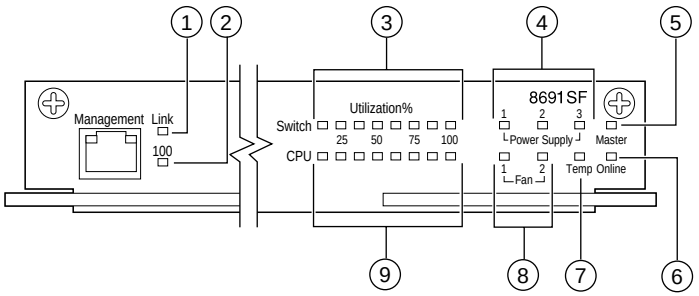
The CPU subsystem uses a PowerPC CPU and 64 megabytes (MB) of synchronous dynamic random access memory (SDRAM). The 8691SF Module contains 16 MB of onboard flash memory, used to store the image file, and 2 MB of boot memory (ROM).

The routing switch fabric uses 10 MB of shared, high-speed memory. This memory buffers traffic destined for I/O modules. The switch logic allocates memory to the various switch priority queues according to traffic usage and current switch configuration.

LEDs

Figure 27 shows the location of the LEDs on the 8691SF Module.

Figure 27 8691SF Module LEDs



1 = Link LED
2 = Port speed LED
3 = Switch Utilization LEDs
4 = Power supply status LEDs
5 = Master LED
6 = Online LED
7 = Temp LED
8 = Fan LEDs
9 = CPU Utilization LEDs

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The Switch and CPU LEDs serve as a bar graph to indicate card activity. The Switch bar graph increases as the switch fabric utilization increases. The CPU bar graph increases when the CPU is actively performing tasks, such as learning media access control (MAC) addresses, updating routing tables, or interacting with the device management station.

Table 14 describes the operation of the LEDs on the 8691SF Module.

Table 14 8691SF Module LEDs

Label	Color/State	Meaning
Link	Green/Steady	The Management port is connected, and the link is good.
	Off	There is no link to the Management port.
100	Green/Steady	The Management port is operating at 100 Mb/s.
	Off	The Management port is operating at 10 Mb/s.
Switch Utilization (8 LEDs)	Green	The number of lit LEDs indicates the utilization level of the switch fabric as follows: 1 LED = 10 Mb/s 5 LEDs = 10 Gb/s 2 LEDs = 100 Mb/s 6 LEDs = 20 Gb/s 3 LEDs = 1 Gb/s 7 LEDs = 40 Gb/s 4 LEDs = 5 Gb/s 8 LEDs = 64 Gb/s
CPU Utilization (8 LEDs)	Green	The number of lit LEDs indicates the level of CPU activity as follows: 1 LED = 12% 5 LEDs = 60% 2 LEDs = 24% 6 LEDs = 72% 3 LEDs = 36% 7 LEDs = 84% 4 LEDs = 48% 8 LEDs = 100%
Power Supply 1, 2, 3	Green/Steady	The specified power supply is operating normally.
	Amber/Steady	The specified power supply has a fault.
	Off	A power supply is not present in the specified position, or the power supply in the specified position is not turned on.
Fan 1, 2	Green/Steady	The specified fan is operating normally.
	Amber/Steady	The specified fan has failed.
Temp	Green/Steady	The temperature is normal for switch operation.
	Amber/Steady	The maximum operating temperature has been exceeded.
Master	Green/Steady	The CPU subsystem on the module is performing diagnostics.
	Green/Blinking	This module is providing active CPU functions for the switch and is the master CPU module.
	Amber/Steady	The CPU subsystem is in a fault state.
	Off	The CPU subsystem on the module is up and in standby mode.
Online	Green/Steady	The switch fabric portion of the module is online and is load-sharing.
	Amber/Steady	The switch fabric portion of the module has failed diagnostics.
	Off	The switch fabric portion of the module is offline.

Ethernet Management port

The Ethernet Management port on the 8691SF Module is an MDI 10/100BASE-T port that allows out-of-band management of the swich using a Web browser or Device Manager. You can also establish a Telnet or SSH (Secure Shell) session to access the CLI. You can use this port to connect the switch to a network management station. The port has its own IP address but does not participate with the switching fabric.

Note: This port should be used only as a management port. It provides out-of-band management for the 8691SF Module.

DCE/DTE switch

The DCE/DTE switch changes the pin assignments on the Console port and allows you to designate the connector as either DTE or DCE. For information about pin assignments for the Console port, refer to “Console serial port” on page 164.

Serial ports

The 8691SF Module provides two serial ports for attaching modem or console devices. The Console port provides terminal access to the 8691SF Module to use the CLI. The Modem port allows you to connect a standard modem for out-of-band, dial-up management. For information about pin assignments for these ports, refer to “Console serial port” on page 164 and “Modem serial port” on page 165.

Reset button

The recessed Reset button on the module allows you to perform a hard reset or reboot of the system.

PCMCIA card slot

The PCMCIA card slot on the 8691SF Module accepts an ATA-type, SanDisk*-compatible flash memory card. This memory card provides a convenient way to store switch configurations and boot images. Using a memory card, you can quickly transfer configurations and images between multiple switches or store multiple configurations for a single switch.

Memory cards that will work in the 8691SF module also include the following cards:

- Modem cards that are compatible with Intel* 8250 or National 16552 serial ports
- LAN cards from 3Com* 589, 562, or 556 equipment

Note: You cannot use the Accelar 1200 memory card in 8600 Switch equipment.

Chapter 3
Installing the 8003 Chassis

This chapter describes how to install the 8003 Chassis in any EIA standard 19-inch equipment rack or on a sturdy table or shelf. The chapter includes the following topics:

Preparing to install the 8003 Chassis

Before beginning the installation, verify that:

- Your shipment is complete and undamaged.
- You have the cables, tools, and other equipment that you need.
- Your installation site meets the physical, electrical, and environmental requirements described in “Site requirements” on page 68.

The sections that follow provide information to help you prepare for installation.

Shipment contents

Inspect all items for shipping damage. If you detect any damage, do not install the 8003 Chassis. Call the Nortel Networks Technical Solutions Center in your area (see “How to get help” on page 22).

In addition to the 8003 Chassis, your shipping container contains several hardware accessories. Verify that the items in the shipping container match those on the shipment packing list.

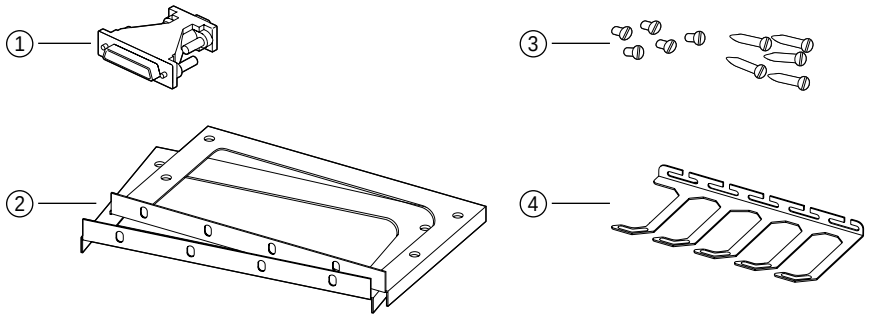
Use Table 15 as a checklist when verifying the contents of the shipping container.

Table 15 8003 Chassis package contents

Check	Accessory	Use to
	Bracket kit containing: • Two rack-mounting brackets • Flat-head screws	Prepare chassis for installation in an equipment rack.
	Screw package	Mount the chassis in an equipment rack.
	One side cable management brackets	Manage network interface cables.
	Cable adapter	Connect an optional management console.

Figure 28 illustrates the items in the 8003 Chassis shipping container.

Figure 28 Items in the 8003 Chassis shipping container



1 = Cable adapter
2 = Rack mounting brackets
3 = Screws for brackets and equipment rack
4 = Cable guide

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Supplying equipment

You might need items that are not included in the accessory package. Before installing the hardware, ensure that you have all the cables, tools, and other equipment that you need.

Management console

To configure startup options and to monitor the results of startup diagnostics, you can attach an optional PC, laptop, VT-100 console or equivalent, such as a PC terminal emulator. Or you can attach an AT-compatible modem to allow dial-in access to startup configuration and diagnostics.

Cables

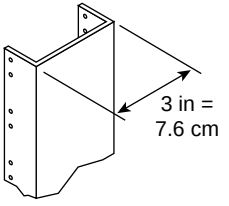
Unless you specifically ordered them, the cables required for your network configuration are not included in the 8003 Chassis accessory package. If you do not have the proper cables, contact your network administrator.

Hardware for mounting the chassis in an equipment rack

To install the chassis in an equipment rack, you need a Phillips screwdriver and a rack that meets the following specifications:

- Heavy-duty steel construction
- Electronic Industries Association (EIA) standard hole-spacing
- Equipment rack with width of 19 in. (48.26 cm) and depth of 24 in. (60.96 cm)
- Side rail dimensions as shown in Figure 29.

Figure 29 Side rail dimensions for equipment racks



Site requirements

Ensure that the installation site meets the space, electrical, and environmental requirements listed in this section. See Appendix A, “Chassis technical specifications,” on page 141 for more information.

Space requirements

The installation site must provide sufficient free space around the 8003 Chassis to ensure proper ventilation and access for servicing

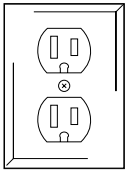
Use the following guidelines to plan front and rear access:

- The maintenance aisle in front of the frame requires a clearance of 76.2 cm (30 inches).
- The wiring aisle at the back of the frame requires a clearance of 61 cm (24 inches).

AC input electrical requirements

The installation site must meet the following electrical requirements for AC power (Table 16). (For additional electrical requirements, see Appendix A, “Chassis technical specifications,” on page 141.) .

Table 16 Wall receptacle requirements for AC power

Country	Receptacle	Voltage
United States and Canada	National Electrical Manufacturers Association (NEMA) 5-15P standard receptacle  10405EA	100-120 V
Any other country	For installation outside of North America, make sure that you have the proper power cord for your country.	100-240 V

Environmental requirements

The installation site must meet the following environmental requirements (Table 17).

Table 17 Environmental requirements

Altitude	Humidity	Temperature
0-10,000 ft (0-3048 m)	5%-85%, noncondensing	41°–104° F (5°–40°C), stable

Installing the chassis

When you are ready to install the 8003 Chassis, you can do one of the following:

- Position the chassis on a flat, sturdy, horizontal surface.
- Mount the chassis in a standard equipment rack.

Note: To make the chassis lighter during the installation, you can remove the module filler panels (page 84), power supply filler panels (page 77), or the fan tray (page 122).

Installing the chassis on a flat surface

When positioning the 8003 Chassis on a flat surface, make sure that the surface is large enough for the chassis to operate properly and sturdy enough to support the combined weight of the chassis, its components and any cables that you attach to it (110 pounds or 49.5 kilograms).

Mounting the 8003 Chassis in an equipment rack

To mount the 8003 Chassis in an equipment rack, you need the following equipment:

- A standard 19-inch equipment rack. If the rack does not have threaded rail holes, you must attach the cagenuts shipped with the 8003 Chassis.

Note: If you are mounting the 8003 Chassis in a 23-inch equipment rack, refer to the rack manufacturer's 19-inch-to-23-inch rack adapter installation instructions.

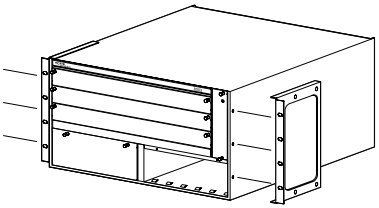
- Ten screws and washers (supplied with the chassis)
- A Phillips screwdriver

In a 7-foot equipment rack, you can install seven 8003 Chassis.

To install the 8003 Chassis in a 19-inch equipment rack:

1 Hold each rack-mounting bracket against one side of the chassis (Figure 30). Align the attachment holes in the bracket with the holes in the chassis.

Figure 30 Positioning the rack-mounting brackets



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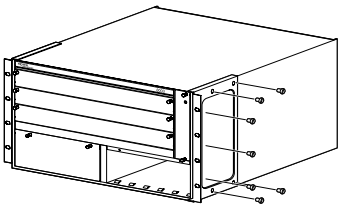
2 Insert and tighten the supplied flat-head screws to fasten each bracket to the chassis (Figure 31).

Figure 31 Attaching the rack-mounting brackets to the chassis



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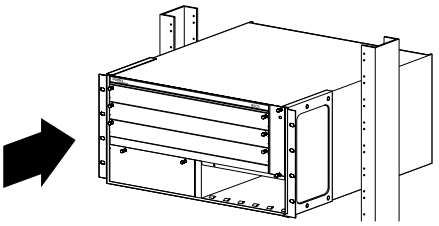
3 Measure 6 rack units (10.5 in.) of free vertical space inside the rack and mark the spot.

4 Slide the chassis into the rack (Figure 32).

Figure 32 Sliding the chassis into the rack



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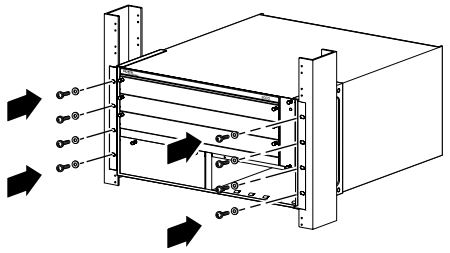
5 Holding the chassis in position, align the flanged end of each mounting bracket with two holes on each side of the vertical rack support.

6 Insert and tighten the rack-mounting screws (Figure 33).

Figure 33 Securing the chassis to the rack



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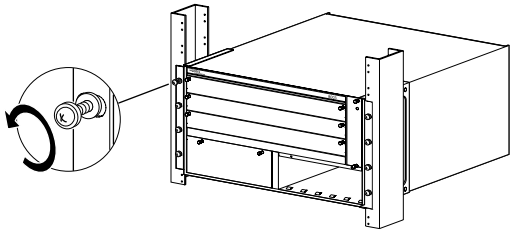
Installing the cable guide

The cable guide keeps cable clusters fastened out of the way but accessible for maintenance activities. Attach the cable guide to the left side of the chassis so the bundled cables will not obstruct airflow to the right side of the chassis.

To install the cable guide:

1 Loosen, but do not remove, the rack-mounting screws needed to install the cable guide (Figure 34).

Figure 34 Loosening the rack-mounting screws



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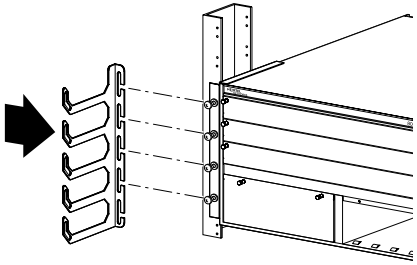
2 Slide the guide onto the loosened screws (Figure 35).

