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Installing Passport 8600 Switch Modules

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Preface

The Nortel Networks* 8000 Series chassis provides the physical enclosure for the 8000 Series switch modules. When Passport 8600 modules are installed in the chassis, the resulting Passport 8600 Switch provides a range of data speeds and high-performance switching and routing features.

This guide provides instructions for installing the Passport 8600 modules in a 8000 Series chassis.

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 need to install or replace a Passport 8600 module in the chassis. A qualified service person should have appropriate technical training and experience and be aware of the hazards involved in installing and replacing customer-replaceable units.

Text conventions

This guide uses the following text conventions:

italic text	Indicates new terms and book titles.

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Chapter 1
Passport 8600 modules

The Passport 8600 modules provide a full complement of core routing and switching capabilities in a Passport 8000 Series chassis. The Passport 8600 modules include switch fabric (SF) modules and interface modules. A Passport 8000 Series chassis with installed Passport 8600 modules constitutes a Passport 8600 Switch with distributed management and full redundancy that delivers wire-speed routing and layer 2 switching.

The Passport 8600 interface 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
- 1 Gb/s (1000 Mb/s) fiber and copper Ethernet ports
- 10 Gb/s (10,000 Mb/s) fiber Ethernet ports
- ATM OC-3c/STM-1, OC-12c and DS-3 ports
- POS OC-3c/STM-1 and OC-12c/STM-4 ports

This chapter includes the following topics:

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Table 1 lists the maximum port densities available with each type of interface module.

Table 1 Maximum port densities for Passport 8600 modules

Module type	Port type	Maximum number of ports per chassis		
		8003	8006	8010 and 8010co
8608GBE and 8608GBM	1000BASE-SX	16	32	64
	1000BASE-LX	16	32	64
	1000BASE-ZX	16	32	64
	1000BASE-XD	16	32	64
	1000BASE-CWDM	16	32	64
	1000BASE-T	16	32	64
8608GTE and 8608GTM	1000BASE-T	16	32	64
8608SXE	1000BASE-SX	16	32	64
8616GTE	1000BASE-T	32	64	128
8616SXE	1000BASE-SX	32	64	128
8624FXE	100BASE-FX	48	96	192
8632TXE and 8632TXM	10BASE-T/100BASE-TX	64	128	256
	1000BASE-SX	4	8	16
	1000BASE-LX	4	8	16
	1000BASE-ZX	4	8	16
	1000BASE-XD	4	8	16
	1000BASE-CWDM	4	8	16
	1000BASE-T	4	8	16

Table 1 Maximum port densities for Passport 8600 modules (continued)

Module type	Port type	Maximum number of ports per chassis		
		8003	8006	8010 and 8010co
8648TXE and 8648TXM	10BASE-T/100BASE-TX	96	192	384
8672ATME and 8672ATMM[1]	OC-3c MDA	16	32	48
	OC-12c MDA	4	8	12
	DS-3 MDA	8	16	24
8681XLR	10GBASE-LR	2	4	8
8681XLW	10GBASE-LW	2	4	8
8683POSM[2]	OC-3c MDA	12	24	24
	OC-12c MDA	6	12	12

1 For information about these MDAs, see "8672ATME and 8672ATMM Modules" on page 42.

2 For information about these MDAs, see "The 8681XLW Module supports up to 128,000 table entries in its forwarding engine allowing for large layer 2 and layer 3 configurations including Internet routing tables. Refer to Network Design Guidelines for usage of table entries." on page 49.

Each Passport 8600 interface module supports varying numbers and types of interfaces as described in Table 1. Additionally, each Passport 8600 interface module consists of a Backplane Forwarding Module (BFM) with common application specific integrated circuits (ASIC) on each module. These ASICs provide a forwarding engine and local storage of Layer 2-4 forwarding tables. Each forwarding engine provides lookups, resolves addresses and sends packets through the switch fabric to a destination port without CPU intervention. The forwarding engine also filters packets against current prioritization policies and can set prioritization information in the internal packet header.

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

- Strict priority
- Weighted Round Robin (WRR)

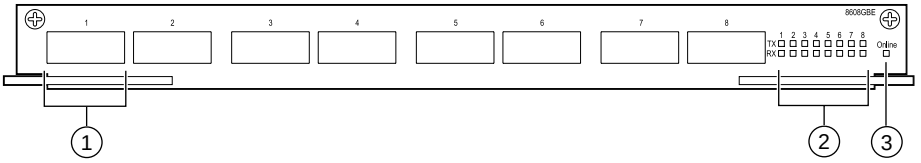
Strict priority guarantees the highest priority. WRR gives priority based on a round robin algorithm. For more information on prioritization schemes see *Network Design Guidelines.*

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.

8608GBE and 8608GBM Modules

Both the 8608GBE and 8608GBM Modules (Figure 1) provide eight bays for installing gigabit interface converters (GBICs). The ports on the GBICs allow you to make riser connections, server attachments, or interswitch links.

Figure 1 8608GBE/8608GBM Module



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

9717EC

Nortel Networks has qualified the GBICs listed in Table 2 for use in the 8608GBE and 8608GBM modules:

Table 2 8608GBE and 8608GBM qualified GBICs

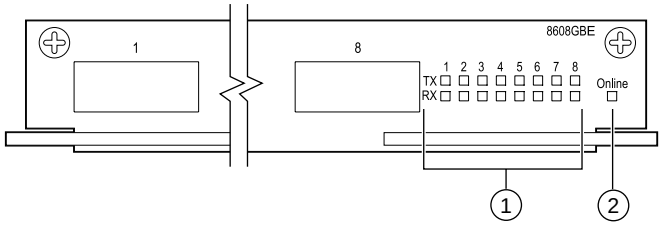
GBIC order number	GBIC type
AA1419001	1000BASE-SX
AA1419002	1000BASE-LX
AA1419003	1000BASE-XD
AA1419004	1000BASE-ZX
AA1419041	1000BASE-T
AA1419017-9024	CWDM wavelengths 1470nm-1610nm

Note: Only GBICs qualified by Nortel Networks are supported for use in the 8608GBE Module. GBICs not qualified by Nortel Networks may operate within the module, but have not been tested for power draw, electromagnetic interference and interoperability.

For more information about the GBICs and instructions for installing them, see *Installing GBIC and Gigabit SFP Transceivers.*

Figure 2 shows the location of the 8608GBE and 8608GBM Module LEDs.

Figure 2 8608GBE/8608GBM Module LEDs



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

9718EB

Table 3 describes the 8608GBE and 8608GBM Module LEDs.

Table 3 8608GBE/8608GBM 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 on the attached remote device.
		Off	The port has not detected a fault condition.
	RX	Green/Steady	The port has 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.

Table 3 8608GBE/8608GBM Module LEDs (continued)

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. If the switch power is on, the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.

The 8608GBE Module supports up to 32,000 table entries in its forwarding engine. Refer to *Network Design Guidelines* for usage of table entries.

The 8608GBM Module supports up to 128,000 table entries in its forwarding engine allowing for large layer 2 and layer 3 configurations including Internet routing tables. Refer to *Network Design Guidelines* for usage of table entries.

The Passport 8600 system has two modes of operation: E mode and M mode. E mode is the default mode and supports up to 32,000 table entries in the system M mode supports up to 128,000 table entries in the system. For full support of M mode (128,000 table entries) the following configuration conditions are required:

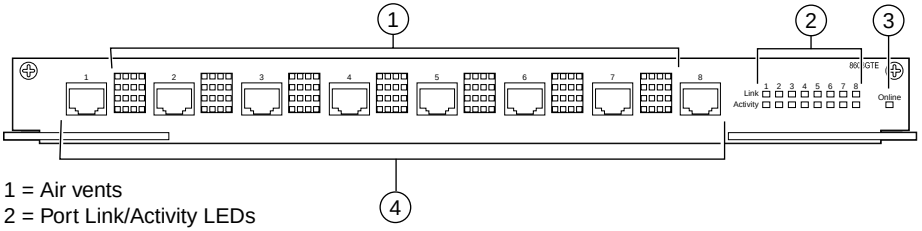
- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults to E mode.
- All modules installed in the chassis must support 128,000 table entries (these are referred to as M modules and include the 8632TXM, 8648TXM, 8608GBM, 8608GTM, 8683POSM, 8672ATMM, 8672ATMM, 8681XLR and 8681XLW).
- M modules require 8000 Series Release 3.3 or later.
- MMode must be enabled. For instructions on enabling MMode, see *Managing Platform Operations*.

Note: If M mode is enabled and one or more modules installed in the chassis is an E module (32,000 table entries), the E modules will be disabled. This protects the system forwarding tables from lost entries. For instructions on enabling or disabling M mode, refer to *Managing Platform Operations*.

8608GTE and 8608GTM Modules

Both the 8608GTE and 8608GTM Module (Figure 3) provide eight 1000BASE-T, copper gigabit Ethernet ports with 8-pin modular (RJ-45) connectors. Each port operates in 1000 Mb/s (1 Gb/s) full-duplex mode and supports IEEE 802.3 1998 Clause 28 autonegotiation and remote fault identification when the connected device also supports autonegotiation. Distances of up to 100 meters are obtainable with Category-5 unshielded twisted pair (UTP) cable.

Figure 3 8608GTE/8608GTM Module

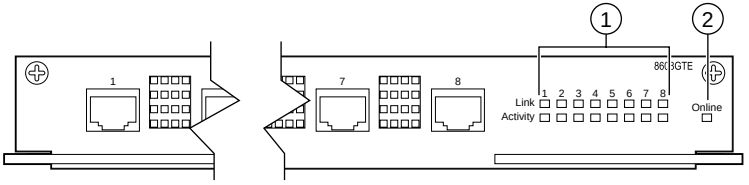


1 = Air vents
2 = Port Link/Activity LEDs
3 = Module Online LED
4 = 1000BASE-T ports

10351EB

Figure 4 shows the location of the 8608GTE and 8608GTM Module LEDs.

Figure 4 8608GTE/8608GTM Module LEDs



9900EB

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

Table 4 describes the 8608GTE and 8608GTM Module LEDs.

Table 4 8608GTE/8608GTM 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 switch power is off. If the switch power is on, the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.

The 8608GTE Module supports up to 32,000 table entries in its forwarding engine. Refer to *Network Design Guidelines* for usage of table entries.

The 8608GTM Module supports up to 128,000 table entries in its forwarding engine allowing for large layer 2 and layer 3 configurations including Internet routing tables. Refer to *Network Design Guidelines* for usage of table entries.

The Passport 8600 system has two modes of operation: E mode and M mode. E mode is the default mode and supports up to 32,000 table entries in the system M mode supports up to 128,000 table entries in the system. For full support of M mode (128,000 table entries) the following configuration conditions are required:

- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults to E mode.
- All modules installed in the chassis must support 128,000 table entries (these are referred to as M modules and include the 8632TXM, 8648TXM, 8608GBM, 8608GTM, 8683POSM, 8672ATMM, 8672ATMM, 8681XLR and 8681XLW).
- M modules require 8000 Series Release 3.3 or later.

