

Brocade FastIron SX Series



HIGHLIGHTS

- Industry-leading price/performance value for campus aggregation and core switching, providing a scalable, secure, low-latency, and fault-tolerant infrastructure for 1 GbE and 10 GbE enterprise deployments
- High-performance architecture with up to 132 10 GbE and 384 1 GbE ports in a single chassis supporting IPv4/IPv6-capable Layer 2/3 switching and routing
- Highly available design with Multi-Chassis Trunking (MCT); redundant management modules (with hitless failover), switch fabrics, power supplies, and fans; stateful OSPF redundancy; graceful BGP and OSFP restarts; and hitless In-Service Software Upgrades (ISSU)
- Embedded sFlow per port to support scalable hardware-based traffic monitoring across all ports without compromising performance
- Covered by Brocade Assurance Limited Lifetime Warranty

High-Performance, Non-Stop Networking for Mission-Critical Enterprise Applications and Services

As organizations strive for a competitive advantage, their network infrastructures must be resilient, secure, and highly efficient. 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 even greater value.

The Brocade® FastIron® SX Series of Layer 2/3 switches provides a superior scalable foundation for improved operational efficiency and faster response to business opportunities today and into the future. The FastIron SX Series 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.

In addition, the FastIron SX Series offers compatibility with 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).

The FastIron SX Series has an extensive feature set, making it well suited for real-time collaborative applications, IP telephony, IP video, e-learning, and Wireless LANs (WLANs). The FastIron SX Series delivers wire-speed performance and ultra-low latency, which are ideal for converged network applications such as Voice over IP (VoIP) and video conferencing. These platforms present the industry's most scalable and resilient Power over Ethernet (PoE) design, with a robust feature set to secure and

simplify the deployment of an edge-to-core converged network. In addition, the FastIron SX Series supports high-density 10 Gigabit Ethernet (GbE) capabilities for enterprise backbone deployments.

Future-Proofing the Network With IPv6

Migration to IPv6 is inevitable, but by starting with the deployment of IPv6-capable hardware, organizations can make the transition 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.

Combined with the Brocade FCX Series, the Brocade ICX® 6610 Switch, and the Brocade MLX® Router solutions, the IPv6-capable FastIron SX Series provides the industry's most complete end-to-end IPv6 solution. Organizations can deploy the switches knowing they are IPv6-capable whether deploying IPv6 today or in the future.

The IPv6-capable FastIron SX Series enables organizations to either deploy IPv6 today or future-proof their networks to support IPv6. These high-performance platforms deliver security, convergence, and complete IPv4/IPv6 visibility using embedded sFlow for a robust edge-to-core IPv6 solution.

Configuration Alternatives

The FastIron SX Series is optimized for flexibility with upgradability for PoE/PoE+, 10 GbE, and redundant management, switch fabrics, and power. Available in two chassis models, the scalable FastIron SX Series 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 SX Series includes the following switch models:

• FastIron SX 800 switches

- Eight interface slots
- Up to 68 10 GbE SFP+ ports
- Up to 192 FE/GbE SFP ports
- Up to 192 Class 3 PoE or PoE+ (802.3at-compliant) ports
- N+1 system power redundancy
- N+1 PoE power redundancy
- Management redundancy
- Switch fabric redundancy
- Brocade Assurance® Limited Lifetime Warranty

• FastIron SX 1600 switches

- Sixteen interface slots
- Up to 132 10 GbE ports
- Up to 384 FE/GbE SFP ports
- Up to 384 Class 3 PoE or PoE+ (802.3at-compliant) ports
- Up to N+3 system power redundancy
- Up to N+3 PoE power redundancy
- Management redundancy
- Switch fabric redundancy
- Brocade Assurance Limited Lifetime Warranty

Primary Features and Benefits

The FastIron SX Series provides a wide range of business advantages, as described in the following sections.

Resilient Design to Guarantee Business Continuity

The FastIron SX Series is built for mission-critical environments and features Multi-Chassis Trunking (MCT), which enables two FastIron SX chassis to appear as a single logical switch at Layer 2 in active/active mode and delivers uninterrupted traffic flow in the event of node failover. FastIron SX 800 and FastIron SX 1600 switches also feature redundant management modules, fans, load-sharing switch fabrics, and power supply modules for maximum system availability and non-stop networking.

