

BROCADE FASTIRON EDGE X6 SERIES



IPv4/IPv6対応レイヤ 2/3エッジスイッチ

IPv6対応、コンパクトなサイズで堅牢性を高めた ROIの高いエッジソリューション

特長

- 優れたパフォーマンス、QoS、セキュリティ機能を備えたIPv6対応コンパクトスイッチで、高いコンバージェンス効果を発揮
- ハードウェアによるワイヤースピードのIPv4 / IPv6ルーティング、フォワーディング
- 1.5RUのシャーシによる高いポート密度
- 豊富なレイヤ2機能
- オプションで可能なフルレイヤ3アップグレード
- 充実したセキュリティ機能
- マルチベンダ環境でのネットワーク管理機能
- 低消費電力設計、1.5RUまでのコンパクト設計によるTCO削減
- 内部AC/DC電源の冗長化などによる堅牢性向上

Brocade FastIron Edge X6シリーズは、ハイレベルのパフォーマンスやQoS、セキュリティ、統合管理、耐障害性を必要とするレイヤ2 / 3エッジやアグリゲーションのニーズに最適です。標準でIPv6に対応しており、sFlowによるIPv4/IPv6の統合管理も実現。IPv6への移行を前提としたネットワーク環境の構築をスムーズに進めることが可能です。

1.5RUのシャーシによる高いポート密度

- 20または44個の10/100/1000 RJ-45と4コンポ SFP/RJ-45ポートを搭載可能
- 20個の100/1000 SFPと4コンポ SFP/RJ-45ポートを搭載可能
- オプションで2ポート10GbE XFPモジュールを搭載可能

豊富なレイヤ2機能

- 802.3ad、VSRP、802.1D/802.1w、PVST/PVGST、トポロジグループ / 802.1s、ループ防止機能
- SAV/Q-in-Q、リング用冗長プロトコル(MRP、MRP-II)

オプションで可能なフルレイヤ3アップグレード

- RIP、OSPF、BGP4、PIM-DM、PIM-SM、DVMRP、PBRなど
- RIPng、OSPFv3、MLDv1/v2、IGMPv3

充実したセキュリティ機能

- ワイヤースピードのアクセスコントロールリスト
- システムへのきめ細かなアクセス制御、SNMPv3、RADIUS、TACACS/TACACS+、HTTPS、SSH、SCP

- 802.1XもしくはMACアドレス認証によるダイナミックVLAN、制限VLANおよびダイナミックACL
- DAI、DHCPスヌーピング、IPソースガード、Dos攻撃からの保護機能
- BPDUガード、ルートガード
- Broadcast、Multicast、Unknown-unicastのレートリミット機能

マルチベンダ環境でのネットワーク管理機能

- LLDP/LLDP-MED、FDP、CDPによる統合管理や相互運用性の実現
- 全ポートでハードウェアによるsFlowトラフィックモニタリングに対応
- ワイヤースピードでIPv4/IPv6、レイヤ2からレイヤ7の詳細なトラフィックフローの収集を実現
- IPv4/IPv6ネットワークを容易に管理可能

低消費電力設計、1.5RUまでのコンパクト設計によるTCO削減

内部AC/DC電源の冗長化などによる堅牢性向上

詳細については、Brocade 販売パートナーまでお問い合わせいただくか、またはWebサイトをご覧ください。

www.brocadejapan.com



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BROCADE FastIron Edge X6 Series 仕様

