
Foundry BigIron MG8 Switch Installation and Basic Configuration Guide



FOUNDRY
NETWORKS
www.foundrynetworks.com

2100 Gold Street
P.O. Box 649100
San Jose, CA 95164-9100
Tel 408.586.1700
Fax 408.586.1900

July 2005

Copyright © 2005 Foundry Networks, Inc. All rights reserved.

No part of this work may be reproduced in any form or by any means – graphic, electronic or mechanical, including photocopying, recording, taping or storage in an information retrieval system – without prior written permission of the copyright owner.

The trademarks, logos and service marks ("Marks") displayed herein are the property of Foundry or other third parties. You are not permitted to use these Marks without the prior written consent of Foundry or such appropriate third party.

Foundry Networks, BigIron, FastIron, IronView, JetCore, NetIron, ServerIron, Turbolron, IronWare, EdgIron, IronPoint, the Iron family of marks and the Foundry Logo are trademarks or registered trademarks of Foundry Networks, Inc. in the United States and other countries.

F-Secure is a trademark of F-Secure Corporation. All other trademarks mentioned in this document are the property of their respective owners.

CHAPTER 1

GETTING STARTED..... 1-1

INTRODUCTION	1-1
AUDIENCE	1-1
NOMENCLATURE	1-1
RELATED PUBLICATIONS	1-2
WHAT'S NEW IN THIS EDITION	1-2
HOW TO GET HELP	1-9
WEB ACCESS	1-9
EMAIL ACCESS	1-9
TELEPHONE ACCESS	1-9
WARRANTY COVERAGE	1-9

CHAPTER 2

PRODUCT OVERVIEW 2-1

PRODUCT OVERVIEW	2-1
BIGIRON MG8 BACKBONE APPLICATIONS	2-2
CAMPUS CONNECTIVITY	2-2
GRID COMPUTING	2-3
HARDWARE FEATURES	2-3
CHASSIS	2-4
MANAGEMENT MODULES	2-7
PCMCIA SLOTS.....	2-7
CONSOLE PORT.....	2-7
10/100 ETHERNET PORT	2-7
LEDs.....	2-8
INTERFACE MODULES	2-8
10 GIGABIT ETHERNET INTERFACE MODULES	2-9
LEDs	2-10
1 GIGABIT ETHERNET INTERFACE MODULES	2-10
60-PORT 1 GIGABIT ETHERNET INTERFACE MODULE (COPPER)	2-11

SUPPORT FOR CWDM MINI-GBICS	2-12
SUPPORT FOR 1000BASE-BX MINI-GBICS	2-12
SUPPORT FOR NEW XENPAKS	2-13
10 Gigabit Ethernet Copper XENPAK	2-13
10 Gigabit Ethernet Fiber LX4 XENPAKs	2-14
10 Gigabit Ethernet ZR Fiber XENPAKs	2-14
10 Gigabit Ethernet ZRD Fiber XENPAKs	2-15
XENPAK WAN PHY Transceiver for 10 Gigabit Ethernet Ports	2-15
SETTING THE WAN PHY XENPAK TO WAN MODE.....	2-16
SWITCH FABRIC MODULE	2-16
POWER SUPPLIES	2-17
AC POWER SUPPLIES.....	2-17
DC POWER SOURCE	2-18
COOLING SYSTEM	2-18
RACK MOUNT KIT	2-20
SUPPORTED FEATURES	2-20
SUPPORT FOR SOFTWARE FEATURES BY TCAM VERSION INSTALLED	2-20
SUPPORT FOR VERSION 02.1.00 FEATURES	2-21
SUPPORT FOR VERSION 02.2.00 FEATURES	2-22
SUPPORT FOR VERSION 02.2.01 FEATURES	2-22
DETERMINING THE TYPE OF INTERFACE MODULE THAT YOU HAVE INSTALLED	2-22
OTHER SUPPORTED SOFTWARE FEATURES	2-23
BIGIRON MG8 ARCHITECTURE	2-24
SWITCHING ARCHITECTURE	2-24
HOW A PACKET FLOWS THROUGH THE SWITCHING ARCHITECTURE	2-25
SYSTEM MANAGEMENT ARCHITECTURE	2-26
REAL TIME OPERATING SYSTEM	2-27

CHAPTER 3

INSTALLING A BIGIRON MG8.....	3-1
SUMMARY OF INSTALLATION TASKS	3-1
INSTALLATION PRECAUTIONS	3-3
GENERAL PRECAUTIONS	3-3
LIFTING PRECAUTIONS	3-3
POWER PRECAUTIONS	3-4
PREPARING THE INSTALLATION SITE	3-5
CABLING INFRASTRUCTURE	3-5
INSTALLATION LOCATION	3-5
INSTALLING A CHASSIS IN A RACK	3-5
ATTACHING MOUNTING BRACKETS TO CHASSIS	3-5
MOUNTING THE CHASSIS IN A RACK	3-6
REMOVING THE SLOT PANELS	3-8
INSTALLING THE MODULES	3-9
INSTALLING POWER SUPPLIES	3-10
INSTALLING AN AC POWER SUPPLY	3-11
CONNECTING A DC POWER SOURCE	3-11
ATTACHING A MANAGEMENT STATION	3-12
ATTACHING A PC OR TERMINAL TO THE CONSOLE PORT OR ETHERNET PORT	3-13

ATTACHING A SWITCH BIGIRON MG8 TO THE ETHERNET PORT3-13

POWERING ON A SYSTEM3-13

VERIFYING PROPER OPERATION3-14

 OBSERVING THE LEDES3-14

 DISPLAYING THE MODULE STATUS3-19

CHAPTER 4

CONNECTING A BIGIRON MG8

TO A NETWORK DEVICE 4-1

ASSIGNING PERMANENT PASSWORDS4-1

CONFIGURING IP ADDRESSES4-2

 SUPPORT OF SUBNET MASKS4-3

 ASSIGNING AN IP ADDRESS TO A MANAGEMENT INTERFACE4-3

 ASSIGNING AN IP ADDRESS TO AN INTERFACE, VIRTUAL INTERFACE, OR LOOPBACK4-4

 DISABLING AND REENABLING THE MANAGEMENT AND ETHERNET PORTS4-5

CONNECTING AN ETHERNET INTERFACE MODULE4-5

 INSTALLING A FIBER-OPTIC MODULE4-5

 CABLING A FIBER-OPTIC MODULE4-6

 CLEANING FIBER-OPTIC CONNECTORS4-6

TESTING NETWORK CONNECTIVITY4-6

 TROUBLESHOOTING NETWORK CONNECTIONS4-6

 PINGING AN IP ADDRESS4-7

 TRACING A ROUTE4-8

CHAPTER 5

GETTING FAMILIAR WITH BIGIRON MG8

MANAGEMENT APPLICATIONS..... 5-1

LOGGING ON THROUGH THE CLI5-1

 ON-LINE HELP5-2

 COMMAND COMPLETION5-2

 SCROLL CONTROL5-2

 LINE EDITING COMMANDS5-3

 SEARCHING AND FILTERING OUTPUT FROM CLI COMMANDS5-3

 SEARCHING AND FILTERING OUTPUT FROM SHOW COMMANDS..... 5-3

 Displaying Lines Containing a Specified String5-4

 Displaying Lines That Do Not Contain a Specified String5-4

 Displaying Lines Starting with a Specified String5-4

 SEARCHING AND FILTERING OUTPUT AT THE --MORE-- PROMPT 5-5

 USING SPECIAL CHARACTERS IN REGULAR EXPRESSIONS..... 5-6

LOGGING ON THROUGH THE WEB MANAGEMENT INTERFACE5-8

 WEB MANAGEMENT INTERFACE5-9

LOGGING ON THROUGH IRONVIEW NETWORK MANAGER5-11

CHAPTER 6

USING A REDUNDANT MANAGEMENT MODULE 6-1

HOW MANAGEMENT MODULE REDUNDANCY WORKS6-1

MANAGEMENT MODULE REDUNDANCY OVERVIEW	6-1
MANAGEMENT MODULE SWITCHOVER	6-2
UNAVAILABLE ACTIVE MODULE.....	6-2
MANUAL SWITCHOVER	6-2
REMOVAL AND REPLACEMENT OF A MANAGEMENT MODULE.....	6-3
Removal and Replacement of an Active Management Module	6-3
Removal and Replacement of a Standby Management Module	6-3
SWITCHOVER IMPLICATIONS	6-3
MANAGEMENT SESSIONS	6-3
SYSLOG AND SNMP TRAPS.....	6-4
MAC ADDRESS CHANGES	6-4
LAYER 2 HITLESS FAILOVER IN TERATHON IRONWARE RELEASE 02.0.02 AND LATER	6-4
MANAGEMENT MODULE REDUNDANCY CONFIGURATION	6-4
CHANGING THE DEFAULT ACTIVE CHASSIS SLOT	6-5
MANAGING MANAGEMENT MODULE REDUNDANCY	6-5
FILE SYNCHRONIZATION BETWEEN THE ACTIVE AND STANDBY MANAGEMENT MODULES	6-6
COMPARING AND SYNCHRONIZING FILES	6-7
SYNCHRONIZING FILES WITHOUT COMPARISON	6-8
CONFIGURING AUTOMATIC SYNCHRONIZATION INTERVAL FOR THE RUNNING-CONFIG FILE	6-8
MANUALLY SWITCHING OVER TO THE STANDBY MANAGEMENT MODULE	6-8
REBOOTING THE ACTIVE AND STANDBY MANAGEMENT MODULES	6-8
MONITORING MANAGEMENT MODULE REDUNDANCY	6-9
DETERMINING MANAGEMENT MODULE STATUS	6-9
STATUS LED.....	6-9
SOFTWARE.....	6-9
DISPLAYING TEMPERATURE INFORMATION	6-10
DISPLAYING SWITCHOVER INFORMATION	6-10
FLASH MEMORY AND PCMCIA FLASH CARD FILE MANAGEMENT COMMANDS	6-11
MANAGEMENT FOCUS	6-12
FLASH MEMORY FILE SYSTEM	6-13
FILE NAMING CONVENTIONS	6-13
PCMCIA FLASH CARD FILE SYSTEM	6-13
PCMCIA FLASH CARD SUBDIRECTORIES	6-13
FILE AND SUBDIRECTORY NAMING CONVENTIONS	6-14
WILDCARDS	6-15
FORMATTING A FLASH CARD	6-15
DETERMINING THE CURRENT MANAGEMENT FOCUS	6-15
SWITCHING THE MANAGEMENT FOCUS	6-16
DISPLAYING A DIRECTORY OF THE FILES	6-16
DISPLAYING THE CONTENTS OF A FILE	6-19
DISPLAYING THE HEXADECIMAL OUTPUT OF A FILE	6-19
CREATING A SUBDIRECTORY	6-19
REMOVING A SUBDIRECTORY	6-21
RENAMING A FILE	6-21
CHANGING THE READ-WRITE ATTRIBUTE OF A FILE	6-22
DELETING A FILE	6-22
RECOVERING (“UNDELETING”) A FILE	6-23
APPENDING A FILE TO ANOTHER FILE	6-24

COPYING FILES USING THE COPY COMMAND	6-24
COPYING FILES FROM ONE FLASH CARD TO THE OTHER	6-25
COPYING FILES BETWEEN A FLASH CARD AND FLASH MEMORY	6-25
COPYING SOFTWARE IMAGES BETWEEN ACTIVE AND STANDBY MANAGEMENT MODULES	6-25
COPYING FILES FROM A MANAGEMENT MODULE TO AN INTERFACE MODULE	6-25
COPYING TERATHON IRONWARE IMAGES FROM FLASH MEMORY TO A TFTP SERVER.....	6-26
COPYING FILES BETWEEN A FLASH CARD AND A TFTP SERVER	6-26
COPYING THE STARTUP-CONFIG FILE BETWEEN A FLASH CARD AND FLASH MEMORY	6-26
COPYING THE STARTUP-CONFIG FILE BETWEEN FLASH MEMORY AND A TFTP SERVER	6-27
COPYING THE RUNNING-CONFIG TO A FLASH CARD OR A TFTP SERVER	6-27
LOADING A RUNNING-CONFIG FROM A FLASH CARD OR A TFTP SERVER	6-27
COPYING FILES USING THE CP COMMAND	6-28
LOADING THE SOFTWARE	6-28
REBOOTING FROM THE SYSTEM	6-28
CONFIGURING THE BOOT SOURCE FOR FUTURE REBOOTS.....	6-29
SAVING CONFIGURATION CHANGES	6-30
DISPLAYING THE CURRENT LOCATION FOR SAVING CONFIGURATION CHANGES.....	6-30
SPECIFYING THE LOCATION FOR SAVING CONFIGURATION CHANGES	6-30
FILE MANAGEMENT MESSAGES	6-30

CHAPTER 7

MANAGING THE BIGIRON MG8 MODULES..... 7-1

MANAGING THE BIGIRON MG8 CHASSIS	7-1
ENABLING AND DISABLING A DC POWER SOURCE	7-1
DISPLAYING CHASSIS STATUS AND TEMPERATURE READINGS	7-2
DISPLAYING THE SYSLOG CONFIGURATION AND STATIC AND DYNAMIC BUFFERS	7-5
STATIC AND DYNAMIC BUFFERS	7-6
MANAGING THE COOLING SYSTEM	7-7
CONFIGURING THE COOLING SYSTEM	7-7
CHANGING TEMPERATURE THRESHOLDS FOR MODULES AND FAN SPEEDS.....	7-7
Displaying Temperature Thresholds for Modules and Fan Speeds	7-10
CHANGING THE TEMPERATURE POLLING INTERVAL	7-11
MANAGING THE COOLING SYSTEM	7-11
INITIALIZING THE FAN CONTROL MODULES.....	7-11
MANUALLY SETTING THE FAN SPEED	7-11
Prior to Terathon IronWare software release 02.1.00:	7-12
Software Release 02.1.00 and Later:	7-12
MONITORING THE COOLING SYSTEM	7-13
DISPLAYING THE FAN CONTROL MODULE TEMPERATURE	7-13
DISPLAYING FAN STATUS AND SPEED.....	7-14
DISPLAYING TEMPERATURE WARNINGS	7-15
MANAGING THE INTERFACE MODULES	7-15
CONFIGURING INTERFACE MODULE BOOT PARAMETERS	7-15
SYNCHRONIZING THE INTERFACE MODULE'S TERATHON IRONWARE IMAGES BETWEEN	
MANAGEMENT AND INTERFACE MODULES	7-15
Synchronizing the Interface Modules' Terathon IronWare Software Images During Bootup	
7-16	
Specifying an Immediate Synchronization	7-16
Disabling or Reenabling an Automatic Check and Synchronization	7-16
CHANGING THE BOOT SOURCE	7-17

Specifying an Immediate Boot	7-17
Configuring an Automatic Boot	7-18
CHANGING PRIORITY OF CHASSIS SLOTS FOR INTERFACE MODULES	7-21
DISABLING AND REENABLING POWER TO THE INTERFACE MODULES	7-21
MANAGING THE SWITCH FABRIC MODULE	7-21
DISABLING AND REENABLING POWER TO THE SWITCH FABRIC MODULE	7-21
MONITORING THE SWITCH FABRIC MODULE	7-22
DISPLAYING THE LINK STATUS	7-22
DISPLAYING TEMPERATURE.....	7-22
ENABLING AND DISABLING MANAGEMENT MODULE CPU USAGE CALCULATIONS	7-23
DISPLAYING MANAGEMENT MODULE CPU USAGE	7-24
ENABLING AND DISABLING PACKET LOGGING FOR MANAGEMENT AND INTERFACE MODULES	7-24
DISPLAYING A PACKET LOG	7-26
REMOVING MAC ADDRESS ENTRIES	7-27
SETTING MAXIMUM FRAME SIZE PER PPCR	7-28

CHAPTER 8

CONFIGURING BASIC SOFTWARE FEATURES..... 8-1

USING THE WEB MANAGEMENT INTERFACE FOR BASIC CONFIGURATION CHANGES	8-2
BIGIRON CONFIGURING BASIC SYSTEM PARAMETERS	8-2
ENTERING SYSTEM ADMINISTRATION INFORMATION	8-3
CONFIGURING SIMPLE NETWORK MANAGEMENT (SNMP) PARAMETERS	8-3
SPECIFYING AN SNMP TRAP RECEIVER.....	8-4
SPECIFYING A SINGLE TRAP SOURCE.....	8-4
SETTING THE SNMP TRAP HOLDDOWN TIME	8-5
DISABLING SNMP TRAPS	8-5
Layer 2 Switch Traps	8-5
Layer 3 Switch Traps	8-6
DISABLING SYSLOG MESSAGES AND TRAPS FOR CLI ACCESS.....	8-6
Examples of Syslog Messages for CLI Access	8-6
Disabling the Syslog Messages and Traps	8-7
SPECIFYING A SIMPLE NETWORK TIME PROTOCOL (SNTP) SERVER	8-7
SETTING THE SYSTEM CLOCK	8-9
LIMITING BROADCAST, MULTICAST, OR UNKNOWN-UNICAST RATES	8-10
LIMITING BROADCASTS	8-10
LIMITING MULTICASTS	8-11
LIMITING UNKNOWN UNICASTS	8-11
CONFIGURING CLI BANNERS	8-11
SETTING A MESSAGE OF THE DAY BANNER	8-11
SETTING A PRIVILEGED EXEC CLI LEVEL BANNER.....	8-12
DISPLAYING A MESSAGE ON THE CONSOLE WHEN AN INCOMING TELNET SESSION IS DETECTED ...	8-12
CONFIGURING TERMINAL DISPLAY	8-12
CHECKING THE LENGTH OF TERMINAL DISPLAYS	8-13
CONFIGURING BASIC PORT PARAMETERS	8-13
ASSIGNING A PORT NAME	8-13
DISABLING OR RE-ENABLING A PORT	8-14
DISABLING OR RE-ENABLING FLOW CONTROL	8-14
SPECIFYING THRESHOLD VALUES FOR FLOW CONTROL	8-14
MODIFYING PORT PRIORITY (QoS)	8-15

CONFIGURING BASIC LAYER 2 PARAMETERS	8-15
ENABLING OR DISABLING THE SPANNING TREE PROTOCOL (STP)	8-15
MODIFYING STP BRIDGE AND PORT PARAMETERS	8-15
STP Bridge Parameters	8-15
STP Port Parameters	8-16
ENABLING OR DISABLING LAYER 2 SWITCHING (LAYER 3 SWITCHES ONLY)	8-16
CHANGING THE MAC AGE TIME	8-17
CONFIGURING STATIC MAC ENTRIES	8-17
CONFIGURING STATIC ARP ENTRIES.....	8-18
ENABLING PORT-BASED VLANs	8-18
ASSIGNING IEEE 802.1Q TAGGING TO A PORT.....	8-18
ENABLING OR DISABLING ROUTING PROTOCOLS	8-19
DISPLAYING AND MODIFYING SYSTEM PARAMETER DEFAULT SETTINGS	8-19
ASSIGNING A MIRROR PORT AND MONITOR PORTS	8-21
CONFIGURATION GUIDELINES FOR MONITORING INBOUND TRAFFIC	8-21
NOTES REGARDING MONITORING OF ROUTER TRAFFIC	8-21
CONFIGURING PORT MIRRORING AND MONITORING	8-21
MONITORING AN INDIVIDUAL TRUNK PORT	8-23

CHAPTER 9

MAINTAINING A BIGIRON MG8 9-1

HARDWARE MAINTENANCE SCHEDULE	9-1
REPLACING AN AIR FILTER	9-2
CLEANING THE FIBER-OPTIC CONNECTORS	9-3
REPLACING A MANAGEMENT MODULE	9-3
REMOVING A MANAGEMENT MODULE	9-4
INSTALLING A NEW MANAGEMENT MODULE	9-4
REPLACING AN INTERFACE MODULE	9-5
REMOVING AN INTERFACE MODULE	9-5
INSTALLING A NEW INTERFACE MODULE	9-5
REPLACING A SWITCH FABRIC MODULE	9-6
REMOVING A SWITCH FABRIC MODULE	9-7
INSTALLING A NEW SWITCH FABRIC MODULE	9-7
REPLACING A FIBER-OPTIC MODULE	9-8
REMOVING A FIBER-OPTIC MODULE	9-8
INSTALLING A NEW FIBER-OPTIC MODULE	9-8
CABLING A FIBER-OPTIC MODULE	9-9
REPLACING AN AC POWER SUPPLY	9-9
DETERMINING WHICH POWER SUPPLY FAILED	9-9
REPLACING AN AC POWER SUPPLY	9-9
REPLACING COOLING SYSTEM COMPONENTS	9-11
REPLACING A FAN	9-11
REPLACING A FAN CONTROL MODULE	9-13

CHAPTER 10

UPGRADING SOFTWARE IMAGES AND CONFIGURATION FILES..... 10-1

SOFTWARE UPGRADE OVERVIEW	10-1
FLASH	10-1
UPGRADABLE SOFTWARE IMAGES	10-2
IMAGE FILE TYPES	10-4
OVERVIEW OF THE TASKS IN THE SOFTWARE UPGRADE PROCESS	10-4
DETERMINING THE CURRENTLY INSTALLED AND RUNNING SOFTWARE IMAGES	10-5
UPGRADING THE MANAGEMENT MODULE'S SOFTWARE IMAGES	10-11
UPGRADING THE MANAGEMENT MODULE'S MONITOR IMAGE	10-11
UPGRADING THE MANAGEMENT MODULE'S TERATHON IRONWARE SOFTWARE IMAGE	10-11
UPGRADING THE INTERFACE MODULE'S IMAGES	10-12
UPGRADING THE INTERFACE MODULE'S MONITOR IMAGE	10-12
Upgrading the Monitor Image in Code Flash	10-12
Upgrading the Boot Image in Boot Flash	10-13
UPGRADING THE INTERFACE MODULE'S TERATHON IRONWARE IMAGE	10-13
REBOOTING THE MANAGEMENT MODULE	10-14
UPGRADING AN FPGA FOR A 4-PORT 10 GIGABIT ETHERNET MODULE	10-15
OVERVIEW OF TASKS IN THE FPGA IMAGE UPGRADE PROCESS	10-15
DETERMINING THE FPGA IMAGE VERSIONS	10-15
UPGRADING THE FPGA IMAGES	10-16
REBOOTING THE INTERFACE MODULE	10-17
LOADING AND SAVING CONFIGURATION FILES	10-17
REPLACING THE STARTUP CONFIGURATION WITH THE RUNNING CONFIGURATION	10-17
REPLACING THE RUNNING CONFIGURATION WITH THE STARTUP CONFIGURATION	10-17
LOGGING CHANGES TO THE STARTUP-CONFIG FILE	10-18
COPYING A CONFIGURATION FILE TO OR FROM A TFTP SERVER	10-18
MAKING LOCAL COPIES OF THE STARTUP CONFIGURATION FILE	10-18
DYNAMIC CONFIGURATION LOADING	10-19
USAGE CONSIDERATIONS.....	10-19
PREPARING THE CONFIGURATION FILE	10-19
LOADING THE CONFIGURATION INFORMATION INTO THE RUNNING-CONFIG	10-20
USING SNMP TO SAVE AND LOAD CONFIGURATION INFORMATION	10-20
ERASING IMAGE AND CONFIGURATION FILES	10-21
UPGRADING VIA SSH	10-22
SCHEDULING A SYSTEM RELOAD	10-22
RELOADING AT A SPECIFIC TIME	10-22
RELOADING AFTER A SPECIFIC AMOUNT OF TIME	10-23
DISPLAYING THE AMOUNT OF TIME REMAINING BEFORE A SCHEDULED RELOAD	10-23
CANCELING A SCHEDULED RELOAD	10-23
DIAGNOSTIC ERROR CODES AND REMEDIES FOR TFTP TRANSFERS	10-23
DOWNLOADING A NEW IMAGE USING THE SUPPLIED SCRIPT	10-24
SAMPLE DOWNLOAD SCRIPT	10-27

CHAPTER 11

HARDWARE SPECIFICATIONS..... 11-1

HARDWARE SPECIFICATIONS	11-1
-------------------------------	------

POWER SPECIFICATIONS	11-1
PHYSICAL DIMENSIONS	11-3
OPERATING ENVIRONMENT	11-3
STORAGE ENVIRONMENT	11-3
SAFETY AGENCY APPROVALS	11-3
ELECTROMAGNETIC APPROVALS	11-3
PORT SPECIFICATIONS	11-4
CONSOLE PORT PIN ASSIGNMENTS	11-4
MANAGEMENT PORT PIN ASSIGNMENTS	11-5

APPENDIX A

REGULATORY STATEMENTS	A-1
U.S.A.	A-1
INDUSTRY CANADA STATEMENT	A-1
EUROPE AND AUSTRALIA	A-1
JAPAN	A-1

APPENDIX B

CAUTIONS AND WARNINGS.....	B-1
CAUTIONS	B-1
WARNINGS	B-7

APPENDIX C

SOFTWARE SPECIFICATIONS	C-1
IEEE COMPLIANCE	C-1
RFC SUPPORT	C-1
GENERAL PROTOCOLS	C-1
BGP	C-2
OSPF	C-3
RIP	C-3
IP MULTICAST	C-3
MANAGEMENT	C-3
INTERNET DRAFTS	C-4

Chapter 1

Getting Started

Introduction

This guide describes the BigIron MG8 Layer 3 Switch from Foundry Networks. It provides procedures for installing modules and AC power supplies into the BigIron MG8 chassis, cabling the 1 and 10 Gigabit Ethernet interface ports, and performing a basic configuration of the software. The guide explains how to perform tasks using the CLI.

Audience

This guide is designed for network installers, system administrators, and resellers who will install and perform a basic software configuration for the BigIron MG8 Layer 3 Switch. This guide assumes a working knowledge of Layer 2 and Layer 3 switching and routing concepts.

If you are using the BigIron MG8 as a Layer 3 Switch, you should be familiar with the following protocols if applicable to your network – IP, RIP, OSPF, BGP4, DVMRP, MBGP, IGMP, PIM, VRRP, and VRRPE.

Nomenclature

This guide uses the following typographical conventions to show information:

Italic highlights the title of another publication and occasionally emphasizes a word or phrase.

Bold highlights a CLI command.

Bold Italic highlights a term that is being defined.

NOTE: A note emphasizes an important fact or calls your attention to a dependency.

WARNING: A warning calls your attention to a possible hazard that can cause injury or death.

CAUTION: A caution calls your attention to a possible hazard that can damage equipment.

Related Publications

The following Foundry Networks documents supplement the information in this guide.

- *Foundry Security Guide* – provides procedures for securing management access to Foundry devices and for protecting against Denial of Service (DoS) attacks.
- *Foundry Switch and Router Installation and Basic Configuration Guide* – provides configuration guidelines for Foundry Layer 2/3 switches and Metro routers.
- *Foundry Enterprise Configuration and Management Guide* – provides configuration information for enterprise routing protocols, including IP, RIP, IP multicast, OSPF, BGP4, VRRP, and VRRPE.
- *Foundry Switch and Router Command Line Interface Reference* – provides a list and syntax information for all the Layer 2 Switch and Layer 3 Switch CLI commands.
- *Foundry Diagnostic Guide* – provides descriptions of diagnostic commands that can help you diagnose and solve issues on Layer 2 Switches and Layer 3 Switches.
- *Management Information Base Reference* – contains the Simple Network Management Protocol (SNMP) Management Information Base (MIB) objects that are supported in the Foundry devices.
- *IronView Network Management User's Guide* – describes how to use the SNMP-based GUI for managing Foundry Networks switches and switching routers.

To order additional copies of these manuals, do one of the following:

- Call 1.877.TURBOCALL (887.2622) in the United States or 1.408.586.1881 outside the United States.
- Send email to info@foundrynet.com.

What's New in This Edition

This Foundry user guides have been updated with features that were introduced in the BigIron MG8 and NetIron 40G software releases 02.x.xx. See the table below for a list of new features and the user guide where they are discussed.

NOTE: In addition to the user guides where the new features are found, the *Foundry Switch and Router Command Line Interface Reference* was also updated to include the commands for the new features in the table below.

Enhancement	Description	BigIron MG8 Release	Discussed in
Change in Default and Recommended fan threshold values.	The default and recommended low and high temperature thresholds for fan speeds on Interface modules are changed with this release.	02.0.02	<i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i>
New Command for Setting Fan Speed	A new command has been introduced to set fan speed.	02.1.00	<i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i>

Enhancement	Description	BigIron MG8 Release	Discussed in
New Interface modules	This release supports the following new Interface module on the BigIron MG8: <ul style="list-style-type: none"> 8-port 10 Gigabit Ethernet Interface module 	02.1.00	<i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i>
New Interface modules	This release supports the following new Interface modules: <ul style="list-style-type: none"> 60-port 1 Gigabit Ethernet Copper IPv6 module (supported on BigIron MG8 only) 20-port 1 Gigabit Ethernet IPv6 module 10-port 1 Gigabit Ethernet IPv6 module <p>The IPv6 modules have more CAM space than the modules that were previously released. The additional CAM space is necessary for IPv6 and outbound ACL support.</p>	02.0.02	<i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i>
New Interface modules	Release provides support for the following IPv6 Interface modules: <ul style="list-style-type: none"> 2-port 10 Gigabit Ethernet Interface module 4-port 10 Gigabit Ethernet Interface module 40-port 1 Gigabit Ethernet Interface module <p>These two modules have the same form factor, LED values and interface options of the previously released IPv4 modules</p>	02.0.02	<i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i>
New XENPACK Transceiver	Software release introduced introduced the WAN PHY XENPACK Transceiver.	02.0.02	<i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i>
Support for 1000Base-BX Mini-GBICs	This release supports use of 1000Base-BX Ethernet Mini-GBICs on 1 Gigabit Ethernet Interface modules.	02.1.00	<i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i>
Support for CWDM Mini-GBICs	This release supports Coarse Wavelength Division Multiplexing (CWDM) mini-GBICs on Gigabit Ethernet interface modules.	02.1.00	<i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i>

Enhancement	Description	BigIron MG8 Release	Discussed in
Support for software features by the TCAM version installed	Software features are supported selectively on different Interface modules depending on the version of TCAM installed	02.1.00, 02.2.00, 02.2.01	<i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i>
Support for new Xenpak	This release supports the following new XENPAK modules: <ul style="list-style-type: none"> • 10 Gigabit Ethernet Copper XENPAK • 10 Gigabit Ethernet Fiber LX4 XENPAK • 10 Gigabit Ethernet ZR Fiber XENPAK • 10 Gigabit Ethernet ZRD Fiber XENPAK 	02.1.00	<i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i>
Downloading a New Image Using a Script	In this release, the capability to download a new image using a script is added. See the section referenced for instructions.	02.1.00	<i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i>
Upgrading via SSH	With the addition of SSHv2 to this release, there are potential problems that can occur when upgrading via SSH. This section describes the issues involved and how to manage them.	02.1.00	<i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i>
Layer 2 Hitless Failover	This feature allows failover from an active management module to a redundant management module with no loss of Layer 2 connectivity.	02.0.02	<i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i>
Clarification to the multicast limit, broadcast limit, and unknown-unicast limit commands.	This is not a new feature but a clarification of a feature in In the <i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i> , the following limit commands configured at the global level and not at the interface level. also, the values you enter are applied to each management module (slot) installed in the device: <ul style="list-style-type: none"> • multicast limit • broadcast limit • unknown-unicast limit 	02.0.02	<i>Foundry BigIron Mg8 Switch Installation and Basic Configuration Guide</i>

Enhancement	Description	BigIron MG8 Release	Discussed in
CAM Partitioning	This release supports CAM Partitioning by blocks for the following CAM entries: <ul style="list-style-type: none"> session-mac ip-mac out-session ipv6 ipv6-session 	02.0.02	<i>Foundry Diagnostic Guide</i>
Enabling support for more ACL entries	This release provides support for additional ACL entries as described: <ul style="list-style-type: none"> The NetIron 40G supports 40K ACL entries The BigIron MG8 supports 4K ACL entries 	02.1.00	<i>Foundry Enterprise Configuration and Management Guide</i>
Layer-2 ACLs	This release supports Layer 2 ACLs to use the etype argument to filter on the following etypes (EtherType): <ul style="list-style-type: none"> IPv4-15 (Etype=0x0800, IPv4, HeaderLength 20 bytes) ARP (Etype=0x0806, IP ARP) IPv6 (Etype=0x86dd, IP version 6) 	02.1.00	<i>Foundry Enterprise Configuration and Management Guide</i>
Changes to Rate Limiting Counters	With this release, you can enable your NetIron 40G or BigIron MG8 to perform accounting of the number of bytes received by all the member ports of a VLAN.	02.2.00	<i>Foundry Enterprise Configuration and Management Guide</i>
Enhancements to Rate-Limiting	This release provides several enhancements to the rate-limiting function. See the section referenced for details.	02.1.00	<i>Foundry Enterprise Configuration and Management Guide</i>
MSDP	This release supports Multicast Source Discovery Protocol (MSDP) as described in the <i>Foundry Enterprise Configuration and Management Guide</i> .	02.1.00	<i>Foundry Enterprise Configuration and Management Guide</i>
MSDP Cache Size Increase	With this release, the MSDP cache size is increase to 32 K.	02.2.00	<i>Foundry Enterprise Configuration and Management Guide</i>
New show ip vrrp statistics output	In this release, more statistics are available with this show command.	02.0.02	<i>Foundry Enterprise Configuration and Management Guide</i>
Support for a system-wide IPv6 address	With this release, a BigIron MG8 that is operating with a switch-only code image can configure an IPv6 system-wide address.	02.1.00	<i>Foundry IPv6 Configuration Guide</i>

Enhancement	Description	BigIron MG8 Release	Discussed in
Support for IPv6	<p>This release supports the following additional IPv6 features:</p> <ul style="list-style-type: none"> • sFlow for IPv6 • Trunk Server for Ipv6 • SNTP for IPv6 • The following IPv6 MIBs: 2452 - TCP 2454 - UDP 2465 - Textual Conventions and General Group 2466 - ICMPv6 Group <p>NOTE: IPv6 is supported only on High Value interface modules.</p> <p>For information about configuring IPv6 on the BigIron MG8, see the <i>Foundry IPv6 Configuration Guide</i>.</p>	02.0.02	<i>Foundry IPv6 Configuration Guide</i>
Support for IPv6 on Management Port	This release allows you to configure a management port to automatically obtain an IPv6 address.	02.1.00	<i>Foundry IPv6 Configuration Guide</i>
Support for Network-based ECMP Load Sharing for IPv6	While in previous releases ECMP load sharing by host was supported, this release also supports ECMP load sharing by network.	02.1.00	<i>Foundry IPv6 Configuration Guide</i>
New Clear ISIS commands	<p>The following clear isis commands have been added:</p> <ul style="list-style-type: none"> • clear isis counts • clear isis neighbor • clear isis route • clear isis traffic 	02.1.00	<i>Foundry NetIron Service Provider Configuration and Management Guide</i>
802.1x Port Security	With this release, 802.1X port security is supported on the BigIron MG8 and NetIron 40G as described.	02.1.00	<i>Foundry Security Guide</i>
Foundry Direct Routing (FDR)	Foundry Direct Routing (FDR), also known as IP static cam mode, enables very large routing/forwarding tables (up to twice the published Internet routes) to be maintained at the interface module level so that all packet forwarding is done at wire speed without the need to learn the best routes in real-time. This release provides detailed instructions for enabling and operating this feature.	02.1.00	<i>Foundry Security Guide</i>

Enhancement	Description	BigIron MG8 Release	Discussed in
Reverse Path Forwarding	Reverse Path Forwarding (RPF) is designed to prevent malicious users from spoofing a source IP address by checking that the source address specified for a packet is received from a network that the BigIron MG8 or NetIron 40G have access to.	02.2.00	<i>Foundry Security Guide</i>
Secure Shell (SSH) Version 2	With this release, Secure Shell (SSH) Version 2 is supported on the BigIron MG8 and NetIron 40G as described. Note: This release supports SSH v2 only. Other versions of SSH are not supported.	02.1.00	<i>Foundry Security Guide</i>
SSHv2 Enhancement: Importing Authorized Public Keys into the Foundry Device	In this release, we support the ability to download a public key from a TFTP server to a Foundry device.	02.2.00	<i>Foundry Security Guide</i>
SSL Security for the Web Management Interface	This release supports use of the https protocol for secure management of a NetIron 40G or BigIron MG8.	02.1.00	<i>Foundry Security Guide</i>
802.1Q Tag-type Translation - Per-port Regions	This is not a new feature. The 802.1Q Tag-type translation feature has been supported in all versions of the MG8 software. The port regions that can have tag-types assigned to them are defined for each interface module in these release notes.	02.0.02	<i>Foundry Switch and Router Installation and Basic Configuration Guide</i>
Clarification of VSRP support.	Layer-3 VSRP is not supported. Consequently, the router VSRP commands are not available and VRRP can be run concurrently with VSRP.	02.0.02	<i>Foundry Switch and Router Installation and Basic Configuration Guide</i>
Maximum Frame Size Support	With this release, maximum frame size per port is changed as described: Untagged Ports – 1518 bytes Tagged Ports – 1522 bytes Super-aggregated VLAN ports – 1526 bytes	02.1.00	<i>Foundry Switch and Router Installation and Basic Configuration Guide</i>
Maximum number of server trunks increased	The maximum number of server trunks supported is increased from 16 to 64.	02.0.02	<i>Foundry Switch and Router Installation and Basic Configuration Guide</i>
Port Mirroring and sFlow	With this release, port mirroring and sFlow can be configured simultaneously on an individual port. In earlier releases this was not supported.	02.2.00	<i>Foundry Switch and Router Installation and Basic Configuration Guide</i>

Enhancement	Description	BigIron MG8 Release	Discussed in
Protocol-based VLANs	<p>This release introduces support for protocol-based VLANs. VLANs can be created for the following protocols:</p> <ul style="list-style-type: none"> • AppleTalk • IPX • IPv4 • IPv6 • Other <p>These VLANs can be static and can exclude ports.</p>	02.0.02	<i>Foundry Switch and Router Installation and Basic Configuration Guide</i>
Support for MRP Phase 2	<p>Support for MRP Phase 2 has been added to this release. With MRP Phase 2, MRP rings can be configured to share the same interfaces as long as the interfaces belong to the same VLAN.</p>	02.2.00	<i>Foundry Switch and Router Installation and Basic Configuration Guide</i>
Unicast Flooding on VLAN Ports	<p>This feature allows devices to perform hardware flooding for Layer 2 unknown unicast packets on all ports that belong to a VLAN.</p>	02.0.02	<i>Foundry Switch and Router Installation and Basic Configuration Guide</i>
VLAN Translation	<p>This release supports VLAN translation. VLAN Translation allows traffic from one VLAN to be transported across a different VLAN.</p>	02.0.02	<i>Foundry Switch and Router Installation and Basic Configuration Guide</i>
Setting Maximum Frame Size Per PPCR	<p>In this release when you set the maximum frame size for a port, it applies to all other ports that are associated with the same PPCR.</p>	02.1.00	<i>Foundry Switch and Router Installation and Basic Configuration Guide</i>
Super Aggregated VLAN: Configuring the Core Device to Copy the QoS Priority from Internal VLAN Tag to the external VLAN tag	<p>This feature allows the Foundry device to copy the QoS 802.1p VLAN priority from packets entering the untagged ports to the external Super Aggregated VLAN tag priority field thereby allowing proper prioritization in the service provider network.</p>	02.2.00	<i>Foundry Switch and Router Installation and Basic Configuration Guide</i>
VSRP and MRP Signaling	<p>This release supports VSRP and MRP signaling to provide a redundant path between a device and an MRP ring.</p>	02.1.00	<i>Foundry Switch and Router Installation and Basic Configuration Guide</i>
VSRP Fast Start	<p>This release supports VSRP fast start to enable the port on a VSRP master to restart when a VSRP failover occurs.</p>	02.1.00	<i>Foundry Switch and Router Installation and Basic Configuration Guide</i>

How to Get Help

Foundry Networks technical support will ensure that the fast and easy access that you have come to expect from your Foundry Networks products will be maintained.