Switch fabric failover preserves network connectivity in the event of a switch module failure. Hitless failover provides automatic management failover from the active management module to the standby module without interrupting traffic forwarding in the event of a management module failure. Hitless In-Service Software Upgrade (ISSU) enables network administrators to perform software upgrades with no interruption of service.

In the event of a topology change due to a port or facility failure, Layer 1 and Layer 2 protocols—such as Protected Link, Metro Ring Protocol (MRP), IEEE 802.3ad, UDLD, VSRP, and Rapid Spanning Tree Protocol (RSTP)—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 rogue hijacking of spanning tree root and maintain a contention- and loop-free environment, especially during dynamic network deployments.

These high-availability capabilities enable deployment of a highly reliable network infrastructure that is resilient to, and tolerant of, network and equipment failures.



Figure 1: Third-generation FastIron SX line cards quadruple 10 GbE port density with up to 132 10 GbE ports per chassis, and deliver hardware support for MACsec and EEE for future-proofing.

Advanced QoS and Low Latency for Enterprise Convergence

The FastIron SX Series offers superior QoS features that enable organizations to prioritize high-priority and delay-sensitive services throughout the network. The switches can classify, re-classify, police, mark, and re-mark an Ethernet frame or an IP packet prior to delivery. This flexibility lets organizations 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 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 to ensure 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 1 GbE or 10 GbE 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 one million BGP routes and 64 BGP peers.

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

High-Quality and Reliable Network Convergence

The FastIron SX Series provides a scalable, secure, low-latency, and fault-tolerant infrastructure for cost-effective integration of Unified Communications (UC), video, wireless access, Virtual Desktop Infrastructure (VDI), 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 help ensure reliable and high-quality VDI and UC services.

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 SX Series establishes a new class of convergence-ready solutions, enabling organizations to implement a secure, reliable, scalable, and high-quality infrastructure for total network convergence.

Flexible Bandwidth Management

The FastIron SX Series supports 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 Virtual LAN (VLAN). On egress, outbound rate limiting can control bandwidth per port and per priority queue. These features allow fine-grained control of bandwidth utilization based on a wide range of application and user criteria.

A 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, MLD (v1 and v2), PIM-SM, PIM-SSM, and PIM-DM multicast routing optimizes traffic routing and network utilization for multicast applications.

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

The advanced Brocade FastIron software operating system 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. The FastIron SX Series can be upgraded with advanced routing software (a Layer 3 upgrade for IPv4 and IPv6 routing support).

To achieve wire-speed Layer 3 performance, the FastIron SX Series supports 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 512,000 routes.

Comprehensive Security Suite

The FastIron SX Series supports 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, organizations can enable considerable centralized control and restrict unauthorized users from altering network configurations.

The FastIron SX Series 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 SX switches support a flexible suite of access control capabilities, including multi-host IEEE 802.1X, Web authentication, and MAC authentication schemes. Upon successful user or device authentication, the switches 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.

Organizations 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 SX Series, providing host posture verification

and remediation. This design allows organizations 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 become a priority. To prevent "user identity theft" (spoofing), the FastIron SX Series supports DHCP snooping, Dynamic ARP inspection, and IP source guard. These features work together to deny spoofing attempts and to defeat man-in-the-middle attacks. To control where users connect, the 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, the FastIron SX Series features embedded hardware-based sFlow packet sampling, which provides system-wide traffic monitoring for accounting, troubleshooting, and intrusion detection. Using Brocade Network Advisor to process sFlow data from the switches, Brocade IronShield 360 provides closed-loop threat detection and response. sFlow packet samples are scanned for known threat signatures. Upon a positive match, Brocade Network Advisor can automatically send a control command to the switches 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.

IPv6 Routing Support

The FastIron SX Series' IPv6-capable management and interface modules support an easy migration path by interworking between IPv4 and IPv6 switches within the existing network or across networks. Organizations can choose which sites are upgraded with

IPv6-capable modules, preparing the network for future IPv6 applications, or implementing a complete IPv6 deployment.