機能	FESX624 FESX624-PREM FESX624-PREM6	FESX648 FESX648-PREM FESX648-PREM6	FESX624HF FESX624HF-PREM FESX624HF-PREM6
スイッチング性能	88 Gbps	136 Gbps	88 Gbps
フォワーディング性能	65 Mpps	101 Mpps	65 Mpps
Layer 2 エントリ (ハードウェア)	16,000	16,000	16,000
Layer 3 IPv4 エントリ (ハードウェア)	N/A (FESX624) 256,000 (FESX624-PREM) 256,000 (FESX624-PREM6)	N/A (FESX648) 256,000 (FESX648-PREM) 256,000 (FESX648-PREM6)	N/A (FESX624HF) 256,000 (FESX624HF-PREM) 256,000 (FESX624HF-PREM6)
Layer 3 IPv6 エントリ (ハードウェア)	N/A (FESX624) N/A (FESX624-PREM) 32,000 (FESX624-PREM6)	N/A (FESX648) N/A (FESX648-PREM) 32,000 (FESX648-PREM6)	N/A (FESX624HF) N/A (FESX624HF-PREM) 32,000 (FESX624HF-PREM6)
10/100/1000 ポート密度	20 with 4 port Combo	44 with 4 port Combo	4-port Combo
100/1000 SFP ポート密度	4-port Combo (1000 Only)	4-port Combo (1000 Only)	20 100/1000 SFP
100 Mbps 光イーサネット	N/A	N/A	100FX-SR, 100FX-IR, 100FX-LR, BXD/BXU
Gigabit 光イーサネット	SX, LX, LHA, LHB, BXD/BXU, CWDM		
10 Gigabit イーサネット	2-port XFP Module (Optional), LR WAN PHY (Optional)		
10 Gigabit 光イーサネット	SR, LR, ER, ZR, ZRD, CX4, 1310-MMF		
AC/DC 電源への対応	Yes	Yes	Yes
電源冗長性	1+1	1+1	1+1
電源仕様	AC 入力電圧: 100VAC @ 3.5A MAX, 240VAC @ 1.5A MAX, 50-60Hz per auto-sensing, auto-switching power supply	AC 入力電圧: 100VAC @ 8A MAX, 240VAC @ 3.2A MAX, 50-60Hz per auto-sensing, auto-switching power supply	100vAC @ 3.5A MAX, 240vAC @ 1.5A MAX, 50-60Hz per auto-sensing, auto-switching power supply
外形寸法 (高さ × 幅 × 奥行)	2.63" × 17.5" × 19.6" 6.68 cm × 44.45 cm × 49.78 cm	2.63" × 17.5" × 19.6" 6.68 cm × 44.45 cm × 49.78 cm	2.63" × 17.5" × 19.6" 6.68 cm × 44.45 cm × 49.78 cm
重量 (冗長電源を含むフルローディング時)	11.36 kg	13.2 kg	11.36 kg
重量 (シャーシのみ)	7.95 kg	7.95 kg	7.95 kg

- FESX6xx シリーズはフルレイヤ 2、ベースレイヤ 3 で選択可能なモデルです。
- FESX6xx-PREM シリーズはフルレイヤ 2、IPv4 フルレイヤ 3 で選択可能なモデルです。
- FESX6xx-PREM6 シリーズはフルレイヤ 2、IPv4/IPv6 フルレイヤ 3 で選択可能なモデルです。

技術仕様

動作環境

- 騒音: 47dB
- 動作温度: 32°~104°F (0°~40°C)
- 相対湿度: 5%~90% (結露のないこと)

保管環境

- 保管温度: -23°~158°F (-25°~70°C)
- 保管湿度: 10,000ft (3,000m) maximum

最大消費電力

- FESX624 および FESX624HF: 1 電源あたり 220W(750BTU/Hr)
- FESX648: 1 電源あたり 600W(2047BTU/Hr)

環境規制

- RoHS Compliant (5 of 6)
- WEEE Compliant

安全認証

- EN 60950
- CAN/CS-C22.2 No. 60950-00
- EN 60825-1 Safety of Laser Products-Part 1
- EN 60825-2 Safety of Laser Products-Part 2
- IEC 950
- UL 1950 Third Edition
- CSA 950

電磁環境適合性

- FCC Class A (Part 15)
- EN 55022/CISPR-22 Class A
- VCCI Class A

イミュニティ

- Generic: EN 50082-1

準拠規格

- IEEE 802.3 10Base-T
- IEEE 802.3u 100Base-TX
- IEEE 802.3u 100Base-FX
- IEEE 802.3u 100Base-LX
- IEEE 802.3z 1000Base-SX/LX
- IEEE 802.3ab 1000Base-T
- IEEE 802.3ae 10-Gigabit Ethernet
- IEEE 802.3x Flow Control
- IEEE 802.3ad Link Aggregation
- IEEE 802.1p/q VLAN Tagging
- IEEE 802.1d Ethernet Bridging
- IEEE 802.1D MAC Bridges
- IEEE 802.1w Rapid Spanning Tree
- IEEE 802.1s Multiple Spanning Tree
- IEEE 802.1X Port-based Network Access Control

