Product Brief

Passport 8000

8600 Series Routing Switch Modules

Passport 8600 Series Features and Benefits

- High Availability
- Operational Simplicity
- Low Cost of Ownership
- Open IP Environment

The Passport* 8600 Routing Switch modules deliver wire-speed switching and routing over copper and fiber media. The Passport 8600 Routing Switch modules support a high-performance Layer 2 and Layer 3 switching architecture that delivers 128 Gbps of switching capacity for high-performance application support today, scaling to 256 Gbps in the future. Wire-speed switching and routing between any two ports on the switch is performed with latency less than 10µs, making the Passport 8600 the ideal platform for deploying eBusiness and Internet Telephony applications in an Open IP environment. All 8600 Routing Switch modules feature Express Classification (XC), embedded hardware-based filtering for security and traffic classification, for wire-speed Layer 2, Layer 3 and Layer 4 policy services.

In combination with the Passport 8100 series Edge Switch modules and the Passport 700 server switches, the Passport 8600 Routing Switch modules are ideal for Enterprise backbones and server farms. One software license per 8600 chassis is required.

Switch Management

The 8690SF module (see Figure 1) is optimized for high-performance switching of Layer 2 and Layer 3 traffic. The on-board CPU performs independent learning of unknown devices and topology updates so that the switch fabric is dedicated to switching critical application

Figure 1: Passport 8600 series Switch Fabric/CPU Module.

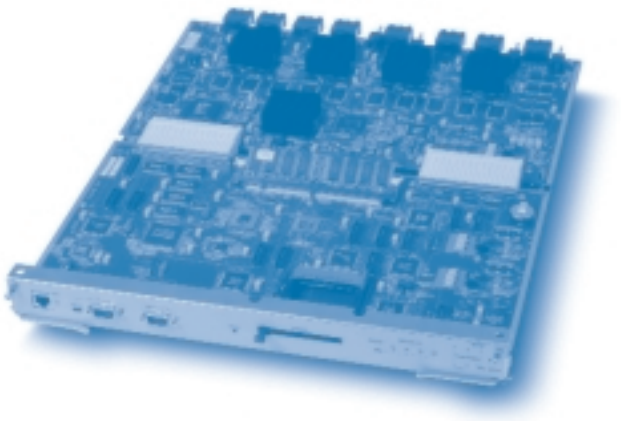

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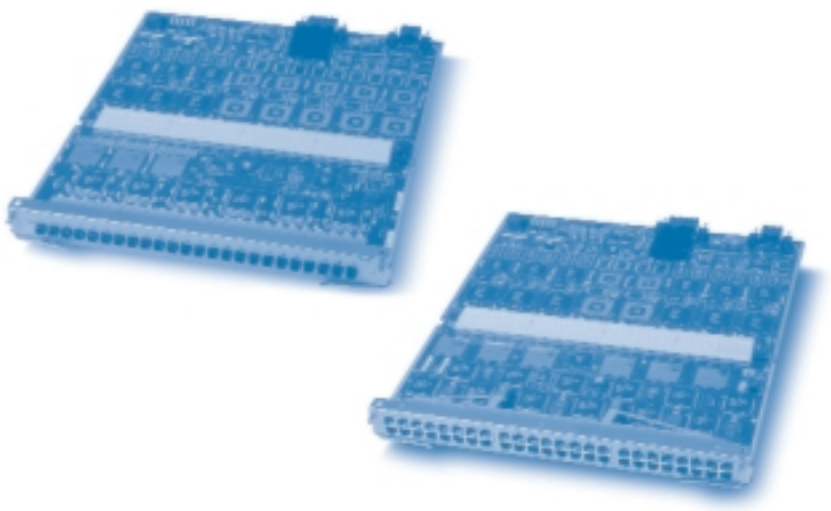
Figure 2: Passport 8600 series Fast Ethernet Routing Switch Modules.



traffic. Two 8690SF modules can be installed for optimum performance and reliability. Both switch fabrics are used for traffic forwarding, doubling performance, and one CPU acts as the master software control engine. In the event of a SF/CPU failure, traffic is switched via the remaining SF/CPU module and control is passed to the secondary CPU automatically, in less than one second.

The SF/CPU module provides a console port (DTE/DCE switch selectable) and modem port using DB-9 pin connectors; a PCMCIA slot for ATA type cards and a 10/100 Ethernet port for management.

