BROCADE FASTIRON SUPERX FAMILY

ENTERPRISE LAN SWITCHING

High Performance, Intelligent Switches For Total Network Convergence

HIGHLIGHTS

- Industry-leading, chassis-based convergence solution provides a scalable, secure, low-latency and fault-tolerant infrastructure for cost-effective deployment of Voice over IP (VoIP), wireless, and high-capacity data services throughout the enterprise

- The Brocade SuperX™ family features an N+1 power redundancy design to enhance power operation and simplify system configuration

- A rich suite of security features including IP source guard, dynamic Address Resolution Protocol (ARP) inspection, and DHCP snooping shields the enterprise from internal and external threats

- Highest Class 3 PoE capacity in the industry—The FastIron SX 1600 scales to 36 10-GE and 384 POE ports of 10/100/1000 Mbps, each capable of delivering 15.4 watts to provide customers with a convergence-ready infrastructure that will scale to support future growth

- Combined SP/WRR queuing and cell-based switch fabric ensure low latency and jitter for voice and video traffic

- Intelligent PoE and configuration management with LLDP, LLDP-MED and PoE Prioritization for IP Phones

- Redundant architecture and resilient protocols ensure business continuity in the event of network or equipment failure(s)

- Embedded, hardware-based sFlow™ traffic monitoring enables network-wide accounting, utilization reporting, capacity planning, intrusion detection, and more

- Advanced IronWare™ Layer 2 Ethernet switching with robust suite of security capabilities

- Flexibility option to upgrade the software to full Layer 3, including support for IP routing protocols such as RIPv1/v2, OSPF, BGP, and support for multicast routing

- IronShield™ 360 intrusion protection delivers dynamic and real-time protection from network and host-based attacks

Businesses continue to strive to be competitively superior and demand network infrastructures be resilient, secure, and do more with less. As requirements to protect, optimize, and grow the enterprise have extended from basic connectivity to a much higher level of intelligent service-based infrastructures, the network has evolved to provide an even greater value to the organizations. The Brocade® FastIron® SuperX/SX family of PoE-ready Layer 2/Layer 3 switches provides a superior scalable foundation for better operational efficiency and faster response to business opportunities today and into the future.

The FastIron SuperX/SX family extends control from the network edge to the backbone with intelligent network services, including superior quality of service (QoS), predictable performance, advanced security, comprehensive management, and integrated resiliency. Additionally, the FastIron SuperX/SX family offers compatibility in a common operating system, and a shared interface and power supply modules reduce the cost of ownership by minimizing operational expenses and improving return on investment (ROI).

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The FastIron SuperX/SX family has an extensive feature set, making it well suited for real-time collaborative applications, IP telephony, IP video, e-learning, wireless LANs, and raising the organization's productivity. The FastIron SuperX/SX family delivers wire-speed performance and ultra low latency, which are ideal for converged network applications such as VoIP and video conferencing. These platforms present the industry's most scalable and resilient PoE design, with a robust feature set to secure and simplify the deployment of an edge-to-core converged network. In addition, the FastIron SuperX/SX family supports high-density 10 Gigabit Ethernet for enterprise backbone deployments.

In addition, service providers will benefit from the power that IronWare operating system's networking intelligence offers, including advanced Layer 2 services, the Brocade Metro Ring Protocol (MRP) for rapid service restoration in ring-based topologies, VLAN stacking for tunneled VLAN services, and rich bandwidth management for controlling network utilization.

FUTURE-PROOFING THE NETWORK WITH IPV6

Migration to IPv6 is inevitable, but by starting with the deployment of IPv6-capable hardware the transition can be more controlled and less disruptive to the network. Japan and Europe are aggressively deploying IPv6, and deployment in North America is on the rise. In fact, some government agencies are mandating the purchase of IPv6-capable switches and routers. Therefore, it is important that enterprises and service providers plan to deploy IPv6-capable devices to capitalize on this inevitable change.

The Brocade IPv6-capable FastIron SuperX/SX family combined with other Brocade products such as BigIron® and NetIron®, provides the industry's most complete end-to-end IPv6 solution. Customers can deploy the FastIron SuperX/SX family switches knowing it is IPv6-capable hardware today, and that future separately priced software upgrades will support IPv6 routing and advanced IPv6 features tomorrow.

The new IPv6-capable FastIron SuperX/SX family switches enable network managers to future-proof the network to support IPv6. These high performance, IPv6-ready platforms deliver security, convergence, and complete IPv4/IPv6 visibility using embedded sFlow for a robust edge-to-core IPv6 solution. Migration to IPv6 is inevitable. By starting early with the deployment of IPv6-capable hardware, the transition can be more controlled and less disruptive to the network.

CONFIGURATION ALTERNATIVES

The FastIron SuperX/SX family of switches is optimized for flexibility with upgradeability for PoE, redundant management, switch fabric and power, and 10 Gigabit Ethernet. Available in three chassis models, the scalable FastIron SuperX/SX family helps enterprises and service providers reduce costs and gain the operational benefits of a common operating system, a shared interface, and common power supply modules.