- IEEE 802.1Q Generic VLAN Registration Protocol (GVRP)
- IEEE 802.3AB LLDP
- IEEE 802.1p Mapping to Priority Queue

Layer2 機能

- Per VLAN STP (PVST/PVST+)
- Metro Ring Protocol (MRP)
- Virtual Switch Redundancy Protocol (VSRP)

RFC 準拠

BGP4

- 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 マルチキャスト

- 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

一般的なルーティングプロトコル

- 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
- VRRPE (Broadcast VRRP Enhanced)

IPv6

- RFC 2460 IPv6 Specification
- RFC 2461 IPv6 Neighbor Discovery
- RFC 2462 IPv6 Stateless Address Auto-Configuration
- RFC 2463 ICMPv6
- RFC 3513 IPv6 Addressing Architecture
- RFC 3587 IPv6 Global Unicast Address Format
- RFC 2375 IPv6 Multicast Address Assignments
- RFC 2464 Transmission of IPv6 over Ethernet Networks
- RFC 2711 IPv6 Router Alert Option
- RFC 3596 DNS support

IPv6 ルーティング

- RFC 2080 RIPng for IPv6
- RFC 2740 OSPFv3 for IPv6

IPv6 マルチキャスト

- RFC 2710 Multicast Listener Discovery (MLD) for IPv6
- RFC 3810 - Multicast Listener Discovery Version 2 for IPv6

IPv6 移行

- RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers

QoS

- 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)

管理と制御

- RFC 2571 Architecture for Describing SNMP Framework
- RFC 951 BootP
- RFC 1542 BootP Extensions
- RFC 2131 DHCP
- RFC 1493 Bridge MIB
- Configuration Logging
- RFC 1643 Ethernet-like Interface MIB
- RFC 2068 HTTP
- RFC 2818 HTTPS
- RFC 1354 IP Forwarding Table MIB
- RFC 3176 sFlow
- RFC 1213 MIB-II
- RFC 1516 Repeater MIB
- RFC 1724 RIPv2 MIB
- RFC 1757 RMON MIB
- RFC 2572 SNMP Message Processing and Dispatching
- RFC 1573 SNMP MIB II
- RFC 2575 SNMP View-based Access Control Model SNMP
- RFC 1157 SNMPv1/v2c
- 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 SNMPv3 VACM

主要なセキュリティオプション

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



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Future-Proofing the Network Through Deployment of IPv6-Capable Switches

Networks are in the early stages of large-scale IPv6 production deployment. However, few innovative IPv6 applications are on the market. Although the success of IPv6 will ultimately depend on the new applications that run over it, 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 Edge X Series of IPv6-capable switches, which support the 128-bit addressing format, are introduced with software release 04.0.01, offering an easy migration path by interworking between IPv4 and IPv6 switches with

the existing network or across networks. The IPv6-capable FastIron Edge X Series delivers a full complement of standards-based, feature-rich switching and IPv4 multiprotocol routing capabilities. The network manager can pick and choose which sites are upgraded with IPv6-capable switches, preparing the network for future IPv6 applications.

The FastIron Edge X Series IPv6-capable switches are designed with high 10/100 port density and Gigabit Ethernet uplinks in a compact form factor. The switches provide enterprise network connectivity, delivering GoC to the desktop, within the enterprise distribution layer, and the data center for high-end servers, cluster computing, and network-attached storage devices.