The SF/CPU module has LEDs to indicate temperature, power supply and fan tray status, CPU/SF master/secondary status, CPU and Switch Fabric utilization, and management port link and speed.

In addition to one or two SF/CPU modules, up to eight 8600 series Routing Switch modules can be installed in the Passport 8000 10-slot chassis and up to four modules in the 6-slot chassis.

Fast Ethernet

The two Fast Ethernet Routing Switch modules for the Passport 8600 are the 8648TX module and the 8624FX module (see Figure 2). These provide high availability, high port density and operational simplicity for LAN server farms and high-end policy-enabled wiring closets.

The 8648TX module provides 48 autosensing 10/100 Mbps ports for server and desktop connectivity using RJ-45 connectors. It is optimized for high-density server farms and high-end wiring closets, delivering cost-effective 10/100 switching and routing.

The 8624FX module provides 24 100 Mbps ports for riser and inter-switch connections using mini MT-RJ connectors. It is optimized for Fast Ethernet risers and long distance switch inter-connection over multi-mode fiber, delivering up to 1.6 Gbps of bandwidth in a single trunk using distributed Multi-Link Trunking. Both modules support Express Classification (XC) for wire-speed Layer 2, Layer 3 and Layer 4 policy services.

Each module has LEDs to indicate port status and activity, and additional LEDs to indicate module power and diagnostic status. The 8648TX module has LEDs to indicate port speed.

Gigabit Ethernet

The Passport 8600 series Gigabit Ethernet Routing Switch modules are IEEE 802.3z standards-compliant and deliver wire-speed switching and routing over both multi-mode and single-mode fiber media.

The 8608SX module provides eight 1000 Mbps ports for server and inter-switch connectivity using SC connectors. It is optimized for high-density server farms and building risers, delivering cost-effective wire-speed Gigabit switching and routing using multi-mode fiber.

Table 1: Maximum port densities for the Passport 8010 and 8006 chassis.

Module and Interface Type	No. of Interfaces per module	Maximum No. of Interfaces per Chassis	
		Passport 8006 6-slot chassis	Passport 8010 10-slot chassis
8648TX Routing Switch module 10/100 BASE-TX (RJ45)	48	192	384
8624FX Routing Switch module 100 BASE-FX (Mini MT-RJ)	24	96	192
8608SX Routing Switch module 1000 BASE-SX (SC)	8	32	64
8608GBIC Routing Switch module 1000 BASE-SX/LX/XD GBICs (SC)	8	32	64

The 8-port 8608GBIC Routing Switch module (see Figure 3) uses plug-in Gigabit Interface Converters (GBICs) with SC connectors for customers wishing to "mix and match" interface types on a single module. They are available in shortwave (SX), longwave (LX) and extended distance (XD and ZX). The 8608GBIC module is optimized for LAN backbones and server farms, enabling long-distance switch interconnection over multi-mode or single-mode fiber.

Both modules deliver up to 16 Gbps of bandwidth in a single trunk using distributed Multi-Link Trunking and also support Express Classification (XC) for wire-speed Layer 2, Layer 3 and Layer 4 policy services.

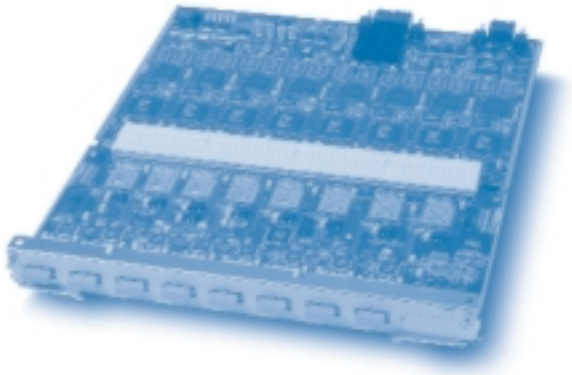
Each module has LEDs to indicate port status and activity and additional LEDs to indicate power and diagnostic status.

Table 1 shows the connectivity types and maximum port density that can be supported in both the 6-slot and 10-slot chassis.

Future support for 16-port Gigabit Ethernet modules will enable density to scale to 128 ports in the 10-slot chassis and 64 ports in the 6-slot chassis.

