DATA SHEET

FASTIRON EDGE SWITCH

FastIron® Edge Switch™– A New Breed of Intelligent Edge Products

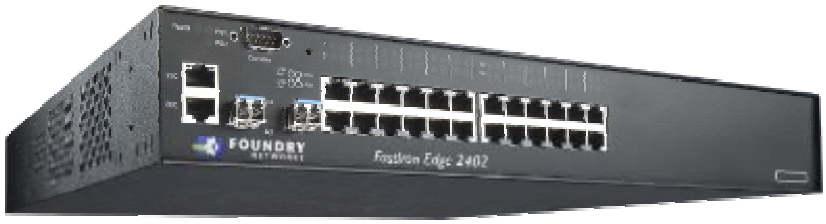
- Figure 1: FastIron Edge Family Including Hot-Swappable, Field-Replaceable AC & DC Power Supply Units

Delivering More for Less…

The FastIron® Edge Switch (FES) series of intelligent edge products provides more flexibility, greater levels of security, extensive redundancy, expanded reliability, and increased resiliency -- while decreasing the network's Total Cost of Ownership (TCO) and reducing the cost of network operation and network administration training. Deploying the FastIron Edge Switch product family in your network increases your network's Return on Investment (ROI) through a complete set of adjustable and controllable features in a compact (1.5 – 2.5 Rack Units) form factor at industry leading prices. Using an advanced hardware platform to provide user-selectable Layer 2 switching – upgradeable to full Layer 3 multiprotocol routing – the FastIron Edge Switch is the next Leadership Platform for today's Enterprise wiring closet and server farm applications.

The Foundry Networks® FastIron Edge Switch (FES) family establishes the next benchmark in edge connectivity by delivering the industry's most adaptable feature set along with the highest combined 10/100Base-TX and Gigabit Ethernet port densities in the smallest, most compact form factor available today. The FES delivers optimized price/performance and a full complement of switching and Layer 3 multiprotocol routing services along with multiple levels of redundancy and inclusive QoS support for deployment in a wide variety of value-added networking applications. The extensive FES feature set provides network administrators with a powerful, yet cost-effective platform to accommodate the widest variety of existing and emerging networking needs ranging from basic network connectivity to full streaming audio and video, as well as extensive multicast support and a platform for converged Voice over IP (VoIP) applications. The FES allows up to two software code images to be stored in memory, an advanced feature found across Foundry's entire product line. The second storage location provides the network administrator an additional level of assurance in the event the primary image becomes corrupted during an upgrade cycle. With this outstanding suite of capabilities, an infrastructure built using Foundry's FES series products is a secure networking environment that delivers the highest ROI unified with the lowest TCO available today and for well into the future.

The FES Intelligent Edge Products include the following configurations:



- Figure 2: FastIron Edge 2402

FES2402: 24 ports 10/100Base-TX plus 2 ports integrated 1000Base-T (RJ45) paired to 2 slots 1000Base-X (mini-GBIC), Full Layer 2 & Base Layer 3 and one hot-swappable, field replaceable AC power supply; Occupies 1.5 rack units (RU)

FES2402-PREM: 24 ports 10/100Base-TX plus 2 ports integrated 1000Base-T (RJ45) paired to 2 slots 1000Base-X (mini-GBIC), Full Layer 2 & 3 and one hot-swappable, field replaceable AC power supply; Occupies 1.5 RU

- Figure 3: FastIron Edge 4802

FES4802: 48 ports of 10/100Base-TX plus 2 ports integrated 1000Base-T (RJ45) paired to 2 slots 1000Base-X (mini-GBIC), Full Layer 2 & Base Layer 3 and one hot-swappable, field replaceable AC power supply; Occupies 1.5 RU

FES4802-PREM: 48 ports 10/100Base-TX plus 2 ports integrated 1000Base-T (RJ45) paired to 2 slots 1000Base-X (mini-GBIC), Full Layer 2 & 3 and one hot-swappable, field replaceable AC power supply; Occupies 1.5 RU

- Figure 4: FastIron Edge 9604

FES9604: 96 ports 10/100Base-TX plus 4 ports integrated 1000Base-T (RJ45) paired to 4 slots 1000Base-X (mini-GBIC), Full Layer 2 & Base Layer 3 and one hot-swappable, field replaceable AC power supply; Occupies 2.5 RU