KEY FEATURES AND BENEFITS

IronShield Advanced Security Features

- 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 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, and MAC filter
- 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
- ACL log reports provide source detail for denied packets
- ACL-based Port Mirroring enables IP monitoring for CALEA and related law enforcement traffic monitoring
- Port Security and MAC Address Locking limits the number of MAC addresses learned on a port. Using Port Security, network managers can allow specific MAC addresses access to the network for specific time periods.
- MAC address authentication including multiple device authentication and dynamic policy configuration
- Byte-based and packet-based Broadcast, Multicast and unknown Unicast rate limiting
- Enhanced Port security for controlling access of authorized users

KEY FEATURES AND BENEFITS CONTINUED

Superior Quality of Service

- Classification, reclassification, policing, and marking the traffic prior to delivery
- Identification, classification, and reclassification based on specific criteria 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
- LLDP/LLDP-MED standards greatly simplify and enhance network management, QoS, asset management, and network troubleshooting
- 32M ingress and 32M egress external buffers with dynamic buffer allocation for voice/video applications

High Availability Design

- Redundant, hot-swappable, load-sharing and distributed power supplies for system power
- Advanced protocols for topology resilience:
 - Metro Ring Protocol (MRP)
 - Virtual Switch Redundancy Protocol (VSRP)
 - Virtual Router Redundancy Protocol (VRRP)
 - Enhanced VRRP (VRRPE)
 - Rapid Spanning Tree Protocol (RSTP)
 - BPDU Guard and Root Guard
 - Per-VLAN Spanning Tree (PVST/PVRST) and Multiple Spanning Tree (802.1s)
 - IEEE 802.3ad trunking. Support for single instance LACP
 - Protected link
 - UDLD with link error dampening

SYSTEM SUMMARY

Feature	FESX424, FESX624 & FESX424-POE	FESX448 & FESX648	FESX424HF & FESX624HF
Switching Performance	88 Gbps	136 Gbps	88 Gbps
Forwarding Performance	65 Mpps	101 Mpps	65 Mpps
Layer 2 Entries in Hardware	16,000	16,000	16,000
Layer 3 IPv4 Entries in Hardware	128,000 for FESX424 256,000 for FESX624	128,000 for FESX448 256,000 for FESX648	128,000 for FESX424HF 256,000 for FESX624HF
Layer 3 IPv6 Entries in Hardware	32K for FESX624	32K for FESX648	32K for FESX624HF
10/100/1000 Port Density	24 with 4-port Combos	48 with 4-port Combo	4-port Combo
10/100/1000 Mbps PoE Density with 15.4W each	24 for FESX424-POE	0	0
100/1000 Mbps SFP Port Density	4-port Combo (1000 Only)	4-port Combo (1000 Only)	20 100/1000 SFP
100 Mbps Ethernet Optics	Not Applicable	Not Applicable	100FX-SR, 100FX-IR, 100FX-LR, and 100Base-BXD/BXU
Gigabit Ethernet Optics	SX, SX2, LX, LHA, LHB, 1000Base BXD/BXU, and CWDM		
10 Gigabit Ethernet	1 or 2-port XFP Module(s) (Optional) for FESX4xx; 2-port XFP Module (Optional) for FESX6xx; IPv4 and IPv6 versions of LR WAN PHY (Optional)		
10 Gigabit Ethernet Optics	SR, LR, ER, ZR, 1310-MM ⁺ , and ZRD		
Support for AC and DC Power Supply	Yes	Yes	Yes
Power Supply Redundancy	1+1 for System/PoE	1+1 for System	1+1 for System

1-The Brocade 10G-XFP-1310-MM transceivers support 10-GbE operation on up to 200 meters of FDDI-grade MM fiber. This transceiver is compatible with 10GBase-LRM optics..

BROCADE FASTIRON EDGE X 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
- 802.3x 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)
- 802.3AB LLDP
- 802.1p Mapping to Priority Queue

RFC Compliance

Protocol Support	<ul style="list-style-type: none">• DNS Client• RFC 1812 IP• RFC 2338 VRRP• VRRPE (Brocade VRRP Enhanced)• Generic VLAN Registration Protocol (GVRP) (conforms to IEEE 802.1Q)• PVST/PVST+/PVRST
BGP4	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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 with Digital Signatures (Password, MD-5)• RFC 2178 OSPF v2• RFC 2370 OSPF Opaque LSA Option
RIP	<ul style="list-style-type: none">• RFC 1058 RIP v1• RFC 1723 RIP v2
IP Multicast	<ul style="list-style-type: none">• 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

