Nortel Ethernet Routing Switch 8600

# Installing Ethernet Routing Switch 8600 Modules

**ATTENTION**

Clicking on a PDF hyperlink takes you to the appropriate page. If necessary, scroll up or down the page to see the beginning of the referenced section.

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# Contents





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# New in this release

See the following sections for details about what is new in *Installing Ethernet Routing Switch 8600 Modules* (NN46205-304; 312749-K) for release 4.1.

## Features

There are no new feature-related changes in this document release.

## Other changes

See the following sections for information about changes that are not feature-related:

### Updates

The maximum forwarding throughput is 384 Mp/s [see "8692SF module" (page 66)]. The switch supports 16 000 ARP entries in R mode; this change has been made in various places in this document.

### Document changes

This document is reformatted to comply with the Nortel Customer Documentation Standards.


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# Introduction

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

This guide provides instructions for installing the Ethernet Routing Switch 8600 modules in a 8000 Series chassis.

This guide is intended for qualified service personnel who need to install or replace a Ethernet Routing Switch 8600 modules 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.

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

## Regulatory information

### International regulatory statements of conformity

This is to certify that the Nortel Networks 8000 Series chassis and components installed within the chassis were evaluated to the international regulatory standards for electromagnetic compliance (EMC) and safety and were found to have met the requirements for the following international standards:

- EMC - Electromagnetic Emissions – CISPR 22, Class A
- EMC - Electromagnetic Immunity – CISPR 24
- Electrical Safety – IEC 60950, with CB member national deviations

Further, the equipment has been certified as compliant with the national standards as detailed below.


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## National electromagnetic compliance (EMC) statements of compliance

### FCC statement (USA only)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the Federal Communications Commission (FCC) rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy. If it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to take whatever measures may be necessary to correct the interference at their own expense.

### ICES statement (Canada only)

#### Canadian Department of Communications Radio Interference Regulations

This digital apparatus (8000 Series chassis and installed components) does not exceed the Class A limits for radio-noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

#### Règlement sur le brouillage radioélectrique du ministère des Communications

Cet appareil numérique (8000 Series chassis) respecte les limites de bruits radioélectriques visant les appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique du ministère des Communications du Canada.

### CE marking statement (Europe only)

#### EN 55 022 statements

This is to certify that the Nortel Networks 8000 Series chassis and components installed within the chassis are shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC. Conformity is declared by the application of EN 55 022 Class A (CISPR 22).

**CAUTION**

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take appropriate measures.


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**ATTENTION**

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### EN 55 024 statement

This is to certify that the Nortel Networks 8000 Series chassis is shielded against the susceptibility to radio interference in accordance with the application of Council Directive 89/336/EEC. Conformity is declared by the application of
EN 55 024 (CISPR 24).

### EC Declaration of Conformity

This product conforms to the provisions of the R&TTE Directive 1999/5/EC.

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## MIC notice for 8010, 8006, and 8003 chassis (Republic of Korea only)

This device has been approved for use in Business applications only per the Class A requirements of the Republic of Korea Ministry of Information and Communications (MIC). This device may not be sold for use in a non-business application.


## National safety statements of compliance

## CE marking statement (Europe only)

### EN 60 950 statement

This is to certify that the Nortel Networks 8000 Series chassis and components installed within the chassis are in compliance with the requirements of EN 60 950 in accordance with the Low Voltage Directive. Additional national differences for all European Union countries have been evaluated for compliance. Some components installed within the 8000 Series chassis may use a nickel-metal hydride (NiMH) and/or lithium-ion battery. The NiMH and lithium-ion batteries are long-life batteries, and it is very possible that you will never need to replace them. However, should you need to replace them, refer to the individual component manual for directions on replacement and disposal of the battery.

## NOM statement 8010, 8006, and 8003 chassis (Mexico only)

The following information is provided on the devices described in this document in compliance with the safety requirements of the Norma Oficial Méxicana (NOM):

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| Tel: | 52 5 480 2100 |


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| | |
|---|---|
| Fax: | 52 5 480 2199 |
| Input: | Model 8003AC: |
| | 100-240 VAC, 50-60 Hz, 9 A max. per power supply |
| | Model 8004AC: |
| | 100-240 VAC, 50 to 60 Hz, 12-6 A max. per power supply |
| | single supply, single supply + one redundant supply, two supplies, or two + one redundant supply configuration |
| | Model 8005AC: |
| | 100 to 120 VAC, 50 to 60 Hz, 16 A max. per power supply |
| | 200 to 240 VAC, 50 to 60 Hz, 9.5 A max. per power supply |
| | single supply, single supply + one redundant supply, two supplies, or two + one redundant supply configuration |
| | Model 8004DC: |
| | -48 VDC, 29 A |
| | single supply, single supply + one redundant supply, two supplies, or two + one redundant supply configuration |
| | Model 8005DC: |
| | -48 VDC, 42A |
| | single supply, single supply + one redundant supply, two supplies, or two + one redundant supply configuration |

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| | |
|---|---|
| Tel: | 52 5 480 2100 |
| Fax: | 52 5 480 2199 |
| Embarcar a: | Model 8003AC: |
| | 100-240 VCA, 50-60 Hz, 9 A max. por fuente de poder |
| | Model 8004AC: |
| | 100-240 VCA, 50 - 60 Hz, 12-6 A max. por fuente de poder |
| | una fuente, una fuente + configuraciones de una fuente redundante, dos fuentes o dos + configuraciones de una fuente redundante |
| | Model 8005AC: |
| | 100 - 120 VCA, 50 -60 Hz, 16 A max. por fuente de poder |
| | 200 - 240 VCA, 50 - 60 Hz, 9.5 A max. por fuente de poder |
| | una fuente, una fuente + configuraciones de una fuente redundante, dos fuentes o dos + configuraciones de una fuente redundante |
| | Model 8004DC: |
| | -48 VCD, 29A por fuente de poder |
| | una fuente, una fuente + configuraciones de una fuente redundante, dos fuentes o dos + configuraciones de una fuente redundante |
| | Model 8005DC: |
| | -48/-60 VCD, 42A por fuente de poder |
| | una fuente, una fuente + configuraciones de una fuente redundante, dos fuentes o dos + configuraciones de una fuente redundante |

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## Navigation

- "Ethernet Routing Switch 8600 modules" (page 19)
- "Installing Ethernet Routing Switch 8600 modules and connecting equipment" (page 73)
- "Ethernet Routing Switch 8600 module technical specifications" (page 109)
- "Installing the Enterprise enhanced CPU daughter card" (page 139)

## Acronyms

This guide uses the following acronyms:

| | |
|---|---|
| ASIC | application-specific integrated circuit |
| ATM | Asynchronous Transfer Mode |
| BFM | Backplane Forwarding module |
| CLI | command line interface |
| SF/CPU | switch fabric/central processing unit |
| CTS | clear to send |
| CWDM | coarse wavelength-division multiplexing |
| DCD | data carrier detect |
| DCE | data communications equipment |
| DM | Device Manager |
| DSR | data set ready |
| DTE | data terminal equipment |
| DTR | data terminal ready |
| FFE | Flexible Forwarding Engine |
| FOQ | Feedback Output Queuing |
| FPGA | Field-Programmable Gate Array |
| FTAP | Fast TAPmux |
| GBIC | Gigabit Interface Converters |
| HA | high availability |
| HA-CPU | High Availability–Central Processing Unit |
| IANA | Internet Assigned Numbers Authority |
| IEEE | Institute of Electrical and Electronics Engineers |
| IGMP | Internet Group Membership Protocol |
| IGP | Interior Gateway Protocol |
| IP | Internet Protocol |


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| | |
|---|---|
| IST | interswitch trunking |
| I/O | input/output |
| KB | kilobyte |
| L2 | Layer 2 |
| L3 | Layer 3 |
| LAN | local area network |
| LC | latch connector |
| LED | light emitting diode |
| MAC | Media Access Control |
| MAU | Media Access Unit |
| MDA | media dependent adapter |
| MDI | Medium Dependent Interface |
| MDI-X | Medium Dependent Interface Crossover |
| MLT | MultiLink Trunking |
| MMF | multimode fiber |
| NE | network element |
| NetBIOS | Network Basic Input/Output System |
| NNI | network to network interface |
| NVRAM | Non-Volatile Random Access Memory |
| OC-3c | Optical Carrier level 3 |
| OC-12c | Optical Carrier level 12 |
| ODATA | original data |
| OOB | Out of Band |
| PCMCIA | Personal Computer Memory Card International Association |
| PHY | Physical Layer |
| PIM | Protocol Independent Multicasting or Port Interface module |
| POS | Packet over SONET |
| PPP | Point-to-Point Protocol |
| PPPoE | Point-to-Point Protocol over Ethernet |
| pps | packets per second |
| PVC | permanent virtual connection |
| QoS | Quality of Service |
| RDATA | retransmitted data |


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| | |
|---|---|
| RFC | Request for Comments |
| RJ | registered jack |
| RLSD | received line signal detection |
| RMON | remote monitoring |
| ROM | read only memory |
| RSP2 | Route Switch Processor 2 |
| RSTP | Rapid Spanning Tree Protocol |
| RTS | ready to send |
| RX | receive |
| SC | snap-in connector |
| SDH | Synchronous Digital Hierarchy |
| SDRAM | Synchronous Dynamic Random Access Memory |
| SF | switch fabric |
| SFP | small form factor pluggable |
| SMF | single mode fiber |
| SMLT | Split MultiLink Trunking |
| SONET | Synchronous Optical Network |
| SSF | single strand fiber or silicon switching fabric |
| SSH | Secure Shell |
| SSL | Secure Socket Layer |
| STM | Synchronous Transmission module |
| STP | Shielded Twisted Pair or Spanning Tree Protocol |
| TACACS | Terminal Access Controller Access Control System |
| TCP/IP | Transmission Control Protocol over IP |
| TFTP | Trivial File Transfer Protocol |
| TOS | type of service |
| TPE | Twisted Pair Ethernet |
| TSI | transport session identifier |
| TX | transmit |
| UNI | user to network interface |
| UTP | unshielded twisted pair |
| VLAN | virtual local area network |
| WAN | wide area network |
| WRR | Weighted Round Robin |
| XFP | 10 Gigabit Ethernet small form factor pluggable |


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# Ethernet Routing Switch 8600 modules

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

The Ethernet Routing Switch 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 gigabits per second (Gb/s) fiber and copper Ethernet ports
- 10 Gb/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
- SFP Ethernet ports

This section includes the following topics:




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- "8616GTE module" (page 32)
- "8616SXE module" (page 34)
- "8624FXE module" (page 36)
- "8630GBR module" (page 38)
- "8632TXE and 8632TXM modules" (page 41)
- "8648GTR module" (page 44)
- "8648TXE and 8648TXM modules" (page 47)
- "8672ATME and 8672ATMM modules" (page 49)
- "8681XLR module" (page 51)
- "8681XLW module" (page 53)
- "8683POSM module" (page 55)
- "8683XLR module" (page 56)
- "8683XZR module" (page 59)
- "8691SF module" (page 62)
- "8692SF module" (page 66)

Table 1 "Maximum port densities for Ethernet Routing Switch 8600 modules" (page 20) lists the maximum port densities available with each type of interface module.

For information about the 8672ATME and 8672ATMM MDAs, see "8672ATME and 8672ATMM modules" (page 49).

For information about the 8683POSM MDAs, see "8683POSM module" (page 55).

**Table 1**
**Maximum port densities for Ethernet Routing Switch 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 |


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| module type | Port type | Maximum number of ports per chassis | | |
|---|---|---|---|---|
| | | 8003 | 8006 | 8010 and 8010co |
| 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 |
| 8630GBR | 1000BASE-SX | Not supported | 120 | 240 |
| | 1000BASE-LX | Not supported | 120 | 240 |
| | 1000BASE-ZX | Not supported | 120 | 240 |
| | 1000BASE-XD | Not supported | 120 | 240 |
| | 1000BASE-CWDM | Not supported | 120 | 240 |
| | 1000BASE-T | Not supported | 120 | 240 |
| 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 |
| 8648GTR | 10BASE-T/100BASE-TX/1000BASE-T | Not supported | 192 | 384 |
| 8648TXE and 8648TXM | 10BASE-T/100BASE-TX | 96 | 192 | 384 |
| 8672ATME and 8672ATMM | 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 |
| 8683XLR | 10GBASE-SR | Not supported | 12 | 24 |
| | 10GBASE-LR | Not supported | 12 | 24 |
| | 10GBASE-ER | Not supported | 12 | 24 |
| | 10GBASE-ZR | Not supported | 4 | 8 |


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| module type | Port type | Maximum number of ports per chassis | | |
|---|---|---|---|---|
| | | 8003 | 8006 | 8010 and 8010co |
| 8683XZR | 10GBASE-SR | Not supported | 12 | 24 |
| | 10GBASE-LR/LW | Not supported | 12 | 24 |
| | 10GBASE-ER/EW | Not supported | 12 | 24 |
| | 10GBASE-ZR/ZW | Not supported | 4 | 8 |
| 8683POSM | OC-3c MDA | 12 | 24 | 24 |
| | OC-12c MDA | 6 | 12 | 12 |

Each Ethernet Routing Switch 8600 interface module supports varying numbers and types of interfaces as described in Table 1 "Maximum port densities for Ethernet Routing Switch 8600 modules" (page 20).

## Ethernet Routing Switch 8600 modules (Release 3.x feature set)

Each Ethernet Routing Switch 8600 interface module (Release 3.x feature set) 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.

## Ethernet Routing Switch 8600 modules (Release 4.x feature set)

Each Ethernet Routing Switch 8600 R module (Release 4.x feature set) consists of a Distributed Processing module (DPM) as well as a Port Interface module (PIM). The PIM consists of various Media Access Controls


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(MAC)s and Physical Layer Controls (PHY)s as well as the physical interfaces for direct network connections. A single PIM interconnects with a single DPM to form a Ethernet Routing Switch 8600 module. modules with DPMs are R modules.

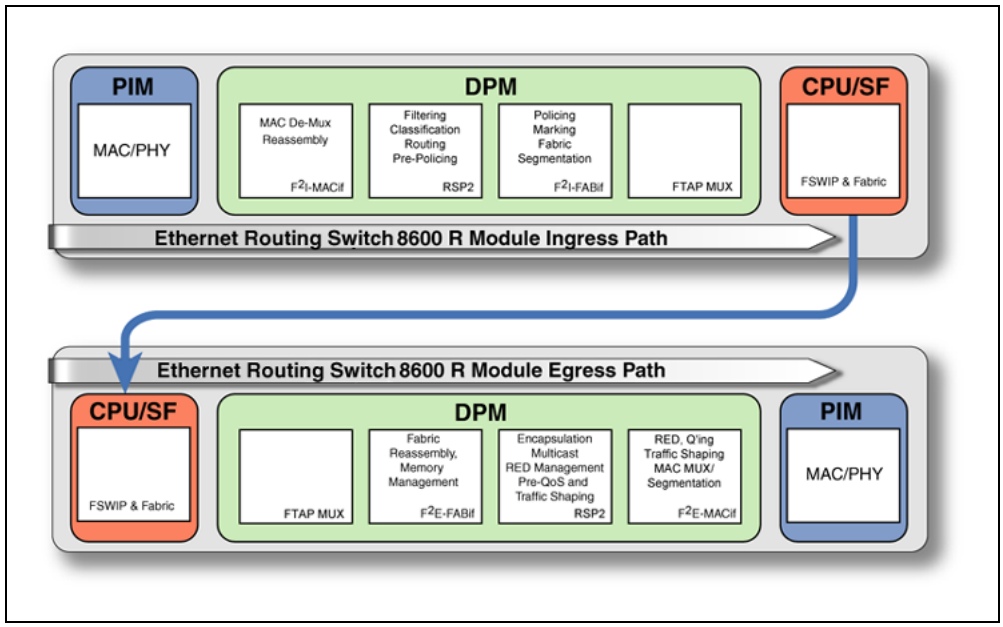
Ethernet Routing Switch 8600 modules which use the BFM are pre-E, E, or M modules. These modules are described in, "Ethernet Routing Switch 8600 modules (Release 3.x feature set)" (page 22).

Each DPM contains either two or three lanes depending on the module. Both the 8630GBR and the 8683XLR modules consist of three lanes. The 8648GTR module consists of two lanes. Each lane is also known as a Flexible Forwarding Engine (FFE). The FFE lane is the basis for the Ethernet Routing Switch 8600 R modules. The FFE lane consists of:

- Two Flexible Route Switch Processors— ingress Route Switch Processor 2 (RSP2) and egress RSP2
- One egress packet handling ASIC- F2E
- One ingress packet handling ASIC- F2I

Figure 1 "Ethernet Routing Switch 8600 R module packet flow on ingress and egress" (page 23) shows Ethernet Routing Switch 8600 R module packet flow on ingress and egress.

**Figure 1**
**Ethernet Routing Switch 8600 R module packet flow on ingress and egress**




The ingress RSP2 executes lookups, performs filtering and classification operations, and modifies the IP and MAC headers within the body of the packet to reflect routing and switching decisions.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The RSP2 determines the information the fabric needs to carry the packet to the correct egress point and determines the physical egress port. As part of the lookup process it can also determine and record the egress queue ID and pass it to egress RSP2.

Encapsulation is the most significant egress RSP2 operation performed. To specify the egress queue, the queuing and traffic shaping functions use:

- encapsulation information from the egress RSP2
- MAC and IP packet headers
- Quality of Service (QoS) bits

The F2E egress ASIC supports the FFE's QoS including the functions of random early drop, queuing and selection, traffic shaping, and interfacing to other similar R modules. Similarly, the F2I ingress ASIC provides packet policing and marking.

Each DPM also consists of the following:

- One Fast TAPmux (FTAP) interface to the Ethernet Routing Switch 8600 Fabric modules
- One Feedback Output Queue Manager (FOQ) Field-Programmable Gate Array (FPGA)

The FTAP ASIC interfaces each DPM to the CPU/Switch Fabric modules through the Ethernet Routing Switch 8600 switching backplane.

The FOQ Management system collects information about the state of queues, packet storage elements and the fabric. This information is available to the F2I at the point where packets are segmented for entry to the fabric. When congestion exists, Ethernet Routing Switch 8600 modules with a BFM (pre-E, E, and M modules) use fabric feedback information only at this point to drop packets.

The FOQ mechanism also provides information on the state of each of the egress queues and on the fullness of the F2E reassembly function buffers and queues. The F2E reports this information to the FOQ Manager FPGA on each module. The constellation of these FOQ FPGAs (one per DPM) drives a shared backplane bus that each FPGA senses. Therefore, each R module has pertinent information on the state of all other R modules in the system.

## M mode configuration requirements

M mode supports the Ethernet Routing Switch 8600 Release 3.x feature set. Full support of M mode requires the following configuration conditions:

- The chassis must include at least one 8691SF CPU module. If the chassis includes an 8690SF CPU module, it uses the default mode.


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- All modules installed in the chassis must minimally support 128,000 table entries. M modules (8632TXM, 8648TXM, 8608GBM, 8608GTM, 8683POSM, 8672ATMM, 8672ATMM, 8681XLR and 8681XLW modules) support 128,000 table entries.
- M modules require Ethernet Routing Switch 8600 Release 3.3 or later.
- M mode must be enabled. For instructions on enabling M mode, see *Managing Platform Operations*.
- If your system has R modules, M modules, E modules, or pre-E modules, see *Managing Platform Operations* for configuration information so that the switch reboots in the desired mode.

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 are disabled. This protects the system forwarding tables from lost entries. For instructions on enabling or disabling M mode, refer to *Managing Platform Operations*.

## R mode configuration requirements

R mode supports the Ethernet Routing Switch 8600 4.x feature set. Full support of R mode requires the following configuration conditions:

- The system must include only R modules. A system with a mix of R, M, E, or pre-E modules can be configured in R mode. However, M, E, or pre-E modules are not enabled. See *Managing Platform Operations* for information on configuring R modules in R mode.
- The system must include at least one 8692SF CPU module. R modules does not boot with the 8690SF or 8691SF CPU modules.
- R modules require Ethernet Routing Switch 8600 Release 4.0 or later.
- R mode must be enabled. For instructions on enabling R mode, see *Managing Platform Operations*.

If the system is currently in default mode or M mode, with SF/CPU 1 as the master and SF/CPU 2 as the standby, and you enable R mode on SF/CPU 1, save the configuration, and reboot, SF/CPU 2 comes up as the master and SF/CPU 1 as the standby. If you then enable R mode on the new master (SF/CPU 2), the standby (SF/CPU 1) goes offline and remains offline.

To configure QoS, Filters, Policing, and Shaping on R modules, see *Configuring QoS and Filtering for Ethernet Routing Switch 8600 R modules*.

## 8608GBE and 8608GBM modules

Both the 8608GBE and 8608GBM modules (Figure 2 "8608GBE/8608GBM module" (page 26)) 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.