Designed for medium to large enterprise backbones, the IPv6-capable FastIron SX Series includes modular switches that provide 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 FastIron SX 800 and FastIron SX 1600 management modules have a console port and a 10/100/1000 Mbps port for out-of-band management.
- The IPv6-capable FastIron SX 800 and FastIron SX 1600 management modules are interchangeable between devices with systems using second- or third-generation modules.
- Redundant management modules on the IPv6-capable FastIron SX 800 and FastIron SX 1600 provide full redundancy.
- The independent crossbar (xbar) architecture enables the management module to switch between each interface module and within the management module.
- The IPv6-capable interface modules and power supplies are interchangeable among FastIron SX Series switches.
- The IPv6-capable FastIron SX 800 and FastIron SX 1600 management, switch fabric, and interface modules are hot-swappable, which means a module can be removed and replaced while the chassis is powered on and running.

Resilient Power Distribution and Consumption in Support of Green Initiatives

The FastIron SX Series 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 amount of equipment and ongoing costs compared to modular systems that use a common power supply for both the systems and the PoE equipment. In the FastIron SX Series, 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 110 V/220 VAC power, -48 VDC power, and mixed AC/DC power configurations. To scale PoE configurations, PoE power supplies are available in two ratings—1250 W and 2500 W. When configured with four 2500 W 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+)

PoE is a key enabler of applications such as VoIP, IEEE 802.11 WLANs, and IP video. The FastIron SX Series is a third-generation PoE-capable switch family and incorporates the latest advances in PoE/PoE+ provisioning and system design to provide scalable and intelligent PoE capabilities. 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.

Organizations have the choice of purchasing PoE/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 auto-discovery or legacy Layer 2 discovery protocols. Port priorities are also configurable and are used to prioritize PoE power in over-subscribed configurations.

Ease of Use: Plug and Play

The FastIron SX Series supports the IEEE 802.1AB LLDP and ANSI TIA 1057 LLDP-MED standards, enabling organizations to build open convergence, advanced multivendor 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 might 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 they significantly reduce operations costs.

Software Key or EPROM License Activation

To simplify feature upgrades and deployments, a key-based license activation technology for FastIron SX Series switches is available to unlock optional features and software functionality, complementing the alternative EPROM-based licensing mechanism. This process eliminates the need to physically access the switch, greatly reducing the amount of time required to activate optional features. This capability enables organizations to use software keys to activate optional features on existing switches without removing the management module.

Brocade Network Management Suite

Managing enterprise campus networks continues to become more complex, due to the growth in enterprise applications and services that rely on campus networks. Services such as Internet, e-mail, video conferencing, real-time collaboration, and distance learning all have specific configuration and management requirements. At the same time, organizations face increasing demand to provide uninterrupted services for high-quality voice, data, and multimedia applications.

To reduce complexity and time spent managing these environments, the easy-to-use Brocade Network Advisor discovers, manages, and deploys configurations to campus LAN switches and groups of IP devices. By using the Brocade Network Advisor Device Configuration Manager tool, organizations

can configure VLANs within the network or execute CLI commands on specific IP devices or groups of IP devices. sFlow-based proactive monitoring is ideal for performing network-wide troubleshooting, generating traffic reports, and gaining visibility into network activity from the edge to the core. Moreover, Brocade Network Advisor centralizes management of the entire family of Brocade FastIron enterprise LAN switches.

Brocade Global Services

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 15 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, network monitoring services, and education, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

Maximum Operational Efficiency and Investment Protection

To further improve operational efficiency, Brocade FSX Switches come with 90 days of technical support from the Brocade Technical Assistance Center and free software updates. With these capabilities, organizations gain peace of mind while freeing up IT budget and resources to grow their businesses.

Warranty

The Brocade FastIron SX Series is covered by the Brocade Assurance Limited Lifetime Warranty. For details, visit www.brocade.com/warranty.

Affordable Acquisition Options

Brocade Capital Solutions helps organizations easily address their IT requirements by offering flexible network acquisition and support alternatives. Organizations can select from purchase, lease, Brocade Network Subscription, and Brocade Subscription Plus options to align network acquisition with their unique capital requirements and risk profiles. To learn more, visit www.Brocade.com/CapitalSolutions.