The FastIron SuperX

- 8 Interface slots
- Up to 192 Class 3 PoE ports
- N+1 system power redundancy
- N+1 PoE power redundancy

The FastIron SX 800

- 8 interface slots
- Up to 192 Class 3 PoE ports
- N+1 system power redundancy
- N+1 PoE power redundancy
- Management redundancy
- Fabric redundancy

The FastIron SX 1600

- Up to N+3 system power redundancy
- Up to N+3 PoE power redundancy
- Up to 384 Class 3 PoE ports
- Up to 36 10GbE ports
- Management redundancy
- Fabric redundancy

PRIMARY FEATURES AND BENEFITS

Solution Designed for High-Quality and Reliable Network Convergence

The FastIron SuperX/SX family provides a scalable, secure, low-latency, and fault-tolerant infrastructure for cost-effective integration of VoIP, video, wireless access, and high-performance data onto a common network. The system architecture features a scalable and resilient PoE design and a low-latency, cell-based switch fabric with intelligent traffic management to ensure reliable and high-quality VoIP service. A rich suite of security features, including policy-based access control, IP source guard, dynamic ARP inspection, and DHCP snooping, work in unison to control network access and shield the network from internal and external threats. The FastIron SuperX/SX family establishes a new class of convergence-ready solutions, enabling organizations to implement a secure, reliable, scalable, and high-quality infrastructure for total network convergence.

Resilient Power Distribution and Consumption in Support of Green Initiatives

The FastIron SuperX/SX family features a unique power distribution design for the system and PoE power. The chassis are designed with independent systems and PoE power subsystems. This design achieves optimal power operation and configuration, reducing the equipment and ongoing costs, in comparison to

modular systems that use a common power supply for both the systems and the PoE equipment. In the FastIron SuperX/SX family, the power consumption of a line module's PoE circuitry does not impact the system power. Similarly, the power consumption of the line modules, switch modules, and management modules does not impact the PoE power.

Power consumption for the system and PoE are calculated, provisioned, and managed independently of one another. As more PoE devices are added to a switch, a simple power budget calculation determines whether another PoE power supply needs to be added to the switch. The system power distribution and the PoE power distribution subsystems are each designed for M+N load-sharing operation. This dual-distribution power design simplifies the power configuration of the system while enhancing system reliability.

The chassis can be configured for a wide range of power environments including: 110V/220V AC power, -48V DC power and mixed AC/DC power configurations. To scale PoE configurations, PoE power supplies are available in two ratings—1250W and 2500W. When configured with four 2500W PoE supplies, the FastIron SX 1600 supports up to 384 10/100/1000 Mbps Class 3 PoE ports and still maintains N+1 power redundancy. This resiliency is unmatched in the industry.

Intelligent and Scalable Power Over Ethernet (PoE)

PoE is a key enabler of applications such as VoIP, IEEE 802.11 wireless LANs, and IP video. The FastIron SuperX/SX is a third-generation PoE-capable switch family and incorporates the latest advances in PoE provisioning and system design, delivering scalable and intelligent PoE to the enterprise. The PoE power distribution subsystem is independent of the system power,

eliminating system disruption in the event of PoE over-subscription or a PoE power failure. Customers have the choice of purchasing PoE-ready line modules or upgrading 10/100/1000 Mbps line modules when needed with field-installable PoE daughter modules. PoE power per port can be manually or dynamically configured. Dynamic configuration is supported using standards-based autodiscovery or legacy Layer 2 discovery protocols. Port priorities are also configurable and are used to prioritize PoE power in over-subscribed configurations.

Advanced QoS and Low Latency for Enterprise Convergence

The FastIron SuperX/SX family offers superior quality of service (QoS) features that enable network administrators to prioritize high-priority and delay-sensitive services throughout the network. FastIron SuperX/SX switches can classify, re-classify, police, mark, and re-mark an Ethernet frame or an IP packet prior to delivery. This flexibility lets network administrators discriminate among various traffic flows and enforce packet-scheduling policies based on Layer 2 and Layer 3 QoS fields.

Once classified, the traffic is queued and scheduled for delivery. Three configurable queuing options provide the network administrator with flexible control over how the system services the queues. Weighted Round Robin (WRR) queuing applies user-configured weighting for servicing multiple queues, ensuring that even low priority queues are not starved for bandwidth. With Strict Priority (SP) queuing, queues are serviced in priority order ensuring that the highest-priority traffic is serviced ahead of lower priority queues. Combined SP and WRR queuing ensures that packets in the SP queue are serviced ahead of the WRR queues. Combined queuing is often used in VoIP networks where the VoIP traffic is assigned to the SP queue and data traffic is assigned to the WRR queues.

In addition, the switch management modules are available with integrated Gigabit Ethernet or 10-Gigabit Ethernet ports. These modules provide cost-effective system configurations supporting high-capacity connections to upstream switches. The management modules utilize high-performance system processors with high-capacity memory for scalable networking up to a routing capacity of 1 million BGP routes and 20 BGP peers.

The FastIron SuperX/SX switches utilize an advanced cell-based switch fabric with internal flow-control, ensuring very low latency and jitter performance for converged applications.

Ease of Use: Plug and Play

The FastIron SuperX/SX family supports the IEEE 802.1AB LLDP and ANSI TIA 1057 LLDP-MED standards, enabling organizations to build open convergence, advanced multi-vendor networks. LLDP greatly simplifies and enhances network management, asset management, and network troubleshooting. For example, it enables discovery of accurate physical network topologies, including those that have multiple VLANs where all subnets may not be known. LLDP-MED addresses the unique needs that voice and video demand in a converged network by advertising media and IP telephony specific messages that can be exchanged between the network and the endpoint devices. LLDP-MED provides exceptional interoperability, IP telephony troubleshooting, and automatic deployment of policies, inventory management, advanced PoE power negotiation, and E911 location/emergency call service. These sophisticated features make converged network services easier to install, manage, and upgrade and significantly reduce operations costs.