FES9604-PREM: 96 ports 10/100Base-TX plus 4 ports integrated 1000Base-T (RJ45) paired to 4 slots 1000Base-X (mini-GBIC), Full Layer 2 & 3 and one hot-swappable, field replaceable AC power supply; Occupies 2.5 RU

IronShield™ Security – Wire-speed Network Protection

The FastIron Edge Switch supports multiple levels of security starting with support for MAC address lockdown. The network administrator can assign a single MAC address or a group of MAC addresses to an individual port in order to control unauthorized users from plugging into open RJ45 wall outlets. For more complex networking environments using Remote Authentication Dial-In User Service (RADIUS) authentication servers, the network manager can enable 802.1x port-based authentication – ensuring that the FES authenticates the user first before allowing the port to transmit data onto the network. This also grants users secure mobility while still maintaining the integrity and security of the network against unwarranted breaches. Additionally, the FES supports both regular and extended ACLs. Once the port is operational, the network administrator can deny traffic based on source/destination MAC addresses, source/destination IP addresses, or TCP/UDP ports – further protecting and restricting network access from malicious users. The FES implements ACL lookups in hardware so that providing security and protection for the network does not adversely affect switching or routing performance.

By deploying the FES, network managers can provide layered levels of access to the management console. Multilevel access security on the console and web-based management interface prevents unauthorized users from accessing or changing the switch configuration. By using Terminal Access Controller Access Control Systems (TACACS/TACACS+) as well as RADIUS authentication, the network administrator can enable considerable centralized control and restrict malevolent users from altering network configurations. The FES also supports Secure Shell (SSHv1) and SNPMv3 to further restrict and encrypt communications to the management interface and system, thereby assuring highly secure network management access. The network administrator can use ACLs and provide fine-tuned access and control to the system by binding the ACL to TELNET, web-management, and SNMP interfaces.

To protect the network against Denial of Service (DoS) attacks, the network manager can disable the forwarding of ICMP PING messages and also enable the option to rate limit ICMP and TCP SYN packets. The FES can monitor, throttle, and lockout ICMP and TCP SYN traffic both to the management address of the switch and for traffic transiting the system – enabling this feature can secure and protect the network from suffering from, or aiding, a user-generated DoS attack.

JetScope – Illuminating Network Traffic for Better Network Management and Control

All versions of the FastIron Edge Switch support JetScope™ – Foundry's unique solution to simplify network management. Deploying switches in a networking infrastructure increases overall network performance but essentially eliminates the network administrator's ability to receive a total picture of network capacity, bandwidth consumption, utilization, and overall network health. JetScope illuminates the network and grants visibility about what is actually transpiring in real time to the traffic flowing throughout the network. JetScope uses the built-in capability of the FES ASICs to collect and aggregate details on traffic flows from Layer 2 through Layer 7 and automatically delivers that information to the IronView Network Management station – a Java-based network configuration and management tool that displays, in detail and graphically, network and application level traffic information. With this insight, the network manager can now quickly and accurately review overall networking operations, zero in on hot spots, quickly diagnose, and troubleshoot difficulties before they develop into widespread problems. JetScope also automatically delivers accurate SNMP/RMON statistics to reduce the administrative burden normally associated with proactive network management, design and capacity planning.

Increasing Network Value with Converged (Voice, Video, and Data) Deployments

The FastIron Edge Switch series establishes a high performance platform on which to build flexible and converged voice, video, and data services that can easily adapt to changes and the introduction of future technologies. Deployed in the wiring closet, the FES products provide the capabilities and functionalities required for supporting robust telephony integration within existing networking infrastructures. Providing multiple levels of redundancy and topology fault tolerance, IP phone systems and other converged technologies such as desktop video, built using the FES products, deliver advanced QoS features required to ensure the same level of reliability and availability your end users expect from their existing legacy telephone and video systems.

Intelligent Traffic Control to Manage QoS and Bandwidth Consumption

The FastIron Edge Switch offers superior QoS features to enable network administrators to provide and ensure high-quality services throughout the network from end to end. Foundry's QoS implementation uses the most efficient methodology to classify and prioritize network traffic to avoid widespread network congestion. The FES supports Dual-Mode operation – the ability to identify both 802.1Q tagged and untagged data streams, and places these into their appropriately assigned VLANs. The integration of Voice and Data services onto one common structured cabling plant further reduces the network's TCO – a single FES switch port supports both the handset and PC, thereby reducing by ½ the number of switch ports needed within a converged networking infrastructure. Dual-Mode operation segments and prioritizes 802.1Q tagged IP voice packets, while properly assigning untagged data traffic to the appropriate VLAN, isolating the voice from the data traffic for troubleshooting and traffic monitoring purposes.