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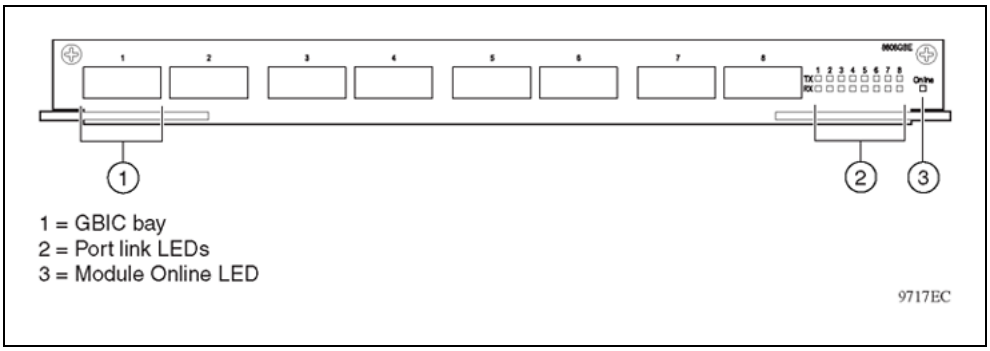
**Figure 2**
**8608GBE/8608GBM module**




Nortel has qualified the GBICs listed in Table 2 "8608GBE and 8608GBM qualified GBICs" (page 26) for use in the 8608GBE and 8608GBM modules. Only GBICs qualified by Nortel are supported for use in the 8608GBE module. GBICs not qualified by Nortel can operate within the module, but are not tested for power draw, electromagnetic interference and interoperability

**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 |

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

Figure 3 "8608GBE/8608GBM module LEDs" (page 27) shows the location of the 8608GBE and 8608GBM module LEDs.


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**Figure 3**
**8608GBE/8608GBM module LEDs**

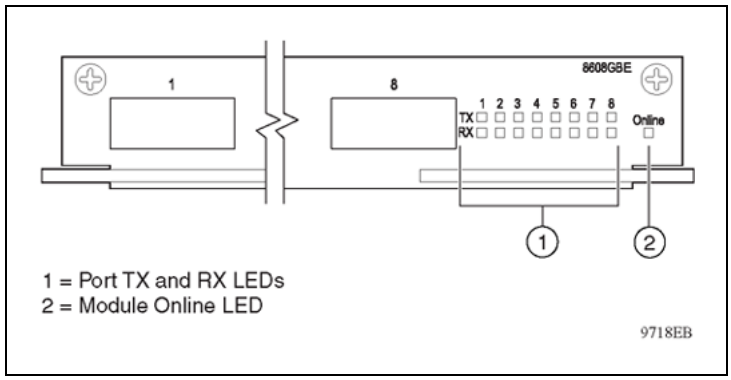


Table 3 "8608GBE/8608GBM module LEDs" (page 27) describes the 8608GBE and 8608GBM module LEDs.

**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. |
| 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.


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The 8608GBM module is an M module and 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 Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.
- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

  This mode supports R modules only.

The 8608GBE module does not support R or M mode. The 8608GBM module supports R and M mode. For specific R and M mode configuration requirements, see "M mode configuration requirements" (page 24) and "R mode configuration requirements" (page 25).

## 8608GTE and 8608GTM modules

Both the 8608GTE and 8608GTM module (Figure 4 "8608GTE/8608GTM module" (page 28)) 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 auto-negotiation and remote fault identification when the connected device also supports auto-negotiation. Distances of up to 100 meters are obtainable with Category-5 unshielded twisted pair (UTP) cable.

**Figure 4**
**8608GTE/8608GTM module**

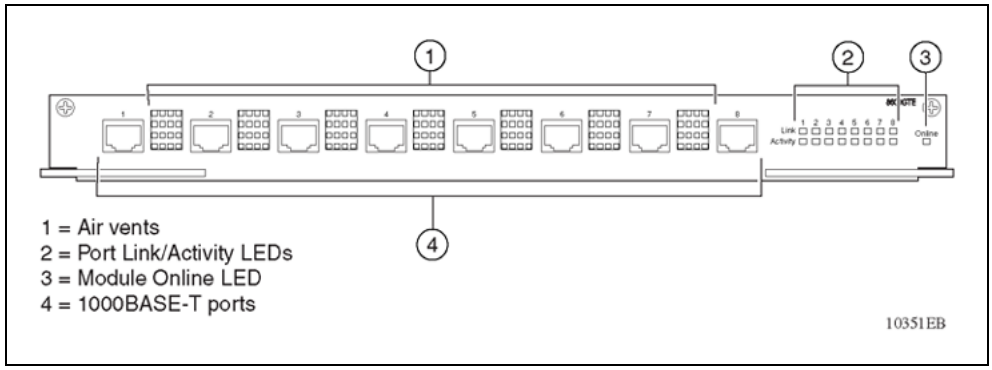



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Figure 5 "8608GTE/8608GTM module LEDs" (page 29) shows the location of the 8608GTE and 8608GTM module LEDs.

**Figure 5**
**8608GTE/8608GTM module LEDs**

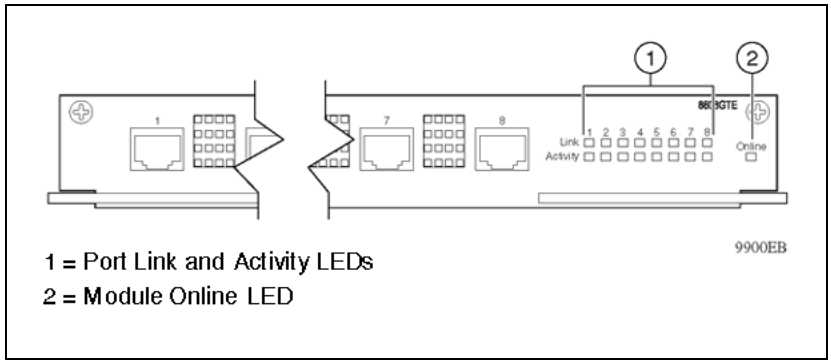


Table 4 "8608GTE/8608GTM module LEDs" (page 29) describes the 8608GTE and 8608GTM module LEDs.

**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. As port utilization increases this LED can blink so fast that it appears to be always on. |
| 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 is 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.


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The 8608GTM module is an M module and 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 Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.
- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

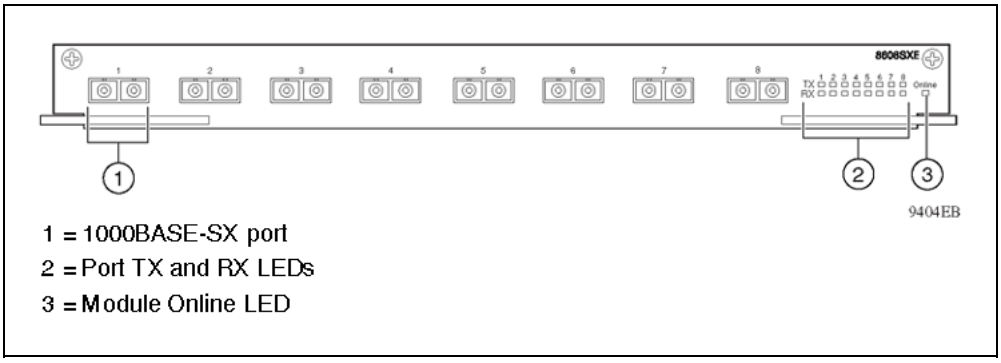
  This mode supports R modules only.

The 8608GTE module does not support R or M mode. The 8608GTM module supports R and M mode. For specific R and M mode configuration requirements, see "M mode configuration requirements" (page 24) and "R mode configuration requirements" (page 25).

## 8608SXE module

The 8608SXE module Figure 6 "8608SXE module" (page 30) 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 1000 Mb/s (1 Gb/s) full-duplex operation only.

**Figure 6**
**8608SXE module**




The shortwave optical transceivers provide transmission ranges as follows:

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

Figure 7 "8608SXE module LEDs" (page 31) shows the location of the 8608SXE module LEDs.

**Figure 7**
**8608SXE module LEDs**

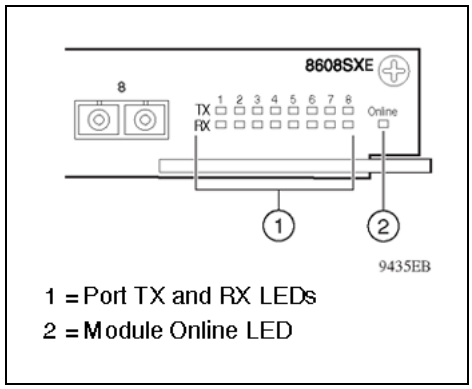


Table 5 "8608SXE module LEDs" (page 31) describes the 8608SXE module LEDs.

**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. |
| 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. |


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

The Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.
- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

  This mode supports R modules only.

The 8608SXE module does not support R or M mode.

## 8616GTE module

The 8616GTE module (Figure 8 "8616GTE module" (page 32)) provides 16 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 the IEEE 802.3ae standard. Distances of up to 100 meters are obtainable with Category-5 unshielded twisted pair (UTP) cable.

**Figure 8**
**8616GTE module**

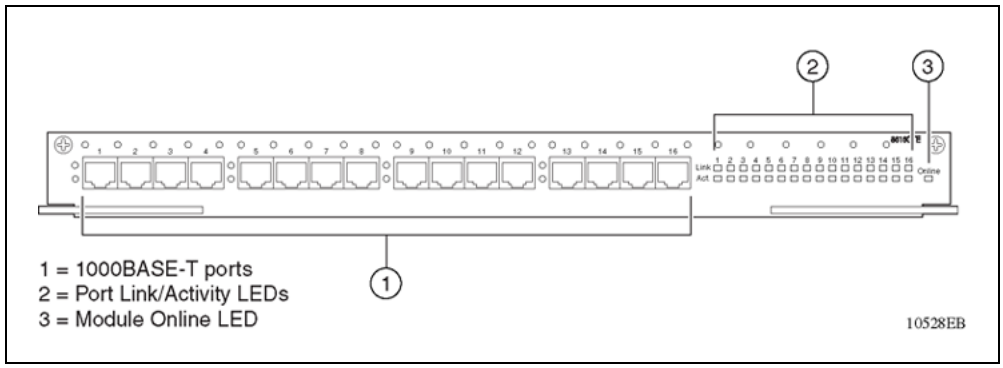


Figure 9 "8616GTE module LEDs" (page 33) shows the location of the 8616GTE module LEDs.


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**Figure 9**
**8616GTE module LEDs**

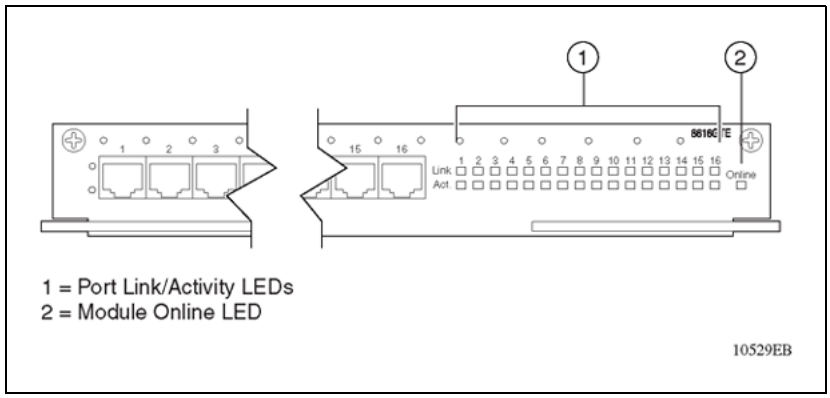


Table 6 "8616GTE module LEDs" (page 33) describes the 8616GTE module LEDs.

**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. As port utilization increases this LED can blink so fast that it appears to be always on. |
| 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 is 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 6 "8608SXE module" (page 30)) supports up to 32,000 table entries in its forwarding engine. Refer to *Network Design Guidelines* for usage of table entries.


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The Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.
- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

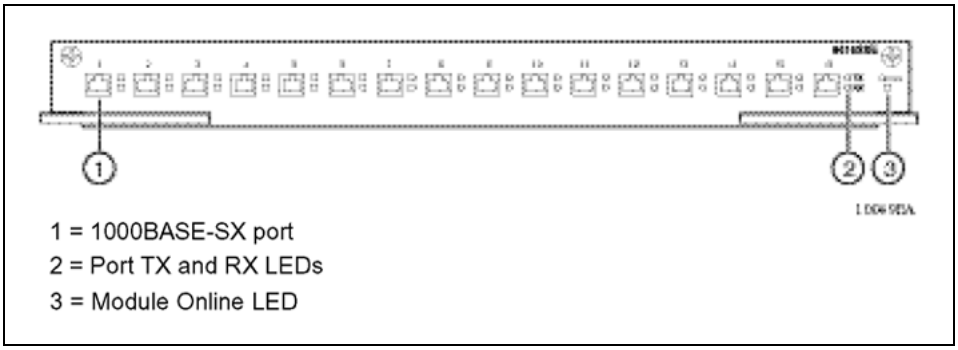
  This mode supports R modules only.

The 8616GTE module does not support R or M mode.

## 8616SXE module

The 8616SXE module (Figure 10 "8616SXE module" (page 34)) 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 1000 Mb/s (1 Gb/s) full-duplex operation only.

**Figure 10**
**8616SXE module**




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 11 "8616SXE module LEDs" (page 35) shows the location of the 8616SXE module LEDs.


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**Figure 11**
**8616SXE module LEDs**

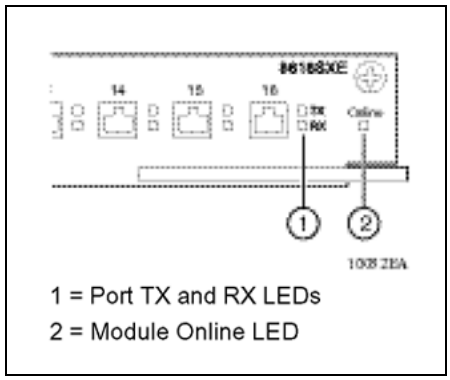


Table 7 "8616SXE module LEDs" (page 35) describes the 8616SXE module LEDs.

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

The Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.


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- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

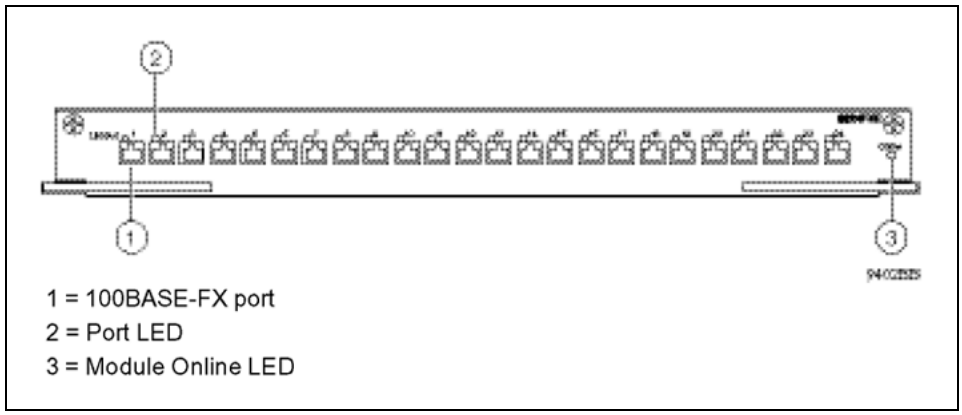
  This mode supports R modules only.

The 8616SXE module does not support R or M mode.

## 8624FXE module

The 8624FXE module (Figure 12 "8624FXE module" (page 36)) provides 24 100BASE-FX ports using MT-RJ type connectors.

**Figure 12**
**8624FXE module**




The 24 100BASE-FX ports on the 8624FXE module can operate in 100 Mb/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 13 "8624FXE module LEDs" (page 37) shows the location of the LEDs.


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**Figure 13**
**8624FXE module LEDs**

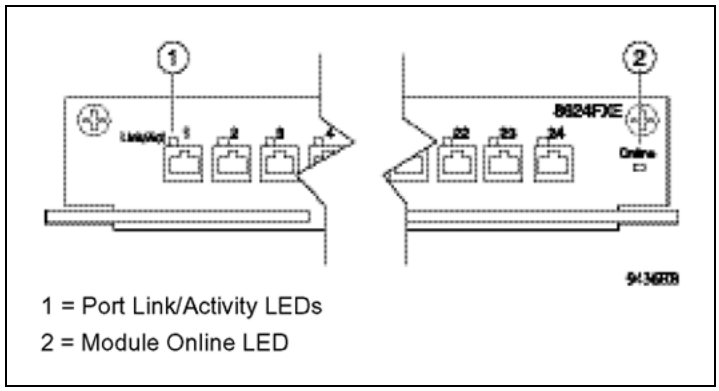


Table 8 "8624FXE module LEDs" (page 37) describes the 8624FXE module LEDs.

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

The Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.


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- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

  This mode supports R modules only.

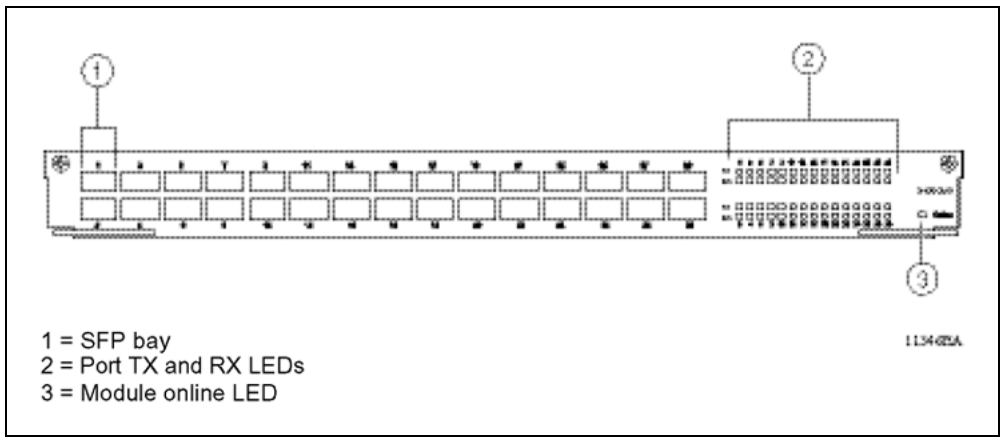
The 8624FXE module does not support R or M mode.

## 8630GBR module

The 8630GBR module (Figure 14 "8630GBR module" (page 38)) provides 30 bays for installing small form factor pluggable (SFP) transceivers. You can use the ports on the SFPs to make riser connections, server attachments, or interswitch links.

The Ethernet Routing Switch 8630GBR module includes three forwarding engine lanes. Each lane supports 10 Gb/s bidirectional traffic. All 30 ports can run concurrently at 1 Gb/s.

**Figure 14**
**8630GBR module**




Nortel has qualified the SFP transceivers listed in Table 9 "8630GBR qualified SFP transceivers" (page 39) for use in the 8630GBR module. Only SFP transceivers qualified by Nortel are supported for use in the 8630GBR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module. SFP transceivers not qualified by Nortel can operate within the module, but are not tested for power draw, electromagnetic interference and interoperability.

**Table 9**
**8630GBR qualified SFP transceivers**

| SFP order number | SFP type |
|---|---|
| AA1419013 | 1000BASE-SX |
| AA1419014 | 1000BASE-SX |
| AA1419015 | 1000BASE-LX |
| AA1419025 - AA1419032 | 1000BASE CWDM |
| AA1419033 - AA1419040 | 1000BASE CWDM |
| AA1419043 | 1000BASE-T |
| AA1419069 - AA1419070 | 1000BASE-BX |

The 8630GBR module is not supported with Ethernet Routing Switch 8600 Software Release 4.1 when Single Fiber Fault Detection (SFFD) is configured on a port.

The 8630GBR module is not supported in the 8003 chassis with Ethernet Routing Switch 8600 Software Release 4.1

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

Figure 15 "8630GBR module LEDs" (page 39) shows the location of the 8630GBR module LEDs.

**Figure 15**
**8630GBR module LEDs**

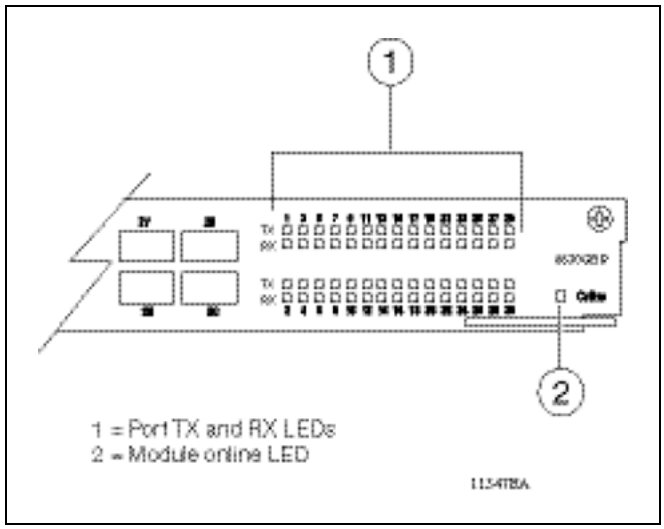



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Table 10 "8630GBR module LEDs" (page 40) describes the 8630GBR module LEDs.

