BIGIRON MG8



HIGHLIGHTS

- Wire-speed 480-Mpps routing performance with distributed, non-blocking 1.28-Tbps switching architecture
- Extensive, scalable IPv4/IPv6 protocol support with up to 200 BGP peers and 2 million BGP routes, and hardware routing of IPv4 and IPv6 traffic
- ► Highest density 10-GbE, 32 ports, and 1-GbE, 480 ports, dual-stack IPv4/IPv6 switching and routing
- ▶ sFlow Layer 2-4 traffic monitoring for Ethernet, IPv4 and IPv6

10-GIGABIT ETHERNET LAYER 3 SWITCH

The BigIron® MG8 is designed for the low latency, high performance, and high reliability environments of the next generation networks. Built on a distributed, non-blocking switch architecture the MG8 delivers wire-speed performance for high density Gigabit and 10-Gigabit Ethernet applications. Whether for aggregation in a high performance cluster computing environment, or for a next generation Enterprise backbone, the MG8 offers unparalleled Quality of Service, low latency, robust security, high reliability and extensive scalability.

The BigIron MG8 complements Foundry's enterprise chassis-based portfolio that consists of the BigIron and FastIron JetCore family. The BigIron MG8 extends the power and performance of Foundry's BigIron family into environments that demand high density Gigabit and 10-Gigabit Ethernet with sophisticated high performance filtering and forwarding requirements.

Key Features and Benefits

- ▶ Unparalleled industry leading port density of up to 32 10-GbE ports or 480 GbE ports within a chassis, and up to 96 10-GbE ports in or 1440 GbE ports in a standard 7 foot rack frees rack space for Cluster Computing environments without giving up performance
- ► Distributed route forwarding tables in hardware on the line cards allows for wire speed IPv4 or IPv6 routing, accelerating network performance
- ► Hardware-based ACLs and DoS protection provides traffic filtering and network protection without impacting application or switch performance
- ➤ Superior QoS delivery with Advanced Bandwidth Management (ABM) for advanced individual and group user bandwidth management based on Layer 2—4 information
- ▶ Industry's lowest 10-GbE switching latency of less than 10 microseconds, increases performance of sensitive applications including Voice over IP (VoIP), video, Grid Computing, Storage Area Networks, and real-time transactions
- ▶ High-availability design which includes redundant management modules with Hitless Management Failover (HMF), hot-swappable modules with localized forwarding and routing information, hot-swappable power supplies, variable-speed fans, and hot-pluggable optics giving continuous up time for mission critical networks





BIGIRON MG8



System Summary

FEATURE	SPECIFICATION
Interface Slots	8
System Switching Architecture	1.28-Tbps
Switch Forwarding Capacity	640-Gbps
Routing Performance per System	480-Mpps*
Routing Performance per 7' Rack	1.5-Bpps
Max 10-GbE Ports per System	32
Max 10-GbE Ports per 7' Rack	96
Max 1-GbE Ports per System	480
Max 1-GbE Port per 7' Rack	1,440
Height (inches/Rack units)	AC:26.25"/15 RU DC:22.75"/13 RU
Power supply redundancy	AC: N+1, 1+1 DC: 1+1

^{*}Million Packets per second (Mpps) numbers are aggregate based on switching capacities of the line cards



Purpose-Built for Demanding Applications

INDUSTRY LEADING PERFORMANCE / CAPACITY

The MG8 incorporates the industry's highest performance, non-blocking, distributed switching architecture with a parallel cross-point switch fabric providing up to 640-Gigabits per second of switching throughput, and 480 million packets per second switching performance.

Each of the interface slots in the BigIron MG8 supports 40-Gbps of full duplex, non-blocking traffic forwarding. This allows for wire speed switching of 4 10-GbE or 40 1-GbE ports across the switching fabric, as well as locally on the module.

SUPERIOR HIGH AVAILABILITY

Redundant, hot-swappable components offer non-stop traffic forwarding.