Enhancing QoS to Ensure High Availability and Superior Data Traffic Integrity

The FastIron Edge Switch can classify, reclassify, police, and mark the traffic prior to delivery. Network administrators can classify traffic generated by different networking characteristics or devices, such as VoIP handsets, executive management, or bandwidth critical applications, to discriminate among various traffic flows and enforce bandwidth policies on Layer 2 and Layer 3 QoS fields. The FES can identify, classify, and reclassify traffic based on specific criteria such as port, source/destination Media Access Control (MAC) address, 802.1p priority bit, source/destination IP address, Type of Service (ToS) or Differentiated Services Control Point (DSCP) fields, or the Transmission Control Protocol/User Datagram Protocol (TCP/UDP) port.

Once classified, the traffic is queued and scheduled for delivery – the network administrator has complete control over how the system services the queues: Weighted, adjustable Round Robin (WRR) queuing ensures that all packets have the ability to be delivered and ensures that lower-priority packets are not starved for bandwidth; Strict Priority (SP) queuing ensures that the highest-priority traffic always gets serviced first, ahead of all other traffic (which could result in lower-priority bandwidth starvation); Combined SP with WRR guarantees highest-priority traffic delivery while equally servicing the lower priority queues.

The FES is capable of performing extensive rate limiting optimization including input-port and rate limiting controlled by regular and extended ACLs. Rate limiting gives the network administrator the granular control needed to regulate how end users consume bandwidth. Using rate limiting together with the multiple queuing techniques enables the network manager to fairly balance, fine-tune, and control bandwidth consumption, providing the foundation for end-to-end QoS parameters to regulate traffic flows across the entire network. Voice, video, and high-speed data services can be combined and delivered throughout a unified network without suffering from reduced performance or negatively impacting the end-user experience.

Increasing Network Reliability with Load-Balanced and Redundant Power

- Figure 5: FastIron Edge Switch Rear View

Every FastIron Edge Switch ships with either a single AC or DC power supply. Each FES supports two hot-swappable, load-sharing AC, DC, or combined AC and DC, power supply units for unbeatable power redundancy and deployment flexibility. All FES share the same common AC (RPS5) and DC (RPS5-DC) power supply units, further reducing equipment sparing costs and decreasing administrative expenses while, at the same time, increasing overall network serviceability, reliability, and availability. All of the power redundancy features normally available only from a modular chassis are built-in to the FES – a compact, easy to install and manage, fixed-port device.

Enhancing Network Resilience with Redundant Uplink Options

The 1000Base-X (mini-GBIC) Gigabit Ethernet interfaces support a wide range of mini-GBIC transceivers for the full breadth of networking interconnectivity including 1000Base-T (available Q4/02), 1000Base-SX, 1000Base-LX, 1000Base-LHA, and 1000Base-LHB (available 2H/02) for Gigabit Ethernet links up to 100m over Category 5/5e Unshielded Twisted Pair (UTP), 550m over Multimode Fiber (MMF), 10km over Single Mode Fiber (SMF), 70km over SMF, and 150km over SMF, respectively. Higher levels of link resilience can be implemented by deploying dual-homed and redundant Gigabit Ethernet uplinks enabled with Fast Port/Fast Uplink, IEEE 802.1s Multiple Spanning Tree standard, Per-VLAN Spanning Tree (PVST/PVST+), Per-VLAN Group Spanning Tree (PVGST), or load-sharing 802.1Q trunks or Equal Cost Multi Path (ECMP) data center connections. This unmatched selection of redundancy, quick recovery, and load balancing options grants the network administrator the widest range of implementation choices, making the FastIron Edge Switch the ideal intelligent Enterprise edge device to maximize stability and increase network reliability with sub-second failover and recovery. It equally complements the features and functionality available through the rest of Foundry's JetCore™-based modular and fixed-port configuration devices.