Figure 35 Sliding the cable guide onto the screws



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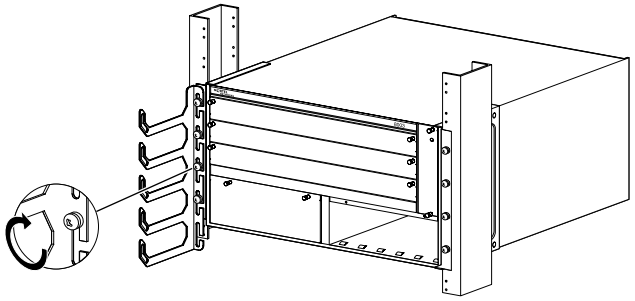
3 Tighten the screws to secure the guide to the chassis (Figure 36).

Figure 36 Securing the cable guide to the chassis



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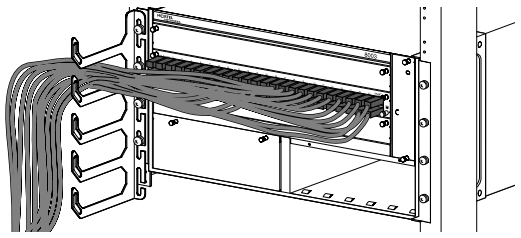
4 When you connect cables to installed modules in the chassis, route them through the cable guide (Figure 37).

Figure 37 Routing cables through the cable guide



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Chapter 4
Installing power supplies

This chapter describes how to install or replace the power supply and includes the following topics:

Power supply features

The 8003 Chassis operates with an AC input power source. The 8003 Chassis contains one or two 8003AC power supplies (Figure 38).

Figure 38 8003AC Power Supply

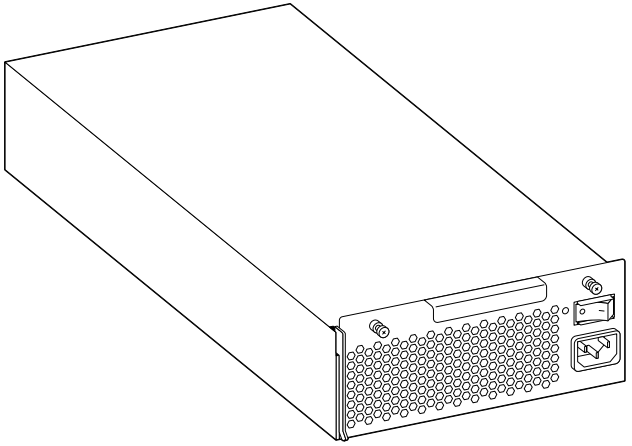


Table 18 describes the LED on the power supply.

Table 18 Power supply LED

State	Meaning
Off	No output is present.
On (green)	Power supply output is normal.

The 8003 Chassis is shipped with no installed power supplies. Install the first power supply in the leftmost bay. (Power supply bays are numbered 1 and 2 left to right as viewed from the front of the chassis.) An optional second power supply provides redundancy and high-availability operation.

If a chassis has a redundant power configuration, you can hot-swap one power supply while the chassis continues to operate with no interruption of service. .

Note: When you plug the power cord for each power supply into a separate AC circuit, a redundant power supply also provides protection against the disconnection or failure of an individual circuit or power source.

If a chassis has only one power supply and the power supply fails, the system loses power and network connectivity

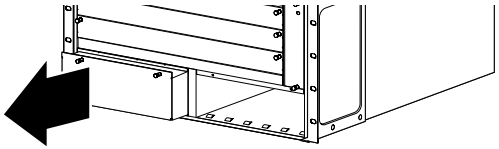
Removing and installing a power filler panel

A power filler panel maintains the proper cooling airflow in the 8003 Chassis. When you install a power supply, you must first remove the power filler panel from the power bay. If you remove a power supply from the 8003 Chassis without replacing it, you must install a power filler panel.

To remove a power filler panel:

1. Using a Phillips screwdriver, loosen the 2 captive screws that fasten the power filler panel to the chassis until the screws are free of the threads in the chassis frame.
2. Pull the filler panel out of the 8003 Chassis (Figure 39).

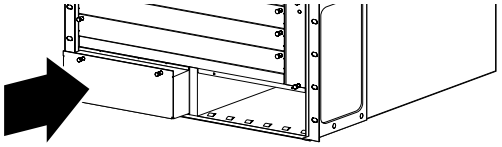
Figure 39 Removing a power filler panel



To install a power filler panel:

1. Place the power filler panel over the empty power supply bay (Figure 40).
2. Tighten the two captive screws until the power filler panel is seated firmly.

Figure 40 Installing a power filler panel



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Installing an AC power supply

You can install a second AC power supply with the power on or off. You should replace a failed power supply as soon as possible to restore high-availability operation.

To install an AC power supply:

1. Remove the filler panel from the power supply bay if necessary.

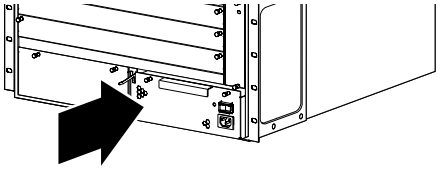
   For instructions, see "Removing and installing a power filler panel" on page 77.

2. If you are replacing a failed power supply, remove the failed supply.

   For instructions, see "Removing an AC power supply" on page 80.

3. Grasp the handle of the new power supply.
4. Push the power supply firmly into the bay (Figure 41).

Figure 41 Installing the AC power supply



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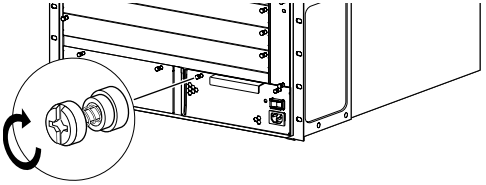
5. Tighten the retaining screws (Figure 42).

Figure 42 Tightening the power supply retaining screws



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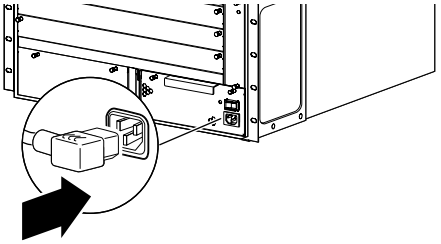
6 With the AC power switch off, connect the power cord to the power supply and to an AC power outlet that is on a circuit with no other equipment connected to it (Figure 43).

Connect each power supply in the chassis to a separate AC circuit.

Figure 43 Connecting the power cord to the AC power supply



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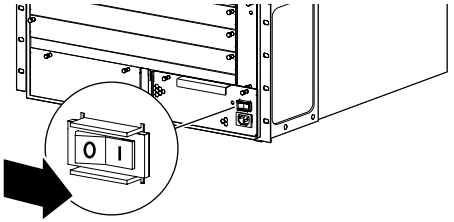
7 Turn on the power switch (Figure 44).

Figure 44 AC power supply switch on



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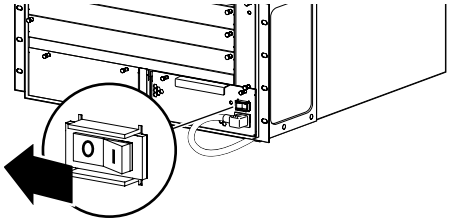
Removing an AC power supply

You can remove a redundant power supply without affecting the operation of the 8600 Switch. When you remove a power supply, the LED on the power supply turns off, and the 8003 Chassis automatically redistributes the load to the remaining power supply.

To remove a power supply:

1 Turn off the power switch on the supply you are replacing (Figure 45).

Figure 45 AC power supply switch off



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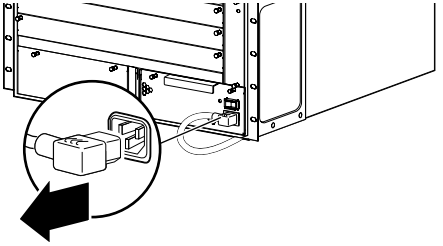
2 Disconnect the power cord from the power outlet and from the power supply (Figure 46).

Figure 46 Disconnecting the AC power cord



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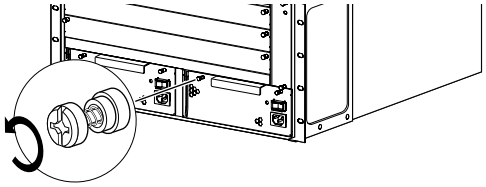
3 Loosen the retaining screws on the power supply (Figure 47).

Figure 47 Loosening the power supply retaining screws



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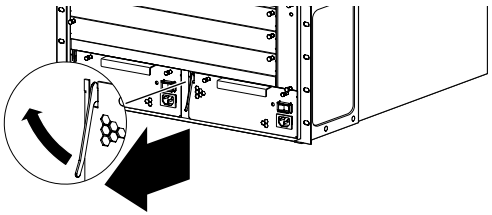
4 Lift the extractor lever to disconnect the power supply from the backplane (Figure 48).

Figure 48 Removing the power supply from the chassis



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5 Pull the power supply out of the chassis (Figure 48).

6 Install a new power supply (see “Installing an AC power supply” on page 78) or install a power filler panel (see “Removing and installing a power filler panel” on page 77).

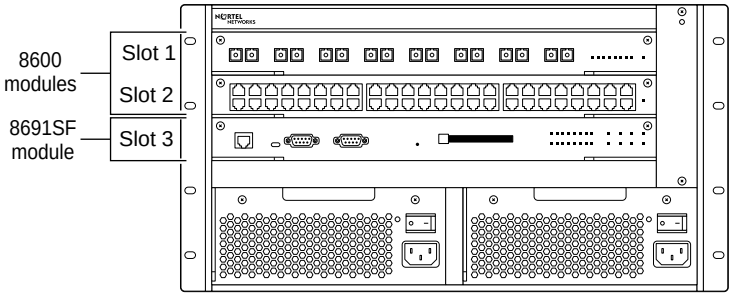
Chapter 5
Installing 8600 modules and connecting equipment

This chapter provides instructions for installing and connecting 8600 modules in a 8003 Chassis to create a 8600 Switch. This chapter includes the following topics:

Location of the 8000 Series modules

Figure 49 shows the location of the 8000 Series modules in a 8003 Chassis. For descriptions of these modules, see Chapter 2, “8600 modules.”

Figure 49 Location of the 8000 Series modules



Removing and installing a filler panel

Nortel Networks ships the 8003 Chassis with a filler panel covering each empty module slot.

Before you can install a new module, you must remove the appropriate filler panel. For instructions, see the next section, "Removing a filler panel."

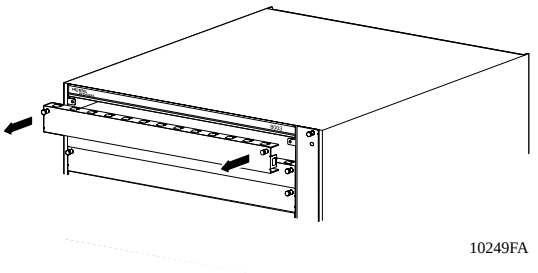
If you need to install a filler panel, see "Installing a filler panel" on page 85.

Removing a filler panel

To remove a filler panel:

1. Using a Phillips screwdriver, loosen the 2 captive screws that fasten the filler panel to the chassis (Figure 50).

Figure 50 Removing a filler panel



2 Pull the filler panel away from the slot.

Installing a filler panel

If you plan to remove a module from the chassis without immediately replacing it, you must install a filler panel in the slot.

To install a filler panel:

1 Locate the slot where you want to install the filler panel.

2 Set the filler panel over the slot.

3 Tighten the 2 screws with a Phillips screwdriver.

Installing and replacing a module

Take all possible precautions to prevent static discharge damage when you work with printed circuit boards. Place each module on a grounded antistatic mat until you are ready to install the module. If you do not have an antistatic mat, wear a discharge leash or wrist strap to free yourself of static before touching any of the modules, or free yourself of static by touching the metal chassis before you handle the module.

Caution: The Passport 8000 Series equipment uses electronic components that are sensitive to static electricity. Static discharge from your clothing or other fixtures around you, even at levels that do not create a spark, can cause damage.

You can add or replace a module with the power on or off.

To replace a module, see the next section, “Removing a module.” To install a module, see “Installing a 8600 module” on page 88.

Warning: Fiber optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to a light source.

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Removing a module

You can remove any 8600 module from an operating switch chassis without turning off the chassis power.

Caution: Before you remove the 8691SF Module, back up your configuration.

After you remove or replace a module in your chassis, you can expect the following results:

- If you remove an I/O module from an operating switch without turning off the chassis power and replace it with the same type module, the system restores the configuration.
- If you remove a 8672ATME, 8672ATMM, or 8683POSM module from an operating switch without turning off the chassis power and the module you insert has the same type MDAs installed as the module which was removed, the system saves the configuration.
- If you remove a 8672ATME, 8672ATMM, or 8683POSM module from an operating switch without turning off the chassis power and the module you insert has different MDAs installed than the module which was removed, you must reconfigure the module. Nortel Networks recommends that you save the original configuration in a file for future use.
- If you replace a module with a different type module, the system discards the configuration of the old ports, and the new ports are added to either the default VLAN or a null VLAN, depending on the operating mode of the switch.

- If you save the configuration in nonvolatile random access memory (NVRAM), turn off the switch, replace a module with a different module type, and turn the system on again, the system discards the configuration of the old ports, add adds new ports to either the default VLAN or an unassigned VLAN, depending on the operating mode of the switch.
- If you replace a 8691SF Module, all the other modules in the chassis reset and revert to their saved configuration settings. If configuration settings for a module were not saved, the module reverts to its factory default settings.

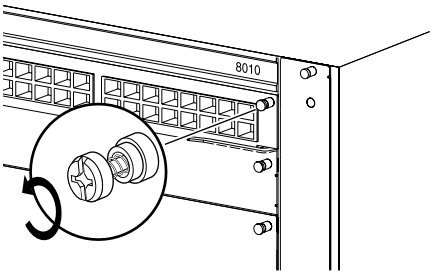
To remove a module:

1 Disconnect any cables attached to the ports on the module.

Caution: Do not operate the 8600 Switch with an empty module slot. If you need to replace a failed module and you do not yet have a replacement module, leave the failed module installed or install a filler panel.