Future releases will provide for Gigabit Ethernet over copper media, using IEEE 802.3ab compliant 1000BASE-T modules.

Figure 3: Passport 8600 series Gigabit Ethernet Routing Switch Modules (8608SX).



Features and Benefits

High Availability

- Redundant Switch Fabrics, with active load-balancing and automatic failover to eliminate any single point of failure.
- Hot-swap for all modules and chassis components.
- Enhanced Spanning Tree FastStart reduces convergence time on Layer 2 links.
- Distributed Multi-Link Trunking (MLT) delivers scalable, fail-safe riser, backbone and server connectivity with trunks distributed across multiple modules for improved resilience.
- Virtual Router Redundancy Protocol (VRRP) provides load-balancing and automatic recovery from default gateway failure.
- Equal Cost Multi-Path (ECMP) routing for OSPF backbones provides load-balancing and fast recovery from router or trunk failures in future software release.

Operational Simplicity

- Switch capacity of 128 Gbps, easily upgradeable to 256 Gbps in the future.
- Hardware support for up to 32,000 forwarding and filtering entries per switch.
- IEEE 802.3u 10/100 auto-negotiation for automatic speed and duplex setting.
- Non-blocking, wire-speed switching and routing for Ethernet, Fast Ethernet and Gigabit Ethernet.
- Express Classification (XC) — wire-speed filtering for security and policy services, based on Layer 2, 3 or 4 information.
- Multi-Link Trunking (MLT) increases riser, backbone and server scalability by aggregating 2 to 8 ports to form a single high-performance link of up to 16 Gbps capacity.
- Internet Group Management Protocol (IGMP) snooping and pruning, plus DVMRP multicast routing provides efficient control of Multicast traffic, with hardware scaling to 16,000 multicast groups
- Port, Protocol, MAC address and IP Subnet-based VLANs provides broadcast containment and separation of network traffic.
- 802.1Q VLAN tagging enables multiple VLANs be carried over a single riser trunk.
- Brouter support enables Layer 2 switching of legacy protocols like AppleTalk and DECnet while routing IP and IPX on the same port.
- 802.1p prioritization enables Class of Service (CoS) support for critical business applications.
- IP DiffServ support, with 8 hardware queues per port and Weighted Round Robin (WRR) queuing provides support for policy-based networking.
- Four groups of Remote Network Monitoring (RMON) per port.
- Conversation steering for local monitoring and troubleshooting or for use with Optivity* web-enabled StackProbes for full RMON2 management.
- Configuration using Command Line Interface (CLI) and Device Manager/VLAN Manager, common to all Passport products.

Low Cost of Ownership

- Future-proof chassis with built-in support for many different technologies.
- Web-based Optivity device and network management
- Support for Optivity end-to-end policy management
- Optimized solution for carrying Internet Telephony

Technical Specifications

Table 2: Technical specifications for the Passport 8690SF Switch Fabric/CPU module.

System Electrical Specifications	
Line Frequency	47 to 63 Hz
MTBF rating	119,047 hrs
Module Microprocessor	PowerPC 740
Module Memory	
Processor DRAM	64MB
Flash Memory	16MB
Module Electrical Specifications	
Input Power	100W (max)
Thermal Rating	340 BTU/hr
Module Physical Dimensions	1.5 in. (H) x 15.4 in. (W) x 18.5 in. (D) [3.8 cm (H) x 39.1 cm (W) x 47.0 cm (D)]
Module Weight	
lb (kg)	9 lbs (4 kgs) approx
Environmental Specifications	
Operating Temperature	5° to 40° C
Storage Temperature	-25° to 70° C
Operating Humidity	85% maximum relative humidity, non-condensing
Storage Humidity	95% maximum relative humidity, non-condensing
Operating Altitude	10,000 ft (3,000 m) maximum
Storage Altitude	10,000 ft (3,000 m) maximum
Free Fall/Drop	ISO 4180-s, NSTA 1A
Vibration	IEC 68-2-6/34
Shock/Bump	IEC 68-2-27-29

Table 2: Technical specifications for the Passport 8690SF Switch Fabric/CPU module (continued).