**Table 10**
**8630GBR module LEDs**

| Type | Label | Color/State | Meaning |
|---|---|---|---|
| Port | TX | Green/Steady | The port is enabled and has a link. |
| | | Green/Blinking (1 second on; 1 second off) | Port disabled. |
| | | Green/Flashing | The port is transmitting data. The LED flash rate indicates the level of activity on the link. |
| | | Off | The port is enabled but has no link. |
| | RX | Green/Steady | The port is enabled and has a link. |
| | | Green/Blinking (1 second on; 1 second off) | Port disabled. |
| | | Green/Flashing | The port is receiving data. The LED flash rate indicates the level of activity on the link. |
| | | Amber/Flashing | Data error. |
| | | Off | The port is enabled but has no link. |
| Module | Online | Green/Steady | The module is online and is operating normally. |
| | | Amber/Steady | The module failed its power-on self-test. |
| | | Amber/Blinking | The module is inserted into the chassis and diagnostics are running. |
| | | Off | The switch power is off. |

The Ethernet Routing Switch 8600 8630GBR module is an R module and supports:

- 256,000 IP routes
- 64,000 MAC records
- 16,000 ARP records

Refer to *Network Design Guidelines* for usage of table entries.

The Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.


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- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

  This mode supports R modules only.

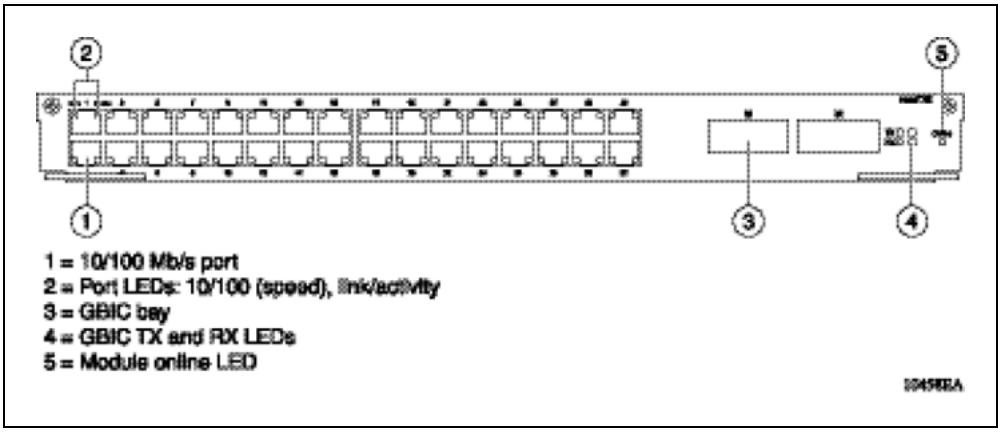
The 8630GBR module supports R and M mode. For specific R and M mode configuration requirements, see "M mode configuration requirements" (page 24) and "R mode configuration requirements" (page 25).

## 8632TXE and 8632TXM modules

Both the 8632TXE and 8632TXM modules (Figure 16 "8632TXE/8632TXM module" (page 41)) provide 32 autonegotiating 10BASE-T/100BASE-TX ports using 8-pin modular (RJ-45) connectors, Ports operate at either 10 Mb/s or 100 Mb/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 16**
**8632TXE/8632TXM module**




The 8632TXE and 8632TXM module ports support the IEEE 802.3 1998 Clause 28 auto-negotiation 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 auto-negotiation standard, the two devices negotiate the highest possible data rate and the duplex mode of operation.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Nortel has qualified the GBICs listed in Table 11 "8632TXE and 8632TXM qualified GBICs" (page 42) for use in the 8632TXE and 8632TXM modules. Only GBICs qualified by Nortel are supported for use in the 8632TXE and 8632TXM modules. GBICs not qualified by Nortel can operate within these modules, but are not tested for power draw, electromagnetic interference and interoperability.

**Table 11**
**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 1470 nm to 1610 nm |

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

Figure 17 "8632TXE/8632TXM module LEDs" (page 42) shows the location of the 8632TXE and 8632TXM module LEDs.

**Figure 17**
**8632TXE/8632TXM module LEDs**

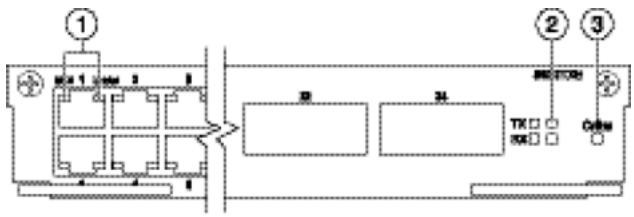



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Table 12 "8632TXE/8632TXM module LEDs" (page 43) describes the 8632TXE and 8632TXM module LEDs.

**Table 12**
**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. |
| 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 is an M module and 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.


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The Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.
- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

  This mode supports R modules only.

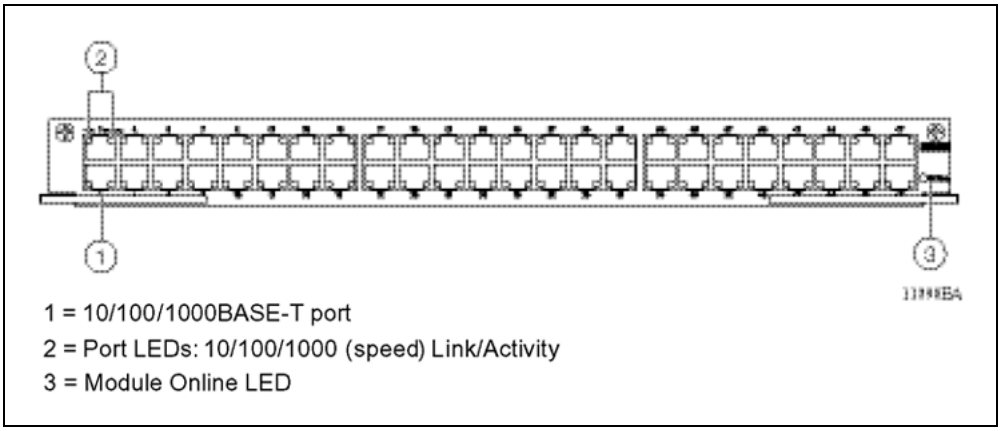
The 8632TXE module does not support R or M mode. The 8632TXM module supports R and M mode. For specific R and M mode configuration requirements, see "M mode configuration requirements" (page 24) and "R mode configuration requirements" (page 25).

## 8648GTR module

The 8648GTR module (Figure 18 "8648GTR module" (page 44)) provides 48 10/100/1000BASE-TX ports using 8-pin module (RJ-45) connectors. Each port operates either at 10 Mb/s, 100 Mb/s, or 1000 Mb/s (1 Gb/s) and supports the IEEE 802.3ab standard. Distances of up to 100 meters are obtainable with category-5 unshielded twisted pair (UTP) cable.

The 8648GTR module is not supported in the 8003 chassis with Ethernet Routing Switch 8600 Software Release 4.1.

**Figure 18**
**8648GTR module**





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The 8648GTR module ports supports the IEEE 802.3 1998 Clause 28 auto-negotiation 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 auto-negotiation standard, the two devices negotiate the highest possible data rate and the duplex mode of operation.

Figure 19 "8648GTR module LEDs" (page 45) shows the location of the 8648GTR module LEDs.

**Figure 19**
**8648GTR module LEDs**

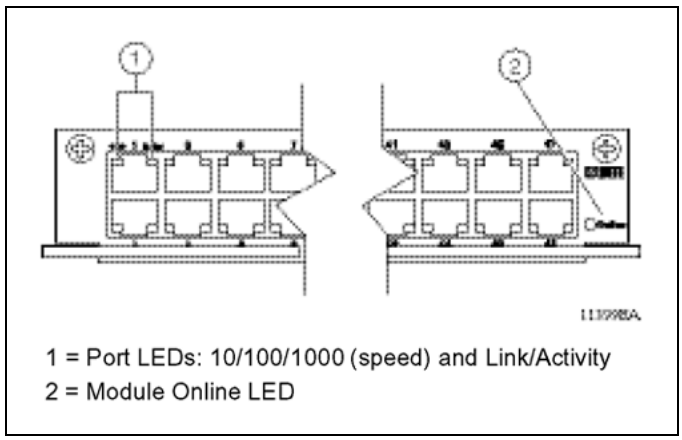


Table 13 "8648GTR module LEDs" (page 45) describes the 8648GTR module LEDs.

**Table 13**
**8648GTR module LEDs**

| Type | Label | Color/State | Meaning |
|---|---|---|---|
| Port | 10/100/1000 | Green/Steady | The port is operating at 1000 Mb/s. |
| | | Amber/Steady | The port is operating at 100 Mb/s. |
| | | Off | The port is operating at 10 Mb/s |
| | Link/Activity | Amber/Blinking | Error condition. |
| | | Green/Steady | The port is connected, and the link is good. |
| | | Green/Blinking | Data is passing through the port.<br>The blink rate indicates the level of link activity. |
| | | Amber/Steady | The port is administratively disabled. |
| | | Off | The port has no link. |


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| 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 | Interim boot state, non-operational. |
| | | Amber/Blinking | The module failed to boot. |
| | | 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 Ethernet Routing Switch 8600 8648GTR is an R module and supports:

- 256,000 IP routes
- 64,000 MAC records
- 16,000 ARP records

Refer to *Network Design Guidelines* for usage of table entries.

The Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.
- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

  This mode supports R modules only.

The 8648GTR module supports R and M mode. For specific R and M mode configuration requirements, see "M mode configuration requirements" (page 24) and "R mode configuration requirements" (page 25).


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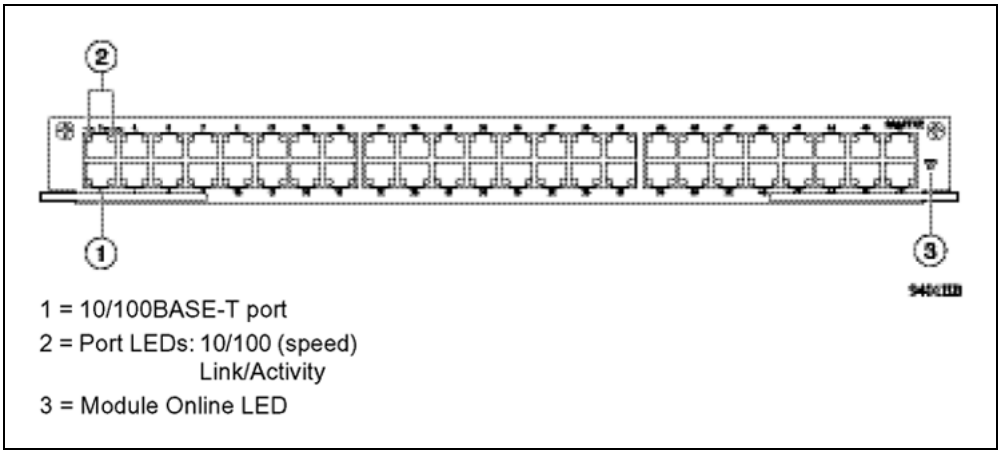
# 8648TXE and 8648TXM modules

The 8648TXE and 8648TXM modules (Figure 20 "8648TXE/8648TXM module" (page 47)) provide 48 autonegotiating 10BASE-T/100BASE-TX ports using 8-pin modular (RJ-45) connectors. Ports operate either at 10 Mb/s or 100 Mb/s up to distances of 100 m with Category-3 or greater unshielded twisted pair (UTP) cable.

**Figure 20**
**8648TXE/8648TXM module**




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

Figure 21 "8648TXE/8648TXM module LEDs" (page 47) shows the location of the 8648TXE module LEDs.

**Figure 21**
**8648TXE/8648TXM module LEDs**

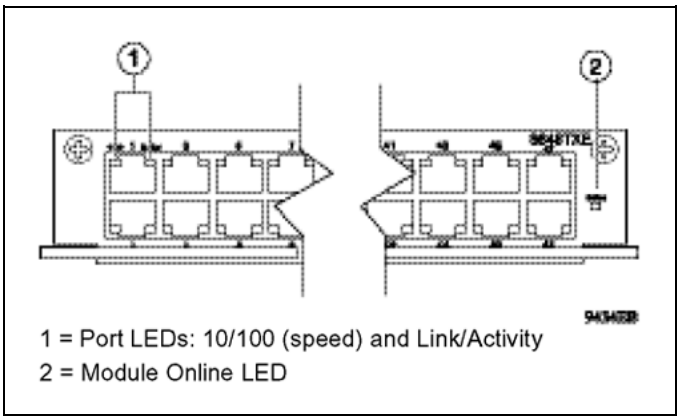




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Table 14 "8648TXE/8648TXM module" (page 48) describes the 8648TXE and 8648TXM module LEDs.

**Table 14**
**8648TXE/8648TXM module**

| 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 8648TXE 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 is an M module and 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 Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.
- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

  This mode supports R modules only.


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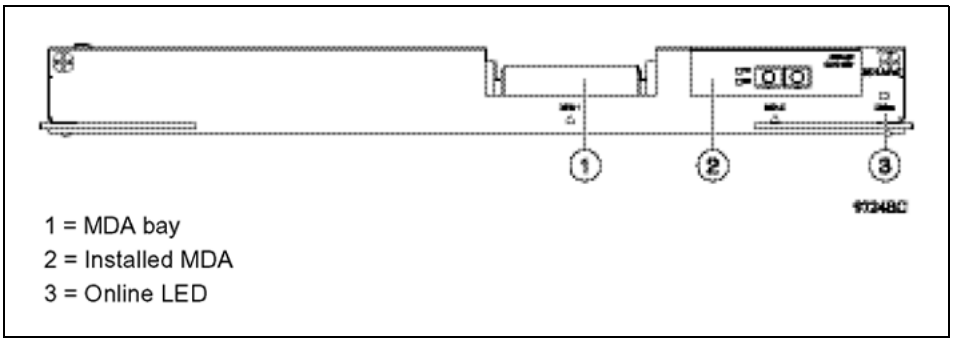
The 8648TXE module does not support R or M mode. The 8648TXM module supports R and M mode. For specific R and M mode configuration requirements, see "M mode configuration requirements" (page 24) and "R mode configuration requirements" (page 25).

## 8672ATME and 8672ATMM modules

Both the 8672ATME and 8672ATMM modules (Figure 22 "8672ATME/8672ATMM module with an OC-12c/STM-4 MDA" (page 49)) have two bays for installing ATM MDAs. These MDAs provide interface flexibility and ATM network transmission that supports RFC 1483 routed and bridged permanent virtual connections (PVC). The 8672ATME and 8672ATMM modules support Synchronous Optical Network (SONET) and Synchronous Digital Hierarchy (SDH) frame structures for data.

**Figure 22**
**8672ATME/8672ATMM module with an OC-12c/STM-4 MDA**




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 SONET or 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 Ethernet Routing Switch 8600 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.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Both the 8672ATME and 8672ATMM modules have an Online LED that indicates overall status for the module. Table 15 "8672ATME/8672ATMM Module LED" (page 50) describes the Online LED .

**Table 15**
**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 is an M module and 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 Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.
- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

  This mode supports R modules only.

The 8672ATME module does not support R or M mode. The 8672ATMM module supports R and M mode. For specific R and M mode configuration requirements, see "M mode configuration requirements" (page 24).


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# 8681XLR module

The 8681XLR module (Figure 23 "8681XLR module" (page 51)) provides a single 10GBASE-LR 1310 nm 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 23**
**8681XLR module**

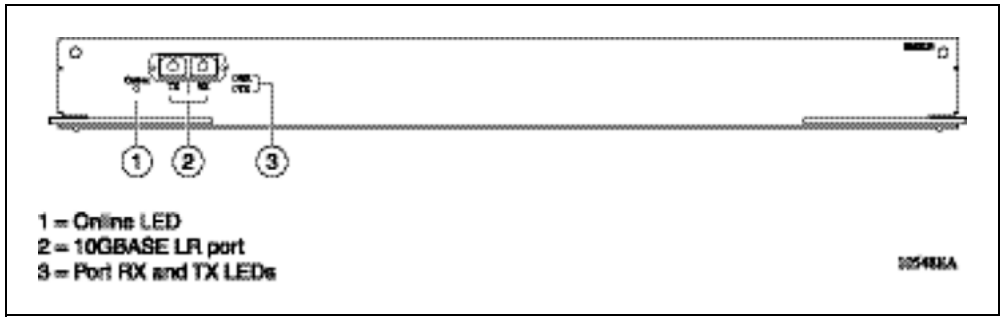


Figure 24 "8681XLR module LEDs" (page 51) shows the location of the 8681XLR module LEDs. Unlike other Ethernet Routing Switch 8600 modules, the TX LED for the 8681XLR and 8681XLW modules is located below the RX LED.

**Figure 24**
**8681XLR module LEDs**

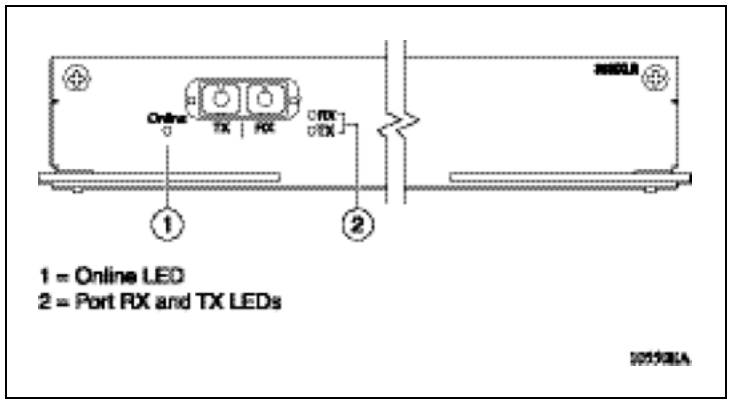


Table 16 "8681XLR module LEDs" (page 51) describes the 8681XLR module LEDs.

**Table 16**
**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. |


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| Type | Label | Color/State | Meaning |
|---|---|---|---|
| | RX | Off | The port transmit is disabled. |
| | | 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. |

See *Using Ethernet Routing Switch 8600 10 Gigabit Ethernet modules* for a description of how to configure the 8681XLR module using the Command Line Interface (CLI) or Device Manager.

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 Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.
- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

  This mode supports R modules only.

The 8681XLR module supports R and M mode. For specific R and M mode configuration requirements, see "M mode configuration requirements" (page 24) and "R mode configuration requirements" (page 25).


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# 8681XLW module

The 8681XLW module (Figure 25 "8681XLW module" (page 53)) provides a single 10GBASE-LW 1310 nm 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 25**
**8681XLW module**

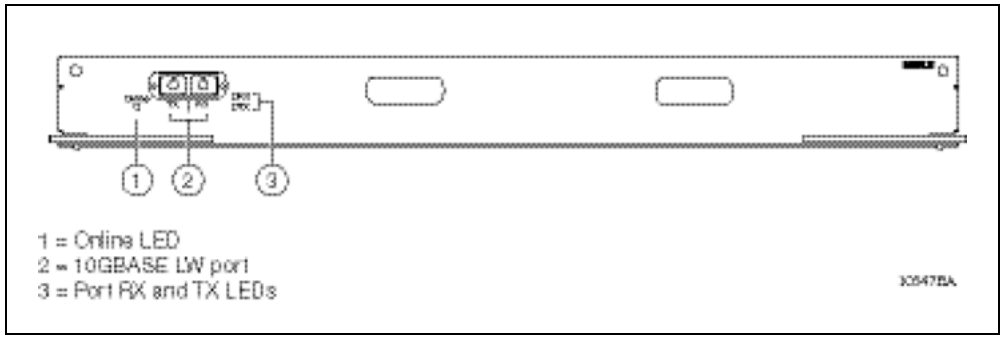


Figure 26 "8681XLW module LEDs" (page 53) shows the location of the 8681XLW module LEDs. Unlike other Ethernet Routing Switch 8600 modules, the TX LED for the 8681XLR and 8681XLW modules is located below the RX LED.

**Figure 26**
**8681XLW module LEDs**

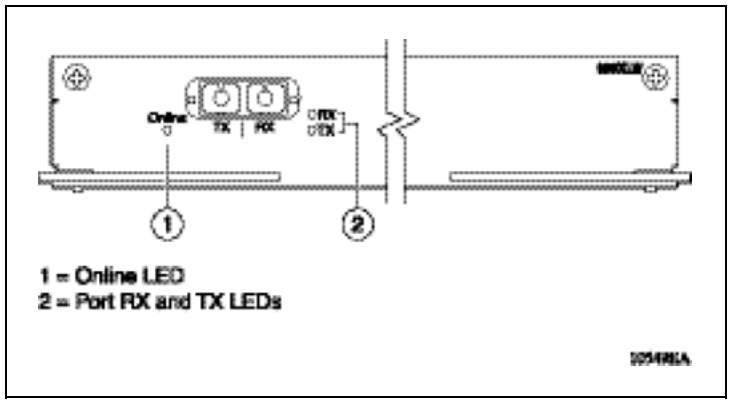


Table 17 "8681XLW module LEDs" (page 53) describes the 8681XLW module LEDs.

**Table 17**
**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. |


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| Type | Label | Color/State | Meaning |
|---|---|---|---|
| | | 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. |

See *Using Ethernet Routing Switch 8600 10 Gigabit Ethernet modules* for a description of how to configure the 8681XLW module using the Command Line Interface (CLI) or Device Manager.

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 Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.
- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

  This mode supports R modules only.

The 8681XLW module supports R and M mode. For specific R and M mode configuration requirements, see "M mode configuration requirements" (page 24) and "R mode configuration requirements" (page 25).