Flexible Bandwidth Management

The FastIron SuperX/SX switches support a rich set of bandwidth management features, allowing granular control of bandwidth utilization. On ingress, extended ACLs can be used in combination with traffic policies to control bandwidth by user, by application, and by VLAN. On egress, outbound rate limiting can control bandwidth per port and per priority queue. These features allow the network operator fine-grained control of bandwidth utilization based on a wide range of application and user criteria.

Complete Solution for Multicast and Broadcast Video

The use of video applications in the workplace requires support for scalable multicast services from the edge to the core. IGMP and PIM snooping improves bandwidth utilization in Layer 2 networks by restricting multicast flows to only those switch ports that have multicast receivers. In Layer 3 networks, support for IGMP (v1, v2, and v3), IGMP Proxy, PIM-SM, PIM-SSM, and PIM-DM multicast routing optimizes traffic routing and network utilization for multicast applications.

Advanced Full Layer 2/Layer 3 Wire-Speed IP Routing Solution

Advanced IronWare supports a full complement of unicast and multicast routing protocols, enabling users to build fully featured Layer 2/Layer 3 networks. Supported routing protocols include RIPv1/v2, OSPF, PIM-SM/DM, BGP, and Equal Cost Multi-path (ECMP) for improved network performance. M2, M3, and M4 management modules can support routing table capacity of up to 1,000,000 BGP routes and 20 BGP peers. FastIron SuperX/SX switches can be upgraded with Advanced IronWare routing software (a Layer 3 upgrade).

To achieve wire-speed Layer 3 performance, the FastIron SuperX/SX switches support Brocade Direct Routing (BDR), in which the forwarding information base (FIB) is maintained in local memory on the line modules. The hardware forwarding tables are dynamically populated by system management with as many as 256,000 routes.

Comprehensive Security Suite

Security is a concern for today's network managers, and the FastIron SuperX/SX switches support a powerful set of network management solutions to help protect the switch. Multilevel access security on the console and a secure Web management interface prevent unauthorized users from accessing or changing the switch configuration. Using Terminal Access Controller Access Control Systems (TACACS/TACACS+) and RADIUS authentication, network managers can enable considerable centralized control and restrict unauthorized users from altering network configurations.

The FastIron SuperX/SX family includes Secure Shell (SSHv2), Secure Copy, and SNMPv3 to restrict and encrypt communications to the management interface and system, thereby ensuring highly secure network management access. For an added level of protection, network managers can use ACLs to control which ports and interfaces have TELNET, Web, and/or SNMP access.

Controlling network access is a top priority for network operators. FastIron SuperX/SX switches support a flexible suite of access control capabilities in the IronShield product. IronShield's network access control features include multi-host IEEE 802.1x and MAC authentication schemes. Upon successful

user or device authentication, the FastIron SuperX/SX switch will apply the appropriate access policy for the user. The access policy may define the assigned VLAN, QoS, and ACL to be applied to the user's traffic. The network administrator can also specify an action in case the MAC or 802.1x authentication times out. Because of its standards-based design, this solution can be augmented with access control software and external appliances for enhanced access control operation. For example, an external NAC appliance and/or software can be used in combination with the FastIron SuperX/SX, providing host posture verification and remediation. This design allows customers the flexibility to build best-of-breed solutions for their access control infrastructure and not be locked into a single offering.

Once the user is permitted access to the network, protecting the user's identity and controlling where the user connects becomes a priority. To prevent "user identity theft" (spoofing), the FastIron SuperX/SX switches support DHCP snooping, Dynamic ARP inspection, and IP source guard. These three features work together to deny spoofing attempts and to defeat man-in-the-middle attacks. To control where users connect, the FastIron SuperX/SX switches support private VLANs, quarantine VLANs, policy-based routing, and extended ACLs, all of which can be used to control a user's access to the network.

In addition, FastIron SuperX/SX switches feature embedded sFlow packet sampling, which provides system-wide traffic monitoring for accounting, troubleshooting, and intrusion detection. Using the Brocade IronView® Network Management (INM)

System to process sFlow data from the switches, IronShield 360 provides closed loop threat detection and response. sFlow packet samples are scanned for known threat signatures. Upon a positive match, INM can automatically send a control command to the FastIron SuperX/SX switch to throttle or disable the port on which the threat has been detected. This advanced security capability provides a network-wide security umbrella without the added complexity and cost of ancillary sensors.

Resilient Design Ensures Business Continuity

A FastIron SuperX/SX networking solution is built for high-value environments. Featuring redundant management modules, redundant fans, redundant load-sharing switch fabrics, and power supply modules, the FastIron SX 800/1600 switches are designed for maximum system availability. Switch fabric failover preserves network connectivity in the event of a switch module failure. Automatic management failover quickly restores network connectivity in the event of a management module failure. In the event of a topology change due to a port or facility failure, Layer 1 and Layer 2 protocols—e.g., Protected Link, Metro Ring Protocol (MRP), IEEE 802.3ad, UDLD, VSRP, and Rapid Spanning Tree Protocol—will restore service in sub-second time (tens to hundreds of milliseconds, depending on the protocol), protecting users from costly service disruption. Enhanced spanning tree features such as Root Guard and BPDU Guard prevent rouge hijacking of spanning tree root and maintain a contention and loop-free environment especially during dynamic network deployments. These high availability capabilities enable network deployments of a highly reliable network infrastructure that is resilient to, and tolerant of, network and equipment failures.