Web Access

- <http://www.foundrynetworks.com>

Email Access

Technical requests can also be sent to the following email address:

- support@foundrynet.com

Telephone Access

- 1.877.TURBOCALL (887.2622) United States
- 1.408.586.1881 Outside the United States

Warranty Coverage

Contact Foundry Networks using any of the methods listed above for information about the standard and extended warranties.

Chapter 2

Product Overview

The BigIron MG8 provides high-performance switching for the Enterprise, campus networks, and grid computing topologies. This chapter provides an overview of Foundry's BigIron MG8. It provides the following information:

- Overview of the benefits the BigIron MG8 offers.
- Network topologies in which a BigIron MG8 will be commonly deployed.
- The BigIron MG8 hardware and how each major hardware component functions.
- Software features that the BigIron MG8 supports.
- The BigIron MG8's architecture, how it differs from other Layer 3 Switch architectures, and how you will benefit from the differences.

Product Overview

The BigIron MG8 provides the following benefits:

- The ability of the 10 Gigabit Ethernet ports to process both inbound and outbound user packets at a full 10 Gbps, thereby delivering true wire-speed performance.
- High availability (redundancy) of the following BigIron MG8 critical components:
 - Management modules
 - AC power supplies
 - Fans

Each of these components, along with the 10 Gigabit Ethernet interface modules, is hot swappable, which means you can remove and replace them while the BigIron MG8 chassis is powered on and running.

- Completely separate data and control planes, which results in uncompromised switching performance, increased reliability of both planes, and increased security of the control plane in the event of a Denial of Service attack (DoS) on the data plane.
- Distributed data and control planes, which results in uncompromised wire-speed performance for the data plane and faster and more efficient performance of management functions for the control plane.
- A management (10BaseT/100BaseTX Ethernet) port that can provide connectivity to your existing management network.

BigIron MG8 Backbone Applications

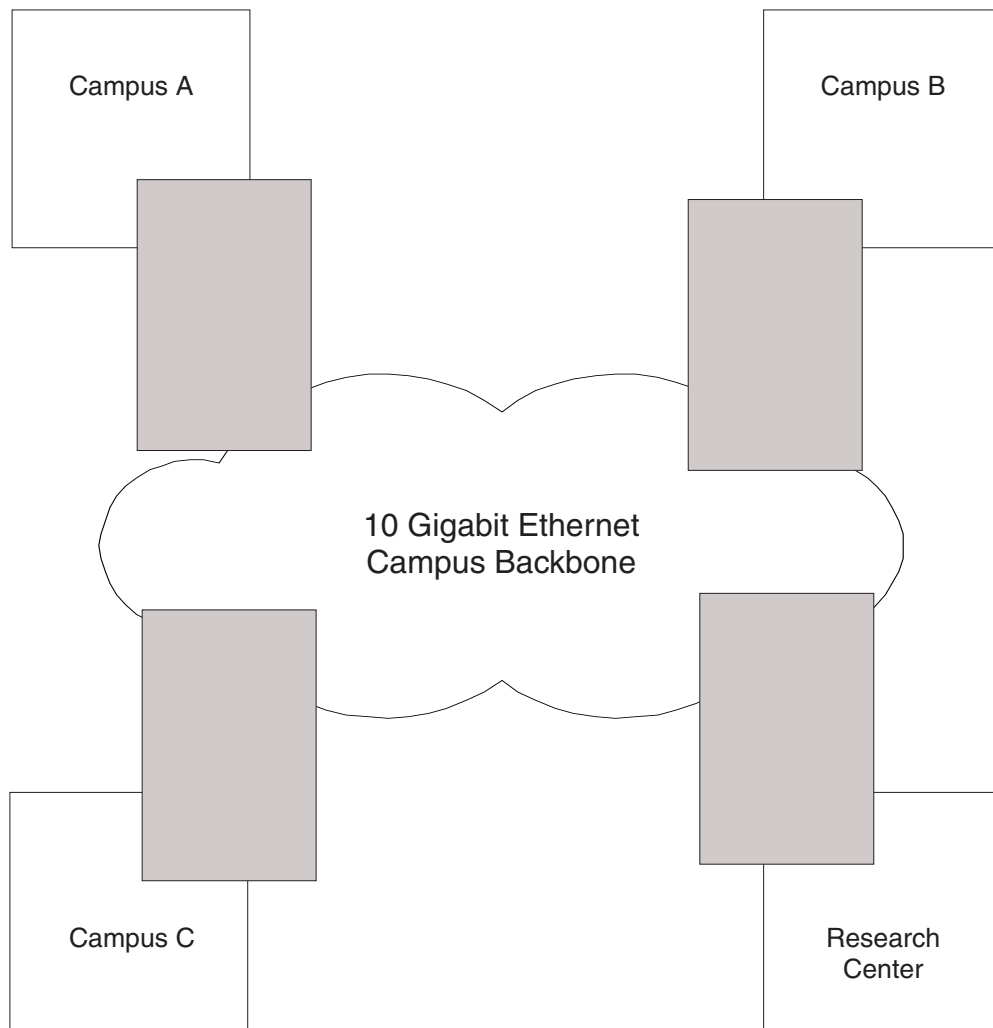
The BigIron MG8 is commonly deployed in the following situations:

- Campus connectivity
- Grid computing

Campus Connectivity

The BigIron MG8 is commonly deployed as a backbone device in a campus setting. Instead of using more complex WAN technologies over which to transport traffic, the BigIron MG8 provides a simpler Ethernet-based transport environment. Figure 2.1 shows a campus composed of multiple, distributed buildings, which are connected by a backbone of BigIron MG8es.

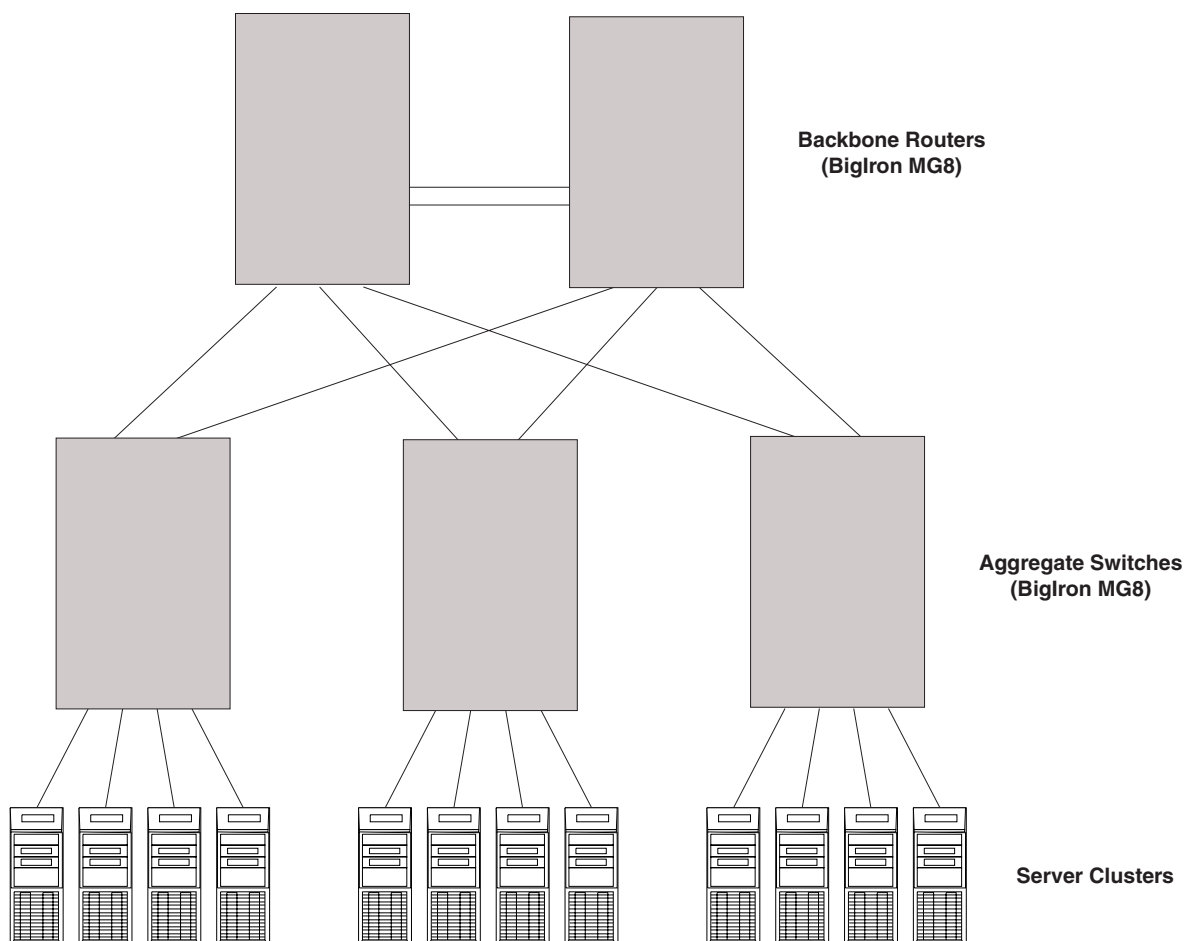
Figure 2.1 BigIron MG8s in a Campus Setting



Grid Computing

In grid computing, clusters of single- or multiple-processor high-end PCs perform tasks, such as transferring massive amounts of data and analyzing data. In this scenario, the BigIron MG8 is deployed as an aggregate switch connecting clusters of 10 Gigabit Ethernet servers to a backbone of routers (also the BigIron MG8). Figure 2.2 shows three server clusters that are connected to a router backbone by aggregate switches.

Figure 2.2 BigIron MG8s in a Grid Computing Topology



Hardware Features

The BigIron MG8 is composed of the following major hardware components:

- Chassis
- Management modules
- Interface modules
- Switch fabric module
- Power supplies
- Cooling system, which is composed of temperature sensors, fans, fan control modules, and an air filter
- Rack mount kit

The following sections provide more information about these components.

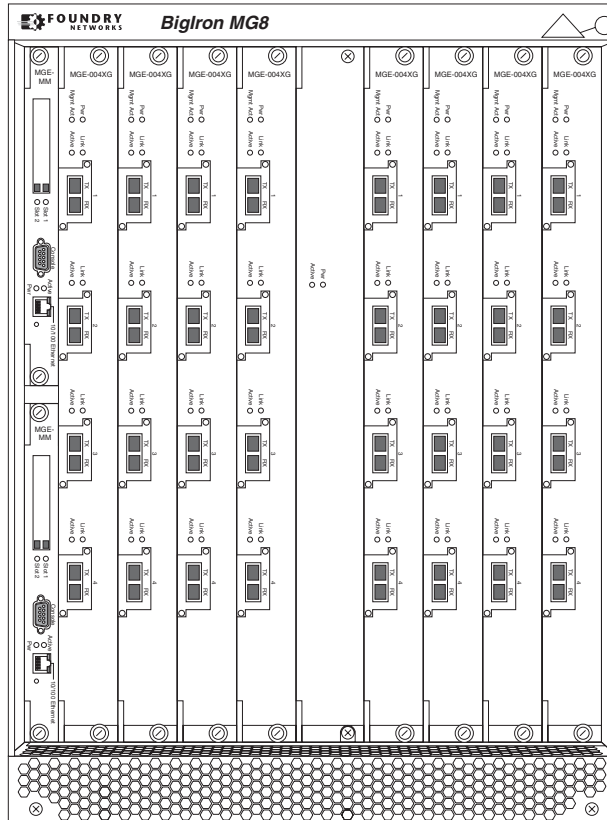
Chassis

The BigIron MG8 chassis is a native -48 VDC input card shelf, in which management, switch fabric, and interface modules reside. You can order the following versions of BigIron MG8 chassis:

- DC chassis
- AC chassis

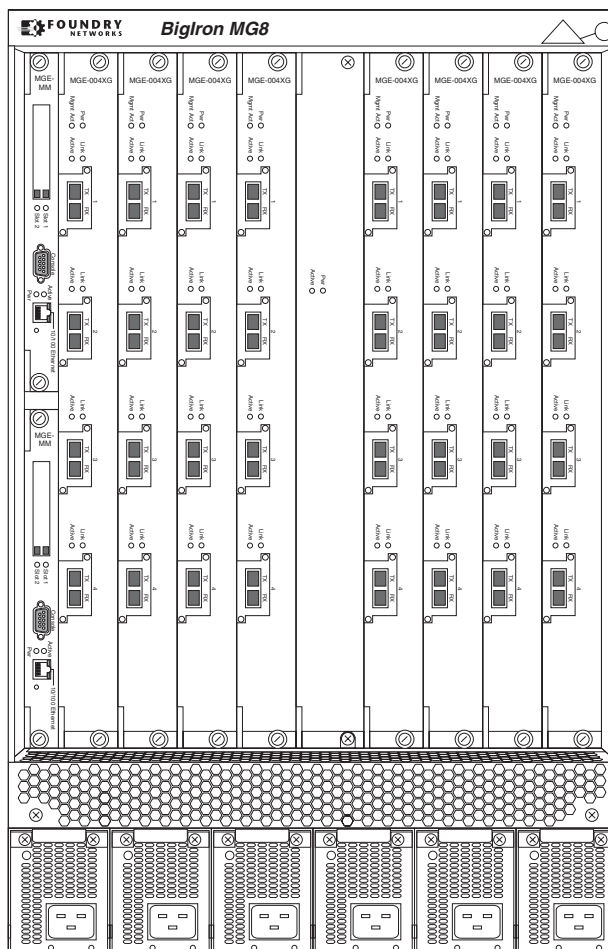
The DC chassis consists of the card shelf only (see Figure 2.3). It allows connections to DC power sources, which you must supply.

Figure 2.3 BigIron MG8 DC Chassis



The AC chassis consists of the card shelf and power supply slots along the bottom of the card shelf (see Figure 2.4). Foundry supplies the AC power supplies that you can install in the power supply slots. The power supply slots add an additional 3.5 inches (2 rack units [RU]) to the height of the chassis.

Figure 2.4 BigIron MG8 AC Chassis



Also, the rear cover of the AC chassis is slightly different from that of the DC chassis. Because of the height the power supply slots add to the AC chassis, the AC rear cover is longer in height than that of the DC chassis.

Upon shipment from the factory, the following components are installed in both versions of the BigIron MG8 chassis:

- A switch fabric module.
- A slot panel in each module slot. The slot panel covers a slot that does not currently have a module installed in it, ensuring proper airflow within the chassis.
- Fans and fan control modules, which are located at the rear of the chassis. For more information about the fans, see “Cooling System” on page 2-18.
- A blank power supply faceplate in each power supply slot (AC chassis only).

In the slots of both chassis versions, you can install the following:

- Up to two management modules (one active and one redundant).
- Up to eight interface modules.

You can install up to six AC power supplies in the AC chassis. Before installing any modules or AC power supplies (AC chassis only), you must remove the slot panel or blank power supply faceplate, respectively.

CAUTION: If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.

Figure 2.5 shows the BigIron MG8 AC chassis and the slots into which you install the various modules and power supplies. (All slots for the DC chassis are exactly the same as those for the AC chassis except the DC chassis does not have power supply slots.)

Figure 2.5 BigIron MG8 Chassis Slots

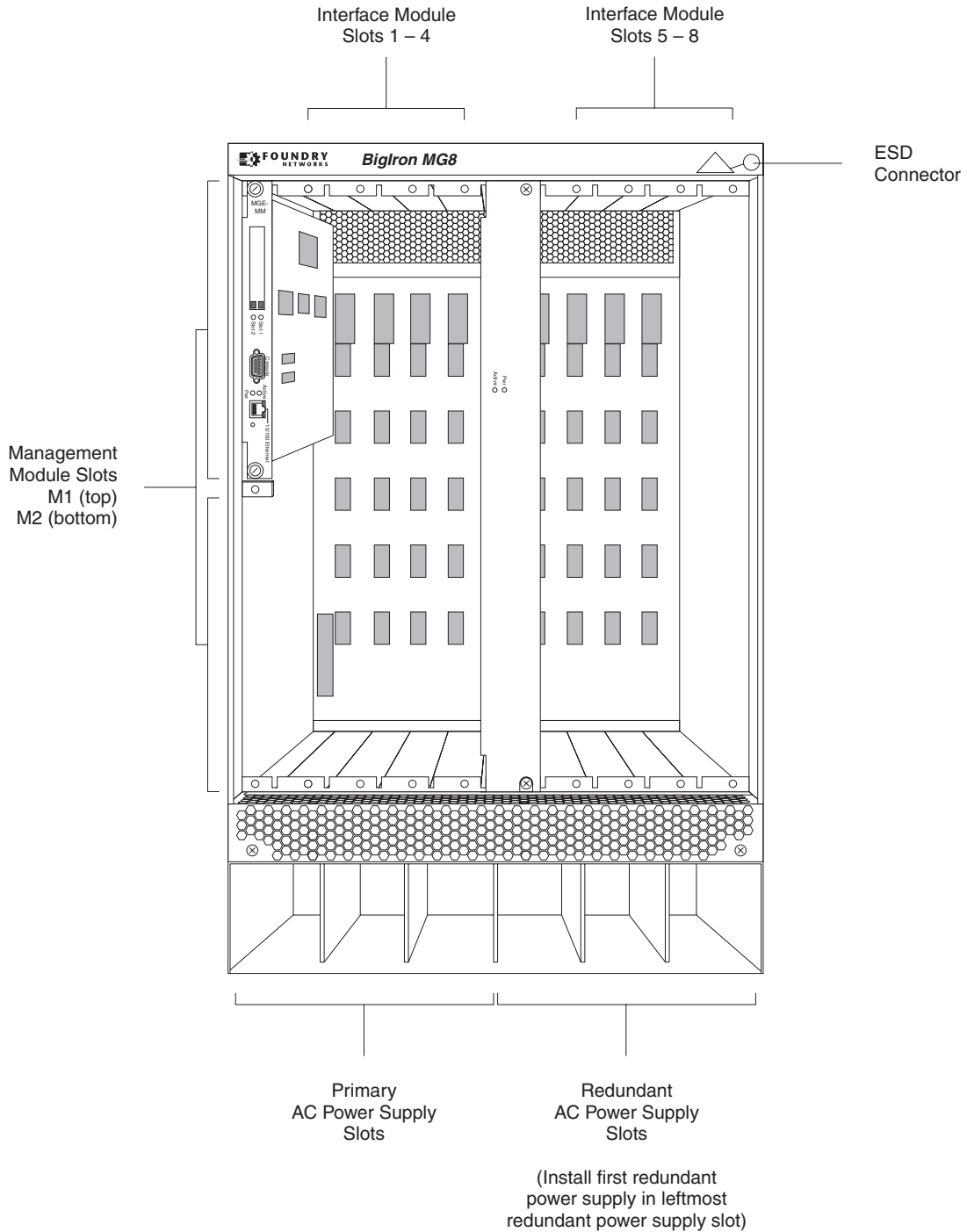


Figure 2.5 also shows an electrostatic discharge (ESD) connector, into which you can plug an ESD wrist strap to ground yourself while handling and installing modules. Another connector is provided on the upper right corner of the chassis' rear panel.

WARNING: For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

Both chassis versions also include a grounding lug connector, located on the rear panel (left side).

Management Modules

The management module controls the BigIron MG8 hardware components, runs the networking protocols, and provides the Real Time Operating System (RTOS).

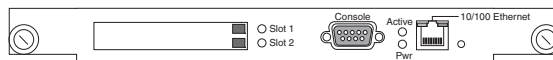
Each BigIron MG8 chassis requires one management module and can accept a second one for redundancy. A redundant management module works along with the active management module. If the active module becomes unavailable, the redundant management module automatically takes over the system operation, minimizing system downtime. For information about the functions an active management performs, see “System Management Architecture” on page 2-26. For information about the redundancy feature, see “How Management Module Redundancy Works” on page 6-1.

You can install management modules in dedicated slots marked M1 (upper) and M2 (lower). Because of the smaller size of these modules (as compared to the other modules), you can install them one atop the other as shown in Figure 2.5 on page 2-6. By default, the system considers the module installed in the slot marked M1 to be the active management module.

A management module is hot swappable, which allows you to remove and replace it without powering down the system.

Figure 2.6 shows the management module's front panel.

Figure 2.6 Management Module Front Panel



The front panel includes the following control features:

- Two PCMCIA slots
- A Console port
- A 10/100 Ethernet port
- Six LEDs

PCMCIA Slots

The PCMCIA slots support a flash PC card. The flash PC card provides storage space in addition to the system's flash memory. A flash PC card can store system files, including boot images, startup configuration files, running configuration files, and so on. As a result, you can perform system management tasks, such as copying files between flash PC cards, copying files between a flash PC card and flash memory, and so on.

Console Port

The Console port is a standard DB-9 serial connector through which you can attach a PC or terminal to configure the BigIron MG8 using the command line interface (CLI).

This port interfaces the control plane only and not the data plane.

10/100 Ethernet Port

The front panel includes a 10BaseT/100BaseTX auto-sensing, auto-negotiating Ethernet port. This port has an RJ-45 unshielded twisted pair (UTP) connector.

Typical uses of this port include but are not limited to the following:

- Connecting a PC through which you can access the system directly or through a Telnet connection and configure, monitor, and manage the BigIron MG8.
- Connecting a 10BaseT/100BaseTX switch, which will provide connectivity to your existing management network. You can then access the BigIron MG8 and configure, monitor, and manage the system from a management station.

For information about connecting a PC and a switch to the 10/100 Ethernet port, see “Attaching a Management Station” on page 3-12.

This port interfaces the control plane only and not the data plane.

LEDs

Table 2.1 describes the LEDs on the management module’s front panel.

Table 2.1: Management Module LEDs

LED	State	Meaning
PCMCIA	On or blinking	You have inserted a PCMCIA flash card in a slot or initiated a task related to the file management system on a flash card. As a result, the software is currently accessing the flash card.
	Off	The software is not currently accessing a PCMCIA flash card inserted in a slot.
Active	On	The module is functioning as the active management module.
	Off	The module is functioning as the redundant management module.
Pwr	On	The module is receiving power.
	Off	The module is not receiving power.
10/100 Ethernet Port	On (Green)	A link is established with the remote port.
	Off	A link is not established with the remote port.
10/100 Ethernet Port	On or blinking (Yellow)	The port is transmitting and receiving packets.
	Off for an extended period	The port is not transmitting or receiving packets.

Interface Modules

You can install up to eight interface modules in the chassis slots shown in Figure 2.5 on page 2-6. The interface modules are hot swappable, which means you can remove and replace them without powering down the system.

The following interface modules are available:

- 2-port 10 Gigabit Ethernet Interface module (software release 02.1.00). This module provides IPv6 hardware support and support for XENPAK optics. (Requires 10G-XNPK-SR/LR/ER optics)
- 4-port 10 Gigabit Ethernet Interface module (software release 02.1.00). This module provides IPv6 hardware support and support for XENPAK optics. (Requires 10G-XNPK-SR/LR/ER optics)
- 8-port 10 Gigabit Ethernet Interface Module (software release 02.1.00)

- 10-port 1 Gigabit Ethernet Interface Module (mini-GBIC, software release 02.0.02)
- 20-port 1 Gigabit Ethernet Interface Module (mini-GBIC, software release 02.0.02)
- 40-port 1 Gigabit Ethernet Interface module (software release 02.1.00). This module provides IPv6 hardware support and SFP slots. (Requires optics.)
- 60-port 1 Gigabit Ethernet Interface Module (copper, software release 02.0.02)

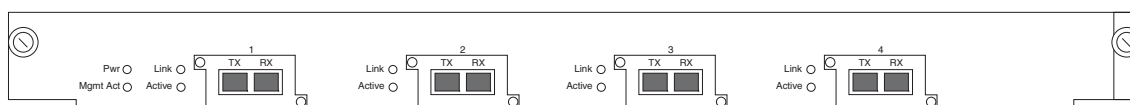
10 Gigabit Ethernet Interface Modules

A 2-port, 4-port, and 8-port 10 Gigabit Ethernet module contains two, four, and eight physical ports respectively, through which you can connect your BigIron MG8 to other network devices at a speed of 10 Gigabits.

Into a physical port, you must insert a fiber-optic module provided by Foundry. For information about the fiber-optic modules, the cabling, and how to install, see “Connecting an Ethernet Interface Module” on page 4-5.

Figure 2.7 shows a 4-port 10 Gigabit Ethernet module’s front panel.

Figure 2.7 4-port 10 Gigabit Ethernet Module Front Panel

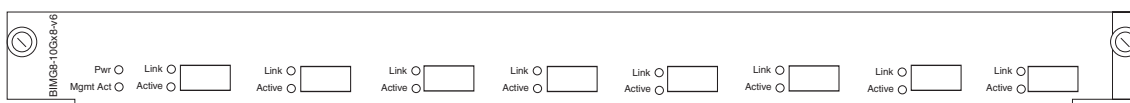


The front panel includes:

- Two LEDs (Pwr and Mgmt Act) that report module operation.
- Two LEDs (Link and Active) for each port.
- Four 10 Gigabit Ethernet ports

Figure 2.8 shows an 8-port 10 Gigabit Ethernet module’s front panel. The module has eight optical interfaces for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant transceivers. These transceivers support 10G-Base-SR and 10G-Base-LR fiber optic cabling.

Figure 2.8 8-port 10 Gigabit Ethernet Module Front Panel



The front panel includes the following control features:

- Two LEDs (Pwr and Mgmt Act) that report module operation.
- Two LEDs (Link and Active) for each port.
- Eight 10 Gigabit Ethernet XFP ports

LEDs

The module's front panel includes two LEDs indicating the general status of the module and two LEDs for each port indicating the status of the port, as described in Table 2.2.

Table 2.2: Interface Module LEDs

LED	State	Meaning
Pwr	On	The module is receiving power.
	Off	The module is not receiving power.
Mgmt Act	During initialization: steady blinking. After initialization: occasional blinking.	The active management module's processor and the interface module's processor are communicating.
	Off for an extended period.	The interface module is not being managed by the active management module.
Link	On	A link is established with the remote port.
	Off	A link is not established with the remote port.
Active	On or blinking	The port is transmitting and receiving packets.
	Off for an extended period	The port is not transmitting or receiving packets.

1 Gigabit Ethernet Interface Modules

The 10-port and 20-port 1 Gigabit Ethernet interface modules contain 10 and 20 physical ports respectively, through which you can connect your BigIron Layer 3 Switch to other network devices at a speed of 1 Gigabit.

Into a physical port, you must insert a copper or fiber mini-GBIC provided by Foundry. Note that the copper mini-GBICs can operate in 1000 Mbps autonegotiation mode only. You cannot configure them to operate in other modes.

Figure 2.9 and Figure 2.10 show, respectively, a 10-port and 20-port 1 Gigabit Ethernet module's front panel.

Figure 2.9 10-port 1 Gigabit Ethernet Module Front Panel

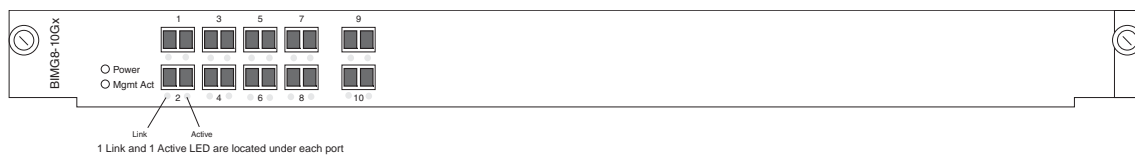
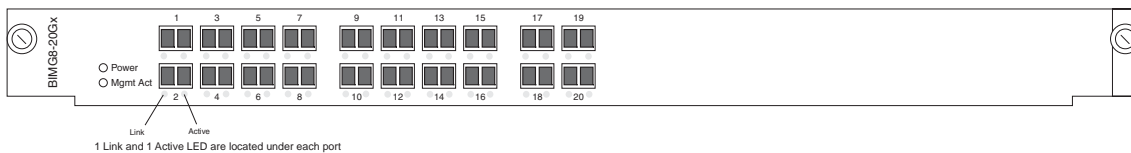


Figure 2.10 20-port 1 Gigabit Ethernet Module Front Panel



The front panel includes:

- Two LEDs (Pwr and Mgmt Act) indicating the general status of the module

- Two LEDs (Link and Active) below each port indicating the status of the port
- 1-Gigabit Ethernet ports, ten in Figure 2.9 and twenty in Figure 2.10

For information on LEDs, see Table 2.2.

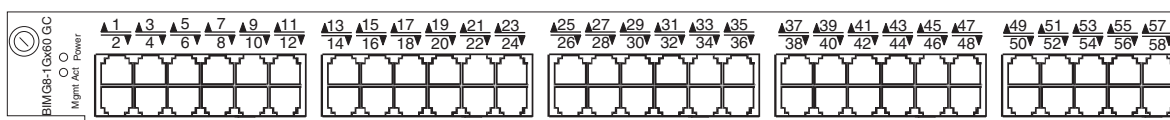
60-port 1 Gigabit Ethernet Interface Module (copper)

Software release 02.0.02 and later for the BigIron MG8 introduces the 60-port Gigabit over Copper (GoC) interface module.

It contains 60 physical ports, through which you can connect your BigIron Layer 3 Switch to other network devices at a maximum speed of 1 Gigabit. Into a physical port, you must insert an RJ-45 copper cable connector.

Figure 2.11 shows a 60-port GoC interface module's front panel.

Figure 2.11 60-port GoC Interface Module Front Panel



The front panel includes:

- Two LEDs (Pwr and Mgmt Act) indicating the general status of the module
- Two LEDs for each port indicating the status of the port
- 10/100/1000 Ethernet ports with RJ-45 copper connectors

Table 2.3 describes the LEDs on the front panel of the 60-port GoC interface module.

Table 2.3: LEDs for 10/100/1000 Mbps Ports

LED	State	Meaning
Pwr	On	The module is receiving power.
	Off	The module is not receiving power.
Mgmt Act	During initialization: steady blinking. After initialization: occasional blinking.	The active management module's processor and the interface module's processor are communicating.
	Off for an extended period.	The interface module is not being managed by the active management module.
▲	Off	No copper port connection exists on upper copper connector.
	Green	Copper port is connected on upper copper connector.
	Amber	Traffic is being transmitted and received on upper copper connector.

Table 2.3: LEDs for 10/100/1000 Mbps Ports(Continued)

LED	State	Meaning
▼	Off	No copper port connection exists on lower copper connector.
	Green	Copper port is connected on lower copper connector.
	Amber	Traffic is being transmitted and received on lower copper connector.

Support for CWDM Mini-GBICs

Release 02.1.00 includes support for Coarse Wavelength Division Multiplexing (CWDM) mini-GBICs on Gigabit Ethernet modules. CWDM mini-GBICs allow you to connect up to 8 Gigabit Ethernet ports over a single fiber link using mux/demux equipment at both ends of the link.

The Foundry device automatically detects the CWDM mini-GBICs. Valid part numbers are FWDM-1519-7D-xx for transceivers with a reach of 80 km, and FWDM-1619-7D-yy for transceivers with a reach of 100 km, where xx and yy represent the wavelength of the transceivers.