Maximizing Investments

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.
Key Features and Benefits

Key Features and Benefits

Advanced Security

- Secure Multi-VRF routing supports both IPv4 and IPv6 Multi-VRFs
- Multilevel access security for console access
- 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 and 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 to 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
- Eight 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 and fabric switch 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)
- Multi-Chassis Trunking (MCT)
- Enhanced VRRP (VRRPE)
- Rapid Spanning Tree Protocol (RSTP)
- Multiple Spanning Tree (802.1s)
- Per-VLAN Spanning Tree (PVST/PVRST)
- BPDU Guard and Root Guard
- Port loop detection
- 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 Routing and Hosts

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

- RIPng
- OSPF v3
- BGP-MP for IPv6
- MLD v1, v2
- DHCPv6 relay
- 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 SNMP

Robust VoIP and Power over Ethernet

- Standards-based IEEE 802.3af PoE and 802.3at PoE+ with auto-detection and auto-configuration
- Choice of 1250 W (70 Class 3) or 2500 W (140 Class 3) per PoE power supplies
- Independent system and PoE power subsystems that allow the addition of PoE without affecting the system power
- High-availability power design—N+1 PoE power redundancy for the FastIron SX 800 chassis and N+3 PoE power redundancy for the 16-slot FastIron SX 1600 chassis
- Software-accessible system and per-port power consumption
- Advanced QoS and cell-based fabric to enable high-quality VoIP service
- Voice VLAN feature that automatically places IP phones in their own VLAN
- LLDP/LLDP-MED standards that greatly simplify and enhance network management, asset management, and network troubleshooting

Brocade FastIron SX Series 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
 - 802.3at Power over Ethernet Plus
 - 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
 - 802.1AE- MACsec (hardware-capable)
 - 802.3az-2010 - EEE (hardware-capable)
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RFC Compliance

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|------------------|---|
| Protocol Support | <ul style="list-style-type: none">• DNS Client• RFC 1812 IP Requirements• RFC 2338 VRRP• RFC 5798 VRRP for IPv4 and IPv6• VRRPE (Brocade VRRP Enhanced)• PVST/PVST+/PVRST• IPv4 Unicast and IPv4 Multicast over GRE |
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BGPv4

- RFC 1269 BGP-3 MIB
 - RFC 1657 BGP-4 MIB
 - RFC 1745 OSPF Interactions
 - RFC 4271 BGPv4
 - 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
 - RFC 2385 BGP Session Protection via TCP MD5
 - RFC 4893 BGP Support for Four-octet AS Number Space
 - RFC 4724 Graceful Restart Mechanism for BGP
 - VRF support
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OSPF

- RFC 1583 and 2328 OSPF v2
 - RFC 3101 OSPF NSSA Option
 - RFC 1745 OSPF Interactions
 - RFC 1765 OSPF Database Overflow
 - RFC 1850 OSPF v2 MIB and Traps
 - RFC 2154 OSPF w/Digital Signatures (Password, MD-5)
 - RFC 2178 OSPF v2
 - RFC 2370 OSPF Opaque LSA Option
 - RFC 3623 Graceful OSPF Restart
 - VRT support
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RIP

- RFC 1058 RIP v1
 - RFC 2453 RIP v2
 - RFC 1812 RIP Requirements
 - VRF support
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- IP Multicast
- RFC 1112 IGMP
 - RFC 2236 IGMP v2
 - RFC 3376 IGMP v3
 - IGMP Proxy
 - RFC 1075 DVMRP
 - RFC 1122 Host Extensions
 - RFC 1256 ICMP Router Discovery Protocol
 - RFC 3973 PIM-DM v1
 - RFC 2362 PIM-SM
 - RFC 3618 MSDP
 - RFC 3446 Anycast RP
 - PIM-SSM
 - VRF multicast support on third-generation modules
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- 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
 - RFC 1212 Concise MIB definitions
 - RFC 2579 Textual Conventions for SMIv2
 - RFC 2580 Conformance Statements for SMIv2
 - VRF-aware
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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
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IPv6 Support