- ► Management module—The system can be configured with dual management modules with sub-second detection and fail-over capabilities
- ► Hitless Management Failover (HMF)—Management module failover is performed in a stateful manner, maintaining all the Layer 2 and Layer 3 information required for packet forwarding¹. This enhances network availability for mission critical applications.
- ➤ Variable-speed fans—The cooling sub-system comes with two software controlled, variable-speed, hot-swappable fans that auto-adjust to meet airflow demand
- ► Redundant Power Supplies—Redundant, load sharing, hot-swappable power supplies offer N+1 as well 1+1 (full) redundancy
- ▶ Optional −48v DC—The system may optionally be configured for running using an external DC power in a non-redundant or 1+1 redundant configuration.
- ➤ Distributed processor architecture improves the performance of the system by lowering the processing load on the management module

Utilizing the port trunking capabilities improves the reliability and scales the network capacity by dynamically combining up to eight cross-module 10-Gigabit Ethernet ports together, providing a resilient high-capacity connection between switches.

This all comes together by utilizing network-level redundancy protocols for Layer 2 and Layer 3 networks. The BigIron MG8 IronWare OS provides carrier-class resilience in case of link or system failures. VRRP and VRRPE provide redundancy in Layer 3 networks while MRP, VSRP, and RSTP provide SONET-like resiliency in Layer 2 networks.

INDUSTRY LEADING LAYER 2 FEATURES

To provide self-healing topologies in Layer 2 networks the BigIron MG8 supports industry standard protocols such as SpanningTree (STP), Rapid SpanningTree (R-STP), perVLAN STP, and per VLAN group STP. In addition to these protocols, Foundry has developed advanced Layer 2 protocols to increase network reliability. These include:

- ▶ Metro Ring Protocol (MRP)—Foundry's patented metro protocol offers an alternative to Spanning Tree-based designs and provides sub-second fault detection and fail-over specifically for Ethernet ring topologies. MRP also works in conjunction with VSRP and 802.3ad based link aggregation to provide bandwidth scalability and SONET-like resiliency.
- ► Virtual Switch Redundancy Protocol (VSRP)—Offers an alternative to Spanning Tree-based designs and provides subsecond fault detection and fail over protocol for mesh topologies
- ► Topology Groups—Goes beyond PVGST to scale all supported Layer 2 control protocols including STP, RSTP, MRP and VSRP
- ➤ SuperSpan[™]—A unique innovation from Foundry that allows for building of very large Layer 2 Ethernet networks and having STP running in the core of the network and separate instances of STP running at edge locations, with the edge STP packets tunneling through the core
- ➤ Super Aggregated VLANs (SAVs)—Allows transparent tunneling of multiple VLANs using a single backbone VLAN. This allows for the creation of a flexible, scalable layer-2 backbone that supports up to 16 million.



The BigIron MG8 also supports high performance Layer 2 multicast with hardware, wire-speed forwarding. In order to efficiently handle the distribution of multicast traffic, the switch supports advanced techniques to determine which ports truly requires the multicast traffic.

- ► IGMP Snooping—Delivers hardware-based multicast support that forwards multicast traffic only to a requesting port based on IGMP join and leave packets
- ▶ PIM Snooping—The BigIron MG8 snoops the PIM traffic and forwards multicast group traffic only to the routers requesting the traffic, eliminating the wasteful bandwidth consumption of sending the traffic to all other members of the VLAN

ROBUST LAYER 3 FEATURE SET

The Foundry IronWare operating system offers Internet strength, robust routing protocol implementations that are extensively deployed in many large-scale ISP and Enterprise environments.