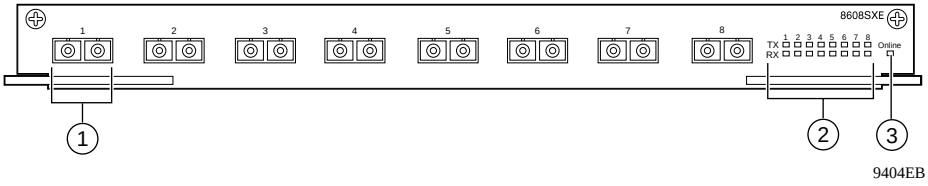
- M mode must be enabled. For instructions on enabling M mode, see *Managing Platform Operations*.

Note: If M mode is enabled and one or more modules installed in the chassis is an E module (32,000 table entries), the E modules will be disabled. This protects the system forwarding tables from lost entries. For instructions on enabling or disabling M mode, refer to *Managing Platform Operations*.

8608SXE Module

The 8608SXE Module supports eight 1000BASE-SX ports (850 nanometer [nm] shortwave, Gigabit Ethernet) using SC type connectors for riser connections, server attachments, or interswitch links. The 8608SXE Module supports standards-based 1000Mb/s (1Gb/s) full-duplex operation only.

Figure 5 8608SXE Module



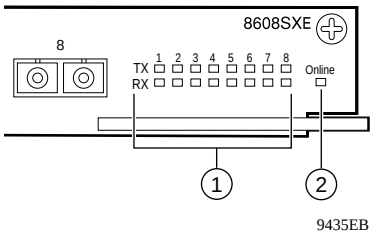
1 = 1000BASE-SX port
2 = Port TX and RX LEDs
3 = Module Online LED

The shortwave optical transceivers provide transmission ranges as follows:

- Up to 275 meters (m) using 62.5 micrometers (µm) multimode fiber cable
- Up to 550 m using 50 µm multimode fiber cable

Figure 6 shows the location of the 8608SXE Module LEDs.

Figure 6 8608SXE Module LEDs



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

Table 5 describes the 8608SXE Module LEDs.

Table 5 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 on the 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.

Table 5 8608SXE 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. If the switch power is on, the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.

The 8608SXE Module (Figure 5) supports up to 32,000 table entries in its forwarding engine. Refer to *Network Design Guidelines* for usage of table entries.

The Passport 8600 system has two modes of operation: E mode and M mode. E mode is the default mode and supports up to 32,000 table entries in the system M mode supports up to 128,000 table entries in the system. For full support of M mode (128,000 table entries) the following configuration conditions are required:

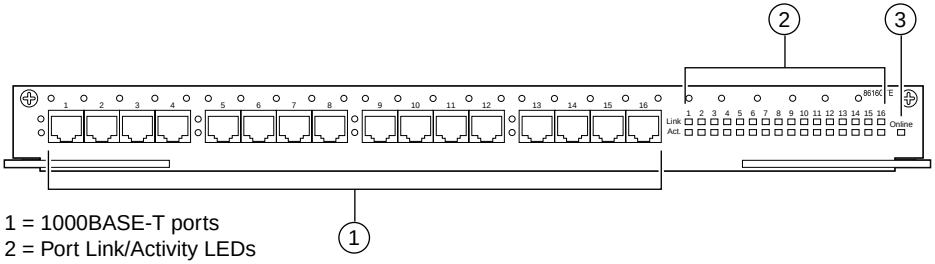
- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults to E mode.
- All modules installed in the chassis must support 128,000 table entries (these are referred to as M modules and include the 8632TXM, 8648TXM, 8608GBM, 8608GTM, 8683POSM, 8672ATMM, 8672ATMM, 8681XLR and 8681XLW).
- M modules require 8000 Series Release 3.3 or later.
- M mode must be enabled. For instructions on enabling M mode, see *Managing Platform Operations*.

Note: If M mode is enabled and one or more modules installed in the chassis is an E module (32,000 table entries), the E modules will be disabled. This protects the system forwarding tables from lost entries. For instructions on enabling or disabling M mode, refer to *Managing Platform Operations*.

8616GTE Module

The 8616GTE Module provides sixteen 1000BASE-T, copper gigabit Ethernet ports with 8-pin modular (RJ-45) connectors. Each port operates in 1000 Mb/s (1Gb/s) full-duplex mode and supports the IEEE 802.3ae standard. Distances of up to 100 meters are obtainable with Category-5 unshielded twisted pair (UTP) cable.

Figure 7 8616GTE Module

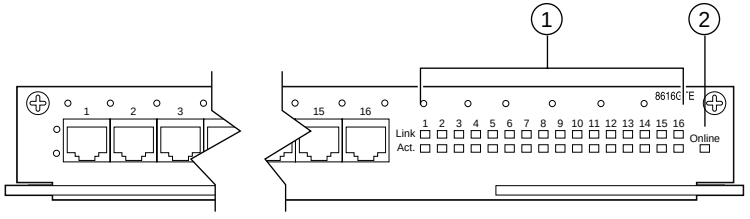


1 = 1000BASE-T ports
2 = Port Link/Activity LEDs
3 = Module Online LED

10528EB

Figure 8 shows the location of the 8616GTE Module LEDs.

Figure 8 8616GTE Module LEDs



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

10529EB

Table 6 describes the 8616GTE Module LEDs.

Table 6 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. If the switch power is on, the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.

The 8616GTE Module (Figure 5) supports up to 32,000 table entries in its forwarding engine. Refer to *Network Design Guidelines* for usage of table entries.

The Passport 8600 system has two modes of operation: E mode and M mode. E mode is the default mode and supports up to 32,000 table entries in the system M mode supports up to 128,000 table entries in the system. For full support of M mode (128,000 table entries) the following configuration conditions are required:

- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults to E mode.
- All modules installed in the chassis must support 128,000 table entries (these are referred to as M modules and include the 8632TXM, 8648TXM, 8608GBM, 8608GTM, 8683POSM, 8672ATMM, 8672ATMM, 8681XLR and 8681XLW).
- M modules require 8000 Series Release 3.3 or later.

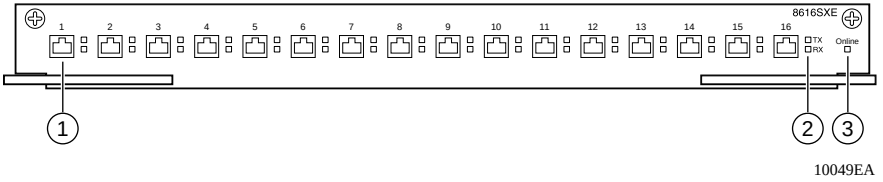
- M mode must be enabled. For instructions on enabling M mode, see *Managing Platform Operations*.

Note: If M mode is enabled and one or more modules installed in the chassis is an E module (32,000 table entries), the E modules will be disabled. This protects the system forwarding tables from lost entries. For instructions on enabling or disabling M mode, refer to *Managing Platform Operations*.

8616SXE Module

The 8616SXE Module (Figure 9) provides 16 1000BASE-SX ports (850 nm, shortwave, Gigabit Ethernet) using MT-RJ type connectors for riser connections, server attachments, or interswitch links. The 8616SXE Module supports standards-based 1000Mb/s (1Gb/s) full-duplex operation only.

Figure 9 8616SXE Module



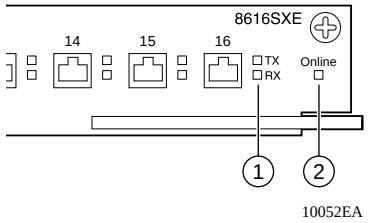
1 = 1000BASE-SX port
2 = Port TX and RX LEDs
3 = Module Online LED

The shortwave optical transceivers provide transmission ranges as follows:

- Up to 275 m using 62.5 µm multimode fiber cable
- Up to 550 m using 50 µm multimode fiber cable

Figure 10 shows the location of the 8616SXE Module LEDs.

Figure 10 8616SXE Module LEDs



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

Table 7 describes the 8616SXE Module LEDs.

Table 7 8616SXE Module LEDs

Type	Label	Color/State	Meaning
Port	TX	Green/Blinking	The 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.
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. If the switch power is on, the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.

The 8616SXE Module (Figure 5) supports up to 32,000 table entries in its forwarding engine. Refer to *Network Design Guidelines* for usage of table entries.

The Passport 8600 system has two modes of operation: E mode and M mode. E mode is the default mode and supports up to 32,000 table entries in the system M mode supports up to 128,000 table entries in the system. For full support of M mode (128,000 table entries) the following configuration conditions are required:

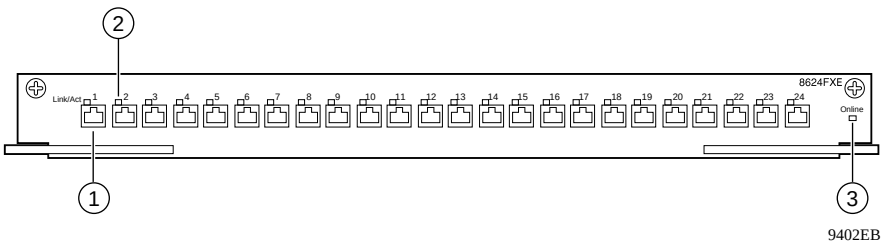
- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults to E mode.
- All modules installed in the chassis must support 128,000 table entries (these are referred to as M modules and include the 8632TXM, 8648TXM, 8608GBM, 8608GTM, 8683POSM, 8672ATMM, 8672ATMM, 8681XLR and 8681XLW).
- M modules require 8000 Series Release 3.3 or later.
- M mode must be enabled. For instructions on enabling M mode, see *Managing Platform Operations*.

Note: If M mode is enabled and one or more modules installed in the chassis is an E module (32,000 table entries), the E modules will be disabled. This protects the system forwarding tables from lost entries. For instructions on enabling or disabling M mode, refer to *Managing Platform Operations*.

8624FXE Module

The 8624FXE Module provides 24 100BASE-FX ports using MT-RJ type connectors.

Figure 11 8624FXE Module

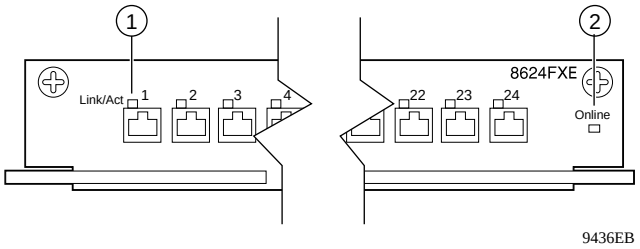


1 = 100BASE-FX port
2 = Port LED
3 = Module Online LED

The 24 100BASE-FX ports on the 8624FXE Module can operate in 100Mb/s Fast Ethernet full-duplex mode. The optical transceivers provide transmission ranges of up to 6562 ft (2 km) using 62.5 µm multimode fiber cable or 4,264 ft (1.3 km) using 50 µm multimode fiber cable.

Figure 12 shows the location of the LEDs.

Figure 12 8624FXE Module LEDs



1 = Port Link/Activity LEDs

2 = Module Online LED

Table 8 describes the 8624FXE Module LEDs.

Table 8 8624FXE Module LEDs

Type	Label	Color/State	Meaning
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.
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. If the switch power is on, the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.

The 8624FXE Module (Figure 5) supports up to 32,000 table entries in its forwarding engine. Refer to *Network Design Guidelines* for usage of table entries.