Each of the ports must operate on different wavelengths. The following wavelengths are supported:

- 1470 nm
- 1490 nm
- 1510 nm
- 1530 nm
- 1550 nm
- 1570 nm
- 1590 nm
- 1610 nm

The output of the **show media** command displays the following information for ports that have CWDM mini-GBICs:

```
BigIron(config)# show media
Port 6/6:
  Type   : SFP (LX-1470nm)
  Vendor : Foundry Networks   , Version:  A
  Part#  : FWDM-1519-7D-47   , Serial#:  X3R00T7
```

Support for 1000Base-BX Mini-GBICs

Release 02.1.00 supports use of 1000Base-BX Ethernet Mini-GBICs on the BigIron MG8 1 Gigabit Interface Modules. These mini-GBICs interface to a single fiber strand and have built-in optical MUX and DE-MUX circuits.

Table 2.4 describes the specifications for these modules.

Table 2.4: 1000Base-BX Mini-GBICs

Show Media Display	Part #	Fiber Type	Wavelength	Range (meters)
SFP (LX-1490nm)	E1MG-BXD	SMF	1490 nm	up to 10 km
SFP (LX-1310nm)	E1MG-BXU	SMF	1310 nm	up to 10 km

The output of the **show media** command displays the following information for ports that have the 1000Base-BX Ethernet Mini-GBICs installed:

```
BigIron MG8# show media
Port 6/10:
  Type      : SFP (LX-1310nm)
  Vendor    : Foundry Networks           , Version: 0000
  Part#     : TRPBG1LXDBBSH   , Serial#: 2809540
Port 6/9:
  Type      : SFP (LX-1490nm)
  Vendor    : Foundry Networks           , Version: 0000
  Part#     : TRPBG1LXDBVS2   , Serial#: 2809547
```

Support for New XENPAKs

Software release 02.1.00 supports the following new XENPAK modules:

- “10 Gigabit Ethernet Copper XENPAK”
- “10 Gigabit Ethernet Fiber LX4 XENPAKs”
- “10 Gigabit Ethernet ZR Fiber XENPAKs”
- “10 Gigabit Ethernet ZRD Fiber XENPAKs”

10 Gigabit Ethernet Copper XENPAK

Software release 02.1.00 supports use of 10 Gigabit Ethernet Copper XENPAKs on the BigIron MG8 10 Gigabit Interface Modules.

Table 2.5 describes the specifications for these modules.

Table 2.5: 10 Gigabit Copper XENPAK

Show Media Display	Part #	Media Type	Range (meters)
10G-CX4 (XENPAK)	10G-XNPK-CX4	Infiniband copper cable	up to 15 meters

The output of the **show media** command displays the following information for ports that have the 10 Gigabit Ethernet Copper Xenpaks installed:

```
BigIron MG8# show media
Port 5/1:
  Type   :    10G-CX4 (XENPAK)
  Vendor :    Foundry Networks, Version: 3A
  Part#  :    FCU-010M001      , Serial#:
```

10 Gigabit Ethernet Fiber LX4 XENPAKS

Release 02.1.00 supports use of 10 Gigabit Ethernet Fiber LX4 XENPAKS on the BigIron MG8 10 Gigabit Interface Modules.

Table 2.6 describes the specifications for these modules.

Table 2.6: 10 Gigabit Ethernet LX4 Fiber XENPAKS

Show Media Display	Part #	Wavelength	Fiber	Range (meters)
10G-LX4	10G-XNPK-LX4	1550 nm	MMF (FDDI Grade) 50 u and 62.5 u	300 meters
			SMF	up to 10 km

The output of the **show media** command displays the following information for ports that have the 10 Gigabit Ethernet Copper Xenpaks installed:

```
BigIron MG8# show media
Port 5/1:
  Type   :    10G-LX4 (XENPAK)
  Vendor :    Foundry Networks, Version: 3A
  Part#  :    FCU-010M001      , Serial#:
```

10 Gigabit Ethernet ZR Fiber XENPAKS

Release 02.1.00 supports use of 10 Gigabit Ethernet ZR Fiber XENPAKS on the BigIron MG8 10 Gigabit Interface Modules.

Table 2.7 describes the specifications for these modules.

Table 2.7: 10 Gigabit Ethernet ZR Fiber XENPAKS

Show Media Display	Part #	Fiber Type	Wavelength	Range (meters)
10G-ZR	10G-XNPK-ZR	SMF	1550 nm	up to 80 km

The output of the **show media** command displays the following information for ports that have the 10 Gigabit Ethernet ZR fiber Xenpaks installed:

```
BigIron MG8# show media
```

```
Port 8/1:
```

```
  Type : 10G-ZR 1550 nm 80km (XENPAK)
  Vendor: Foundry Networks , Version: 00
  Part# : TRE7062EN-SW-W1 , Serial#: 04H58534
```

```
Port 8/2:
```

```
  Type : 10G-ZR 1550 nm 80km (XENPAK)
  Vendor: Foundry Networks , Version: 00
  Part# : TRE7062EN-SW-W1 , Serial#: 04G458151241
```

10 Gigabit Ethernet ZRD Fiber XENPAKs

Release 02.1.00 supports use of 10 Gigabit Ethernet ZRD Fiber XENPAKs on the BigIron MG8 10 Gigabit Interface Modules. This ZENPAK module operates on up to 40 different wavelengths at DWDM spacing on the ITU grid.

Table 2.8 describes the specifications for these modules.

Table 2.8: 10 Gigabit Ethernet ZRD Fiber XENPAKs

Show Media Display	Part #	Fiber Type	Wavelength	Range (meters)
10G-ZRD (XENPAK)	10G-XNPK-ZRD-1556.55 ^a	SMF	1550 nm	up to 80 km

a. This module supports 40 different wavelengths. The last 6 digits of the part number describes the wavelength of a particular XENPAK module.

The output of the **show media** command displays the following information for ports that have the 10 Gigabit Ethernet ZR fiber Xenpaks installed:

```
BigIron MG8# show media
```

```
Port 8/1:
```

```
  Type : 10G-ZR 1550.1556.55 nm 80km (XENPAK)
  Vendor: Foundry Networks , Version: 00
  Part# : TRE7062EN-SW-W1 , Serial#: 04H58534
```

XENPAK WAN PHY Transceiver for 10 Gigabit Ethernet Ports

The XENPAK WAN PHY transceiver enables a port on a 10 Gigabit Ethernet module to use SONET/SDH for Layer 1 transport across a WAN transport backbone. The XENPAK WAN PHY transceiver can be directly linked to an OC192 SONET-based port. This allows for the extension of ethernet links across a WAN transport backbone.

The XENPAK WAN PHY transceiver can be set-up for either WAN or LAN mode. The default state is LAN mode. To determine the mode of an individual transceiver, use the **show media** command as shown below. XENPAK's of the type "10G-LW," "10G-SW", or "10G-EW" (as shown for ports 1/1 - 1/4) are configured for WAN mode.

XENPAK's of the type "10G-LR", "10G-SR", or "10G-ER" (as shown for ports 2/1 - 2/4) are configured for LAN mode.

```
BigIron#show media
Port 1/1:
Type: 10G-LW (XENPAK)
Vendor: Foundry Networks, Version: B
Part#: TOP 4010-03, Serial#: 0405000262
Port 1/2:
Type: 10G-LW (XENPAK)
Vendor: Foundry Networks, Version: B
Part#: TOP 4010-SC, Serial#: KK04080036
Port 1/3:
Type: 10G-LW (XENPAK)
Vendor: Foundry Networks, Version: B
Part#: TOP 4010-03, Serial#: 0405000263
Port 1/4:
Type: 10G-LW (XENPAK)
Vendor: Foundry Networks, Version: B
Part#: TOP 4010-SC, Serial#: 0404000134
Port 2/1:
Type: 10G-LR (XENPAK)
Vendor: Foundry Networks, Version: B
Part#: TOP 3010-SC, Serial#: KK03260028
Port 2/2:
Type: 10G-LR (XENPAK)
Vendor: Foundry Networks, Version: B
Part#: TOP 3010-SC, Serial#: KK03300054
Port 2/3:
Type: 10G-LR (XENPAK)
Vendor: Foundry Networks, Version: B
Part#: TOP 3010-SC, Serial#: KK03310030
Port 2/4:
Type: 10G-LR (XENPAK)
Vendor: Foundry Networks, Version: B
Part#: TOP 3010-SC, Serial#: KK03260143
```

Setting the WAN PHY XENPAK to WAN mode

If you want to change the mode of a WAN PHY XENPAK to WAN mode, use the following command:

```
BigIron#(config-if-e10000-6/3)# phy-mode wan
```

Syntax: [no] phy-mode wan

Use the **no** version of the command to return the port to LAN mode, the default

Switch Fabric Module

The switch fabric module switches user packets from one interface module installed in a chassis to another.

The BigIron MG8 chassis ships with a switch fabric module installed in the BigIron MG8 chassis, as shown in Figure 2.5 on page 2-6.

CAUTION: Do not remove the switch fabric module while the BigIron MG8 chassis is powered on and running. If you attempt to remove this module while the chassis is powered on and running, all traffic being handled by the system will stop.

Figure 2.12 shows the switch fabric module's front panel.

Figure 2.12 Switch Fabric Module Front Panel

The front panel includes two LEDs, which Table 2.9 describes.

Table 2.9: Switch Fabric Module LEDs

LED	State	Meaning
Pwr	On	The module is receiving power.
	Off	The module is not receiving power.
Active	On	The chassis switch fabric is active and ready to switch user packets.
	Off for an extended period	The chassis switch fabric is not active and cannot switch user packets.

Power Supplies

The BigIron MG8 supports the following power supply options:

- AC power supplies – Foundry provides AC power supplies.
- DC power source – You supply your own DC power source.

The following sections describe these options.

AC Power Supplies

Foundry provides AC power supplies that plug into a wall outlet. To supply enough power to the BigIron MG8 chassis, Foundry recommends installing a minimum of three AC power supplies. The first AC power supply supports the management module, the switch fabric module, and two interface modules. The second power supply supports three interface modules. The third power supply supports three interface modules. For AC power supply specifications, see “Power Specifications” on page 11-1.

To provide redundancy for the three AC power supplies, you can install up to three additional AC power supplies. One additional power supply, for a total of 4 power supplies, provides $n + 1$ redundancy; two additional power supplies, for a total of 5 power supplies, provides $n + 2$ redundancy; and three additional power supplies, for a total of 6 power supplies, provide full redundancy. Foundry recommends installing a minimum of one redundant power supply.

As shown in Figure 2.5 on page 2-6, you install the AC power supplies in the slots along the bottom of the chassis. The installed power supplies provide power to all chassis components, sharing the workload equally and reporting their status to the management module. If the management module detects that one of these power supplies has failed or overheated, the management module will redistribute the failed power supply’s workload to the remaining power supplies.

Each AC power supply has an LED on its faceplate. If the LED is on (a steady green), the power supply is providing power to the chassis components. If the LED is amber or off, the power supply is not providing power to the chassis components.

The AC power supplies are hot swappable, which means you can remove and replace them without powering down the system. For information about replacing a power supply, see “Replacing an AC Power Supply” on page 9-9.

WARNING: The AC power supplies are hot swappable, which means they can be removed and replaced while the BigIron MG8 chassis is powered on and running. However, Foundry recommends that you disconnect the AC power supply from wall outlet before removing and replacing the supply. The BigIron MG8 chassis can be running while a power supply is being removed and replaced, but the power supply itself should not be connected to a power source. Otherwise, you could be injured or the AC power supply or other parts of the device could be damaged.

DC Power Source

You can provide your own DC power source for the BigIron MG8 DC chassis. The BigIron MG8 DC chassis needs a minimum of 2800 W. For more information about power specifications, see “Power Specifications” on page 11-1.

To connect a DC power source, you must remove a panel on the DC chassis rear, which exposes two terminal blocks. You can connect the DC power source(s) to the terminal blocks marked Power Input B or Power Input A.

If you connect primary and redundant DC power sources, both sources provide power to all chassis components, sharing the workload equally. If one of the power sources fails, the management module redistributes the failed power source’s workload to the remaining power source.

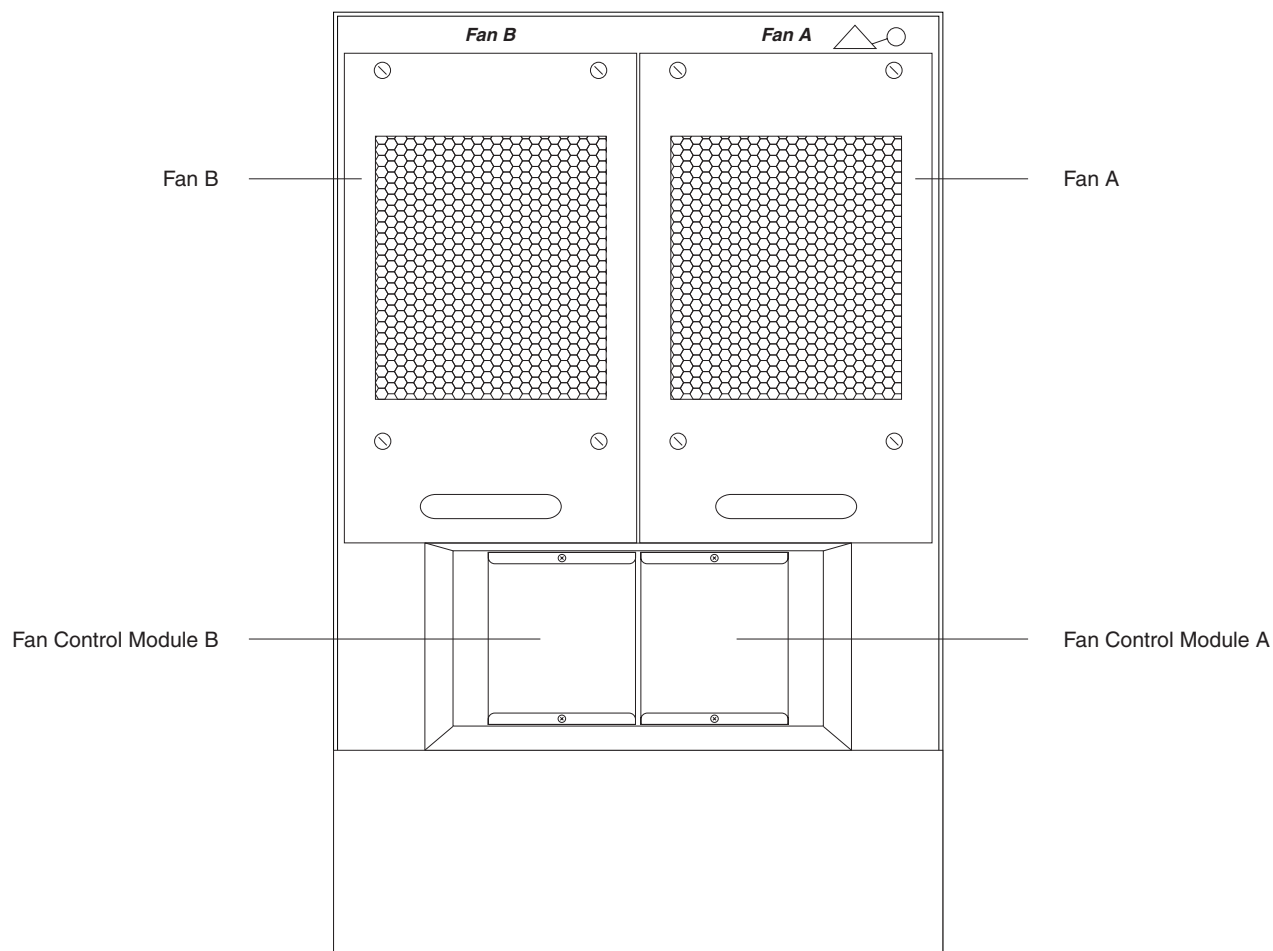
Cooling System

The following components comprise the cooling system for the BigIron MG8:

- At least one temperature sensor on each module board.
- Two four-speed fans.
- Two fan control modules (one fan control module per fan). Each fan control module maintains the power to one fan and controls the fan speed and the reporting of the fan status to the management module.
- An air filter, which filters air entering the BigIron MG8 chassis.

As shown in Figure 2.13, the fans and fan control modules are located in the rear of the BigIron MG8 chassis.

Figure 2.13 Fan Component Locations



Upon system startup, the two fans in the BigIron MG8 chassis operate at high speed, then the management module lowers the fan speed to low speed. The second fan provides full redundancy to the first fan in ambient conditions of up to 40° C (104° F).

By default, the BigIron MG8 polls the temperature sensor on each module every 60 seconds to get a temperature reading. (For information about changing the default temperature polling interval, see “Changing Temperature Thresholds For Modules and Fan Speeds” on page 7-7.) Depending on the temperature readings for the modules, the system can do the following:

- Leave the fan speed as is
- Increase the fan speed
- Decrease the fan speed
- Shut down a module to prevent damage

If the temperature of a module exceeds specified high temperature thresholds, the system generates a Syslog message and SNMP trap. The system can also shut the module down if the temperature exceeds the highest threshold.

You can change default low and high temperature thresholds for modules and fan speeds. For more information, see “Changing Temperature Thresholds For Modules and Fan Speeds” on page 7-7.

The fan control module includes a bi-color LED, which indicates the status of the fans. Table 2.10 describes the LED.

Table 2.10: Fan Control Module LED

LED	Position	State	Meaning
Fan control module LED	Rear of chassis	Off	The fans are not receiving power.
		Green	The fans are working and responding to controls from the fan control module.
		Amber	The fans are not working and not responding to controls from the fan control module.

The BigIron MG8 chassis ships with all fan components fully installed. However, Foundry recommends that you replace the air filter every 6 months. For information about replacing the air filter and if necessary, other fan components, see “Maintaining a BigIron MG8” on page 9-1. The fan components are hot swappable, which means you can remove and replace them without powering down the system.

CAUTION: To avoid overheating of the BigIron MG8 chassis, remove only one fan at a time. Do not remove both fans from the chassis at one time.

Rack Mount Kit

The BigIron MG8 ships with two L-shaped mounting brackets and mounting screws, which allow you to mount the chassis in a standard 19-inch (EIA310-D) rack.

In a rack, you can install up to two BigIron MG8 chassis , in the following combinations :

- Two AC chassis.
- Three DC chassis.

Supported Features

Support for Software Features by TCAM Version Installed

Several BigIron MG8 software features in releases 02.1.00, 02.2.00, and 02.2.01 are supported selectively on different Interface modules depending on the version of TCAM installed. The versions of TCAM are described in the following:

- **IPv4 TCAM Installed** – In these modules, the factory-installed TCAM is IPv4 capable.
- **IPv6 TCAM Upgrade** – In these modules, the TCAM has been field-upgraded to be IPv6 capable (in addition to IPv4).
- **IPv6 TCAM Installed** – In most cases for these modules, the TCAM was factory-installed to be IPv6 capable (in addition to IPv4). Some 1G x 40 SFP and 1G x 20 SFP modules are field-upgraded to this level of operation.

Table 2.11 describes the BigIron MG8 Interface modules and which version of TCAM they have installed. The following section: "Determining the Type of Interface Module That You Have Installed", describes how to use the **show module** display to determine the TCAM version installed on an individual Interface module.

Table 2.11: TCAM Installed on Interface Modules

Module	IPv4 TCAM Installed	IPv6 TCAM Upgrade	IPv6 TCAM Installed
10G x 2	BIM-10G x 2	BIMG8-10Gx2-v6	BIMG8-10Gx2-v6-A
10G x 4	BIM-10G x 4	BIMG8-10Gx4-v6	BIMG8-10Gx4-v6-A
1G x 10 SFP			BIMG8-1Gx10-SFP-v6
1G x 20 SFP			BIMG8-1Gx20-SFP-v6
1G x 40 SFP	BIMG8-1G x 40-SFP		BIMG8-1Gx40-SFP-v6
1G x 40 GC	BIMG8-1G x 40-GC		BIMG8-1G x 40-GC-v6
1G x 60 GC			BIMG8-1G x 60-GC-v6

The following sections describe features that are selectively supported depending on the version of TCAM installed on the Interface modules. Depending on the BigIron MG8 software version, the same feature may or may not be supported.

Support for Version 02.1.00 Features

Table 2.12 lists several features of BigIron MG8 software release version 02.1.00 in the "Feature" column. The following columns describe which Interface modules support the feature.

Table 2.12: Features supported by Interface Module TCAM support for software version 02.1.00

Feature	IPv4 TCAM Installed Module	IPv6 TCAM Upgrade Modules	IPv6 TCAM Installed Modules
IPv4	Supported	Supported	Supported
IPv6	not available	Either IPv6 or IPv4 Outbound ACLs supported but not both.	Supported
IPv4 Outbound ACLs	not available	Either IPv6 or IPv4 Outbound ACLs supported but not both.	Supported
VLAN Translation	not available	not available	Supported

Support for Version 02.2.00 Features

Table 2.13 lists several features of BigIron MG8 software release version 02.2.00 in the "Feature" column. The following columns describe which Interface modules support the feature.

Table 2.13: Features supported by Interface Module TCAM support for software version 02.2.00

Feature	IPv4 TCAM Installed Module	IPv6 TCAM Upgrade Modules	IPv6 TCAM Installed Modules
IPv4 Outbound ACLs	not available	not available	Supported
IPv6 VLAN Translation	not available	not available	Supported
VLAN Counters	not available	not available	Supported
Rate Limit Counters	not available	not available	Supported

Support for Version 02.2.01 Features

Table 2.14 lists several features of BigIron MG8 software release version 02.2.01 in the "Feature" column. The following columns describe which Interface modules support the feature.

Table 2.14: Features supported by Interface Module TCAM support for software version 02.2.01

Feature	IPv4 TCAM Installed Module	IPv6 TCAM Upgrade Modules	IPv6 TCAM Installed Modules
IPv4	Supported	not available	Supported
VLAN Translation with SAV	Supported	not available	Supported
VLAN Counters	not available	not available	Supported

Determining the Type of Interface Module That You Have Installed

Table 2.12, Table 2.13, and Table 2.14 show various levels of support available for different BigIron MG8 Interface Modules. For the following interface modules, that level of support can vary depending on the model of the Interface module that you have installed.

- 10G x 2
- 10G x 4
- 1G x 40 SFP
- 1G x 40 GC

The following instructions describe how to determine which model that you have installed in your system.

1. From the Privileged Exec level, use the **show module** command to display all of the interface modules in your chassis.

```
BI MG8 Router# show module
```

Module	Status	Ports	Starting MAC
M1 (upper): BIMG8-MR Management Module	Active		
M2 (lower):			
F1: BIMG8-SFM Switch Fabric Module	Active		
S1: BIMG8-10Gx4 4-port 10GbE Module	CARD_STATE_UP	4	00b0.00c0.0000
S2: BIMG8-10Gx4-v6 4-port 10GbE Module	CARD_STATE_UP	4	00b0.00c0.0000
S3:			
S4: BIMG8-10Gx2-v6-A 2-port 10GbE Module	CARD_STATE_UP	2	00b0.00c0.00c0
S5: BIMG8-1Gx40-SFP-v6 40-port 1 GbE Module	CARD_STATE_UP	20	00b0.00c0.0100
S6: BIMG8-1Gx40-GC 40-port 1 GbE Module	CARD_STATE_UP	40	00b0.00c0.0140
S7:			
S8: BIMG8-10Gx2v6 2-port 10GbE Module	CARD_STATE_UP	2	00b0.00c0.01c0

1. If your configuration contains a 2-port or 4-port 10 Gigabit Ethernet Module that doesn't have a "-v6" variable in its module description, it is of the type **IPv4 TCAM Installed**.

```
S1: BIMG8-10Gx2 2-port 10GbE Module CARD_STATE_UP 4 00b0.00c0.0000
```

2. If your configuration contains a 2-port or 4-port 10 Gigabit Ethernet Module that has a "-v6" variable but doesn't have "-A" variable in its module description, it is of the type **IPv6 TCAM Upgrade**. In the following example, the "-A" variable is not in the module description. The example has the "-v6" variable and it is shown in bold.

```
S1: BIMG8-10Gx4-v6 4-port 10GbE Module CARD_STATE_UP 4 00b0.00c0.0000
```

3. If your configuration contains a 2-port or 4-port 10 Gigabit Ethernet Module that has the "-A" variable in its module description, it is of the type **IPv6 TCAM Installed**. In the following example, the "-A" variable is shown in bold.

```
S4: BIMG8-10Gx2-v6-A 2-port 10GbE Module CARD_STATE_UP 4 00b0.00c0.0000
```

4. If your configuration contains a 40-port 1 Gigabit Ethernet Module that has a "-v6" variable in its module description, it is of the type **IPv6 TCAM Installed**. In the following example, the "-v6" variable is shown in bold.

```
S5: BIMG8-1Gx40-SFP-v6 40-port 1 GbE Module CARD_STATE_UP 20 00b0.00c0.0100
```

3. If your configuration contains a 40-port 1 Gigabit Ethernet Module that doesn't have the "-v6" variable in its module description, it is of the type **IPv4 TCAM Installed**. In the following example, the "-v6" variable is not in the module description.

```
S6: BIMG8-1Gx40-GC 40-port 1 GbE Module CARD_STATE_UP 40 00b0.00c0.0140
```

Other Supported Software Features

For a complete list of software features supported on the BigIron MG8, see the software release notes for this device. For information about configuring basic, non-protocol software features supported on this device, see "Configuring Basic Software Features" on page 8-1. For information about configuring all other software features supported on this device, see the *Foundry Switch and Router Installation and Basic Configuration Guide* and the *Foundry Enterprise Configuration and Management Guide*.

BigIron MG8 Architecture

The BigIron MG8 architecture implements the following notable features:

- Completely separate control and data planes.
- A distributed architecture of switching user packets and processing system management functions.

A data plane and a control plane typically comprise the architecture of a Layer 3 Switch. The data plane handles the switching of user packets, while the control plane handles system management tasks, running the networking protocols, providing hardware control and monitoring, and providing the user environment. Many Layer 3 Switches implement their data and control planes using common hardware and software components.

In contrast, the BigIron MG8 implements different switch fabrics to handle user and control packets. Separate data and control planes offer many benefits. For example:

- Uncompromised performance – Separate data and control planes provide the ability to manage the BigIron MG8 without compromising the device's switching performance.
- Increased reliability – If a dedicated component fails, the loss of the component affects only the plane to which the component belongs.
- Increased scalability – Dedicated components have enough bandwidth in reserve to handle increased future workloads.
- Increased security – If an attacker perpetrates a Denial of Service (DoS) attack in the data plane, the control plane, being isolated, is not affected and will still function.

The BigIron MG8 also implements a distributed architecture of switching and processing. A local switch fabric on the interface module can switch user packets from one local port to another, while the chassis switch fabric can switch user packets from one interface module in the BigIron MG8 chassis to another.

Also, a processor on the management module and a smaller processor on each interface module share system management functions. The management and interface modules' processors can communicate via management switch fabrics and management interfaces, which comprise a point-to-point 1 Gigabit Ethernet network. This dedicated network carries control packets only (and not user packets).

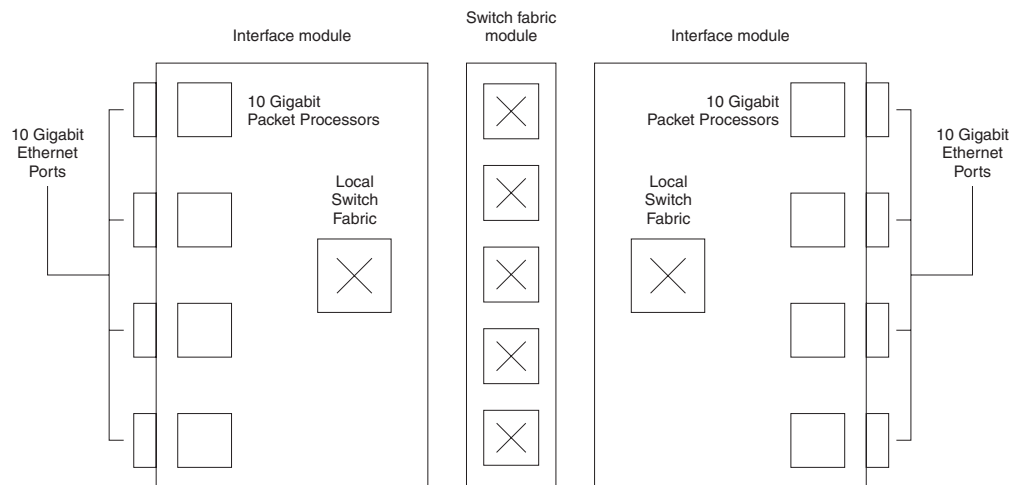
The following sections provide more information about the following topics:

- Switching architecture (data plane)
- System management architecture (control plane)

Switching Architecture

The BigIron MG8 implements a distributed switching architecture. As shown in Figure 2.14, the switching architecture is composed of the following major components:

- Interface modules:
 - One 10 Gigabit packet processor associated with each 10 Gigabit Ethernet port.
 - A local switch fabric.
- A chassis switch fabric implemented via Foundry's super crosspoint (SXPNT) ASICs.

Figure 2.14 Switching Architecture

In this distributed architecture, a local switch fabric can switch packets from one local port to another, while the chassis switch fabric can switch packets from one interface module in a chassis to another. The distribution of switching tasks allows the BigIron MG8 to deliver uncompromised wire-speed performance.

Four 10 Gigabit packet processors, which reside on an interface module, perform packet classification. Based on a packet's addressing information, these processors determine to which interface module and port a packet is forwarded to reach its destination. These processors can process both inbound and outbound packets at a full 10 Gbps.

A local switch fabric on each interface module forwards packets between the module's ports and the chassis switch fabric. Each local switch fabric can communicate with each SXPNT on the chassis switch fabric via a full-duplex 40 Gbps pipe.

The local switch fabric also performs multicast replication. If a local switch fabric receives a multicast packet targeted for multiple local ports from the chassis switch fabric, it replicates the packet, sending one copy to each targeted local port on the fly.

The chassis switch fabric forwards packets between the interface modules at a high speed. The chassis switch fabric can carry multiple packet flows simultaneously between the interface modules.

How a Packet Flows through the Switching Architecture

After a 10 Gigabit Ethernet port receives a packet, it is forwarded to the associated 10 Gigabit packet processor. The processor examines the packet and performs lookups to determine where to forward the packet.

The lookups can produce the following local destinations:

- A port on the same interface module on which the packet was received.
- Another interface module in the BigIron MG8 chassis.
- The interface module's management subsystem.

If the local destination is a port on the same interface module, the packet is forwarded to the local switch fabric, which then forwards the packet out of the local port.

If the local destination is another interface module, the packet is forwarded to the local switch fabric, which then forwards the packet to the chassis switch fabric. The chassis switch fabric in turn forwards the packet to the destination interface module's local switch fabric, which then forwards the packet to a local port.

In either of the above scenarios, the local switch fabric handles replication of a multicast packet depending on the packet's destination:

- If the packet is destined for a port(s) on the same interface module, the local switch fabric makes one copy of the packet for each port.

- If the packet is destined for a port(s) on other interface module(s), the local switch fabric makes one copy of the packet for each module. The destination interface module then produces a copy for each local destination port.

If a multicast packet is destined for multiple VLANs attached to the same port, the packet processor on an interface module has its own VLAN multicast map and counter that allows it to replicate multicast packets for the VLANs.

If the local destination is the interface module's management subsystem, the packet is forwarded there for further processing.

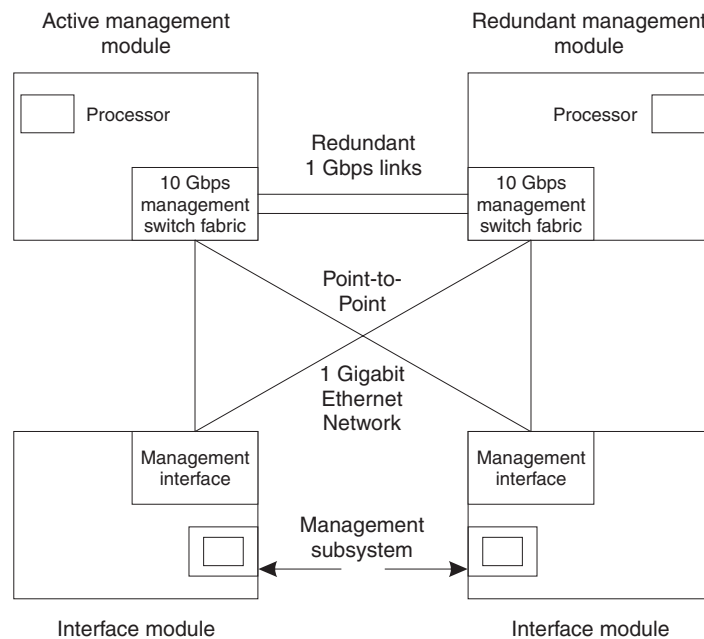
System Management Architecture

The BigIron MG8 implements a distributed system management architecture. As shown in Figure 2.15, the system management architecture is composed of the following major components:

- A large processor on each installed management module.
- A smaller processor, which along with SDRAM comprises a management subsystem on each installed interface module.
- A 10 Gbps management switch fabric, through which these modules communicate.
- A Real Time Operating System (RTOS).
- Two management ports on the management module control panel.

NOTE: Figure 2.15 is a conceptual diagram of how the system management architecture functions. It is not meant to literally represent how the system management architecture functions.

Figure 2.15 System Management Architecture



In this distributed architecture, the active management module and the interface modules' management subsystems share system management functions. The active management module handles only high-level functions, such as the following:

- Running network protocols.
- Obtaining network topology and reachability information.

- Determining the best paths to known destinations.
- Performing high-level chassis management functions, such as bringing modules up and down.
- Providing the user environment.
- Managing the configuration.

Meanwhile, the active management module delegates the following low-level functions to the interface modules' management subsystems:

- Monitoring local hardware status and providing the status to the active management module upon demand or if a problem arises.
- Maintaining L2/L3/L4 tables it obtains from the active management module.

The distribution of low-level functions to the interface modules allows the active management module to perform its own functions faster and more reliably. The distributed architecture also prevents the active management module from becoming a single point of potential failure.

For information about what happens if the active management module becomes unavailable and the redundant management assumes the management functions, see "How Management Module Redundancy Works" on page 6-1.

The processor on the active management module can communicate with the processor on each interface module via the management switch fabrics and management interfaces, which comprise a point-to-point 1 Gigabit Ethernet network. The 1 Gigabit Ethernet network is isolated from the chassis switch fabric, a component in the switching architecture; therefore, the network carries control packets only (and not user packets).

The dedicated 1 Gigabit Ethernet network provides ample bandwidth to quickly update the local tables on the interface modules, especially in demanding situations such as obtaining a large routing or MAC table from the active management module when an interface module is initializing. The dedicated management network relies on the management switch fabrics, which offers an aggregate bandwidth of 10 Gbps.

NOTE: The system management architecture allows communication from the active management module to the interface modules and vice versa, but not between the interface modules.

The management module control panel includes two out-of-band ports that provide management access to the BigIron MG8:

- A 10BaseT/100BaseTX Ethernet port
- A serial (Console) port

Both ports allow you to access and configure, monitor, and manage the BigIron MG8 using a PC. However, the Ethernet port also allows you to connect your BigIron MG8 to an already existing management network so that it can be configured, monitored, and managed, along with other devices in your network, from a management station.

For more information about the system management architecture's RTOS, see "Real Time Operating System" on page 2-27.

Real Time Operating System

The BigIron MG8 control plane uses a **multi-threaded** Real Time Operating System (RTOS), which allows multiple functions to run in parallel with other functions. Functions related to enabled routing protocols, VLAN management, and so on, are implemented in smaller, manageable tasks. As a result, the RTOS allocates CPU time to the functions with increased efficiency and does not allow the CPU time to be consumed by any particular function.