- ▶ BGPv4—Internet-proven interior and exterior BGP with support for 2 million IPv4 routes, 200 peers, route-flap dampening, confederations, route-reflectors, route-maps, and peer groups. The IronWare OS implements a full complement of BGP features including:
 - Route Redistribution
 - Load-sharing/multi-homing
 - Fast External Fail over
 - Route Refresh
 - BGP route filtering based on IP address ACL
 - Community ACL
 - —AS-Path ACL
 - --- Prefix-list
 - User attributes and community
 - ECMP Load Sharing on up to 8 paths
 - MD5 Authentication
 - -BGP-Guard

- ► OSPF—Robust scalability with support for over 400,000 routes and features such as:
 - OSPF Stub Area, Totally Stubby Area, & Not-so-Stubby Area
 - -Virtual Link
 - External Route Summarization
 - MD5 Authentication
 - Route Redistribution
 - LSDB Overflow Handling
 - Group LSA Pacing
 - ECMP Load Sharing on up to 8 paths
 - Route filtering based on IP address ACLs & redistribution filters
- ▶ Policy Based Routing (PBR)—Allows for access control list (ACL) based policies in determining routing decisions. Control network usage by traffic flows through setting policies that determine which type of traffic takes which path through the network.
- ▶ Multicast Routing—Provides hardware-based multicast support including DVMRP, MSDP, PIM-SM (Sparse Mode) and PIM-DM (Dense Mode) protocols that allows network managers to efficiently deploy next-generation streaming media applications for improved employee collaboration and productivity
- ▶ VRRP and VRRPE (Enhanced VRRP)—Improves Layer 3 reliability by supporting resilient dual-homed router topologies. In the event of a router failure, the BigIron will automatically and seamlessly perform the tasks of the failed router. VRRPE extends the capabilities of VRRP by providing network managers the convenience of a virtual interface to aid in traditional IP troubleshooting tools.

ADVANCED QUALITY OF SERVICE (QOS)

Advanced QoS allows administrators to prioritize flows, and to enforce or change traffic priority based on port, VLAN, Source MAC, ACL, 802.1p, Type of Service (ToS) or DiffServ settings to enhance QoS for business-critical flows with the traffic directed to the appropriate internal queue for handling. The BigIron MG8 supports Strict Priority (SP) and Weighted Fair Queuing (WFQ) mechanisms for queue processing. This allows for high priority traffic to take advantage of the ultra-low latency, less then 10 microseconds, for superior application performance.



ADVANCED BANDWIDTH MANAGEMENT (ABM)

Intelligent bandwidth management uses hardware based enforcement of Committed Information Rate (CIR) with Excess Burst control capabilities and seamlessly integrates with other advanced QoS features including priority marking and honoring. Bandwidth allocation can be made per port, per port and traffic priority level, or down to the Layer 2 or Layer 3 flow level.

IRONSHIELD™ SECURITY

The Foundry BigIron MG8 incorporates hardware and software features to improve the security of the network. The device includes support for AAA control of access to the BigIron MG8 with SSH, HTTPS and SNMPv3, as well as to the network itself with advanced features such as IEEE 802.1x with dynamic VLAN and filters support. It incorporates secure links for managing the device as well as between devices (such as MD5 with BGP). And most importantly, it is able to monitor traffic and implement filters based on traffic type, and rates. With support for up to 10,000 Layer 2 or Layer 3 ACL elements, the MG8 is capable of granular control of packet forwarding and filtering with wire-speed switching and routing. The MG8 supports the full set of IronShield security features. Visit the Foundry website for the most up to date information on best practices for securing your network.

IPV6 ROUTING AND SWITCHING SOLUTIONS FOR THE NEW INTERNET

Foundry continues to address the ongoing challenges faced by service provider and enterprise customers alike with industry-leading, hardware-based 10-GbE and Gigabit Ethernet Layer 3 switches and routers. Foundry Networks proven IronWare operating system, delivers a rich IPv6 feature set that allows customers to begin their migration path to IPv6. Foundry's IPv6 implementation maintains many of the basic attributes of IPv4 while offering new capabilities and increased flexibility, and addressing key challenges inherent to IPv4 such as growth, quality of service and security. Features designed to provide smooth migration and support of dual-stack environments, are among them.