The Passport 8600 system has two modes of operation: E mode and M mode. E mode is the default mode and supports up to 32,000 table entries in the system M mode supports up to 128,000 table entries in the system. For full support of M mode (128,000 table entries) the following configuration conditions are required:

- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults to E mode.
- All modules installed in the chassis must support 128,000 table entries (these are referred to as M modules and include the 8632TXM, 8648TXM, 8608GBM, 8608GTM, 8683POSM, 8672ATMM, 8672ATMM, 8681XLR and 8681XLW).
- M modules require 8000 Series Release 3.3 or later.
- M mode must be enabled. For instructions on enabling M mode, see *Managing Platform Operations*.

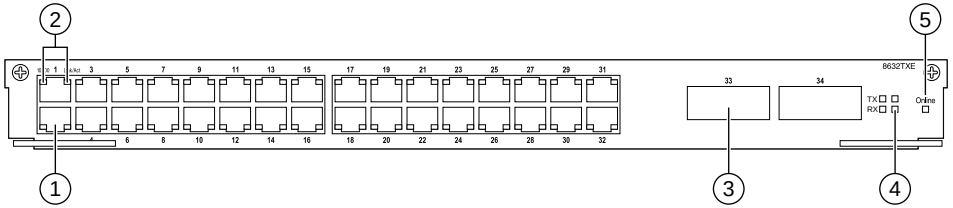
Note: If M mode is enabled and one or more modules installed in the chassis is an E module (32,000 table entries), the E modules will be disabled. This protects the system forwarding tables from lost entries. For instructions on enabling or disabling M mode, refer to *Managing Platform Operations*.

8632TXE and 8632TXM Modules

Both the 8632TXE and 8632TXM Modules (Figure 13) provide 32 autonegotiating 10BASE-T/100BASE-TX ports using 8-pin modular (RJ-45) connectors, Ports operate at either 10 Mb/s or 100Mb/s up to distances of 100 m with Category-3 or greater unshielded twisted pair (UTP) cable.

Additionally two bays are provided for 1000BASE-X gigabit Ethernet interface connectors (GBICs).

Figure 13 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 802.3 1998 Clause 28 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 802.3 1998 Clause 28 autonegotiation standard, the two devices negotiate the highest possible data rate and the duplex mode of operation.

Nortel Networks has qualified the GBICs listed in Table 2 for use in the 8608GBE and 8608GBM modules:

Table 9 8632TXE and 8632TXM qualified GBICs

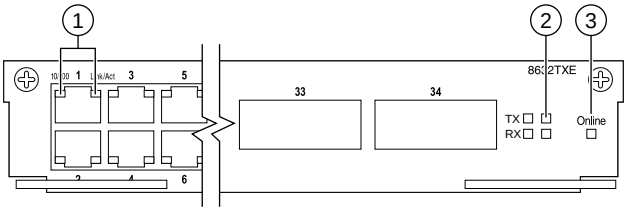
GBIC order number	GBIC type
AA1419001	1000BASE-SX
AA1419002	1000BASE-LX
AA1419003	1000BASE-XD
AA1419004	1000BASE-ZX
AA1419041	1000BASE-T
AA1419017-9024	CWDM wavelengths 1470nm-1610nm

Note: Only GBICs qualified by Nortel Networks are supported for use in the 8632TXE and 8632TXM Modules. GBICs not qualified by Nortel Networks may operate within these modules, but have not been tested for power draw, electromagnetic interference and interoperability.

For more information about the GBICs and instructions for installing them, see *Installing GBIC and Gigabit SFP Transceivers.*

Figure 14 shows the location of the 8632TXE and 8632TXM Module LEDs.

Figure 14 8632TXE/8632TXM Module LEDs



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

10459EA

Table 10 describes the 8632TXE and 8632TXM Module LEDs.

Table 10 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. If the switch power is on, and the module is performing its power-on self-test and software initialization. A module in this state is not yet functional.

Table 10 8632TXE/8632TXM Module LEDs (continued)

Type	Label	Color/State	Meaning
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.
GBIC	TX	Green/Blinking	The port is transmitting data.
		Amber/Steady	A fault condition exists on the line or on the attached remote device.
		Off	The port has not detected a fault condition.
	RX	Green/Steady	The port has 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.

The 8632TXE Module supports up to 32,000 table entries in its forwarding engine. Refer to *Network Design Guidelines* for usage of table entries.

The 8632TXM Module supports up to 128,000 table entries in its forwarding engine allowing for large layer 2 and layer 3 configurations including Internet routing tables. Refer to *Network Design Guidelines* for usage of table entries.

The Passport 8600 system has two modes of operation: E mode and M mode. E mode is the default mode and supports up to 32,000 table entries in the system M mode supports up to 128,000 table entries in the system. For full support of M mode (128,000 table entries) the following configuration conditions are required:

- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults to E mode.
- All modules installed in the chassis must support 128,000 table entries (these are referred to as M modules and include the 8632TXM, 8648TXM, 8608GBM, 8608GTM, 8683POSM, 8672ATMM, 8672ATMM, 8681XLR and 8681XLW).
- M modules require 8000 Series Release 3.3 or later.

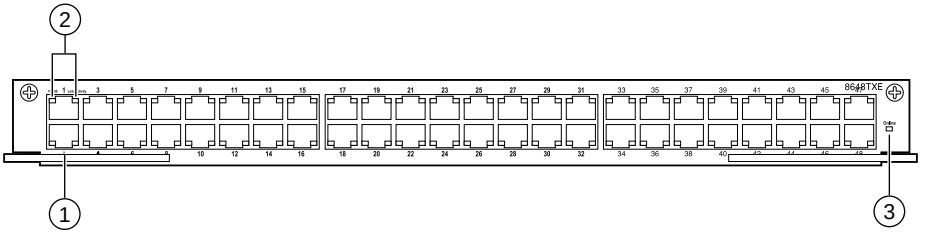
- M mode must be enabled. For instructions on enabling M mode, see *Managing Platform Operations*.

Note: If M mode is enabled and one or more modules installed in the chassis is an E module (32,000 table entries), the E modules will be disabled. This protects the system forwarding tables from lost entries. For instructions on enabling or disabling M mode, refer to *Managing Platform Operations*.

8648TXE and 8648TXM Modules

The 8648TXE and 8648TXM Modules (Figure 15) provide 48 autonegotiating 10BASE-T/100BASE-TX ports using 8-pin modular (RJ-45) connectors. Ports operate either at 10 Mb/s or 100Mb/s up to distances of 100 m with Category-3 or greater unshielded twisted pair (UTP) cable.

Figure 15 8648TXE/8648TXM Module



1 = 10/100BASE-T port

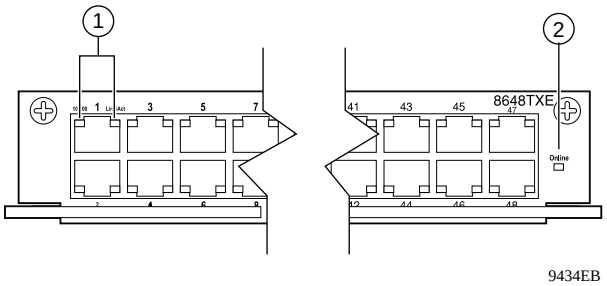
2 = Port LEDs: 10/100 (speed)
Link/Activity

3 = Module Online LED

Both the 8648TXE and 8648TXM Module ports support the IEEE 802.3 1998 Clause 28 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 802.3 1998 Clause 28 autonegotiation standard, the two devices negotiate the highest possible data rate and the duplex mode of operation.

Figure 16 shows the location of the 8648TXE Module LEDs.

Figure 16 8648TXE/8648TXM Module LEDs



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

Table 11 describes the 8648TXE and 8648TXM Module LEDs.

Table 11 8648TXE/8648TXM Module LEDs

Type	Label	Color/State	Meaning
Port	10/100	Green/Steady	The port is operating at 100 Mb/s.
		Off	The port is operating at 10 Mb/s.
	Link/Activity	Green/Steady	The port is connected, and the link is good.
		Green/Blinking	Data is passing through the port.
		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 failed its power-on self-test.
		Off	The switch power is off. If the switch power is on, the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.

The 8688TXE Module supports up to 32,000 table entries in its forwarding engine. Refer to *Network Design Guidelines* for usage of table entries.

The 8648TXM Module supports up to 128,000 table entries in its forwarding engine allowing for large layer 2 and layer 3 configurations including Internet routing tables. Refer to *Network Design Guidelines* for usage of table entries.

The Passport 8600 system has two modes of operation: E mode and M mode. E mode is the default mode and supports up to 32,000 table entries in the system M mode supports up to 128,000 table entries in the system. For full support of M mode (128,000 table entries) the following configuration conditions are required:

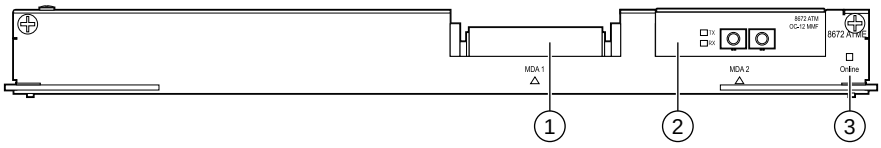
- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults to E mode.
- All modules installed in the chassis must support 128,000 table entries (these are referred to as M modules and include the 8632TXM, 8648TXM, 8608GBM, 8608GTM, 8683POSM, 8672ATMM, 8672ATMM, 8681XLR and 8681XLW).
- M modules require 8000 Series Release 3.3 or later.
- M mode must be enabled. For instructions on enabling M mode, see *Managing Platform Operations*.

Note: If M mode is enabled and one or more modules installed in the chassis is an E module (32,000 table entries), the E modules will be disabled. This protects the system forwarding tables from lost entries. For instructions on enabling or disabling M mode, refer to *Managing Platform Operations*.

8672ATME and 8672ATMM Modules

Both the 8672ATME and 8672ATMM Modules (Figure 17) have two bays for installing ATM MDAs. These MDAs provide interface flexibility and ATM network transmission that supports RFC 1483 routed and bridged PVCs. The 8672ATME and 8672ATMM Modules support SONET and SDH frame structures for data.

Figure 17 8672ATME/8672ATMM Module with an OC-12c/STM-4 MDA



9724EC

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

The module requires at least one of the following MDAs:

- 1-port OC-12c/STM-4: single-mode fiber (SMF) or multimode fiber (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 Module, see *Installing Media Dependent Adapters for the 8672ATME and 8672ATMM Modules*.

In the data center, the 8672ATME and 8672ATMM Modules act as an edge device for WAN connectivity to connect an 8600 Switch to public or private ATM networks. In the wiring closet, this module provides inter-building connections for campus networks where each building is supported by frame-switched networks.

You can install up to six 8672ATME or 8672ATMM Modules in one 8010 10-slot chassis. You can install up to four 8672ATME or 8672ATMM Modules in one 8006 6-slot chassis. You can install up to two 8672ATME or 8672ATMM Modules in a 8003 3-slot chassis.

Both the 8672ATME and 8672ATMM Modules have an Online LED that indicates overall status for the module. Table 12 describes the Online LED.