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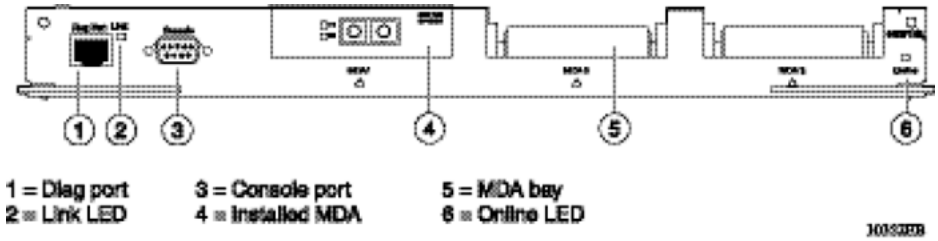
# 8683POSM module

The 8683POSM module (Figure 27 "8683POSM module with an OC-12c/STM-4 MDA" (page 55)) 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 27**
**8683POSM module with an OC-12c/STM-4 MDA**




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 18 "8683POSM module LED" (page 55) describes the Online LED

**Table 18**
**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. |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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 is an M module and 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 Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.
- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

  This mode supports R modules only.

The 8683POSM module supports R and M mode. For specific R and M mode configuration requirements, see "M mode configuration requirements" (page 24) and "R mode configuration requirements" (page 25).

## 8683XLR module

The 8683XLR module (Figure 28 "8683XLR module" (page 57)) provides three bays for installing 10 Gigabit Ethernet small form factor-pluggable (XFP) transceivers. The 10GBASE-R port (10.3 Gb/s LAN PHY) operates in full-duplex mode.

The 8683XLR module is comprised of three forwarding engine lanes. Each lane supports 10 Gb/s bidirectional traffic. All three ports can run concurrently at 10 Gb/s.

The 8683XLR module is not supported in the 8003 chassis with Ethernet Routing Switch 8600 Software Release 4.1.


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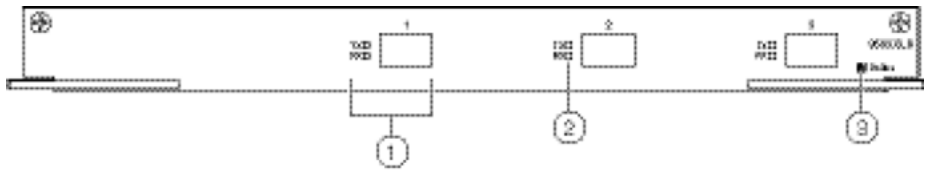
**Figure 28**
**8683XLR module**




The 8683XLR module supports up to three 10 Gigabit Ethernet small form factor-pluggable (XFP) transceivers. Although some of the XFPs are LAN/WAN (that is, LR/LW, ER/EW, ZR/ZW) this module only makes use of the LAN functionality.

Nortel has qualified the XFPs listed in Table 19 "8683XLR qualified XFPs" (page 57).

**Table 19**
**8683XLR qualified XFPs**

| XFP order number | XFP type |
|---|---|
| AA1403005 | 10GBase-SR |
| AA1403001 | 10GBase-LR |
| AA1403003 | 10GBase-ER |
| AA1403006 | 10GBase-ZR |

For Release 4.1, Nortel recommends installing only one 10GBase-ZR/ZW due to cooling limitations on the 8683XLR and XZR. Nortel further recommends the installation of the XFP only in Port 1. A 10GBase-SR, -LR/LW, or ER/EW can be installed in one or both of the remaining ports.

Figure 29 "8683XLR module LEDs" (page 58) shows the location of the 8683XLR module LEDs.


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**Figure 29**
**8683XLR module LEDs**

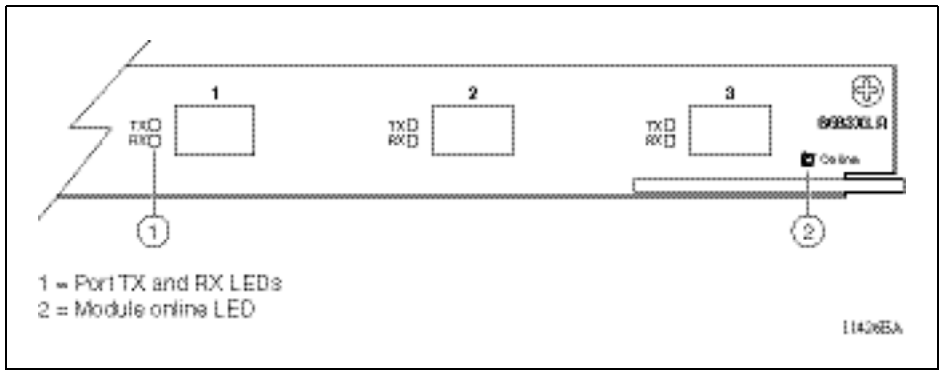


Table 20 " 8683XLR module LEDs" (page 58) describes the 8683XLR module LEDs.

**Table 20**
**8683XLR 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 cable is disconnected or the link is down. |
| | RX | Green/Steady | The port has a link and is enabled. |
| | | Green/Blinking | The port is receiving data. |
| | | Off | The cable is disconnected or the link is down. |
| | TX & RX | Both Blinking Green | The port is disabled. |
| 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 or in the process of software initialization. |
| | | Off | The switch power is off or there is no power to the card. 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. |

See Using *Ethernet Routing Switch 8600 10 Gigabit Ethernet modules* for a description of how to configure the 8683XLR module using the Command Line Interface (CLI) or Device Manager.


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The Ethernet Routing Switch 8600 8683XLR module is an R module and supports:

- 256,000 IP routes
- 64,000 MAC records
- 16,000 ARP records

Refer to *Network Design Guidelines* for usage of table entries.

The Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.
- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.
- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

  This mode supports R modules only.

The 8683XLR module supports R and M mode. For specific R and M mode configuration requirements, see "M mode configuration requirements" (page 24) and "R mode configuration requirements" (page 25).

## 8683XZR module

The 868XZR module supports both LAN and WAN operation (10.3 Gb/s LAN PHY and 9.9 Gb/s WAN PHY). The 8683XZR module (Figure 30 "8683XZR module" (page 60)) provides three bays for installing 10 Gigabit Ethernet small form factor-pluggable (XFP) transceivers. The port operates in full-duplex mode.

The 8683XZR module includes three forwarding engine lanes. Each lane supports 10 Gb/s bidirectional traffic. All three ports can run concurrently at 10 Gb/s.

The 8683XZR module is not supported in the 8003 chassis with Ethernet Routing Switch 8600 Software Release 4.1.

For Release 4.1, Nortel recommends installing only one 10GBase-ZR/ZW due to cooling limitations on the 8683XLR and XZR. Nortel further recommends the installation of the XFP only in Port 1. A 10GBase-SR, -LR/LW, or ER/EW can be installed in one or both of the remaining ports.


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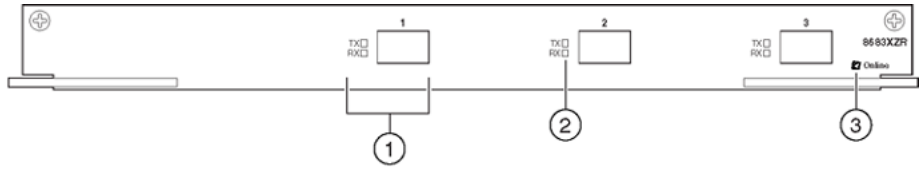
**Figure 30**
**8683XZR module**




The 8683XZR module supports up to three 10 Gigabit Ethernet small form factor-pluggable (XFP) transceivers.

Nortel has qualified the XFPs listed in Table 21 "8683XZR qualified XFPs" (page 60).

**Table 21**
**8683XZR qualified XFPs**

| XFP order number | XFP type |
|---|---|
| AA1403005 | 10GBase-SR/SW |
| AA1403001 | 10GBase-LR/LW |
| AA1403003 | 10GBase-ER/EW |
| AA1403006 | 10GBase-ZR/ZW |

Figure 31 "8683XZR module LEDs" (page 60) shows the location of the 8683XZR module LEDs.

**Figure 31**
**8683XZR module LEDs**

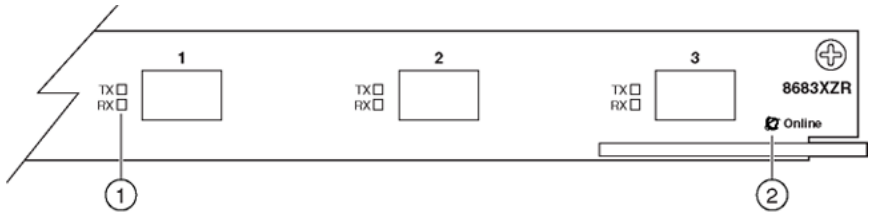




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Table 22 " 8683XZR module LEDs" (page 61) describes the 8683XZR module LEDs.

**Table 22**
**8683XZR 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 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. |

See *Using Ethernet Routing Switch 8600 10 Gigabit Ethernet modules* for a description of how to configure the 8683XZR module using the Command Line Interface (CLI) or Device Manager.

The Ethernet Routing Switch 8683XZR module is an R module and supports:

- 256,000 IP routes
- 64,000 MAC records
- 16,000 ARP records

Refer to *Network Design Guidelines* for usage of table entries.

The Ethernet Routing Switch 8600 system has three hardware operating modes:

- Default mode (32,000 table entries) supports up to 32,000 hardware records. This mode supports all modules.
- M mode (128,000 table entries) supports up to 128,000 hardware records. This mode supports M and R modules only.


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- R mode supports up to:
  - 256,000 IP routes
  - 64,000 MAC entries
  - 16,000 ARP entries

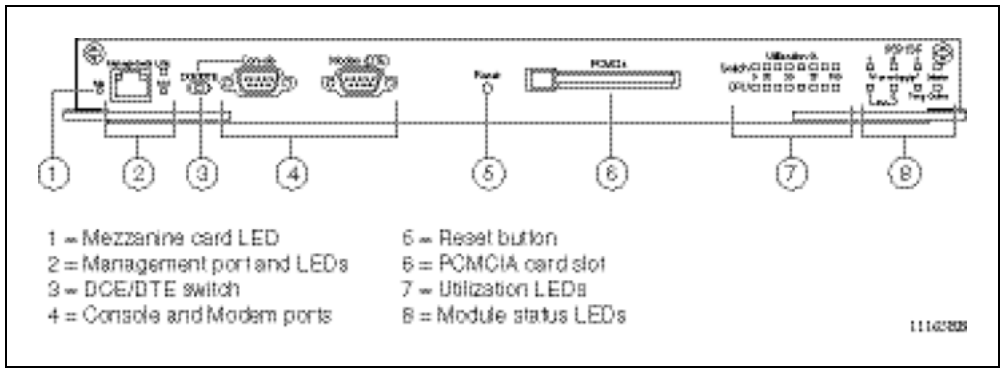
  This mode supports R modules only.

The 8683XZR module supports R and M mode. For specific R and M mode configuration requirements, see "M mode configuration requirements" (page 24) and "R mode configuration requirements" (page 25).

## 8691SF module

The 8691SF module (Figure 32 "8691SF module" (page 62)) provides the core switching fabric for the Ethernet Routing Switch 8600, 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 32**
**8691SF module**




The 8691SF module consists of a printed circuit board with status LEDs, a management port, a data communications equipment (DCE)/data terminal equipment (DTE) switch for the console port, a console port, a modem port, a reset button, and a Personal Computer Memory Card International Association (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 Ethernet Routing Switch 8600 Release 3.7 with 128 MB SDRAM. Future release can require a memory upgrade kit (DS1411016) to upgrade to 256 MB SDRAM.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The 8681SF/256 (DS1404090) is functionally identical to the 8691SF except it has 256 MB 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 Ethernet Routing Switch 8600 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.

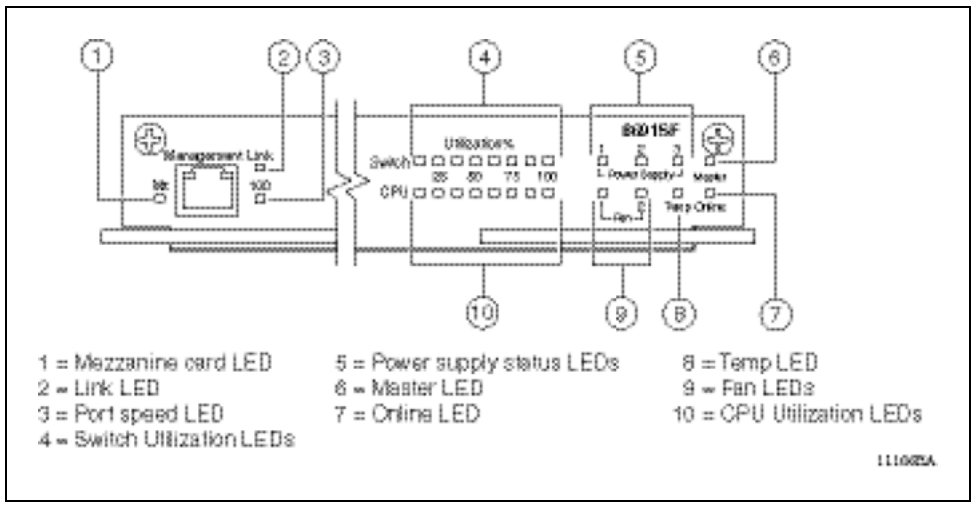
When the 8691SF module in slot 6 completes initialization, it relearns the routing and VLAN bridging information for the switch unless you have enabled the HA-CPU flag. In that case the static routes and ARP entries for routing are synchronized to the redundant CPU which results in no interruption of 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 33 "8691SF module LEDs" (page 63) shows the location of the 8691SF module LEDs.

**Figure 33**
**8691SF module LEDs**





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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 23 "8691SF module LEDs" (page 64) describes the 8691SF module LEDs.

**Table 23**
**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. |
| 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 Mb/s<br>2 LEDs =100 Mb/s<br>3 LEDs = 1 Gb/s<br>4 LEDs = 5 Gb/s<br>5 LEDs = 10 Gb/s<br>6 LEDs = 20 Gb/s<br>7 LEDs = 40 Gb/s<br>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:<br>1 LED = 12 percent<br>2 LEDs = 24 percent<br>3 LEDs = 36 percent<br>4 LEDs = 48 percent<br>5 LEDs = 60 percent<br>6 LEDs = 72 percent<br>7 LEDs = 84 percent<br>8 LEDs = 100 percent |
| 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. |


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| Label | Color/State | Meaning |
|---|---|---|
| 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.

This port can 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" (page 134).


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### 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" (page 135).

### 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 24 "Ethernet Routing Switch 8600 PCMCIA cards" (page 66). 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 24**
**Ethernet Routing Switch 8600 PCMCIA cards**

| Part number | Card Type |
|---|---|
| DS1411003 | PCMCIA 8 MB 3.3 V |
| DS1411014 | PCMCIA 16 MB 3.3V |
| DS1411021 | PCMCIA 64 MB 3.3 V |
| DS1411022 | PCMCIA 256 MB 3.3V |

## 8692SF module

Dual 8692SF switch fabric modules (Figure 34 "8692SF module" (page 67)) enable a maximum switch bandwidth of 512 Gb/s. Using the Split MultiLink Trunking (SMLT) protocol in the core, a redundant Ethernet Routing Switch 8600 with two 8692SF modules can provide over 1 Tb/s of core switching capacity.


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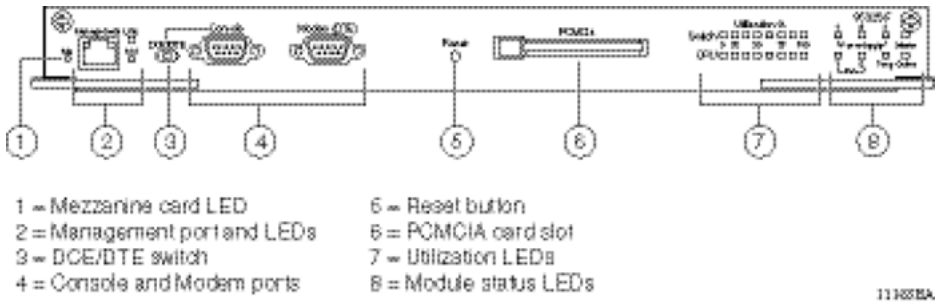
**Figure 34**
**8692SF module**




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 Ethernet Routing Switch 8600 software Release 3.7.

Ethernet Routing Switch 8600 software does not support configurations of the Ethernet Routing Switch 8600 8692SF module, and Ethernet Routing Switch 8600 8690SF or Ethernet Routing Switch 8600 8691SF module installed within the same chassis.

To upgrade to the Ethernet Routing Switch 8600 8692SF module, see "Upgrading from the 8690SF or 8691SF module to the 8692SF module" (page 68).

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 8692SF is capable of supporting an optional Enterprise Enhanced CPU Daughter Card. The Enterprise Enhanced CPU Daughter Card is a mezzanine daughter card for the consisting of dual 1 GHz Power PC processors. Installing the daughter card on an 8692SF module offloads processor intensive tasks from the 333 MHz processor located on the 8692SF CPU motherboard. The Enterprise Enhanced CPU Daughter Card is required for configuration of sub-100 millisecond failover and support of IPV6 routing interfaces. For installation instructions, see "Installing the Enterprise enhanced CPU daughter card" (page 139).

The Flash memory is divided into two volumes: Volume/0 has a capacity of 16 MB and Volume/1 has a capacity of 40 MB. You can use either volume to store multiple file types, however, the 8692SF module can only use either Volume/0 or Volume/1. By default, the system can only use 16 MB on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Volume/0. If you want to use 40 MB on Volume/1, refer to the procedure for upgrading the Flash memory to 40 MB in the *Release Notes for the Ethernet Routing Switch 8600 Software Release 4.1*.

The 8692SF switch fabric enables a maximum forwarding throughput of 384 Mp/s, Using the Split MultiLink Trunking (SMLT) protocol in the core, the Ethernet Routing Switch 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 you have enabled the high-availability mode (HA-CPU flag). In that case all Layer 3 information (except multicast, IPX, BGP, and fast-VRRP) is synchronized to the redundant CPU which results in no interruption of network services. For more information about the high-availability mode, see *Managing 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 from the 8690SF or 8691SF module to the 8692SF module

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

**CAUTION**

Do not install a software version earlier than Release 3.5.6 on the 8692SF module. Operating the 8692SF module with any release below Ethernet Routing Switch 8600 Software Release 3.5.6 damages this module.

**CAUTION**

Before inserting an 8692SF in a secondary CPU slot, make sure that the primary CPU is already running Ethernet Routing Switch 8600 Software Release 4.1.


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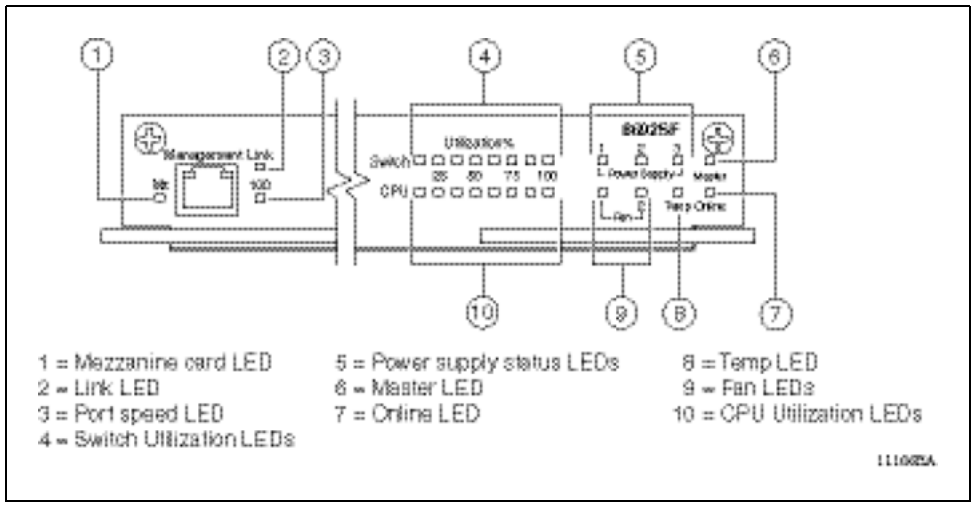
To upgrade to the 8692SF module, refer to *Release Notes for the Ethernet Routing Switch 8600 Software Release 4.1*.

## LEDs

Figure 35 "8692SF module LEDs" (page 69) shows the location of the 8692SF module LEDs.

**Figure 35**
**8692SF module LEDs**




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 25 "8692SF module LEDs" (page 69) describes the 8692SF module LEDs.