The RTOS is also distributed, which means that it delegates high-level functions only to the processor on the active management module and low-level functions to the smaller processor on each interface module. (For more information about the high- and low-level functions performed by the management and interface modules, see "System Management Architecture" on page 2-26.) This distribution of functions to multiple processors ensures that an individual processor is not overloaded and increases the performance for each function.

The RTOS also maintains the same look and feel of the IronWare operating system, which many users are already familiar with.

Chapter 3

Installing a BigIron MG8

This chapter describes hardware installation tasks for the BigIron MG8. It discusses the following topics:

- Summary of hardware installation procedures.
- Unpacking the system.
- Hardware installation precautions.
- Preparing the installation site.
- Installing a BigIron MG8 chassis in a rack.
- Removing slot panels.
- Installing modules.
- Installing power supplies.
- Attaching a management station.
- Powering on the BigIron MG8.
- Verifying the proper operation of the BigIron MG8 hardware.

For information about connecting the BigIron MG8 to other network devices, see “Connecting a BigIron MG8 to a Network Device” on page 4-1.

WARNING: The procedures in this manual are for qualified service personnel.

Summary of Installation Tasks

Table 3.1 lists the tasks you must perform to install your BigIron MG8 and where to access detailed information that allows you to perform each task.

Table 3.1: BigIron MG8 Installation Tasks

Task Number	Task	Where to Find More Information
Hardware installation		
1.	Review the installation cautions and warnings.	“Installation Precautions” on page 3-3
2.	Ensure that the physical environment that will host the BigIron MG8 chassis has proper cabling and ventilation.	“Preparing the Installation Site” on page 3-5
3.	Install the BigIron MG8 chassis in a rack.	“Installing a Chassis in a Rack” on page 3-5
4.	The BigIron MG8 chassis ships with a slot panel installed in all module slots that don’t currently have a module installed. If you plan to install a module in a slot, you must remove the slot panel. CAUTION: If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.	“Removing the Slot Panels” on page 3-8
5.	Install management modules or interface modules in the BigIron MG8 chassis.	“Installing the Modules” on page 3-9
6.	Install AC power supplies in a BigIron MG8 AC chassis, or connect DC power sources to a DC chassis. (Do not power on the chassis until step 9.)	“Installing Power Supplies” on page 3-10
7.	Attach a management station to the management module’s serial (Console) port or the 10BaseT/100BaseTX Ethernet (management) port.	“Attaching a Management Station” on page 3-12
8.	Power on the AC power supplies or DC power source.	“Powering On a System” on page 3-13
9.	After the BigIron MG8 chassis is powered on, observe the LEDs or display the status of the modules using the CLI to determine that the chassis is operating properly.	“Verifying Proper Operation” on page 3-14
Establishing Network Connectivity		
10.	Secure access to the BigIron MG8 CLI by assigning passwords.	“Assigning Permanent Passwords” on page 4-1
11.	Configure IP addresses for the management, Ethernet, virtual, and loopback interfaces.	“Configuring IP Addresses” on page 4-2

Table 3.1: BigIron MG8 Installation Tasks (Continued)

Task Number	Task	Where to Find More Information
12.	Install a fiber-optic module into each 10 Gigabit Ethernet port, connect the port to another networking device, and troubleshoot any problems that can arise.	"Installing a Fiber-Optic Module" on page 4-5
13.	Test a port for connectivity to other networking devices using the ping and tracert commands.	"Testing Network Connectivity" on page 4-6

Installation Precautions

Follow these precautions when installing the BigIron MG8.

General Precautions

WARNING: All fiber-optic interfaces use Class 1 Lasers.

CAUTION: Do not install the device in an environment where the operating ambient temperature might exceed 40° C (104° F).

CAUTION: Make sure the air flow around the sides and back of the device is not restricted.

CAUTION: If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.

WARNING: When installing a fan, follow the installation instructions included in the fan replacement kit.

CAUTION: Never leave tools inside the chassis.

Lifting Precautions

WARNING: A fully populated chassis is heavy. TWO OR MORE PEOPLE ARE REQUIRED WHEN LIFTING, HANDLING, OR MOUNTING THESE DEVICES.

WARNING: Do not use the handles on the power supply units to lift or carry Chassis devices.

WARNING: The front panel of an AC power supply includes a handle that locks the power supply in the chassis. This handle is a locking mechanism only and should not be used to lift and carry the power supply. You may sustain physical injury or harm if you attempt to lift and carry a power supply using the locking handle.

WARNING: A fully populated chassis is heavy. TWO OR MORE PEOPLE ARE REQUIRED WHEN LIFTING, HANDLING, OR MOUNTING THESE DEVICES.

WARNING: Make sure the rack or cabinet housing the device is adequately secured to prevent it from becoming

unstable or falling over.

WARNING: Mount the devices you install in a rack or cabinet as low as possible. Place the heaviest device at the bottom and progressively place lighter devices above.

Power Precautions

WARNING: Disconnect the power cord from all power sources to completely remove power from the device.

WARNING: Make sure that the power source circuits are properly grounded, then use the power cord supplied with the device to connect it to the power source.

CAUTION: Foundry recommends using a separate branch circuit for each AC power cord. This provides redundancy in case one of the circuits fails and helps prevent overloading the branch circuit.

CAUTION: All devices with DC power sources are intended for installation in restricted access areas only. A restricted access area is where access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.

CAUTION: For a DC system, use a grounding wire of at least 6 American Wire Gauge (AWG). The 6 AWG wire should be attached to an agency-approved crimp connector (provided on the BigIron MG8 chassis rear), crimped with the proper tool. The single crimp connector should allow for securement to both ground screws on the enclosure.

CAUTION: For the DC input circuit to the system, make sure there is a Listed 60 amp circuit breaker, minimum -48Vdc, double pole, on the input to the terminal block. The input wiring for connection to the product should be Listed copper wire, 6 AWG, marked VW-1, and rated minimum 90° C.

WARNING: Make sure to choose the appropriate circuit device depending on the number of AC power supplies installed in the chassis. The maximum current draw is three AC power supplies.

WARNING: Disconnect the power cord from all power sources to completely remove power from the device.

WARNING: To avoid the risk of electrical shock, make sure that the power source circuits are properly grounded, then use the power cord supplied with the device to connect it to the power source.

WARNING: If your installation requires a different power cord than the one supplied with the device, be sure to use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device. Make certain that the amperage ratings of the power cord are adequate for the product.

CAUTION: Ensure that the device does not overload the power circuits, wiring, and over-current protection. To determine the possibility of overloading the supply circuits, add the ampere (amp) ratings of all devices installed on the same circuit as the device. Compare this total with the rating limit for the circuit. The maximum ampere ratings are usually printed on the devices near the input power connectors.

CAUTION: Carefully follow the mechanical guides on each side of the power supply slot and make sure the power supply is properly inserted in the guides. Never insert the power supply upside down.

Preparing the Installation Site

Cabling Infrastructure

Ensure that the proper cabling is installed in the site.

For information on cabling, see “Installing an AC Power Supply” on page 3-11, “Attaching a Management Station” on page 3-12, and “Connecting a BigIron MG8 to a Network Device” on page 4-1.

Installation Location

Before installing the device, plan its location and orientation relative to other devices and equipment. Allow at least 3" of space at the front of the device for the fiber-optic, and power cabling. Also, allow a minimum of 3" of space between the sides and the back of the device and walls or other obstructions.

Installing a Chassis in a Rack

Because of the weight of a fully loaded BigIron MG8 chassis (242 lbs), Foundry recommends mounting a chassis in a rack before installing the modules and power supplies.

In a standard 19-inch (EIA310-D) rack, you can install up to three BigIron MG8 chassis, in the following combinations:

- Two AC chassis.
- Three DC chassis.

Before performing this task, you should have an assembled rack and a #2 Phillips-head screwdriver.

This section describes the following tasks:

- Attaching mounting brackets to a chassis
- Mounting the chassis in a rack

Attaching Mounting Brackets to Chassis

The BigIron MG8 chassis ships with a rack mount kit. The kit includes two L-shaped mounting brackets and mounting screws.

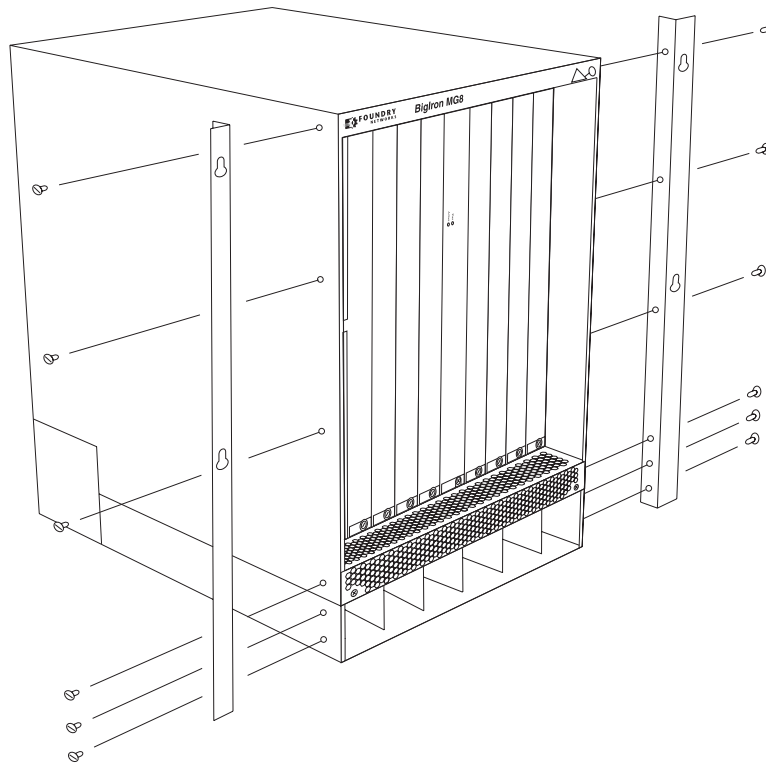
The length of the mounting brackets you receive depends on which chassis you have. If you have an AC chassis with the power supply slots along the chassis bottom, you receive longer brackets. If you have a DC chassis without the power supply slots, you receive shorter brackets.

The chassis sides have three sets of screw holes: one set for attaching the mounting brackets close to the chassis front, another set for attaching the brackets toward the chassis center, and another set for attaching the brackets close to the chassis rear.

Attach the mounting brackets to the sides of the chassis as illustrated in Figure 3.1. Note that the narrow portion of the keyhole slot is up and the wide portion of the slot is down.

NOTE: Figure 3.1 shows the mounting brackets being attached to an AC chassis in the front position. The procedure for attaching the brackets in the center or rear position or to a DC chassis is exactly the same except with a DC chassis, you attach the brackets with fewer screws.

Figure 3.1 Attaching mounting brackets to chassis



Mounting the Chassis in a Rack

Keep the following in mind when mounting a BigIron MG8 chassis in a rack:

WARNING: The Chassis devices are very heavy, especially when fully populated with modules and power supplies. TWO OR MORE PEOPLE ARE REQUIRED WHEN LIFTING, HANDLING, OR MOUNTING THESE DEVICES. Remove all power supplies and network modules before lifting or handling.

WARNING: Do not use the handles on the power supply units to lift or carry Chassis devices.

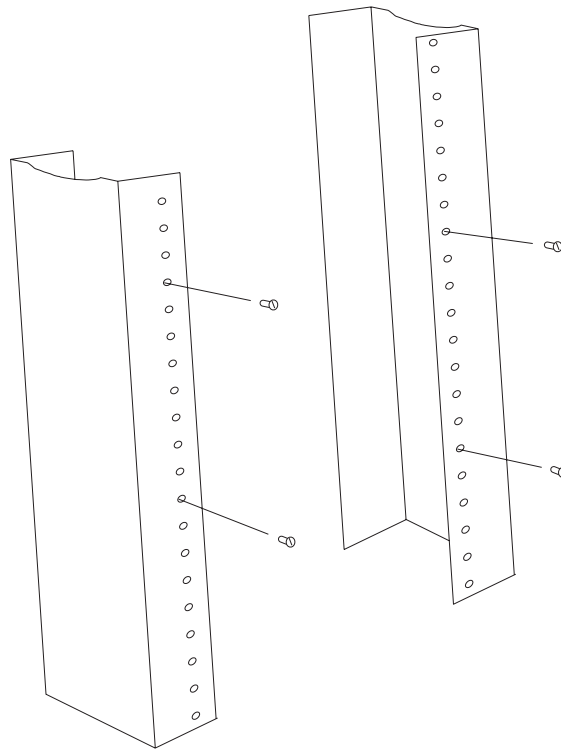
WARNING: Make sure the rack or cabinet housing the device is adequately secured to prevent it from becoming unstable or falling over.

WARNING: Devices installed in a rack or cabinet should be mounted as low as possible, with the heaviest devices at the bottom and progressively lighter devices installed above.

For each BigIron MG8 chassis that you install in a rack, you must provide four screws on which to mount and secure the chassis.

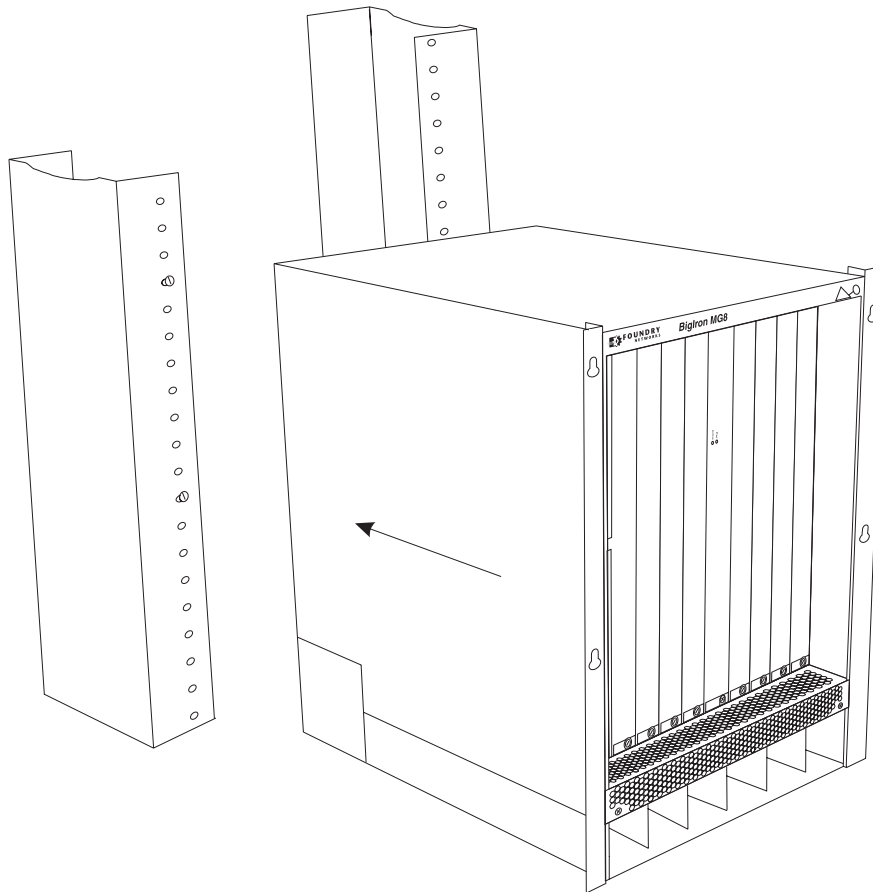
To mount a BigIron MG8 chassis in a rack, do the following:

14. Determine the position of each chassis in the rack, for example, a lighter AC chassis on top and a heavier AC chassis below.
15. Position the four screws for each chassis that you plan to mount in the rack according to the spacings of the keyhole slots on the mounting brackets as shown in Figure 3.2. Do not secure the screws completely; leave approximately 1/4 in of clearance between the back of the screw head and the rack.

Figure 3.2 Positioning the screws in a rack

16. Starting with the chassis that you want to mount in the lowest position in the rack, mount the chassis in the rack as shown in Figure 3.3. With two or more people lifting the chassis, slip the wide portion of each keyhole slot over the corresponding screw in the rack.

Figure 3.3 Mounting the chassis in a rack



17. Slide the chassis down so that the screw heads are in the narrow portion of the keyhole slots.
18. Tighten the screws to secure the chassis in place.
19. Repeat Step 16 through Step 18 to mount each subsequent chassis in the same rack.

Removing the Slot Panels

The BigIron MG8 chassis ships with slot panels installed in all module slots. The slot panel covers a slot that does not currently have a module installed in it, ensuring proper airflow within the chassis. If you plan to install a module in a particular slot, you must remove the slot panel.

CAUTION: If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.

Although the slot panels are different in size, the procedure for removing them from the BigIron MG8 chassis is the same. Therefore, this section provides one procedure that applies to all slot panels.

You might need a flat-head screwdriver to perform this task.

To remove a slot panel, do the following:

20. Loosen the thumbscrews on either end of the slot panel by hand or with a flat-head screwdriver, if necessary.
21. Pull the slot panel out of the chassis, and store it in a safe place for future use.

Installing the Modules

Although the modules are different in size and function, the procedure for installing each of them into the BigIron MG8 chassis is the same. Therefore, this section provides one procedure that applies to all modules.

NOTE: The BigIron MG8 modules are dedicated, which means that you must install them in the BigIron MG8 chassis only. For example, if you attempt to install the BigIron MG8 management module in another Foundry chassis or a management module intended for another Foundry chassis in the BigIron MG8 chassis, the chassis and module will not function properly.

Table 3.2 provides the chassis slot number(s) into which you must install the modules. Markings for the chassis slots appear at the base of the slots.

Table 3.2: Module Installation

Module	Chassis Slot Number
Management modules	<ul style="list-style-type: none"> • Active module – M1 (upper). • Redundant module – M2 (lower).
Interface modules	1 – 8

The BigIron MG8 chassis ships with a switch fabric module installed in a slot marked SF; therefore, you do not need to install this module initially.

CAUTION: If you do not install a module in a slot, you must leave the slot panel installed in the slot. If you run the BigIron MG8 chassis with an uncovered slot, the system will overheat.

If you are installing a redundant management module, see “Using a Redundant Management Module” on page 6-1 for information about how the redundant module works, optional software configuration that you can perform, and how to manage the redundancy feature.

Before installing a module in the BigIron MG8 chassis, have the following on hand:

- An ESD wrist strap with a plug for connection to the ESD connector on the BigIron MG8 chassis.

WARNING: For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

- A large flat-head screwdriver.

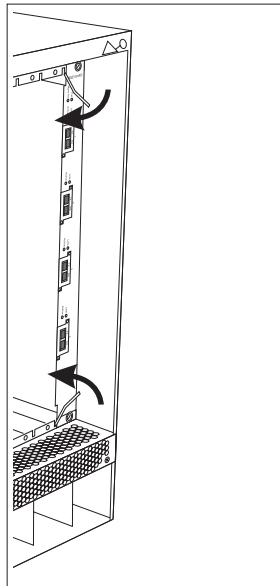
To install a module in the BigIron MG8 chassis, do the following:

22. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the upper right corner of the chassis front.
23. Remove the module from its packaging.
24. Insert the module into the appropriate chassis slot and slide the card along the card guide until the ejectors on either side of the module move close to the module front panel.
25. Push the ejectors in the directions shown in Figure 3.4 until they are flush with the module front panel. This action will fully seat the module in the backplane.

NOTE: Although the module shown in Figure 3.4 is an interface module, the directions in which to push the ejectors to fully seat the module in the backplane applies to a management module also.

26. Tighten the two screws at either end of the module front panel by pushing them in and turning them clockwise. If desired, tighten the screws further using the flat-head screwdriver.

Figure 3.4 Installing a Module



Installing Power Supplies

Table 3.3 outlines the power supply installation options that the BigIron MG8 supports. In this table, “AC power supply” indicates an AC power supply provided by Foundry, and “DC power source” indicates a DC power source that you provide.

The “redundancy feature” referred to in the table indicates the ability of the management module to redistribute the workload of a failed power supply to remaining power supplies.

Table 3.3: Power Supply Installation Options

Primary	Redundant	Redundancy Feature Supported?
Three AC power supplies. (The first AC power supply supports the management module, the switch fabric module, and two interface modules. The second power supply supports three interface modules. The third power supply supports three interface modules.)	Up to three additional AC power supplies: <ul style="list-style-type: none"> • One additional power supply provides n + 1 redundancy. • Two additional power supplies provides n + 2 redundancy. • Three additional power supplies provide n + 3 or full redundancy. Foundry recommends installing a minimum of one redundant power supply.	Yes
DC power source.	DC power source.	Yes

The following sections provide information about installing AC and DC power supplies.

Installing an AC Power Supply

As shown in Figure 2.5 on page 2-6, you install the AC power supplies starting in the leftmost power supply slots. You need a small Phillips or flat-head screwdriver to perform this task.

WARNING: The front panel of an AC power supply includes a handle that locks the power supply in the chassis. This handle is a locking mechanism only and should not be used to lift and carry the power supply. You may sustain physical injury or harm if you attempt to lift and carry a power supply using the locking handle.

To install a power supply in the chassis, do the following:

27. Remove the blank power supply faceplate, and expose the empty power supply slot.
28. Remove the power supply from its packaging.
29. Insert the power supply into the empty power supply slot, using the guides provided on either side of the slot.

CAUTION: Carefully follow the mechanical guides on each side of the power supply slot and make sure the power supply is properly inserted in the guides. Never insert the power supply upside down.

30. After the power supply is fully inserted, push the power supply front panel toward the back of the chassis until the front panel is flush with the rest of the chassis. This action causes the power supply connector to lock into the backplane connector.
31. Gently pull the handle on the power supply front panel upward and toward the top of the power supply front panel. This action locks the power supply in place.
32. Use the screwdriver to tighten the two screws on either side of the power supply front panel.
33. Connect the Foundry-supplied AC power cord to the power supply front panel.

WARNING: If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.

34. For information about powering on the system, see “Powering On a System” on page 3-13.

Connecting a DC Power Source

WARNING: The procedure in this section is for qualified service personnel.

WARNING: Before beginning the installation, see the precautions in “Power Precautions” on page 3-4.

To perform this task, you need the following tools:

- A small Phillips screwdriver.
- Two Panduit model LCD6-14BH-L two hole copper lug, 6 AWG, 1/4” hole, 3/4” spacing, 45 degree angle tongue cables.
- A small adjustable wrench.

To connect a DC power source to a DC chassis, do the following:

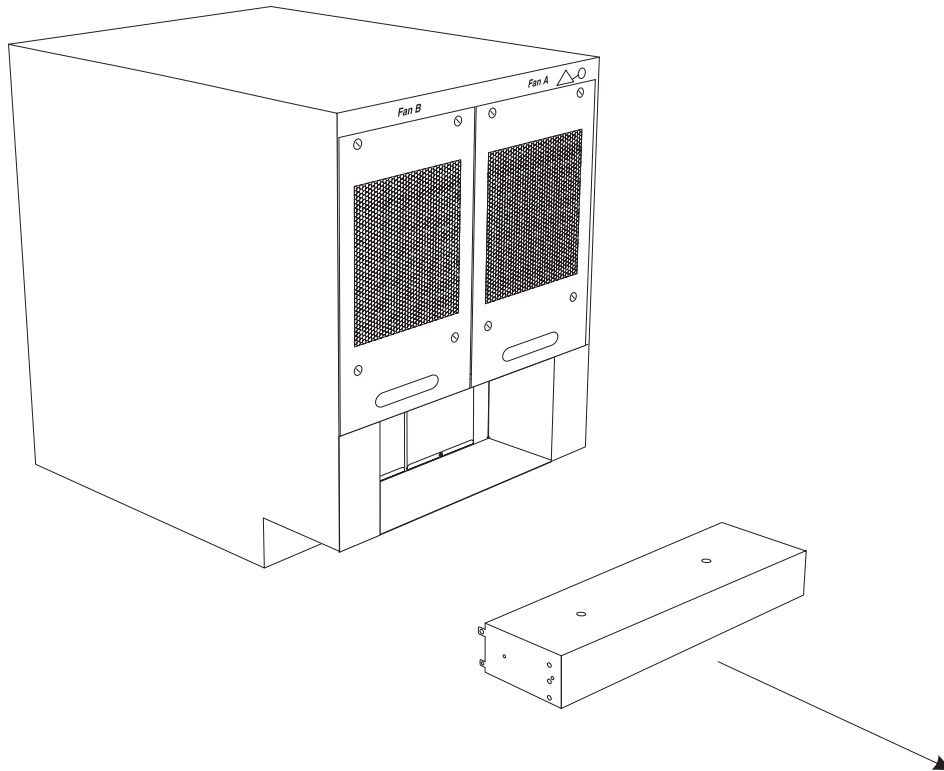
35. Use the Phillips screwdriver to remove screws on the sides and top of the lower rear panel. As you remove the last set of screws, place your hand under the rear panel to keep it from falling to the floor and pull the panel away from the chassis as shown in Figure 3.5.

Removing the rear panel exposes two terminal blocks. You can connect a DC power source to the terminal blocks labeled Power Input B or Power Input A.

NOTE: All DC power covers need to be removed prior to mounting into a cabinet.

36. Connect one end of a two-hole lug cable to the desired terminal block and the other end of the cable to your DC power source.
37. Repeat Step 36 until all DC power sources are connected.
38. For information about powering on the system, see “Powering On a System” on page 3-13.

Figure 3.5 Removing Lower Rear Chassis Panel



By default, the BigIron MG8 chassis assumes that its power is supplied by the AC power supplies. Therefore, you must enable the chassis to recognize the DC power source using the **use-dc-power** command. For information about performing this task, see “Enabling and Disabling a DC Power Source” on page 7-1.

Attaching a Management Station

You can manage the BigIron MG8 in the following ways:

- You can connect a PC or terminal to the management module's serial (console) port and access the BigIron MG8 directly from the PC or terminal.
- You can connect a PC to the management module's 10BaseT/100BaseTX Ethernet (management) port and access the BigIron MG8 via a telnet connection from the PC.
- You can connect the BigIron MG8 to your existing management network and manage the BigIron MG8, along with other network devices, from a management station. To do this, you can connect the management module's 10BaseT/100BaseTX Ethernet (management) port to a switch on your existing management network.

For information about connecting a PC or terminal to the management module's Console port or management port, see “Attaching a PC or Terminal to the Console Port or Ethernet Port” on page 3-13. For information about

connecting a BigIron MG8 to the management port, see “Attaching a Switch BigIron MG8 to the Ethernet Port” on page 3-13.

Attaching a PC or Terminal to the Console Port or Ethernet Port

The management module’s Console port, which has a male DB-9 serial connector, and 10BaseT/100Base TX Ethernet port, which has an RJ-45 UTP connector, allow you to attach a PC or terminal. From the Console port, you can access the BigIron MG8 CLI directly from the PC or terminal or via a Telnet connection to the PC or terminal. From the Ethernet port, you can access the BigIron MG8 CLI or Web management interface directly from the PC or terminal or via a Telnet or HTTP connection to the PC or terminal.

Before performing this task, you need the following items:

- PC running a terminal emulation application or a terminal.
- If connecting the PC or terminal to the Console port, a straight-through EIA/TIA DB-9 serial cable with one end terminated in a female DB-9 connector and the other end terminated in a male or female DB-9 or DB-25 connector, depending on the specifications of your PC or terminal. You can order the serial cable separately from Foundry Networks or build your own cable. If you prefer to build your own, see the pinout information in “Console Port Pin Assignments” on page 11-4.
- If connecting the PC or terminal to the Ethernet port, a category 5 UTP crossover cable, which you must supply. For information about the management port pin assignments, see “Management Port Pin Assignments” on page 11-5.

To attach a PC or terminal to the Console port or Ethernet port, do the following:

39. Connect a PC or terminal to the Console port or Ethernet port using the appropriate cable.
40. Open the terminal emulation program, and set the session parameters as follows:
 - Baud: 9600 bps
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow control: None

Attaching a Switch BigIron MG8 to the Ethernet Port

The management module’s 10BaseT/100BaseTX Ethernet (management) port, which has an RJ-45 UTP connector, allows you to attach a 10BaseT/100BaseTX device. A management station in your existing management network can then access the BigIron MG8 using the IronView Network Manager.

To attach a 10BaseT/100BaseTX device, you need a category 5 UTP straight-through cable, which you must supply. Connect one end of the straight-through cable to the management port and the other end to the BigIron MG8 Layer 3 Switch.

Powering On a System

After you complete the hardware installation, you can power on the system:

41. Verify that all modules and power supplies are fully and properly installed and no module slots are uncovered.

CAUTION: If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.

42. If you are using Foundry's AC power supplies as your power source, attach one end of a Foundry-supplied AC power cord into the front of an installed power supply and insert the other end into a 115V/120V wall outlet. Repeat this step for each installed power supply.

WARNING: If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.

NOTE: If the wall outlet is not rated 115/120V and 20A, stop and get the appropriate cable for the outlet. Make sure you obtain a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.

NOTE: Make sure you apply power to all AC power supplies at the same time. Otherwise, the device either will not boot at all, or will boot and then repeatedly display a warning message stating that you need to add more power supplies. The BigIron MG8 is designed to provide uninterrupted service even when you insert or remove the management module(s) and the interface modules. Therefore, the system does not have a separate on/off power switch. To turn the system off, simply unplug the power cords.

NOTE: The wall outlet should be installed near the equipment and should be easily accessible.

43. If you are supplying your own DC power source, power on the source(s).
44. Verify that the BigIron MG8 has initialized successfully. For information, see "Verifying Proper Operation" below.

Verifying Proper Operation

To verify the proper operation of the BigIron MG8 after power on, you can do the following:

- Observe the LEDs.
- Display the status of the modules using the CLI.

Observing the LEDs

After a BigIron MG8 powers on, you can observe its LEDs to verify that it initialized successfully. Table 3.4 outlines the LEDs, the desired state of each LED, possible abnormal states of each LED, and what to do if an LED indicates an abnormal state.

Table 3.4: Desired and Abnormal LED States After System Power On

LED	Desired State	Meaning	Abnormal State	Meaning/Action
Management Module				
Active	The Active LED on one of the installed management modules should be on.	The module is functioning as the active management module.	Off	Neither of the management module(s) is managing the switch fabric and interface modules. A problem could have occurred during initialization. Check your attached PC or terminal for possible error messages.

Table 3.4: Desired and Abnormal LED States After System Power On (Continued)

LED	Desired State	Meaning	Abnormal State	Meaning/Action
Pwr	On	The module is receiving power.	Off	The module is not receiving power. You can do the following: <ul style="list-style-type: none"> • Make certain that the module is installed properly. For more information, see “Installing the Modules” on page 3-9. • If using AC power supplies, see the entry for the AC power supply LED in this table for more information. • If supplying your own DC power source, check your power source for problems.
10/100 Ethernet Port	On (Green)	A link is established with the remote port.	Off	A link is not established with the remote port. You can do the following: <ul style="list-style-type: none"> • Verify that the connection to the other device has been properly made. Also, make certain that the other device is powered on and operating correctly. • Try using a different cable.
10/100 Ethernet Port	On or blinking (Yellow)	The port is transmitting and receiving packets.	Off for an extended period	The port is not transmitting or receiving packets. You can check the other 10/100 Ethernet port LED to make sure a link is established with the remote port. If not, take the actions described in the Meaning/Action column for the other 10/100 Ethernet port LED.

Table 3.4: Desired and Abnormal LED States After System Power On (Continued)

LED	Desired State	Meaning	Abnormal State	Meaning/Action
Interface Module				
Pwr	On	The module is receiving power.	Off	<p>The module is not receiving power. You can do the following:</p> <ul style="list-style-type: none"> • Make certain that the module is installed properly. For more information, see “Installing the Modules” on page 3-9. • The module may not be receiving enough power. Foundry recommends installing a minimum of four AC power supplies (three primary and one for redundancy) for a fully loaded chassis. • Check the Pwr LED on the management module. If it is on, this module may be holding the power from the interface module. • Enter the show chassis command at any level of the CLI to determine if the management module recognizes the presence of all installed power supplies. • If using AC power supplies, check the entry for the AC power supply LED in this table for more information. • If supplying your own DC power source, check your power source for problems. Make sure that you are supplying a minimum of 2800 W to the DC chassis.
Mgmt Act	During initialization: steady blinking. After initialization: occasional blinking.	The active management module's processor and the interface module's processor are communicating.	Off for an extended period.	The interface module may be in interactive mode. Check the status of the module by entering the show module command at any CLI prompt.

Table 3.4: Desired and Abnormal LED States After System Power On (Continued)

LED	Desired State	Meaning	Abnormal State	Meaning/Action
Link	On	A link is established with the remote port.	Off	At this stage of the installation, you have not yet cabled the 10 Gigabit Ethernet ports, so this LED will be off. After cabling this port, if this LED is off, a link is not established with the remote port. For more information, see Table 4.2 on page 4-7.
Active	On or blinking	The port is transmitting and receiving user packets.	Off for an extended period.	At this stage of the installation, you have not yet cabled the 10 Gigabit Ethernet ports, so this LED will be off. After cabling this port, if this LED is off, the port is not transmitting or receiving user packets. For information about action you can take to troubleshoot the problem, see Table 4.2 on page 4-7.
Switch Fabric Module				
Pwr	On	The module is receiving power.	Off	The module is not receiving power. You can do the following: <ul style="list-style-type: none"> • If using AC power supplies, see the entry for the AC power supply LED in this table for more information. • If supplying your own DC power source, check your power source for problems.
Active	On	The switch fabric module is active and ready to switch user packets.	Off for an extended period.	The switch fabric module is not active and user packets are not being switched from one interface module to another. You must replace the switch fabric module. For information about performing this task, see "Replacing a Switch Fabric Module" on page 9-6.

Table 3.4: Desired and Abnormal LED States After System Power On (Continued)

LED	Desired State	Meaning	Abnormal State	Meaning/Action
AC Power Supply				
Unlabeled	Green (steady)	The power supply is supplying power to the chassis.	Amber or off	<p>The power supply is not supplying power to the chassis. You can do the following:</p> <ul style="list-style-type: none"> • Make sure that the power supply cord is connected securely to the wall outlet and the power supply. • Make sure that the wall outlet is rated for 115/120V and 20A. If it is not, obtain a cable that is compatibly rated for the outlet. • Make sure that the wall outlet has power.

Table 3.4: Desired and Abnormal LED States After System Power On (Continued)

LED	Desired State	Meaning	Abnormal State	Meaning/Action
Fan control module (two LEDs on rear panel of chassis)				
Unlabeled	Green (steady)	The fans are working and responding to controls from the fan control module.	Off or amber	<p>The fans are not receiving power (off), or the fans are not working and not responding to controls from the fan control module (amber). You can do the following:</p> <ul style="list-style-type: none"> If the LED is off, check the power LED on the other modules to make sure they are receiving power. Also, take the actions described in the Meaning/Action column for the AC power supply LED. If these actions don't resolve the problem, check the LED on each power supply or enter the show chassis command at any CLI prompt to determine if a power supply has failed. If a power supply has failed, you need to replace it. For more information, see "Replacing an AC Power Supply" on page 9-9. If the LED is amber, you need to replace the fan and fan control module. For information about performing these tasks, see "Replacing a Fan" on page 9-11 and "Replacing a Fan Control Module" on page 9-13.

If a problem persists after taking action described in this table, contact Foundry's technical support.