Table 12 8672ATME/8672ATMM Module LED

Color/State	Meaning
Green	The module is receiving power and is 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 8672ATME and 8672ATMM Modules* for a description of how to configure the 8672ATME and 8672ATMM Modules using the Command Line Interface (CLI) or Device Manager.

The 8672ATME Module supports up to 32,000 table entries in its forwarding engine. Refer to *Network Design Guidelines* for usage of table entries.

The 8672ATMM Module supports up to 128,000 table entries in its forwarding engine allowing for large layer 2 and layer 3 configurations including Internet routing tables. Refer to *Network Design Guidelines* for usage of table entries.

The Passport 8600 system has two modes of operation: E mode and M mode. E mode is the default mode and supports up to 32,000 table entries in the system M mode supports up to 128,000 table entries in the system. For full support of M mode (128,000 table entries) the following configuration conditions are required:

- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults to E mode.
- All modules installed in the chassis must support 128,000 table entries (these are referred to as M modules and include the 8632TXM, 8648TXM, 8608GBM, 8608GTM, 8683POSM, 8672ATMM, 8672ATMM, 8681XLR and 8681XLW).
- M modules require 8000 Series Release 3.3 or later.

- M mode must be enabled. For instructions on enabling M mode, see *Managing Platform Operations*.

Note: If M mode is enabled and one or more modules installed in the chassis is an E module (32,000 table entries), the E modules will be disabled. This protects the system forwarding tables from lost entries. For instructions on enabling or disabling M mode, refer to *Managing Platform Operations*.

8681XLR Module

The 8681XLR Module (Figure 18) provides a single 10GBASE-LR 1310nm 10gigabit 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.

Figure 18 8681XLR Module

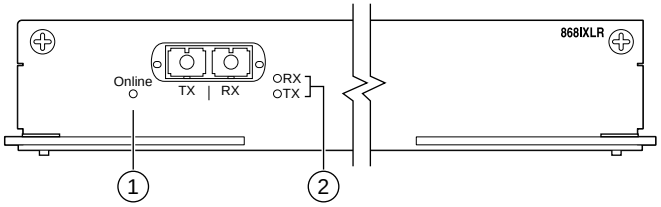
1 = Online LED
2 = 10GBASE LR port
3 = Port RX and TX LEDs

10548EA

Figure 19 shows the location of the 8681XLR Module LEDs.

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

Figure 19 8681XLR Module LEDs



1 = Online LED
2 = Port RX and TX LEDs

10550EA

Table 13 describes the 8681XLR Module LEDs.

Table 13 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 cable is disconnected, the port is disabled, or the link is down.
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. If the switch power is on, the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.

The 8681XLR Module supports up to 128,000 table entries in its forwarding engine allowing for large layer 2 and layer 3 configurations including Internet routing tables. Refer to *Network Design Guidelines* for usage of table entries.

The Passport 8600 system has two modes of operation: E mode and M mode. E mode is the default mode and supports up to 32,000 table entries in the system M mode supports up to 128,000 table entries in the system. For full support of M mode (128,000 table entries) the following configuration conditions are required:

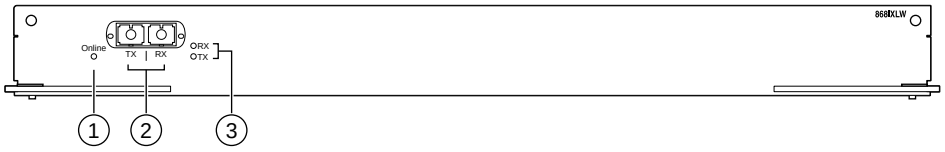
- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults to E mode.
- All modules installed in the chassis must support 128,000 table entries (these are referred to as M modules and include the 8632TXM, 8648TXM, 8608GBM, 8608GTM, 8683POSM, 8672ATMM, 8672ATMM, 8681XLR and 8681XLW).
- M modules require 8000 Series Release 3.3 or later.
- M mode must be enabled. For instructions on enabling M mode, see *Managing Platform Operations*.

Note: If M mode is enabled and one or more modules installed in the chassis is an E module (32,000 table entries), the E modules will be disabled. This protects the system forwarding tables from lost entries. For instructions on enabling or disabling M mode, refer to *Managing Platform Operations*.

8681XLW Module

The 8681XLW Module (Figure 20) provides a single 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 a transmission range of up to 10 km using 9/125 µm single-mode fiber cable.

Figure 20 8681XLW Module



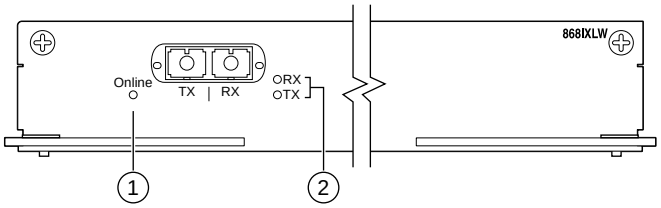
1 = Online LED
2 = 10GBASE LW port
3 = Port RX and TX LEDs

10547EA

Figure 21 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 21 8681XLW Module LEDs



1 = Online LED
2 = Port RX and TX LEDs

10549EA

Table 14 describes the 8681XLW Module LEDs.

Table 14 8681XLW Module LEDs

Type	Label	Color/State	Meaning
Port	TX	Green/Blinking	The port is transmitting data.
		Green/Steady	The port is enabled but not transmitting data.
		Off	The port has not detected a fault condition.
	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. If the switch power is on, the module is going through its power-on self-test and software initialization. A module in this state is not yet functional.

The 8681XLW Module supports up to 128,000 table entries in its forwarding engine allowing for large layer 2 and layer 3 configurations including Internet routing tables. Refer to *Network Design Guidelines* for usage of table entries.

The Passport 8600 system has two modes of operation: E mode and M mode. E mode is the default mode and supports up to 32,000 table entries in the system M mode supports up to 128,000 table entries in the system. For full support of M mode (128,000 table entries) the following configuration conditions are required:

- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults to E mode.
- All modules installed in the chassis must support 128,000 table entries (these are referred to as M modules and include the 8632TXM, 8648TXM, 8608GBM, 8608GTM, 8683POSM, 8672ATMM, 8672ATMM, 8681XLR and 8681XLW).
- M modules require 8000 Series Release 3.3 or later.

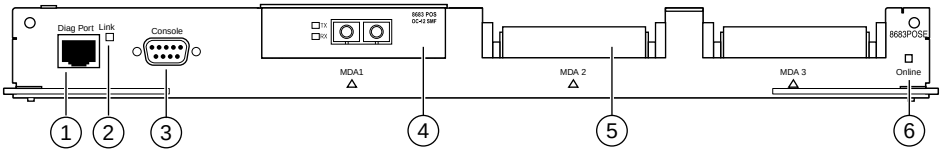
- M mode must be enabled. For instructions on enabling M mode, see *Managing Platform Operations*.

Note: If M mode is enabled and one or more modules installed in the chassis is an E module (32,000 table entries), the E modules will be disabled. This protects the system forwarding tables from lost entries. For instructions on enabling or disabling M mode, refer to *Managing Platform Operations*.

8683POSM Module

The 8683POSM Module (Figure 22) has three bays for installing POS media dependent adapters (MDAs). These MDAs provide MAN/WAN support by allowing access to SONET services in the metropolitan area. You can connect multiple campuses in a single metropolitan area without compromising performance or increasing complexity. You can install up to four 8683POSM Modules in one 8010 10-slot chassis (four in a 8006 6-slot chassis, and two in a 8003 3-slot chassis).

Figure 22 8683POSM Module with an OC-12c/STM-4 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: SMF or MMF using SONET media
- 2-port OC-3c/STM-1: SMF or MMF using SONET media

The 8683POSM Module supports a mixture of OC-3c/STM-1 and OC-12c/STM-4 lines. For example, you can install an OC-12c/STM-4 MDA in the first bay and OC-3c/STM-1 MDAs in 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.

For more information about the MDAs for the 8683POSM Module, see *Installing Media Dependent Adapters for the 8683POSM Module*.

The 8683POSM Module has an Online LED that indicates overall status for the module. Table 15 describes the Online LED.

Table 15 8683POSM Module LED

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

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

The 8683POSM Module supports up to 128,000 table entries in its forwarding engine allowing for large layer 2 and layer 3 configurations including Internet routing tables. Refer to *Network Design Guidelines* for usage of table entries.

The Passport 8600 system has two modes of operation: E mode and M mode. E mode is the default mode and supports up to 32,000 table entries in the system M mode supports up to 128,000 table entries in the system. For full support of M mode (128,000 table entries) the following configuration conditions are required:

- The chassis must include at least one 8691SF CPU module. If the chassis includes a 8690SF module, the mode defaults to E mode.
- All modules installed in the chassis must support 128,000 table entries (these are referred to as M modules and include the 8632TXM, 8648TXM, 8608GBM, 8608GTM, 8683POSM, 8672ATMM, 8672ATMM, 8681XLR and 8681XLW).
- M modules require 8000 Series Release 3.3 or later.

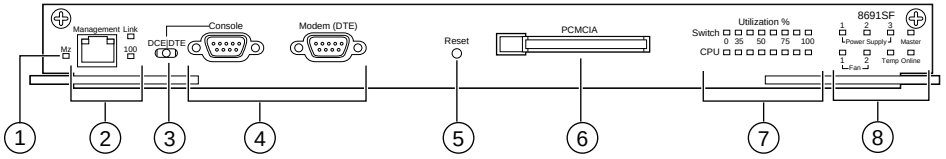
- M mode must be enabled. For instructions on enabling M mode, see *Managing Platform Operations*.

Note: If M mode is enabled and one or more modules installed in the chassis is an E module (32,000 table entries), the E modules will be disabled. This protects the system forwarding tables from lost entries. For instructions on enabling or disabling M mode, refer to *Managing Platform Operations*.

8691SF Module

The 8691SF Module (Figure 23) provides the core switching fabric for the Passport 8600 Switch, as well as a a CPU subsystem and a real-time clock. The core switching fabric switches all traffic through the routing switch modules. The CPU subsystem manages the routing switch fabric and the other interface modules.

Figure 23 8691SF Module



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

11165EB

The 8691SF Module consists of a printed circuit board with status LEDs, a management port, a DCE/DTE switch for the console port, a console port, a modem port, a reset button, and a PCMCIA card slot.

The CPU subsystem uses a PowerPC CPU and has 128 MB of synchronous dynamic random access memory (SDRAM). The 8691SF is capable of supporting Passport 8600 Release 3.7 with 128MB SDRAM. Future release may require a memory upgrade kit (DS1411016) to upgrade to 256MB SDRAM.

The 8681SF/256 (DS1404090) is functionally identical to the 8691SF except it has 256MB of SDRAM installed. The 8691SF/256 is identified by the front panel model number label in the upper right corner as 8691SF/256.

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 interface modules. The switch logic allocates memory to the various switch priority queues according to traffic usage and current switch configuration.

In all 8000 Series Chassis other than the 8003 Chassis you can install a 8691SF Module in both slots 5 and 6 of the chassis to enable redundant operation. The redundant module in slot 6 can then assume the processing duties of a failing primary 8691SF Module in slot 5.