**Table 25**
**8692SF module LEDs**

| Label | Color/State | Meaning |
|---|---|---|
| Mz | Green | The module completed software initialization and is operating normally. |
| | Off | The module is not installed or did not initialize properly. |
| Link | Green/Steady | The management port is connected, and the link is good. |
| | Off | There is no link to the management port. |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| Label | Color/State | Meaning |
|---|---|---|
| 100 | Green/Steady | The management port is operating at 100 Mb/s. |
| | Off | The management port is operating at 10 Mb/s. |
| Switch Utilization (8 LEDs) | Green | The number of lit LEDs indicates the utilization level (full-duplex operation) of the switch fabric as follows:<br>1 LED = 4.0 Gb/s to 34 Gb/s<br>2 LEDs = 34 Gb/s to 68 Gb/s<br>3 LEDs = 68 Gb/s to 102 Gb/s<br>4 LEDs = 102 Gb/s to 136 Gb/s<br>5 LEDs = 136 Gb/s to 170 Gb/s<br>6 LEDs = 170 Gb/s to 204 Gb/s<br>7 LEDs = 204 Gb/s to 238 Gb/s<br>8 LEDs = 238 Gb/s to 256 Gb/s |
| CPU Utilization (8 LEDs) | Green | The number of lit LEDs indicates the level of CPU activity (full-duplex operation) as follows:<br>1 LED = 12 percent<br>2 LEDs = 24 percent<br>3 LEDs = 36 percent<br>4 LEDs = 48 percent<br>5 LEDs = 60 percent<br>6 LEDs = 72 percent<br>7 LEDs = 84 percent<br>8 LEDs = 100 percent |
| 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. |


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| Label | Color/State | Meaning |
|---|---|---|
| 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 8692SF module is an Medium Dependent Interface (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.

This port can 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" (page 137).

### 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" (page 137).

### 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.


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## PCMCIA card slot

The PCMCIA card slot in the 8692SF module accepts the PCMCIA cards listed in Table 26 "Ethernet Routing Switch 8600 PCMCIA cards" (page 72). 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 26**
**Ethernet Routing Switch 8600 PCMCIA cards**

| Part number | Card Type |
|---|---|
| DS1411003 | PCMCIA 8 MB 3.3 V |
| DS1411014 | PCMCIA 16 MB 3.3V |
| DS1411021 | PCMCIA 64 MB 3.3 V |
| DS1411022 | PCMCIA 256 MB 3.3V |


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# Installing Ethernet Routing Switch 8600 modules and connecting equipment

This section provides instructions for installing and connecting Ethernet Routing Switch 8600 modules in an 8000 Series chassis to create an Ethernet Routing Switch 8600. This section includes the following topics:



## Removing and installing a filler panel

Nortel ships the 8000 Series chassis with a filler panel covering each empty module slot. 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" (page 74).

If you need to install a filler panel, see "Installing a filler panel" (page 75).


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## Removing a filler panel

To remove a filler panel:

| Step | Action |
|---|---|
| 1 | Using a Phillips screwdriver, loosen the 2 captive screws that fasten the filler panel to the chassis (Figure 36 "Removing a filler panel: 8003, 8006, and 8010 chassis" (page 74) or Figure 37 "Removing a filler panel: 8010co chassis" (page 74)). |

**Figure 36**
**Removing a filler panel: 8003, 8006, and 8010 chassis**

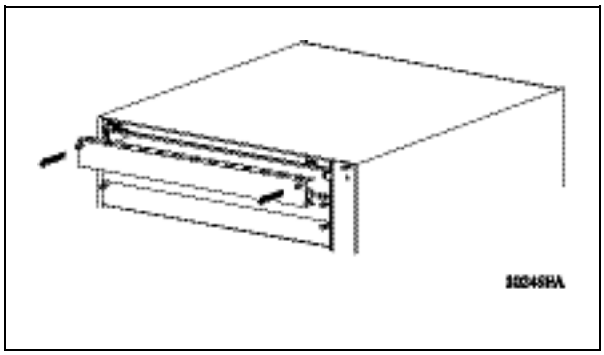
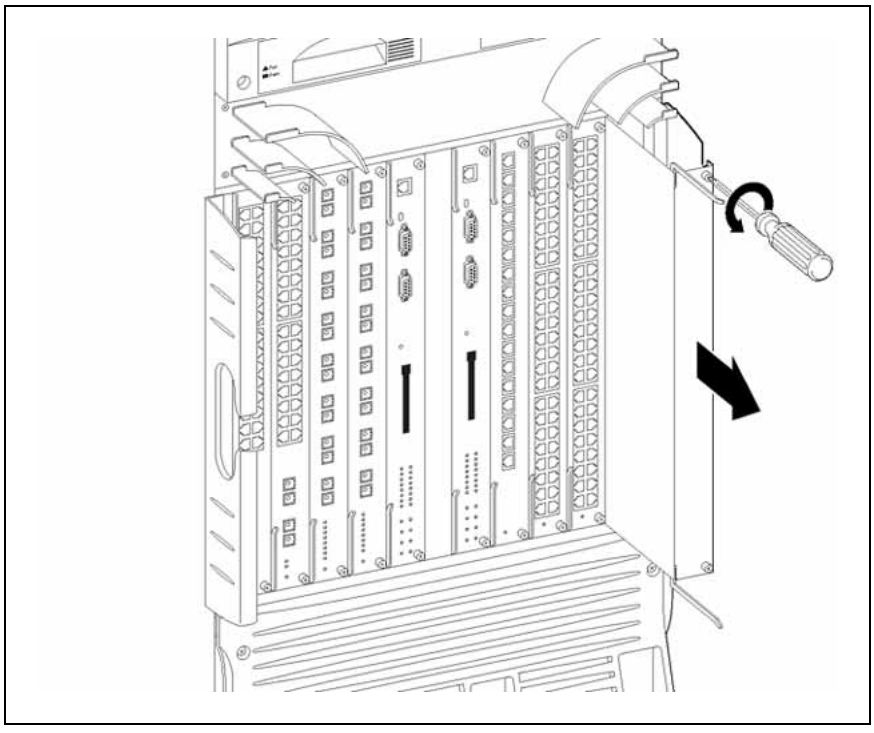


**Figure 37**
**Removing a filler panel: 8010co chassis**

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2 Pull the filler panel away from the slot.

**—End—**

### 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:

| Step | Action |
|---|---|
| 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. |

**—End—**

## Replacing a CPU module in a single-CPU chassis

You must have access to the Console port and the Ethernet Management port. Use the following procedure to replace a CPU module.

**ATTENTION**

Before you replace a CPU module, you must obtain the boot configuration file, configuration file, and hidden password files. If the /flash is accessible on the faulty CPU, copy the files from /flash to the pcmcia card. If the /flash is not accessible on the faulty CPU, obtain the files from another source, which can be another network device, such as a tftp or ftp server. Alternatively, the files can be rebuilt using the Customer Spec Book or the configuration from the VRRP peer 8600 switch.

| Step | Action |
|---|---|

*Saving configuration files*

1 Using the console port, login to the CPU.

2 Save boot and runtime configuration files to flash memory. Enter the following commands:

```
ERS-8606:6# save config

Save config to file /flash/config.cfg successful.

ERS-8606:6# save bootconfig
```


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```
Save bootconfig to file /flash/boot.cfg successful.
```

3 Enter the **show sys sw** command and note the software release running on the CPU, and the location for the files:

- PrimaryImageSource : /flash/p80a4100.img runtime image name and location
- PrimaryConfigSource : /flash/config.cfg: the runtime config file name and location

You may have to delete old files from the PCMCIA card to make room for the new files. You can use the **remove** command.

4 You must copy all required files from the CPU flash memory to the PCMCIA card. First, copy the boot and runtime configuration files to the PCMCIA card.

Enter the following commands:

```
ERS-8606:6# copy /flash/boot.cfg /pcmcia/
```

```
ERS-8606:6# copy /flash/config.cfg /pcmcia/
```

5 Copy hidden files to the PCMCIA card. Enter the following commands:

```
ERS-8606:6# copy /flash/shadov.txt /pcmcia/
```

```
ERS-8606:6# copy /flash/snmp_usm.txt /pcmcia/
```

```
ERS-8606:6# copy /flash/snmp_comm.txt /pcmcia/
```

If the switch is in hsecure mode, you must also copy the password file. Enter the following command:

```
ERS-8606:6# copy /flash/passvord.txt /pmcia/
```

6 Copy image files from flash memory to the PCMCIA card. Enter the following commands:

To copy the runtime image:

```
ERS-8606:6# copy /flash/p80a4100.img /pcmcia/
```

To copy the boot monitor image:

```
ERS-8606:6# copy /flash/p80b4100.img /pcmcia/
```

To copy the ATM IO image if an ATM card is present:

```
ERS-8606:6# copy /flash/p80t4100.img /pcmcia/
```

To copy the encryption module image:

```
ERS-8606:6# copy /flash/p80c4100.img /pcmcia/
```

To copy the AES encryption module :


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```
ERS-8606:6# copy /flash/p80c4100.aes
```

In previous releases, filenames ended with .des rather than .aes.

To copy the R module image if R modules are present:

```
ERS-8606:6# copy /flash/p80j4100.img /pcmcia/
```

To copy the SuperMezz image if a SuperMezz daughtercard is present:

```
ERS-8606:6# copy flash/p80m4100.dld /pcmcia/
```

*Replacing the CPU*

**7** Power down the switch to stop all traffic.

**8** Disconnect the cables from the Management and Console ports.

**9** Remove the old CPU. For additional information about removing modules, see "Installing and replacing a module" (page 84) .

**10** Insert the new CPU. For more information, see "Installing and replacing a module" (page 84).

**11** Reconnect the cables to the Management and Console ports, and insert the pcmcia from the old card.

**12** Connect to the console and open the terminal emulator application.

**13** Power up the switch. Before the system loads the runtime image, the following message appears: "Loaded boot configuration from file /flash/boot.cfg Attaching network interface lo0... done. Press <Return> to stop autoboot..."

**14** Press **Return** on the keyboard to stop the auto-boot process.

*Copying configuration files to new CPU*

**15** Using the CLI Console port, copy all required files from the PCMCIA card to the flash memory. For example, enter:

```
Monitor# copy /pcmcia/boot.cfg /flash/
Monitor# copy /pcmcia/config.cfg /flash/
Monitor# copy /pcmcia/shadov.txt /flash/
Monitor# copy /pcmcia/snmp_usm.txt /flash/
Monitor# copy /pcmcia/snmp_comm.txt /flash/
Monitor# copy /pcmcia/passvord.txt /flash/
Monitor# copy /pcmcia/p80a4100.img /flash/
Monitor# copy /pcmcia/p80b4100.img /flash/
```


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```
Monitor# copy /pcmcia/p80t4100.img /flash/
Monitor# copy /pcmcia/p80c4100.ing /flash/
Monitor# copy /pcmcia/p80c4100.aes /flash/
Monitor# copy /pcmcia/p80j4100.img /flash/
Monitor# copy /pcmcia/p80m4100.img /flash/
```

**16** Hide the files that should be hidden. Use the following commands:

```
Monitor# attrib /flash/shadov.txt "+h"
Monitor# attrib /flash/snmp_usm.txt "+h"
Monitor# attrib /flash/snmp_comm.txt "+h"
Monitor# attrib /flash/passvord.txt "+h"
```

*Booting the system*

**17** Boot the system and write the correct boot monitor to flash. For example, enter the following command:

```
Monitor# boot /flash/p80b4100.img
```

A message appears in the console stating that the boot flash will be written, and to not interrupt the process. After the system writes the boot flash with the new boot monitor, the system reboots and loads boot.cfg and config.cfg along with the proper runtime software specified within the new configuration. The upgrade is now complete.

*Verifying configuration*

**18** After the boot is complete, note the value for `Version:`, and verify that the image and configuration loaded properly. Enter the following command:

```
ERS-8606:6# show sys sw
```

(partial output)

```
System Software Info :

Default Runtime Config File :  /flash/config.cfg
Default Boot Config File :  /flash/boot.cfg
Config File :
Last Runtime Config Save :  THU JUL 27 09:37:13 2006
Last Runtime Config Save to Slave :  0
Last Boot Config Save :  THU JUL 27 10:08:44 2006
Last Boot Config Save on Slave :  0

Boot Config Table
Slot# :  6
Version :  Build REL4.1.0.0 on Sun Jun 4 21:20:29 PDT
2006
LastBootConfigSource :  /flash/boot.cfg
```


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```
LastRuntimeImageSource :  /flash/p80a4100.img
LastRuntimeConfigSource :  /flash/config.cfg
PrimaryImageSource :  /flash/p80a4100.img
PrimaryConfigSource :  /flash/config.cfg
SecondaryImageSource :  /pcmcia/p80a4100.img
SecondaryConfigSource :  /pcmcia/config.cfg
TertiaryImageSource :  0.0.0.0:
TertiaryConfigSource :  /flash/config.cfg

LastRunTimeMezzSource:  Not running mezz
```

**—End—**

## Replacing a SF/CPU module in a dual-SF/CPU chassis

**ATTENTION**

Before replacing the SF/CPU, you must determine which SF/CPU is operating as the master SF/CPU. On the Master SF/CPU faceplate, the “Master” LED blinks green. If you logged onto the switch through Telnet, SSH or through the console, enter the **`show sys info`** command to determine which SF/CPU is operating as the master. Enter **`config sys set action cpuswitchover`** at the command prompt of the Master SF/CPU if the SF/CPU you want to replace is the Master.

To replace a SF/CPU module in a dual-SF/CPU chassis:

| Step | Action |
|---|---|
| 1 | Disconnect the cables from the Management and Console ports of the SF/CPU you want to replace (the current slave), and remove the SF/CPU module. For more information, see "Installing and replacing a module" (page 84). |
| 2 | Insert the new SF/CPU module. |
| 3 | Reconnect the cables. |
| 4 | After the standby SF/CPU boots, verify the software releases running on new master and new S SF/CPU:<br>• Log into the master SF/CPU (Telnet/SSH or through the console) and enter the **`show sys sw`** command.<br>• Note the software release running on the Master SF/CPU. Verify that the software release is the same as was previously running the switch. |


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- From the Master, peer Telnet to the Standby SF/CPU and enter the **`show sys sw`** command.
- Verify that the Standby SF/CPU module contains the correct files within the /flash directory. If the code release running on each SF/CPU is not the same, see "Copying required files to the standby SF/CPU" (page 82).

5 Use the **`rm/flash/filename.img -y`** command to remove old files from flash memory or the PCMCIA card, if required.

If peer Telnets fail, connect the console cable to the Standby SF/CPU in order to determine the status. Once you establish communication between the master and standby, re-establish the peer Telnet. Correct any remaining communications issues by verifying that TFTP and other appropriate deamons are enabled on the Standby SF/CPU through local console access.

6 While logged into Master SF/CPU, enter **`show bootconfig flags`** to verify the setting for the **savetostandby** flag.

7 If the **savetostandby** flag is set to **True**, save the current runtime and boot configurations to overwrite the old runtime configuration (config.cfg) and boot configuration (boot.cfg) files in both the Master and Standby.

If the **savetostandby** flag is set to **False**, copy the boot,cfg and config.cfg to the Standby SF/CPU. For example, enter **`ERS-8606:<slot># copy /flash/config.cfg 127.0.0.<slot>/flash/config.cfg`**

8 Hide the files that were previously hidden with the following commands:

You must be logged into the Standby CPU to hide the following files.

```
@ERS-8606:<slot># attrib /flash/shadov.txt "+h"
@ERS-8606:<slot># attrib /flash/snmp_usm.txt "+h"
@ERS-8606:<slot># attrib /flash/snmp_comm.txt "+h"
@ERS-8606:<slot># attrib /flash/passvord.txt "+h"
```

9 From the Standby SF/CPU prompt, boot the new Standby and write the new boot monitor to flash by entering the following command:

```
@ERS-8606:  <slot># boot/flash/p80bxxx.img -y
```

If you are connected directly to the console, a message appears on the console stating that the boot flash will be written, and to not interrupt the process. After the system writes the new boot monitor, the system reboots and loads the bootconfig (boot.cfg), the runtime


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image (p80axxxx.img), and the runtime config (config.cfg), as well as any other appropriate files. If you issued the boot command (boot /flash/p80bxxxx.img –y) while using TELNET or SSH, loose connectivity to the standby SF/CPU during this process and must wait until Standby finishes booting and loading images before you can log on again.

After the standby SF/CPU boots and loads the new runtime image and configurations, the replacement procedure is complete. To verify that all is correct, connect to the standby SF/CPU and enter **show sys sw** to validate that the system has loaded the required software with commands below:

```
@ERS-8606:6# show sys sw
```

(partial output)

```
System Software Info :

Default Runtime Config File :  /flash/config.cfg

Default Boot Config File :  /flash/boot.cfg

Config File :

Last Runtime Config Save :  THU JUL 27 09:37:13
2006

Last Runtime Config Save to Slave :  0

Last Boot Config Save :  THU JUL 27 10:08:44 2006

Last Boot Config Save on Slave :  0

Boot Config Table

Slot# :  6

Version :  Build REL4.1.0.0 on Sun Jun 4 21:20:29
PDT
```

The 8692SF SF/CPU on-board flash memory size is 64 MB. However, software releases previous to 4.0 recognize a total flash size of 16 MB. Performing a flash format with Software release 4.0 allows the system to recognize 40 MB of total space, and with software release 4.1 and later, performing a flash format allows the system to recognize 64 MB of total space. This extra space can be required if you are also installing a SuperMezz SF/CPU daughter card or R modules, as both require additional images. The images combined with the system images, exceed the 16 MB of space on flash available. For more information about reformatting the flash, see *Release Notes for the Ethernet Routing Switch 8600 Software Release 4.1.0* (317177-D).


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**—End—**

## Copying required files to the standby SF/CPU

This procedure is required only if software and configuration files are different on the Master SF/CPU and the Standby SF/CPU.

Required files can be stored in the following locations:

- Flash memory: copy files from the Flash memory on the Master SF/CPU to the flash memory on the Standby SF/CPU

  For example: **ERS-8606:5# copy/flash/p80axxx.img 127.0.0 6:/flash/p80axxx.img**

- PCMCIA card: insert a PCMCIA card with the required files, copied from the Master SF/CPU, into the Standby SF/CPU. Copy files from the PCMCIA card to the Standby SF/CPU flash memory.

  For example: **ERS-8606:6# copy/pcm-cia/p80axxx.img/flash/p80axxx.img**

- A remote TFTP server: use the TFTP copy command and specify the destination internal slot IP address for the Standby SF/CPU (127.7.7 <slot>).

  For example: **ERS-8606:6# copy/<IP address of server>/path to file/p80axxx.img/flash/p80axxx.img**

| Step | Action |
|---|---|
| **1** | Copy required files:<br><br>The following commands copy all required files from the Flash memory on the Master CPU to the Flash memory on the Standby CPU. p80yxxx.img represents the software release. <slot> is either slot 5 or slot 6, depending on where the Master and Stanby SF/CPU are installed.<br><br>• To copy the runtime image, enter **ERS-8606:<slot># copy /flash/p80axxxx.img 127.0.0. <slot>/flash/p80axxxx.img**<br><br>• To copy the boot monitor , enter **ERS-8606:<slot># copy /flash/p80bxxxx.img 127.0.0. <slot>/flash/p80bxxxx.img** |
| **2** | Copy the following files, if required: |


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- To copy the ATM IO image if an ATM card is present, enter **ERS-8606:<slot># copy /flash/p80txxxx.img 127.0.0. <slot>/flash/p80txxxx.img**
- To copy the encryption module image, enter **ERS-8606:<slot># copy /flash/p80cxxxx.img 127.0.0. <slot>/flash/p80cxxxx.img**
- To copy the AES encryption module, enter **ERS-8606:<slot># copy /flash/p80cxxxx.aes 127.0.0. <slot>/flash/p80cxxxx.aes**
- To copy the R module image if R modules are present, enter **ERS-8606:<slot># copy /flash/p80jxxxx.dld 127.0.0. <slot>/flash/p80jxxxx.dld**
- To copy the SuperMezz image if a SuperMezz daughtercard is present, enter ERS-8606:5# copy flash/p80m4100.img /pcmcia/
- To copy the POS IO image if a POS card is present, enter **ERS-8606:<slot># copy /flash/p80pxxxx.dld 127.0.0. <slot>/flash/p80pxxxx.dld**
- To copy the SuperMezz image if a SuperMezz daughtercard is present, enter **ERS-8606:<slot># copy /flash/p80mxxxx.img 127.0.0. <slot>/flash/p80mxxxx.img**

3 Copy hidden files with the following commands:

```
ERS-8606:<slot># copy /flash/shadov.txt
127.0.0.<slot>:/flash/shadov.txt
```

```
ERS-8606:<slot># copy /flash/snmp_usm.txt
127.0.0.<slot>:/flash/snmp_usm.txt
```

```
ERS-8606:<slot># copy /flash/snmp_comm.txt
127.0.0.<slot>:/flash/snmp_comm.txt
```

4 If the switch is in hsecure mode, copy the password file with the following command:

```
ERS-8606:<slot># copy /flash/passvord.txt
127.0.0.<slot>:/flash/passvord.txt
```

**—End—**

## Hot-swapping the SF/CPU module or I/O modules

When hot-swapping the active SF/CPU module in an Ethernet Routing Switch 8600 with redundant SF/CPU modules, wait until the redundant SF/CPU module is stabilized before inserting any other modules. The


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redundant SF/CPU module displays a login prompt on the console screen. If no console connection is available, wait for at least thirty seconds before inserting the replacement SF/CPU module or before reinserting the removed SF/CPU module.

In addition, during a SF/CPU failover, do not hot swap I/O modules until the new SF/CPU becomes the master SF/CPU.

**CAUTION**
Do not hot-swap or insert modules in a Ethernet Routing Switch 8600 switch chassis while the switch is booting. Doing so may cause the module not to be recognized and may cause module initialization failure.