- Virtual Cable Tester
- IEEE 802.3 MAU MIB (RFC 2239)
- RFC 2571 Architecture for Describing SNMP Framework
- RFC 951 BootP
- RFC 1542 BootP Extensions
- RFC 2131 DHCP
- RFC 1493 Bridge MIB
- Configuration Logging
- RFC 1643 Ethernet-like Interface MIB
- RFC 2068 HTTP
- RFC 2818 HTTPS
- Industry Standard Command Line Interface (CLI)
- Integration with HP OpenView for Sun Solaris, HP-UX, IBM's AIX, and Windows NT Standalone Windows NT
- RFC 1354 IP Forwarding Table MIB
- IronView Network Manager (INM) Web-based Graphical User Interface
- Embedded Web Management
- RFC 3176 sFlow
- RFC 1213 MIB-II
- RFC 1516 Repeater MIB
- RFC 1724 RIPv2 MIB
- RFC 1757 RMON MIB
- RFC 2572 SNMP Message Processing and Dispatching
- RFC 1573 SNMP MIB II
- RFC 2575 SNMP View-based Access Control Model SNMP
- RFC 1157 SNMPv1/v2c
- 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 SNMPv3 VACM

BROCADE FASTIRON EDGE X SERIES SPECIFICATIONS CONTINUED

Element Security Options	
<ul style="list-style-type: none">• Authentication, Authorization, and Accounting (AAA)• Bi-level Access Mode (Standard and EXEC Level)• Protection for Denial of Service attacks, Man-in-the-Middle attacks, TCP SYN attacks and Smurf attacks• RADIUS• Secure Copy (SCP)• Secure Shell (SSHv2)• TACACS/TACACS+• Username/Password (Challenge and Response)	
Performance	
FESX424 and FESX624	<ul style="list-style-type: none">• Switching Capacity 88 Gbps• Forwarding Rate 65 Mpps
FESX448 and FESX648	<ul style="list-style-type: none">• Switching Capacity 136 Gbps• Forwarding Rate 101 Mpps
FESX424HF and FESX624HF	<ul style="list-style-type: none">• Switching Capacity 88 Gbps• Forwarding Rate 65 Mpps
Dimensions	
FESX424 and FESX624	2.63" (H) x 17.5" (W) x 19.6" (D) 6.68 cm (H) x 44.45 cm (W) x 49.78 cm (D)
FESX448 and FESX648	2.63" (H) x 17.5" (W) x 19.6" (D) 6.68 cm (H) x 44.45 cm (W) x 49.78 cm (D)
FESX424HF and FESX624HF	2.63" (H) x 17.5" (W) x 19.6" (D) 6.68 cm (H) x 44.45 cm (W) x 49.78 cm (D)
Weight	
FESX424 and FESX624	25 lbs (11.36 kg) Fully Loaded including dual redundant power 17.5 lbs (7.95 kg) Empty
FESX448 and FESX648	29 lbs (13.2 kg) Fully Loaded including dual redundant power 17.5 lbs (7.95 kg) Empty
FESX424HF and FESX624HF	25 lbs (11.36 kg) Fully Loaded including dual redundant power 17.5 lbs (7.95 kg) Empty
Environmental Ranges	
<ul style="list-style-type: none">• Acoustic: 47dB• Operating temperature: 32° to 104° F (0° to 40° C)• Relative humidity: 5% to 90%, non-condensing• Storage temperature: -23° to 158° F (-25° to 70° C)• Maximum Watts:<ul style="list-style-type: none">– 220W (750 BTU/Hr) per supply for the FESX424, FESX424HF, FESX624 and FESX624HF– 600W (2,047 BTU/Hr) per supply for the FESX448 and FESX648• Storage altitude: 10,000ft (3,000m) maximum	
Environmental Regulatory Compliance	
<ul style="list-style-type: none">• I RoHS Compliant (5 of 6)• WEEE Compliant	
MTBF	
<ul style="list-style-type: none">• FESX424—302,114 hrs• FESX424 with 2 XFP ports—127,795 hrs• FESX424HF—274,776 hrs• FESX424HF with 2 XFP ports—122,643 hrs• FESX448—171,350 hrs• FESX448 with 2 XFP ports—92,601 hrs• FESX624—256,327 hrs• FESX624 with 2 XFP ports—112,054 hrs• FESX624HF—263,315 hrs• FESX624HF with 2 XFP ports—119,292 hrs• FESX648—177,648 hrs• FESX648 with 2 XFP ports—86,242 hrs	
Power Requirements	
FESX424 and FESX624	AC input voltage: 100vAC @ 3.5A MAX, 240vAC @ 1.5A MAX, 50-60Hz per auto-sensing, auto-switching power supply
FESX448 and FESX648	AC input voltage: 100vAC @ 6A MAX, 240vAC @ 2.5A MAX, 50-60Hz per auto-sensing, auto-switching power supply
FESX424HF and FESX624HF	AC input voltage: 100vAC @ 3.5A MAX, 240vAC @ 1.5A MAX, 50-60Hz per auto-sensing, auto-switching power supply
Safety Certifications	
<ul style="list-style-type: none">• EN 60950• CAN/CS-C22.2 No. 60950-00• EN 60825-1 Safety of Laser Products—Part 1• EN 60825-2 Safety of Laser Products—Part 2• IEC 950• UL 1950 Third Edition• CSA 950	
Electromagnetic Emission Certification	
<ul style="list-style-type: none">• FCC Class A (Part 15)• EN 55022/CISPR-22 Class A• VCCI Class A	
Immunity	
<ul style="list-style-type: none">• Generic: EN 50082-1	
Electromagnetic Emission Certifications	
<ul style="list-style-type: none">• FCC Class A (Part 15)• EN 55022/CISPR-22 Class A• VCCI Class A	
Immunity	
Generic: EN 50082-1	