Displaying the Module Status

After you have attached a PC or terminal to the management module's Console port or Ethernet port and the BigIron MG8 has initialized successfully, press Enter to display the following CLI prompt in the terminal emulation window:

```
BigIron MG8>
```

If you do not see this prompt:

45. Make sure the cable is securely connected to your PC or terminal and the Console port or Ethernet port.
46. Check the settings in your terminal emulation program. In addition to the session settings listed in "Attaching a PC or Terminal to the Console Port or Ethernet Port" on page 3-13, make sure the terminal emulation session is running on the same serial port you attached to the Console port.

If you see this prompt (BigIron MG8>), you are now connected to the system and can display the status of the modules using the CLI. Enter the following command at any CLI level:

```
BigIron MG8# show module
      Module                               Status      Ports  Starting MAC
M1 (upper): BigIron MG8 Mgmt Module      Active
M2 (lower):
F0: BigIron MG8 Switch Fabric Module      Active
S1:
S2:
S3:
S4: BigIron MG8 4-Port 10Gig Module      CARD_STATE_UP  4  000c.db80.0000
S5: BigIron MG8 4-Port 10Gig Module      CARD_STATE_UP  4  000c.db80.0000
S6: BigIron MG8 4-Port 10Gig Module      CARD_STATE_UP  4  000c.db80.0000
S7:
S8:
```

Syntax: show module

The Status column shows the module status. A management module can have one of the following statuses:

- ACTIVE – The module is currently the active management module.
- STANDBY – The module is currently the standby management module.
- COMING UP – The module is coming up as the standby module. This status occurs if the standby management module becomes the active module, which is called a switchover. For more information about switchovers, see “Management Module Switchover” on page 6-2.

The switch fabric module can have one of the following statuses:

- ACTIVE – The module is up and running.
- BAD – The management module cannot initialize the switch fabric module.

An interface module can have one of the following statuses:

- CARD_STATE_INIT – The system detects the module but the module is not up and running yet.
- CARD_STATE_BOOT – The module is booting.
- CARD_STATE_INTERACTIVE – The module is booting from interactive mode.
- CARD_STATE_LP_SYNC – The module’s Terathon IronWare images are synchronized between the management module and interface module.
- CARD_STATE_SYNC – The system is currently synchronizing the module’s Terathon IronWare images between the management module and interface module.
- CARD_STATE_SOFTWARE_LOADED – The module has loaded its Terathon IronWare image.
- CARD_STATE_STRIPE_SYNC – The module is synchronizing with other interface modules through the switch fabric module.
- CARD_STATE_POWER_OFF – The module does not have power.
- CARD_STATE_UP – The module is up and operating normally.
- CARD_STATE_FAILED – The management module was unable to bring up an interface module properly. If you observe this status, make certain that the interface module is installed properly. For more information, see “Installing the Modules” on page 3-9.
- CARD_DOWN_REASON_<explanation> – The module is in a nonfunctional state. This status appears with an explanation for why the module is down, for example, “CARD_DOWN_REASON_BOOT_FAILED.” If the explanation does not help you resolve the problem, you can contact Foundry Networkstechnical support and

provide the explanation provided with this status.

Chapter 4

Connecting a BigIron MG8 to a Network Device

This chapter provides information about performing the following tasks:

- Securing access to the BigIron MG8 CLI by assigning passwords.
- Configuring IP addresses for the management, Ethernet, virtual, and loopback interfaces.
- Connecting an interface module to a networking device.
- Testing and troubleshooting network connection.

WARNING: The procedures in this manual are for qualified service personnel.

Assigning Permanent Passwords

By default, the BigIron MG8 CLI is not protected by passwords. To secure CLI access, Foundry strongly recommends assigning passwords. (For additional information on security, see the *Foundry Security Guide*.)

The CLI contains the following access levels:

- User EXEC – The level you enter when you first start a CLI session. At this level, you can view some system information but you cannot configure system or port parameters.
- Privileged EXEC – This level is also called the Enable level and can be secured by a password. You can perform tasks such as manage files on the flash module, save the system configuration to flash, and clear caches at this level.
- CONFIG – The configuration level. This level lets you configure the system's IP address and configure switching and routing features. To access the CONFIG mode, you must already be logged into the Privileged level of the EXEC mode.

NOTE: You cannot assign a password using the Web management interface. You can assign passwords using the IronView Network Manager if an Enable password for a Super User is already configured on the device.

You can set the following levels of Enable passwords:

- Super User – Allows complete read-and-write access to the system. This is generally for system administrators and is the only password level that allows you to configure passwords.

NOTE: You must set a super user password before you can set other types of passwords.

- Port Configuration – Allows read-and-write access for specific ports but not for global (system-wide) parameters.
- Read Only – Allows access to the Privileged EXEC mode and CONFIG mode but only with read access.

To set passwords:

1. At the opening CLI prompt, enter the following command to change to the Privileged level of the EXEC mode:

```
BigIron MG8> enable
```

2. Access the CONFIG level of the CLI by entering the following command:

```
BigIron MG8# configure terminal
BigIron MG8(config)#
```

3. Enter the following command to set the super-user password:

```
BigIron MG8(config)# enable super-user-password <text>
```

NOTE: You must set the super-user password before you can set other types of passwords.

4. Enter the following commands to set the port configuration and read-only passwords:

```
BigIron MG8(config)# enable port-config-password <text>
BigIron MG8(config)# enable read-only-password <text>
```

NOTE: If you forget your super-user password, see the Release Notes.

Syntax: enable super-user-password | read-only-password | port-config-password <text>

Passwords can be up to 48 characters long.

Configuring IP Addresses

As discussed in “BigIron MG8 Architecture” on page 2-24, the BigIron MG8 implements separate data and control planes. This new architecture affects how you assign IP addresses. Table 4.1 outlines the interfaces to which you can assign IP addresses.

In this table, “in band” refers to an interface over which user packets are routed, while “out of band” refers to an interface over which control packets related to system management are forwarded.

Table 4.1: Assigning IP Addresses

Interface	Associated Physical Port	Out of band/ In band
Management interface	Ethernet 10/100 port on active or redundant management module	Out of band
Any interface over which user packets are routed	Any 10 Gigabit Ethernet port	In band

Table 4.1: Assigning IP Addresses (Continued)

Interface	Associated Physical Port	Out of band/ In band
Any virtual interface over which user packets are routed	Any 10 Gigabit Ethernet port	In band
Loopback interface	–	In band

This section describes the following:

- BigIron MG8 support of subnet masks.
- How to assign an IP address to a management interface.
- How to assign an IP address to an interface or virtual interface over which user packets are routed.

Support of Subnet Masks

The BigIron MG8 supports both classical IP network masks (Class A, B, and C subnet masks, and so on) and Classless Interdomain Routing (CIDR) network prefix masks.

- To enter a classical network mask, enter the mask in IP address format. For example, enter “209.157.22.99 255.255.255.0” for an IP address with a Class-C subnet mask.
- To enter a prefix number for a network mask, enter a forward slash (/) and the number of bits in the mask immediately after the IP address. For example, enter “209.157.22.99/24” for an IP address that has a network mask with 24 significant (“mask”) bits.

Assigning an IP Address to a Management Interface

Instead of assigning a global IP address to the BigIron MG8 for system management purposes, you now assign an IP address to the management interface. The IP address is assigned to the active management module port. If the active management module becomes unavailable and the redundant module becomes the active module, the IP address is assigned to the new active management module port.

For example, to assign the IP address 10.0.1.1 to the management interface, do the following:

1. At the opening CLI prompt, enter **enable**.

```
BigIron MG8> enable
```

2. Enter the following command at the Privileged EXEC level prompt (for example, `BigIron MG8#`), then press Enter. This command erases the factory test configuration if still present:

```
BigIron MG8# erase startup-config
```

CAUTION: Use the **erase startup-config** command only for new systems. If you enter this command on a system you have already configured, the command erases the configuration. If you accidentally erase the configuration on a configured system, enter the **write memory** command to save the running configuration to the startup-config file.

3. Access the configuration level of the CLI by entering the following command:

```
BigIron MG8# configure terminal          Privileged EXEC Level
BigIron MG8(config)#                    Global CONFIG Level
```

4. Configure the IP address and mask for the management interface.

```
BigIron MG8(config)# interface management 1
BigIron MG8(config-if-mgmt-1)# ip address 10.0.1.1 255.255.255.0
```

Syntax: enable [<password>]

Syntax: configure terminal

Syntax: interface management 1

Syntax: [no] ip address <ip-addr> <ip-mask>

or

Syntax: [no] ip address <ip-addr>/<mask-bits>

Assigning an IP Address to an Interface, Virtual Interface, or Loopback

As you have done with previous Foundry Layer 3 Switches, you must assign an IP address to each interface and virtual interface over which user packets are routed. You can also assign an IP address to a loopback interface, which is generally used for testing and diagnostic purposes.

You must use the serial connection to assign the first IP address. For subsequent addresses, you also can use the CLI through Telnet or the Web management interface. You can use IronView Network Manager to assign IP addresses to virtual routing interfaces only.

By default, you can configure up to 24 IP interfaces on each interface, virtual interface, and loopback interface.

For example, to assign the IP address 192.22.3.44 and subnet mask 255.255.255.0 to interface 1/1, do the following.

1. At the opening CLI prompt, enter **enable**.

```
BigIron MG8> enable
```

2. Enter the following command at the Privileged EXEC level prompt (for example, BigIron#), then press Enter. This command erases the factory test configuration if still present:

```
BigIron MG8# erase startup-config
```

CAUTION: Use the **erase startup-config** command only for new systems. If you enter this command on a system you have already configured, the command erases the configuration. If you accidentally do erase the configuration on a configured system, enter the **write memory** command to save the running configuration to the startup-config file.

3. Access the configuration level of the CLI by entering the following command:

```
BigIron MG8# configure terminal          Privileged EXEC Level
BigIron MG8(config)#                    Global CONFIG Level
```

4. Configure the IP addresses and mask addresses for the interfaces on the router.

```
BigIron MG8(config)# interface ethernet 1/1
BigIron MG8(config-if-e10000-1/1)# ip address 192.22.3.44 255.255.255.0
```

Syntax: enable [<password>]

Syntax: configure terminal

Syntax: [no] ip address <ip-addr> <ip-mask> [secondary]

or

Syntax: [no] ip address <ip-addr>/<mask-bits> [secondary]

Use the **secondary** parameter if you have already configured an IP address within the same subnet on the interface.

Disabling and Reenabling the Management and Ethernet Ports

By default, the management port and the 10 Gigabit Ethernet ports are enabled. If desired, you can disable each of these ports using the **disable** command. For example, to disable the management port, enter the following command at the management interface configuration level of the CLI:

```
BigIron MG8(config-if-mgmt-1)# disable
```

Syntax: disable

You can reenabling each of these ports using the **enable** command. For example, to reenabling the management port, enter the following command at the management interface configuration level of the CLI:

```
BigIron MG8(config-if-mgmt-1)# enable
```

Syntax: enable

Connecting an Ethernet Interface Module

You can connect a BigIron MG8 to another Ethernet network device, in most cases, another Layer 3 Switch. The BigIron MG8 supports connections to other vendors' as well as Foundry's network devices.

You install fiber-optic modules provided by Foundry into the Ethernet ports. The XENPAK-compliant fiber-optic modules provide an optical transceiver or a physical medium dependent (PMD) interface for single mode fiber that can be used with the LAN physical layer (PHY).

The following optic modules versions are available from Foundry:

- Short wavelength (86 – 300 meters) – Foundry part number 10G-XNPK-SR
- Long wavelength (10 kilometers) – Foundry part number 10G-XNPK-LRJ8173A
- Extra long wavelength (40 kilometers) – Foundry part number 10G-XNPK-ERJ8176A

For more information on the optic modules and cabling, visit <http://www.foundry.com/services/faqs/> and see the Media section.

NOTE: Cable installation and network configuration will affect overall transmission capability. The numbers provided above represent the accepted recommendations of the various standards. For network-specific recommendations, consult your local Foundry reseller or system engineer.

To connect an Ethernet Interface Module to a network device, do the following:

- Install the fiber-optic module in the ports.
- Cable the fiber-optic modules.

The following section provide information about performing these tasks.

Installing a Fiber-Optic Module

WARNING: All fiber-optic interfaces use Class 1M Lasers.

NOTE: See "Installation Precautions" on page 3-3 for other hardware installation precautions.

Before installing a fiber-optic module, have the following on hand:

- An ESD wrist strap with a plug for connection to the ESD connector on the BigIron MG8.

WARNING: For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

- A small flathead screwdriver.

To install a fiber-optic module into an Ethernet port, do the following:

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the upper right corner of the chassis front.
2. Remove the module from its protective packaging.
3. Remove the metal cover from the port on the interface module's control panel.
4. Gently insert the fiber-optic module into the port until the module clicks into place. The fiber-optic modules are keyed to prevent incorrect insertion.
5. Secure the fiber-optic module by tightening the two thumb-screws. If desired, you can further tighten the thumb-screws using the flathead screwdriver.

Cabling a Fiber-Optic Module

To cable a fiber-optic module, do the following:

1. Remove the protective covering from the fiber-optic port connectors and store the covering for future use.
2. Before cabling a fiber-optic module, Foundry strongly recommends cleaning the cable connectors and the port connectors. For more information, see "Cleaning Fiber-Optic Connectors".
3. Gently insert the two cable connectors (a tab on each connector should face upward) into the port connectors until the tabs lock into place.

Cleaning Fiber-Optic Connectors

To avoid problems with the connection between the fiber-optic module port and the fiber cable connector, Foundry strongly recommends cleaning both connectors before making this connection. In particular, dust can accumulate in either connector and cause problems such as reducing the optic launch power.

To clean the fiber cable connectors, Foundry recommends using a fiber-optic reel-type cleaner. You can purchase this type of cleaner from the following Website:

http://www.fisfiber.com/Home_Page.asp

When not using a fiber-optic module port connector, make sure to keep the protective covering on.

Testing Network Connectivity

After you cable the fiber-optic modules, you can:

- Observe certain LEDs to determine if the network connections are functioning properly.
- Test connectivity to other network devices by pinging those devices.
- Perform trace routes.

Troubleshooting Network Connections

Table 4.2 outlines the LEDs related to the network connections, the desired state of each LED, possible abnormal states of each LED, and what to do if an LED indicates an abnormal state.

Table 4.2: Network Connection-Related LED States

LED	Desired State	Meaning	Abnormal State	Meaning/Action
Interface Module				
Link	On	A link is established with the remote port.	Off	<p>A link is not established with the remote port. You can do the following:</p> <ul style="list-style-type: none"> Verify that the connection to the other network device has been properly made. Also, make certain that the other network device is powered on and operating correctly. Verify that the transmit port on the BigIron MG8 is connected to the receive port on the other network device, and that the receive port on the BigIron MG8 device is connected to the transmit port on the other network device. If you are not certain, remove the two cable connectors from the port connector and reinsert them in the port connector, reversing their order. Dust may have accumulated in the cable connector or port connector. For information about cleaning the connectors, see "Cleaning Fiber-Optic Connectors" on page 4-6. If the other actions don't resolve the problem, try using a different port or a different cable.
Active	On or blinking	The port is transmitting and receiving user packets.	Off for an extended period.	<p>The port is not transmitting or receiving user packets. You can do the following:</p> <ul style="list-style-type: none"> Check the Link LED to make sure the link is still established with the remote port. If not, take the actions described in the Meaning/Action column for the Link LED. Verify that the port has not been disabled through a configuration change. You can use the CLI. If you have configured an IP address on the device, you also can use the Web management interface or IronView Network Manager.

If a problem persists after taking these actions, contact Foundry's technical support.

Pinging an IP Address

To verify that a BigIron MG8 can reach another device through the network, enter a command such as the following at any level of the CLI on the BigIron MG8:

```
BigIron MG8> ping 192.33.4.7
```

Syntax: ping <ip addr> | <hostname> [source <ip addr>] [count <num>] [timeout <msec>] [ttl <num>] [size <byte>] [quiet] [numeric] [no-fragment] [verify] [data <1-to-4 byte hex>] [brief]

See the *Foundry Switch and Router Command Line Interface Reference* for information about the parameters.

NOTE: If you address the ping to the IP broadcast address, the device lists the first four responses to the ping.

Tracing a Route

To determine the path through which a BigIron MG8 can reach another network device, enter a command such as the following at any level of the CLI on the BigIron MG8:

```
BigIron MG8> traceroute 192.33.4.7
```

Syntax: traceroute <host-ip-addr> [maxttl <value>] [minttl <value>] [numeric] [timeout <value>] [source-ip <ip addr>]

The CLI displays trace route information for each hop as soon as the information is received. Traceroute requests display all responses to a given TTL. In addition, if there are multiple equal-cost routes to the destination, the Foundry device displays up to three responses by default.

See the *Foundry Switch and Router Command Line Interface Reference* for information about the command syntax.

Chapter 5

Getting Familiar With BigIron MG8 Management Applications

This chapter describes the different applications you can use to manage the BigIron MG8. The BigIron MG8 supports the same management applications as other Foundry devices.

As with other Foundry devices, you can manage a BigIron MG8 using any of the following applications:

- Command Line Interface (CLI) – a text-based interface accessible directly from a PC or terminal attached to the management module's serial (Console) port or 10BaseT/100BaseTX Ethernet (management) port, or from a Telnet connection to the PC or terminal.
- Web management interface – A GUI-based management interface accessible through an HTTP (web browser) connection.
- IronView Network Manager – An optional SNMP-based standalone GUI application.

The following section describes how to log on to these applications.

Logging on Through the CLI

Once an IP address is assigned to the BigIron MG8's management port, you can access the CLI through a PC or terminal attached to the management module's serial (Console) port or 10BaseT/100BaseTX Ethernet (management) port, or from a Telnet connection to the PC or terminal.

You can initiate a local Telnet or SNMP connection by specifying the management port's IP address.

The commands in the CLI are organized into the following levels:

- User EXEC – Lets you display information and perform basic tasks such as pings and traceroutes.
- Privileged EXEC – Lets you use the same commands as those at the User EXEC level plus configuration commands that do not require saving the changes to the system-config file.
- CONFIG – Lets you make configuration changes to the device. To save the changes across software reloads and system resets, you need to save them to the system-config file. The CONFIG level contains sub-levels for individual ports, for VLANs, for routing protocols, and other configuration areas.

NOTE: By default, any user who can open a direct or Telnet connection to the BigIron MG8 can access all these CLI levels. To secure access, you can configure Enable passwords or local user accounts, or you can configure the device to use a RADIUS or TACACS/TACACS+ server for authentication. See the *Foundry Security Guide*.

On-Line Help

To display a list of available commands or command options, enter “?” or press Tab. If you have not entered part of a command at the command prompt, all the commands supported at the current CLI level are listed. If you enter part of a command, then enter “?” or press Tab, the CLI lists the options you can enter at this point in the command string.

If you enter an invalid command followed by ?, a message appears indicating the command was unrecognized. For example:

```
BigIron MG8(config)# router ip
Unrecognized command
```

Command Completion

The CLI supports command completion, so you do not need to enter the entire name of a command or option. As long as you enter enough characters of the command or option name to avoid ambiguity with other commands or options, the CLI understands what you are typing.

Scroll Control

By default, the CLI uses a page mode to paginate displays that are longer than the number of rows in your terminal emulation window. For example, if you display a list of all the commands at the global CONFIG level but your terminal emulation window does not have enough rows to display them all at once, the page mode stops the display and lists your choices for continuing the display.

Here is an example:

```
aaa
access-list
all-client
arp
banner
base-mac-addr
boot

some lines omitted for brevity...

default-vlan-id
enable
enable-acl-counter
end
exit
fan
--More--, next page: Space, next line: Return key, quit: Control-c
```

The software provides the following scrolling options:

- Press the Space bar to display the next page (one screen at a time).
- Press the Return or Enter key to display the next line (one line at a time).
- Press Ctrl-C to cancel the display.

Line Editing Commands

The CLI supports the following line editing commands. To enter a line-editing command, use the CTRL-key combination for the command by pressing and holding the CTRL key, then pressing the letter associated with the command.

Table 5.1: CLI Line Editing Commands

Ctrl-Key Combination	Description
Ctrl-A	Moves to the first character on the command line.
Ctrl-B	Moves the cursor back one character.
Ctrl-C	Escapes and terminates command prompts and ongoing tasks (such as lengthy displays), and displays a fresh command prompt.
Ctrl-D	Deletes the character at the cursor.
Ctrl-E	Moves to the end of the current command line.
Ctrl-F	Moves the cursor forward one character.
Ctrl-K	Deletes all characters from the cursor to the end of the command line.
Ctrl-L; Ctrl-R	Repeats the current command line on a new line.
Ctrl-N	Enters the next command line in the history buffer.
Ctrl-P	Enters the previous command line in the history buffer.
Ctrl-U; Ctrl-X	Deletes all characters from the cursor to the beginning of the command line.
Ctrl-W	Deletes the last word you typed.
Ctrl-Z	Moves from any CONFIG level of the CLI to the Privileged EXEC level; at the Privileged EXEC level, moves to the User EXEC level.

For a complete list of CLI commands and syntax information for each command, see the *Foundry Switch and Router Command Line Interface Reference*.

Searching and Filtering Output from CLI Commands

You can filter CLI output from **show** commands and at the --More-- prompt. You can search for individual characters, strings, or construct complex regular expressions to filter the output.

Searching and Filtering Output from show commands

You can filter output from **show** commands to display lines containing a specified string, lines that do not contain a specified string, or output starting with a line containing a specified string. The search string is a regular expression consisting of a single character or string of characters. You can use special characters to construct complex regular expressions. See "Using Special Characters in Regular Expressions" on page 5-6 for information on special characters used with regular expressions.

Displaying Lines Containing a Specified String

The following command filters the output of the **show interface** command for port 3/1 so it displays only lines containing the word “Internet”. This command can be used to display the IP address of the interface.

```
BigIron MG8# show interface e 3/1 | include Internet
Internet address is 192.168.1.11/24, MTU 1518 bytes, encapsulation ethernet
```

Syntax: <show-command> | include <regular-expression>

NOTE: The vertical bar (|) is part of the command.

Note that the regular expression specified as the search string is case sensitive. In the example above, a search string of “Internet” would match the line containing the IP address, but a search string of “internet” would not.

Displaying Lines That Do Not Contain a Specified String

The following command filters the output of the **show who** command so it displays only lines that do not contain the word “closed”. This command can be used to display open connections to the BigIron MG8.

```
BigIron MG8# show who | exclude closed
Console connections:
    established
    you are connecting to this session
    2 seconds in idle
Telnet connections (inbound):
    1    established, client ip address 192.168.9.37
        27 seconds in idle
Telnet connection (outbound):
SSH connections:
```

Syntax: <show-command> | exclude <regular-expression>

Displaying Lines Starting with a Specified String

The following command filters the output of the **show who** command so it displays output starting with the first line that contains the word “SSH”. This command can be used to display information about SSH connections to the BigIron MG8.

```
BigIron MG8# show who | begin SSH
SSH connections:
    1    established, client ip address 192.168.9.210
        7 seconds in idle
    2    closed
    3    closed
    4    closed
    5    closed
```

Syntax: <show-command> | begin <regular-expression>

Searching and Filtering Output at the --More-- Prompt

The --More-- prompt is displayed when output extends beyond a single page. From this prompt, you can press the Space bar to display the next page, the Return or Enter key to display the next line, or Ctrl-C to cancel the display. In addition, you can search and filter output from this prompt. For example:

```
BigIron MG8# ?
append          Append one file to another
attrib          Change file attribute
boot            Boot system from bootp/tftp server/flash image
cd              Change current working directory
chdir           Change current working directory
clear           Clear table/statistics/keys
clock           Set clock
configure       Enter configuration mode
copy            Copy between flash, tftp, config/code
cp             Copy file commands
debug           Enable debugging functions (see also 'undebug')
delete          Delete file on flash
dir             List files
dm             test commands
erase           Erase image/configuration files from flash
exit            Exit Privileged mode
fastboot        Select fast-reload option
force-sync-standby Sync active flash (pri/sec/mon/startup config/lp images)
to standby
format          Format PCMCIA card
hd             Hex dump
ipc            IPC commands
kill            Kill active CLI session
--More--, next page: Space, next line: Return key, quit: Control-c
```

At the --More-- prompt, you can press the forward slash key (/) and then enter a search string. The device displays output starting from the first line that contains the search string, similar to the **begin** option for **show** commands. For example:

```
--More--, next page: Space, next line: Return key, quit: Control-c
/telnet
```

The results of the search are displayed:

```
searching...
telnet          Telnet by name or IP address
terminal        Change terminal settings
traceroute      TraceRoute to IP node
undelete        Recover deleted file
whois           WHOIS lookup
write           Write running configuration to flash or terminal
```

To display lines containing only a specified search string (similar to the **include** option for **show** commands) press the plus sign key (+) at the --More-- prompt and then enter the search string.

```
--More--, next page: Space, next line: Return key, quit: Control-c
+telnet
```

The filtered results are displayed:

```
filtering...
telnet                Telnet by name or IP address
```

To display lines that do not contain a specified search string (similar to the **exclude** option for **show** commands) press the minus sign key (-) at the --More-- prompt and then enter the search string.

```
--More--, next page: Space, next line: Return key, quit: Control-c
-telnet
```

The filtered results are displayed:

```
filtering...
sync-standby         Sync active flash (pri/sec/mon/startup config/lp images)
                    to standby if different
terminal             Change terminal settings
traceroute           TraceRoute to IP node
undelete             Recover deleted file
whois                WHOIS lookup
write                Write running configuration to flash or terminal
```

As with the commands for filtering output from **show** commands, the search string is a regular expression consisting of a single character or string of characters. You can use special characters to construct complex regular expressions. See the next section for information on special characters used with regular expressions.

Using Special Characters in Regular Expressions

You use a regular expression to specify a single character or multiple characters as a search string. In addition, you can include special characters that influence the way the software matches the output against the search string. These special characters are listed in the following table.

Table 5.2: Special Characters for Regular Expressions

Character	Operation
.	The period matches on any single character, including a blank space. For example, the following regular expression matches "aaZ", "abZ", "acZ", and so on, but not just "aZ": a.Z
*	The asterisk matches on zero or more sequential instances of a pattern. For example, the following regular expression matches output that contains the string "abc", followed by zero or more Xs: abcX*
+	The plus sign matches on one or more sequential instances of a pattern. For example, the following regular expression matches output that contains "de", followed by a sequence of "g"s, such as "deg", "degg", "deggg", and so on: deg+

Table 5.2: Special Characters for Regular Expressions (Continued)

Character	Operation
?	<p>The question mark matches on zero occurrences or one occurrence of a pattern.</p> <p>For example, the following regular expression matches output that contains "dg" or "deg": de?g</p> <p>Note: Normally when you type a question mark, the CLI lists the commands or options at that CLI level that begin with the character or string you entered. However, if you enter Ctrl-V and then type a question mark, the question mark is inserted into the command line, allowing you to use it as part of a regular expression.</p>
^	<p>A caret (when not used within brackets) matches on the beginning of an input string.</p> <p>For example, the following regular expression matches output that begins with "deg": ^deg</p>
\$	<p>A dollar sign matches on the end of an input string.</p> <p>For example, the following regular expression matches output that ends with "deg": deg\$</p>
_	<p>An underscore matches on one or more of the following:</p> <ul style="list-style-type: none"> • , (comma) • { (left curly brace) • } (right curly brace) • ((left parenthesis) •) (right parenthesis) • The beginning of the input string • The end of the input string • A blank space <p>For example, the following regular expression matches on "100" but not on "1002", "2100", and so on: _100_</p>
[]	<p>Square brackets enclose a range of single-character patterns.</p> <p>For example, the following regular expression matches output that contains "1", "2", "3", "4", or "5": [1-5]</p> <p>You can use the following expression symbols within the brackets. These symbols are allowed only inside the brackets.</p> <ul style="list-style-type: none"> • ^ – The caret matches on any characters <i>except</i> the ones in the brackets. For example, the following regular expression matches output that does <i>not</i> contain "1", "2", "3", "4", or "5": [^1-5] • - The hyphen separates the beginning and ending of a range of characters. A match occurs if any of the characters within the range is present. See the example above.

Table 5.2: Special Characters for Regular Expressions (Continued)

Character	Operation
	A vertical bar separates two alternative values or sets of values. The output can match one or the other value. For example, the following regular expression matches output that contains either “abc” or “defg”: abc defg
()	Parentheses allow you to create complex expressions. For example, the following complex expression matches on “abc”, “abcabc”, or “defg”, but not on “abcdefgdefg”: ((abc)+) ((defg)?)

If you want to filter for a special character instead of using the special character as described in the table above, enter “\” (backslash) in front of the character. For example, to filter on output containing an asterisk, enter the asterisk portion of the regular expression as “*”.

```
BigIron MG8# show ip route bgp | include \*
```

Logging On Through the Web Management Interface

To use the Web management interface, open a Web browser and enter the IP address of the BigIron MG8’s management port in the Location or Address field. The Web browser contacts the device and displays the login panel for the BigIron MG8, as shown in Figure 5.1.

Figure 5.1 Web Management Interface Login Panel



[\[Login\]](#)

NOTE: If you are unable to connect with the device through a Web browser due to a proxy problem, it may be necessary to set your Web browser to direct Internet access instead of using a proxy. For information on how to change a proxy setting, refer to the on-line help provided with your Web browser.

To log in, click on the [Login](#) link. Figure 5.2 shows the dialog box that displays.

Figure 5.2 Web Management Interface Login Dialog

Enter Network Password

Please type your user name and password.

Site: 192.168.4.151

Realm: Web Management

User Name: get

Password: [masked]

Save this password in your password list

OK Cancel

The login username and password you enter depends on whether your device is configured with AAA authentication for SNMP. If AAA authentication for SNMP is not configured, you can use the user name “get” and the default read-only password “public” for read-only access. However, for read-write access, you must enter “set” for the user name, and enter a read-write community string you have configured on the device for the password. There is no default read-write community string. You must add one using the CLI. See the *Foundry Security Guide*.

Web Management Interface

When you log into a device, the System configuration panel is displayed. This panel allows you to enable or disable major system features. You can return to this panel from any other panel by selecting the [Home](#) link.

The [Site Map](#) link gives you a view of all available options on a single screen.

Figure 5.3 displays the first Web management interface panel for Layer 3 Switch features, while Figure 5.4 displays the first panel for Layer 2 Switch features. These panels allow you to configure the features supported by the Layer 3 Switch and Layer 2 Switch software.

Figure 5.3 First Panel for Layer 3 Switch Features

Identification

IP Address

Clock

NTP

Module

Max-Parameter

RADIUS

TACACS

Management

Redundant

Spanning Tree Disable Enable Single Fast

QOS Strict Weighted

OSPF Disable Enable

RIP Disable Enable

DVMRP Disable Enable

PIM Disable Enable

BGP Disable Enable Local AS

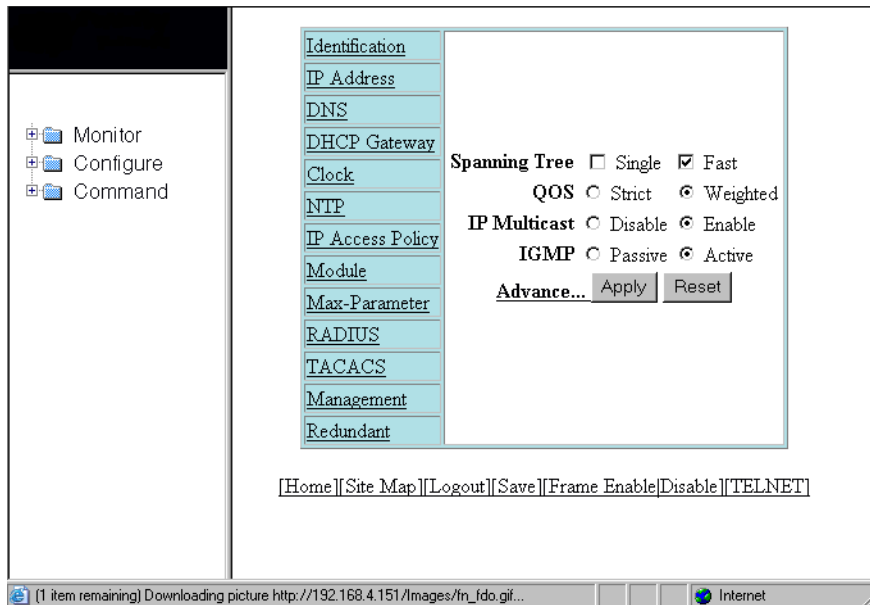
VRRP Disable Enable

VRRP-E Disable Enable

Advance... Apply Reset

[Home][Site Map][Logout][Save][Frame Enable][Disable][TELNET]

Figure 5.4 First Panel for Layer 2 Switch Features



The left pane of the Web management interface window contains a “tree view,” similar to the one found in Windows Explorer. Configuration options are grouped into folders in the tree view. These folders, when expanded, reveal additional options. To expand a folder, click on the plus sign to the left of the folder icon.

You can configure the appearance of the Web management interface by using one of the following methods.

USING THE CLI

Using the CLI, you can modify the appearance of the Web management interface with the **web-management** command.

To cause the Web management interface to display the List view by default:

```
Mucho Router(config)# web-management list-menu
```

To disable the front panel frame:

```
Mucho Router(config)# no web-management front-panel
```

When you save the configuration with the **write memory** command, the changes will take place the next time you start the Web management interface, or if you are currently running the Web management interface, the changes will take place when you click the Refresh button on your browser.

USING THE WEB MANAGEMENT INTERFACE

1. Click on the plus sign next to Configure in the tree view to expand the list of configuration options.
2. Click on the plus sign next to System in the tree view to expand the list of system configuration links.
3. Click on the plus sign next to Management in the tree view to expand the list of system management links.
4. Click on the Web Preference link to display the Web Management Preferences panel.
5. Enable or disable elements on the Web management interface by clicking on the appropriate radio buttons on the panel. The following figure identifies the elements you can change.

NOTE: The tree view is available when you use the Web management interface with Netscape 4.0 or higher or Internet Explorer 4.0 or higher browsers. If you use the Web management interface with an older browser, the Web management interface displays the List view only, and the Web Management Preferences panel does not include an option to display the tree view.

6. When you have finished, click the Apply button on the panel, then click the Refresh button on your browser to activate the changes.
7. To save the configuration, click the plus sign next to the Command folder, then click the [Save to Flash](#) link.

NOTE: The only changes that become permanent are the settings to the Menu Type and the Front Panel Frame. Any other elements you enable or disable will go back to their default settings the next time you start the Web management interface.

Logging on Through IronView Network Manager

See the *Foundry IronView Network Management User's Guide* for information about using IronView Network Manager.

Chapter 6

Using a Redundant Management Module

You can install a redundant management module in slot M1 (upper) or M2 (lower) of the BigIron MG8. (By default, the system considers the module installed in slot M1 to be the active management module and the module installed in slot M2 to be the redundant or standby module. If the active module becomes unavailable, the standby module automatically takes over management of the system.

This chapter describes the redundant management module, how it works with the active module, and how to configure and manage it.

This chapter explains the following information:

- How management module redundancy works.
- Optional management module redundancy configurations that you can perform.
- How to manage and monitor the redundancy feature.
- Flash memory and PCMCIA flash card file management commands.

How Management Module Redundancy Works

This section explains the following:

- How management module redundancy works under normal operating conditions.
- Events that cause a standby management module to assume the role of the active module and how the switchover occurs as a result of each event.
- Implications that you should be aware of if a switchover occurs.

Management Module Redundancy Overview

When you power on or reload a BigIron MG8 with two management modules installed, by default, the management module installed in slot M1 becomes the active module and the module installed in slot M2 becomes the standby module. (You can change the default active slot from M1 to M2 using the **active-management** command. For information about performing this task, see “Changing the Default Active Chassis Slot” on page 6-5.)