**CAUTION**
Nortel strongly recommends that you make the backup SF/CPU the master before removing the master SF/CPU in an HA configuration. Removing the master directly could cause traffic loss.

If a dual SF/CPU system has HA-CPU mode enabled, the following procedure will minimize packet loss. If the SF/CPU is in warm standby mode, because most of the hardware will be rebooted, packet loss cannot be avoided; however, the procedure will minimize downtime.

To perform a SF/CPU failover, use the following procedure:

| Step | Action |
|---|---|
| 1 | Reboot the master SF/CPU from the console, followed by a remote Telnet/SSH session. |
| 2 | Allow the hot standby SF/CPU take over as the new master SF/CPU. |
| 3 | As required, remove the rebooted master SF/CPU after the new master SF/CPU is online. |

**—End—**

## Installing and replacing a module

The Ethernet Routing Switch 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.


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To prevent static discharge damage when you work with Ethernet Routing Switch 8600, 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" (page 85). To install a module, see "Installing a module" (page 90).

**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.




## Removing a module

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

**CAUTION**
Before you remove a 8691SF or 8692SF module, back up your configuration. If the chassis has only one 8691SF or 8692SF module and you remove that module, the switch does not operate.


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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 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 or 8692SF 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:

| Step | Action |
|---|---|
| 1 | Disconnect any cables attached to the ports on the module. |

**CAUTION**
Do not operate the Ethernet Routing Switch 8600 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 38 "Loosening screws on the |


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module: 8003, 8006, and 8010 chassis" (page 87) or Figure 39 "Loosening screws on the module: 8010co chassis" (page 87)).

**Figure 38**
**Loosening screws on the module: 8003, 8006, and 8010 chassis**

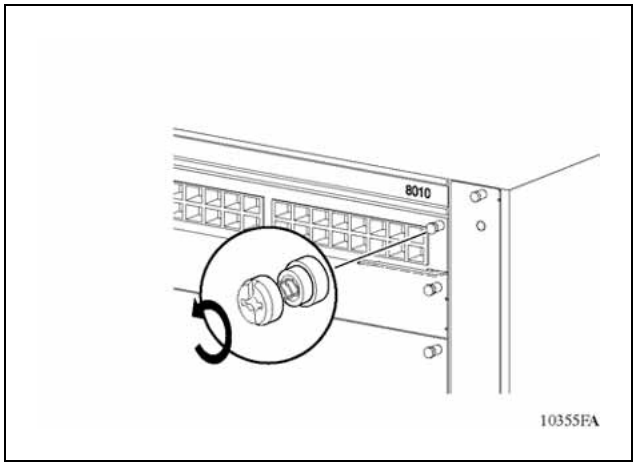
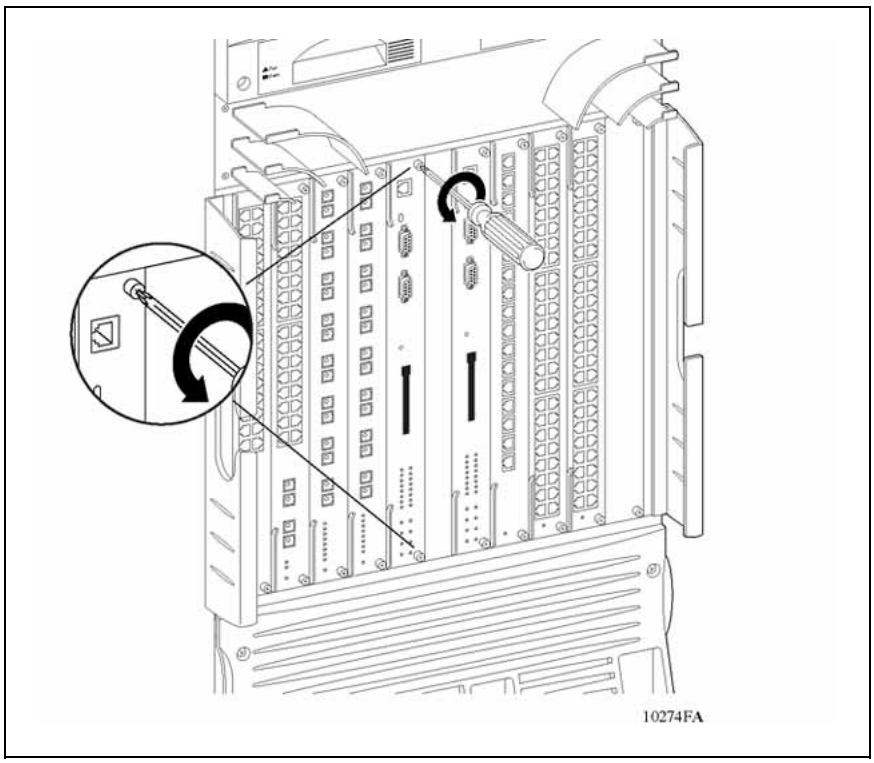



**Figure 39**
**Loosening screws on the module: 8010co chassis**




3 Rotate the insert/extract levers to eject the module from the chassis (Figure 40 "Ejecting the module from the chassis: 8003, 8006, and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8010 chassis" (page 88) or Figure 41 "Ejecting the module from the chassis: 8010co chassis" (page 88)).

**Figure 40**
**Ejecting the module from the chassis: 8003, 8006, and 8010 chassis**

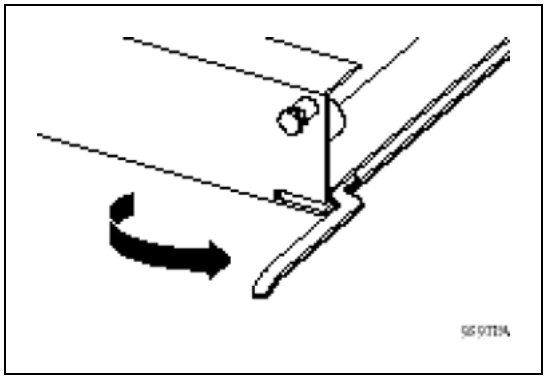
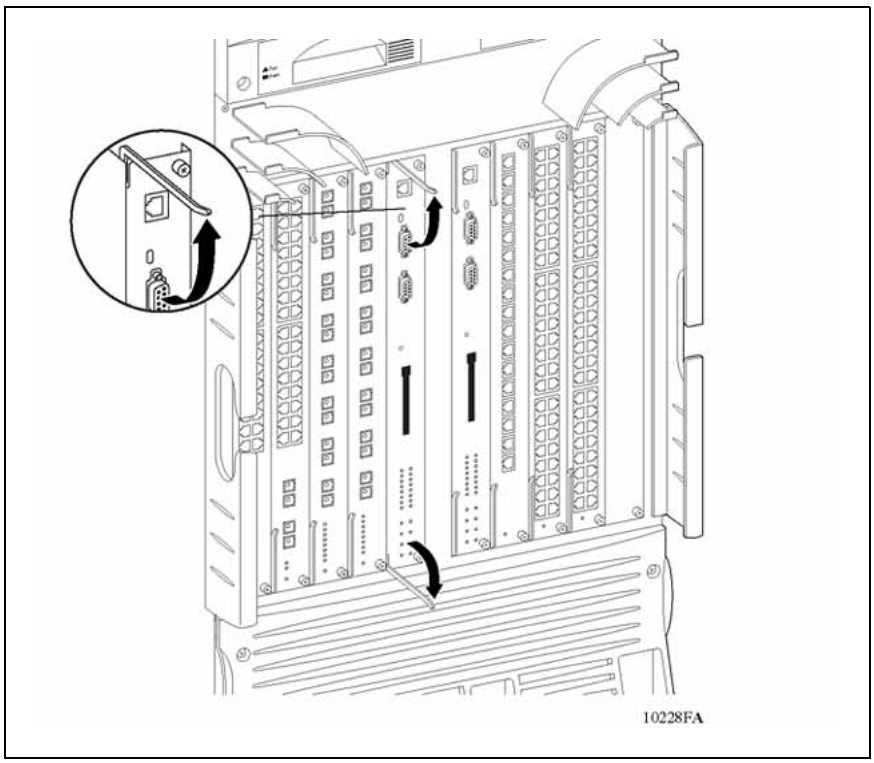


**Figure 41**
**Ejecting the module from the chassis: 8010co chassis**




4 Slide the module out of the chassis (Figure 42 "Removing a module: 8003, 8006, and 8010 chassis" (page 89) or Figure 43 "Removing a module: 8010co chassis" (page 89)).


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**Figure 42**
**Removing a module: 8003, 8006, and 8010 chassis**

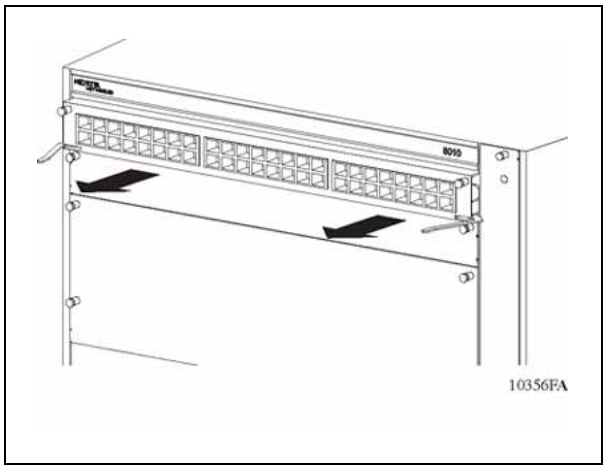
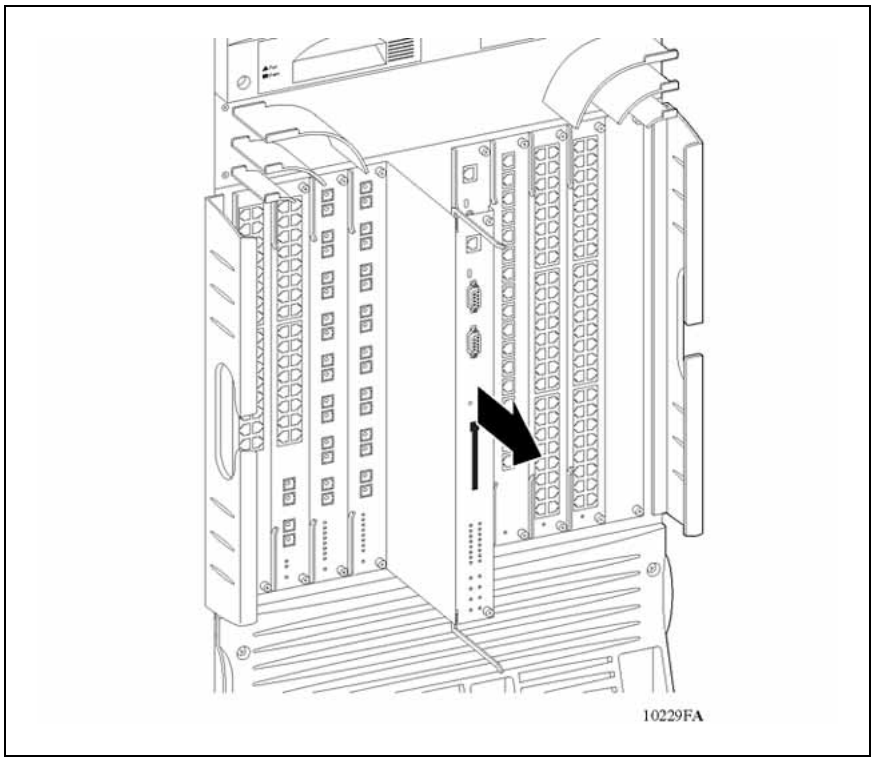



**Figure 43**
**Removing a module: 8010co chassis**




**5** If you are installing a replacement module, go to the next section. Otherwise, install a filler panel (see "Installing a filler panel" (page 75)).

**—End—**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## Installing a module

You can install an Ethernet Routing Switch 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 an Ethernet Routing Switch 8600 chassis is reset to factory defaults.

**CAUTION**
Electrostatic discharge can damage hardware. Review the antistatic precautions on "Installing and replacing a module" (page 84).

To install an Ethernet Routing Switch 8600 module:

| Step | Action |
|---|---|
| 1 | Locate the slot where you want to install the module. |
| 2 | Remove the installed module or the filler panel.<br>For instructions, see "Removing a module" (page 85) or "Removing a filler panel" (page 74). |
| 3 | Make sure that the insert/extract levers are extended away from the front of the module (see Figure 40 "Ejecting the module from the chassis: 8003, 8006, and 8010 chassis" (page 88) or Figure 41 "Ejecting the module from the chassis: 8010co chassis" (page 88)). |
| 4 | Slide the module into the slot using the slot module guides (Figure 44 "Installing a module: 8003, 8006, and 8010 chassis" (page 90) or Figure 45 "Installing a module: 8010co chassis" (page 91)). |

**Figure 44**
**Installing a module: 8003, 8006, and 8010 chassis**

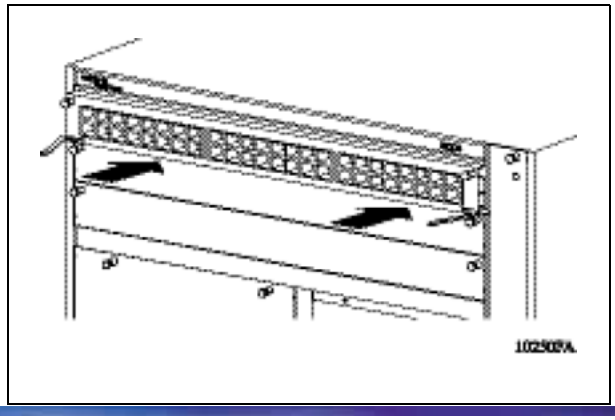


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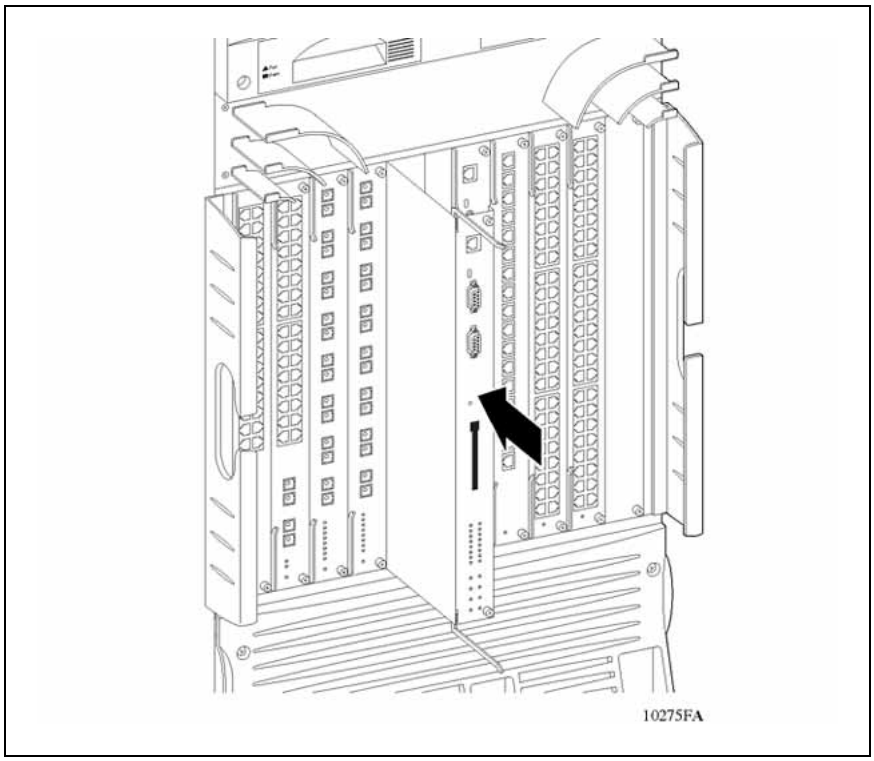
**Figure 45**
**Installing a module: 8010co chassis**




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 46 "Seating the backplane connectors: 8003, 8006, and 8010 chassis" (page 91) or Figure 47 "Seating the backplane connectors: 8010co chassis" (page 92)).

**Figure 46**
**Seating the backplane connectors: 8003, 8006, and 8010 chassis**

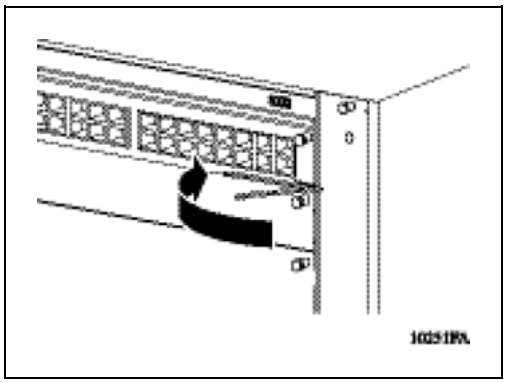



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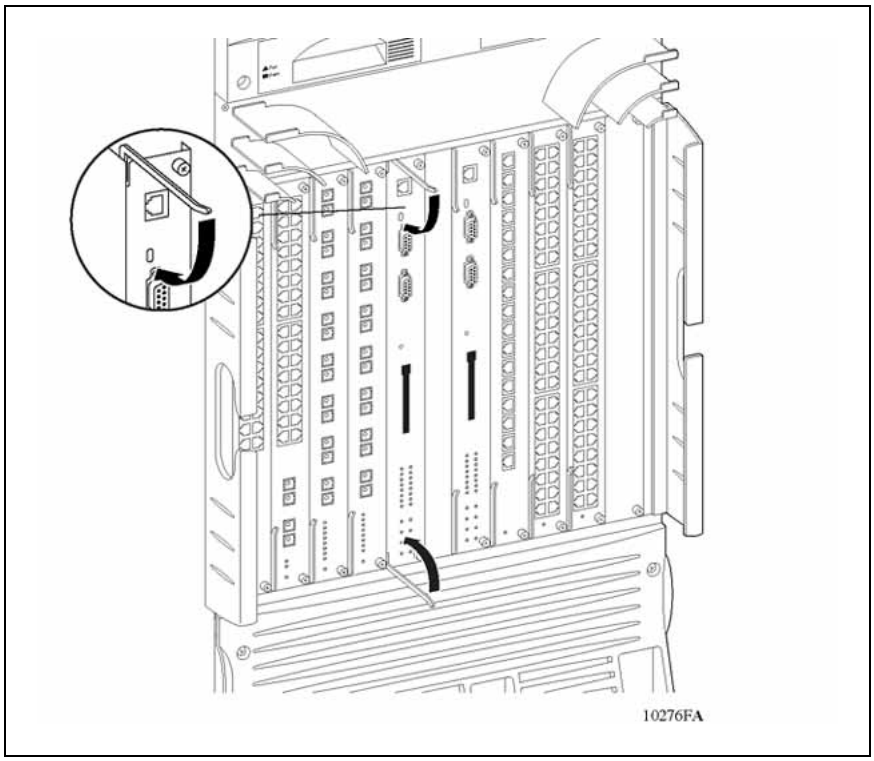
**Figure 47**
**Seating the backplane connectors: 8010co chassis**




7 Using a Phillips screwdriver, tighten the 2 captive screws to secure the module to the chassis (Figure 48 "Securing the module in the chassis: 8003, 6006, and 8010 chassis" (page 92) or Figure 49 "Securing the module in the chassis: 8010co chassis" (page 93)).

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

**Figure 48**
**Securing the module in the chassis: 8003, 6006, and 8010 chassis**

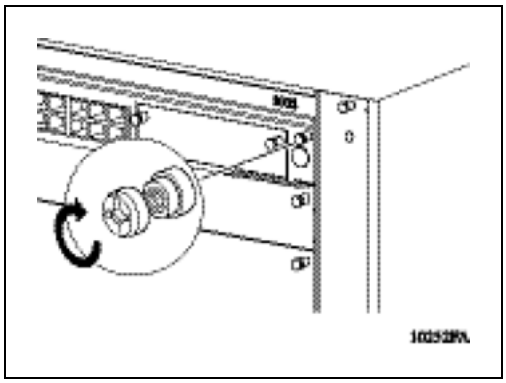



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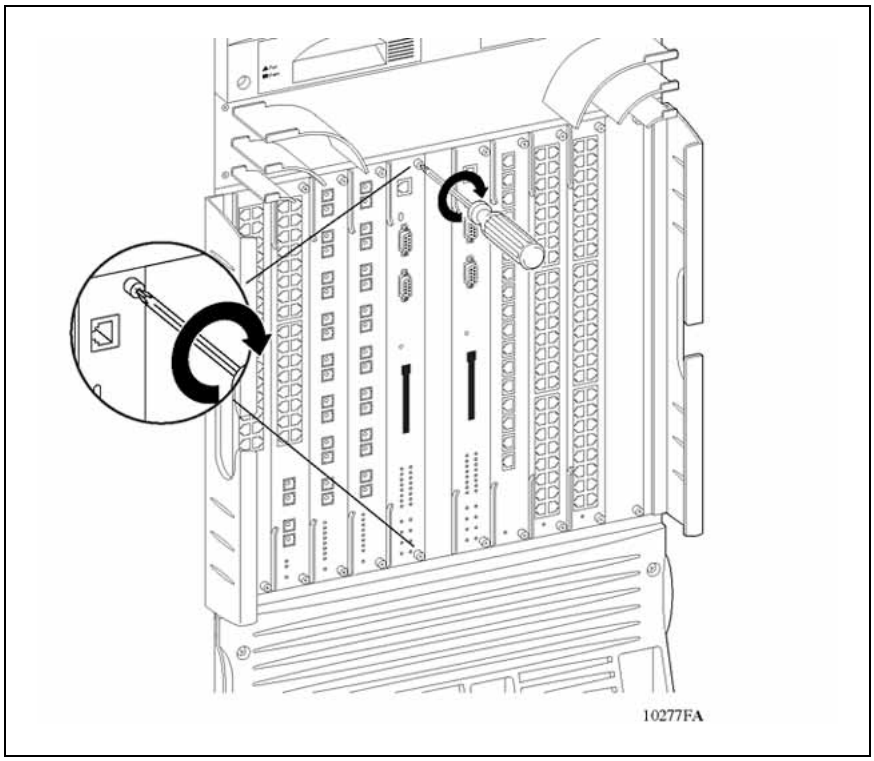
**Figure 49**
**Securing the module in the chassis: 8010co chassis**




**—End—**

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" (page 93)
- "Connecting a modem to the switch" (page 94)
- "Connecting communications cables to the Ethernet Routing Switch 8600" (page 96)

## Connecting a PC or terminal to the switch

You use Device Manager or the command line interface (CLI) to customize your Ethernet Routing Switch 8600 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 or 8692SF 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: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| Step | Action |
|---|---|

1 Turn on and configure the terminal or a communications port on the PC, using the parameters in Table 27 "PC and terminal parameters" (page 94).