2 Using a Phillips screwdriver, loosen the captive screws securing the module to the chassis (Figure 51).

Figure 51 Loosening screws on the module



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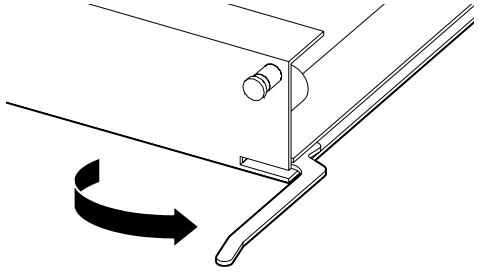
3 Rotate the insert/extract levers to eject the module from the chassis (Figure 52).

Figure 52 Ejecting the module from the chassis



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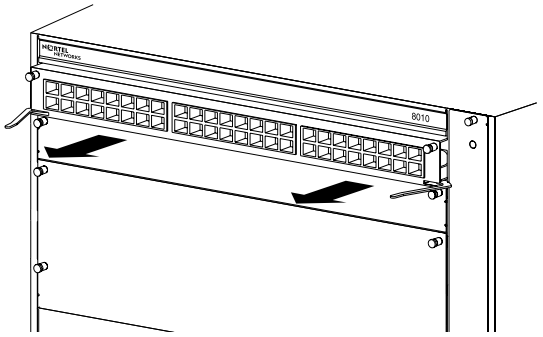
4 Slide the module out of the chassis (Figure 53).

Figure 53 Removing a module



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5 If you are installing a replacement module, go to the next section. Otherwise, install a filler panel (see "Installing a filler panel" on page 85).

Installing a 8600 module

You can install a 8600 module with the power on or off. If you install a module into the same chassis slot where the same type of module was previously installed, the previous configuration is maintained for the new module in that slot. In all other cases, a module installed in a 8003 Chassis is reset to factory defaults.

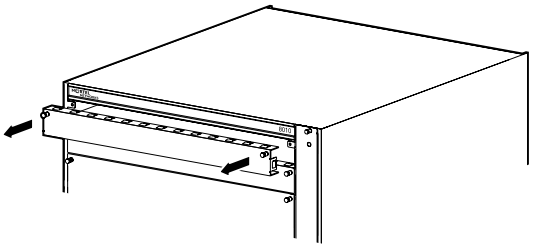
Caution: Electrostatic discharge can damage hardware. Review the antistatic precautions on page 85.

To install a 8600 module:

1 Locate the slot where you want to install the module.

2 Remove the filler panel (Figure 54).

Figure 54 Removing a filler panel



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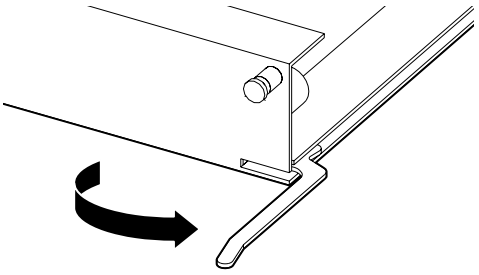
3 Make sure that the insert/extract levers are extended away from the front of the module (Figure 55).

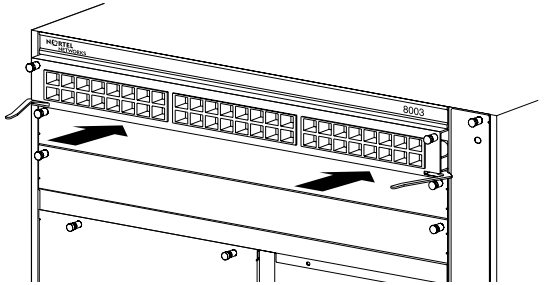
Figure 55 Insert/extract levers in extended position



9397FA

4 Slide the module into the slot using the slot module guides (Figure 56).

Figure 56 Installing a 8600 module



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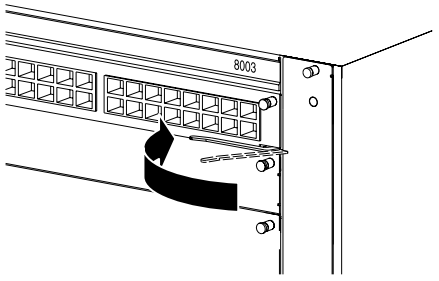
5 Slide the module into the chassis until its connector panel touches the chassis back panel.

6 Rotate the insert/extract levers to seat the module backplane connectors (Figure 57).

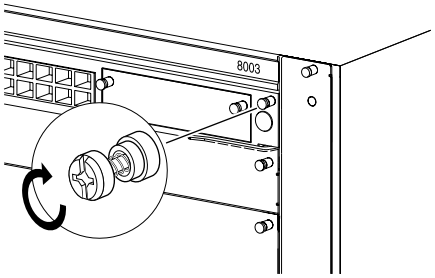
Figure 57 Seating the backplane connectors



10251FA

7 Using a Phillips screwdriver, tighten the 2 captive screws to secure the module to the chassis (Figure 58).

Figure 58 Securing the module in the chassis



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Note: Make sure that both screws are tight for proper module operation.

After you install the modules, connect console equipment and network cables. For instructions, see these sections:

- "Connecting a PC or terminal to the console port" on page 92
- "Connecting a modem" on page 93
- "Connecting a network management station to the switch" on page 93
- "Connecting communications cables to 8600 modules" on page 95

Connecting a PC or terminal to the console port

You use Device Manager or the command line interface (CLI) to customize your 8600 Switch configuration (for example, by editing IP parameters). To establish a local CLI or Device Manager session, you must connect a PC, laptop, or a VT-100 terminal to the console port on the 8691SF Module.

To connect a PC, laptop, or terminal to the console port, you need a serial console cable with a 9-pin receptacle connector. See "Console serial port" on page 164 for a list of pin assignments.

To connect a PC, laptop, or terminal to the console port:

1. Turn on and configure the terminal or a communications port on the PC, using the parameters in Table 19.

   See the PC or terminal user manual for instructions.

Table 19 PC and terminal parameters

Parameter	Value
Baud rate	9600
Data bits	8
Stop bits	1
Parity	None

2. Insert the 9-pin receptacle end of the console cable into the console connector on the 8691SF Module.
3. Attach the 9-pin plug end of the cable to the serial communications port on the back of the PC or terminal.

Connecting a network management station to the switch

The management port on the 8691SF Module is a 10/100 Mb/s Ethernet port implemented on an RJ-45 connector wired as an MDI connection. You can use this port to connect the switch to a network management station for out-of-band management of the switch using a Web browser or Device Manager.

The port has its own IP address but does not switch traffic to other ports in the chassis.

Note: For 10 Mb/s connections, you can use Category 3, 4, or 5 copper unshielded twisted pair (UTP) cable. Use only Category 5 UTP cable to connect ports that will operate at 100 Mb/s.

To connect a UTP cable to the management port, insert the cable into the RJ-45 receptacle connector on the 8691SF Module.

Connecting a modem

If you need remote dial-in access to the CLI, you can connect a modem (AT or Hayes compatible) to the 8691SF Module using a serial cable.

To connect a modem to the 8600 Switch:

1 Turn on and configure the modem, using the parameters in Table 20.

See the modem documentation for instructions.

Table 20 Modem settings

Setting	Value
Clear to send (CTS) signal	On
Data terminal ready (DTR) signal	Modem will only connect if the DTR signal is present. If the DTR signal is not present, the modem will disconnect.
Data carrier detect (DCD) or received line signal detection (RLSD)	On while the carrier is present. The switch uses DCD to detect modem connect and disconnect.

Table 20 Modem settings

Setting	Value
Data set ready (DSR) signal	On
Ready to send (RTS) signal	Ignored
Synchronous/asynchronous mode	Asynchronous
Auto answer	Answer on two rings when DTR is active.
Local character echo	Off
Supervisory functions	Off
Baud rate	9600
Data bits	8
Stop bits	1
Parity	None

2 Insert the 9-pin receptacle end of the serial cable into the modem connector on the 8691SF Module.

3 Insert the 25-pin plug connector at the other end of the serial cable into the modem's RS-232 data communications port.

Connecting communications cables to 8600 modules

Gather the communications equipment and cables that you will attach to the 8600 modules. If you do not have the proper cables, contact your network administrator. Table 21 lists the cable requirements for the 8600 modules..

Table 21 Connectors and cables for 8600 modules

Module	Port	Connector	Recommended cable type	Minimum cable length	Maximum cable length
8608GBE or 8608GBM	1000 Mb/s Ethernet port	Duplex SC fiber optic connector	Depends on installed GBIC model; for specifications, see "GBICs" on page 147.		Depends on installed GBIC model; for specifications, see "GBICs" on page 147
8608GTE or 8608GTM	1000BASE-T Ethernet ports	RJ-45	EIA Category 5 or better UTP/STP straight-through cable. Cables must use all four pairs.	7 ft (2.1 m)	328 ft (100 m)
8608SXE	1000BASE-SX Ethernet ports	Duplex SC	62.5 µm multimode fiber optic cable	None	722 ft (220 m) @ 160 MHz/km bandwidth 902 ft (275 m) @ 200 MHz/km bandwidth
			50 µm multimode fiber optic cable	None	1640 ft (500 m) @ 400 MHz/km bandwidth 1804 ft (550 m) @ 400 MHz/km bandwidth
8616GTE	1000BASE-T Ethernet ports	RJ-45	EIA Category 5 or better UTP/STP straight-through cable. Cables must use all four pairs.	7 ft (2.1 m)	328 ft (100 m)

Table 21 Connectors and cables for 8600 modules (continued)

Module	Port	Connector	Recommended cable type	Minimum cable length	Maximum cable length
8616SXE	1000BASE-SX Ethernet ports	MT-RJ	62.5 µm multimode fiber optic cable	None	722 ft (220 m) @ 160 MHz/km bandwidth 902 ft (275 m) @ 200 MHz/km bandwidth
			50 µm multimode fiber optic cable	None	1640 ft (500 m) @ 400 MHz/km bandwidth 1804 ft (550 m) @ 400 MHz/km bandwidth
8624FXE	100BASE-FX Ethernet ports	MT-RJ	62.5 µm multimode fiber optic cable	None	6562 ft (2 km)
8632TXE or 8632TXM	1000 Mb/s Ethernet port	Duplex SC	Depends on installed GBIC model; for specifications, see"GBICs" on page 147 .	None	Depends on installed GBIC model; for specifications, see "GBICs" on page 147.
	10/100 Mb/s Ethernet ports	RJ-45 wired as MDI-X	EIA Category 3, 4, or 5 UTP for 10 Mb/s operation; EIA Category 5 required for 100 Mb/s operation	None	328 ft (100 m)
8648TXE or 8632TXM	10/100 Mb/s Ethernet ports	RJ-45 wired as MDI-X	EIA Category 3, 4, or 5 UTP for 10 Mb/s operation; EIA Category 5 required for 100 Mb/s operation	None	328 ft (100 m)
8672ATME OC-3	OC-3	MT-RJ	9/125 µm single-mode fiber optic cable	None	9.3 mi (15 km)
	OC-3	MT-RJ	62.5/125 µm multimode fiber optic cable	None	1.24 mi (2 km)
8672ATME OC-12	OC-12	Duplex SC	9/125-µm single-mode fiber optic cable	None	9.3 mi (15 km)
	OC-12	Duplex SC	62.5/125 µm multimode fiber optic cable	None	1640 ft (500 m)
8672ATME DS-3	DS-3	BNC	75 ohm coaxial cable	None	450 ft (137 m)

Table 21 Connectors and cables for 8600 modules (continued)

Module	Port	Connector	Recommended cable type	Minimum cable length	Maximum cable length
8681XLR	10GBASE-LR port	Duplex SC	9/125 µm single-mode fiber optic cable	None	6.2 mi (10 km)
8681XLW	10GBASE-LW port	Duplex SC	9/125 µm single-mode fiber optic cable	None	6.2 mi (10 km)
8683POSM OC-3	OC-3	MT-RJ	9/125 µm single-mode fiber optic cable	None	9.3 mi (15 km)
	OC-3	MT-RJ	62.5/125 µm multimode fiber optic cable	None	1.24 mi (2 km)
8683POSM OC-12	OC-12	Duplex SC	9/125-µm single-mode fiber optic cable	None	9.3 mi (15 km)
	OC-12	Duplex SC	62.5/125 µm multimode fiber optic cable	None	1640 ft (500 m)
8691SF	Ethernet Management port	RJ-45	EIA Category 3, 4, or 5 UTP for 10 Mb/s operation; EIA Category 5 required for 100 Mb/s operation	None	328 ft (100 m)
	Serial ports	DB-9	RS-232		

Note: Ports on the 8632TXE and 8648TXE Modules are wired as MDI-X. Use straight-through cables to connect these ports to MDI connections such as workstations or servers. Use crossover cables to connect these ports to other MDI-X connections such as hubs or other switches.

Chapter 6
Installing gigabit interface converters

Gigabit interface converters (GBICs) are hot-swappable I/O enhancement components that link Gigabit Ethernet ports to fiber optic networks.

This chapter describes how to install GBICs in the following 8600 modules that support GBICs:

- 8608GBE Module
- 8608GBM Module
- 8632TXE Module
- 8632TXM Module

This chapter does not describe how to install coarse wavelength division multiplexing (CWDM) GBICs in 8000 Series modules. To install the CWDM GBICs and the optical routing system, see the following documents:

- *Installing CWDM Gigabit Interface Converters*

  Describes how to install CWDM GBICs in 8000 Series modules.

- *Installation and Networking Guidelines for Optical Routing*

  Describes how to install the optical routing system, including connections between the GBICs, multiplexers, and the switch.

This chapter includes the following topics:

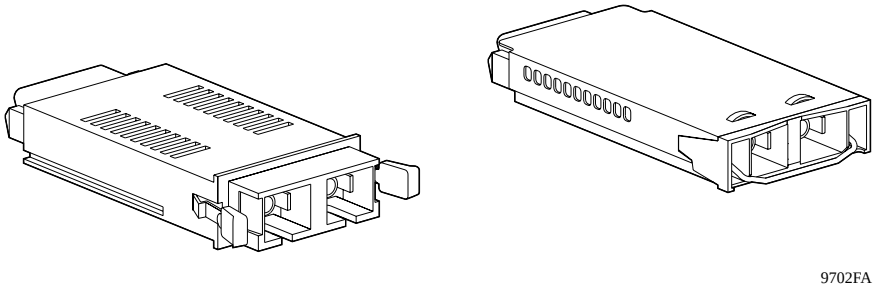
The 8608GBIC Module has eight bays for installing GBICs. The 8632TXE Module has two bays for installing GBICs. The GBIC bays are covered by spring-loaded filler panels that rotate out of the way when you push the GBIC into place.