Future-Proofing the Network Through

Deployment of IPv6 Capable Hardware

Networks are in the early stages of large-scale IPv6 production deployment, however few IPv6 innovative applications are currently on the market. Although the success of IPv6 will ultimately depend on the new applications that run over IPv6, a key part of the IPv6 design is the ability to integrate into and coexist with existing IPv4 switches within the network and across networks during the steady migration from IPv4 to IPv6.

The FastIron SuperX Series' IPv6-capable management and interface modules, commencing with software release FSX 04.0.01, support an easy migration path by interworking between IPv4 and IPv6 switches with the existing network or across networks. The network manager can pick and choose which sites are upgraded with IPv6-capable modules, preparing the network for future IPv6 applications

Designed for medium to large enterprise backbones, the IPv6- capable FastIron SuperX Series are modular switches that provide the enterprise network with a complete, end-to-end enterprise LAN solution, ranging from the wiring closet to the LAN backbone.

Benefits of the IPv6-capable modules

include:

- The IPv6-capable FSX management modules are non-blocking, with a built-in switch fabric module and 12 combination Gigabit Ethernet copper or fiber ports that provide connectivity to your existing management network.

- The IPv6-capable FSX 800 and FSX 1600 management modules have a console port and a 10/100/1000 port for out-of-band management. The management modules optionally support 2-port 10-GbE ports or 8-port GbE fiber and copper ports.

- The IPv6-capable FSX 800 and FSX 1600 management modules are interchangeable between devices.

- Redundant management modules on the IPv6-capable FSX 800 and FSX 1600 provide 100% redundancy.

- The crossbar (xbar) architecture enables the management module to switch 30 Gbps between each interface module and within the management module.

- The IPv6-capable interface modules and power supplies are interchangeable among FastIron SuperX Series switches.

- The IPv6-capable FSX 800 and FSX 1600 management, switch fabric, and interface modules are hot swappable, which means a module may be removed and replaced while the chassis is powered on and running.

KEY FEATURES AND BENEFITS

Robust VoIP and Power over Ethernet

- Standards-based IEEE 802.3af PoE supporting a wide variety of endpoints
- Choice of 1250W (70 Class 3) or 2500W (140 Class 3) per PoE power supply
- Independent system and PoE power subsystems allow the addition of PoE without affecting the system power
- High-availability power design—N+1 PoE power redundancy for the 8-slot FastIron SuperX and FSX 800 chassis and N+3 PoE power redundancy for the 16-slot FSX 1600 chassis
- Intelligent PoE power management
- PoE auto-detection enables support for PoE and non-PoE devices without configuration changes
- Software accessible system and per port power consumption
- Configurable per port PoE priority for power allocation
- Proven interoperability with popular voice over IP equipment, including legacy Cisco IP phones
- Advanced QoS and cell-based fabric enable high-quality VoIP service
- Auto-configuration for VoIP endpoints
- Voice VLAN feature automatically places IP phones in their own VLAN
- Auto-detects legacy and standard 802.3af powered devices
- LLDP/LLDP-MED standards greatly simplify and enhance network management, asset management, and network troubleshooting

IronShield Advanced Security

- Multilevel access security for console access
- IronShield 360—sFlow-powered automated closed-loop threat detection and mitigation solution
- Secure Web-based management interface prevents unauthorized users from accessing or changing the switch configuration
- Terminal Access Controller Access Control Systems (TACACS/TACACS+) and RADIUS operator authentication
- Secure Shell, Secure Copy, and SNMPv3 restrict and encrypt communications to the management interface and system
- IEEE 802.1x authentication including multiple device authentication and dynamic policy configuration for authenticated clients—VLAN, ACL
- Private VLANs provide security and isolation between switch ports to help ensure that users cannot snoop on other users' traffic
- Denial of Service Protection—Monitoring, throttling, and locking out of ICMP and TCP SYN traffic both to the management address of the switch and for transit traffic
- IP Source Guard, DHCP Snooping, and ARP Inspection protect against snooping and man-in-the-middle attacks
- Byte-based and packet-based Broadcast, Multicast, and unknown Unicast rate limiting
- ACL log reports provide source detail for denied packets
- ACL-based Port Mirroring enables IP monitoring for CALEA and related law enforcement traffic monitoring
- Enhanced MAC filtering to include Denial of Service protection
- MAC address authentication including multiple device authentication and dynamic policy configuration
- Enhanced Port security for controlling access of authorized users

Advanced Quality of Service

- Classification, reclassification, policing, and marking the traffic prior to delivery
- Identification, classification, and reclassification based on specific criteria (ACL-based) including port, source/destination MAC address
- 802.1p priority bit, source/destination IP address, Type of Service (ToS), Differentiated Services Control Point (DSCP) fields, or the Transmission Control Protocol/User Datagram Protocol (TCP/UDP) port
- Flexible queue servicing utilizing configurable Weighted Round Robin (WRR), Strict Priority (SP), or combined SP/WRR
- 8 hardware queues for flexible QoS management
- Ingress rate limiting—standard and extended ACL control, per VLAN, per port
- Egress rate shaping per port