- RFC 1886 DNS Extensions to Support IPv6
 - RFC 1887 IPv6 Unicast Address Allocation Architecture
 - RFC 1981 IPv6 Path MTU Discovery
 - RFC 2373 IPv6 Addressing Architecture
 - RFC 2374 IPv6 Aggregatable Global Unicast Address Format
 - RFC 2460 IPv6 Specification
 - RFC 2461 IPv6 Neighbor Discovery
 - RFC 2462 IPv6 Stateless Address Auto-configuration
 - RFC 2464 Transmission of IPv6 over Ethernet Networks
 - RFC 3513 IPv6 Addressing Architecture
 - RFC 3587 IPv6 Global Unicast Address Format
 - RFC 4443 ICMPv6
 - RFC 2080 RIPng for IPv6
 - RFC 2740 OSPFv3 for IPv6
 - RFC 2545 Use of BGP for IPv6
 - RFC 2710 MLDv1
 - RFC 3810 MLDv2
 - RFC 4604 IGMPv3 and MLDv2 for SSM
 - RFC 4607 Source-Specific Multicast for IP
 - RFC 2362 PIM-SM
 - RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers
 - RFC 3056 Connection of IPv6 Domains via IPv4 Clouds
 - Multi-VRF support
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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 5905 Network Time Protocol
- 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

Management and Control (Continued)

- RFC 1516 Repeater MIB
- RFC 1724 RIPv2 MIB
- RFC 2572 SNMP Message Processing and Dispatching
- RFC 1901 Introduction to Community-based SNMPv2
- RFC 3410 Applicability Statements for SNMP
- RFC 1350 The TFTP Protocol (Revision 2)
- ANSI TIA 1057 LLDP-MED
- TACACS+ v1.78
- MRP (Metro Ring Protocol)
- UDLD (Uni-directional Link Detection)
- IGMP Snooping
- MLD Snooping
- PIM Snooping
- Dynamic Filters and VLAN assignment
- CDP and FDP
- Configuration Logging
- DHCP Server and Client

System Management

- Brocade Network Advisor
- Industry-standard Command Line Interface (CLI)
- RMON HP OpenView for Sun Solaris, HP-UX, IBM AIX, and Microsoft Windows
- Repeater MIB
- Management VLAN
- Management VRF

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

Physical Dimensions

FastIron SX 800	10.46 in. (H) × 17.45 in. (W) × 19.5 in. (D) 26.6 cm (H) × 44.3 cm (W) × 49.5 cm (D)
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FastIron SX 1600	24.46 in. (H) × 17.45 in. (W) × 22.55 in. (D) 62.1 cm (H) × 44.3 cm (W) × 57.3 cm (D)
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Weight (Fully Loaded)

FastIron SX 800	97 lb (43.9 kg)
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FastIron SX 1600	196 lb (88.6 kg)
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Environmental

- Operating temperature: 0°C to 40°C (32°F to 104°F)
- Relative humidity: 5 to 90%, at 40°C (104°F, non-condensing)
- Operating altitude: 6600 ft (2000 m)
- Storage temperature: -25°C to 70°C (-13°F to 158°F)
- Storage humidity: 95% maximum relative humidity, non-condensing
- Storage altitude: 15,000 ft (4500 m) maximum

MTBF

Chassis	<ul style="list-style-type: none">• SX 800 Chassis, Fan Tray, 1 P/S: 142,786 hrs• SX 800 Chassis, Fan Tray, 2 P/S: 230,584 hrs• SX 1600 Chassis, Fan Tray, 2 P/S: 99,908 hrs• SX 1600 Chassis, Fan Tray, 4 P/S: 213,865 hrs
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Management Modules	<ul style="list-style-type: none">• Third-generation management module, no ports: 534,522 hrs• First-generation management module, 2×10 GbE ports, no optics: 269,436 hrs• Second-generation management module, 2×10 GbE, no optics: 304,109 hrs• Third-generation management module, 2×10 GbE ports, no optics: 506,155 hrs
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Interface Modules (third generation)	<ul style="list-style-type: none">• 48-port 10/100/1000 Mbps copper module: 340,000 hrs• 24-port 10/100/1000 Mbps copper module: 352,103 hrs• 24-port SFP module, no optics: 348,204 hrs• 2-port 10 GbE module, no optics: 464,938 hrs• 8-port 10 GbE module, no optics: 454,938 hrs
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Power Requirements