After the active and standby modules are determined, both modules boot from the source specified for the active module. The active management module can boot from the following sources:

- The active management module’s flash memory.
- A PCMCIA flash card inserted in one of the PCMCIA slots in the active management module’s front panel.

After the modules boot, the active module compares the standby module's flash code and system-config file to its own. If differences exist, the active module synchronizes the standby module's flash code and system-config file with its own.

During normal operation, the active module handles tasks such as obtaining network topology and reachability information and determining the best paths to known destinations. (The active module does not share this information with the standby module.) The active module also monitors the standby module. For more information about the tasks the active module performs, see "System Management Architecture" on page 2-26.

The standby module functions in an active standby mode. While in this mode, the standby module does the following:

- Monitors itself.
- Receives updates of the system-config file from the active module when this file on the active module is updated.
- Receives updates of the running-config file at regular intervals from the active module.

Keeping the system-config and running-config files on both modules synchronized allows the standby module to assume the role of active module seamlessly if necessary.

Management Module Switchover

The following events cause the standby management module to become the active module, which is called a **switchover**:

- The active module becomes unavailable.
- You perform a manual switchover.
- You remove and replace the active management module.

The following sections explain how the switchover occurs for each event.

Unavailable Active Module

The following events cause an active module to become unavailable and a switchover to occur:

- An active module experiences a problem significant enough to cause a reset of the module.
- The active module loses power.

Before a switchover occurs, the active module resets itself and sends an interrupt signal to the standby module. The standby module then becomes the active module and resets the interface modules.

NOTE: During reset of the interface modules, any user packets being handled by the interface modules are lost.

The new active module begins to manage the system. When the original active module becomes available again or is replaced, it assumes the role of standby module.

Manual Switchover

In some situations, you may want to manually switch the role of active management module from the currently active module to the standby module. For example, if the module in slot M2 is the active module and the module in slot M1 is the standby module and you want the module in M1 to be the active module and the module in M2 to be the standby module, you can perform a manual switchover using the **switchover** command. For information about performing this task, see "Manually Switching Over to the Standby Management Module" on page 6-8.

When the switchover occurs, the standby module then becomes the active module and resets the interface modules.

NOTE: During reset of the interface modules, any user packets being handled by the interface modules are lost.

Removal and Replacement of a Management Module

For information about how to remove and replace a management module, see “Replacing a Management Module” on page 9-3.

This section explains how management module redundancy is affected when you remove and replace an active or standby management module.

Removal and Replacement of an Active Management Module

If you remove the active management module, the standby module automatically assumes the role of the active module. The new active module resets the interface modules then begins to manage the system.

NOTE: During reset of the interface modules, any user packets being handled by the interface modules are lost.

After you insert a replacement module in the slot from which the original active module was removed, the replacement module becomes the standby module. The module boots from the source specified for the active module. The active management module can boot from the following sources:

- The active management module’s flash memory.
- A PCMCIA flash card inserted in one of the PCMCIA slots in the active management module’s front panel.

After the replacement module boots, the active module compares the standby module’s flash code and system-config file to its own. If differences exist, the active module synchronizes the standby module’s flash code and system-config file with its own.

Removal and Replacement of a Standby Management Module

You can remove a standby management module without causing a switchover to occur. The active module continues to function as is. Communication between the active module and the removed module stops until the new module is installed in the BigIron MG8. After the new module is installed, it assumes the role of standby module. The module boots from the source specified for the active module. The active management modules can boot from the following sources:

- The active management module’s flash memory.
- A PCMCIA flash card inserted in one of the PCMCIA slots in the active management module’s front panel.

After the module boots, the active module compares the standby module’s flash code and system-config file to its own. If differences exist, the active module synchronizes the standby module’s flash code and system-config file with its own.

Switchover Implications

After the role of the active management module switches from one module to another, you must be aware of implications that affect the following areas:

- Management sessions
- Syslog and SNMP traps
- MAC addresses

The following sections explain the implications for these areas.

Management Sessions

You can establish management sessions with the active management module’s management port. If a switchover occurs, the management port on the original active module shuts down and all open CLI, Web management interface, and IronView Network Manager sessions with that port close. You can open new sessions with the new active module, provided that the new active module has the same management port connections. (For example, if you were accessing the Web management interface via a PC connected to the original active module’s management port, you can open a new session if a PC is connected to the new active module’s management port.)

In the scenario described above, you can open a new session using the same IP address you were using before the switchover. (You configure an IP address for the active module only; if a switchover occurs, the IP address is used by the new active module.)

Syslog and SNMP Traps

When a switchover occurs, the BigIron MG8 sends a Syslog message to the local Syslog buffer and also to the Syslog server, if you have configured the system to use one. In addition, if you have configured an SNMP trap receiver, the system sends an SNMP trap to the receiver.

When the system is powered on or otherwise reset normally, the system sends a cold start message and trap. However, if the system is reset as the result of switchover to the standby management module, the system instead sends a warm start message and trap.

MAC Address Changes

The MAC addresses in the BigIron MG8 are based on the MAC address of the BigIron MG8. During switchover, the system's MAC addresses change and the system sends out gratuitous ARP requests to flush the old MAC addresses from the ARP caches on attached IP devices, and update the caches with the system's new MAC addresses.

Layer 2 Hitless Failover in Terathon IronWare Release 02.0.02 and Later

In software release 02.0.02 and later for the BigIron MG8, the Layer 2 Hitless Failover feature provides automatic failover from the active management module to the standby management module without interrupting operation of any interface modules in the chassis. Configuration changes made from the CLI to the active management module are also written to the standby management module even if they are not written to flash memory.

NOTE: Since both the standby and active management modules run the same code, a command that brings down the active management module will most likely bring down the standby management module. Because all configuration commands are synchronized from active to standby management module in real time, both management modules will crash at almost the same time. This in turn causes the system to reset all interface modules (similar to the behavior when the 'reboot' command is executed) and causes packet loss associated with a system reboot.

Once booted, the redundant management module keeps up-to-date copies of the active module's running configuration. Layer 2 protocols such as STP, RSTP, MRP, and VSRP are run concurrently on both the active and standby management modules. Upon the failover of the active management module, the standby module takes over as the active management module and picks up where the active module left off, without interrupting any Layer 2 traffic.

The interface modules are not reset, as they are with the previous cold-restart redundancy feature. The interface modules continue to forward traffic while the standby management module takes over operation of the system. The new now-active management module receives updates from the interface modules and sends verification information to the interface modules to ensure that they are synchronized.

If the new active management module becomes out-of-sync with an interface module, information on the interface module can be overwritten in some cases which can cause an interruption of traffic forwarding. Layer 3 hitless failover is not supported in this release. Consequently, a failover will result in a re-synchronization of Layer 3 data structures.

NOTE: The Redundancy CONFIG level command **running-config-sync-period** is removed in this release because with the Hitless Failover feature, CLI configuration is synced immediately.

Management Module Redundancy Configuration

Configuring management module redundancy consists of performing one optional task (changing the default active chassis slot). The section explains how to perform this task.

Changing the Default Active Chassis Slot

By default, the BigIron MG8 considers the module installed in slot M1 to be the active management module. If desired, you can change the default active chassis slot to M2.

To change the default active chassis slot to M2, enter the following commands:

```
BigIron MG8(config)# redundancy
BigIron MG8(config-redundancy)# active-management 10
```

Syntax: active-management <slot-num>

The <slot-num> parameter specifies the chassis slot, which can be 9 (slot M1) or 10 (slot M2).

Managing Management Module Redundancy

The BigIron MG8 allows you to perform the following management tasks related to management module redundancy:

- Perform immediate synchronization of files.
- Perform a manual switchover to the standby module.
- Reboot the standby module.

File Synchronization Between the Active and Standby Management Modules

Each active and standby management module contains the following files that can be synchronized between the two modules:

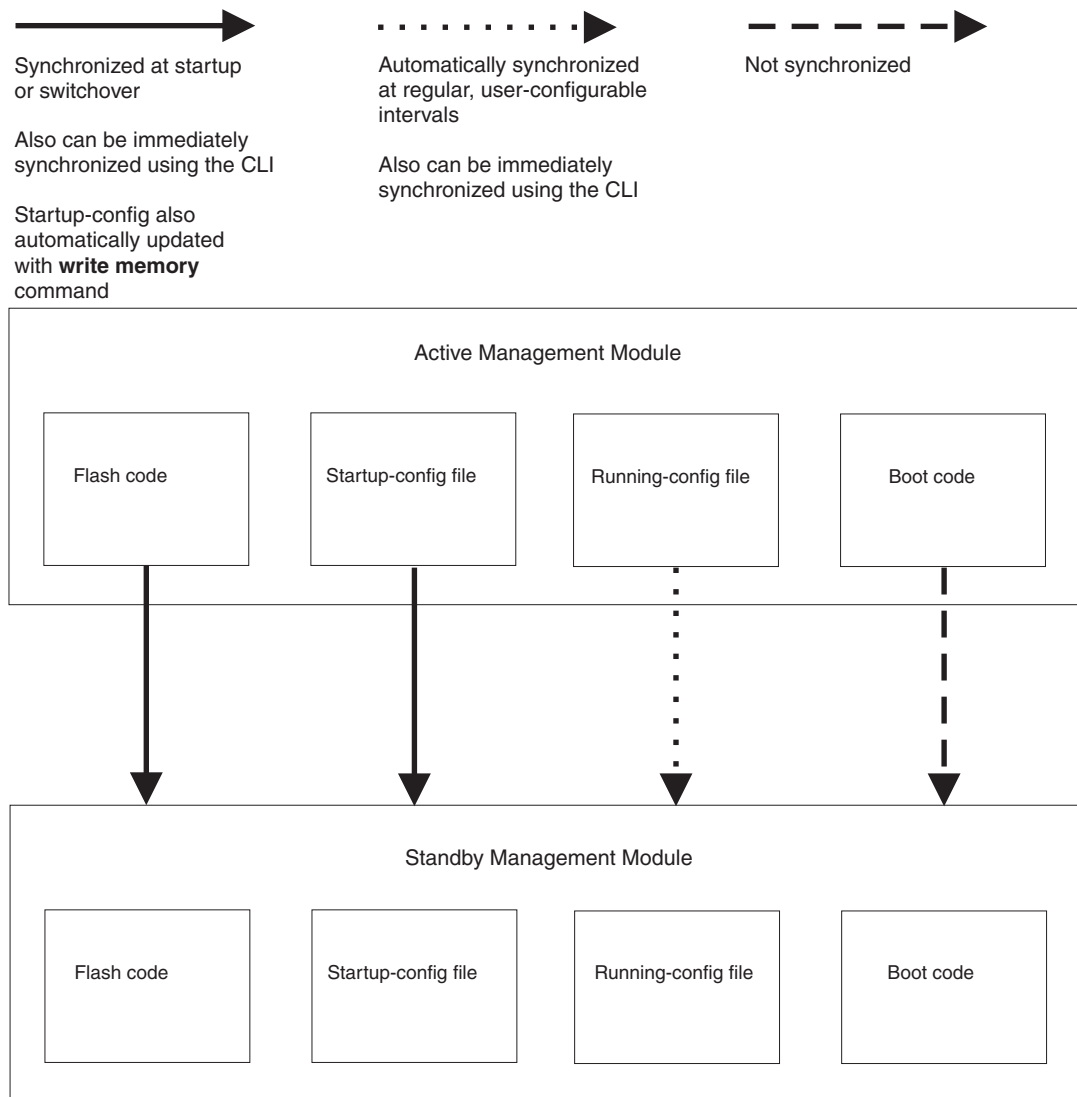
- Flash code – The flash code can include the following files:
 - monitor, which contains the management module's Real Time Operating System (RTOS).
 - primary, which contains the management module's primary Terathon IronWare image.
 - secondary, which contains the management module's secondary Terathon IronWare image.

(A Terathon IronWare image contains the layer 1 – 3 software run by the management module.) During startup or switchover, the active module compares the standby module's flash code to its own. If differences exist, the active module synchronizes the standby module's flash code with its own. If you update the flash code on the active module, the active module automatically synchronizes (without comparison) the standby module's flash code with its own.

- System-config file – The flash code also includes the system-config file. During startup or switchover, the active module compares the standby module's system-config file to its own. If differences exist, the active module synchronizes the standby module's system-config file with its own. When you save changes to the system-config file on the active module, the active module automatically synchronizes (without comparison) the standby module's system-config file with its own.
- Running-config – The running-config file resides in the BigIron MG8's memory. The running-config file is automatically synchronized (without comparison) from the active module to the standby module at regular intervals. The default interval is 7 seconds. For information about changing the default interval, see "Configuring Automatic Synchronization Interval for the Running-Config File" on page 6-8.

Each active and standby management module also includes boot code, which is the code a module runs when it first starts up. The boot code resides in each module's boot flash. The boot code is not synchronized between the two modules. The unsynchronized boot code allows the system to run using an older version of boot code on the standby module if desired.

Figure 6.1 shows how the files are synchronized between the active module and the standby module.

Figure 6.1 Active and Standby Management Module File Synchronization

The BigIron MG8 allows you to do the following related to file synchronization:

- Compare files on the active module with files on the standby module and immediately synchronize any files that are different.
- Immediately synchronize all files between the active and standby modules.
- Change the default automatic synchronization interval for the running-config file.

The following sections explain how to perform these tasks.

Comparing and Synchronizing Files

You can initiate a comparison of the flash code, system-config file, and running-config file on the active management module with the same files on the standby module and synchronize the files immediately if differences exist. When you synchronize the files, the active module copies its files to the standby module, replacing the files on the standby module.

To compare and immediately synchronize files between the active and standby modules if differences exist, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# sync-standby
```

Syntax: sync-standby

Synchronizing Files Without Comparison

You can synchronize the flash code, system-config file, and running-config file immediately without comparison. When you synchronize the files, the active module copies its files to the standby module, replacing the files on the standby module.

To immediately synchronize the files between the active and standby modules, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# force-sync-standby
```

Syntax: force-sync-standby

Configuring Automatic Synchronization Interval for the Running-Config File

The running-config file is automatically synchronized (without comparison) from the active management module to the standby module at regular intervals. The default interval is 7 seconds.

For example, to set the automatic synchronization interval for the running-config file to 20 seconds, enter the following command at the Redundancy Configuration level of the CLI:

```
BigIron MG8(config-redundancy)# running-config-sync-period 20
```

Syntax: running-config-sync-period <seconds>

For the <seconds> parameter, you can specify a value from 4 – 20 seconds. If you specify a value of 0, the active module does not synchronize its configuration data with the standby module.

Manually Switching Over to the Standby Management Module

You can cause the BigIron MG8 to switch over to the standby module (and thus make it the active module). To do so, you can enter either the **switchover** or the **reset** commands at the Privileged EXEC level:

```
BigIron MG8# switchover
```

or

```
BigIron MG8# reset
```

Syntax: switchover

Syntax: reset

Rebooting the Active and Standby Management Modules

You can reboot the management modules, maintaining the active and standby roles currently performed by each module, using the **boot system** or **reload** commands. You can also reboot the standby module only, maintaining its current standby role, using the **reboot-standby** command.

For example, to reboot the active and standby management modules from the primary IronWare image in the management module's flash memory, enter the following command at the Privileged EXEC level:

```
BigIron MG8# boot system flash primary
```

Syntax: boot system bootp | [flash primary | secondary] | slot <number> <filename>

The <primary> parameter specifies the primary Terathon IronWare image in the management module's flash memory, while the <secondary> parameter specifies the secondary Terathon IronWare image in the flash memory.

For the <number> parameter, specify 1 for PCMCIA slot 1 on the active management module and 2 for PCMCIA slot 2 on the active management module.

For the <filename> parameter, specify the name of the image on the PCMCIA flash card.

For example, to reboot the active and standby management modules, enter the following command at the Privileged EXEC level:

```
BigIron MG8# reload
```

Syntax: reload

To reboot the standby module only, enter the following command at the Privileged EXEC level:

```
BigIron MG8# reboot-standby
```

Syntax: reboot-standby

Monitoring Management Module Redundancy

You can monitor the following aspects of management module redundancy:

- The status of the management modules (if a module is the active or standby module).
- The switchover history for the management modules.

The following sections explain how you can monitor the management modules.

Determining Management Module Status

You can determine the status of a management module in the following ways:

- LEDs – The management module's LEDs indicate whether a module is the active module or the standby module, and if the module has power.
- Module information in software – The module information displayed by the software indicates whether a module is the active module or the standby module.

Status LED

If you are located near the BigIron MG8, you can determine which management module is currently the active module and which is the standby module by observing the Active LED on each module. If this LED is on (green), the module is the active module. If this LED is off, the module is the standby module.

You can also observe the Pwr LED on each module. If this LED is on (green), the module is receiving power. If this LED is off, the module is not receiving power. (A module without power will not function as the active or standby module.)

Software

To display the status of the management modules, enter the following command at any CLI level:

```
BigIron MG8# show module
```

Module	Status	Ports	Starting MAC
M1 (upper): BigIron MG8 Mgmt Module	Active		
M2 (lower): BigIron MG8 Mgmt Module	Standby (Ready)		
...			

Syntax: show module

The Status column indicates the module status. The management modules can have one of the following statuses:

- ACTIVE – The module is currently the active management module.
- STANDBY – The module is the standby management module. The status of the standby module can be one of the following:
 - Init – The module is currently initializing as the standby module.

- Ready – The module is ready to take over as the active module, if necessary.
- Wait – The module is awaiting boot information from the active management module.
- Sync – The active module is currently synchronizing files between itself and the standby module.

Displaying Temperature Information

Each management module contains a temperature sensor. By default, the BigIron MG8 polls the temperature of each management module every 60 seconds. You can display the current temperature of the management modules (and all other modules) by entering the following command at any CLI level:

```
BigIron MG8# show chassis
...
Active Mgmt Module: 28.43C
Standby Mgmt Module: 29.15C...
Temperature Monitoring Poll Period is 60 seconds
...
```

The output displays the temperature of the management modules in the BigIron MG8 and also indicates that the temperature readings were provided within the last 60 seconds. For information about all output generated by the **show chassis** command, see “Displaying Chassis Status and Temperature Readings” on page 7-2.

Syntax: show chassis

Displaying Switchover Information

You can display the following related to a switchover:

- Redundancy parameter settings and statistics, which includes the number of switchovers that have occurred.
- System log or the traps logged on an SNMP trap receiver, which includes information about whether a switchover has occurred.

To view the redundancy parameter settings and statistics, enter the following command at any level of the CLI:

```
BigIron MG8# show redundancy
=== MP Redundancy Settings ===
Default Active Slot = 9
Running-Config Sync Period = 7 seconds

=== MP Redundancy Statistics ===
Current Active Session:
Active Slot = 9, Standby Slot = 10 (Ready State), Switchover Cause = No Switchover
Start Time = 0-0-17 19:47:39 (Wednesday)

Previous Active Session #1:
Active Slot = 10, Standby Slot = 9, Switchover Cause = Active Rebooted
Start Time = 0-0-17 19:46:9 (Wednesday), End Time = 0-0-17 19:47:39 (Wednesday)

Previous Active Session #2:
Active Slot = 9, Standby Slot = 10, Switchover Cause = Active Rebooted
Start Time = 0-0-17 19:44:14 (Wednesday), End Time = 0-0-17 19:46:9 (Wednesday)
...
```

This output displays that the default active chassis slot is configured as slot 9 (M1) and the automatic synchronization interval is configured for 7 seconds. It also displays that in the current active session, the module

installed in slot 9 (M1) is the active module, the module installed in slot 10 (M2) is the standby module, which is in Ready state, and no switchovers have occurred.

However, in two previous sessions, switchovers occurred because the active module was rebooted. In session #2, the module installed in slot 9 (M1) was the active module, while the module installed in slot 10 (M2) was the standby module. In session #1, the module installed in slot 10 (M2) was the active module, while the module installed in slot 9 (M1) was the standby module.

To view the system log or the traps logged on an SNMP trap receiver, enter the following command at any level of the CLI:

```
BigIron MG8# show log

Syslog logging: enabled (0 messages dropped, 0 flushes, 0 overruns)
  Buffer logging: level ACDMEINW, 24 messages logged
  level code: A=alert C=critical D=debugging M=emergency E=error
              I=informational N=notification W=warning

Static Log Buffer:
Sep 28 11:31:25:A:Power Supply 1, 1st left, not installed
Sep 28 11:31:25:A:Power Supply 3, middle left, not installed
Sep 28 11:31:25:A:Power Supply 4, middle right, failed
Sep 28 11:31:25:A:Power Supply 5, 2nd right, not installed

Dynamic Log Buffer (50 lines):
Sep 27 18:06:58:I:Interface ethernet6/2, state up
Sep 27 18:06:57:I:Interface ethernet3/2, state up
Sep 27 15:39:42:I:Interface ethernet3/2, state up
Sep 27 15:39:42:I:Interface ethernet6/2, state up
...
Sep 27 14:23:45:N:Module up in slot 6
Sep 27 14:23:45:N:Module up in slot 3

Sep 27 14:23:27:A:Management module at slot 9 state changed from standby to active
```

This output displays that one switchover occurred.

Flash Memory and PCMCIA Flash Card File Management Commands

The BigIron MG8 supports file systems in the following locations:

- The management module's flash memory.
- A PCMCIA flash card inserted in the management module's slots 1 or 2.

Table 6.1 outlines the root directory for each file system.

Table 6.1: BigIron MG8 File System Root Directories

File System	Root Directory
Flash memory	/flash/
PCMCIA flash card in slot 1	/slot1/
PCMCIA flash card in slot 2	/slot2/

This section describes commands that manage the files in flash memory and on the flash cards. You can use the file management commands to perform the following tasks:

- Format a flash card
- Determine the current management focus.
- Switch the management focus.
- Display a directory of the files.
- Display the contents of a file.
- Display the hexadecimal output of a file.
- Create a subdirectory.
- Remove a subdirectory.
- Rename a file.
- Change the read-write attribute of a file.
- Delete a file.
- Recover or “undelete” a file.
- Append one file to another (join two files).
- Perform copy operations using the **copy** command.
- Perform copy operations using the **cp** command.
- Load the system software from flash memory, a flash card, or other sources during system reboot.
- Change the save location of the startup-config file from the default location (flash memory) to a flash card in slot 1 or 2.

In the CLI, you can access all the file management commands at the Privileged EXEC level of the CLI.

CAUTION: Do not add or remove a flash card while a file operation involving the flash card’s slot is in progress. Doing so can result in corruption of the flash card. If this occurs, you may need to reformat the flash card to make it usable again. Reformatting the card erases all data stored on the card.

Management Focus

The **management focus** determines the default file system (flash memory or the flash card inserted in slot 1 or 2) to which a file management operation applies. When you power on or reload a BigIron MG8 system, by default, the management focus is on flash memory.

You can change the current management focus from flash memory to a slot and subdirectory using the **cd** or **chdir** command. (For more information about these commands, see “Switching the Management Focus” on page 6-16.)

To determine the slot and subdirectory that have the current management focus, enter the **pwd** command. (For more information about this command, see “Determining the Current Management Focus” on page 6-15.)

Most file management commands provide the option of specifying the file system to which the command applies. If you want the command to apply to the file system that has the current management focus, you do not need to specify the file system. If you want the operation to apply to the file system that does not have the current management focus, you must specify one of the following keywords:

- **flash** – indicates flash memory
- **slot1** – indicates the flash card inserted in slot 1
- **slot2** – indicates the flash card inserted in slot 2

For example, if you want to display a directory of files in flash memory and flash memory has the current management focus, you do not need to specify the **flash** keyword. However, if you want to display a directory of files for slot 1 and flash memory has the current focus, you must specify the **slot1** keyword.

Flash Memory File System

The flash memory file system is flat, which means that it does not support subdirectories. As a result, you cannot create or delete subdirectories in this file system using the **md/mkdir** and **rd/rmdir** commands, respectively. Also, when specifying the syntax for the various file management commands, you will not need to specify a pathname to a subdirectory because it is not possible for a subdirectory to exist.

File Naming Conventions

A file name in the flash memory file system can be a maximum of 31 characters. File names are not case-sensitive. The flash memory file system does not accept spaces as part of a file name.

The following characters are valid in file names:

- All upper and lowercase letters
- All digits
- Any of the following special characters:
 - \$
 - %
 - '
 - -
 - _
 - @
 - ~
 - `
 - !
 - (
 -)
 - {
 - }
 - ^
 - #
 - &

PCMCIA Flash Card File System

The PCMCIA flash card file system is hierarchical, which means that it supports subdirectories. Therefore, you can create or delete subdirectories in this file system using the **md/mkdir** and **rd/rmdir** commands, respectively. Also, when specifying the syntax for the various file management commands, you may need to specify a pathname to a subdirectory as appropriate to manipulate a file in a subdirectory.

PCMCIA Flash Card Subdirectories

The full path name for a file's location can be a maximum of 256 characters. You can nest subdirectories as deep as you want as long as the full path name is 256 characters or less.

When you include a subdirectory path in a file management command, use a slash between each level. For example, to create a subdirectory structure on the PCMCIA card in slot 1, enter the following command:

```
BigIron MG8# mkdir slot1 /RouterCode/initial-release
```

This command creates two levels of subdirectories on the flash card in PCMCIA slot 1.

File and Subdirectory Naming Conventions

PCMCIA files and subdirectory names can be up to 32 characters long. File names are not case-sensitive. The following characters are valid in file and subdirectory names:

- All upper and lowercase letters
- All digits
- Spaces
- Any of the following special characters:
 - \$
 - %
 - '
 - -
 - _
 - @
 - ~
 - `
 - !
 - (
 -)
 - {
 - }
 - ^
 - #
 - &

You can use spaces in a file or subdirectory name if you enclose the name in double quotes. For example, to specify a subdirectory name that contains spaces, enter a string such as the following: "a long subdirectory name".

A subdirectory or file name can be a maximum of 256 characters long. A complete subdirectory path name cannot contain more than 256 characters.

There is no maximum file size. A file can be as large as the available flash card space.

Wildcards

Commands to display a directory of files, to change the read-write attribute of a file, or to delete files accept wildcards in the file name (<file-name>). When using these commands, you can use "*" (asterisk) as a wildcard for any part of the name. For example, all the following values are valid for <file-name>:

- teststartup.cfg
- test*.cfg
- mb01000.bin
- *.bin
- m*.bin
- m*.*

Formatting a Flash Card

The flash cards shipped with a management module are already formatted for the 16 FAT file system used by the modules. If you want to use a flash card that is not formatted for the 16 FAT file system, you need to reformat the flash card before you can store files on the card.

CAUTION: Make sure the flash card is empty or does not contain files you want to keep. Formatting a flash card completely erases all files on the card.

CAUTION: Once you start the formatting process, you cannot stop it. Even if you enter CTRL-C to stop the CLI output and a new prompt appears, the formatting continues. Make sure you want to format the card before you enter the command.

For example, to reformat a flash card in the management module's slot 2, enter the following command:

```
BigIron MG8# format slot2
.....
.....
.....
.....

80809984 bytes total card space.
80809984 bytes available on card.

    2048 bytes in each allocation unit.
    39458 allocation units available on card.
```

Syntax: format slot1 | slot2

The **slot1** | **slot2** keyword specifies the PCMCIA slot that contains the flash card you are formatting.

Determining the Current Management Focus

For conceptual information about management focus, see "Management Focus" on page 6-12.

If you are not sure which file system has the current management focus, enter the following command:

```
BigIron MG8# pwd
Flash /flash/
```

Syntax: pwd

In this example, the management focus is the flash memory.

In the following example, the management focus is the root directory of the flash card in slot 1:

```
BigIron MG8# pwd
/slot1/
```

In the following example, the management focus is a subdirectory called “test” on the flash card in slot 1.

```
BigIron MG8# pwd
/slot1/test/
```

Switching the Management Focus

The effect of file management commands depends on the file system that has the current management focus. For example, if you enter a command to delete a file and do not specify the location of the file, the software attempts to delete the file from the location that currently has the management focus.

By default, the management focus is on the management module’s flash memory. You can switch the focus from flash memory to the management module’s slot 1 or slot 2 using the **cd** or **chdir** commands, which have the same syntax and function exactly the same.

For example, to switch the focus from flash memory to the flash card in slot 2, enter the following command:

```
BigIron MG8# cd /slot2
BigIron MG8#
```

When you enter the **cd** command, the software changes the management focus to slot 2 then displays a new command prompt. If a slot you specify does not contain a flash card, the software displays the message shown in the following example.

```
BigIron MG8# cd /slot1
Device not present
```

Syntax: `cd /slot1 | /slot2 | /flash`

Syntax: `chdir /slot1 | /slot2 | /flash`

For the <directory-pathname> parameter for both **cd** and **chdir** commands, you can specify `/slot1` or `/slot2` to switch the focus to slot 1 or slot 2, respectively. Specify `/flash` to switch the focus to flash memory.

After you have switched the focus to a slot such as slot 2, you can specify the <directory-pathname> parameter to switch the focus to a subdirectory on a flash card inserted in slot 2. For example, to switch the focus from the root directory level (`/`) of slot 2 to the subdirectory named “PLOOK,” enter the following command:

```
BigIron MG8# cd PLOOK
```

Syntax: `cd <directory-pathname>`

Syntax: `chdir <directory-pathname>`

If you specify an invalid subdirectory path, the CLI displays a message such as the following:

```
BigIron MG8# cd PLOOK
File not found
```

If you are certain the path you specified exists, make sure you are at the correct level for reaching the path. For example, if you are already at the PLOOK level, the CLI cannot find the subdirectory “PLOOK” because it is not a subdirectory from the level that currently has the management focus.

To change the management focus back to flash memory, enter the following command:

```
BigIron MG8# cd /flash
BigIron MG8#
```

Displaying a Directory of the Files

You can display a directory of the files in the management module’s flash memory or on a flash card inserted in the management module’s slot 1 or slot 2 using the **dir** or **ls** commands.

The software displays the directory of the file system that has the current management focus. By default, flash memory has the management focus. However, you do not need to change the focus to list the files on the file system that does not currently have management focus. In this case, you can specify the <path-name> parameter with the **dir** or **ls** commands to display the directory of the desired file system.

For example, to display a directory of the files in flash memory, if flash memory has the management focus, enter the following command:

```
BigIron MG8# dir
Directory of /flash/

07/28/2003 15:57:45          3,077,697 1060.tmp
07/28/2003 15:56:10          3,077,697 14082.tmp
07/28/2003 16:00:08          3,077,697 2084.tmp
07/25/2003 18:00:23           292,701 boot
00/00/00   00:00:00              12 boot.ini
07/28/2003 14:40:19           840,007 lp-primary-0
07/28/2003 15:18:18           840,007 lp-secondary-0
07/28/2003 09:56:16           391,524 monitor
07/28/2003 15:08:12          3,077,697 primary
07/28/2003 16:02:23           1,757 startup-config
07/25/2003 18:02:14           1,178 startup.sj2
07/28/2003 14:28:47           1,662 startup.spa
07/26/2003 12:16:29           1,141 startup.vso
07/25/2003 18:11:01           1,008 startup.vsr
07/28/2003 09:40:54           1,554 startup.vsrp.ospf

          15 File(s)          14,683,339 bytes
           0 Dir(s)           15,990,784 bytes free
```

Syntax: dir | ls [<path-name>]

You can enter either **dir** or **ls** for the command name.

Specify the <path-name> parameter to display the following:

- The files that match the value for a flash memory directory, or flash card directory/subdirectory you specify.
- The files that match the value for a name you specify.

For example, to list only files that contain a .tmp suffix in flash memory, if flash memory is the current management focus, enter a command such as the following:

```
BigIron MG8# dir *.tmp
Directory of /flash/

07/28/2003 15:57:45          3,077,697 1060.tmp
07/28/2003 15:56:10          3,077,697 14082.tmp
07/28/2003 16:00:08          3,077,697 2084.tmp

          3 File(s)          9,292,701 bytes
           0 Dir(s)          15,990,784 bytes free
```

For example, to display a directory of the files on the flash card in slot 2, if flash memory has the management focus, enter the following command:

```
BigIron MG8# dir /slot2
Directory of /slot2/

08/01/2003 18:25:28          3,092,508 PRIMARY
08/01/2003 18:28:06          3,092,508 primary.1234
08/01/2003 18:28:24           389,696 MONITOR
08/01/2003 18:28:30           389,696 MONITOR1
08/01/2003 18:28:01           389,696 MONITOR2
08/01/2003 18:28:03           389,696 MONITOR3
08/01/2003 18:29:04           389,696 MONITOR4
08/01/2003 18:29:12    <DIR>          DIR1
08/01/2003 18:32:03           389,696 1234567890.12345
08/01/2003 18:32:08           389,696 123456.123
08/01/2003 18:32:11           389,696 123456.123
08/01/2003 18:32:14           389,696 123456.123
08/01/2003 18:32:17           389,696 123456.123

                12 File(s)          10,081,976 bytes
                 1 Dir(s)           114,577,408 bytes free
```

The following information is displayed for each file.

Table 6.2: CLI Display of Directory Information

This Field...	Displays...
File date	The date on which the file was placed in the flash memory or card, if the Foundry device's system clock is set.
Time of day	The time of day at which the file was placed in the flash memory or card, if the Foundry device's system clock is set.
File size	The number of bytes in the file.
Read-write attribute	If you have set the file's read-write attribute to read-only, "R" appears before the file name. If the file's read-write attribute is read-write (the default), no value appears in this column. For information, see "Changing the Read-Write Attribute of a File" on page 6-22.
File name	The file name.
Long file name	This field applies to files on a flash card only. The longer file name if the file was created on a PC and the name is longer than the 8.3 format.

The directory also lists the total number of files that match the parameters you specified, the total number of bytes used by all the files, and the number of bytes still free.

Displaying the Contents of a File

You can display the contents of a file in the management module's flash memory or on a flash card inserted in the management module's slot 1 or slot 2.

The software attempts to display the specified file in the file system that has the current management focus. By default, flash memory has the management focus. However, you do not need to change the focus to display the file in a file system that does not currently have management focus. In this case, you can specify the `/<directory>/<path-name>` parameter with the **more** command to display the file in the desired file system.

For example, to display the contents of a file in flash memory, if flash memory has the current management focus, enter a command such as the following:

```
BigIron MG8# more cfg.cfg
```

Syntax: more [`/<directory>/`]`<file-name>`

Use the `<directory>` parameter to specify a directory in a file system that does not have current management focus.

Use the `<file-name>` parameter to specify the file you want to display.

For example, to display the contents of a file on the flash card in slot 2, if flash memory has the current management focus, enter a command such as the following:

```
BigIron MG8# more /slot2/cfg.cfg
```

Displaying the Hexadecimal Output of a File

You can display the hexadecimal output of a file in the management module's flash memory or on a flash card inserted in the management module's slot 1 or slot 2.

The software attempts to display the hexadecimal output of a specified file in the file system that has the current management focus. By default, flash memory has the management focus. However, you do not need to change the focus to display the hexadecimal output of the file in a file system that does not currently have management focus. In this case, you can specify the `/<directory>/<file-name>` parameter with the **hd** command to display the output of the file in the desired file system.

For example, to display the hexadecimal output of a file in flash memory, if flash memory has the current management focus, enter the following command:

```
BigIron MG8# hd cfg.cfg
```

Syntax: hd [`/<directory>/`]`<file-name>`

Use the `<directory>` parameter to specify a directory in a file system that does not have current management focus.

Use the `<file-name>` parameter to specify a file for which you want to display the hexadecimal output.

For example, to display the hexadecimal output of a file in a flash card inserted in slot 2, if flash memory has the current management focus, enter the following command:

```
BigIron MG8# hd /slot2/cfg.cfg
```

Creating a Subdirectory

You can create a subdirectory in the flash card file system using the **md** and **mkdir** commands, which have the same syntax and function exactly the same.