The following types of GBICs are available:

- 1000BASE-SX—uses multimode fiber over distances up to 550 meters (m)
- 1000BASE-LX—uses multimode fiber over distances up to 550 m or single-mode fiber over distances up to 5 kilometers (km)
- 1000BASE-XD—uses single-mode fiber over distances up to 50 km
- 1000BASE-ZX—uses single-mode fiber over distances up to 70 km
- 1000BASE-CWDM—uses single-mode fiber over distances up to 120 km

GBICs are available in different case styles (Figure 59). One type has two spring tabs at the front of the GBIC; the other type has an extractor handle on the front.

Figure 59 Types of GBICs



GBICs are shipped with a protective rubber plug in the connectors. Leave the plug in place when no cables are connected to the GBIC.

Installing a GBIC

You can install or replace a GBIC in an operating 8600 module without turning off power to the switch.

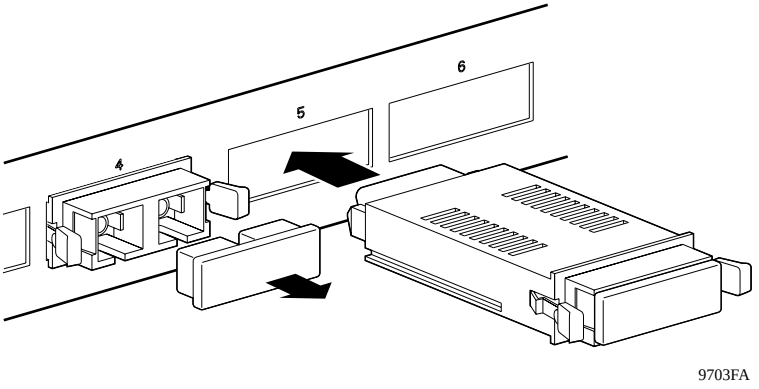
Danger: Fiber optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to a light source.

To install a GBIC:

1. Remove the GBIC from its protective packaging.
2. Insert the GBIC into the bay on the module (Figure 60).

   GBICs are keyed to prevent improper insertion. If the GBIC resists pressure, do not force it. Remove it, turn it over, and reinsert it.

Figure 60 Installing a GBIC



3. Press on the front of the GBIC until it snaps into place.
4. Remove the rubber plug from the connectors to connect the cables.

When shorter lengths of single-mode fiber cable are used with the 1000BASE-ZX and 1000BASE-XD GBICs, there is a risk of overloading the receiver. You may need to insert an in-line optical attenuator at each end of the link between the fiber optic cable plant and the receiving port on the 1000BASE-ZX or 1000BASE-XD GBIC (Table 22).

Table 22 In-line optical attenuators for 1000BASE-ZX and 1000BASE-XD GBICs

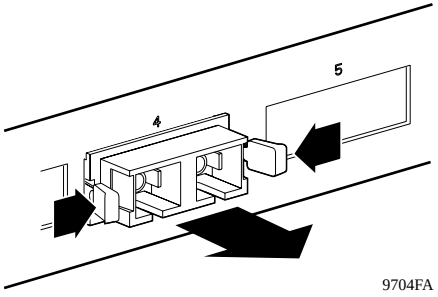
Fiber optic cable span	In-line optical attenuator
Less than 25 km	10 dB
Less than 50 km	5 dB

Removing a GBIC

To remove an installed GBIC:

- If the GBIC has an extractor handle, grasp the handle and pull firmly to remove the GBIC from the bay.
- If the GBIC has spring tabs, press in on the tabs on each side of the GBIC and pull the GBIC out of the bay (Figure 61).

Figure 61 Removing a GBIC



Chapter 7
Installing media dependent adapters in 8600 modules

This chapter provides instructions for adding and replacing media dependent adapters (MDAs) on the 8672ATME Module and the 8683POSM Module. It also discusses connecting communications cables. This chapter includes the following topics:

8672ATME and 8672ATMM Module MDAs

The media dependent adapters (MDAs) for the 8672ATME and 8672ATMM Modules are modular port adapters that you install on the module. The module has two slots for MDAs. You can install one or two of the following MDAs:

- 1-port OC-12c/STM-4 (Figure 62)
- 4-port OC-3c/STM-1 (Figure 63)
- 2-port DS-3 (Figure 64)

Figure 62 8672ATME/8672ATMM Module MDA: OC-12c/STM-4

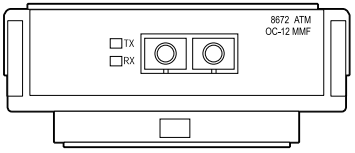


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Figure 63 8672ATME/8672ATMM Module MDA: OC-3c/STM-1

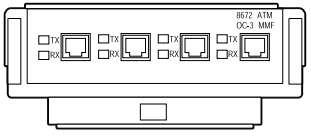

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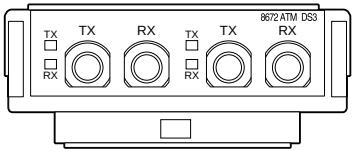
Figure 64 8672ATME/8672ATMM Module MDA: DS-3



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Each MDA has ports for connection to an ATM network. You can install both types of MDA to achieve flexibility in connectivity types. Table 23 lists the MDAs available for the 8672ATME/8672ATMM Module.

Table 23 MDAs for the 8672ATME/8672ATMM Module

Port type	Model	Cable type	Connector type
OC-12c/STM-4	DS1304004	Multimode fiber	Duplex SC
	DS1304005	Single-mode fiber	Duplex SC
OC-3c/STM-1	DS1304006	Multimode fiber	MT-RJ
	DS1304007	Single-mode fiber	MT-RJ
DS-3	DS1304002	75 ohm coaxial	BNC

The OC-3c/STM-1 and OC-12c/STM-4 MDAs for the 8672ATME and 8672ATMM Modules are Class 1 laser products, as identified by the label on the MDA (Figure 65).

Figure 65 Product label for the 8672ATME/8672ATMM Module MDA

The MDAs have two bicolor LEDs for each port: one marked TX (transmit) and one marked RX (receive). Table 24 describes the LEDs..

Table 24 LEDs on the 8672ATME/8672ATMM Module MDA

Label	Color	State	Meaning
Tx	Green	Steady	Indicates network activity for the corresponding port. A very low level of network activity (approximately 1-5 pps) can cause the LED to blink.
	—	Off	The port is not transmitting data (no network activity).
	Amber	Blinking	The port is out of order; the administrative state is down.

Table 24 LEDs on the 8672ATME/8672ATMM Module MDA (continued)

Label	Color	State	Meaning
Rx	Green	Steady	The port is operational; no network activty.
	Green	Blinking	Indicates network activity for the corresponding port (the port is receiving traffic).
	Amber	Steady	An Remote Defect Indication (RDI)[1] alarm condition has been detected; the administrative state is down.
	Amber	Blinking	The port is not operational; the administrative state is down.
	—	Off	The port is not operational; (be sure the MDA is fully seated in the slot; check that the port is properly configured).

1 Remote defect indication (RDI): Indicates that a failure has occurred at the far end of the network in ATM, when the physical layer detects loss of signal or cell synchronization, RDI cells are used to report a VPC/VCC failure. RDI cells are sent upstream by a VPC/VCC endpoint to notify the source VPC/VCC endpoint of the downstream failure.

Specifications for the 8672ATME and 8672ATMM Module MDAs

Table 25 lists the specifications for the 8672ATME and 8672ATMM Module MDA- OC3c/STM-1 and OC-12c/STM-4.

Table 25 8672ATME/8672ATMM Module MDA specifications- OC3c/STM-1 and OC-12c/STM-4

Port type	Operating wavelength	Operating power	Pulse repetition rate
OC-12c/STM-4	1274-1356 nm	-14 to -20 dBm	622.08 Mb/s
	1260-1360 nm	-8 to -15 dBm	622.08 Mb/s
OC-3c/STM-1	1274-1356 nm	-14 to -20 dBm	155.52 Mb/s
	1260-1360 nm	-8 to -15 dBm	155.52 Mb/s

Note: See Table 28 for DS-3 specifications.

The OC-3c/STM-1 MDA uses SONET STS-3c/SDH STM-1 1300 nm optical transceivers with MT-RJ fiber optic connectors and either single-mode fiber (SMF) or multimode fiber (MMF) cabling. Table 26 describes the connector specifications.

Table 26 OC-3c/STM-1 specifications: 8672ATME/8672ATMM Module MDA

Parameter	SMF description	MMF description
Physical media	9/125 µm	62.5/125 µm
Line code	NRZ	NRZ
Wavelength	1274 to 1356 nm	1274 to 1356 nm
Average transmit output power	-8 to -15 dBm	-14 to -20 dBm
Average receiver sensitivity	-8 to -28 dBm	-14 to -30 dBm
Distance	15 km	2 km
Input power	40 W	40 W
Thermal rating	138 Btu/hour maximum	138 Btu/hour maximum

The OC-12c/STM-4 MDA uses SONET STS-3c/SDH STM-1 1300 nm optical transceivers with duplex SC-type fiber optic connectors and either single-mode fiber (SMF) or multimode fiber (MMF) cabling. Table 27 describes the connector specifications.

Table 27 OC-12c/STM-4 specifications: 8672ATME/8672ATMM Module MDA

Parameter	SMF description	MMF description
Physical media	9/125 µm	62.5/125 µm
Line code	NRZ	NRZ
Wavelength	1274 to 1356 nm	1274 to 1356 nm
Average transmit output power	-8 to -15 dBm	-14 to -20 dBm
Average receiver sensitivity	-8 to -28 dBm	-14 to -26 dBm
Distance	15 km	500 m
Input power	40 W	40 W
Thermal rating	138 Btu/hour maximum	138 Btu/hour maximum

The DS-3 MDA uses a 75-ohm coaxial cable. Table 27 describes the connector specifications for the DS-3 MDA.

Table 28 DS-3 specifications: 8672ATME/8672ATMM Module MDA

Parameter	Specification
Line rate	44.736 Mb/s (20 ppm)
Impedence	75 ohms
Maximum length	450 feet (135 m)

8683POSM Module MDAs

The MDAs for the 8683POSM Module are modular port adapters that you install on the module. The module has three slots for MDAs. You can install one, two, or three of the following SMF and MMF MDAs:

- 1-port OC-12c/STM-4 (Figure 66)
- 2-port OC-3c/STM-1 (Figure 67)

Figure 66 8683POSM Module MDA: OC-12c/STM-4

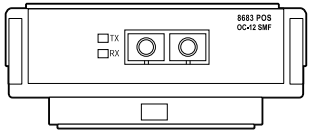

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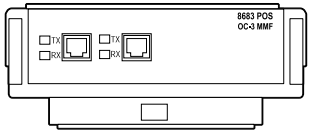
Figure 67 8683POSM Module MDA: OC-3c/STM-1



9903EA

Each MDA has ports for connection to a packet over SONET (POS) network. You can install both types of MDA to achieve flexibility in connectivity types. Table 29 lists the MDAs available for the 8683POSM Module.

Table 29 MDAs for the 8683POSM Module

Port type	Model	Cable type	Connector type
OC-12c/STM-4	DS1333001	Multimode fiber	Duplex SC
	DS1333002	Single-mode fiber	Duplex SC
OC-3c/STM-1	DS1333003	Multimode fiber	MT-RJ
	DS1333004	Single-mode fiber	MT-RJ

The MDAs for the 8683POSM Module are Class 1 laser products, as identified by the label on the MDA (Figure 68).

Figure 68 Product label for the 8683POSM Module MDA

The MDAs have two bicolor LEDs for each port: one marked TX (transmit) and one marked RX (receive). Table 30 describes the LEDs.

Table 30 LEDs on the 8683POSM Module MDA

Label	Color	State	Meaning
Tx	Green	Steady	Indicates network activity for the corresponding port. A very low level of network activity (approximately 1-5 pps) can cause the LED to blink.
	—	Off	The port is not transmitting data (no network activity).
	Amber	Blinking	The port is out of order; the administrative state is down.
Rx	Green	Steady	The port is operational; no network activty.
	Green	Blinking	Indicates network activity for the corresponding port (the port is receiving traffic).
	Amber	Steady	An Remote Defect Indication (RDI)[1] alarm condition has been detected; the administrative state is down.
	Amber	Blinking	The port is not operational; the administrative state is down.
	—	Off	The port is not operational; (be sure the MDA is fully seated in the slot; check that the port is properly configured).

1 Remote defect indication (RDI): Indicates that a failure has occurred at the far end of the network in POS, when the physical layer detects loss of signal or cell synchronization, RDI cells are used to report a VPC/VCC failure. RDI cells are sent upstream by a VPC/VCC endpoint to notify the source VPC/VCC endpoint of the downstream failure.

Specifications for the 8683POSM Module MDAs

Table 31 lists the specifications for the 8683POSM Module MDA.

Table 31 8683POSM Module MDA specifications

Port type	Operating wavelength	Operating power	Pulse repetition rate
OC-12c/STM-4	1274-1356 nm	-14 to -20 dBm	622.08 Mbs
	1260-1360 nm	-8 to -15 dBm	622.08 Mbs
OC-3c/STM-1	1274-1356 nm	-14 to -20 dBm	155.52 Mbs
	1274-1356 nm	-8 to -15 dBm	155.52 Mbs

The OC-3c/STM-1 MDA uses SONET STS-3c/STM-1 1300 nm optical transceivers with MT-RJ fiber optic connectors and either single-mode fiber (SMF) or multimode fiber (MMF) cabling. Table 32 describes the connector specifications for OC-3c/STM-1.

Table 32 OC-3c/STM-1 specifications: 8683POSM Module MDA

Parameter	SMF description	MMF description
Physical media	9/125 µm	62.5/125 µm
Line code	NRZ	NRZ
Wavelength	1274 to 1356 nm	1274 to 1356 nm
Average transmit output power	-8 to -15 dBm	-14 to -20 dBm
Average receiver sensitivity	-14 to -28 dBm	-4 to -29 dBm
Distance	15 km	2 km
Input power	70 W	70 W
Thermal rating	241 Btu/hour maximum	241 Btu/hour maximum

The OC-12c/STM-4 MDA uses SONET STS-3c/STM-1 1300 nm optical transceivers with duplex SC-type fiber optic connectors and either single-mode fiber (SMF) or multimode fiber (MMF) cabling. Table 33 describes the connector specifications for OC-12c/STM-4.