Foundry supports a comprehensive IPv6 feature set including:

- ► IPv6 protocol VLANs to create separate IPv4 and IPv6 broadcast domains
- ► Huge IPv6 address space for global scalability and reachability
- ► IPv6 neighbor discovery to facilitate finding and keeping track of neighbors
- ► Stateless auto-configuration and subnet renumbering lets hosts dynamically configure their own addresses and simplifies IP addresses changes
- ► Path MTU discovery facilitates the handling of fragmented packets along an IPv6 path, streamlining router processing and increasing performance
- ► RIPng offers the same benefits as RIPv2 (RFC 1271) with support for IPv6 prefixes
- ► OSPFv3 designed to handle the increased address size with enhanced processing
- ▶ BGP for IPv6 increases scalability with support for IPv6 addresses
- ► Hierarchical addressing structure designed to reduce the number of routes and increase efficiency
- ▶ Dual Stacks enable seamless integration of IPv4 and IPv6 networks
- ► Three different types of tunneling to facilitate the migration to IPv6 in an IPv4

Foundry Networks IPv6 implementation offers early adopters the tools they need to begin their IPv6 migration. The addition of IPv6 to the BigIron MG8 is a natural progression and leverages its industry proven routing capabilities to deliver scalable IPv6 network solutions.



Technical Specifications

IEEE COMPLIANCE

- 802.3ae 10-Gigabit Ethernet
- 802.3x Flow Control
- 802.3ad Link Aggregation
- 802.1QVLANs
- 802.1D Bridging
- 802.1w Rapid STP
- 802.1X User Authentication
- 802.3 Ethernet Like MIB
- Repeater MIB
- Ethernet Interface MIB
- SNMP v1. v2c and V3
- SNMP MIB II

RFC COMPLIANCE

BGPv4

- RFC 1771 BGPv4
- RFC 1745 OSPF interactions
- RFC 1997 Communities & Attributes
- RFC 2439 route flap dampening
- RFC 2796 route reflection
- RFC 1965 BGP4 confederations
- RFC 2842 Capability Advertisement
- RFC 2918 Route Refresh Capability
- RFC 1269 Managed Objects for BGP
- RFC 2385 BGP Session Protection via TCP MD5

OSPF

- RFC 1583 OSPF v2
- RFC 2328 OSPF v2
- RFC 1587 OSPF NSSA
- RFC 1745 OSPF Interactions
- RFC 1765 OSPF Database Overflow
- RFC 1850 OSPFTraps
- RFC 2154 OSPF w/Digital Signatures (Password, MD-5)
- RFC 1850 OSPF v2 MIB

RIP

- RFC 1058 RIP v1
- RFC 1723 RIP v2
- RFC 1812 RIP Requirements

IP Multicast

- RFC 1112 IGMP
- RFC 2236 IGMP v2
- RFC 2362 PIM-SM
- PIM-DM v1
- DVMRP v3-07
- MSDP
- RFC 2283 MBGP

General Protocols

- RFC 791 IP
- RFC 792 ICMP
- RFC 1256 ICMP Router Discovery Protocol
- RFC 793TCP
- RFC 783TFTP
- RFC 826 ARP
- RFC 768 UDP
- RFC 894 IP over Ethernet
- RFC 906 TFTP Bootstrap
- RFC 1027 Proxy ARP

- REC 854TELNET
- RFC 951 BootP
- RFC 1542 BootP Extensions
- RFC 1122 Host Requirements
- RFC 1256 IRDP
- RFC 1519 CIDR
- RFC 1591 DNS (client)
- RFC 1812 General Routing
- RFC 1541 and 1542 DHCP
- RFC 2131 BootP/DHCP Helper
- RFC 2338VRRP

Others

- RFC1354 IP Forwarding MIB
- RFC 1757 RMON Groups 1,2,3,9
- RFC 2068 HTTP
- REC 2030 SNTP
- RFC 2138 RADIUS
- RFC 3176 sFlow
- Draft-ietf-tcpm-tcpsecure-00

IPv6 Core

- 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 1981 IPv6 Path MTU Discovery
- 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 3363 DNS support

IPv6 Routing

- RFC 2080 RIPng for IPv6
- RFC 2740 OSPFv3 for IPv6
- IETF Draft_ietf_isis_IPv6 IS-IS for IPv6
- RFC 2545 Use of MP-BGP-4 for IPv6