See the PC or terminal user manual for instructions.

**Table 27**
**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 or 8692SF module.

3 Attach the 9-pin plug end of the cable to the serial communications port on the back of the PC or terminal.

**—End—**

## 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 or 8692SF module using a serial cable.

To connect a modem to the Ethernet Routing Switch 8600:

| Step | Action |
|---|---|

1 Turn on and configure the modem, using the parameters in Table 28 "Modem settings" (page 94).

See the modem documentation for instructions.

**Table 28**
**Modem settings**

| Setting | Value |
|---|---|
| Clear to send (CTS) signal | On |
| Data terminal ready (DTR) signal | Modem can only connect if the DTR signal is present. If the DTR signal is not present, the modem disconnects. |


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| Setting | Value |
|---|---|
| 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 or 8692SF 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.

**—End—**

## 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.

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 operate at 100 Mb/s.


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| Step | Action |
|---|---|
| 1 | To connect a UTP cable to the management port, Insert the cable into the RJ-45 receptacle connector on the 8691SF or 8692SF module. |

**—End—**

## Connecting communications cables to the Ethernet Routing Switch 8600

Gather the communications equipment and cables that you attach to the Ethernet Routing Switch 8600 modules. If you do not have the proper cables, contact your network administrator. Table 29 "Connectors and cables for Ethernet Routing Switch 8600" (page 96) lists the cable requirements for the Ethernet Routing Switch 8600.

**Table 29**
**Connectors and cables for Ethernet Routing Switch 8600**

| Module | Connector | Recommended cable type | Minimum cable length | Maximum cable length |
|---|---|---|---|---|
| 8608GBE or 8608GBM 1000 Mb/s Ethernet | Duplex SC fiber optic connector or RJ-45 copper connector | Depends on installed GBIC model; for specifications, see "GBICs" (page 113) | — | Depends on installed GBIC model; for specifications, see "GBICs" (page 113) |
| 8608GTE or 8608GTM 1000BASE-T | 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 | Duplex SC | 62.5 µm multimode fiber optic cable | — | 722 ft (220 m) @ 160 MHz-km bandwidth<br>902 ft (275 m) @ 200 MHz-km bandwidth |
| | | 50 µm multimode fiber optic cable | — | 1640 ft (500 m) @ 400 MHz-km bandwidth<br>1804 ft (550 m) @ 400 MHz-km bandwidth |


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| Module | Connector | Recommended cable type | Minimum cable length | Maximum cable length |
|---|---|---|---|---|
| 8616GTE 1000BASE-T | 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) |
| 8616SXE 1000BASE-SX | MT-RJ | 62.5 µm multimode fiber optic cable | — | 722 ft (220 m) @ 160 MHz-km bandwidth<br>902 ft (275 m) @ 200 MHz-km bandwidth |
| | | 50 µm multimode fiber optic cable | — | 1640 ft (500 m) @ 400 MHz-km bandwidth<br>1804 ft (550 m) @ 400 MHz-km bandwidth |
| 8624FXE 100BASE-FX | MT-RJ | 62.5 µm multimode fiber optic cable | — | 6562 ft (2 km) for 62.5 µm MMF full-duplex links or 4264 ft (1.3km) for 50 µm MMF full-duplex links. |
| 8630GBR 1000 Mb/s Ethernet | SFP | Depends on installed SFP model; for specifications, see *Installing SFP and XFP Transceivers and GBICs* | — | Depends on installed SFP model; for specifications, see *Installing SFP and XFP Transceivers and GBICs* |
| 8632TXE or 8632TXM | Duplex SC 1000 Mb/s Ethernet | Depends on installed Gigabit Ethernet transceiver model; for specifications, see "GBICs" (page 122) | — | Depends on installed Gigabit Ethernet transceiver model; for specifications, see "GBICs" (page 122) |
| | RJ-45 wired as MDI-X 10/100 Mb/s Ethernet | EIA Category 3, 4, or 5 UTP for 10 Mb/s operation; EIA Category 5 UTP required for 100 Mb/s operation | — | 328 ft (100 m) |


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| Module | Connector | Recommended cable type | Minimum cable length | Maximum cable length |
|---|---|---|---|---|
| 8648GTR 10/100/1000 Mb/s Ethernet | RJ-45 | EIA Category 5 UTP | Depends on installed XFP model; for specifications, see *Installing SFP and XFP Transceivers and GBICs*. | 328 ft (100 m) |
| 8648TXE or 8632TXM 10/100 Mb/s Ethernet | 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 | — | 328 ft (100 m) |
| 8672ATME OC-3 or 8672ATMM OC-3 | MT-RJ | 9/125 µm single mode fiber optic cable | — | 9.3 mi (15 km) |
| | MT-RJ | 62.5/125 µm multimode fiber optic cable | — | 1.24 mi (2 km) |
| 8672ATME OC-12 or 8672ATMM OC-12 | Duplex SC | 9/125-µm single mode fiber optic cable | — | 9.3 mi (15 km) |
| | Duplex SC | 62.5/125 µm multimode fiber optic cable | — | 1640 ft (500 m) |
| 8672ATME DS-3 or 8672ATMM DS-3 | BNC | 75 ohm coaxial cable | — | 450 ft (137 m) |
| 8681XLR 10GBASE-LR | Duplex SC | 9/125 µm single mode fiber optic cable | — | 10 km |
| 8681XLW 10GBASE-LW | Duplex SC | 9/125 µm single mode fiber optic cable | — | 10 km |
| 8683POSM OC-3 | MT-RJ | 9/125 µm single mode fiber optic cable | — | 9.3 mi (15 km) |
| | MT-RJ | 62.5/125 µm multimode fiber optic cable | — | 1.24 mi (2 km) |
| 8683POSM OC-12 | Duplex SC | 9/125-µm single mode fiber optic cable | — | 9.3 mi (15 km) |
| | Duplex SC | 62.5/125 µm multimode fiber optic cable | — | 1640 ft (500 m) |


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| Module | Connector | Recommended cable type | Minimum cable length | Maximum cable length |
|---|---|---|---|---|
| 8683XLR 10GBASE-LR | Duplex LC | Depends on installed XFP model; for specifications, see *Installing SFP and XFP Transceivers and GBICs*. | — | Depends on installed XFP model; for specifications, see *Installing SFP and XFP Transceivers and GBICs*. |
| 8683XZR 10GBASE-R | Duplex LC | Depends on installed XFP model; for specifications, see *Installing SFP and XFP Transceivers and GBICs* | — | Depends on installed XFP model; for specifications, see *Installing SFP and XFP Transceivers and GBICs* |
| 8691SF | RJ-45 Ethernet Management port | EIA Category 3, 4, or 5 UTP for 10 Mb/s operation; EIA Category 5 UTP required for 100 Mb/s operation | — | 328 ft (100 m) |
| | DB-9 Serial ports | RS-232 | | |
| 8692SF | RJ-45 Ethernet Management port | EIA Category 3, 4, or 5 UTP for 10 Mb/s operation; EIA Category 5 UTP required for 100 Mb/s operation | — | 328 ft (100 m) |
| | DB-9 Serial ports | RS-232 | | |

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.

## Managing cables for the 8000 Series chassis

The 8000 Series chassis ship with cable management brackets. The cable management brackets keep groups of cable clusters fastened and out of the way, but accessible for maintenance.


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To facilitate card installation and removal, bundle the cables for each slot. Connect, label, and bundle the cables for each module together, and then use velcro straps or sheet fiber wrapped around the cables to organize them along the entire cable path before you connect cables to another module. Secure the velcro straps or sheet fiber to brackets with lacing cord or tie wrap.

To manage cables for the 8000 Series chassis:

| Step | Action |
|---|---|
| 1 | Connect the appropriate cable to the module. |
| 2 | Route the cable up to the appropriate cable management bracket and channel (Figure 50 "Managing cables: 8010co chassis" (page 101) and Figure 51 "Managing cables: 8010, 8006, 8003 chassis" (page 102)). |


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**Figure 50**
**Managing cables: 8010co chassis**

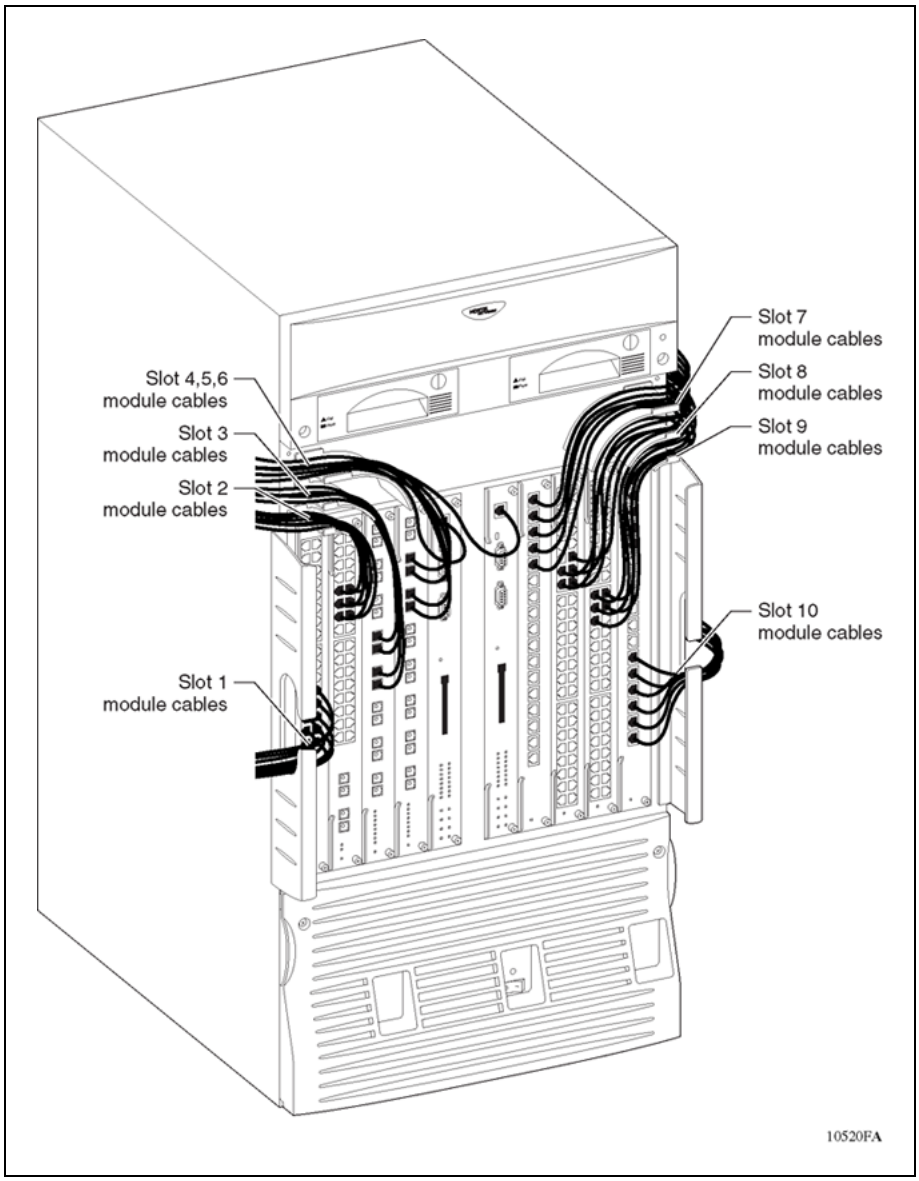



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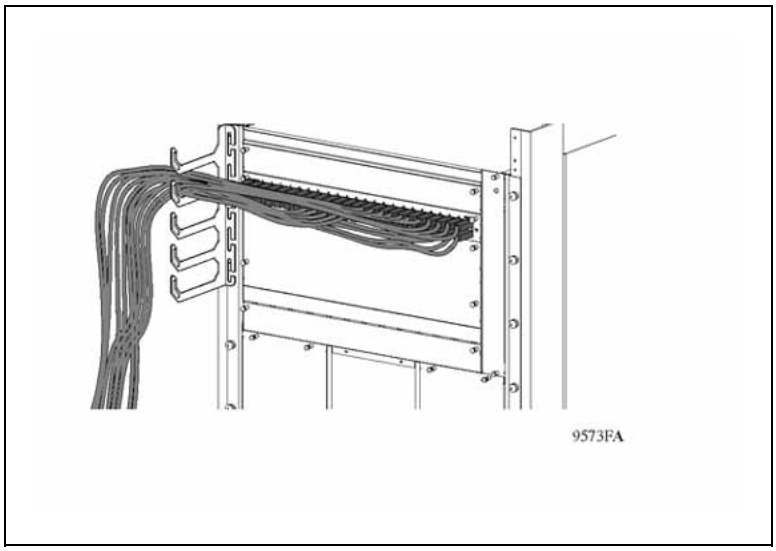
**Figure 51**
**Managing cables: 8010, 8006, 8003 chassis**




3 Route the cable to the termination panel, loosely fastening it with velcro straps or sheet fiber along the path.

4 Fasten the connector onto the termination panel end of the cable. Use the instructions supplied with the connector. If you are using cables manufactured by Nortel, the connectors are already fastened to predetermined lengths of cable.

5 Label the unconnected end of the cable with the node identifier (from site records) and the shelf, cage, slot, and port number.

6 When all the transmitting cables from the same module are connected to the termination panel, use velcro straps or sheet fiber wrapped around the cables to manage them.

7 Using a scissors, cut a section of the sheet fiber that is wide enough to wrap around the cables.

8 Using a scissors, round the corners of the sheet fiber section.

9 Loosely wrap the sheet fiber and secure it using lacing cord or tie wraps (Figure 52 "Wrapping cables with sheet fiber and securing with lacing cord" (page 103)).


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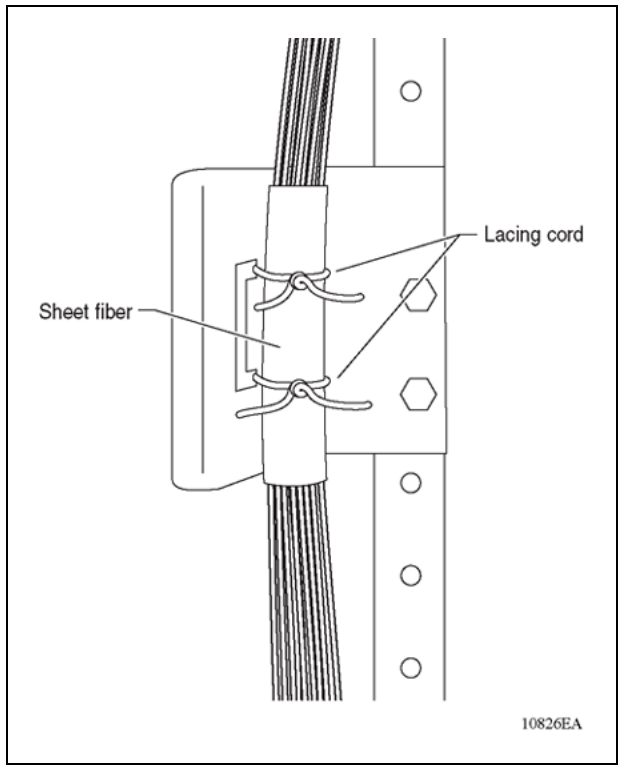
**Figure 52**
**Wrapping cables with sheet fiber and securing with lacing cord**




**10** Secure the velcro straps or sheet fiber to brackets with lacing cord or tie wraps.

**—End—**

## Initializing the 8672ATME, 8672ATMM, and 8683POSM modules

If you have installed a 8672ATME, 8672ATMM, or 8683POSM module with at least one MDA into a Ethernet Routing Switch 8600 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 30 "Image filenames for 8672ATME/8672ATMM/8683POSM" (page 103) for a list of image filenames.

**Table 30**
**Image filenames for 8672ATME/8672ATMM/8683POSM**

| module | Image filename |
|---|---|
| 8672ATME | p80t4100.dld |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| module | Image filename |
|---|---|
| 8672ATMM | p80t4100.dld |
| 8683POSM | p80p4100.dld |

For more information about the PCMCIA slot and the 8691SF or 8692SF module, refer to "PCMCIA card slot" (page 66) (8691SF) or "PCMCIA card slot" (page 72) (8692SF).

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, and 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/p80t4100.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 53 "Unsuccessful download screen output" (page 105).


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**Figure 53**
**Unsuccessful download screen output**

```
Copyright (c) 2005 Nortel, Inc.
CPU Slot 5:     PPC 745 Map B
Version:        4.1.0.0/083
Creation Time: Nov 5 2005, 17:51:07
Hardware Time: DEC 03 2005, 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/p80a4100b086.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 REL4.1.0.0_B086
Copyright (c) 1996-2005 Nortel, 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[12/03/05 14:58:21] HW INFO Card inserted: Slot=5 Type=8690SF
CPU5[12/03/05 14:58:21] HW INFO Card inserted: Slot=1 Type=8648TX
CPU5[12/03/05 14:58:21] HW INFO Card inserted: Slot=4 Type=8672ATME
CPU5[12/03/05 14:58:21] HW INFO Card inserted: Slot=8 Type=8662SAM
CPU5[12/03/05 14:58:21] HW INFO Card inserted: Slot=10 Type=8661SAM
CPU5[12/03/05 14:58:21] HW INFO Initializing 8690SF in slot #5...
CPU5[12/03/05 14:58:21] HW INFO Initializing 8648TX in slot #1...
CPU5[12/03/05 14:58:21] HW INFO Initializing 8672ATME in slot #4 ...
CPU5[12/03/05 14:58:24] ATM ERROR Couldn't find an ATM download image!
(File name: /flash/p80t4100.dld or /pcmcia/p80t4100.dld)
Slot 4 ATM card is put offline!
CPU5[12/03/05 14:58:41] HW INFO Initialization of card failed for Slot 4 !
CPU5[12/03/05 14:58:41] HW INFO Initializing 8662SAM in slot #8 ...
CPU5[12/03/05 14:58:43] HW INFO Initializing 8661SAM in slot #10 ...
CPU5[12/03/05 14:58:50] SW INFO Loading configuration from /flash/config.cfg
CPU5[12/03/05 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.

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

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



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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 *Installing and Maintaining the Ethernet Routing Switch 8600 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*.

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, and 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.
```


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If you see this message, contact a service representative.

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

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

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 *Installing and Maintaining the Ethernet Routing Switch 8600 Chassis*.

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

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.


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# Appendix Ethernet Routing Switch 8600 module technical specifications

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



## General specifications

### Supported standards



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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


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Shock/bump:
IEC 68-2-27/29
**Performance specifications (64-byte packets)**

Aggregate throughput:
maximum 384 Mpps

Routing and switching
10 Mb/s: 14,880 pps maximum

forwarding rates:
100 Mb/s: 148,810 pps maximum

1000 Mb/s: 1,488,100 pps maximum

10 Gb/s: 8x1,488,100 pps maximum

Latency:
Minimum 10 microseconds
**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). Some entries are reserved for system use.

R modules:
256,000 table entries per system (when configured for R mode)
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 later)


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64 to 9600 bytes (8608GBE, 8608GBM, 8608GTE, 8608GTM, 8681XLW, 8681XLR modules only with Release 3.3 or later)

64 to 9600 bytes (8630GBR, 8648GTR, 8683XLR, and 8683XZR with Release 4.0 or later)

| **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<br>CE Mark |
| Electromagnetic susceptibility: | EN55024:1998/CISPR 24:1997 |

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

The Gigabit Ethernet transceivers installed in the 8608GBE and 8608GBM modules must also meet the standards listed in the preceding table. In addition, the Gigabit Ethernet transceivers are certified to FDA requirement 21 CFR, section 1, Subsection 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)


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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) |

The advertised range listed in Table 31 "Gigabit Ethernet standard maximum distance ranges" (page 114) represent the minimum and maximum distances attainable using high quality fiber. The range varies depending on attenuation and dispersion. Nortel recommends a fiber loss analysis for each run of cable to determine actual achievable distances.