System Power Supply (SX-ACPWR, SX-DCPWR)

- -40 to -60 VDC Consumption (Amps): 36 A
- 100 to 120 VAC Consumption (Amps): 14.3 A
- 200 to 240 VAC Consumption (Amps): 7.2 A
- AC Frequency: 50 to 60 Hz
- Max BTU: 4874 BTU/Hr
- Max Watts (Output): 1200 W
- Max Watts (Input): 1428 W

1250 W PoE Power Supply

- 100 to 120 VAC Consumption (Amps): 14 A
- 200 to 240 VAC Consumption (Amps): 7 A
- AC Frequency: 50 to 60 Hz
- Max BTU: 4736 BTU/Hr
- Max Watts (Output): 1250 W
- Max Watts (Input): 1388 W

2500 W PoE Power Supply (SX-ACPWR-2500-POE)

- 200 to 240 VAC Consumption (Amps): 14 A
- AC Frequency: 50 to 60 Hz
- Max BTU: 9471 BTU/Hr
- Max Watts (Output): 2500 W
- Max Watts (Input): 2775 W

Safety Certifications

- CAN/CSA-C22.2 No. 60950-1-07
 - Information Technology Equipment
 - Safety—Part 1: General Requirement
 - UL 60950-1 Second Edition, Information Technology Equipment—Safety—Part 1: General Requirement
 - EN 60950-1:2006, Information Technology Equipment—Safety—Part 1: General Requirement
 - IEC 60950-1 Second Edition, 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
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Environmental Regulatory Compliance

- RoHS compliant (5 of 6)
 - WEEE compliant
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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
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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
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Mounting Options

- 19 in. Universal EIA (Telco) Rack or Tabletop
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Brocade FastIron SX Feature/Model Comparison

Chassis	FastIron SX 800	FastIron SX 1600
Height	10.4 in. (6RU)	24.5 in. (14RU)
Interface slots	8	16
Backplane maximum switching capacity	1,200 Gbps	2,160 Gbps
Data maximum L2/3 switching capacity	960 Gbps	1,728 Gbps
Current modules packet forwarding capacity	IPv4 345 Mpps IPv6 315 Mpps	IPv4 630 Mpps IPv6 576 Mpps
Management redundancy	Yes	Yes
Switch fabric redundancy ¹	1+1	1+1
Management processor	First/second-generation 667 MHz Third-generation 1.5 GHz Quad Core	First/second-generation 667 MHz Third-generation 1.5 GHz Quad Core
Memory options	First/second-generation 512 MB Third-generation 4 GB	First/second-generation 512 MB Third-generation 4 GB
Local storage	Third-generation management: 2 GB flash internal, USB 2.0 port external storage	Third-generation management: 2 GB flash internal, USB 2.0 port external storage
Current modules maximum port density per unit		
100BaseFX	192	384
1000BaseT, 10/100/1000 Mbps (RJ-45)	192	384
IEEE 802.3af Class 3 10/100/1000 Mbps	192	384
IEEE 802.3af Class 3 10/100/1000 Mbps with N+1 PoE power redundancy ²	140	384
IEEE 802.3at Class 5 10/100/1000 Mbps	162	324
IEEE 802.3at Class 5 10/100/1000 Mbps with N+1 PoE power redundancy ²	81	244
1000BaseX ports (SFP)	192	384
10GBaseX ports (XFP)	4	4
10GBaseX ports (SFP+)	68	132
Power supply redundancy		
System power	N+1	N+2
PoE power	N+1	N+3
Power supply options	AC/DC	AC/DC

¹The 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 Computation is based on the 2,500 W, 220 VAC PoE power supply.