Expansive Switching and Routing Options

The FES2402, FES4802, and FES9604 all support wire-speed Layer 2 switching and Basic Layer 3 functionality upgradeable to full multiprotocol Layer 3 routing. The PREM version of the FastIron Edge Switch supports a more in-depth set of multiprotocol routing features including hardware based IP and IPX routing, AppleTalk, RIPv1, RIPv2, OSPF, multicast routing (including PIM-SM/DM, IGMPv2/v3, and DVMRP), Access Control Lists (ACLs) and Extended ACLs, along with Virtual Router Redundancy Protocol (VRRP) and VRRP-Enhanced (VRRPE). All FastIron Edge Switches are upgradeable from complete Layer 2/Basic Layer 3 to Full Layer 3 capability – providing a "pay as you go" strategy, enabling the built-in advanced Full Layer 3 feature set only to those areas that require it.

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Technical Specifications:

Standards Compliance

- 802.1d Bridging
- 802.1D-1998 (includes 802.1p)
- 802.1Q VLAN Tagging
- 802.1s Multiple Instances SP
- 802.1x Port-based Authentication(*)
- 802.3 Ethernet Like MIB
- 802.3,10Base-T
- 802.3ad Link Aggregation
- 802.3u 100Base-TX
- 802.3x Flow Control (*)
- 802.3z 1000Base-SX/LX/TX

Protocol Support

- AppleTalk
- DNS Client
- IP (RFC 1812)
- IPX RIP/SAP
- OPSF NSSA (RFC 1587)
- OSPF (RFC 1583)
- OSPF Database Overflow (RFC 1765)
- OSPF Traps (RFC 1850)
- OSPFv2 (RFC 2328v2)
- RIPv1 (RFC 1058)
- RIPv2 (RFC 1723)
- VRRP (RFC 2338)
- VRRPE (Foundry VRRP Enhanced)

IP Multicast

- DVMRP Host Requirements (RFC 1122)
- DVMRPv2 draft IETF DVMRP v3-07
- IGMP Snooping
- IGMPv1 (RFC 1112)
- IGMPv2 (RFC 2236)
- PIM-DM Draft IETF PIM Dense Mode v2-dm-03
- PIM-SM (RFC 2362)

Management and Control

- 802.3 MAU MIB (RFC 2239)
- Architecture for Describing SNMP Framework (RFC 2571)
- BootP (RFC 951 & RFC 1542)
- BootP/DHCP Relay (RFC 2131)
- Bridge MIB (RFC 1493)
- Configuration Logging
- Ethernet Interface MIB (RFC 1643)
- Ethernet MIB (RFC 1643)
- HTTP (RFC 2068)
- ICMP Router Discovery Protocol (RFC 1256)
- Industry Standard Command Line Interface (CLI)
- Integration with HP OpenView for Sun Solaris, HP-UX, IBM's AIX, and Windows NT Standalone Windows NT
- IP Forwarding Table MIB (RFC 1354)
- IronView Network Manager (INM) Web based graphical user interface
- JetScope - sFlow (RFC3176)
- MIB-II (RFC 1213)
- Repeater MIB (RFC 1516)
- RIPv2 MIB (RFC 1724)
- RMON MIB (RFC 1757)
- SNMP Message Processing and Dispatching (RFC 2572)
- SNMP MIB II (RFC 1573)
- SNMP View-based Access Control Model SNMP (RFC 2575)
- SNMPv1/v2c (RFC 1157)
- SNMPv3 Applications (RFC 2573)
- SNMPv3 Intro to Framework (RFC 2570)
- SNMPv3 User-based Security Model (RFC 2574)
- Support for Multiple SysLogD Servers
- TELNET (RFC 854)
- TFTP (RFC 783)

Element Security Options

- AAA
- Bi-level Access Mode (Standard and EXEC Level)
- Protection for Denial of Service attacks(*)
- RADIUS
- Secure Copy (SCP)
- Secure Shell (SSH v1)
- TACACS/TACACS+
- Username/Password (Challenge and Response)

(*) Denotes future supported item

FASTIRON EDGE SWITCH

Performance:

- FES2402: 6.6 Mpps
- FES4802: 10.2 Mpps
- FES9604: 20.4 Mpps

Physical Dimensions:

- **FES2402:**
  2.63" (H) x 17.5" (W) x 19.6" (D)
  6.68cm (H) x 44.45cm (W) x 49.78cm (D)

- **FES4802**:
  2.63" (H) x 17.5" (W) x 19.6" (D)
  6.68cm (H) x 44.45cm (W) x 49.78cm (D)