Table 33 OC-12c/STM-4 specifications: 8683POSM Module MDA

Parameter	SMF description	MMF description
Physical media	9/125 µm	62.5/125 µm
Line code	NRZ	NRZ
Wavelength	1274 to 1356 nm	1260 to 1360 nm
Average transmit output power	-8 to -15 dBm	-14 to -20 dBm
Average receiver sensitivity	-7 to -18 dBm	-14 to -28 dBm
Distance	15 km	500 m
Input power	90 W	90 W
Thermal rating	310 Btu/hour maximum	310 Btu/hour maximum

Installing an MDA on a 8600 module

To install an MDA on a 8672ATME Module, 8672ATMM Module, or a 8683POSM Module:

1 Remove the module from the chassis and place it on a flat, static-free surface.

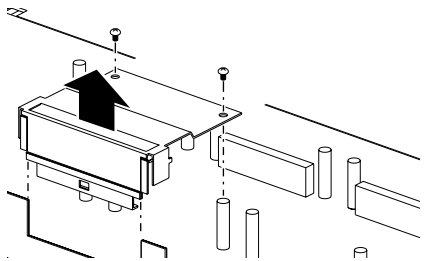
For instructions on removing a module, see "Removing a module" on page 86.

Warning: You cannot hot-swap an MDA. You must remove the 8672ATME, 8672ATMM, or 8683POSM Module, install the MDA, and then reinstall the module.

2 Using a Phillips screwdriver, remove the 2 screws securing the MDA slot cover to the module (Figure 69).

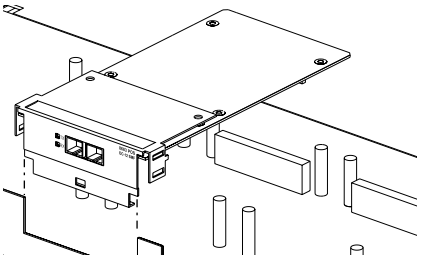
3 Lift the cover straight up. (Save the cover for possible future use.)

Figure 69 Removing the MDA slot cover



4 Align the front of the MDA with the front of the 8672ATME, 8672ATMM, or 8683POSM Module (Figure 70).

Figure 70 Aligning the MDA with the front of the module



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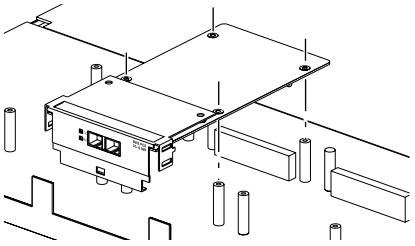
5 Align the four holes on the MDA with the mounting posts on the module (Figure 71).

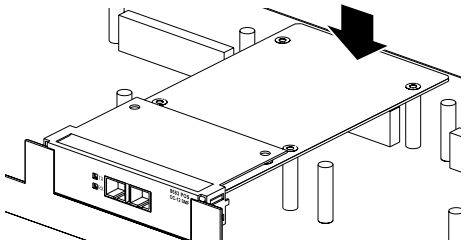
Figure 71 Aligning the MDA with the mounting posts of the module



9907FA

6 Press firmly on the MDA in the middle of the back to seat the MDA in the mounting posts on the module (Figure 72). Apply about 20 pounds of pressure.

Figure 72 Seating the MDA on the module



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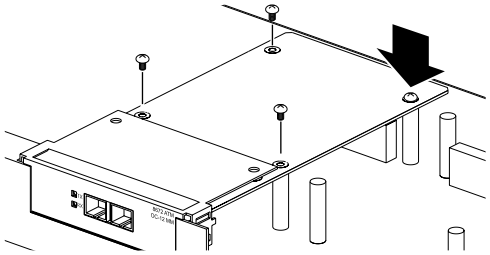
When the MDA is seated properly, the posts of the module are visible in the holes of the MDA.

7 Insert the Phillips screws through the holes. Use the Phillips screwdriver to tighten the screws (Figure 73).

Note: Tighten the rear screws before you tighten the front screws.

Figure 73 Tightening the screws on the MDA



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8 Attach the supplied laser product label to the front panel of the host module, directly below the MDA. Use the label that is printed in the appropriate language for the country where you are installing the equipment.

9 Reinstall the 8672ATME, 8672ATMM, or 8683POSM Module in the chassis.

For instructions on installing a 8600 module, see "Installing a 8600 module" on page 88.

Replacing an MDA on a 8600 module

To replace an MDA on a 8672ATME Module, 8672ATMM Module, or a 8683POSM Module:

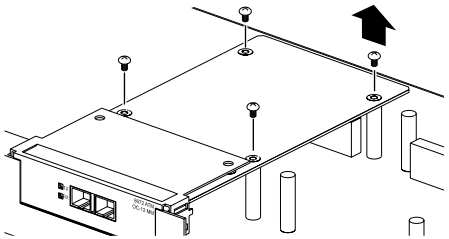
1 Remove the module from the chassis and place it on a flat, static-free surface.

For instructions on removing a module, see "Removing a module" on page 86.

Warning: You cannot hot-swap an MDA. You must power down the switch and remove the 8672ATME, 8672ATMM, or 8683POSM Module, replace the MDA, and then reinstall and power up the module.

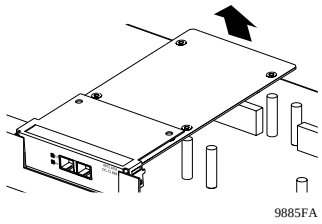
2 Using a Phillips screwdriver, unscrew the 4 screws from the MDA that you want to replace (Figure 74).

Figure 74 Preparing an MDA for removal



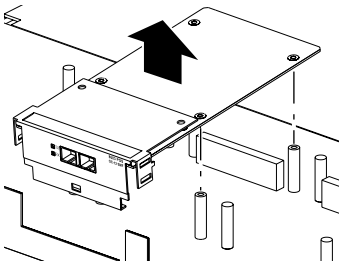
3 Place the palm of your hand on top of the MDA and cup your fingers around the back of the MDA. Lift the MDA enough to loosen it from the mounting posts (Figure 75).

Figure 75 Loosening the MDA from the mounting posts



4 When the MDA is loosened from the mounting posts, hold the sheet metal by each side and lift the MDA straight up (Figure 76). Be careful not to catch the lip of the MDA on the module. Store the MDA in a static-free container.

Figure 76 Removing the MDA from the module



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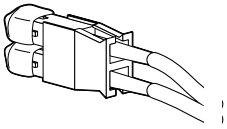
5 See "Installing an MDA on a 8600 module" on page 112 for instructions on installing the replacement MDA.

Connecting fiber cables to a 8600 module MDA

The OC-12c/STM-4 MDA uses duplex SC connectors (Figure 77).

Figure 77 OC-12c/STM-4 MDA duplex SC connector with dust cover



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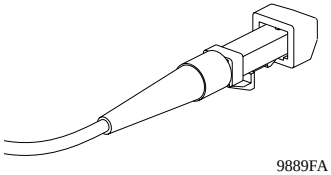
The OC-3c/STM-1 MDA uses MT-RJ connectors (Figure 78).

Figure 78 OC-3c/STM-1 MDA MT-RJ connector with dust cap



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To connect a fiber cable to an MDA:

1 Remove the protective dust plug from the connector on the MDA (Figure 79 and Figure 80). Save the dust plug for future use.

Figure 79 Removing the dust plug from an OC-12c/STM-4 MDA (SC) connector

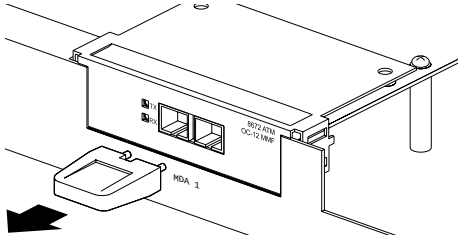

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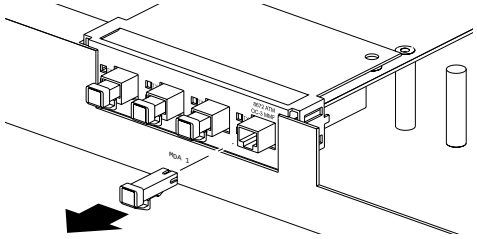
Figure 80 Removing the dust plug from an OC-3c/STM-1 MDA (MT-RJ) connector



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2 Remove the protective dust caps from the connector on the fiber cable. Save the dust caps for future use (Figure 81 and Figure 82).

Figure 81 Removing the dust cap from an SC fiber cable connector

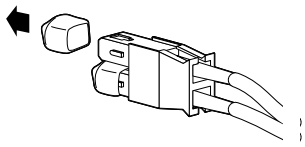

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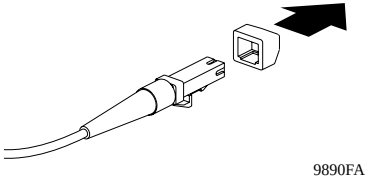
Figure 82 Removing the dust cap from an MT-RJ fiber cable connector



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3 Hold the cable connector so that the keyed surface will insert easily into the MDA connector.

4 Carefully insert the cable connector into the MDA connector and push gently until you hear the cable connector snap into place (Figure 83 and Figure 84).

Figure 83 Inserting the SC cable connector into an OC-12c/STM-4 MDA

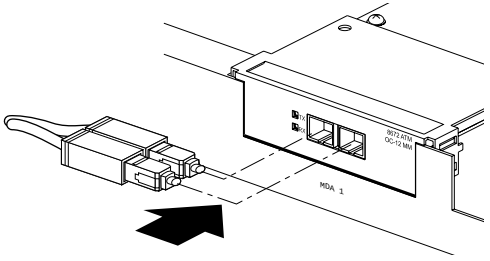

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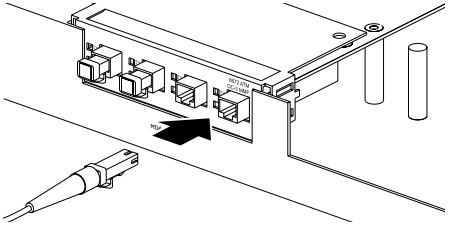
Figure 84 Inserting the MT-RJ cable connector into an OC-3c/STM-1 MDA



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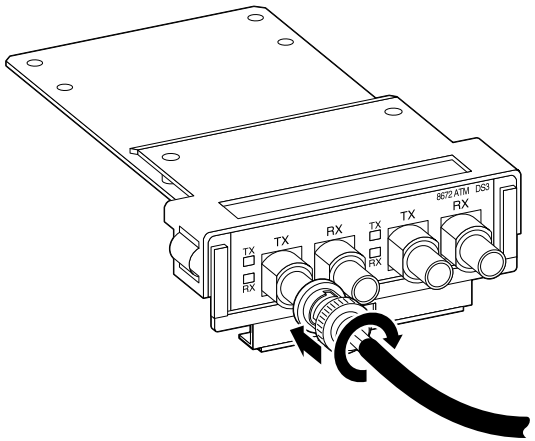
Connecting coaxial cables to a 8600 module MDA

The DS-3 MDA uses BNC connectors (Figure 85).

To connect a coaxial cable to a DS-3 MDA:

1 Push the coaxial cable onto the DS-3 connector (Figure 85).

Figure 85 Pushing the coaxial cable onto a DS-3 connector



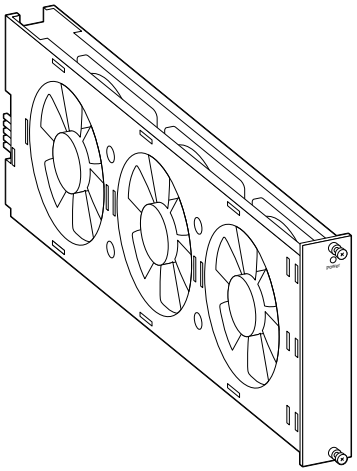
2 Turn the coaxial cable to the right until the key on the DS-3 connector clicks into the notch on the coaxial cable.

Chapter 8
Installing or removing the fan tray

This chapter describes how to replace a fan tray in the 8003 Chassis.

The 8003 Chassis uses a single fan tray that is installed on the right side of the chassis (Figure 86). The fan tray contains three high-capacity, multiple-speed fans and a control/monitor circuit board.

Figure 86 Fan tray



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If one of the fans in the tray fails, the LED lights amber. In such a case, replace the fan tray as quickly as possible to maintain high-availability operation. Failure to replace the tray could cause the chassis to overheat.

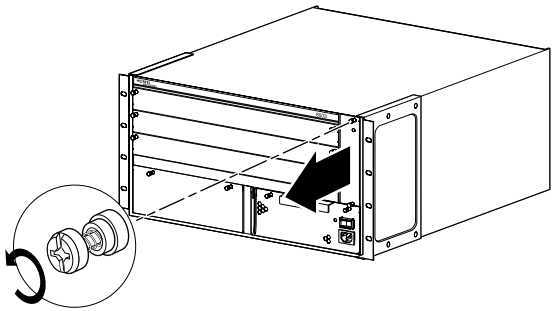
Replacing the fan tray

You can replace the fan tray in the 8003 Chassis with the power on or off.

To replace the fan tray:

1 Loosen the retaining screws that fasten the fan tray to the chassis (Figure 87).

Figure 87 Removing the fan tray



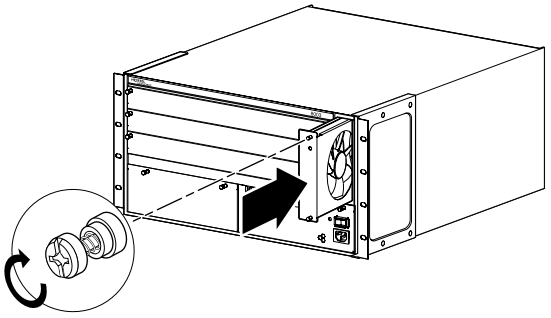
2 Wait 10 seconds for the fans to stop turning, and then pull the fan tray out of the 8003 Chassis (Figure 87).

Warning: Grasp the fan tray at the middle of the front panel, and be careful to keep your fingers out of the fan blades.

3 Slide the new fan tray into the chassis until the connectors at the rear of the fan tray engage (Figure 88).

If the 8003 Chassis is on, the fans start turning when the fan tray connectors fully engage.

Figure 88 Installing the fan tray



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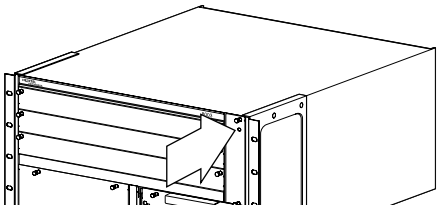
4 Tighten the captive screws to fasten the fan tray to the chassis (Figure 88).

5 With the chassis power on, verify that the green status LED is lit (Figure 89).

Figure 89 Fan tray LED



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Chapter 9
Operating the 8600 Switch

Series switch and provides troubleshooting information. It includes the following topics:

Turning the 8600 Switch on and off

To turn on a 8600 Switch with an AC power supply:

1. Verify that the AC power cords are connected to AC power outlets.
2. Turn the power switch on each AC power supply to the on position.
3. Verify that the power LED on each power supply lights green.
4. Verify that air is flowing from the cooling fans out through the vents of the chassis.