NOTE: You cannot create subdirectories in the flash memory file system. Therefore, the **md** and **mkdir** commands do not apply to the flash memory file system.

The software attempts to create a subdirectory in the file system that has the current management focus. By default, flash memory has the management focus. However, you do not need to change the focus to create a subdirectory in a file system that does not currently have management focus. In this case, you can specify the **slot1** or **slot2** keyword with the **md** or **mkdir** command to create the subdirectory in the desired file system.

For example, to create a subdirectory on the flash card inserted in slot 2, if the flash memory has current management focus, enter a command such as the following:

```
BigIron MG8# mkdir /slot2/TEST
```

Syntax: md | mkdir [/slot1/ | /slot2/] <dir-name>

You can enter either **md** or **mkdir** for the command name.

Specify the **/slot1** or **/slot2** keyword to create a subdirectory on the flash card in slot 1 or slot 2, respectively. If you do not specify one of these parameters, the command applies to the file system that currently has the management focus.

The <dir-name> parameter specifies the subdirectory name. You can enter a name that contains any combination of the following characters. Do not enter a slash “/” in front of the name. Remember, a file name preceded by a slash represents the absolute path name (/flash, /slot1, or /slot2).

- All upper and lowercase letters
- All digits
- Spaces
- Any of the following special characters:
 - \$
 - %
 - ‘
 - -
 - _
 - @
 - ~
 - `
 - !
 - (
 -)
 - {
 - }
 - ^
 - #
 - &

You can use spaces in a subdirectory name if you enclose the name in double quotes. For example, to specify a subdirectory name that contains spaces, enter a string such as the following: “a long subdirectory name”.

A subdirectory name can be a maximum of 256 characters long. A complete subdirectory path name cannot contain more than 256 characters.

The name is not case sensitive. You can enter upper- or lowercase letters. The CLI displays the name using uppercase letters.

To verify successful creation of the subdirectory, enter a command such as the following to change to the new subdirectory level:

```
BigIron MG8# chdir /slot2/TEST
Current directory of slot2 is: /TEST
```


For information about changing the directory using the **cd** and **chdir** commands, see “Switching the Management Focus” on page 6-16.

Removing a Subdirectory

You can remove a subdirectory from the flash card file system using the **rd** and **rmdir** commands, which have the same syntax and function exactly the same.

NOTE: You cannot remove subdirectories from the flash memory file system. Therefore, the **rd** and **rmdir** commands do not apply to the flash memory file system.

NOTE: You can remove a subdirectory only if the subdirectory does not contain files or other subdirectories.

The software attempts to remove a subdirectory from the file system that has the current management focus. By default, flash memory has the management focus. However, you do not need to change the focus to remove a subdirectory from a file system that does not currently have management focus. In this case, you can specify the **/slot1** or **/slot2** keyword with the **rd** or **rmdir** command to remove the subdirectory from the desired file system.

For example, to remove a subdirectory from the flash card inserted in slot 2, if the flash memory has current management focus, enter a command such as the following:

```
BigIron MG8# rmdir /slot2/TEST
```

Syntax: `rd | rmdir [/slot1/ | /slot2/] <dir-name>`

You can enter either **rd** or **rmdir** for the command name.

Specify the **/slot1** or **/slot2** keyword to remove a subdirectory on the flash card in slot 1 or slot 2, respectively. If you do not specify one of these parameters, the command applies to the file system that currently has the management focus.

The `<dir-name>` parameter specifies the subdirectory you want to delete. You can enter a path name if the subdirectory is not in the current directory.

If you receive a message such as the following, enter the **pwd** command to verify that the management focus is at the appropriate level of the directory tree.

```
BigIron MG8# rmdir temp
rmdir /slot1/test/dirl/temp failed - File not found
```

For information about using the **pwd** command, see “Determining the Current Management Focus” on page 6-15.

Renaming a File

You can rename a file in the management module’s flash memory or on a flash card inserted in the management module’s slot 1 or slot 2 using the **rename** or **mv** command.

The software attempts to rename the file in the file system that has the current management focus. By default, flash memory has the management focus. However, you do not need to change the focus to rename the file in a file system that does not currently have management focus. In this case, you can specify the `/<directory>/<old-file-name> /<directory>/<new-file-name>` parameter with the **rename** or **mv** command to rename the file in the desired file system.

For example, to rename a file in flash memory, if flash memory has the current management focus, enter a command such as the following:

```
BigIron MG8# rename oldname newname
```

If the command is successful, the CLI displays a new command prompt.

Syntax: `rename | mv [/<directory>]/<old-file-name> [/<directory>]/<new-file-name>`

You can enter either **rename** or **mv** for the command name.

The `/<directory>/` parameter specifies a directory in a file system that does not have current management focus.

The <old-file-name> parameter specifies the original filename that you want to change.

The <new-file-name> parameter specifies the new filename that you want to assign to the original file.

For example, to rename a file on the flash card inserted in slot 2, if flash memory has the current management focus, enter a command such as the following:

```
BigIron MG8# rename /slot2/oldname /slot2/newname
```

Changing the Read-Write Attribute of a File

You can specify the read-write attribute of a file on a flash card as follows:

- Read-only – You can display or copy the file but you cannot replace (copy over) or delete the file.
- Read-write – You can replace (copy over) or delete the file. This is the default.

NOTE: The read-write attribute of all files in flash memory is set to read-write. You cannot change this attribute for the files in flash memory. Therefore, the **attrib** command does not apply to the flash memory file system.

To determine the current setting of the read-write attribute for a file, use the **dir** command to list the directory information for the file. Files set to read-only are listed with “R” in front of the file name. For information about the **dir** command, see “Displaying a Directory of the Files” on page 6-16.

The software attempts to change the read-write attribute of the file in the file system that has the current management focus. By default, flash memory has the management focus. However, you do not need to change the focus to change this attribute of the file in a file system that does not currently have management focus. In this case, you can specify the **/slot1** or **/slot2** keyword with the **attrib** command to change the attribute of the file in the desired file system.

For example, to change the attribute of a file in slot2 to read-only, if flash memory has the management focus, enter a command such as the following:

```
BigIron MG8# attrib ro /slot2/goodcfg.cfg
```

Syntax: `attrib ro | rw [/slot1/ | /slot2/] <file-name>`

Specify the **/slot1** or **/slot2** keyword to change the attribute of a file on the flash card in slot 1 or slot 2, respectively. If you do not specify one of these keywords, the command applies to the file system that currently has the management focus.

The **ro** parameter specifies that the attribute of the file is set to read-only. The **rw** parameter specifies that the attribute of the file is set to read-write.

The <file-name> parameter specifies the file(s) for which to change the attribute.

For example, to change the attribute of all files on the flash card in slot 2 to read-only, if flash memory has the current management focus, enter a command such as the following:

```
BigIron MG8# attrib ro /slot2/*.*
```

Deleting a File

You can delete a file from flash memory or a flash card inserted in slot 1 or slot 2 using the **delete** or **rm** command.

NOTE: The **delete** or **rm** command deletes all files in a file system unless you explicitly specify the file(s) you want to delete.

NOTE: The software does not support an undelete option for the flash memory file system. When deleting a file from flash memory, make sure you really want to delete the file.

The software attempts to delete the file in the file system that has the current management focus. By default, flash memory has the management focus. However, you do not need to change the focus to delete the file in a file

system that does not currently have management focus. In this case, you can specify the /<directory>/<file-name> parameter with the **delete** or **rm** command to delete the file in the desired file system.

For example, to delete a file in flash memory, if flash memory has the current management focus, enter a command such as the following:

```
BigIron MG8# delete cfg.cfg
```

If the command is successful, the CLI displays a new command prompt.

Syntax: delete | rm [/slot1/ | /slot2/ | /flash/] [<directory>/] <file-name>

You can enter either **delete** or **rm** for the command name.

Specify the **/slot1** or **/slot2** parameters to delete all files on the flash card in slot 1 or slot 2, respectively.

The <directory> parameter specifies the directory in a file system that does not have the current management focus.

The <file-name> parameter specifies the file(s) that you want to delete.

For example, to delete all files with names that start with “test” from flash memory, if flash memory has the current management focus, enter a command such as the following:

```
BigIron MG8# delete test*.*
```

For example, to delete all files on the flash card in slot 2, if flash memory has the current management focus, you can enter the following command:

```
BigIron MG8# delete /slot2/*.*
```

Recovering (“Undeleting”) a File

You can recover or undelete a file you have deleted from a flash card file system.

NOTE: You cannot recover or undelete a file from the flash memory file system. Therefore, the **undelete** command does not apply to the flash memory file system.

The software attempts to recover the file in the file system that has the current management focus. By default, flash memory has the management focus. If you want to recover a file in a file system that does not have the current management focus, you must switch the management focus to the desired file system using the **cd** command. For more information about switching the management focus, see “Switching the Management Focus” on page 6-16.

For example, to undelete a file on the flash card in slot 2, if flash memory has the current management focus, enter a command such as the following:

```
BigIron MG8# cd /slot2
BigIron MG8# undelete
Undelete file ?PRIMARY ? (enter y or n) :y
Input one character: P
File recovered successfully and named to PRIMARY
```

For each file that can be undeleted from the flash card in slot 2, the CLI displays the remaining name entry in the file directory and prompts you for the first character of the file name. You can enter any valid file name character. You do not need to enter the character that was used before in the deleted file name.

Once you enter a character and the CLI undeletes the file, the CLI continues with the next file that can be undeleted. For each file, specify “y” or “n”, and specify a first character for the files that you select to undelete.

NOTE: When you delete a file from a flash card, the CLI leaves the file intact but removes the first letter in the file name from the file directory. However, if you save file changes or new files that use part of the space occupied by the deleted file, you cannot undelete the file. The **undelete** command lists only the files that can be undeleted.

To end the undelete process, enter the CTRL + C key combination.

Syntax: undelete

Appending a File to Another File

You can append a file in flash memory or on a flash card to the end of another file in one of these file systems.

The software attempts to append one file to another in the file system that has the current management focus. By default, flash memory has the management focus. However, you do not need to change the focus to append one file to another in a file system that does not currently have management focus. In this case, you can specify the /<source-dir-path>/ or /<dest-dir-path>/ parameters with the **append** command to append one file to another in the desired file system.

To append one file to another in flash memory, if flash memory has the current management focus, enter a command such as the following:

```
BigIron MG8# append newacfs.cfg startup-config.cfg
```

Syntax: append [/<source-file-system>/] [<source-dir-path>/<source-file-name> [/<dest-file-system>/] [<dest-dir-path>/<dest-file-name>

Specify the <source-file-system> and <dest-file-system> parameters when you are appending a file on one file system to a file on another file system.

The [<source-dir-path>/] <source-file-name> parameter specifies the file you are appending to the end of another file. If the file is not located in the current subdirectory (the subdirectory that currently has the management focus), specify the subdirectory path in front of the file name.

The [<dest-dir-path>/<dest-file-name> parameter specifies the file to which you are appending the other file. If the file is not located in the current subdirectory, specify the subdirectory path in front of the file name.

For example, to append a file in the root directory of slot 1 to another file in a subdirectory of slot 2, enter a command such as the following:

```
BigIron MG8# append /slot1/newacfs.cfg /slot2/TEST/startup-config.cfg
```

Copying Files Using the copy Command

For information about copying files using the **copy** command while upgrading software images, see “Overview of the Tasks in the Software Upgrade Process” on page 10-4.

You can perform the following additional copy operations using the **copy** command:

- Copy files from one flash card to the other.
- Copy files between a flash card and the management module’s flash memory.
- Copy software images between active and standby management modules.
- Copy files from a management module to an interface module.
- Copy management module Terathon IronWare images from flash memory to a TFTP server.
- Copy files between a flash card and a TFTP server.
- Copy a startup-config file between a flash card and the management module’s flash memory.
- Copy a startup-config file between the management module’s flash memory and a TFTP server.
- Copy the running-config to a flash card or a TFTP server.
- Load a running-config from a flash card or TFTP server into the device’s running-config (loading ACLs only)

NOTE: The syntax of the **copy** command does not match the syntax of earlier command descriptions. For example, the slash (/) cannot be used in front of keywords **slot1** and **slot2** for the **copy** command.

NOTE: The copy options require you to explicitly specify the flash card. Therefore, you can perform a copy regardless of the flash card that currently has the management focus.

Copying Files from One Flash Card to the Other

To copy a file from one flash card to the other, enter the following command:

```
BigIron MG8# copy slot1 slot2 sales.cfg
```

Syntax: copy <from-card> <to-card> [/<from-dir-path>]/<from-name> [/<to-dir-path>]/[<to-name>]

For the <from-card> and <to-card> parameters, you can specify **slot1** or **slot2**.

The command shown in the example above copies a file from the flash card in slot 1 to the flash card in slot 2. In this case, the software uses the same name for the original file and for the copy. Optionally, you can specify a different file name for the copy.

Copying Files Between a Flash Card and Flash Memory

To copy a file from a flash card to the primary area in flash memory, enter a command such as the following:

```
BigIron MG8# copy slot1 flash mpr01000.bin primary
```

Syntax: copy slot1 | slot2 flash [/<from-dir-path>]/<from-name> monitor | primary | secondary

To copy a file from flash memory to a flash card, enter a command such as the following:

```
BigIron MG8# copy flash slot2 primary mpr01000.bin
```

The command in this example copies a Terathon IronWare image file from the primary area in flash memory onto the flash card in slot 2. In this case, the software uses the same name for the source file and for the destination file. Optionally, you can specify a different file name for the destination file.,

Syntax: copy flash slot1 | slot2 <source-name> monitor | primary | secondary | startup-config [<dest-name>]

Copying Software Images Between Active and Standby Management Modules

To copy the monitor image from flash memory of the active management module to flash memory of the standby module, enter the following command:

```
BigIron MG8# copy flash flash monitor standby
```

Syntax: copy flash flash monitor standby

To copy the Terathon IronWare image from the secondary location in the active management module's flash memory to the primary location in the active module's flash memory, enter the following command:

```
BigIron MG8# copy flash flash primary
```

Syntax: copy flash flash primary [standby]

Specify the optional **standby** keyword to copy the Terathon IronWare image from the secondary location in the active management module's flash memory to the primary location in the standby module's flash memory.

To copy the Terathon IronWare image from the primary location in the active management module's flash memory to the secondary location in the active module's flash memory, enter the following command:

```
BigIron MG8# copy flash flash secondary
```

Syntax: copy flash flash secondary [standby]

Specify the optional **standby** keyword to copy the Terathon IronWare image from the primary location in the active management module's flash memory to the secondary location in the standby module's flash memory.

Copying Files From a Management Module to an Interface Module

You can copy a software image or other type of file from the management module's flash memory to the flash memory of one or all interface modules.

For example, to copy the interface module's monitor image from the management module to all interface modules, enter a command such as the following:

```
BigIron MG8# copy flash lp lb01000.bin monitor all
```

Syntax: copy flash lp <source-file> monitor | primary | secondary <slot-number> | all

For example, to copy a file called test.cfg from the management module to the interface module in chassis slot 1, enter a command such as the following:

```
BigIron MG8# copy flash lp test.cfg lptest.cfg 1
```

Syntax: copy flash lp <source-file> <dest-file> <slot-number> | all 0

Copying Terathon IronWare Images from Flash Memory to a TFTP Server

You can copy the management module's Terathon IronWare images from the primary and secondary locations in flash memory to a TFTP server. (The BigIron MG8 must have access to the specified TFTP server.)

For example, to copy the Terathon IronWare image in the secondary location in flash memory to a TFTP server, enter a command such as the following:

```
BigIron MG8# copy flash tftp 10.10.10.1 secondary.bak secondary
```

Syntax: copy flash tftp <ip-addr> <dest-file-name> primary | secondary

Copying Files Between a Flash Card and a TFTP Server

Use the following methods to copy files between a flash card and a TFTP server.

NOTE: The BigIron MG8 must have network access to the TFTP server.

To copy a file from a flash card to a TFTP server, enter a command such as the following:

```
BigIron MG8# copy slot1 tftp 192.168.1.17 notes.txt
```

Syntax: copy slot1 | slot2 tftp <ip-addr> [/<from-dir-path>]/<source-file> [/<to-dir-path>]/[<dest-file>]

The command in this example copies a file from slot 1 to a TFTP server. In this case, the software uses the same name for the source file and for the destination file. Optionally, you can specify a different file name for the destination file.

To copy a software image from a TFTP server to a flash card, enter a command such as the following:

```
BigIron MG8# copy tftp slot1 192.168.1.17 mpr01000.bin primary
```

Syntax: copy tftp slot1 | slot2 <ip-addr> [/<from-dir-path>]/<source-file> <path-name> | monitor | primary | secondary

The command in this example copies the primary Terathon IronWare software image from a TFTP server to a flash card in slot 1.

Copying the Startup-Config File Between a Flash Card and Flash Memory

Use the following methods to copy a startup-config file between flash memory and a flash card. By default, the device uses the startup-config in the primary area of flash memory to configure itself when you boot or reload the device.

NOTE: The device cannot use a startup-config file on a flash card to configure itself. You cannot boot or reload from a flash card.

To copy a startup-config file from a flash card to flash memory, enter a command such as the following:

```
BigIron MG8# copy slot1 startup-config test2.cfg
```

Syntax: copy slot1 | slot2 startup-config [/<from-dir-path>]/<file-name>

This command copies a configuration file named test2.cfg from the flash card in slot 1 into the device's flash memory. The next time you reboot or reload the device, it uses the configuration information in test2.cfg.

To copy the device's startup-config file from flash memory onto a flash card, enter a command such as the following:

```
BigIron MG8# copy startup-config slot1 mfgtest.cfg
```

Syntax: copy startup-config slot1 | slot2 [/<to-dir-path>]<to-name>

Copying the Startup-Config File Between Flash Memory and a TFTP Server

Use the following methods to copy a startup-config file between flash memory and a TFTP server to which the BigIron MG8 has access. By default, the device uses the startup-config in the primary area of flash memory to configure itself when you boot or reload the device.

To copy the device's startup-config file from flash memory to a TFTP server, enter a command such as the following:

```
BigIron MG8# copy startup-config tftp 10.10.10.1 /backups/startup.cfg
```

Syntax: copy startup-config tftp <ip-addr> [/<to-dir-path>]<to-name>

To copy a startup-config file from a TFTP server to flash memory, enter a command such as the following:

```
BigIron MG8# copy tftp startup-config 10.10.10.1 test.cfg
```

Syntax: copy tftp startup-config <ip-addr> [/<from-dir-path>]<from-name>

Copying the Running-Config to a Flash Card or a TFTP Server

Use the following method to copy the device's running-config to a flash card or a TFTP server. The running-config contains the device's currently active configuration information. When you copy the running-config to a flash card or TFTP server, you are making a copy of the device's current configuration, including any configuration changes you have not saved to the startup-config file.

To copy the device's running configuration into a file on a flash card, enter a command such as the following:

```
BigIron MG8# copy running-config slot1 runip.1
```

Syntax: copy running-config slot1 | slot2 [/<to-dir-path>]<to-name>

To copy the device's running configuration into a file on a TFTP server, enter a command such as the following:

```
BigIron MG8# copy running-config tftp 10.10.10.1 runip.1
```

Syntax:

Loading a Running-Config from a Flash Card or a TFTP Server

Use the following method to load configuration commands into the device's active configuration.

NOTE: A configuration file that you create must follow the same syntax rules as the startup-config file the device creates. See "Dynamic Configuration Loading" on page 10-19.

To copy a running-config from a flash card, enter a command such as the following:

```
BigIron MG8# copy slot2 running-config runacl.2
```

Syntax: copy slot1 | slot2 running-config [/<from-dir-path>]<from-name>

The command in this example changes the device's active configuration based on the information in the file.

To copy a running-config from a TFTP server, enter a command such as the following:

```
BigIron MG8# copy tftp running-config 10.10.10.1 run.cfg overwrite
```

Syntax: copy tftp running-config <ip-addr> [/<from-dir-path>]<from-name> [overwrite]

This command copies a running-config from a TFTP server and overwrites the device's active configuration.

Copying Files Using the cp Command

Using the **cp** command, you can do the following:

- Copy files from flash memory to flash memory.
- Copy files from flash memory to a flash card or vice versa.
- Copy files from one flash card to another flash card.

The software attempts to copy a file in a file system to another location in the file system that has the current management focus. By default, flash memory has the management focus. However, you do not need to change the focus to copy a file from one location to another in a file system that does not currently have management focus. In this case, you can specify the `<source-dir-path>/` or `<dest-dir-path>/` parameters with the **cp** command to copy a file to or from a file system that does not have current management focus.

For example, to copy a file from flash memory, which has the current management focus, to flash memory, enter a command such as the following:

```
BigIron MG8# cp primary primary2
```

For example, to copy a file from flash memory, which has the current management focus, to the flash card in slot 2, enter a command such as the following:

```
BigIron MG8# cp new.cfg /slot2/cfg/new.cfg
```

Syntax: `cp [<source-dir-path>]<source-file-name> [<dest-dir-path>]<dest-file-name>`

Specify the `<source-dir-path>` parameter if the source file is in a file system that does not have current management focus. The `<source-file-name>` specifies the name of the file you want to copy.

Specify the `<dest-dir-path>` parameter if you want to copy the source file to a file system that does not have current management focus. The `<dest-file-name>` specifies the name of the file you copied to a new destination.

For example, to copy a file from a flash card in slot 2 to flash memory, which has current management focus, enter the following command:

```
BigIron MG8# cp /slot2/cfg/new.cfg new.cfg
```

For example, to copy a file from a flash card in slot 1 to a flash card in slot 2, neither of which has current management focus, enter the following command:

```
BigIron MG8# cp /slot1/cfg/new.cfg /slot2/cfg/new.cfg
```

Loading the Software

By default, the management module loads its Terathon IronWare image from the primary location in flash memory. You can change the system's Terathon IronWare image source to one of the following sources for one reboot or for all future reboots:

- The secondary location in flash memory.
- A flash card inserted in slot 1 or 2.
- A TFTP server.
- A BOOTP server.

If you specify a source other than the primary location in flash memory and for some reason, the source or the Terathon IronWare image is unavailable, the system uses the primary location in flash memory as a default backup source.

Rebooting from the System

To use another source instead of the Terathon IronWare image in the primary location in flash memory for one reboot, enter a command such as the following at the Privileged EXEC level of the CLI:

```
BigIron MG8# boot system slot1 /slot1/mpr01000.bin
```


The command in this example reboots the system using the image `mpr01000.bin` located on the flash card in slot 1. This example assumes the image file is in the root directory on the flash card. If the image file is in a subdirectory, specify the subdirectory path. For example, to boot using an image in a subdirectory called "BIMG", enter a command such as the following:

```
BigIron MG8# boot system slot1 /BIMG/mpr01000.bin
```

Syntax: `boot system slot1 | slot2 [/<dir-path>]/<file-name>`

The **slot1** | **slot2** keywords specify the flash card slot.

The `<file-name>` parameter specifies the file name. If the file is in a subdirectory, specify the subdirectory path in front of the file name. If the file name you specify is not a full path name, the CLI assumes that the name (and path, if applicable) you enter are relative to the subdirectory that currently has the management focus.

NOTE: This command also is supported at the boot PROM.

For example, to reboot the system using the image file `mpr01000.bin` on a TFTP server, enter a command such as the following:

```
BigIron MG8# boot system tftp 10.10.10.1 mpr01000.bin
```

Syntax: `boot system tftp <ip-address> <file-name>`

The `<ip-address>` parameter specifies the name of the Terathon IronWare Image.

The `<file-name>` parameter specifies the name of the Terathon IronWare image on the TFTP server.

For example, to reboot the system using the secondary location in flash memory, enter the following command:

```
BigIron MG8# boot system flash secondary
```

Syntax: `boot system flash secondary`

To reboot the system from a BOOTP server, enter the following command:

```
BigIron MG8# boot system bootp
```

Syntax: `boot system bootp`

Configuring the Boot Source for Future Reboots

To change the Terathon IronWare image source from the primary location in flash memory to another source for future reboots, enter a command such as the following at the global CONFIG level of the CLI:

```
BigIron MG8(config)# boot system slot1 mpr01000.bin
```

The command in this example sets PCMCIA slot 1 as the primary boot source for the device. When you reload the software or power cycle the device, the device will look for the Terathon IronWare image on the flash card in the slot you specify.

Syntax: `boot system slot1 <file-name> | slot2 <file-name> | flash secondary | tftp <ip-address> <file-name> | bootp`

NOTE: The command syntax is the same for immediately reloading and for changing the primary source, except the `<file-name>` must be the full path name. You cannot specify a relative path name. Even if the first character in the path name is not a slash (/), the CLI treats the name you specify as relative to the root directory.

The device's response to the command depends on whether you enter the command at the Privileged EXEC level or the global CONFIG level.

If you enter multiple **boot system** commands at the global CONFIG level, the software places them in the running-config in the order you enter them, and saves them to the startup-config file in the same order when you save the configuration. When you reload or power cycle the device, the device tries the boot sources in the order they appear in the startup-config file.

Saving Configuration Changes

You can configure the BigIron MG8 to save configuration changes to a configuration file in flash memory or on a flash card in slot 1 or 2.

Displaying the Current Location for Saving Configuration Changes

Enter the following command at the Privileged EXEC level of the CLI to display the current save location for the startup-config file:

```
BigIron MG8# locate startup-config
Startup-config data location is flash memory
```

Syntax: locate startup-config

Specifying the Location for Saving Configuration Changes

By default, when you save configuration changes, the changes are saved to the startup-config file in flash memory. If you want to change the save location to a flash card in slot 1 or 2, enter a command such as the following:

```
BigIron MG8# locate startup-config slot1 router1.cfg
BigIron MG8# write memory
```

The first command in this example sets the device to save configuration changes to the file named “router1.cfg” in the flash card in slot 1. The second command saves the running-config to the router1.cfg file on the flash card in slot 1.

NOTE: In this example, after you save the configuration changes using the **write memory** command, the router1.cfg file will include the command that designates slot 1 as the save location for configuration changes.

Syntax: locate startup-config [slot1 | slot2 | flash-memory] [/<dir-path-name>]/<file-name>

The **slot1**, **slot2**, and **flash-memory** keywords specify the flash card in slot 1 or slot 2 or flash memory as the save location for configuration changes.

Specify the <dir-path-name> parameter if you want to save the configuration changes to a directory other than the root directory of a flash card file system.

The <file-name> parameter indicates the name of the saved configuration file.

To change the save location back to flash memory, enter a command such as the following:

```
BigIron MG8# locate startup-config flash-memory router1.cfg
BigIron MG8# write memory
```

File Management Messages

The following table lists the messages the CLI can display in response to file management commands.

Table 6.3: Flash Card File Management Messages

This Message...	Means...
File not found	You specified a file name that the software couldn't find. Verify the command you entered to make sure the command matches the source and destination you intended for the file operation.
Current directory is: <dir-path>	You have successfully changed the management focus to the slot and subdirectory indicated by the message.
Path not found	You specified an invalid path.
There is not enough space on the card	The flash card does not have enough space to hold the file you are trying to copy to it.

Table 6.3: Flash Card File Management Messages (Continued)

This Message...	Means...
Access is denied	You tried to copy or delete a file that has the read-only attribute.
A duplicate file name exists	You tried to rename a file using a name that is already in use by another file.
Fatal error, can not read or write media	A hardware error has occurred. One possible cause of this message is if you removed the flash card while a file operation involving the card was in progress.
There is sharing conflict between format command and other read/write operations	The flash card is currently undergoing formatting. This message also can show up if you enter a command to format the card while the card is being accessed for another file operation.
Invalid DOS file name	A filename you entered contains an invalid character (for example, “.” or “\”).
File recovered successfully and named <file-name>	A file you tried to recover was successfully recovered under the name indicated in the message

Chapter 7

Managing the BigIron MG8 Modules

This chapter contains information about refining the configuration of, monitoring, and managing the following BigIron MG8 hardware components:

- BigIron MG8 chassis
- Cooling system (fans)
- Interface modules
- Switch fabric module

This chapter also provides information about the following tasks:

- Enabling and disabling management module CPU usage calculations
- Displaying management module CPU usage
- Enabling and disabling packet logging for management and interface modules
- Removing MAC address entries

Managing the BigIron MG8 Chassis

You can perform the following management tasks for the BigIron MG8 chassis:

- Enable and disable a DC power source, if necessary.
- Display chassis status and temperatures of all hardware components.
- Display the Syslog configuration and static and dynamic buffers.

Enabling and Disabling a DC Power Source

The BigIron MG8 chassis can support the following power supply options:

- AC power supplies – Foundry provides AC power supplies.
- DC power source – You supply your own DC power source.

By default, the BigIron MG8 chassis assumes that its power is supplied by the AC power supplies. If you decide to supply your own DC power source, you must enable the chassis to recognize the DC power source. To do so, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# use-dc-power
```

Syntax: use-dc-power

To disable the chassis from recognizing the DC power source (and as a result, enabling the chassis to recognize the AC power supplies), enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# no use-dc-power
```

Syntax: no use-dc-power

Displaying Chassis Status and Temperature Readings

You can display the following information related to the BigIron MG8 chassis:

- Status of the AC power supplies.
- Status of the fans.
- Temperature readings of the management, switch fabric, interface, and fan control modules and the interval at which the system reads the temperature of these modules.
- The MAC address of the BigIron MG8 chassis.

To display this information, enter the following command at any level of the CLI:

```
BigIron MG8# show chassis
---POWERS ---
AC Powers Are Used.
Power Supply 1 (1st left): Not Installed
Power Supply 2 (2nd left): Installed (OK)
Power Supply 3 (middle left): Not Installed
Power Supply 4 (middle right): Installed (Failed)
Power Supply 5 (2nd right): Not Installed
Power Supply 6 (1st right): Installed (OK)
Slot Power-On Priority:
Slot1 (pri=1)
Slot2 (pri=1)
Slot3 (pri=1)
Slot4 (pri=1)
Slot5 (pri=1)
Slot6 (pri=1)
Slot7 (pri=1)
Slot8 (pri=1)

--- FANS ---
Fan0: Status = OK, Speed = LOW, ISP
Fan1: Status = OK, Speed = LOW, ISP

--- TEMPERATURE READINGS ---
Active Mgmt Module: 28.53C
Standby Mgmt Module: 29.21C
Fan0: 33.56C
Fan1: 29.84C
SNM0 SXPNT0: 40.18C
SNM0 SXPNT1: 45.50C
SNM0 SXPNT2: 40.75C
SNM0 SXPNT3: 42.93C
SNM0 SXPNT4: 38.3C
SNM1: not present
LP3 Sensor1: 33.81C
LP3 Sensor2: 32.3C
LP3 Sensor3: 44.50C
LP6 Sensor1: 33.56C
LP6 Sensor2: 32.71C
LP6 Sensor3: 44.9C
Temperature Monitoring Poll Period is 60 seconds

--- MISC INFO ---
Backplane EEPROM MAC Address: 000c.db80.3200
```

The display shows the following information:

Table 7.1: Chassis Status and Temperature Information

This Field...	Displays...
Powers	
XX Powers Are Used	The output displays “AC Powers Are Used” if the BigIron MG8 chassis is using AC power supplies provided by Foundry and “DC Powers Are Used” if you are supplying a DC power source.
Power Supply 1 – 6	Indicates whether an AC power supply is installed in the specified power supply slot and the status of the power supply, which can be one of the following: <ul style="list-style-type: none"> • OK – The power supply is functioning properly and supplying power to the chassis and installed modules. • Failed – The power supply is not functioning and is not supplying power to the chassis and installed modules.
Slot Power-On Priority	The configured power-on priority of each interface module installed in a chassis slot.
Slot1 – Slot8	The priority of each chassis slot as configured by the lp-slot-priority command. The priority can be 1 – 8, where 1 is the lowest priority and 8 is the highest priority. (The default priority is 1.) If the supply of power to the chassis falls below a minimum threshold, the chassis slots with the lowest priority will likely lose power. For information about using the lp-slot-priority command, see “Changing Priority of Chassis Slots for Interface Modules” on page 7-21.
Fans	
Fan <number>	Information about fans 0 and 1. NOTE: “Fan 0” refers to the fan marked “Fan A” on the BigIron MG8 chassis rear, and “Fan 1” refers to the fan marked “Fan B.”
Status	The status of a fan can be one of the following: <ul style="list-style-type: none"> • OK – The fan is functioning properly and is keeping the temperature of each module within an acceptable temperature range. • Failed – The fan is not functioning properly or the fan control module cannot control the fan.
Speed	The speed of a fan can be one of the following: <ul style="list-style-type: none"> • Low – The fan is functioning at 50 percent of capacity. • Medium – The fan is functioning at 75 percent of capacity. • Medium-high – The fan is functioning at 90 percent of capacity. • High – The fan is functioning at 100 percent of capacity.
ISP	The fan is a version suited for use in an Internet service provider (ISP) setting.

Table 7.1: Chassis Status and Temperature Information (Continued)

This Field...	Displays...
Temperature Readings	
Active and Standby Mgmt Module	The temperature of the active and standby management modules.
Fan <number>	The temperature of fan0 and fan1.
SNM0 SXPNT <number>	The temperature of each super crosspoint (SXPNT) ASIC on the switch fabric module.
LP <number>	The temperature reading of the various sensors on each interface module.
Temperature Monitoring Poll Period	The interval at which the system reads the temperature sensor on the management, switch fabric, interface, and fan control modules.
Misc Info	
Backplane EEPROM MAC Address	The MAC address of the BigIron MG8 chassis.

Displaying the Syslog Configuration and Static and Dynamic Buffers

For information about configuring Syslog, see the *Foundry Switch and Router Installation and Basic Configuration Guide*.

To display the Syslog parameters currently in effect on a BigIron MG8, enter the following command from any level of the CLI:

```
BigIron MG8> show logging
Syslog logging: enabled (0 messages dropped, 0 flushes, 0 overruns)
  Buffer logging: level ACDMEINW, 7 messages logged
  level code: A=alert C=critical D=debugging M=emergency E=error
              I=informational N=notification W=warning
...
```

Syntax: show logging

The Syslog display shows the following configuration information, in the rows above the log entries themselves.

Table 7.2: Syslog Buffer Configuration

This Field...	Displays...
Syslog logging	The state (enabled or disabled) of the Syslog buffer.
messages dropped	The number of Syslog messages dropped due to user-configured filters. By default, the software logs messages for all Syslog levels. You can disable individual Syslog levels, in which case the software filters out messages at those levels. Each time the software filters out a Syslog message, this counter is incremented.
flushes	The number of times the Syslog buffer has been cleared by the clear logging command. For information about clearing the Syslog buffer, see “Static and Dynamic Buffers” on page 7-6.

Table 7.2: Syslog Buffer Configuration (Continued)

This Field...	Displays...
overruns	The number of times the dynamic log buffer has filled up and been cleared to hold new entries. For example, if the buffer is set for 100 entries, the 101st entry causes an overrun. After that, the 201st entry causes a second overrun.
level	The message levels that are enabled. Each letter represents a message type and is identified by the key (level code) below the value. If you disable logging of a message level, the code for that level is not listed.
messages logged	The total number of messages that have been logged since the software was loaded.
level code	The message levels represented by the one-letter codes.

Static and Dynamic Buffers

The software provides two separate buffers:

- Static – logs power supply failures, fan failures, and temperature warning or shutdown messages
- Dynamic – logs all other message types

In the static log, new messages replace older ones, so only the most recent message is displayed. For example, only the most recent temperature warning message will be present in the log. If multiple temperature warning messages are sent to the log, the latest one replaces the previous one. The static buffer is not configurable.