- **FES9604:**
  4.38" (H) x 17.5" (W) x 19.6 (D)
  11.12cm (H) x 44.45cm (W) x 49.78cm (D)

Weight

- FES2402:
  - 25 lbs (11.36 kg) Fully Loaded including dual redundant power
  - 17.5 lbs (7.95 kg) Empty
- FES4802:
  - 25 lbs (11.36 kg) Fully Loaded including dual redundant power
  - 17.5 lbs (7.95 kg) Empty
- FES9604:
  - 31 lbs (14.09 kg) Fully Loaded including dual redundant power
  - 23.5 lbs (10.68 kg) Empty
- RPS5:
  - 3.75 lbs (1.70 kg)
- RPS5DC:
  - 3.75 lbs (1.70 kg)

Environmental Ranges:

- 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 BTUs: 340 BTU/Hr (100W) per supply
- Storage altitude: 10,000ft (3,000m) maximum

Power Requirements:

- AC input voltage: 100vAC @ 3.5A, 240vAC @ 1.5A, 50-60Hz per auto-sensing, auto-switching power supply
- DC input voltage

Safety Certifications:

- EN 60950
- IEC 950
- UL 1950
- CSA 950

Electromagnetic Emission Certifications:

- FCC Class A
- EN 55022
- CISPR-22 Class A
- VCCI Class A

Immunity:

- Generic: EN 50082-1

Warranty

- 1-year Hardware
- 90-days Software

Ordering Information

Order Number	Description
FES2402	24-port 10/100Base-TX plus 2-ports Gigabit (X or 1000Base-T) Layer 2 & Base Layer 3 and AC Power
FES4802	48-port 10/100Base-TX plus 2-ports Gigabit (X or 1000Base-T) Layer 2 & Base Layer 3 and AC Power
FES9604	96-port 10/100Base-TX plus 4-ports Gigabit (X or 1000Base-T) Layer 2 & Base Layer 3 and AC Power
FES2402-PREM	24-port 10/100Base-TX plus 2-ports Gigabit (X or 1000Base-T) Full Layer 3 and AC Power
FES4802-PREM	48-port 10/100Base-TX plus 2-ports Gigabit (X or 1000Base-T) Full Layer 3 and AC Power
FES9604-PREM	96-port 10/100Base-TX plus 4-ports Gigabit (X or 1000Base-T) Full Layer 3 and AC Power
FES2402-DC	24-port 10/100Base-TX plus 2-ports Gigabit (X or 1000Base-T) Layer 2 & Base Layer 3 and DC Power
FES4802-DC	48-port 10/100Base-TX plus 2-ports Gigabit (X or 1000Base-T) Layer 2 & Base Layer 3 and DC Power
FES9604-DC	96-port 10/100Base-TX plus 4-ports Gigabit (X or 1000Base-T) Layer 2 & Base Layer 3 and DC Power
FES2402-PREM-DC	24-port 10/100Base-TX plus 2-ports Gigabit (X or 1000Base-T) Full Layer 3 and DC Power
FES4802-PREM-DC	48-port 10/100Base-TX plus 2-ports Gigabit (X or 1000Base-T) Full Layer 3 and DC Power
FES9604-PREM-DC	96-port 10/100Base-TX plus 4-ports Gigabit (X or 1000Base-T) Full Layer 3 and DC Power

ACCESSORIES and OPTIONS	
FES3LU-2	Layer 3 Upgrade for FES2402
FES3LU-4	Layer 3 Upgrade for FES4802 (also supports FES2402)
FES3LU-9	Layer 3 Upgrade for FES9604 (also supports FES2402 & FES4802)
E1MG-SX	1000Base-SX mini-GBIC optic, MMF, LC connector
E1MTG-SX	1000Base-SX mini-GBIC optic, MMF, MTRJ connector
E1MG-LX	1000Base-LX mini-GBIC optic, SMF, LC connector
E1MG-LHA	1000Base-LHA mini-GBIC optic, SMF, LC connector, 70km reach
E1MG-LHB	1000Base-LHB mini-GBIC optic, SMF, LC connector, 150km reach (available 2H/02)
E1MG-TX	1000Base-T mini-GBIC optic, UTP Cat. 5/5e, RJ45 connector (available Q4/02)
RPS5	Redundant auto-switching 90-240v AC Power Supply Unit
RPS5DC	-48vDC Power Supply Unit