After you turn on the 8600 Switch, each module automatically initiates a diagnostic test to verify proper module function (see "Verifying a successful installation" on page 126).

If the power supply LED remains off, or if you cannot feel air flow from the 8003 Chassis vents, turn the AC power supplies off, wait 1 minute, and then turn them on again. If the problem persists, contact the Nortel Networks Technical Solutions Center.

Verifying a successful installation

In a normal power-up sequence, the LEDs light as follows:

1. When power is applied to the 8600 Switch, the green LED on each power supply and fan tray turns on within 5 seconds.
2. Each module initiates a self-test, during which the port and module LEDs display various patterns to indicate the progress of the self-test.
3. Upon successful completion of the self-test (within 10 seconds after power is applied), the module Online LED lights.

If the LEDs on the modules light in this sequence, your installation is successful. Contact your network administrator to verify that the 8600 Switch is now connected to the network.

If the LEDs do not light in this sequence, contact your local Nortel Networks Technical Solutions Center.

Initializing the 8672ATME, 8672ATMM, and 8683POSM Modules

If you have installed a 8672ATME, 8672ATMM, or 8683POSM Module with at least one MDA into a 8003 chassis, the 8691SF Module retrieves the image file to download to these modules. Ensure that the installed 8691SF Module has a PCMCIA card inserted and that the PCMCIA card contains the correct image for the installed module. See Table 34 for a list of image filenames.

Table 34 Image filenames for 8672ATME/8672ATMM/8683POSM

Module	Image filename
8672ATME	p80t3300.dld
8672ATMM	p80t3300.dld
8683POSM	p80p3300.dld

For more information about the PCMCIA slot and the 8691SF Module, refer to "8691SF Module" on page 58.

The following sections describe the initialization process for the 8672ATME, 8672ATMM, and 8683POSM Modules.

Initializing the 8672ATME and 8672ATMM Modules

The 8691SF Module retrieves the image file to download to the 8672ATME or 8672ATMM Module. First, the 8691SF Module searches the host flash memory for the file, then the PCMCIA card. The 8691SF Module downloads the image file to the 8672ATME, or 8672ATMM and identifies which MDAs are installed. The screen displays a message similar to the following:

```
Using image = /slot/p80t3200.dld for ATM card download.
ATM card: Slot 4 MDA [OC-12c MM] [Quad OC-3c MM] Ver=2.2
```

If the image file is not found in either the flash memory or the PCMCIA, the system stops and the screen displays an error message such as:

```
ERROR Task=rcStart Couldn't find an ATM download image!
Aborting card initialization in Slot=4
```

or:

```
ERROR Task=rcStart portPresent:port=X/X, invalid port Type
```

The 8672ATME or 8672ATMM Module requests a redownload from the switch fabric module, and the screen displays the following message:

```
Redownload requested by ATM card in slot <number>.
```

If the image download is unsuccessful, the screen displays the following message:

```
ATM card in slot <number> not ready.
```

If there are three unsuccessful attempts to download, the screen displays the message shown in Figure 90.

Figure 90 Unsuccessful download screen output

```
Copyright (c) 2002 Nortel Networks, Inc.
CPU Slot 5:    PPC 740 Map B
Version:       3.3.0.0/097
Creation Time: Aug 27 2002, 17:51:07
Hardware Time: SEP 05 2002, 13:58:01 UTC
Memory Size:   0x04000000
Start Type:    warm
CENTENNIAL    ATA
/flash/  - Volume is OK
Loaded boot configuration from file /flash/boot.cfg
Press <Return> to stop auto-boot...
/pcmcia/  - Volume is OK
4739529 to 15708054 (15708054)
Starting at 0x10000...
CENTENNIAL    ATA
/flash/  - Volume is OK
Passport 8600 System Software Release REL3.3.0.0_B097
Copyright (c) 1996-2002 Nortel Networks, Inc.
[09/05/02 14:58:20] System boot
/pcmcia/  - Volume is OK
[09/05/02 14:58:20] Passport System Software Release
REL3.3.0.0_B097
[09/05/02 14:58:21] Card inserted: Slot=1 Type=8672ATME
[09/05/02 14:58:21] Card inserted: Slot=2 Type=8683POS
[09/05/02 14:58:21] Card inserted: Slot=3 Type=8608SX
[09/05/02 14:58:21] Card inserted: Slot=4 Type=8608GT
[09/05/02 14:58:21] Card inserted: Slot=5 Type=8690SF
[09/05/02 14:58:21] Initializing 8690SF in slot #5 ...
[09/05/02 14:58:24] Initializing 8672ATME in slot #1 ...
[09/05/02 14:58:41] ERROR Task=rcStart Couldn't find an ATM download
image!
(File name: /flash/p80t3300.dld or /pcmcia/p80t3300.dld)
Slot 1 ATM card is put offline!
[09/05/02 14:58:41] Initialization of card failed for Slot 1 !
[09/05/02 14:58:41] Initializing 8683POS in slot #2 ...
[09/05/02 14:58:43] Initializing 8608SX in slot #3 ...
[09/05/02 14:58:46] Initializing 8608GT in slot #4 ...
[09/05/02 14:58:50] Loading configuration from /flash/config.cfg
[09/05/02 14:58:50] The system is ready
[09/05/02 14:58:50] Booted with PRIMARY boot image source - /pcm-
cia/p80a3300b097
```

After the image loads onto the 8672ATME or 8672ATMM Module, it performs a series of self-diagnostic tests. If the module fails the diagnostics, the screen displays the following message:

```
Fatal bring up error on ATM card in slot <number>.
```

If you see this message, contact a service representative. For information on contacting service representatives, refer to "How to get help" on page 22.

When the image successfully loads onto the 8672ATME or 8672ATMM Module, the screen displays the following message:

```
ATM card in slot <number> is online.
```

Note: If you accidentally delete the image file, reset the 8691SF Module and redownload the file. For information on how to reset the 8691SF Module, see "Resetting the 8600 Switch" on page 133.

If you have one MDA installed, you can proceed to configure the 8672ATME or 8672ATMM Module as described in *Using the 8672ATME and 8672ATMM Modules*.

Note: You must save your configuration (using either the CLI or Device Manager) to preserve the configuration changes you made to the 8672ATME or 8672ATMM Module across reboots.

Initializing the 8683POSM Module

The 8691SF Module retrieves the image file to download to the 8683POSM Module. First, the 8691SF Module searches the host flash memory for the file, then the PCMCIA card. The 8691SF Module downloads the image file to the 8683POSM Module and identifies which MDAs are installed. The screen displays a message similar to the following:

```
Downloading POS image to slot <number> .........Done (file
name and image size.)
```

If the image file is not found in either the flash memory or the PCMCIA, the screen displays this message:

```
POS image file name not found either in FLASH or PCMCIA.
```

If the image download is unsuccessful, the screen displays the following message:

```
Card is off line.
```

The 8683POSM Module requests a redownload from the 8691SF module, and the screen displays this message:

```
Redownload requested by POS card in slot <number>.
```

The 8683POSM Module attempts a redownload three times. If the download is still unsuccessful, the 8683POSM Module goes offline and the screen displays this message:

```
Redownload of POS card in slot <number> failed maximum 3
times; POS card is offline.
```

When the 8683POSM Module boots, the redownload count is reset to 0. After the image loads onto the 8683POSM Module, it performs a series of self-diagnostic tests. If the module fails the diagnostics, the screen displays the following message:

```
Port <number> for POS card in slot <number> failed
diagnostics.
```

If you see this message, contact a service representative. For information on contacting service representatives, refer to “How to get help” on page 22.

When the image successfully loads onto the 8683POSM Module, the screen displays the following message:

```
POS card in slot <number> is online.
```

Note: If you accidentally delete the image file, reset the 8691SF Module and redownload the file. For information on how to reset the module, see “Resetting the 8600 Switch” on page 133.

If you have one MDA installed, you can proceed to configure the 8683POSM Module as described in *Using the 8683POSM Module.*

Note: You must save your configuration (using either the CLI or Device Manager) to preserve the configuration changes you made to the 8683POSM Module across reboots.

Configuring the chassis to operate in 32K or 128K Mode

You can configure the chassis to operate either in 32K or 128K extended memory mode (MMode) if you installed a 8691SF CPU Module.

When you configure a chassis you need to ensure that a system having both 128K and 32K modules will reboot in the desired mode. The boot mode is determined by the type of modules installed in the chassis and whether 128K mode is enabled (Table 35).

Table 35 Boot mode at startup

if configuration is:	And 128K mode status at startup is:	Then:
All 128K modules	Enabled	System starts in 128K mode
Mixed modules	Enabled	System starts in 128K mode. Non-128K modules are disabled.
All non-128K modules	Enabled	Non-128K modules are disabled.
All 128K modules	Disabled	System starts in 32K mode
Mixed modules	Disabled	System starts in 32K mode
All non-128K modules	Disabled	System starts in 32K mode

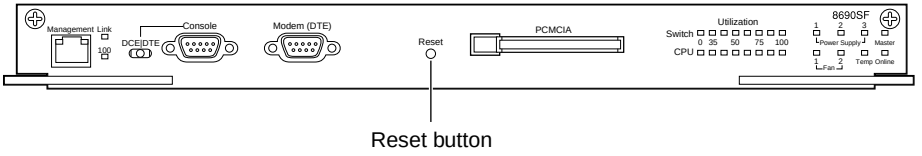
For information on using Device Manager or the CLI to configure 128K records, see *Platform and System Management*.

Resetting the 8600 Switch

You can use the Reset button to reboot the 8600 Switch hardware without cycling power. To *warm-start* the 8600 Switch (no diagnostic tests are run), press the Reset button for less than 5 seconds.

Figure 91 shows the location of the Reset button on the 8691SF Module.

Figure 91 Reset button on the 8691SF Module



OPT0011A

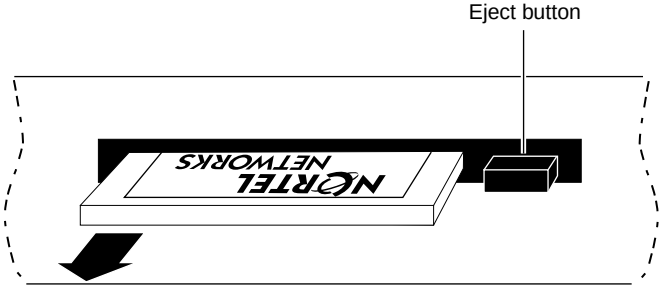
Removing flash memory cards

To remove flash memory cards from the 8691SF Module:

1. Press the eject button to the right of the memory card receptacle on the 8691SF Module (Figure 92).

   The card pops out slightly.

Figure 92 Removing a flash memory card



PPOC0022A

2. Pull the flash memory card out of the card receptacle.

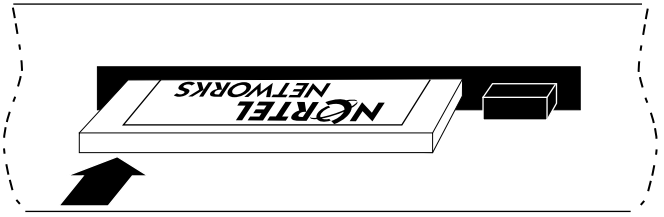
Installing flash memory cards

Caution: You cannot use the Accelar 1200 PCMCIA card in the 8003 Chassis.

To install a flash memory card in a 8691SF Module:

1. Position the card with the label facing up and the insert arrow pointing toward the card receptacle (Figure 93).

Figure 93 Inserting a flash memory card



PPOC0021A

2. Insert the card into the card receptacle.
3. Gently push the card in until it fits snugly in place.

Protecting memory card files

Nortel Networks ships each memory card with its read-write protect switch in the unprotected position. After you successfully load the configuration file and save your configuration, you may want to write-protect the memory card for backup purposes.

Note: You typically do not operate a 8600 Switch with a write-protected memory card. You should make a copy of your configuration on another memory card, write-protect that card, and store it in a safe place.

To change memory card protection:

1 Remove the memory card from the 8003 Chassis.

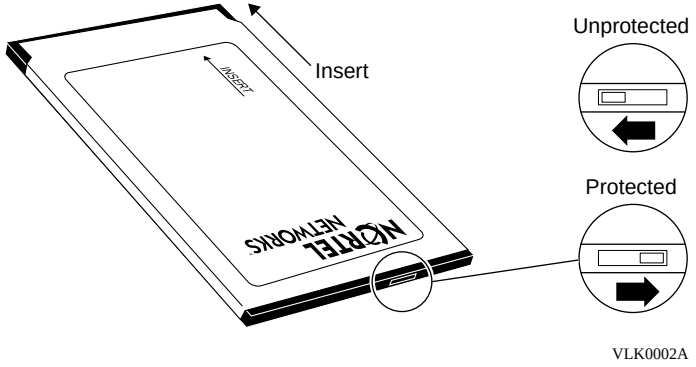
   a Press the eject button to the right of the memory card receptacle (see Figure 92 on page 133).

   b Pull the card out of the card receptacle.

Caution: You must remove the card from the 8003 Chassis before changing the read-write protection. Failure to remove the card may result in improper write protection.

2 Locate the read-write protect switch on the edge opposite the arrow on the memory card (Figure 94).

Figure 94 Memory card read-write protect switch



3 Adjust the read-write protect switch.

4 Reinsert the memory card into the card receptacle (see Figure 93 on page 134).

   a Position the card with the label facing up and the insert arrow pointing toward the card receptacle.

   b Insert the card into the card receptacle.

   c Gently push the card in until it fits snugly in place.

Troubleshooting

The following sections provide troubleshooting information for some of the more common problems that you may encounter with the 8600 Switch.

LED indications of problems

Table 36 lists possible problems indicated by the LEDs on the switch modules and suggests corrective action.

Table 36 LED problem indicators

Symptom	Probable cause	Corrective action
Green AC power supply LEDs are off.	The switch is not receiving AC power.	Verify that each AC power cord is fastened securely at both ends and that power is available at each AC power outlet. Verify that each power supply is turned on.
The Link/Activity LED for a connected port is off or does not blink (and you believe that traffic is present).	The switch is experiencing a port connection problem, or the switch's link partner is not autonegotiating properly.	Verify that the cable connections to the link partner are correct. Verify port configuration parameters for both ends of the connection. Move the cable to another port to see whether the problem occurs on the new port.
The Link/Activity LED blinks continuously.	There may be a port configuration error.	Verify port configuration parameters for both ends of the connection.
The Online LED on an I/O module is amber.	Software incompatibility exists, or the module cannot communicate with the master module over the backplane.	Use the `show log` command to check the system log for indications of communication problems. Use the `boot` command to download a new software image.
The Master LED on a module in slot 1 or slot 2 is amber.	The module has detected a system clock generation failure on its own circuitry.	Replace the module; make sure that it is in the correct slot. **Note:** This LED has significance only for the module in slot 1 or slot 2 that provides the clock function for the switch.