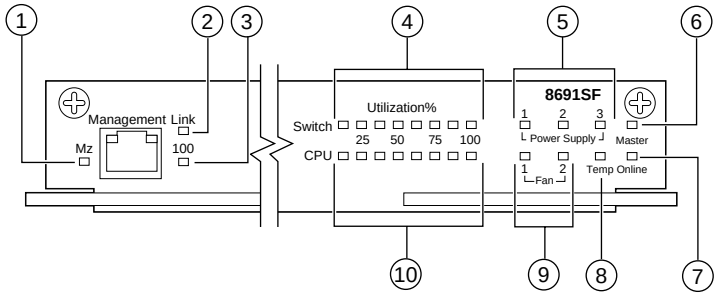
When the 8691SF Module in slot 6 completes initialization, it relearns the routing and VLAN bridging information for the switch unless the HA-CPU flag has been enabled. In that case the static routes and ARP entries for routing are synchronized to the redundant CPU which will result in no interruption of network services.

The two 8691SF Modules share switch fabric functions for the switch. If one 8691SF Module fails, the system reverts to operation with a single 8691SF Module.

LEDs

Figure 24 shows the location of the 8691SF Module LEDs.

Figure 24 8691SF Module LEDs



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

11166EA

The Switch LEDs and the 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 16 describes the 8691SF Module LEDs.

Table 16 8691SF Module LEDs

Label	Color/State	Meaning
Mz	N/A	Reserved for future use.
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.

Table 16 8691SF Module LEDs (continued)

Label	Color/State	Meaning
Switch Utilization (8 LEDs)	Green	The number of lit LEDs indicates the utilization level (full-duplex operation) of the switch fabric as follows: 1 LED = 10.0 Mb/s 2 LEDs =100 Mb/s 3 LEDs = 1 Gb/s 4 LEDs = 5.0 Gb/s 5 LEDs = 10.0 Gb/s 6 LEDs = 20 Gb/s 7 LEDs = 40 Gb/s 8 LEDs = 64 Gb/s
CPU Utilization (8 LEDs)	Green	The number of lit LEDs indicates the level (full-duplex operation) of CPU activity as follows: 1 LED = 12% 2 LEDs = 24% 3 LEDs = 36% 4 LEDs = 48% 5 LEDs = 60% 6 LEDs = 72% 7 LEDs = 84% 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 bay, or the power supply in the specified bay 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 is 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 off-line.

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 switch using a Web browser or Device Manager. You can also establish a TELNET or SSH (Secure Shell) session to access the CLI. Use this port to connect the switch to a network management station. The Ethernet management port has its own IP address but does not switch traffic to other ports in the chassis.

Note: This port should be used only as a management port. This port 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, see "Console serial port" on page 112.

Serial ports

The 8691SF Module provides two serial ports for attaching modem and 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, see "Modem serial port" on page 113.

Reset button

The recessed Reset button on the module allows you to perform a hard reset or reboot of the system. To press the Reset button, insert a small object (for example, a paper clip) into the Reset button hole.

PCMCIA card slot

The PCMCIA card slot in the 8691SF Module accepts the PCMCIA cards listed in Table 17. 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 switches or store multiple configurations for a single switch.t.

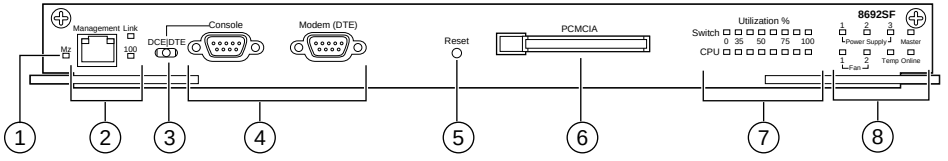
Table 17 Passport 8600 PCMCIA cards

Part number	Card Type
DS1411003	PCMCIA 8M 3.3 V
DS1411014	PCMCIA 16M 3.3V
DS1411021	PCMCIA 64M 3.3 V
DS1411022	PCMCIA 256M 3.3V

8692SF Module

Dual 8692SF switch fabric Modules (Figure 25) enable a maximum switch bandwidth of 512 Gb/s. Using the Split Multi-Link Trunk (SMLT) protocol in the core, a redundant Passport 8600 switch with two 8692SF Modules can provide over 1 Tb/s of core switching capacity.

Figure 25 8692SF Module



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

11165EA

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Note: You can install the 8692SF Module in slots 5 or 6 of the 8006, 8010, or 8010co chassis. The 8692SF Module is not supported in the 8003 chassis with Passport 8600 Series software Release 3.7.

Note: Passport 8600 Series software does not support configurations of the Passport 8692SF Module, and Passport 8690SF or Passport 8691SF Module installed within the same chassis.

To upgrade to the Passport 8692SF Module, see "Upgrading to the 8692SF Module" on page 59."

The 8692SF Module uses a CPU similar to the PowerPC CPU of the 8691SF. The 8692SF CPU has 256 MB of synchronous dynamic random access memory (SDRAM) for forwarding tables, and 56 MB of on-board Flash memory for configuration, image and log file storage. The Flash memory is divided into two volumes: Volume/0 has a capacity of 16 MB and Volume/1 has a capacity of 40MB. You can use either volume to store multiple file types.

The 8692SF switch fabric enables a maximum forwarding throughput of 384Mp/s, Using the Split Multi-Link Trunk (SMLT) protocol in the core, the Passport 8600 can provide over 1 Tb/s of core switching capability.

You can install a 8692SF Module in both slots 5 and 6 of the 8006, 8010, or 8010co chassis to enable redundant operation. The redundant module in slot 6 can then assume the processing duties of a failing primary 8692SF Module in slot 5.

When the 8692SF Module in slot 6 completes initialization, it recalculates the topology (Layer 2 including STG, Layer 3 including routing topology using RIP/OSPF or BGP) information for the switch unless the high-availability mode (HA-CPU flag) has been enabled. In that case all Layer 3 information (except multicast, IPX, BGP, and fast-VRRP) is synchronized to the redundant CPU which will result in no interruption of network services. For more information about the high-availability mode, see *Configuring Platform Operations*.

The two 8692SF Modules share switch fabric functions for the switch. If one 8692SF Module fails, the system reverts to operation with a single 8692SF Module.

Upgrading to the 8692SF Module

If you have two Passport 8690SF Modules or two 8691SF Modules installed in your Passport 8000 Series chassis you can upgrade to the Passport 8692SF module with a minimum loss of traffic.

To upgrade to the 8692SF Module:

1. Upgrade to Passport 8000 Switch Series Software Release 3.7 or later. See *Upgrading to Passport 8000 Switch Series Software Release 3.7*. See your release notes for a list of supported hardware and software capabilities.
2. Remove the redundant 8690SF or 8691SF Module installed in slot 6. For instructions on removing a module, see "Removing a module" on page 69.
3. Install the 8692SF Module in slot 6. For instructions on installing a module, see "Installing a module" on page 74.
4. To allow the system to failover to the 8692SF, reboot the primary CPU.
5. Remove the 8690SF or 8691SF Module installed in slot 5 (the primary CPU) allowing the system to failover to the redundant 8692SF Module. For instructions on removing a module, see "Removing a module" on page 69.
6. Install the 8692SF Module in slot 5. For instructions on installing a module, see "Installing a module" on page 74.

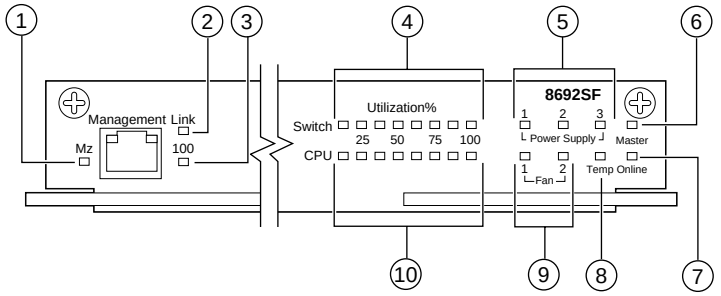
   The system is now active with two 8692SF Modules.

Warning: The 8692SF Module requires Passport 8000 Switch Series Software Release 3.7 or later. Operating the 8692SF Module with any release below Passport 8000 Switch Series Software Release 3.7 will damage this module.

LEDs

Figure 26 shows the location of the 8692SF Module LEDs.

Figure 26 8692SF Module LEDs



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

11166EA

The Switch LEDs and the 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 16 describes the 8692SF Module LEDs.

Table 18 8692SF Module LEDs

Label	Color/State	Meaning
Mz	N/A	Reserved for future use.
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.

Table 18 8692SF Module LEDs (continued)

Label	Color/State	Meaning
Switch Utilization (8 LEDs)	Green	The number of lit LEDs indicates the utilization level (full-duplex operation) of the switch fabric as follows: 1 LED = 4.0 Gb/s - < 34 Gb/s 2 LEDs = 34 Gb/s - < 68 Gb/s 3 LEDs = 68 Gb/s - < 102 Gb/s 4 LEDs = 102 Gb/s - < 136Gb/s 5 LEDs = 136 Gb/s - < 170 Gb/s 6 LEDs = 170 Gb/s - < 204 Gb/s 7 LEDs = 204 Gb/s - < 238 Gb/s 8 LEDs = 238 Gb/s - < 256 Gb/s
CPU Utilization (8 LEDs)	Green	The number of lit LEDs indicates the level of CPU activity (full-duplex operation) 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 bay, or the power supply in the specified bay 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 is in standby mode.

Table 18 8692SF Module LEDs (continued)

Label	Color/State	Meaning
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 off-line.

Ethernet management port

The Ethernet management port on the 8692SF Module is an MDI 10/100BASE-T port that allows out-of-band management of the switch using a Web browser or Device Manager. You can also establish a TELNET or SSH (Secure Shell) session to access the CLI. Use this port to connect the switch to a network management station. The Ethernet management port has its own IP address but does not switch traffic to other ports in the chassis.

Note: This port should be used only as a management port. This port provides out-of-band management for the 8692SF 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, see “Console serial port” on page 115.

Serial ports

The 8692SF Module provides two serial ports for attaching modem and console devices. The Console port provides terminal access to the 8692SF 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, see “Modem serial port” on page 116.

Reset button

The recessed Reset button on the module allows you to perform a hard reset or reboot of the system. To press the Reset button, insert a small object (for example, a paper clip) into the Reset button hole.

PCMCIA card slot

The PCMCIA card slot in the 8692 Module accepts the PCMCIA cards listed in Table 19. 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 switches or store multiple configurations for a single switch.

Table 19 Passport 8600 PCMCIA cards

Part number	Card Type
DS1411003	PCMCIA 8M 3.3 V
DS1411014	PCMCIA 16M 3.3V
DS1411021	PCMCIA 64M 3.3 V
DS1411022	PCMCIA 256 3.3V

Chapter 2
Installing Passport 8600 modules and connecting equipment

This chapter provides instructions for installing and connecting Passport 8600 modules in a Passport 8000 Series chassis to create a Passport 8600 Switch. This chapter includes the following topics:

Topic	Page
Removing and installing a filler panel	65
Installing and replacing a module	68
Connecting a PC or terminal to the switch	78
Connecting a modem to the switch	79
Connecting a network management station to the switch	80
Connecting communications cables to Passport 8600 modules	81
Initializing the 8672ATME, 8672ATMM, and 8683POSM Modules	84

Removing and installing a filler panel

Nortel Networks ships the 8000 Series chassis with a filler panel covering each empty module slot.