WARRANTY

- 5-year Limited Lifetime Hardware Warranty
- 90-days Limited Software Warranty

ORDERING INFORMATION CONTINUED

FESX424-POE+1XG-PREM-DC	FastIron Edge X424-POE with Full IPv4 L3 SW includes 20-port 10/100/1000 802.3af and 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 1-port XFP 10 Gigabit Ethernet and one DC power supply.
FESX424-POE+2XG	FastIron Edge X424-POE with Base L3 SW includes 20-port 10/100/1000 802.3af and 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber(SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet and one AC power supply.
FESX424-POE+2XG-PREM	FastIron Edge X424-POE with Full IPv4 L3 SW includes 20-port 10/100/1000 802.3af and 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet and one AC power supply.
FESX424-POE+2XG-DC	FastIron Edge X424-POEwith Base L3 SW includes 20-port 10/100/1000 802.3af and 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet and one DC power supply.
FESX424-POE+2XG-PREM-DC	FastIron Edge X424-POE with Full IPv4 L3 SW includes 24-port 10/100/1000 802.3af with 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet and one DC power supply.
FESX448	FastIron Edge X448 with Base L3 SW. Includes 44-port 10/100/1000 Mbps (RJ-45), 4-port Combo to support 10/100/1000 Mbps (RJ45) or Gigabit Ethernet fiber (SFP), and one AC power supply.
FESX448-PREM	FastIron Edge X448 with Full IPv4 L3 SW. Includes 44-port 10/100/1000 Mbps (RJ-45), 4-port Combo to support 10/100/1000 Mbps (RJ45) or Gigabit Ethernet fiber (SFP), and one AC power supply.
FESX448-DC	FastIron Edge X448 with Base L3 SW. Includes 44-port 10/100/1000 Mbps (RJ-45), 4-port Combo to support 10/100/1000 Mbps (RJ45) or Gigabit Ethernet fiber (SFP), and one DC power supply.
FESX448-DC-PREM	FastIron Edge X448 with Full IPv4 L3 SW. Includes 44-port 10/100/1000 Mbps (RJ-45), 4-port Combo to support 10/100/1000 Mbps (RJ45) or Gigabit Ethernet fiber (SFP), and one DC power supply.
FESX448+1XG	FastIron Edge X448 with Base L3 SW. Includes 44-port 10/100/1000 Mbps (RJ-45), 4-port Combo to support 10/100/1000 Mbps (RJ45) or Gigabit Ethernet fiber (SFP), 1-port XFP 10 Gigabit Ethernet and one AC power supply.
FESX448+1XG-PREM	FastIron Edge X448 with Full IPv4 L3 SW. Includes 44-port 10/100/1000 Mbps (RJ-45), 4-port Combo to support 10/100/1000 Mbps (RJ45) or Gigabit Ethernet fiber (SFP), 1-port XFP 10 Gigabit Ethernet and one AC power supply.
FESX448+1XG-DC	FastIron Edge X448 with Base L3 SW. Includes 44-port 10/100/1000 Mbps (RJ-45), 4-port Combo to support 10/100/1000 Mbps (RJ45) or Gigabit Ethernet fiber (SFP), 1-port XFP 10 Gigabit Ethernet and one DC power supply.