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After the fiber and connector losses are determined, Nortel suggests that you use a 3 dB safety margin when you determine maximum attainable link lengths. For more information about the modules, see Installing SFP and XFP Transceivers and GBICs.

**Table 31**
**Gigabit Ethernet standard maximum distance ranges**

| Transceiver | Fiber | Advertised Range | Average Optical Transmit Power | Average Receiver Sensitivity (min.) |
|---|---|---|---|---|
| 1000BASE-SX 850 nm | 62.5 µm 160 MHz-km MMF | 2 to 220 m[2] | -9.5 to -4 dBm | -17 dBm |
| 1000BASE-SX 850 nm | 62.5 µm 200 MHz-km MMF | 2 to 275 m[3] | -9.5 to -4 dBm | -17 dBm |
| 1000BASE-SX 850 nm | 50 µm 400 MHz-km MMF | 2 to 500 m | -9.5 to-4 dBm | -17 dBm |
| 1000BASE-SX 850 nm | 50 µm 500 MHz-km MMF | 2 to 550 m[4] | -9.5 to-4 dBm | -17 dBm |
| 1000BASE-LX 1300 nm | 62.5 µm 500 MHz-km MMF | 2 to 550 m[5] | -5.2 to 0 dBm | -22 dBm |
| 1000BASE-LX 1300 nm | 50 µm 400 MHz-km MMF | 2 to 550 m[5] | -5.2 to 0 dBm | -22 dBm |
| 1000BASE-LX 1300 nm | 50 µm 500 MHz-km MMF | 2 to 550 m[5] | -5.2 to 0 dBm | -22 dBm |
| 1000BASE-LX 1300 nm | 9 µm SMF | 2 to 10000 m | -5.2 to 0 dBm | -22 dBm |
| 1000BASE-XD 1550 nm | 9 µm SMF | Up to 50 km | -5.2 to 0 dBm | -24 dBm |
| 1000BASE-ZX 1550 nm | 9 µm SMF | Up to 70 km | 0 to 5.2 dBm | -22 dBm |
| 1000BASE-APD 1550 nm | 9 µm SMF | Up to 96 km[6] | +2 to +6 dBm | -28 dBm |

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 is proposed for addition to ISO/IEC 11801
5. Using LX optics on multimode fiber can require the use of DMD-compensating patch cords


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

### 1000BASE-T GBIC

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

## 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 32 "Pin assignments: 8608GTE/8608GTM module port" (page 116))

**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)


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### Port connectors

The ports on the 8608GTE and 8608GTM modules are RJ-45 ports wired as shown in Table 32 "Pin assignments: 8608GTE/8608GTM module port" (page 116).

**Table 32**
**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**


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Duplex SC

| Cable specifications | |
|---|---|
| Type: | 62.5 µm or 50 µm multimode fiber optic cable |
| Maximum distance: | 62.5 µm multimode fiber optic cable:<br>722 ft (220 m) @ 160 MHz-km bandwidth<br>902 ft (275 m) @ 200 MHz-km bandwidth<br>50 µm multimode fiber optic cable:<br>1640 ft (500 m) @ 400 MHz-km bandwidth<br>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<br>Maximum launch power: -4 dBm |
| Receiver characteristics: | Minimum receiver sensitivity: -17 dBm<br>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:


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100 W maximum

Thermal rating:
344 Btu/hr maximum
**MTBF rating**
147,602 hr
**Connector type**
RJ-45 (see Table 33 "Pin assignments: 8616GTE module port" (page 118))
**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 33 "Pin assignments: 8616GTE module port" (page 118).

**Table 33**
**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)


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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)


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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: -19 dBm

Maximum optical power: -14 dBm

Receiver characteristics:
Minimum receiver sensitivity: -34 dBm

Maximum input power: -14 dBm

## 8630GBR module

**Physical specifications**

Height:
1.5 in. (3.8 cm)


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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:
180 W maximum

Thermal rating:
614 Btu/hr maximum
**MTBF rating**
177,525 hr
**Connector type**
SC (fiber) or RJ-45 (copper)

### Gigabit Ethernet SFP transceivers

| | |
|---|---|
| **Physical specifications** | |
| Height: | 0.53 in. 13.4 mm |
| Width: | 0.33 in. 8.5 mm |
| Depth: | 2.22 in 54.4 mm |
| Weight: | Varies with transceiver type |
| **Connector type** | Multimode fiber optic: LC or MT-RJ<br>single mode fiber optic: LC |

## 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**


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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 "GBICs" (page 122).
**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 "GBICs" (page 122).

### GBICs

| | |
|---|---|
| **Physical specifications** | |
| Height: | 12 mm |
| Width: | 30 mm |
| Depth: | 65 mm |
| Weight: | Varies with transceiver type |
| **Connector type** | Duplex SC |

See Table 31 "Gigabit Ethernet standard maximum distance ranges" (page 114) for a list of Gigabit Ethernet standard minimum distance ranges.

### 1000BASE-T transceiver

| | |
|---|---|
| **Cable specifications** | |
| Type: | Category 5 copper unshielded twisted pair (UTP) |
| Maximum distance: | 328 ft (100m) |

## 8648GTR modules

**Physical specifications**

Height:


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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:
180 W maximum

Thermal rating:
614 Btu/hr maximum

**MTBF rating**

190,803 hr

**Connector type**

RJ-45 connector (see Table 34 "Pin assignments: 8648GTR module port" (page 123))

**Cable specifications**

Type:
Category 3, 4, or 5 for 10 Mb/s operation.

Category 5 or better UTP cable for 100 Mb/s and 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 8648GTR module are RJ-45 ports (Table 34 "Pin assignments: 8648GTR module port" (page 123)).

**Table 34**
**Pin assignments: 8648GTR 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–) |


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| Connector | Pin number | Signal |
|---|---|---|
| | 7 | Bidirectional Data D + (BI_DD+) |
| | 8 | Bidirectional Data D – (BI_DD–) |

## 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 35 "Pin assignments: 8648TXE/8648TXM module port" (page 125))

**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)


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### Port connectors

The ports on both the 8648TXE and 8648TXM modules are RJ-45 ports wired as MDI-X connectors (Table 35 "Pin assignments: 8648TXE/8648TXM module port" (page 125)).

**Table 35**
**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**


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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:


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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


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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**


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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


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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

## 8683XLR module

**Physical specifications**

Height:
1.5 in. (3.8 cm)

Width:
15.4 in. (39.1 cm)

Depth:
18.5 in. (47.0 cm)


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Weight:
8.0 lb (3.6 kg)
**Electrical specifications**

Input power:
180 W maximum

Thermal rating:
614 BTU/hr maximum
**MTBF rating**
184,230 hr
**Data Rate and encoding**
10.3125 Gb/s with 64b/66b encoding
**Compatible with STM-64**
No
**module Performance**
**(64 byte packets)**

Aggregate throughput
3 x 14,880,952 pps

Routing and Switch Forwarding Rates
14,880,952 pps
**Connector type**
LC Duplex
**Port type**
10GBASE-R

### XFPs

| | |
|---|---|
| **Physical specifications** | |
| Height: | 12.5 mm |
| Width: | 18.35 mm |
| Depth: | 71.1 mm |
| Weight: | Varies with XFP type |
| **Connector type** | Dependent on GBIC, XFP, or SFP |

## 8683XZR module

**Physical specifications**

Height:
1.5 in. (3.8 cm)

Width:
15.4 in. (39.1 cm)


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Depth:
18.5 in. (47.0 cm)

Weight:
8.0 lb (3.6 kg)
**Electrical specifications**

Input power:
180 W maximum

Thermal rating:
614 BTU/hr maximum
**MTBF rating**
184,230 hr
**Data Rate and encoding**
10.3125 Gb/s (LAN) or 9.953 Gb/s (WAN) with 64b/66b encoding
**Compatible with STM-64**
No
**module Performance**
**(64 byte packets)**

Aggregate throughput
3 x 14,880,952 pps

Routing and Switch Forwarding Rates
14,880,952 pps
**Connector type**
LC Duplex
**Port type**
10GBASE-R/W

### XFPs

**Physical specifications**

| | |
|---|---|
| Height: | 12.5 mm |
| Width: | 18.35 mm |
| Depth: | 71.1 mm |
| Weight: | Varies with XFP type |
| **Connector type** | Dependent on GBIC, XFP, or SFP |

## 8691SF module

**Physical specifications**

Height:
1.5 in. (3.8 cm)

Width:


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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 36 "Pin assignments: 8691SF module Management port" (page 134))

Console port:
DB-9 connector (see Table 37 "Pin assignments: 8691SF module Console port" (page 134))

Modem port:
DB-9 connector (see Table 38 "Pin assignments: DTE to DCE" (page 135))
**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.


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Table 36 "Pin assignments: 8691SF module Management port" (page 134) shows the pin assignments for this connector.

**Table 36**
**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 |

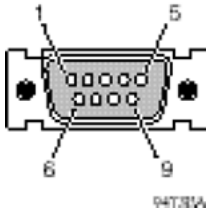
## Console serial port

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 37 "Pin assignments: 8691SF module Console port" (page 134) lists the pin assignments for the Console port for both the DTE and DCE settings.

**Table 37**
**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) |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### 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 38 "Pin assignments: DTE to DCE" (page 135) describes the required cable pin assignments.

**Table 38**
**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**


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213,454 hr
**Connector types**

Ethernet Management port:
RJ-45 connector wired as MDI (see Table 39 "Pin assignments: 8692SF module Management port" (page 136))

Console port:
DB-9 connector (see Table 40 "Pin assignments: 8692SF module Console port" (page 137))

Modem port:
DB-9 connector (see Table 41 "Pin assignments: DTE to DCE" (page 138))
**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 39 "Pin assignments: 8692SF module Management port" (page 136) shows the pin assignments for this connector.

**Table 39**
**Pin assignments: 8692SF 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 |




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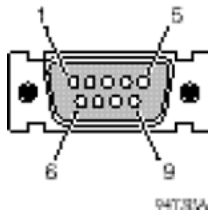
## Console serial port

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 40 "Pin assignments: 8692SF module Console port" (page 137) lists the pin assignments for the Console port for both the DTE and DCE settings.

**Table 40**
**Pin assignments: 8692SF 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.


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Table 41 "Pin assignments: DTE to DCE" (page 138) describes the required cable pin assignments.

**Table 41**
**Pin assignments: DTE to DCE**

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


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# Appendix Installing the Enterprise enhanced CPU daughter card

This appendix describes how to install the optional Enterprise enhanced CPU daughter card (hereinafter referred to as the daughter card or SuperMezz) on the 8692SF CPU module. The Enterprise enhanced CPU daughter card is only supported on the 8692SF CPU module.

The Enterprise enhanced CPU daughter card is a mezzanine daughter card for the 8692SF module. The daughter card consists of dual 1 GHz Power PC processors. Installing the daughter card on an 8692SF module offloads processor intensive tasks from the 333 MHz processor located on the 8692SF CPU motherboard.

With Ethernet Routing Switch 8600 Release 4.1, the daughter card provides decreased convergence times for large forwarding tables.

In a system with two Ethernet Routing Switch 8692SF CPU modules, you must install an 8692SF CPU daughter card on both of the 8692SF modules.

**CAUTION**
Electrostatic discharge can damage hardware. Follow the procedures in this section to protect your equipment from damage.

The 8692SF CPU module is sensitive to static electricity. Be aware that electrostatic discharge from your clothing or other fixtures around you, even at levels that do not create a spark, can cause damage to the module components.

To prevent static discharge damage:

- Always place each module on a grounded antistatic mat until you are ready to perform the upgrade, or leave the module in the sealed ESD bag.


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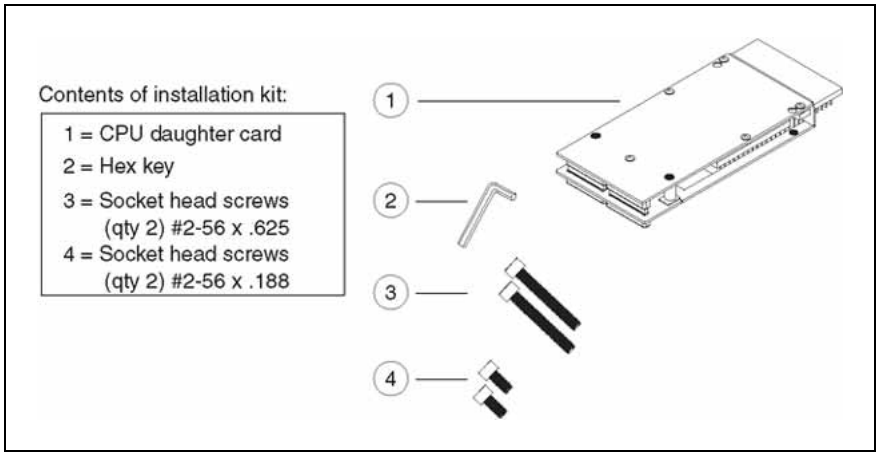
- Always wear a static discharge leash, or an antistatic wrist strap, to free yourself of electrostatic charges before you touch a module.

To install the CPU daughter card:

| Step | Action |
|---|---|
| 1 | Locate the CPU daughter card installation kit and remove the CPU daughter card and installation hardware (Figure 54 "CPU daughter card installation kit" (page 140)).<br><br>The CPU daughter card ships from the factory with included hardware. Be sure your shipment includes all of the items shown in Figure 54 "CPU daughter card installation kit" (page 140). |

**Figure 54**
**CPU daughter card installation kit**




| Step | Action |
|---|---|
| 2 | Remove the 8692SF CPU from the chassis (refer to "Installing and replacing a module" (page 84)). |
| 3 | Pick up the CPU daughter card. |
| 4 | Align the CPU daughter card connectors with the connectors on the 8692SF CPU (Figure 55 "Aligning the CPU daughter card connectors" (page 141)). |


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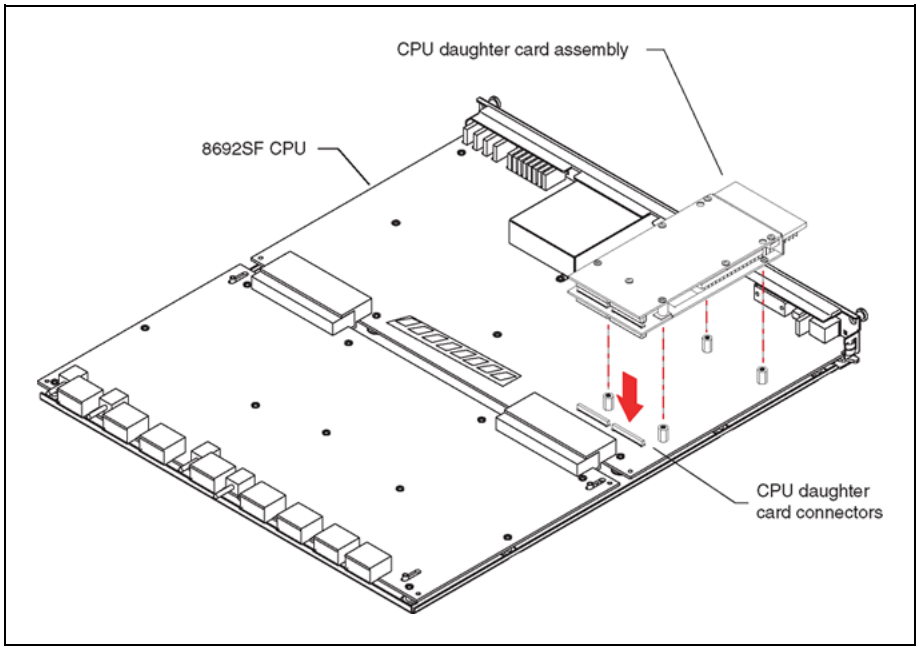
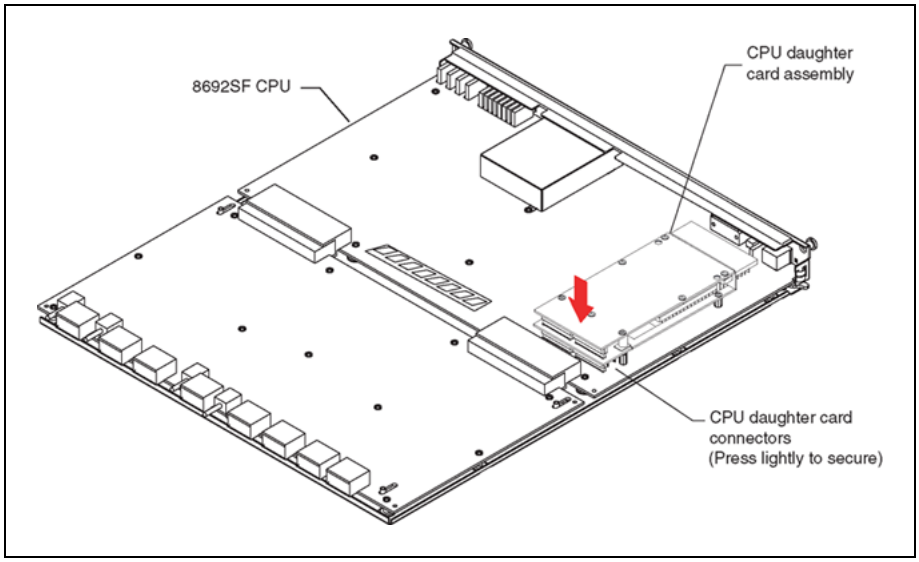
**Figure 55**
**Aligning the CPU daughter card connectors**




5 Press the CPU daughter card assembly into the connectors on the 8692SF CPU (Figure 56 "Mounting the CPU daughter card assembly to the 8692SF CPU" (page 141)).

Make sure that the CPU daughter card is properly seated in the connectors.

**Figure 56**
**Mounting the CPU daughter card assembly to the 8692SF CPU**





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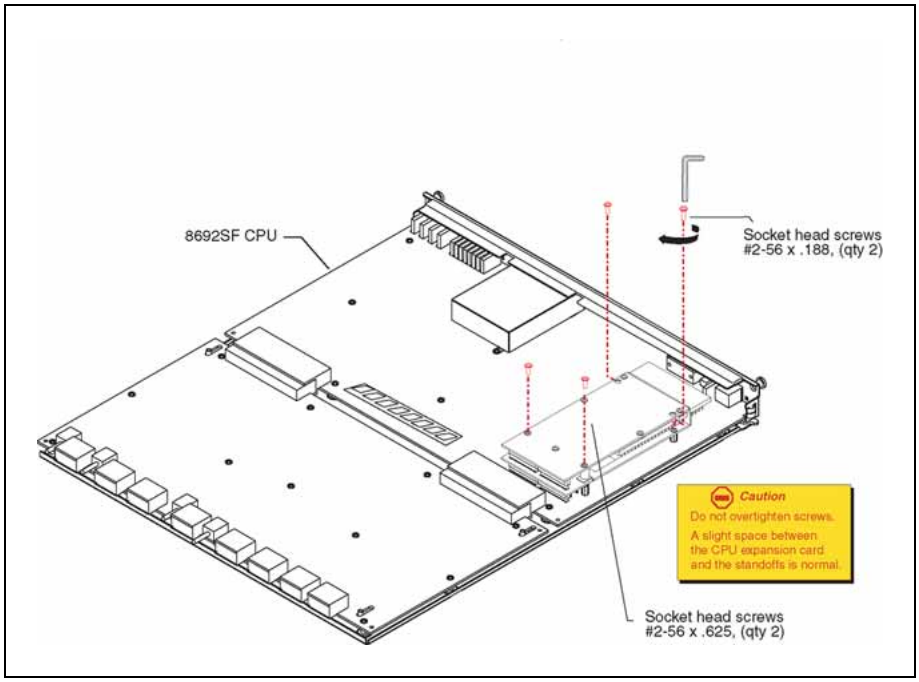
6 Using the hex key, secure the Mezzanine card to the 8692SF CPU using four socket head screws (items 3 and 4 in the installation kit) Figure 57 "Securing the CPU daughter card to the 8692SF CPU" (page 142).

Install the #2-56 x .625 screws first. See Figure 57 "Securing the CPU daughter card to the 8692SF CPU" (page 142) for correct screw placement. Install the #2-56 x .188 screws second. These shorter screws must be inserted in the oval holes in the sheet metal mezzanine card bracket and not through the mezzanine card. After the screw is placed in the hole, insert the hex key through the mezzanine card hole to secure the screw in place.

Do not overtighten the screws. It is normal for a slight space to be visible between the CPU daughter card and the CPU standoffs.

**Figure 57**
**Securing the CPU daughter card to the 8692SF CPU**




7 Replace the 8692SF (with the newly installed CPU daughter card attached) into the vacant chassis slot (refer to "Installing and replacing a module" (page 84)).

After you reinstall the 8692SF CPU into the chassis, refer to the appropriate chassis and component installation guide to power up the chassis and verify a successful installation.

**—End—**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# Index

## Symbols/Numerics





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## A



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## P



## R



## S



## T



## U




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Nortel Ethernet Routing Switch 8600

# Installing Ethernet Routing Switch 8600 Modules

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