Note: On a 8003, 8006, or 8010 Chassis, the filler panel covers an empty module slot. On the 8010co Chassis, the filler panel resembles a module and is installed in the 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 67.

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 27 or Figure 28).

Figure 27 Removing a filler panel: 8003, 8006, and 8010 Chassis

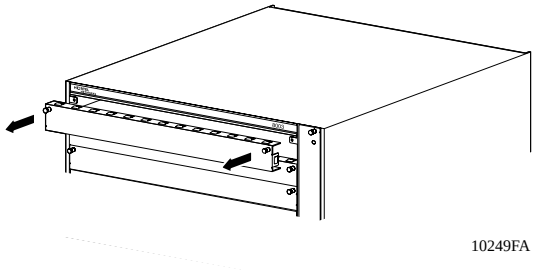
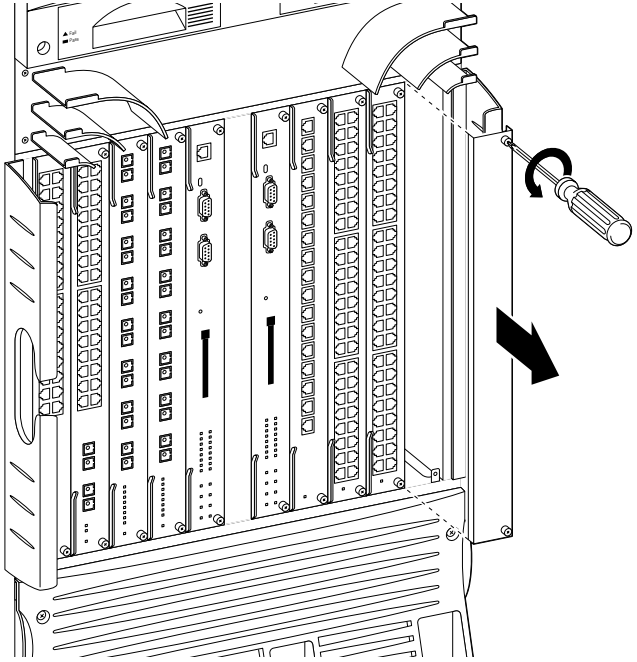


Figure 28 Removing a filler panel: 8010co Chassis



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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 Insert the filler panel into the slot (8010co Chassis), or place the filler panel over the slot (8003, 8006, or 8010 Chassis).

3 Tighten the 2 screws with a Phillips screwdriver.

Installing and replacing a module

The Passport 8600 modules 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.

To prevent static discharge damage when you work with Passport 8600 modules, place each module on a grounded antistatic mat until you are ready to install it. If you do not have an antistatic mat, wear a discharge leash or wrist strap to free yourself of static before you touch a module. (An antistatic wrist strap is shipped with the 8010co Chassis.) You can also free yourself of static by touching the metal chassis before you handle the module.

Caution: Electrostatic discharge can damage hardware. Follow the procedures in this section to protect your equipment from 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 module” on page 74.

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 Passport 8600 module from an operating switch chassis without turning off the chassis power.

Caution: Before you remove a 8691SF Module, back up your configuration. If the chassis has only one 8691SF Module and you remove that module, the switch will not operate.

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

- If you remove an interface 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 Passport 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 2 captive screws that secure the module to the chassis (Figure 29 or Figure 30).

Figure 29 Loosening screws on the module: 8003, 8006, and 8010 Chassis

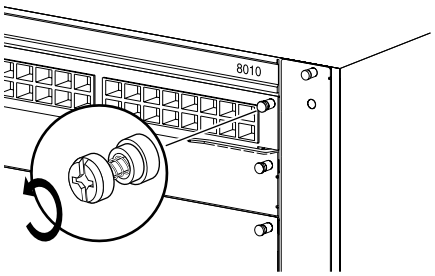
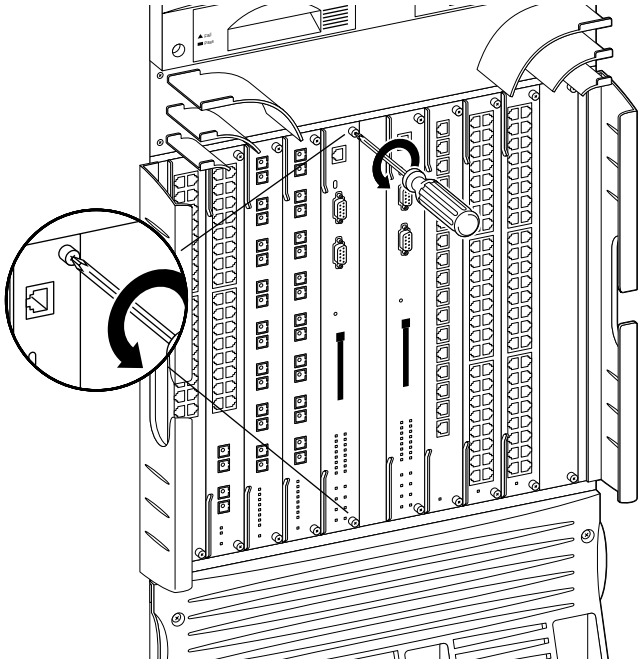


Figure 30 Loosening screws on the module: 8010co Chassis



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3 Rotate the insert/extract levers to eject the module from the chassis (Figure 31 or Figure 32).

Figure 31 Ejecting the module from the chassis: 8003, 8006, and 8010 Chassis

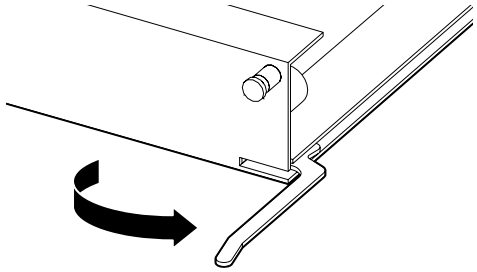

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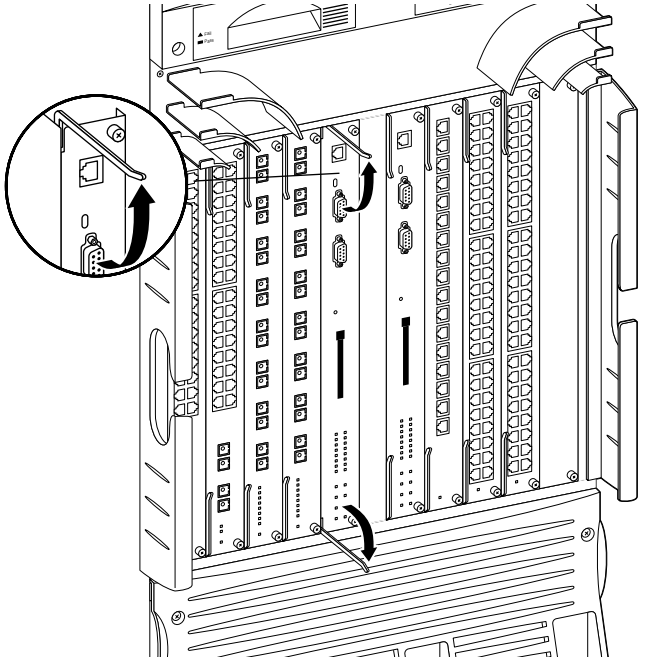
Figure 32 Ejecting the module from the chassis: 8010co Chassis



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4 Slide the module out of the chassis (Figure 33 or Figure 34).

Figure 33 Removing a module: 8003, 8006, and 8010 Chassis

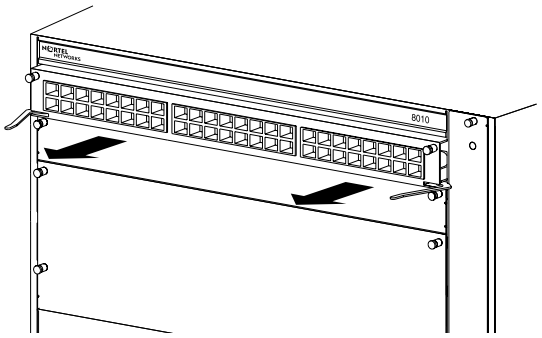

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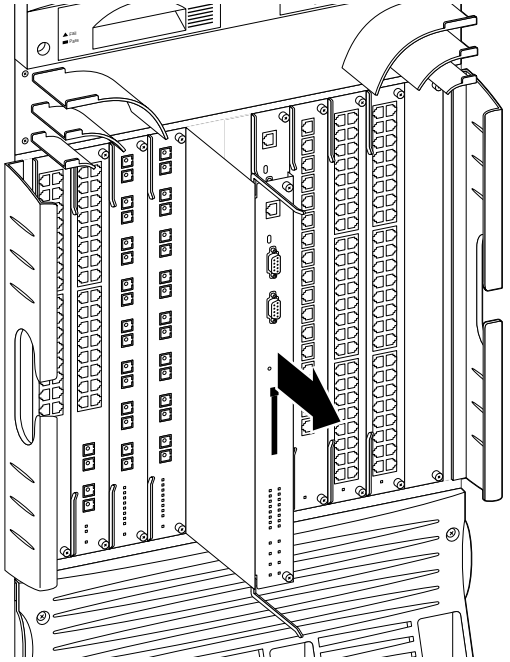
Figure 34 Removing a module: 8010co Chassis



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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 67).

Installing a module

You can install a Passport 8600 module with the power on or off. If you install a module in the same chassis slot where the same type of module was previously installed, the previous configuration is maintained for that module in that slot. With the 8672ATME, 8672ATMM, and 8683POSM Modules, the configuration is maintained only if the same type of MDAs are used. In all other cases, a module installed in a Passport 8000 Series chassis is reset to factory defaults.

Caution: Electrostatic discharge can damage hardware. Review the antistatic precautions on page 68.

To install a Passport 8600 module:

1. Locate the slot where you want to install the module.
2. Remove the installed module or the filler panel.

   For instructions, see "Removing a module" on page 69 or "Removing a filler panel" on page 66.
3. Make sure that the insert/extract levers are extended away from the front of the module (see Figure 31 or Figure 32).
4. Slide the module into the slot using the slot module guides (Figure 35 or Figure 36).