FESX448+1XG-PREM-DC	FastIron Edge X448 with Full IPv4 L3 SW. Includes 44-port 10/100/1000 Mbps (RJ-45), 4-port Combo to support 10/100/1000 Mbps (RJ45) or Gigabit Ethernet fiber (SFP), 1-port XFP 10 Gigabit Ethernet and one DC power supply.
FESX448+2XG	FastIron Edge X448 with Base L3 SW. Includes 44-port 10/100/1000 Mbps (RJ-45), 4-port Combo to support 10/100/1000 Mbps (RJ45) or Gigabit Ethernet fiber (SFP), 2-port XFP 10 Gigabit Ethernet and one AC power supply.
FESX448+2XG-PREM	FastIron Edge X448 with Full IPv4 L3 SW. Includes 44-port 10/100/1000 Mbps (RJ-45), 4-port Combo to support 10/100/1000 Mbps (RJ45) or Gigabit Ethernet fiber (SFP), 2-port XFP 10 Gigabit Ethernet and one AC power supply.
FESX448+2XG-DC	FastIron Edge X448 with Base L3 SW. Includes 44-port 10/100/1000 Mbps (RJ-45), 4-port Combo to support 10/100/1000 Mbps (RJ45) or Gigabit Ethernet fiber (SFP), 2-port XFP 10 Gigabit Ethernet and one DC power supply.
FESX448+2XG-PREM-DC	FastIron Edge X448 with Full IPv4 L3 SW. Includes 44-port 10/100/1000 Mbps (RJ-45), 4-port Combo to support 10/100/1000 Mbps (RJ45) or Gigabit Ethernet fiber (SFP), 2-port XFP 10 Gigabit Ethernet and one DC power supply.
FESX424-L3U	Full IPv4 Layer 3 software upgrade for FESX424, FESX424-POE and FESX424HF. This software upgrade adds support for IPv4 routing protocols such as RIPv1/v2, OSPF, BGP4, and multicast routing, including PIM-SM, PIM-DM, and DVMRP.
FESX448-L3U	Full IPv4 Layer 3 software upgrade for FESX448. This software upgrade adds support for IPv4 routing protocols such as RIPv1/v2, OSPF, BGP4, and multicast routing, including PIM-SM, PIM-DM, and DVMRP.
X4-1XG	Field upgradeable 1-port 10GbE XFP expansion module for FESX424, FESX424HF and FESX448
X4-2XG	Field upgradeable 2-port 10GbE XFP expansion module for FESX424, FESX424HF and FESX448
FESX624	FastIron Edge X624 with Base L3 SW includes 20-port 10/100/1000 plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, and one AC power supply.
FESX624-PREM	FastIron Edge X624 with Full IPv4 L3 SW, includes 20-port 10/100/1000 plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port and one AC power supply.
FESX624-DC	FastIron Edge X624 with Base L3 SW includes 20-port 10/100/1000 plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port and one DC power supply.
FESX624-PREM-DC	FastIron Edge X624 with Full IPv4 L3 SW, includes 20-port 10/100/1000 plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port and one DC power supply.
FESX624+2XG	FastIron Edge X624 with Base L3 SW includes 20-port 10/100/1000 plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet, and one AC power supply.
FESX624+2XG-PREM	FastIron Edge X624 with Full IPv4 SW includes 20-port 10/100/1000 plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet, and one AC power supply.