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	CNS13438, Class A
	EN 55 022 (CISPR 22:1985), Class A
	CE Mark
Electromagnetic Susceptibility	EN 50082-1,1992
Safety Agency Approvals	UL Listed (UL 1950)
	CUL CSA 22.2 #950
	CB with all national deviations
	NOM NOM -019-SCFI 1994

Technical Specifications

Table 3: Technical specifications for the Passport 8648TX and 8624FX Fast Ethernet Routing Switch modules.

System Electrical Specifications	
Line Frequency	47 to 63 Hz
MTBF Ratings	
8648TX	107,411 hrs
8624TX	132,749 hrs
Module Performance Specifications (64 byte packets)	
Aggregate System Throughput	96 Mpps
Switched 10 Mbps Port Forwarding Rate	14,880 pps
Switched 100 Mbps Port Forwarding Rate	148,810 pps
Latency for minimum packet length at 100 Mbps	10µ Sec

Table 3: Technical specifications for the Passport 8648TX and 8624FX Fast Ethernet Routing Switch modules (continued).

Network Protocol and Standards Compatibility	IEEE 802.3 CSMA/CD (ISO/IEC 8802-3) IEEE 802.3i 10BASE-T (ISO/IEC 8802-3) IEEE 802.3u 100BASE-T (ISO/IEC 8802-3) IEEE 802.1D MAC Bridges (ISO/IEC 10038)
Data Rate and Encoding	10 Mbps Manchester encoding 100 Mbps 4B/5B encoding
Module Memory	
Processor DRAM	64MB
Flash Memory	16MB
Module Electrical Specifications	
Input Power	100W (max)
Thermal Rating	340 BTU/hr
Module Physical Dimensions	1.5 in. (H) x 15.4 in. (W) x 18.5 in. (D) [3.8 cm (H) x 39.1 cm (W) x 47.0 cm (D)]
Module Weight	
lb (kg)	9 lbs (4 kgs) approx
Environmental Specifications	
Operating Temperature	5° to 40° C
Storage Temperature	-25° to 70° C
Operating Humidity	85% maximum relative humidity, non-condensing
Storage Humidity	95% maximum relative humidity, non-condensing
Operating Altitude	10,000 ft (3,000 m) maximum
Storage Altitude	10,000 ft (3,000 m) maximum
Free Fall/Drop	ISO 4180-s, NSTA 1A
Vibration	IEC 68-2-6/34
Shock/Bump	IEC 68-2-27-29

Table 3: Technical specifications for the Passport 8648TX and 8624FX Fast Ethernet Routing Switch modules (continued).

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	CNS13438, Class A
	EN 55 022 (CISPR 22:1985), Class A
	CE Mark
Electromagnetic Susceptibility	EN 50082-1,1992
Safety Agency Approvals	UL Listed (UL 1950)
	CUL CSA 22.2 #950
	CB with all national deviations
	NOM NOM -019-SCFI 1994

Technical Specifications

Table 4: Technical specifications for the Passport 8608SX and 8608GBIC Gigabit Ethernet Routing Switch modules.

System Electrical Specifications	
Line Frequency	47 to 63 Hz
MTBF Rating	96,609 hrs
Module Performance Specifications (64 byte packets)	
Aggregate System Throughput	96 Mpps
Switched 1000 Mbps Port Forwarding Rate	1,488,100 pps
Latency for minimum packet length at 100 Mbps	10µ Sec

Table 4: Technical specifications for the Passport 8608SX and 8608GBIC Gigabit Ethernet Routing Switch modules (continued).

Network Protocol and Standards Compatibility	IEEE 802.3 CSMA/CD (ISO/IEC 8802-3) IEEE 802.1D MAC Bridges (ISO/IEC 10038) IEEE 802.3z 1000BASE-SX and 1000BASE-LX
Data Rate and Encoding	1000 Mbps 8B/10B encoding
Gigabit Link Power Budget	
1000BASE-SX	7.5dB
1000BASE-LX MultiMode Fiber	7.5dB
1000BASE-LX SingleMode Fiber	8.0dB
Gigabit Cabling Distance Specification (minimum)	
1000BASE-SX on MultiMode Fiber (50 µm)	550 m
1000BASE-SX on MultiMode Fiber (62.5 µm)	275 m
1000BASE-LX on MultiMode Fiber (50 µm)	550 m
1000BASE-LX on MultiMode Fiber (62.5 µm)	550 m
1000BASE-LX on SingleMode (9 µm)	5 km
1000BASE-XD on SingleMode (9 µm)	50 km
Module Memory	
Processor DRAM	64MB
Flash Memory	16MB
Module Electrical Specifications	
Input Power	100W (max)
Thermal Rating	340 BTU/hr
Module Physical Dimensions	1.5 in. (H) x 15.4 in. (W) x 18.5 in. (D) [3.8 cm (H) x 39.1 cm (W) x 47.0 cm (D)]

Table 4: Technical specifications for the Passport 8608SX and 8608GBIC Gigabit Ethernet Routing Switch modules (continued).