Table 36 LED problem indicators (continued)

Symptom	Probable cause	Corrective action
The Fault LED is blinking amber.	A chassis failure has been detected.	From the console management station, use the `show log` command to check the system log for information about hardware failures. Check the fan tray in the chassis to make sure that both fans are running. Check the switch power supplies; one may have stopped functioning. The module may have failed to read the MAC address from the chassis backplane. If this is the case, arrange to replace the chassis.
The Fault LED is steady amber.	The module failed its power-on self-test. A diagnostic or hardware failure has been detected.	Replace the module.
No LEDs are lit.	A hardware failure has been detected.	Turn the switch power off and then turn it on again.

Apparent module failure

If a module failure occurs, check for possible backplane connection problems. Make sure that the module is correctly seated in the backplane connector and that the retaining screws are securely tightened.

If a module fails during module initialization and the replacement module is the same module type, in rare cases the new module may not initialize.

To workaround this issue, follow the steps in either workaround 1 or 2.

Module failure workaround 1

1. Remove the faulty module.
2. Insert a module type that is different from the module type removed in Step 1and wait for this replacement module to initialize.
3. Remove the module inserted in Step 2.
4. Insert a new module model in the same slot as the faulty module resided. This new module model must be identical to the module model removed in Step 1.

Module failure workaround 2

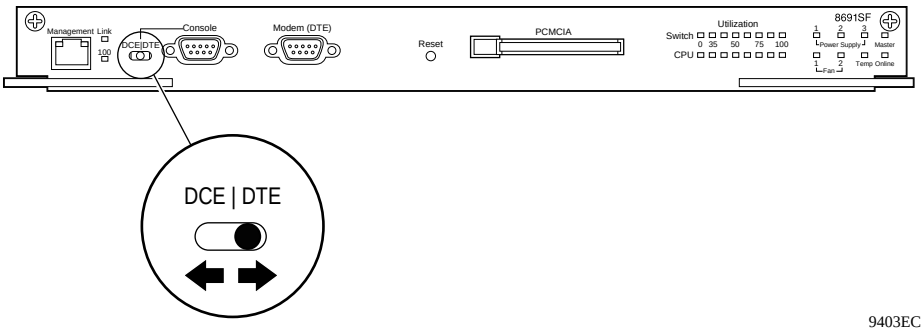
1. Remove the faulty module.
2. Insert a new module.
3. Reboot the chassis.

If the module still fails to operate, contact the Nortel Networks Technical Solutions Center for assistance.

Failure to get a login prompt from the Console port

If you connect a terminal to the Console port of the 8691SF Module and you fail to get a login prompt, the port may have an incorrect DCE/DTE setting. Try moving the DCE/DTE switch from its current setting to the other position (Figure 95).

Figure 95 DCE/DTE switch



Cable connection problems

Port connection problems can usually be traced to a poor cable connection or to an improper connection of the port cables at either end of the link. To remedy such problems, make sure that the cable connections are secure and that the cables are connected to the correct ports at both ends of the link.

10BASE-T cables

Cabling for 10BASE-T networks can consist of two-pair Category 3, 4, or 5 unshielded twisted pair (UTP) wiring. However, to prepare for future upgrades to Fast Ethernet, Nortel Networks strongly recommends that you use all Category 5 cable in your network.

Ethernet 10BASE-T network installations use cables consisting of two pairs of twisted pair wires—one pair to send data and one to receive data. These wires must connect to another 10BASE-T station that has the sending pair attached to its receiving pair and vice versa. If the two nodes are wired alike, they both attempt to send data out on the same RJ-45 pins. In such a case, a straight-through cable would not work. However, a crossover cable would operate normally.

100BASE-T cables

The 100 Mb/s ports are designed to operate using Category 5 UTP cabling only. Category 5 UTP cable is a two-pair cable certified to handle up to 100 Mb/s bandwidth. To minimize crosstalk noise, maintain the twist ratio of the cable up to the point of termination; untwist at any termination should not exceed 0.5 in. (1.27 cm).

For best performance with respect to noise immunity and emissions, the unused pairs in the two-pair cable should be terminated at their characteristic impedance (that is, 100 ohms) in the equipment at each end of the cable. All Nortel Networks 100BASE-TX equipment includes such a Common Mode Termination (CMT).

GBIC cables

Cables for the GBICs vary depending on the specific GBIC type. For information about the cable requirements for GBICs, see “GBICs” on page 147.

Appendix A
Chassis technical specifications

This appendix provides physical, environmental, and electrical specifications for the Passport 8003 Chassis.

Physical specifications

Height:	10.5 in. (26.7 cm)
Width:	18.5 in. (47.0 cm)
Depth:	19.9 in. (50.5 cm)
Weight (empty):	40 lb (18 kg)
Weight (fully loaded):	110 lb (50 kg)
Cooling system:	
Fan tray:	1 per chassis
Fans:	3 per fan tray
Thermal sensors:	1 per fan tray
Noise:	61 dBa maximum

Environmental specifications

Operating temperature:	0°C to 40°C (32°F to 104°F)
Storage temperature:	–25°C to 70°C (–13°F to 158°F)
Operating humidity:	85% maximum relative humidity, noncondensing
Storage humidity:	95% maximum relative humidity, noncondensing
Operating altitude:	3024 m (10,000 ft) maximum
Storage altitude:	3024 m (10,000 ft) maximum
Free fall/drop:	ISO 4180-s, NSTA 1A
Vibration:	IEC 68-2-6/34
Shock/bump:	IEC 68-2-27-29

Passport 8003ACPS Power Supply specifications

Input voltage:	100 to 240 VAC
Line frequency:	50 to 60 Hz
Maximum input current:	7.8 A per power supply
Input power:	770 W maximum
Input volt amperes rating:	765 VA maximum
Thermal rating:	2625 Btu/hr maximum
Output power	500 W

Electromagnetic emissions

Meets requirements of:

US:	FCC CFR47 Part 15, Subpart B, Class A
Canada:	ICES-003, Issue-2, Class A
Australia/New Zealand:	AS/NZS 3548:1995, Class A
Japan:	VCCI-V3/97.04, Class A
Taiwan:	CNS 13438, Class A
Europe:	EN 55022-1998 Class A; EN 61000-3-2/A14, EN 61000-3-3
Global:	CISPR 22-1997 Class A CE Mark

Electromagnetic susceptibility:

EN55024:1998/CISPR 24:1997

Safety agency approvals

US:	UL60950
Canada:	CSA 22.2 No. 60950
Australia/New Zealand:	AS/NZS 3260
Mexico:	NOM-019-SCFI-1998

Appendix B
8600 module technical specifications

This appendix provides technical specifications for the 8600 modules. The appendix includes the following information:

General specifications

Standards supported

IEEE Std 802.3, 1998 Clause 4 Media Access Control CSMA/CD
IEEE Std 802.3, 1998 Clause 14 10Base T New
IEEE Std 802.3, 1998 Clause 21 100Base T
ANSI/IEEE Std 802.1D, 1998 Media Access Control (MAC) Bridges
IEEE 802.1Q Virtual Bridged Local Area Networks
IEEE Std 802.3, 1998 Clause 34-42
IEEE Std 802.3, 1998 Clause 31 (MAC Control)
IEEE Std 802.3ab
IEEE Std 802.3ae

Data rate and encoding

10 Mb/s Manchester encoding
100 Mb/s 4B/5B encoding
1000 Mb/s 8B/10B encoding
10 Gb/s 64/66B encoding

Environmental specifications

Operating temperature:	0°C to 40°C (32°F to 104°F)
Storage temperature:	–25°C to 70°C (–13°F to 158°F)
Operating humidity:	85% maximum relative humidity, noncondensing
Storage humidity:	95% maximum relative humidity, noncondensing
Operating altitude:	3000 m (10,000 ft) maximum
Free fall/drop:	ISO 4180-s, NSTA 1A
Vibration:	IEC 68-2-6/34
Shock/bump:	IEC 68-2-27/29

Performance specifications (64-byte packets)

Aggregate throughput:	10 Mb/s; 100 Mb/s; 1000 Mb/s:100 million pps 10 Gb/s: 8x488,100 pps
Routing and switching forwarding rates:	10 Mb/s: 14,880 pps maximum 100 Mb/s: 148,810 pps maximum 1000 Mb/s: 1,488,100 pps maximum 10 Gb/s: 8x1,488,100 pps maximum
Latency:	10 microseconds (LIFO)

Gigabit link power budget

1000BASE-SX:	7.5 dBm
1000BASE-SX SMF:	8.0 dBm
10GBASE-LR:	-6.0 dBm
10GBASE-LW:	-6.0 dBm

Address database size

Addressing:	48-bit MAC address
Frame length:	64 to 1518 bytes (IEEE 802.1Q Untagged) 64 to 1522 bytes (IEEE 802.1Q Tagged)

Electromagnetic emissions

Meets requirements of:

US:	FCC CFR47 Part 15, Subpart B, Class A
Canada:	ICES-003, Issue-2, Class A
Australia/New Zealand:	AS/NZS 3548:1995, Class A
Japan:	VCCI-V3/97.04, Class A
Taiwan:	CNS 13438, Class A
Europe:	EN 55022-1998 Class A; EN 61000-3-2/A14, EN 61000-3-3
Global:	CISPR 22-1997 Class A CE Mark
Electromagnetic susceptibility:	EN55024:1998/CISPR 24:1997

Safety agency approvals

US:	UL60950
Canada:	CSA 22.2 No. 60950
Australia/New Zealand:	AS/NZS 3260
Mexico:	NOM-019-SCFI-1998

Note: The GBICs installed in the 8608GBE and 8608GBM Modules must also meet these standards.In addition, the GBICs are certified to FDA requirement 21 CFR, Chapter 1, Subchapter J and the international requirements of IEC 60825 for Class 1 Laser.

8608GBE and 8608GBM Modules

Physical specifications	
Height:	1.5 in. (3.8 cm)
Width:	15.4 in. (39.1 cm)
Depth:	18.5 in. (47.0 cm)
Weight:	8.0 lb (3.6 kg)
Electrical specifications	
Input power:	65 W maximum
Thermal rating:	224 Btu/hr maximum
MTBF rating	197,096 hr
Connector type	Duplex SC

GBICs

Physical specifications

Height:	12 mm
Width:	30 mm
Depth:	65 mm
Weight:	Varies with GBIC type
Connector type	Duplex SC

1000BASE-SX GBIC

Cable specifications

Type:	62.5 µm or 50 µm multimode fiber
Maximum distance:	1804 ft (550 m)

Optical specifications

Wavelength:	850 nm (VCSEL)
Average transmit output power:	-9.5 to -4 dBm
Average receiver sensitivity:	-17 dBm (minimum)

1000BASE-LX GBIC

Cable specifications

Type:	62.5 µm multimode fiber or 9 µm single-mode fiber **Note:** Multimode fiber may require a DMD patch cord.
Maximum distance:	Single-mode fiber: 32,810 ft (10 km) Multimode fiber: 1804 ft (550 m)

Optical specifications

Wavelength:	1300 nm (FP laser diode)
Average transmit output power:	-5.2 to 0 dBm
Average receiver sensitivity:	-22 dBm (minimum)

1000BASE-XD GBIC

Cable specifications

Type:	9 µm single-mode fiber
Maximum distance:	31 mi (50 km)
	Note: For a shorter link distance, you may need an in-line attenuator to prevent overloading the receiver.

Optical specifications

Wavelength:	1550 nm (DFB laser diode)
Average transmit output power:	-5.2 to 0 dBm
Average receiver sensitivity:	-24 dBm

1000BASE-ZX GBIC

Cable specifications

Type:	9 µm single-mode fiber
Maximum distance:	43 mi (70 km)
	Note: For a shorter link distance, you may need an in-line attenuator to prevent overloading the receiver.

Optical specifications

Wavelength:	1550 nm (DFB laser diode)
Average transmit output power:	0 to 5.2 dBm
Average receiver sensitivity:	-22 dBm (minimum)

1000BASE-CWDM GBIC

Cable specifications

Type:	9 µm single-mode fiber
Maximum distance:	74.5 mi (120 km)
	Note: Given 30dB loss budget and 0.25 db/Km fiber loss, up to 120 Km in transmission distance is supported with no intermediate multiplexer.

Optical specifications

Wavelength:	1450 to 1620 nm
Average transmit output power:	+2.0 to 6 dBm
Receiver optical input power:	-30 dBm (minimum at 60° case temperature)
	-28 dBm (minimum at 70° case temperature)

8608GTE and 8608GTM Modules

Physical specifications

Height:	1.5 in. (3.8 cm)
Width:	15.4 in. (39.1 cm)
Depth:	18.5 in. (47.0 cm)
Weight:	8.0 lb (3.6 kg)

Electrical specifications

Input power:	100 W maximum
Thermal rating:	344 Btu/hr maximum

MTBF rating 180,449 hr

Connector type RJ-45 (see Table 37)

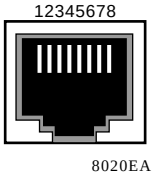
Cable specifications

Type:	Category 5 or better UTP cable for 1000 Mb/s operation. Cables must use all four pairs. Wiring configuration and performance are defined by EIA/TIA Standard 568 and IEEE Standard 802.3 2000 edition.
Maximum distance:	328 ft (100 m)

Port connectors

The ports on the 8608GTE and 8608GTM Modules are RJ-45 ports wired as shown in Table 37.