System and Network Resilience

- Redundant, hot-swappable management modules (FastIron SX 800 and FastIron SX 1600)
- Redundant, hot-swappable switch fabric modules (FastIron SX 800 and FastIron SX 1600)
- Redundant, hot-swappable, load-sharing and distributed power supplies for system and PoE power
- Hot-swappable line modules
- Advanced protocols for topology resilience:
    - The Brocade Metro Ring Protocol (MRP)
    - Virtual Switch Redundancy Protocol (VSRP)
    - Virtual Router Redundancy Protocol (VRRP)
- Enhanced VRRP (VRRPE)
- Rapid Spanning Tree Protocol (RSTP)
- Multiple Spanning Tree (802.1s)
- Per-VLAN Spanning Tree (PVST/PVRST)
- BPDU Guard and Root Guard
- STP Protect
- IEEE 802.3ad and static link aggregation
- UDLD with link error dampening; Support for single instance LACP
- Image checksum verification
- Next Boot Information
- Enhanced Digital Optical Monitoring

IPv6 Futureproofing

The following features enable the switches to be managed as IPv6 hosts or endpoints today:

- IPv6 addresses on the interfaces
- IPv6 debugs
- IPv6 Access Control Lists (ACL) to management ports
- IPv6 Web management using HTTP/HTTPS
- IPv6 logging
- Name-to-IPv6 address resolution using IPv6 DNS server
- IPv6 Ping
- IPv6 Traceroute
- IPv6 Telnet/SSH
- SNMPv3 over IPv6
- IPv6 RADIUS
- IPv6 NTP

BROCADE FASTIRON SUPERX SPECIFICATIONS

IEEE Standards Compliance

- 802.3 10Base-T
- 802.3u 100Base-TX
- 802.3u 100Base-FX
- 802.3u 100Base-LX
- 802.3z 1000Base-SX/LX
- 802.3ab 1000Base-T
- 802.3ae 10-Gigabit Ethernet
- 802.3af Power over Ethernet
- 802.3x Flow Control
- 802.3ad Link Aggregation
- 802.1d Ethernet Bridging
- 802.1D MAC Bridges
- 802.1p/q VLAN Tagging
- 802.1w Rapid Spanning Tree
- 802.1s Multiple Spanning Tree
- 802.1X Port-based Network Access Control
- 802.1Q Generic VLAN Registration Protocol (GVRP)
- 802.3 MAU MIB (RFC 2239)
- 802.3AB LLDP

RFC Compliance

Protocol Support	• DNS Client • RFC 1812 IP Requirements • RFC 2338 VRRP • VRRPE (Brocade VRRP Enhanced) • PVST/PVST+/PVRST
BGPv4	• RFC 1269 BGP-3 MIB • RFC 1657 BGP-4 MIB • RFC 1745 OSPF Interactions • RFC 1771 BGP-4 • RFC 1965 BGP-4 Confederations • RFC 1997 Communities Attribute • RFC 2385 TCP MD5 • Authentication of BGP Session • RFC 2439 Route Flap Dampening • RFC 2796 Route Reflection • RFC 2842 BGP4 Capabilities Advertisement • RFC 2918 Route Refresh Capability
OSPF	• RFC 1583 and 2328 OSPF v2 • RFC 1587 OSPF NSSA Option • RFC 1745 OSPF Interactions • RFC 1765 OSPF Database Overflow • RFC 1850 OSPF Traps • RFC 1850 OSPF v2 MIB • RFC 2154 OSPF w/Digital Signatures (Password, MD-5) • RFC 2178 OSPF v2 • RFC 2370 OSPF Opaque LSA Option
RIP	• RFC 1058 RIP v1 • RFC 1723 RIP v2
IP Multicast	• RFC 1112 IGMP • RFC 2236 IGMP v2 • RFC 3376 IGMP v3 • IGMP Proxy • DVMRP v3-07 • RFC 1075 DVMRP • RFC 1122 Host Extensions • RFC 1256 ICMP Router Discovery Protocol • PIM-DM v1 • RFC 2362 PIM-SM • PIM-SSM

General Routing Protocols	• RFC 768 UDP • RFC 783 TFTP • RFC 791 IP • RFC 792 ICMP • RFC 793 TCP • RFC 826 ARP • RFC 854 TELNET • RFC 894 IP over Ethernet • RFC 903 RARP • RFC 906 TFTP Bootstrap • RFC 1027 Proxy ARP • RFC 1519 CIDR • RFC 1541 and 2131 DHCP • RFC 1591 DNS (client) • RFC 1812 General Routing • RFC 2338 VRRP

Quality of Service

- MAC Address Mapping to Priority Queue
- ACL Mapping to Priority Queue
- ACL Mapping to ToS/DSCP
- ACL Mapping and Marking of ToS/DSCP
- DiffServ Support
- QoS Queue Management Using Weighted Round Robin (WRR), Strict Priority (SP), and a combination of WRR and SP