Figure 35 Installing a module: 8003, 8006, and 8010 Chassis

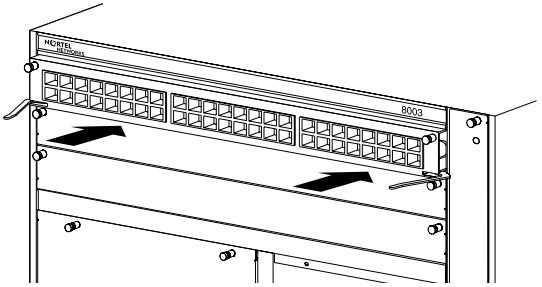

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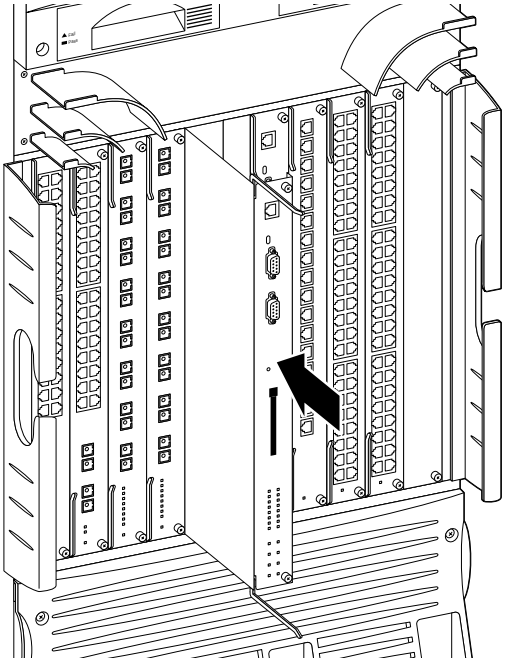
Figure 36 Installing a module: 8010co Chassis



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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 37 or Figure 38).

Figure 37 Seating the backplane connectors: 8003, 8006, and 8010 Chassis

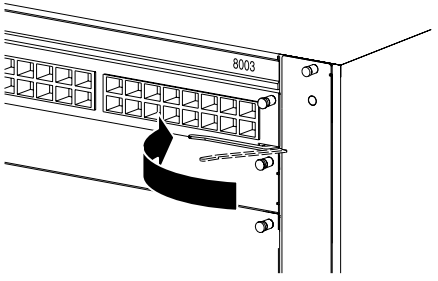

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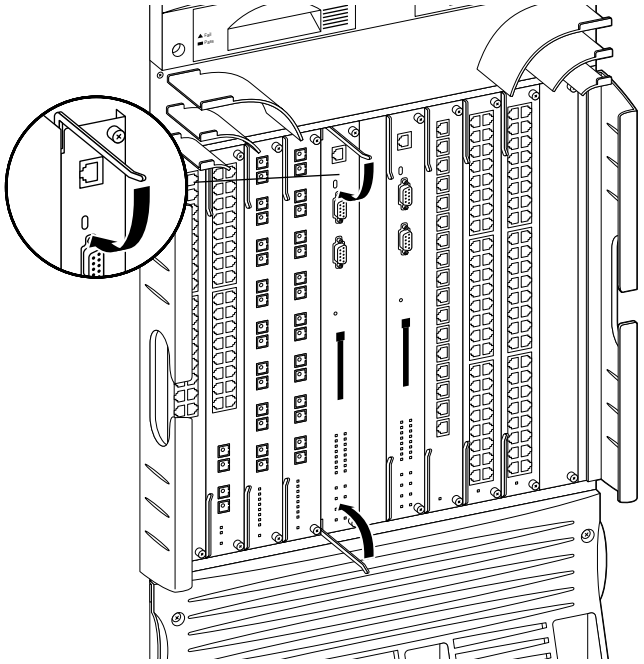
Figure 38 Seating the backplane connectors: 8010co Chassis



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7 Using a Phillips screwdriver, tighten the 2 captive screws to secure the module to the chassis (Figure 39 or Figure 40).

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

Figure 39 Securing the module in the chassis: 8003, 8006, and 8010 Chassis

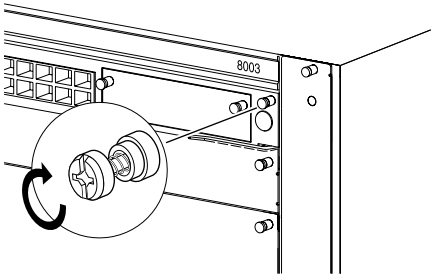

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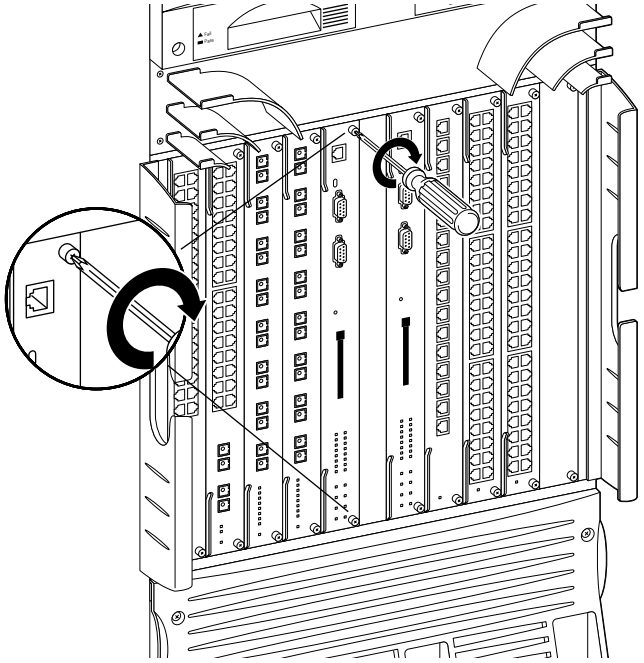
Figure 40 Securing the module in the chassis: 8010co Chassis



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

- "Connecting a PC or terminal to the switch" on page 78
- "Connecting a modem to the switch" on page 79
- "Connecting communications cables to Passport 8600 modules" on page 81

Connecting a PC or terminal to the switch

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

To connect a PC or terminal to the console port, you need a serial console cable with a 9-pin receptacle connector.

To connect a PC 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 20.

   See the PC or terminal user manual for instructions.

Table 20 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 modem to the switch

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 Passport 8600 Switch:

1 Turn on and configure the modem, using the parameters in Table 21.

See the modem documentation for instructions.

Table 21 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.
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 a network management station to the switch

The management port on the 8691SF and 8692SF Modules 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 or 8692SF Module.

Connecting communications cables to Passport 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 22 lists the cable requirements for the Passport 8600 modules.

Table 22 Connectors and cables for Passport 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 or RJ-45 copper connector	Depends on installed GBIC model; for specifications, see "GBICs" on page 95	None	Depends on installed GBIC model; for specifications, see "GBICs" on page 95
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 band-width 902 ft (275 m) @ 200 MHz/km band-width
			50 µm multimode fiber optic cable	None	1640 ft (500 m) @ 400 MHz/km band-width 1804 ft (550 m) @ 400 MHz/km band-width
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 22 Connectors and cables for Passport 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 band-width 902 ft (275 m) @ 200 MHz/km band-width
			50 µm multimode fiber optic cable	None	1640 ft (500 m) @ 400 MHz/km band-width 1804 ft (550 m) @ 400 MHz/km band-width
8624FXE	100BASE-FX Ethernet ports	MT-RJ	62.5 µm multimode fiber optic cable	None	6562 ft (2 km) for 62.5 µm MMF full-duplex links or 4264 ft (1.3km) for 50 µm MMF full-duplex links.
8632TXE or 8632TXM	1000 Mb/s Ethernet port	Duplex SC	Depends on installed GBIC model; for specifications, see "GBICs" on page 103	None	Depends on installed GBIC model; for specifications, see "GBICs" on page 103
	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 UTP 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 UTP required for 100 Mb/s operation	None	328 ft (100 m)
8672ATME OC-3 or 8672TMMM 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)

Table 22 Connectors and cables for Passport 8600 modules (continued)

Module	Port	Connector	Recommended cable type	Minimum cable length	Maximum cable length
8672ATME OC-12 or 8672ATMM 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 or 8672ATMM DS-3	DS-3	BNC	75 ohm coaxial cable	None	450 ft (137 m)
8681XLR	10GBASE-LR port	Duplex SC	9/125 µm single-mode fiber optic cable	None	10 km
8681XLW	10GBASE-LW port	Duplex SC	9/125 µm single-mode fiber optic cable	None	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 UTP required for 100 Mb/s operation	None	328 ft (100 m)
	Serial ports	DB-9	RS-232		
8692SF	Ethernet Management port	RJ-45	EIA Category 3, 4, or 5 UTP for 10 Mb/s operation; EIA Category 5 UTP required for 100 Mb/s operation	None	328 ft (100 m)
	Serial ports	DB-9	RS-232		

Note: Ports on the 8632TXE, 8632TXM, 8648TXE, and 8648TXM 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.

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

If you have installed a 8672ATME, 8672ATMM, or 8683POSM Module with at least one MDA into a Passport 8000 series chassis, the 8691SF or 8692SSF Module retrieves the image file to download to these modules. Ensure that the installed 8691SF or 8692SF Module has a PCMCIA card inserted and that the PCMCIA card contains the correct image for the installed module. See Table 23 for a list of image filenames.

Table 23 Image filenames for 8672ATME/8672ATMM/8683POSM

Module	Image filename
8672ATME	p80t3700.dld
8672ATMM	p80t3700.dld
8683POSM	p80p3700.dld

For more information about the PCMCIA slot and the 8691SF or 8692SF Module, refer to *Installing Passport 8600 Switch Modules.*

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

Initializing the 8672ATME and 8672ATMM Modules

The 8691SF or 8692SF Module retrieves the image file to download to the 8672ATME or 8672ATMM Module. First, the 8691SF or 8692SF Module searches the host flash memory for the file, then the PCMCIA card. The 8691SF or 8692SF 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/p80t3700.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 41.

Figure 41 Unsuccessful download screen output

```
Copyright (c) 2004 Nortel Networks, Inc.
CPU Slot 5:    PPC 745 Map B
Version:       3.7.0.0/083
Creation Time: Apr 19 2004, 17:51:07
Hardware Time: MAY 03 2004, 13:58:01 UTC
Memory Size:   0x04000000
Start Type:    warm
SMART ATA Flash Card TIDALWV SH007
/flash/  - Volume is OK
can't open "/pcmcia/pcmboot.cfg" 0x388002
S_dosFsLib_FILE_NOT_FOUND
/flash/  - Volume is OK
Loaded boot configuration from file/flash/boot.cfg
Loading release_builds/himalaya1.0/b86/p80a3700b086.img with tftp from
198.202.188.174...5779129 to 20307814 (20307814)
Starting at 0x10000...
SMART ATA Flash Card TIDALWV SH007
/flash/  - Volume is OK
Passport 8600 System Software Release REL3.7.0.0_B086
Copyright (c) 1996-2004 Nortel Networks, Inc.
/pcmcia/ - Volume is OK
CPU5[03/03/04 14:58:20] SW INFO System boot
CPU5[03/03/04 14:58:20] SW INFO Passport System Software Release
REL3.7.0.0_B086
CPU5[03/03/04 14:58:21] HW INFO Card inserted: Slot=5 Type=8690SF
CPU5[03/03/04 14:58:21] HW INFO Card inserted: Slot=1 Type=8648TX
CPU5[03/03/04 14:58:21] HW INFO Card inserted: Slot=4 Type=8672ATME
CPU5[03/03/04 14:58:21] HW INFO Card inserted: Slot=8 Type=8662SAM
CPU5[03/03/04 14:58:21] HW INFO Card inserted: Slot=10 Type=8661SAM
CPU5[03/03/04 14:58:21] HW INFO Initializing 8690SF in slot #5...
CPU5[03/03/04 14:58:21] HW INFO Initializing 8648TX in slot #1...
CPU5[03/03/04 14:58:21] HW INFO Initializing 8672ATME in slot #4 ...
CPU5[03/03/04 14:58:24] ATM ERROR Couldn't find an ATM download image!
(File name: /flash/p80t3700.dld or /pcmcia/p80t3700.dld)
Slot 4 ATM card is put offline!
CPU5[03/03/04 14:58:41] HW INFO Initialization of card failed for Slot 4 !
CPU5[03/03/04 14:58:41] HW INFO Initializing 8662SAM in slot #8 ...
CPU5[03/03/04 14:58:43] HW INFO Initializing 8661SAM in slot #10 ...
CPU5[05/03/04 14:58:50] SW INFO Loading configuration from /flash/config.cfg
CPU5[03/03/04 14:58:50] SW INFO The system is ready
```

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 18.