Table 37 Pin assignments: 8608GTE/8608GTM Module port

Connector	Pin number	Signal
	1	Bidirectional Data A + (BI_DA+)
	2	Bidirectional Data A – (BI_DA–)
	3	Bidirectional Data B + (BI_DB+)
	4	Bidirectional Data C + (BI_DC+)
	5	Bidirectional Data C – (BI_DC–)
	6	Bidirectional Data B – (BI_DB–)
	7	Bidirectional Data D + (BI_DD+)
	8	Bidirectional Data D – (BI_DD–)

8608SXE Module

Physical specifications

Height:	1.5 in. (3.8 cm)
Width:	15.4 in. (39.1 cm)
Depth:	18.5 in. (47.0 cm)
Weight:	8.0 lb (3.6 kg)

Electrical specifications

Input power:	65 W maximum
Thermal rating:	224 Btu/hr maximum

MTBF rating 197,887 hr

Connector type Duplex SC

Cable specifications

Type:	62.5 µm or 50 µm multimode fiber optic cable
Maximum distance:	62.5 µm multimode fiber optic cable: 722 ft (220 m) @ 160 MHz/km bandwidth 902 ft (275 m) @ 200 MHz/km bandwidth 50 µm multimode fiber optic cable: 1640 ft (500 m) @ 400 MHz/km bandwidth 1804 ft (550 m) @ 400 MHz/km bandwidth

Optical specifications

Wavelength:	850 nm
Optical budget:	7 dB
Laser transmitter characteristics:	Minimum launch power: -10 dBm Maximum launch power: -4 dBm
Receiver characteristics:	Minimum receiver sensitivity: -17 dBm Maximum input power: 0 dBm

8616GTE Module

Physical specifications

Height:	1.5 in. (3.8 cm)
Width:	15.4 in. (39.1 cm)
Depth:	18.5 in. (47.0 cm)
Weight:	8.0 lb (3.6 kg)

Electrical specifications

Input power:	102 W maximum
Thermal rating:	344 Btu/hr maximum

MTBF rating 147,602 hr

Connector type RJ-45 (see Table 37)

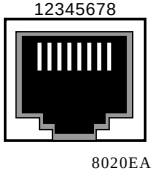
Cable specifications

Type:	Category 5 or better UTP cable for 1000 Mb/s operation. Cables must use all four pairs. Wiring configuration and performance are defined by EIA/TIA Standard 568 and IEEE Standard 802.3 2000 edition.
Maximum distance:	328 ft (100 m)

Port connectors

The ports on the 8616GTE Module are RJ-45 ports wired as shown in Table 38.

Table 38 Pin assignments: 8616GTE Module port

Connector	Pin number	Signal
	1	Bidirectional Data A + (BI_DA+)
	2	Bidirectional Data A – (BI_DA–)
	3	Bidirectional Data B + (BI_DB+)
	4	Bidirectional Data C + (BI_DC+)
	5	Bidirectional Data C – (BI_DC–)
	6	Bidirectional Data B – (BI_DB–)
	7	Bidirectional Data D + (BI_DD+)
	8	Bidirectional Data D – (BI_DD–)

8616SXE Module

Physical specifications

Height:	1.5 in. (3.8 cm)
Width:	15.4 in. (39.1 cm)
Depth:	18.5 in. (47.0 cm)
Weight:	8.0 lb (3.6 kg)

Electrical specifications

Input power:	115 W maximum
Thermal rating:	396 Btu/hr maximum

MTBF rating 178,403 hr

Connector type MT-RJ

Cable specifications

Type:	62.5 µm or 50 µm multimode fiber optic cable
Maximum distance:	62.5 µm multimode fiber optic cable: 722 ft (220 m) @ 160 MHz/km bandwidth 902 ft (275 m) @ 200 MHz/km bandwidth 50 µm multimode fiber optic cable: 1640 ft (500 m) @ 400 MHz/km bandwidth 1804 ft (550 m) @ 400 MHz/km bandwidth

Optical specifications

Wavelength:	850 nm
Optical budget:	7 dB
Laser transmitter characteristics:	Minimum launch power: -10 dBm Maximum launch power: -4 dBm
Receiver characteristics:	Minimum receiver sensitivity: -17 dBm Maximum input power: 0 dBm

8624FXE Module

Physical specifications

Height:	1.5 in. (3.8 cm)
Width:	15.4 in. (39.1 cm)
Depth:	18.5 in. (47.0 cm)
Weight:	7.6 lb (3.4 kg)

Electrical specifications

Input power:	56 W maximum
Thermal rating:	193 Btu/hr maximum

MTBF rating 320,972 hr

Connector type MT-RJ

Cable specifications

Type:	62.5 µm multimode fiber optic cable
Distance:	6562 ft (2 km) for full-duplex links

Optical specifications

Wavelength:	1300 nm
Optical budget:	-20 dBm to -14 dBm
Transmitter characteristics:	Minimum optical power: -10 dBm Maximum optical power: -4 dBm

8632TXE and 8632TXM Modules

Physical specifications

Height:	1.5 in. (3.8 cm)
Width:	15.4 in. (39.1 cm)
Depth:	18.5 in. (47.0 cm)
Weight:	9 lb (4 kg)

Electrical specifications

Input power:	100 W maximum
Thermal rating:	193 Btu/hr maximum

MTBF rating	217,744 hr
Connector type	RJ-45 connector wired as MDI-X SC duplex connectors on GBICs; see GBIC descriptions beginning on page 147.

Cable specifications

Type:	Category 3, 4, or 5 UTP cable (10 Mb/s operation) Category 5 UTP cable (100 Mb/s operation)
Maximum distance:	328 ft (100 m) for 10/100 Mb/s ports For GBIC ports, distance varies with the GBIC; see GBIC descriptions beginning on page 147.

8648TXE and 8648TXM Modules

Physical specifications

Height:	1.5 in. (3.8 cm)
Width:	15.4 in. (39.1 cm)
Depth:	18.5 in. (47.0 cm)
Weight:	8.0 lb (3.6 kg)

Electrical specifications

Input power:	76 W maximum
Thermal rating:	261 Btu/hr maximum

MTBF rating	244,708 hr
Connector type	RJ-45 connector wired as MDI-X (see Table 39)

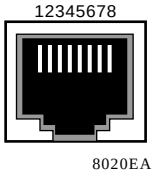
Cable specifications

Type:	Category 3, 4, or 5 UTP cable (10 Mb/s operation) Category 5 UTP cable (100 Mb/s operation)
Maximum distance:	328 ft (100 m)

Port connectors

The ports on the 8648TXE and 8648TXM Modules are RJ-45 ports wired as MDI-X connectors (Table 39).

Table 39 Pin assignments: Module 8648TXE/8648TXM port

Connector	Pin number	Signal
	1	Input receive data + (RX+)
	2	Input receive data - (RX-)
	3	Output transmit data + (TX+)
	6	Output transmit data - (TX-)
	4, 5, 7, 8	Not used

8672ATME and 8672ATMM Modules

Physical specifications

Height:	1.5 in. (3.8 cm)
Width:	15.4 in. (39.1 cm)
Depth:	18.5 in. (47.0 cm)
Weight:	8.0 lb (3.6 kg)

Electrical specifications

Input power:	OC-3c MDA: 40 W maximum OC-12c MDA: 40 W maximum DS-3 MDA: 40 W maximum
Thermal rating:	OC-3c MDA: 138 Btu/hr maximum OC-12c MDA: 138 Btu/hr maximum DS-3 MDA: 138 Btu/hr maximum
MTBF rating	222,103 hr
Connector type	OC-3c MDA: MT-RJ OC-12c MDA: Duplex SC DS-3: BNC

Cable specifications

Type:	Multimode or single-mode fiber optic cable, coaxial cable
Maximum distance:	Multimode fiber optic cable: 1.24 mi (2 km) for OC-3c connection 1640 ft (500 m) for OC-12c connection Single-mode fiber optic cable: 9.3 mi (15 km) for OC-3c connection 9.3 mi (15 km) for OC-12c connection Coaxial cable: 450 ft (137 m) for DS-3 connection

Optical specifications

Wavelength:	OC-3c MDA SMF: 1274 to 1356 nm OC-3c MDA MMF: 1274 to 1356 nm OC-12c MDA SMF: 1274 to 1356 nm OC-12c MDA MMF: 1260 to 1360 nm

Average transmit output power:	OC-3c and OC-12c MDAs SMF: -8 to -15 dBm OC-3c and OC-12c MDAs MMF: -14 to -29 dBm
Average receiver sensitivity:	OC-3c MDA SMF: -14 to -28 dBm OC-3c MDA MMF: -14 to -29 dBm OC-12c MDA SMF: -7 to -18 dBm OC-12c MDA MMF: -14 to -28 dBm

8681XLR Module

Physical specifications	
Height:	1.5 in. (3.8 cm)
Width:	15.4 in. (39.1 cm)
Depth:	18.5 in. (47.0 cm)
Weight:	8.0 lb (3.6 kg)
Electrical specifications	
Input power:	150 W maximum
Thermal rating:	512 BTU/hr maximum
MTBF rating	140,000 hr
Data Rate and encoding	64b/66b (IEEE 802.3ae specified)
Compatible with STM-64	No
Module Performance (64 byte packets)	
Aggregate throughput	8x1,488,100 pps
Routing and Switch Forwarding Rates	8x1,488,100 pps
Connector type	SC Duplex
Port type	10GBASE-LR 1310nm serial PMD
Cable specifications	
Type:	9/125 µm single mode fiber optic cable
Distance:	6.2 miles (10 km)
Optical specifications	
Wavelength:	1310 nm
Optical budget:	5 dB
Transmitter characteristics:	Minimum optical power: -6 dBm Maximum optical power: -1 dBm
Receiver characteristics:	Minimum receiver sensitivity: -12 dBm Maximum input power: -1 dBm

8681XLW Module

Physical specifications	
Height:	1.5 in. (3.8 cm)
Width:	15.4 in. (39.1 cm)
Depth:	18.5 in. (47.0 cm)
Weight:	8.0 lb (3.6 kg)
Electrical specifications	
Input power:	150 W maximum
Thermal rating:	512 BTU/hr maximum
MTBF rating	140,000 hr
Data Rate and encoding	64b/66b (IEEE 802.3ae specified)
Compatible with STM-64	Yes
Module Performance (64 byte packets)	
Aggregate throughput	8x1,488,100 pps
Routing and Switch Forwarding Rates	8x1,488,100 pps
Connector type	SC Duplex
Port type	10GBASE-LW 1310nm serial PMD
Cable specifications	
Type:	9/125 µm single mode fiber optic cable
Distance:	6.2 miles (10 km)
Optical specifications	
Wavelength:	1310 nm
Optical budget:	5 dB
Transmitter characteristics:	Minimum optical power: -6 dBm Maximum optical power: -1 dBm
Receiver characteristics:	Minimum receiver sensitivity: -12 dBm Maximum input power: -1 dBm

8683POSM Module

Physical specifications

Height:	1.5 in. (3.8 cm)
Width:	15.4 in. (39.1 cm)
Depth:	18.5 in. (47.0 cm)
Weight:	8.0 lb (3.6 kg)

Electrical specifications

Input power:	OC-3c MDA: 70 W maximum OC-12c MDA: 90 W maximum
Thermal rating:	OC-3c MDA: 241 Btu/hr maximum OC-12c MDA: 310 Btu/hr maximum

MTBF rating	255,693 hr
Connector types	OC-3c MDA: MT-RJ OC-12c MDA: Duplex SC

Cable specifications

Type:	Multimode or single-mode fiber optic cable
Maximum distance:	Multimode fiber optic cable: 1.24 mi (2 km) for OC-3c connection 1640 ft (500 m) for OC-12c connection Single-mode fiber optic cable: 9.3 mi (15 km) for OC-3c connection 9.3 mi (15 km) for OC-12c connection

Optical specifications

Wavelength:	OC-3c MDA SMF: 1274 to 1356 nm OC-3c MDA MMF: 1274 to 1356 nm OC-12c MDA SMF: 1274 to 1356 nm OC-12c MDA MMF: 1260 to 1360 nm
Average transmit output power:	OC-3c and OC-12c MDAs SMF: -8 to -15 dBm OC-3c and OC-12c MDAs MMF: -14 to -29 dBm
Average receiver sensitivity:	OC-3c MDA SMF: -14 to -28 dBm OC-3c MDA MMF: -14 to -29 dBm OC-12c MDA SMF: -7 to -18 dBm OC-12c MDA MMF: -14 to -28 dBm

8691SF Module

Physical specifications

Height:	1.5 in. (3.8 cm)
Width:	15.4 in. (39.1 cm)
Depth:	18.5 in. (47.0 cm)
Weight:	7.2 lb (3.3 kg)

Electrical specifications

Input power:	70 W maximum
Thermal rating:	241 Btu/hr maximum

MTBF rating 213,454 hr

Connector types

Ethernet Management port:	RJ-45 connector wired as MDI (see Table 40)
Console port:	DB-9 connector (see Table 41)
Modem port:	DB-9 connector (see Table 42)

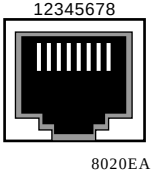
Cable specifications

Ethernet Management port:	Category 3, 4, or 5 UTP cable (10 Mb/s operation) Category 5 UTP cable (100 Mb/s operation)
Console port:	RS-232 cable
Modem port:	DTE-to-DCE cable (straight or transmit cable)

Management port

The Management port is a 10/100 Mb/s Ethernet port implemented on an RJ-45 connector wired as an MDI connection. Table 40 shows the pin assignments for this connector.

Table 40 Pin assignments: 8691SF Module Management port

Connector	Pin number	Signal
	1	Output transmit data + (TX+)
	2	Output transmit data - (TX-)
	3	Input receive data + (RX+)
	6	Input receive data - (RX-)
	4, 5, 7, 8	Not used

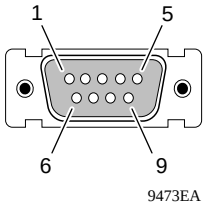
Console serial port

The Console serial port is implemented as a DB-9 connector. This port can operate as a data terminal equipment (DTE) or data communication equipment (DCE) device. Use the switch to the left of the port to set the port to DTE (left) or DCE (right). Default settings for this port are 9600 bits/s, 8 data bits, no parity, and one stop bit.

Because the Console port expects to receive data set ready (DSR) and clear to send (CTS) signals before transmitting, these control lines are required in the cabling. The Console port does not support any inbound flow control; that is, the port does not toggle control lines to indicate an input buffer full condition.

Table 41 lists the pin assignments for the Console port for both the DTE and DCE settings.

Table 41 Pin assignments: 8691SF Module Console port

Connector	Pin number	DCE signal	DTE signal
	2	RXD	TXD
	3	TXD	RXD
	4	DTR	DSR
	5	GND	GND
	6	DSR	DTR
	7	RTS	CTS
	9	CTS	RTS

Modem serial port

The Modem serial port is implemented on a DB-9 connector wired as a DTE connection.

To set up modem access, you need a DTE-to-DCE cable (straight or transmit cable) between the Modem port and a modem or terminal server.

Table 42 describes the required cable pin assignments.

Table 42 Pin assignments: DTE to DCE

Switch		Modem	
Signal	**Pin number**	**DCE DB-9 pin number**	**DCE DB-25 pin number**
RXD	2	2	3
TXD	3	3	2
DTR	4	4	20
GND	5	5	7
DSR	6	6	6
RTS	7	7	4
CTS	8	8	5

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