Management and Control

- RFC 1157 SNMPv1
- RFC 1191 Path MTU Discovery
- RFC 951 BootP
- RFC 1542 BootP Extensions
- RFC 1493 Bridge MIB
- RFC 1215 SNMP Generic Traps
- RFC 1354 IP Forwarding MIB
- RFC 1573 SNMP MIB II
- RFC 1757 RMON Groups 1,2,3,9
- RFC 1905, 1906 SNMPv2c
- RFC 2030 SNTP
- RFC 2068 HTTP
- RFC 2818 HTTPS
- RFC 2138 RADIUS
- RFC 2571 Architecture Describing SNMP Framework
- RFC 3176 sFlow
- RFC 3411 SNMPv3 Framework
- RFC 2570 SNMPv3 Intro to Framework
- RFC 3412 SNMPv3 Processing
- RFC 3414 SNMPv3 USM
- RFC 2574 SNMPv3 User-based Security Model (USM)
- RFC 2573 SNMPv3 Applications
- RFC 2575 SNMP View-based Access Control Model SNMP (VACM)
- RFC 3415 SNMPv3VACM
- RFC 1643 Ethernet-like Interface MIB
- RFC 1354 IP Forwarding Table MIB
- RFC 1213 MIB-II
- RFC 1516 Repeater MIB
- RFC 1724 RIPv2 MIB
- RFC 2572 SNMP Message Processing and Dispatching
- ANSI TIA 1057 LLDP-MED
- TACACS+ v1.78
- MRP (Metro Ring Protocol)
- UDLD (Uni-directional Link Detection)
- IGMP Snooping
- Dynamic Filters and VLAN assignment
- CDP and FDP
- Configuration Logging

System Management

- IronView Network Manager (INM)
- Web-based Graphical User Interface
- Embedded Web Management
- Industry Standard Command Line Interface (CLI)
- RMON HP OpenView for Sun Solaris
- HP-UX, IBM's AIX, and Windows NT
- Virtual Cable Tester
- Repeater MIB

Element Security Options

- Authentication, Authorization, and Accounting (AAA)
- RADIUS
- Secure Shell (SSHv2)
- Secure Copy (SCP)
- TACACS/TACACS+
- Username/Password (Challenge and Response)
- Bi-level Access Mode (Standard and EXEC Level)
- Protection for Denial of Service attacks, such as TCP SYN or Smurf Attacks

Physical Design

- ETSI ETS 300 119-4, Engineering Requirements for Sub-racks in misc. racks and cabinets
- ANSI/EIA-310-D, Cabinets, Racks, Panels, and Associated Equipment

Dimensions

FastIron SuperX and FastIron SX 800	10.4" (H) x 17.5" (W) x 17.3" (D) 26.3 cm (H) x 44.5 cm (W) x 43.8 cm (D)
FastIron SX 1600	24.5" (H) x 17.5" (W) x 17.3" (D) 62.2 cm (H) x 44.5 cm (W) x 43.8 cm (D)

Weight (Fully Loaded)

FastIron SuperX and FastIron SX 800	70 lbs (31 kg)
FastIron SX 1600	196 lbs (88.6 kg)

Environmental

- Operating temperature: 0ºC to 40ºC (32ºF to 104ºF)
- Relative humidity: 5 to 90%, @40ºC (104ºF, non condensing)
- Operating altitude: 6600 ft (2,000 m)
- Storage temperature: -25ºC to 70ºC (-13ºF to 158ºF)
- Storage humidity: 95% maximum relative humidity, non-condensing
- Storage altitude: 15,000 ft (4,500 m) maximum

MTBF

Chassis	• SuperX Chassis, Fan Tray, 1 P/S: 269,386 hrs • SX 800 Chassis, Fan Tray, 1 P/S: 142,786 hrs • SX 800 Chassis, Fan Tray, 2 P/S: 230,584 hrs • SX1600 Chassis, Fan Tray, 2 P/S: 99,908 hrs • SX1600 Chassis, Fan Tray, 4 P/S: 213,865 hrs
Management Modules	• IPv4 Management Module with no optics: 287,664 hrs • IPv4 Management Module, Zero ports: 534,522 hrs • IPv4 Management Module, 2x10-GbE ports: 269,436 hrs • IPv6 Management Module, 256MB SDRAM, no optics: 292,557 hrs • IPv6 Management Module, 512MB SDRAM, no optics: 287,425 hrs • IPv6 Management Module, 2x10GbE, no optics: 304,109 hrs
Interface modules (IPv4 and IPv6 versions)	• 24-port 10/100/1000 Copper Module: 352,103 hrs • 24-port SFP Module: 348,204 hrs • 2-port 10-GbE Module: 464,938 hrs

Power Requirements

System Power Supply (SX-ACPWR, SX-DCPWR)	• -40 – -60 VDC Consumption (Amps): 36A • 100 – 120 VAC Consumption (Amps): 14.3A • 200 – 240 VAC Consumption (Amps): 7.2A • AC Frequency: 50 – 60Hz • Max BTU: 4874 BTU/Hr • Max Watts (Output): 1200W • Max Watts (Input): 1428W
1250W PoE Power Supply	• 100 – 120 VAC Consumption (Amps): 14A • 200 – 240 VAC Consumption (Amps): 7A • AC Frequency: 50 – 60Hz • Max BTU: 4736 BTU/Hr • Max Watts (Output): 1250W • Max Watts (Input): 1388W
2500W PoE Power Supply (SX-ACPWR-2500-POE)	• 200 – 240 VAC Consumption (Amps): 14A • AC Frequency: 50 – 60Hz • Max BTU: 9471 BTU/Hr • Max Watts (Output): 2500W • Max Watts (Input): 2775W

Safety Certifications

- CAN/CSA-C22.2 No. 60950-1-03
- Information Technology Equipment
- Safety—Part 1: General Requirement
- UL 60950-1, Information Technology Equipment—Safety—Part 1: General Requirement
- EN 60950-1, Information Technology Equipment—Safety—Part 1: General Requirement
- IEC 60950-1, Information Technology Equipment—Safety—Part 1: General Requirement
- EN 60825-1, Safety of Laser Products. Equipment Classification, Requirements and User Guide
- EN 60825-2, Safety of Laser Products, Safety of Optical Fibre Communications Systems