Module Weight	
lb (kg)	9 lbs (4 kgs) approx
Environmental Specifications	
Operating Temperature	5° to 40° C
Storage Temperature	-25° to 70° C
Operating Humidity	85% maximum relative humidity, non-condensing
Storage Humidity	95% maximum relative humidity, non-condensing
Operating Altitude	10,000 ft (3,000 m) maximum
Storage Altitude	10,000 ft (3,000 m) maximum
Free Fall/Drop	ISO 4180-s, NSTA 1A
Vibration	IEC 68-2-6/34
Shock/Bump	IEC 68-2-27-29
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	CNS13438, Class A
	EN 55 022 (CISPR 22:1985), Class A
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Electromagnetic Susceptibility	EN 50082-1,1992
Safety Agency Approvals	UL Listed (UL 1950)
	CUL CSA 22.2 #950
	CB with all national deviations
	NOM NOM -019-SCFI 1994

Ordering Information

Table 5: Ordering information for the Passport 8600 Routing Switch modules.

Order Number	Product Name	Description
DS1402001	Passport 8010	10-Slot Chassis incl. 2 fan trays and backplane
DS1402002	Passport 8006	6-Slot Chassis incl. 1 fan tray and backplane
DS1405?01**	Passport 8001	Power Supply: 110/220 V AC
DS1405002	Passport 8002	Power Supply: 48 V DC
DS1404001	Passport 8690SF	Routing Switch Switch Fabric/CPU module
DS1404002	Passport 8648TX	48-port 10/100 Ethernet Routing Switch module (RJ45)
DS1404005	Passport 8624FX	24-port 100BASE-FX Fast Ethernet Routing Switch module (MT-RJ)
DS1404003	Passport 8608SX	8-port 1000BASE-SX Gigabit Ethernet Routing Switch module (SC)
DS1404015	Passport 8608 GBIC	8-port Gigabit Ethernet Routing Switch module (requires one or more GBICs – see below)
AA1419001	1000BASE-SX GBIC	1-port 1000BASE-SX GBIC (SC) for MultiMode fiber
AA1419002	1000BASE-LX GBIC	1-port 1000BASE-LX GBIC (SC) for MultiMode and SingleMode fiber
AA1419003	1000BASE-XD GBIC	1-port 1000BASE-XD GBIC (SC) for SingleMode fiber up to 50 km
AA1419004	1000BASE-ZX GBIC	1-port 1000BASE-ZX GBIC (SC) for SingleMode fiber up to 70 km
DS1410003-3.0		Software for the Passport 8600 series Routing Switch modules

** The seventh character (?) of the AC Power Supply order number MUST be replaced with the proper code to indicate desired product nationalization: "A" – No power cord included. "B" – European "Schuko" power cord common in Austria, Belgium, Finland, France, Germany, The Netherlands, Norway and Sweden. "C" – Power cord commonly used in the United Kingdom and Ireland. "D" – Power cord commonly used in Japan. "E" – North American power cord. "F" – Australian power cord, also commonly used in New Zealand and the People's Republic of China.

Acronym Glossary

CLI Command Line Interface
CoS Class of Service
CPU Central Processor Unit
DVMRP Distance Vector Multicast Routing Protocol
ECMP Equal Cost Multi-Path routing
GBIC Gigabit Interface Converter
IEEE Institute of Electrical and Electronic Engineers
IGMP Internet Group Management Protocol
LAN Local Area Network
LED Light-Emitting Diode
MAC Media Access Control
MLT Multi-Link Trunking
RMON Remote Network Monitoring
SF Switch Fabric
STP Spanning Tree Protocol
VLAN Virtual LAN
VRRP Virtual Router Redundancy Protocol
WRR Weighted Round Robin queuing
XC Express Classification

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