IPv6 Multicast

- RFC 2362 PIM-SM
- RFC 2710 Multicast Listener Discovery (MLD) for IPv6
- RFC 3306 Unicast-Prefix-based IPv6 Multicast Addresses
- IETF Draft-vida-mld-v2

IPv6Transitioning

- RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers
- RFC 3056 Connection of IPv6 Domains via IPv4 Clouds

NETWORK MANAGEMENT

- IronView Network Manager (INM) Web-based graphical user interface
- Integrated Standard-based Command Line Interface (CLI)
- sFlow (RFC 3176)
- Telnet and ssh
- SNMP(v1, 2c, 3)
- RMON
- HP OpenView for Sun Solaris, HP-UX, IBM's AIX, and Windows NT

ELEMENT SECURITY OPTIONS

- AAA
- RADIUS
- Secure Shell (SSH v1 and 1.5)
- 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

ENVIRONMENTAL

- Operating Temperature: 0 °C to 40 °C (32 °F to 104 °F)
- Relative Humidity: 5 to 90%, @ 40 °C (104 °F), non-condensing
- Operating Altitude: 10,000 ft (3,000 m) maximum
- Storage Temperature: -25 °C to 70 °C (-9 °F to 158 °F)
- Storage Altitude: 15,000 ft (4,500 m) maximum
- Storage Humidity:95% maximum relative humidity, non-condensing

SAFETY AGENCY APPROVALS

- CAN/CSA-C22.2 No. 60950-00/UL 60950
 —Third Edition, Safety of Information
 Technology Equipment
- EN 60825-1 Safety of Laser Products—Part 1: Equipment Classification, Requirements and User's Guide
- EN 60825-2 Safety of Laser Products—Part 2: Safety of Optical Fibre Communication Systems
- EN 609500 Safety of Information Technology Equipment

EMISSIONS

- CSA 950 Electromagnetic Emission Certification
- FCC Class A
- FCC Class A - EN 55022 / CISPR-22 Class A / VCCI Class A

IMMUNITY

- EN 61000-3-2 Power Line Harmonics
- EN 61000-3-2 Power
- EN 61000-4-3 Radiated Immunity
- EN 61000-4-3 Radi
- EN 61000-4-5 Surge
- EN 61000-4-6 Low Frequency
- Common Immunity
 EN 61000-4-11Voltage Dips and Sags Generic:
- EN 50082-1
- ESD: IEC 61000-4-2; 4 kV CD, 8 kV AD
 Radiated: IEC 61000-4-3; 3V/m
- EFT/Burst: IEC 61000-4-4; 1.0 kV (power line),
- 0.5 kV (signal line)
 Conducted: IEC 61000-4-6; 3V

WARRANTY

- 1-year hardware
- 90-day software

MOUNTING OPTIONS

- 19" Universal EIA 310 (Telco) Rack or Tabletop



System Specifications

POWER SPECIFICATIONS

	@100 VAC		@200 VAC			@-48 VDC			
	Current (Amps)	Power (Watts)	Thermal Output (BTU/HR)	Current (Amps)	Power (Watts)	Thermal Output (BTU/HR)	Current (Amps)	Power (Watts)	Thermal Output (BTU/HR)
BIMG8-FAN	1.3	132	451	0.7	132	451	2.2	107	365
BIMG8-MR	0.6	62	212	0.3	62	212	1.0	50	171
BIMG8-SFM	1.4	135	461	0.7	135	461	2.3	110	375
BIMG8-1Gx40-SFP	3.2	320	1092	1.6	320	1092	5.4	260	887
BIMG8-1Gx40-GC	3.2	320	1092	1.6	320	1092	5.4	260	887
BIMG8-10Gx2	2.2	222	758	1.1	222	758	3.8	180	614
BIMG8-10Gx4	3.1	308	1051	1.5	308	1051	5.2	250	853
BIMG8-1Gx10-SFP-v6	1.4	140	479	0.7	140	479	2.4	114	389
BIMG8-1Gx20-SFP-v6	2.0	202	689	1.0	202	689	3.4	164	560
BIMG8-1Gx40-SFP-v6	3.3	325	1109	1.6	325	1109	5.4	264	901
BIMG8-1Gx40-GC-v6	3.3	325	1109	1.6	325	1109	5.4	264	901
BIMG8-1Gx60-GC-v6	3.3	329	1123	1.6	329	1123	5.4	268	915
BIMG8-10Gx2-v6-A	2.3	227	775	1.1	227	775	3.8	184	628
BIMG8-10Gx4-v6-A	3.1	313	1068	1.5	313	1068	5.2	254	867
System Max	32	3155	10768	16	3155	10768	54	2568	8765