Environmental Regulatory Compliance

- RoHS Compliant (5 of 6)
- WEEE compliant

Electromagnetic Emission Certifications

- ICES-003, Electromagnetic Emission
- FCC Class A
- EN 55022/CISPR 22 Class A
- VCCI Class A
- EN 61000-3-2, Power Line Harmonics
- EN 61000-3-3, Voltage Fluctuation and Flicker
- EN 61000-6-3, Electromagnetic Compatibility
- AS/NZS CISPR 22, Electromagnetic Compatibility

Immunity

EN 61000-6-1, Electromagnetic Compatibility, Generic Standard

EN 55024, Immunity Characteristics Supersedes:

- EN 61000-4-2, ESD
- EN 61000-4-3, Radiated, Radio Frequency, Electromagnetic Field
- EN 61000-4-4, Electrical Fast Transient
- EN 61000-4-5, Surge
- EN 61000-4-6, Conducted Disturbances Induced by Radio
- Frequency Fields
- EN 61000-4-8, Power Frequency Magnetic Field
- EN 61000-4-11, Power Frequency Magnetic Field

Mounting Options

- 19" Universal EIA (Telco) Rack or Tabletop

SYSTEM SUMMARY

Feature	FastIron SuperX	FastIron SX 800	FastIron SX 1600
Interface Slots	8	8	16
Backplane Switching Capacity	510 Gbps	600 Gbps	1080 Gbps
Data Switching Capacity	408 Gbps	464 Gbps	848 Gbps
Packet Forwarding Capacity	304 Mpps	348 Mpps	636 Mpps
Management Redundancy	No	Yes	Yes
Active 10-GbE Ports with Redundant Management	N/A	4 XFP	4 XFP
Switch Fabric Redundancy[1]	N/A	1+1	1+1
Management Processor	400 MHz	667 MHz	667 MHz
	466 MHz	667 MHz	667 MHz
Memory Options	256 MB	512 MB	512 MB
	512 MB	512 MB	512 MB
Height	10.4" (6RU)	10.4" (6RU)	24.5" (14RU)
Maximum Port Density per Unit			
• 100BaseFX	192	192	384
• 1000BaseT, 10/100/1000 Mbps (RJ-45)[2]	204	192	384
• IEEE 802.3af Class 3 10/100/1000 Mbps	192	192	384
• IEEE 802.3af Class 3 10/100/1000 Mbps with N+1 PoE Power Redundancy[3]	140	140	384
• 1000BaseX Ports (SFP)	204	192	384
• 10GBaseX Ports (XFP)	16	20	36
Maximum Port Density per Rack			
• 100BaseFX	1344	1344	1152
• 1000BaseT, 10/100/1000 Mbps (RJ-45)	1428	1344	1152
• IEEE 802.3af Class 3 10/100/1000 Mbps	1344	1344	1152
• IEEE 802.3af Class 3 10/100/1000 Mbps with N+1 PoE Power Redundancy[3]	980	980	1152
• 1000BaseX Ports (SFP)	1428	1344	1152
• 10GBaseX Ports (XFP)	112	140	108
Power Supply Redundancy			
• System Power	N+1	N+1	N+2
• PoE Power	N+1	N+1	N+3

1-The two switch fabric modules in the FastIron SX 800 and FastIron SX 1600 operate in a load-sharing fashion. Upon failure of one of the switch modules, some system capacity will be lost. In this event, some traffic flows may experience reduced capacity through the remaining operational switch fabric during periods of high traffic loading.

2-FastIron SuperX 1000BaseT modules are field-upgradeable to PoE with a PoE daughter card.

3 -Computation is based on the 2500W, 220 VAC PoE power supply.