FESX624+2XG-DC	FastIron Edge X624 with Base L3 SW includes 20-port 10/100/1000 plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet, and one DC power supply.
FESX624+2XG-PREM-DC	FastIron Edge X624 with Full IPv4 SW includes 20-port 10/100/1000 plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet, and one DC power supply.
FESX624HF	FastIron Edge X624HF with Base L3 SW includes 20-port 100/1000 SFP plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port and one AC power supply.
FESX624HF-PREM	FastIron Edge X624HF with Full IPv4 SW includes 20-port 100/1000 SFP plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port and one AC power supply.
FESX624HF-DC	FastIron Edge X624HF with Base L3 SW includes 20-port 100/1000 SFP plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port and one DC power supply.
FESX624HF-PREM-DC	FastIron Edge X624HF with Full IPv4 L3 SW includes 20-port 100/1000 SFP plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port and one DC power supply.
FESX624HF+2XG	FastIron Edge X624HF with Base L3 SW includes 20-port 100/1000 SFP plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet and one AC power supply.
FESX624HF+2XG-PREM	FastIron Edge X624HF with Full IPv4 L3 SW includes 20-port 100/1000 SFP plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet and one AC power supply.
FESX624HF+2XG-DC	FastIron Edge X624HF with Base L3 SW includes 20-port 100/1000 SFP plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet and one DC power supply.
FESX624HF+2XG-PREM-DC	FastIron Edge X624HF with Full IPv4 L3 SW includes 20-port 100/1000 SFP plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet and one DC power supply.
FESX648	FastIron Edge X648 with Base L3 SW includes 44-port 10/100/1000 plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port and one AC power supply.
FESX648-PREM	FastIron Edge X648 with Full IPv4 L3 SW includes 44-port 10/100/1000 SFP plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port and one AC power supply.
FESX648-DC	FastIron Edge X648 with Base L3 SW includes 44-port 10/100/1000 (RJ-45) plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port and one DC power supply.
FESX648-PREM-DC	FastIron Edge X648 with Full IPv4 L3 SW includes 44-port 10/100/1000 SFP plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port and one DC power supply.
FESX648+2XG	FastIron Edge X648 with Base L3 SW includes 44-port 10/100/1000 plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet and one AC power supply.
FESX648+2XG-PREM	FastIron Edge X648 with Full IPv4 L3 SW includes 44-port 10/100/1000 SFP plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet and one AC power supply.
FESX648+2XG-DC	FastIron Edge X648 with Base L3 SW includes 44-port 10/100/1000 (RJ-45) plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet and one DC power supply.
FESX648+2XG-PREM-DC	FastIron Edge X648 with Full IPv4 L3 SW includes 44-port 10/100/1000 (RJ-45) plus 4-port Combo copper/fiber Gigabit Ethernet ports 10/100/1000 Mbps (RJ45) or Gigabit Ethernet Fiber (SFP) connectivity per port, 2-port XFP 10 Gigabit Ethernet and one DC power supply.
FESX624-L3U-IPV4	Full IPv4 Layer 3 software upgrade for FESX624 and FESX624HF. This software upgrade adds support for IPv4 routing protocols such as RIPv1/v2, OSPF, BGP4, and multicast routing, including PIM-SM, PIM-DM, and DVMRP.
FESX648-L3U-IPV4	Full IPv4 Layer 3 software upgrade for FESX648. This software upgrade adds support for IPv4 routing protocols such as RIPv1/v2, OSPF, BGP4, and multicast routing, including PIM-SM, PIM-DM, and DVMRP.
X6-2XG	Field upgradeable 2-port 10GbE XFP expansion module for the FESX624, FESX624HF and FESX648.
RPS-X424	Redundant power supply (220W) for the FESX424, FWSX424 and FESX624.
RPSDC-X424	Redundant DC power supply (220W) for the FESX424, FESX624 and FWSX424.
RPS-X448	Redundant power supply (600W) for the FESX448, FESX648 and FWSX448.
RPSDC-X448	Redundant DC power supply (600W) for the FES X448 and FWS X448.
RPS8DC	Redundant -48V DC Power Supply for the FESX448, FWSX448 and FESX648 only.
RPS-X424-POE	Redundant power supply (600W) for the FESX424-POE.
RPSDC-X424-POE	Redundant DC (600W) for the FESX424-POE