^{*} Note: Passive Chassis + 2 * BIM8-FAN + 1 * BIMG8-SFM gives base chassis power consumption. Power and current shown above are measured at the primary side of the power supply (inclusive of power supply efficiency)

BIMG8-ACPWR	AC InputVoltage: 100VAC to 240VAC
Power supply module	Maximum Power Consumption: 1150 Watts
	Maximum Current Draw: 14.2A @ 100VAC; 7.1A @ 200VAC
	AC Frequency: 47 – 63 Hz

PHYSICAL SPECIFICATIONS

	AC VERSION	DC Version		
Dimensions	26.25h x 17.5w x 24d inches	22.75h x 17.5w x 24d inches		
	66.68h x 44.45w x 60.96d cm	57.78h x 44.45w x 60.96d cm		
Weight Fully-loaded	242 lbs (110 kg)	174 lbs (79 kg)		



Ordering Information

PART NUMBER	DESCRIPTION
BIMG8-AC	8-slot BigIron MG8 AC chassis with three 1100w power supplies, Backplane switch fabric, Dual Fan modules, Dual Fan Controllers, and replaceable Air Filter
BIMG8-DC	8-slot BigIron MG8 –48V DC Chassis with Backplane switch fabric, Dual Fan modules, Dual Fan Controllers, and replaceable Air Filter
BIMG8-MR	BigIron MG8 System Management Module, 512 MB SDR AM, dual PCMCIA ports and out-of-band 10/100 Ethernet management port
BIMG8-10Gx2	2-port 10-GbE module with support for XENPAK optics—requires optics (10G-XNPK-SR/LR/ER)
BIMG8-10Gx2-v6-A	2-port 10-GbE module with IPv6 hardware support and support for XENPAK optics—requires optics (10G-XNPK-SR/LR/ER)
BIMG8-10Gx4	4-port 10-GbE module with support for XENPAK optics—requires optics (10G-XNPK-SR/LR/ER)
BIMG8-10Gx4-v6-A	4-port 10-GbE module with IPv6 hardware support and support for XENPAK optics —requires optics (10G-XNPK-SR/LR/ER)
BIMG8-1Gx10-SFP-v6	10-port Gigabit Ethernet module with IPv6 hardware support and SFP slots—requires
BIMG8-1Gx20-SFP-v6	20-port Gigabit Ethernet module with IPv6 hardware support and SFP slots—requires optics
BIMG8-1Gx40-SFP	40-port Gigabit Ethernet module with SFP slots—requires optics
BIMG8-1Gx40-SFP-v6	40-port Gigabit Ethernet module with IPv6 hardware support and SFP slots—requires optics
BIMG8-1Gx40-GC	40-port Gigabit Ethernet over Copper module with RJ45 connectors
BIMG8-1Gx40-GC-v6	40-port Gigabit Ethernet over Copper module with IPv6 hardware support and RJ45 connectors
BIMG8-1Gx60-GC-v6	60-port Gigabit Ethernet over Copper module with IPv6 hardware support and RJ45 connectors
BIMG8-ACPWR	1100w AC power supply
10G-XNPK-SR	850nm serial pluggable XENPAK optic only (SC) over MMF
10G-XNPK-LR	1310nm serial pluggable XENPAK optic only (SC) for up to 10km over SMF
10G-XNPK-ER	1550nm serial pluggable XENPAK optic only (SC) for up to 40km over SMF

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