Ordering Information

Chassis and Power Supplies	Description
FI-SX800-AC	FastIron SX 800 bundle with 8-slot chassis, fan tray, two switch fabrics, and one system AC power supply
FI-SX800-DC	FastIron SX 800 bundle with 8-slot chassis, fan tray, two switch fabrics, and one system DC power supply
FI-SX1600-AC	FastIron SX 1600 bundle with 16-slot chassis, fan tray, two switch fabrics, and two system AC power supplies
FI-SX1600-DC	FastIron SX 1600 bundle with 16-slot chassis, fan tray, two switch fabrics, and two system DC power supplies
SX-ACPWR-SYS	FastIron SX 800/SX 1600 system AC power supply, 1200 W
SX-DCPWR-SYS	FastIron SX 800/SX 1600 system DC power supply, 1200 W
SX-ACPWR-POE	FastIron SX 800/SX 1600 PoE AC power supply, 1250 W
SX-DCPWR-POE	FastIron SX 800/SX 1600 PoE DC power supply, 1250 W
SX-ACPWR-2500-POE	FastIron SX 800/SX 1600 PoE AC power supply, 2500 W
Modules	Description
SX-FIZMR	FastIron SX 800/SX 1600 management module with no ports and base Layer 3 software in systems with a mix of first- and third-generation, a mix of second- and third-generation, or all third-generation line modules
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-only services in systems configured with a mix of all first- or third-generation line modules.
SX-FIZMR-6-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 a mix of all second- or third-generation line modules.
SX-FIZMR-6-PREM6	FastIron SX 800/SX 1600 management module with no ports. The loaded software image supports advanced Layer 2 and Layer 3 IPv4 and IPv6 services in systems configured with a mix of second- or third-generation line modules.
SX-FI-ZMR-XL	FastIron SX 800/SX 1600 high-performance management module with no ports and base Layer 3 software in systems with all second- or all third-generation line modules
SX-FI-2XGMR-XL	FastIron SX 800/SX 1600 high-performance management module with 2x10 GbE SFP+ ports and base Layer 3 software in systems with all second- or all third-generation line modules
SX-FI-ZMR-XL-PREM6	FastIron SX 800/SX 1600 high-performance management module with no ports. The loaded software image supports advanced Layer 2 and Layer 3 IPv4 and IPv6 services in systems configured with all second- or all third-generation line modules.
SX-FI-2XGMR-XL-PREM6	FastIron SX 800/SX 1600 high-performance management module with 2x10 GbE SFP+ ports. The loaded software image supports advanced Layer 2 and Layer 3 IPv4 and IPv6 services in systems configured with all third-generation line modules.
SX-FI2XGMR6	2-port 10 GbE management module with base Layer 3 (IPv4 only) for the FastIron SX 800/SX 1600 chassis in systems configured with second- or third-generation line modules
SX-FI2XGMR6-PREM	2-port 10 GbE management module with full Layer 3 (IPv4 only) for the FastIron SX 800/SX 1600 chassis in systems configured with second- or third-generation line modules
SX-FI2XGMR6-PREM6	2-port 10 GbE management module with full Layer 3 (IPv4 and IPv6) for the FastIron SX 800/SX 1600 chassis in systems configured with second- or third-generation line modules
SX-FI-8XG	Third-generation high-density 8-port SFP+ 10 GbE module with hardware support for MACsec
SX-FI-2XG	Third-generation 2-port SFP+ 10 GbE module with hardware support for MACsec
SX-FI-24GPP	Third-generation 24-port 10/100/1000 Mbps Ethernet module with PoE/PoE+ and hardware support for MACsec and EEE

Ordering Information (Continued)

SX-FI-24HF	Third-generation 24-port 100/1000 SFP-based fiber Ethernet module with hardware support for MACsec
SX-FI48GPP	Third-generation 48-port 10/100/1000 Mbps Ethernet module with PoE/PoE+ (use 2 vertical slots)
FI-FISF	FastIron SX 800/SX 1600 switch fabric module
Chassis and Power Supplies	Description
SX-FIL3U-6-IPv4 (-SW)	Layer 3 (IPv4 only) software upgrade kit for the FastIron SX 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. (Available as either an EPROM upgrade or as a Software License Key. Not applicable to XL management modules.)
SX-FIL3U-6-IPv6 (-SW)	Layer 3 (IPv4 and IPv6) software upgrade kit for the FastIron SX IPv6-ready family. This software upgrade, in addition to IPv4 routing, adds support for RIPng and OSPFv3. (Available as either an EPROM upgrade or as a Software License Key. Software license only for XL management modules.)

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