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 or 8692SF Module and download the file again. For information on how to reset the 8691SF or 8692SF Module, see "Resetting the Passport 8000 Series Switch" in *Installing and Maintaining the Passport 8000 Series Chassis*.

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 or 8692SF Module retrieves the image file to download to the 8683POSM Module. First, the 8691SF or 8692SF Module searches the host flash memory for the file, then the PCMCIA card. The 8691SF or 8692SF 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 or 8692SF 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 18.

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 or 8692SF Module and download the file again. For information on how to reset the 8691SF or 8692SF Module, see “Resetting the 8000 Series switch” in Installing and Maintaining the Passport 8000 Series Chassis.

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.

Appendix A
Passport 8600 module technical specifications

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

Topic	Page
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8608GBE and 8608GBM Modules	94
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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 802.3, 1998 Media Access Control (MAC) Bridges
IEEE 802.1Q Virtual Bridged Local Area Networks
IEEE Std 802.3, 1998 Clause 34-42
IEEE 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:	96,000,000 pps (dual fabrics)
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 (minimum 64byte packet size last in, first out)

Address database size

Address table size:	
E Modules:	32,000 table entries per system
M Modules:	128,000 table entries per system (when configured for M mode) NOTE: Some entries are reserved for system use.
Addressing:	48-bit MAC address 32-bit IP address
Frame length:	64 to 1518 bytes (IEEE 802.1Q Untagged) 64 to 1522 bytes (IEEE 802.1Q Tagged) 64 to 1950 bytes (8632TXE, 8632TXM, 8648TXE, 8648TXM, 8616SXE, and 8616GTE Modules with Release 3.3 or greater) 64 to 9600 bytes (8608GBE, 8608GBM, 8608GTE, 8608GTM, 8681XLW, 8681XLR Modules only with Release 3.3 or greater)

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

Safety agency approvals

Australia/New Zealand:	AS/NZS 3260
Mexico:	NOM-019-SCFI-1998

Note: The GBICs installed in the 8608GBE and 8608GBM Modules must also meet the standards listed above. 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	SC (fiber) or RJ-45 (copper)

GBICs

Physical specifications

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

Connector type	SC (fiber) or RJ-45 (copper)

Note: The distances listed in Table 24 represent the minimum and maximum distances attainable on high quality fiber. It may be possible to run Gigabit Ethernet significantly farther assuming that the loss budget is not exceeded, and dispersion is well controlled. Nortel Networks recommends a fiber loss analysis for each run of cable to determine actual achievable distances.

Table 24 Gigabit Ethernet standard minimum distance ranges

Transceiver	Fiber type[1]	Diameter (microns	Modal Band-width (MHz-Km	Advertised Range (Meters)	Average Optical Transmit Power	Average Receiver Sensitivity (min.)	Optical Wave-length	Flux Budget (dB)	Patch Loss (dB)	Remaining Flux Budget (dB)	Fiber Loss (dB/Km)	Max. Fiber length (Km)	Sug. Safety Margin (dB)	Flux Budget w/Safety Margin (dB)	Sug. Max. Fiber Length (Km)
1000BASE-SX	MMF	62.5	160	2 to 220[2]	-9.5 to -4 dBm	-17 dBm	850 nm	7.5	1.0	6.5	3.5	1.9	3.0	3.5	1.0
1000BASE-SX	MMF	62.5	200	2 to 275[3]	-9.5 to -4 dBm	-17 dBm	850 nm	7.5	1.0	6.5	3.5	1.9	3.0	3.5	1.0
1000BASE-SX	MMF	50	400	2 to 500	-9.5 to-4 dBm	-17 dBm	850 nm	7.5	1.0	6.5	3.5	1.9	3.0	3.5	1.0
1000BASE-SX	MMF	50	500	2 to 550[4]	-9.5 to-4 dBm	-17 dBm	850 nm	7.5	1.0	6.5	3.5	1.9	3.0	3.5	1.0
1000BASE-LX	MMF	62.5	500	2 to 550[5]	-5.2 to 0 dBm	-22 dBm	1300 nm	16.8	1.0	15.8	1.0	15.8	3.0	12.8	12.8
1000BASE-LX	MMF	50	400	2 to 550[5]	-5.2 to 0 dBm	-22 dBm	1300 nm	16.8	1.0	15.8	1.5	10.5	3.0	12.8	8.5
1000BASE-LX	MMF	50	500	2 to 550[5]	-5.2 to 0 dBm	-22 dBm	1300 nm	16.8	1.0	15.8	1.5	10.5	3.0	12.8	8.5
1000BASE-LX	SMF	9	N/A	2 to 10000	-5.2 to 0 dBm	-22 dBm	1300 nm	16.8	1.0	15.8	0.4	39.5	3.0	12.8	32.0
1000BASE-XD	SMF	9	N/A	Up to 50 Km	-5.2 to 0 dBm	-24 dBm	1550 nm	18.8	1.0	17.8	0.4	44.5	3.0	14.8	37.0
1000BASE-ZX	SMF	9	N/A	Up to 70 Km	0 to 5.2 dBm	-22 dBm	1550 nm	22	1.0	21.0	0.3	70.0	3.0	18.0	60.0
1000BASE-APD	SMF	9	N/A	Up to 96 Km[6]	+2 to +6 dBm	-28 dBm	1550 nm	30	1.0	29.0	0.3	96.7	5.4	23.6	78.7

1 Multimode fiber = MMF; single mode fiber = SMF

2 The TIA 568 building wiring standard calls for 160/500 MHz-Km multimode fiber

3 The international ISO/IEC 11801 building wiring standard calls for 200/500 MHz-Km multimode fiber

4 The ANSI Fibre Channel specification calls for 500/500 MHz/Km 50 micron multimode fiber and 500/500 fiber will be proposed for addition to ISO/IEC 11801

5 Using LX optics on multimode fiber may require the use of DMD-compensating patch cords

6 CWDM GBICs require a minimum of 5dB attenuation between transmitter and receiver. Safety margin includes normal 3dB plus 2.4 Sigma value for CWDM variation. Maximum distance is only achievable without OADM and OMUX in the path

1000BASE-TGBIC

Cable specifications

Type:	Category 5 copper unshielded twisted pair (UTP)
Maximum distance:	328 ft (100m)

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 25)

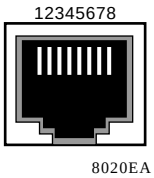
Cable specifications

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 25.

Table 25 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:	100 W maximum
Thermal rating:	344 Btu/hr maximum

MTBF rating 147,602 hr

Connector type RJ-45 (see Table 26)

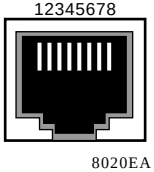
Cable specifications

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 26.

Table 26 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 103.

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 103.

GBICs

Physical specifications

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

Connector type	Duplex SC

See Table 24 for a list of Gigabit Ethernet standard minimum distance ranges.

1000BASE-TGBIC

Cable specifications

Type:	Category 5 copper unshielded twisted pair (UTP)
Maximum distance:	328 ft (100m)

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 27)

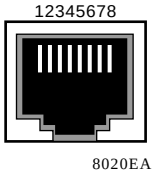
Cable specifications

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 both the 8648TXE and 8648TXM Modules are RJ-45 ports wired as MDI-X connectors (Table 27).

Table 27 Pin assignments: 8648TXE/8648TXM Module 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 MDA: 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:	

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 28 on page 112)
Console port:	DB-9 connector (see Table 29 on page 113)
Modem port:	DB-9 connector (see Table 30 on page 113)

Cable specifications

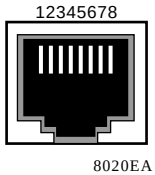
Ethernet Management port:	Category 3, 4, or 5 UTP cable (10 Mb/s operation) Category 5 UTP cable (100 Mb/s operation)
Console port:	RS-232 cable
Modem port:	DTE-to-DCE cable (straight or transmit cable)

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 28 on page 112 shows the pin assignments for this connector.

Table 28 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

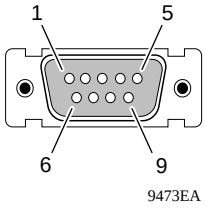
Console serial port

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 (right) or DCE (left). Default settings for this port are 9600 bits/s, 8 data bits, no parity, and one stop bit.

Connection to TXD and RXD signals and GND is sufficient for the console serial port to fully function. 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 29 on page 113 lists the pin assignments for the Console port for both the DTE and DCE settings.

Table 29 Pin assignments: 8691SF Module Console port

Connector	Pin number	Switch position	
		DCE (left)	DTE right)
	2	TXD (Output)	RXD (Input)
	3	RXD (Input)	TXD (Output)
	4	DSR (Input)	DTR (Output)
	5	GND	GND
	6	DTR (Output)	DSR (Input)
	7	CTS (Input)	RTS (Output)
	8	RTS (Output)	CTS (Input)

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 30 describes the required cable pin assignments.

Table 30 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

8692SF 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:	90 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 28 on page 112)
Console port:	DB-9 connector (see Table 29 on page 113)
Modem port:	DB-9 connector (see Table 30 on page 113)

Cable specifications

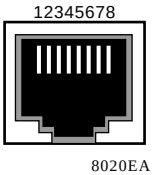
Ethernet Management port:	Category 3, 4, or 5 UTP cable (10 Mb/s operation) Category 5 UTP cable (100 Mb/s operation)
Console port:	RS-232 cable
Modem port:	DTE-to-DCE cable (straight or transmit cable)

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 28 on page 112 shows the pin assignments for this connector.

Table 31 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

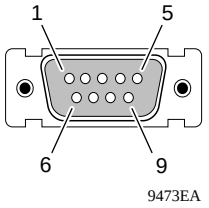
Console serial port

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 (right) or DCE (left). Default settings for this port are 9600 bits/s, 8 data bits, no parity, and one stop bit.

Connection to TXD and RXD signals and GND is sufficient for the console serial port to fully function. 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 29 on page 113 lists the pin assignments for the Console port for both the DTE and DCE settings.

Table 32 Pin assignments: 8691SF Module Console port

Connector	Pin number	Switch position	
		DCE (left)	**DTE right)**
	2	TXD (Output)	RXD (Input)
	3	RXD (Input)	TXD (Output)
	4	DSR (Input)	DTR (Output)
	5	GND	GND
	6	DTR (Output)	DSR (Input)
	7	CTS (Input)	RTS (Output)
	8	RTS (Output)	CTS (Input)

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 30 describes the required cable pin assignments.

Table 33 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