ORDERING INFORMATION

Part Number	Description
FI-SX1-4-AC	FastIron SuperX bundle with 8-slot chassis, fan tray, and 1 AC power supply
FI-SX1-4-DC	FastIron SuperX bundle with 8-slot chassis, fan tray, and 1 DC power supply
FI-SX800-AC	FastIron SX 800 bundle with 8-slot chassis, fan tray, 2 switch fabrics, and 1 AC power supply
FI-SX800-DC	FastIron SX 800 bundle with 8-slot chassis, fan tray, 2 switch fabrics, and 1 DC power supply
FI-SX1600-AC	FastIron SX 1600 bundle with 16-slot chassis, fan tray, 2 switch fabrics, and 2 AC power supplies
FI-SX1600-DC	FastIron SX 1600 bundle with 16-slot chassis, fan tray, 2 switch fabrics, and 2 DC power supplies
SX-FI12GM-4	FastIron SuperX Management Module with Base L3 SW, includes 12-combo Gigabit Ethernet ports and 256 MB SDRAM
SX-FI12GM-4-PREM	FastIron SuperX Management Module with Full IPv4 L3 SW, includes 12-combo Gigabit Ethernet port and 256 MB SDRAM
SX-FI12GM2-4	FastIron SuperX Management Module with Base L3 SW, includes 12-combo Gigabit Ethernet ports and 512 MB SDRAM
SX-FI12GM2-4-PREM	FastIron SuperX Management Module with Full IPv4 L3 SW, includes 12-combo Gigabit Ethernet ports and 512 MB SDRAM
SX-FIZMR	FastIron SX 800/SX 1600 Management Module with no ports and Base L3 SW
SX-FIZMR-PREM	FastIron SX 800/SX 1600 Management Module with no ports. The loaded software image supports Advanced Layer 2 and Full Layer 3 IPv4 services in systems configured with all IPv4 line modules.
SX-FI2XGMR4	FastIron SX 800/SX 1600 Management Module with Base L3 SW, includes 2-port 10-Gigabit Ethernet
SX-FI2XGMR4-PREM	FastIron SX 800/SX 1600 Management Module with Full IPv4 L3 SW, includes 2-port 10-Gigabit Ethernet
SX-FI424F	FastIron SuperX 24-port mini-GBIC based Gigabit Ethernet module
SX-FI424C	FastIron SuperX 24-port 10/100/1000 Ethernet module
SX-FI424HF	FastIron SuperX 24-port 100/1000 Combo Fiber Ethernet module
SX-FI42XG	FastIron SuperX 2-port XFP 10-Gigabit Ethernet module
SX-FI42XGW	FastIron SuperX 2-port LAN/WAN XFP 10-Gigabit Ethernet module
SX-24GCPOE	SuperX 802.3af PoE add-in card for 24-port 10/100/1000 Ethernet module
SX-FI424P	FastIron SuperX 24-port 10/100/1000 Ethernet module with 802.3af PoE
FI-FISF	FastIron SX 800/SX 1600 Switch Fabric module
SX-FIL3U	FastIron SuperX chassis, full Layer 3 upgrade kit
SX-ACPWR-POE	FastIron SuperX/SX 800/SX 1600 POE AC power supply, 1250W
SX-ACPWR-2500-POE	FastIron SuperX/SX 800/SX 1600 POE AC power supply, 2500W
SX-ACPWR-SYS	FastIron SuperX/SX 800/SX 1600 system AC power supply, 1200W
SX-DCPWR-SYS	FastIron SuperX/SX 800/SX 1600 system DC power supply, 1200W
10G-XFP-SR	10-GbE SR XFP optic, MMF, LC connector
10G-XFP-LR	10-GbE LR XFP optic, SMF, LC connector
10G-XFP-ER	10-GbE ER XFP optic, SMF, LC connector
EIMG-SX	1000Base-SX mini-GBIC optic, MMF, LC connector
EIMG-LX	1000Base-LX mini-GBIC optic, SMF, LC connector
EIMG-LHA	1000Base-LHA mini-GBIC optic, SMF, LC connector, 80 km maximum reach

IPV6-CAPABLE ORDERING INFORMATION

Part Number	Description
SX-FI12GM-6	Management module with 12 combo Gigabit Ethernet ports and 256 MB SDRAM. Software includes Advanced Layer 2 and Base Layer 3 IPv4 services.
SX-FI12GM2-6	Management module with 12 combo 10/100/1000 Mbps (RJ45)/SFP Gigabit Ethernet ports and 512MB SDRAM. Software includes Advanced Layer 2 and Base Layer 3 IPv4 services.
SX-FI12GM-6-PREM	Management module with 12 combo 10/100/1000 Mbps (RJ45)/SFP Gigabit Ethernet ports and 256 MB SDRAM. Software includes Advanced Layer 2 and Full Layer 3 IPv4 services.
SX-FI12GM2-6-PREM	Management module with 12 combo 10/100/1000 Mbps (RJ45)/SFP Gigabit Ethernet ports and 512 MB SDRAM. Software includes Advanced Layer 2 and Full Layer 3 IPv4 services.
SX-FIZMR-6-PREM	Management module with no ports. The loaded software image supports Advanced Layer 2 and Full Layer 3 IPv4 services in systems configured with all IPv6-ready line modules.
SX-FI624C	24-port 10/100/1000 Gigabit Ethernet module
SX-FI62XG	2-port XFP 10 Gigabit Ethernet module
SX-FI624HF	24-port 100/1000 SFP based Fiber Ethernet IPv6 module
SX-FI624P	24-port 10/100/1000 Gigabit Ethernet with POE installed IPv6 module
SX-FI624100FX	24-port 100FX bundle, which includes SX-FI624HF and 24 E1MG-100FX optics
SX-FI2XGMR6	2-port 10GbE Management module with Base L3 (IPv4 only) for the FastIron SX 800 and SX 1600 chassis
SX-FI2XGMR6-PREM	2-port 10GbE Management module with Full Layer 3 (IPv4 only) for the FastIron SX 800 and SX 1600 chassis
SX-FI8GMR6	8-port GbE Management module with Base L3 (IPv4 only) for the FastIron SX 800 and SX 1600 chassis
SX-FI8GMR6-PREM	8-port GbE Management module with Full Layer 3 (IPv4 only) for the FastIron SX 800 and SX 1600 chassis
SX-FIL3U-6-IPV4	Layer 3 (IPv4 only) software upgrade kit for the FSX and FSX800/1600 IPv6-ready family. This software upgrade adds support for Full Layer 3, including support for IPv4 routing protocols such as RIPv1/v2, OSPF, BGP4, and multicast routing, including PIM-SM, PIM-DM, and DVMRP.

WARRANTY

- 1-year Hardware Warranty

- 90-days Limited Software Warranty

- Brocade warrants that software, when used in accordance with the terms of the Brocade license, will operate substantially as set forth in the applicable Brocade Documentation following delivery of the software to licensee.

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