The message types that appear in the static buffer do not appear in the dynamic buffer. The dynamic buffer contains up to the maximum number of messages configured for the buffer (50 by default), then begins removing the oldest messages (at the bottom of the log) to make room for new ones.

The static and dynamic buffers are both displayed when you display the log.

```
BigIron MG8(config)# show logging
...
Static Log Buffer:
Aug 27 12:42:42:A:Power Supply 6, 1st right, failed

Dynamic Log Buffer (50 lines):
Aug 27 12:19:04:I:Interface ethernet3/4, state up
Aug 27 12:19:04:I:Interface ethernet6/3, state up
Aug 27 12:19:04:I:Interface ethernet3/2, state up
Aug 27 12:19:04:I:Interface ethernet6/1, state up
Aug 27 12:19:00:N:Module up in slot 6
Aug 27 12:19:00:N:Module up in slot 3
Aug 27 12:18:43:I:Warm start
```

When you clear log entries, you can selectively clear the static or dynamic buffer, or you can clear both. For example, to clear only the dynamic buffer, enter the following command at the Privileged EXEC level:

```
BigIron MG8# clear logging dynamic-buffer
```

Syntax: clear logging [dynamic-buffer | static-buffer]

You can specify the **dynamic-buffer** keyword to clear the dynamic buffer or the **static-buffer** keyword to clear the static buffer. If you do not specify a buffer, both buffers are cleared.

Managing the Cooling System

This section provides configuration, management, and monitoring information about the BigIron MG8 cooling system.

Configuring the Cooling System

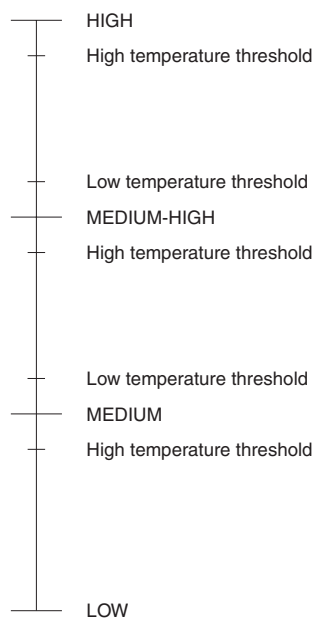
The BigIron MG8 provides default settings for all cooling system parameters. Therefore, no initial configuration of the cooling system is necessary. If desired, you can change the settings of the following cooling system parameters:

- Low and high temperature thresholds for modules and fan speeds
- Interval at which the system polls the temperature sensors on the module for a reading

Changing Temperature Thresholds For Modules and Fan Speeds

The BigIron MG8 cooling system includes two four-speed fans. The fans operate at speeds of low, medium, medium-high, and high. In general, each fan speed, except for low, has a low and high temperature threshold associated with it as shown in Figure 7.1. The low fan speed has a high temperature threshold only.

Figure 7.1 Fan Speeds and Temperature Thresholds



The low and high temperature thresholds enable the BigIron MG8 to determine at which speed the fans should operate. In general, the fans operate as follows:

- If the temperature of all modules falls between the low and high thresholds for a fan speed, the fan continues to operate at that fan speed.
- If the temperature of a management module or the switch fabric module or two interface modules exceeds the high threshold specified for a fan speed, the fan increases its speed to the next higher speed. If the temperature of any of these module(s) exceeds the high threshold for the high speed for 3 minutes (the actual number of polls is determined by the setting of the **temp-poll-period** command), the system shuts down the module(s) to prevent damage. (For information about **temp-poll-period** command, see “Changing the Temperature Polling Interval” on page 7-11.)
- If the temperature of a management module, the switch fabric module, and all interface modules falls below the low threshold for a fan speed, the fan decreases its speed to the next lower speed. If the temperature of all modules falls below the high threshold for the low speed, the fan operates at the low speed.

If the temperature of a management module or the switch fabric module or two interface modules exceeds the high temperature threshold for any of the fan speeds, the system sends a warning message to the system log and an SNMP trap. For information about viewing the warning messages, see “Displaying Temperature Warnings” on page 7-15.

Table 7.3 outlines the default low and high temperature thresholds for each module and fan speed. Note that the default and recommended low and high temperature thresholds for fan speeds on Interface modules is changed with release 02.0.02 and later. The table provides the new default low and high temperature thresholds for each fan speed on BigIron MG8 Interface modules.

Table 7.3: Default Low and High Temperature Thresholds For Modules and Fan Speeds

Fan Speed	Low Temperature Threshold	High Temperature Threshold
Management modules		
High	77° C	85° C
Medium-high	67° C	80° C
Medium	57° C	70° C
Low	–	60° C
Interface modules		
High	63° C	85° C
Medium-high	58° C	65° C
Medium	53° C	60° C
Low	–	55° C
Switch fabric module		
High	72° C	85° C
Medium-high	67° C	80° C
Medium	62° C	75° C
Low	–	70° C

For information about checking the current settings of the low and high temperature thresholds for modules and fan speeds, see “Displaying Temperature Thresholds for Modules and Fan Speeds” on page 7-10.

If desired, you can change the default low and high temperature thresholds for a particular module and fan speed. For example, to change the low and high thresholds of the medium fan speed for the management modules to 56° C and 72° C, respectively, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# fan-threshold mp med 56 72
```

Syntax: fan-threshold <module> [low <high-threshold>] [med <low-threshold> <high-threshold>] [med-hi <low-threshold> <high-threshold>] [hi <low-threshold> <high-threshold>]

For the <module> parameter, you can specify the following:

- lp – Changes low and high temperature thresholds for the Interface modules.
- mp – Changes low and high temperature thresholds for the management modules.
- switch fabric – Changes low and high temperature thresholds for the switch fabric module.

For the <low-threshold> and <high-threshold> parameters, you can specify any temperature in Centigrade. However, when changing low and high temperature thresholds for a module's fan speeds, remember that the low temperature threshold of a higher fan speed must be lower than the high temperature threshold of the lower fan speed. Foundry establishes this guideline to ensure the fan speed stability.

For example, if you are changing the temperature thresholds for a management module's high and medium-high fans speeds, the BigIron MG8 will accept the following values because the low temperature threshold for the high speed (79° C) is lower than the high temperature threshold (82° C) for the medium-high speed.

Fan Speed	Low Temperature Threshold	High Temperature Threshold
High	79° C	87° C
Medium-high	69° C	82° C

However, the BigIron MG8 will not accept the following values because the low temperature threshold for the high speed (83° C) is higher than the high temperature threshold (82° C) for the medium-high speed.

Fan Speed	Low Temperature Threshold	High Temperature Threshold
High	83° C	87° C
Medium-high	69° C	82° C

Displaying Temperature Thresholds for Modules and Fan Speeds

To check the current settings of the low and high temperature thresholds for modules and fan speeds, you can enter the following command at any level of the CLI:

```
BigIron MG8# show fan-threshold
=== Thermal Sensor Control Block (THERMAL_SENSOR_TEST_RULE_MP) ===
Fan Speed Low: -1 - 60
Fan Speed Med: 57 - 70
Fan Speed Med-Hi: 67 - 80
Fan Speed Hi: 77 - 85
state = 0 (FAN_STATE_LOW)
shut_off_count = 0 0 0 0 0 0 0 0
=== Thermal Sensor Control Block (THERMAL_SENSOR_TEST_RULE_SNM) ===
Fan Speed Low: -1 - 70
Fan Speed Med: 62 - 75
Fan Speed Med-Hi: 67 - 80
Fan Speed Hi: 72 - 85
state = 0 (FAN_STATE_LOW)
shut_off_count = 0 0 0 0 0 0 0 0
=== Thermal Sensor Control Block (THERMAL_SENSOR_TEST_RULE_LP) ===
Fan Speed Low: -1 - 70
Fan Speed Med: 62 - 75
Fan Speed Med-Hi: 67 - 80
Fan Speed Hi: 72 - 85
state = 0 (FAN_STATE_LOW)
shut_off_count = 0 0 0 0 0 0 0 0
=== Thermal Sensor Control Block (THERMAL_SENSOR_TEST_RULE_STANDBY_MP) ===
Fan Speed Low: -1 - 60
Fan Speed Med: 57 - 70
Fan Speed Med-Hi: 67 - 80
Fan Speed Hi: 77 - 85
state = 0 (FAN_STATE_LOW)
shut_off_count = 0 0 0 0 0 0 0 0
```

Syntax: show fan-threshold

The display shows the following information:

Table 7.4: Temperature Threshold Information for Modules and Fan Speeds

This Field...	Displays...
Thermal Sensor Control Block (THERMAL_SENSOR_TEST_RULE_<module>)	<p>The temperature threshold information for the various modules. The <module> parameter indicates the following:</p> <ul style="list-style-type: none"> • MP – The active management module. • STANDBY_MP – The standby management module. • SNM – The switch fabric module. • LP – An interface module.

Table 7.4: Temperature Threshold Information for Modules and Fan Speeds (Continued)

This Field...	Displays...
Fan Speed Low/Med/Med-Hi/Hi	The current setting of the low and high temperature thresholds for the low, medium, medium-high, and high fan speeds. NOTE: As indicated in Table 7.3 on page 7-8, the low fan speed for each module does not have a default low temperature threshold value, nor can you configure this value. The “-1” value that appears in the Fan Speed Low field for each module is a Foundry internal value only.
State = 0 (FAN_STATE_LOW)	For Foundry internal use only.
shut_off_count = 0 0 0 0 0 0 0	For Foundry internal use only.

Changing the Temperature Polling Interval

By default, the BigIron MG8 reads the temperature sensor on each module every 60 seconds. To change the interval at which the system reads the temperature sensors on each module, enter a command such as the following at the global CONFIG level of the CLI:

```
BigIron MG8(config)# temp-poll-period 120
```

Syntax: temp-poll-period <seconds>

For the <seconds> parameter, you can specify a value from 30 – 120. You can also specify 0, which disables the system from polling the temperature sensor on each module.

Managing the Cooling System

You can perform the following management tasks for the BigIron MG8 cooling system:

- Manually initialize one or both fan control modules.
- Manually set the speed of one or both fans.

Initializing the Fan Control Modules

The BigIron MG8 chassis includes two fan control modules. The management module controls the two four-speed fans through the fan control modules. If you power on the chassis or replace both of the fan control modules, the BigIron MG8 initializes the modules automatically. However, if for some reason the modules do not initialize automatically, you can initialize them manually.

For example, to initialize both fan control modules manually, enter a command such as the following at the global CONFIG level of the CLI:

```
BigIron MG8(config)# fan 2 init
```

Syntax: fan <fan> init

For the **fan** parameter, you can specify the following:

- 0 – The system initializes the fan control module associated with fan 0.
- 1 – The system initializes the fan control module associated with fan 1.
- 2 – The system initializes the fan control module associated with both fan 0 and fan 1.

NOTE: “Fan 0” refers to the fan marked “Fan A” on the BigIron MG8 chassis rear, and “Fan 1” refers to the fan marked “Fan B.”

Manually Setting the Fan Speed

Prior to Terathon IronWare software release 02.1.00, the following two commands were used for setting fan speed:

In the Privileged EXEC mode:

set-fan-speed

In Global CONFIG mode:

fan init/read-temperature/read-speed/set-speed

In Terathon IronWare software release 02.1.00 and later, both of these commands have been eliminated, and replaced with the following:

```
set-fan-speed [auto | low | med | med-hi | high | auto ]
```

Prior to Terathon IronWare software release 02.1.00:

Typically, the management module, in conjunction with default settings of low and high temperature thresholds, determines the speed of the two four-speed fans. (For information about changing the low and high temperature thresholds, see “Changing Temperature Thresholds For Modules and Fan Speeds” on page 7-7.) If desired, you can manually set the speed of one or both fans. The **fan** command in the global CONFIG level of the CLI and the **set-fan-speed** command in the Privileged EXEC level of the CLI allow you to manually set the speed of the fans.

For example, to set the speed of fan 0 to medium-high, enter one of the following commands:

```
BigIron MG8(config)# fan 0 set-speed 2
```

or

```
BigIron MG8(config)# set-fan-speed 0 2
```

Syntax: fan <fan> set-speed <fan-speed>

Syntax: set-fan-speed <fan> <fan-speed>

For the <fan> parameter, you can specify the following:

- 0 – The system sets the speed of fan 0.
- 1 – The system sets the speed of fan 1.
- 2 – The system sets the speed of both fan 0 and fan 1.

NOTE: “Fan 0” refers to the fan marked “Fan A” on the BigIron MG8 chassis rear, and “Fan 1” refers to the fan marked “Fan B.”

For the <fan-speed> parameter, you can specify the following:

- 0 – The system sets the fan speed to low.
- 1 – The system sets the fan speed to medium.
- 2 – The system sets the fan speed to medium-high.
- 3 – The system sets the fan speed to high.

Software Release 02.1.00 and Later:

Syntax: set-fan-speed [auto | low | med | med-hi | high | auto]

The **auto** parameter set the fan speed to be adjusted by the monitoring service. This is the default setting. Since the “temperature monitoring service” sets both fans to the same speed, the new command also affects both fans.

The **high** parameter sets the fan speed to 100% of full speed.

The **low** parameter sets the fan speed to 50% of full speed

The **med** parameter sets the fan speed to 75% of full speed

The **med-hi** parameter sets the fan speed to 90% of full speed

If set the fan speed to anything other than “auto”, the fan mode becomes manual. In manual mode, the “temperature monitoring service” is stopped, and the fan speed will not change regardless of temperature changes to the chassis.

This command can be saved like other configuration commands.

Using the **show chassis** command you can determine if the chassis is in "auto mode" or "manual mode."

Monitoring the Cooling System

You can monitor the following aspects of the BigIron MG8 cooling system:

- The temperature of the fan control modules.
- The status and speed of the fans.
- The temperature warnings sent to the system log and that generate an SNMP trap.

Displaying the Fan Control Module Temperature

By default, the BigIron MG8 polls the temperature sensor on each module every 60 seconds to get the temperature. (For information about changing the interval at which the system polls the temperature sensor on each module, see "Changing the Temperature Polling Interval" on page 7-11.)

The CLI provides two commands that allow you to display the temperature of the fan control modules. To display the temperature for the fan control modules (and all other modules), enter the following command at any level of the CLI:

```
BigIron MG8# show chassis
...
Fan0: 31.40C
Fan1: 33.6C
...
Temperature Monitoring Poll Period is 60 seconds
...
```

NOTE: "Fan 0" refers to the fan marked "Fan A" on the BigIron MG8 chassis rear, and "Fan 1" refers to the fan marked "Fan B."

The output displays the temperature of the fan control modules associated with Fan0 and Fan1 in the BigIron MG8 chassis. The output also indicates that the temperature readings were provided within the last 60 seconds. For information about all output generated by the **show chassis** command, see "Displaying Chassis Status and Temperature Readings" on page 7-2.

Syntax: show chassis

For example, to display the temperature of both fan control modules, enter the following command at any level of the CLI:

```
BigIron MG8# fan 2 read-temp
Fan0: Temperature = 31.40C
Fan1: Temperature = 33.6C
```

Syntax: fan <fan> read-temp

For the <fan> parameter, you can specify the following:

- 0 – The system reads the temperature of the fan control module associated with fan 0.
- 1 – The system reads the temperature of the fan control module associated with fan 1.
- 2 – The system reads the temperature of the fan control module associated with both fan 0 and fan 1.

Displaying Fan Status and Speed

The CLI provides two commands that allow you to display the status and speed of the two four-speed fans in the BigIron MG8 chassis. To display this information, you can enter the following command at any level of the CLI:

```
BigIron MG8# show chassis
...
Fan0: Status = OK, Speed = LOW, ISP
Fan1: Status = OK, Speed = LOW, ISP
...
```

Syntax: show chassis

For information about all output generated by the **show chassis** command, see “Displaying Chassis Status and Temperature Readings” on page 7-2.

Or, you can enter the following command at any level of the CLI:

```
BigIron MG8# fan 2 read-speed
Fan0: Status = OK, Speed = LOW, ISP
Fan1: Status = OK, Speed = LOW, ISP
```

Syntax: fan <fan> read-speed

For the <fan> parameter, you can specify the following:

- 0 – The system reads the status and speed of fan 0.
- 1 – The system reads the status and speed of fan 1.
- 2 – The system reads the status and speed of both fan 0 and fan 1.

NOTE: “Fan 0” refers to the fan marked “Fan A” on the BigIron MG8 chassis rear, and “Fan 1” refers to the fan marked “Fan B.”

The displays show the following information:

Table 7.5: Fan Status and Speed Fields

This Field...	Displays...
Status	<p>The status can be one of the following:</p> <ul style="list-style-type: none"> • OK – The fan is functioning properly and is keeping the temperature of each module within an acceptable temperature range. • Failed – The fan is not functioning properly or the fan control module cannot control the fan.
Speed	<p>The speed can be one of the following:</p> <ul style="list-style-type: none"> • LOW – The fan is functioning at 50 percent of capacity. • MEDIUM – The fan is functioning at 75 percent of capacity. • MEDIUM-HIGH – The fan is functioning at 90 percent of capacity. • HIGH – The fan is functioning at 100 percent of capacity.
ISP	The fan is a version suited for use in an ISP setting.

Displaying Temperature Warnings

If the temperature of a module exceeds the high temperature threshold for any of the fan speeds, the system sends a warning message to the system log and an SNMP trap. (For more information about the low and high temperature thresholds, see “Changing Temperature Thresholds For Modules and Fan Speeds” on page 7-7.) This section describes how to view the system log. If you have configured the BigIron MG8 to use a Syslog server or SNMP trap receiver, see the documentation for the server or receiver.

To display the system log, enter the following command at any CLI level:

```
BigIron MG8# show log
```

Syntax: show log

Managing the Interface Modules

This section contains the following information:

- Configuring interface module boot parameters.
- Changing the priority of chassis slots for interface modules.
- Disabling and reenabling power to the interface modules.

Configuring Interface Module Boot Parameters

The 10 Gigabit Ethernet interface module has its own system software and boots after the management module boots. By default, the following boot-related events occur:

- The BigIron MG8 synchronizes or prompts you to synchronize the interface modules' Terathon IronWare images between the management module and the interface modules.
- The interface modules boot from a source specified by the management module (the default source is a primary Terathon IronWare image in the interface modules' flash memory).

If desired, you can change the following:

- Disable the synchronization of Terathon IronWare images between the management and all interface modules. You can also initiate an immediate synchronization.
- Change the boot source of one or all interface modules.

Synchronizing the Interface Module's Terathon IronWare Images Between Management and Interface Modules

An interface module can have two Terathon IronWare images: primary and secondary. These images contain the layer 1 – 3 software that the interface modules run. These images reside in the interface module's flash memory. Either the primary or secondary image is run by the interface module from this location.

If you copy the primary and/or secondary Terathon IronWare image to all interface modules using the **copy** command with the **all** keyword, the management module makes a copy of the file and stores it in its code flash under the names lp-primary-0 or lp-secondary-0. The images are stored in this location only and are not run by the management module or the interface modules. If you copy the primary and/or secondary Terathon IronWare image to a specified chassis slot using the **copy** command with the <chassis-slot-number> parameter, the management module does not make a copy of the file.

If the management module has a copy of the primary and/or secondary Terathon IronWare image in its code flash, by default, the BigIron MG8 synchronizes or prompts you to synchronize the interface modules' Terathon IronWare images between the management module and the interface modules during bootup. When the BigIron MG8 synchronizes the Terathon IronWare images, the management module copies the Terathon IronWare images from its code flash to the interface modules' code flash (the interface modules' default boot source).

The system allows you to manage synchronization of the Terathon IronWare images between management and interface modules in the following situations:

- You are prompted to synchronize the Terathon IronWare images during bootup.
- You want to initiate an immediate synchronization; for example, you want an immediate update of the Terathon IronWare images on one or all interface modules.
- You want to disable synchronization; for example, you have upgraded the Terathon IronWare image of one interface module but want to continue running the older image on all other interface modules.

The following section discuss how to manage the Terathon IronWare image synchronization in these situations.

Synchronizing the Interface Modules' Terathon IronWare Software Images During Bootup

By default, the BigIron MG8 checks the Terathon IronWare images in the interface module's flash memory during boot to ensure they are the same as the Terathon IronWare images in the management module's flash memory. If an interface module does not have a Terathon IronWare image, the system automatically downloads the image from the management module's flash memory to the interface module's flash memory.

If an interface module has different Terathon IronWare images, the system prompts you to do the following:

- If you want to update the primary and secondary Terathon IronWare images in the interface module's flash memory with the images in the management module's flash memory, enter the **lp cont-boot sync <slot-number>** command at the Privileged EXEC prompt.
- If you want to retain the Terathon IronWare images in the interface module's flash memory, enter the **lp cont-boot no-sync <slot-number>** command at the Privileged EXEC prompt.

Specifying an Immediate Synchronization

You can immediately synchronize the Terathon IronWare images between the management module and one or all interface modules. For example, to immediately synchronize the Terathon IronWare images between the management module and all interface modules, enter the following command at the Privileged EXEC level:

```
BigIron MG8# lp sync all
```

Syntax: lp sync all | <slot-number>

The **all** keyword indicates that the immediate synchronization applies to all interface modules in the BigIron MG8 chassis.

The <slot-number> parameter specifies the BigIron MG8 chassis slot number that contains the interface module to which the immediate synchronization applies. You can specify 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.

Disabling or Reenabling an Automatic Check and Synchronization

By default, the BigIron MG8 system checks the Terathon IronWare images in the interface module's flash memory during bootup to ensure it is the same as the Terathon IronWare images in the management module's flash memory. For information about what the system does if the interface module does not currently have a Terathon IronWare image or if the image is different from that of the management module, see "Synchronizing the Interface Modules' Terathon IronWare Software Images During Bootup" on page 7-16.

To disable the automatic check and synchronization during bootup, enter the following command at the global CONFIG level:

```
BigIron MG8(config)# lp disable-lp-sync-check
```

Syntax: lp disable-lp-sync-check

Provided that you save this configuration by entering the **write memory** command, the system will disable the automatic check and synchronization of the Terathon IronWare images starting with the next software reload or system reset and each reload or reset after that.

To reenble the automatic check and synchronization of the Terathon IronWare images during bootup, enter the following command at the global CONFIG level:

```
BigIron MG8(config)# no lp disable-lp-sync-check
```

Syntax: no lp disable-lp-sync-check

Changing the Boot Source

By default, the interface modules boot from the primary Terathon IronWare image located in the interface modules' flash memory. If desired, you can change the boot source of one or all interface modules to one of the following sources:

- Management module
 - PCMCIA flash card in slot 1 or 2
 - Primary or secondary Terathon IronWare image in the management module's flash memory
- Interface module
 - Secondary Terathon IronWare image in interface module's flash memory
- TFTP server

You can also specify an interactive boot, which allows you to enter a separate command after the interface module comes up. The command specifies the source from which one or all interface modules should boot.

When changing the boot source for one or all interface modules, you can specify one of the following:

- An immediate boot for one interface module from a specified source.
- An automatic boot for one or all interface modules from a specified source starting with the next software reload or system reset and each reload or reset after that.

The CLI command for specifying an immediate boot for one interface module is the same as that for specifying an automatic boot for one or all modules. The only difference is the CLI level from which you specify the command. You must specify the command for an immediate boot in the Privileged EXEC level and the command for an automatic boot in the global CONFIG level.

The following sections explain how to specify an immediate boot and an automatic boot.

Specifying an Immediate Boot

You can specify an immediate boot for one interface module from a specified source by entering the **lp boot system** command in the Privileged EXEC level. The entered command will override the default or configured boot source one time only.

Specifying an Immediate Boot from the Management Module's PCMCIA Slot

For example, to specify an immediate boot for the interface module installed in slot 1 from the management module's PCMCIA slot 1, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# lp boot system slot1 primary 1
```

Syntax: lp boot system slot1 | slot2 <filename> <slot-number>

The **slot1** and **slot2** keywords indicate the management module's PCMCIA slot from which to boot the interface module.

The <filename> parameter specifies the name of the image from which to boot the interface module.

The <slot-number> parameter specifies the BigIron MG8 chassis slot number that contains the interface module that will undergo an immediate boot. You can specify 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.

Specifying an Immediate Boot from the Management Module's Flash Memory

For example, to specify an immediate boot from the primary Terathon IronWare image in the management module's flash memory for the interface module installed in slot 1, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# lp boot system mp primary mpr01000.bin 1
```

Syntax: lp boot system mp primary | secondary <slot-number>

The **primary** and **secondary** keywords specify the primary or secondary Terathon IronWare image in the management module's flash memory.

The <slot-number> parameter specifies the BigIron MG8 chassis slot number that contains the interface module that will undergo an immediate boot. You can specify 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.

Specifying an Immediate Boot from the Interface Module's Flash Memory

For example, to specify an immediate boot from the primary Terathon IronWare image in the interface module's flash memory for the interface module installed in slot 1, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# lp boot system flash primary 1
```

Syntax: lp boot system flash primary | secondary <slot-number>

The **primary** and **secondary** keywords specify the primary or secondary Terathon IronWare image in the interface module's flash memory.

The <slot-number> parameter specifies the BigIron MG8 chassis slot number that contains the interface module that will undergo an immediate boot. You can specify 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.

Specifying an Immediate Boot from a TFTP Server

For example, to specify an immediate boot for the interface module installed in slot 1 from a TFTP server, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# lp boot system tftp 123.123.123.123 primarympr01000.bin 1
```

Syntax: lp boot system tftp <ip-address> <filename> <slot-number>

The <ip-address> parameter specifies the IP address of the TFTP server from which the interface module will be booted.

The <filename> parameter specifies the name of the image from which to boot the interface module.

The <slot-number> parameter specifies the BigIron MG8 chassis slot number that contains the interface module that will undergo an immediate boot. You can specify 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.

Specifying an Immediate Interactive Boot

To specify an immediate interactive boot for the interface module installed in slot 1, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# lp boot system interactive 1
```

Syntax: lp boot system interactive <slot-number>

The <slot-number> parameter specifies the BigIron MG8 chassis slot number that contains the interface module that will undergo an immediate boot. You can specify 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.

After you enter this command, the system enters the interface module's monitor mode. For example, to boot from the primary Terathon IronWare image in the interface module's flash memory, enter the following command at the monitor prompt:

```
LP MONITOR> boot system flash primary
```

Configuring an Automatic Boot

You can configure an automatic boot for one or all interface modules from a specified source by entering the **lp boot system** command in the global CONFIG level. Provided that you save this configuration by entering the **write memory** command, the system will implement the automatic boot starting with the next software reload or system reset and each reload or reset after that.

Configuring an Automatic Boot from the Management Module's PCMCIA Slot

For example, to configure an automatic boot for all interface modules from the management module's PCMCIA slot 1, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# lp boot system slot1 primary all
```

Syntax: lp boot system slot1 | slot2 <filename> all | <slot-number>

The **slot1** and **slot2** keywords indicate the management module's PCMCIA slot from which to boot the interface module.

The <filename> parameter specifies the name of the image from which to boot the interface module.

The **all** | <slot-number> parameter specifies that the automatic boot applies to all interface modules in the BigIron MG8 chassis or to an interface module in the specified chassis slot number only. You can specify 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.

Configuring an Automatic Boot from the Management Module's Flash Memory

For example, to configure an automatic boot from the primary Terathon IronWare image in the management module's flash memory for all interface modules, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# lp boot system mp primary all
```

Syntax: lp boot system mp primary | secondary all | <slot-number>

The **primary** and **secondary** keywords specify the primary or secondary Terathon IronWare image in the management module's flash memory.

The **all** | <slot-number> parameter specifies that the automatic boot applies to all interface modules in the BigIron MG8 chassis or to an interface module in the specified chassis slot number only. You can specify 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.

Configuring an Automatic Boot from the Interface Module's Flash Memory

For example, to configure an automatic boot from the primary Terathon IronWare image in the interface module's flash memory for all interface modules, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# lp boot system flash primary all
```

Syntax: lp boot system flash primary | secondary all | <slot-number>

The **primary** and **secondary** keywords specify the primary or secondary Terathon IronWare image in the interface module's flash memory.

The **all** | <slot-number> parameter specifies that the automatic boot applies to all interface modules in the BigIron MG8 chassis or to an interface module in the specified chassis slot number only. You can specify 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.

Configuring an Automatic Boot from a TFTP Server

For example, to configure an automatic boot for all interface modules from a TFTP server, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# lp boot system tftp 123.123.123.123 primary all
```

Syntax: lp boot system tftp <ip-address> <filename> all | <slot-number>

The <ip-address> parameter specifies the IP address of the TFTP server from which the interface module will be booted.

The <filename> parameter specifies the name of the image from which to boot the interface module.

The **all** | <slot-number> parameter specifies that the automatic boot applies to all interface modules in the BigIron MG8 chassis or to an interface module in the specified chassis slot number only. You can specify 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.

Configuring an Automatic Interactive Boot

For example, to configure an automatic interactive boot for all interface modules, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# lp boot system interactive all
```

Syntax: lp boot system interactive all | <slot-number>

The **all** | <slot-number> parameter specifies that the automatic boot applies to all interface modules in the BigIron MG8 chassis or to an interface module in the specified chassis slot number only. You can specify 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.

After you enter this command, the system enters the interface module's monitor mode. For example, to boot from the primary Terathon IronWare image in the interface module's flash memory, enter the following command at the monitor prompt:

```
LP MONITOR> boot system flash primary
```


Changing Priority of Chassis Slots for Interface Modules

You can prioritize the BigIron MG8 chassis slots in which the interface modules are installed. The priority range is 1 – 8, where 1 is the lowest priority and 8 is the highest priority. You can set one, some, or all chassis slots to the same priority or each chassis slot to a different priority. If you assign the same priority to all slots, the leftmost slot has the highest priority, while the rightmost slot has the lowest priority.

By default, the priority of all chassis slots is 1, which is the lowest priority. If the supply of power to the chassis falls below a minimum threshold, the chassis slots will likely lose power because of their low priority. In this scenario, chassis slot 8 will lose power first, then slot 7, slot 6, and so on until slot 1 loses power.

For example, to set the priority of chassis slot 1 to the highest priority (8), enter the following command:

```
BigIron MG8(config)# lp-slot-priority 1 8
```

Syntax: lp-slot-priority <slot-number> <priority>

The <slot-number> parameter indicates that the chassis slot number for which you are changing the priority. You can specify slots 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.

The <priority> parameter indicates that the priority of the chassis slot if the chassis loses power. You can specify a value of 1 – 8, where 1 is the lowest priority and 8 is the highest priority. You can set one, some, or all chassis slots to the same priority or each chassis slot to a different priority.

Disabling and Reenabling Power to the Interface Modules

If needed, you can disable power to a specified interface module and then reenabling it. For example, to disable power to the interface module in chassis slot 1, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# power-off lp 1
```

Syntax: power-off lp <slot-number>

The <slot-number> parameter indicates the chassis slot number for which you are disabling the power. You can specify slots 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.

For example, to reenabling power to the interface module in chassis slot 1, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# power-on lp 1
```

Syntax: power-on lp <slot-number>

The <slot-number> parameter indicates the chassis slot number for which you are reenabling the power. You can specify slots 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.

Managing the Switch Fabric Module

This section contains the following information:

- Disabling and reenabling power to the switch fabric module.
- Monitoring the switch fabric module.

Disabling and Reenabling Power to the Switch Fabric Module

If desired, you can disable power to the switch fabric module and then reenabling it. To disable the power, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# power-off snm 0
```

Syntax: power-off lp 0

To reenable power to the switch fabric module, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# power-on snm 0
```

Syntax: power-on snm 0

Monitoring the Switch Fabric Module

The BigIron MG8 system allows you to monitor the following aspects of the switch fabric module:

- Status of link between each super crosspoint (SXPNT) ASIC and installed modules.
- Temperature of each SXPNT.

Displaying the Link Status

The switch fabric module contains five SXPNT ASICs, each of which can communicate with the installed interface modules. You can monitor the link between each SXPNT and installed interface modules by entering the following command at the global CONFIG level of the CLI:

```
BigIron MG8# snm 0 check-link-status
-----Cards Present in Slots 0-7-----
Card in Slot 0
Card in Slot 4

-----SXPNT Link Status-----
Serdes#(0-7)  0    1    2    3    4    5    6    7
Slot#(0-7)   7    1    6    5    2    0    4    3
Device#
SXPNT #0     UP    UP    UP    UP    UP    UP    UP    UP
SXPNT #1     UP    UP    UP    UP    UP    UP    UP    UP
SXPNT #2     UP    UP    UP    UP    UP    UP    UP    UP
SXPNT #3     UP    UP    UP    UP    UP    UP    UP    UP
SXPNT #4     UP    UP    UP    UP    UP    UP    UP    UP
```

Syntax: snm 0 check-link-status

The module parameter indicates the switch fabric module for which you are checking the link status. Currently, you can specify 0 only, which indicates the switch fabric module in chassis slot SF.

In this display, the link between each SXPNT and interface module is UP, which means that the link between the SXPNT ASIC and the interface module is functioning properly. The state of the link could also be DOWN, which indicates that the link between the SXPNT ASIC and the interface module is down and not functioning properly.

Displaying Temperature

The switch fabric module contains five SXPNT ASICs. Each ASIC contains a temperature sensor that, by default, the BigIron MG8 system polls every 60 seconds to get the temperature. (For information about changing the interval at which the system polls the temperature sensor on each module, see “Changing the Temperature Polling Interval” on page 7-11.)

To display the temperature of the SXPNTs, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8# snm 0 read-temperature
SNM0/SXPNT0 temp is 41.87C
SNM0/SXPNT1 temp is 48.71C
SNM0/SXPNT2 temp is 43.3C
SNM0/SXPNT3 temp is 45.0C
SNM0/SXPNT4 temp is 39.40C
```

Syntax: snm 0 read-temperature

You can also display the temperature of the SXPNTs using the **show chassis** command. For more information about this command and the display it generates, see “Displaying Chassis Status and Temperature Readings” on page 7-2.

Enabling and Disabling Management Module CPU Usage Calculations

You can enable the BigIron MG8 to perform usage averaging calculations on tasks handled by the management module’s CPU. If you enable the calculation performance, you can display usage averages for all tasks performed by the management module’s CPU for an interval of up to 1 hour. You can display these statistics using the **show cpu** command. Typically, these statistics are used for debugging purposes.

By default, the performance of the calculations is disabled. When disabled, you can use the **show cpu** command without optional parameters to display usage averages for all tasks performed by the management module’s CPU in the last 1 second.

To enable the performance of the usage averaging calculations, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# cpu-usage on
```

Syntax: cpu-usage on

To disable the performance of the usage averaging calculations, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# cpu-usage off
```

Syntax: cpu-usage off

NOTE: When finished gathering statistics for debugging purposes, Foundry recommends disabling the usage averaging calculations, which are CPU-intensive and can affect the performance of the management module.

Displaying Management Module CPU Usage

You can display the tasks handled by the management module and the amount of the management module's CPU used by each task. To do so, enter the following command at any level of the CLI:

```
BigIron MG8# show tasks
Task Name  Pri  State  PC      Stack    Size  CPU Usage(%)  task id  task vid
-----  ---  -----  -----  -----  -----  -----  -----  -----
idle 0      run  00001904  040560a0  256    66           0        0
monitor 20    susp 0000c658  0404bd80  8192   0            0        0
int 16    susp 0000c658  04051f90  16384  0            0        0
timer 15    susp 0000c658  04055f90  16384  0            0        0
dbg 30    susp 0000c658  0404df10  8192   0            0        0
flash 17    susp 0000c658  0409cf98  8192   0            0        0
wd 31    susp 0000c658  0409af80  8192   0            0        0
boot 17    susp 0000c658  041dbe30  65536  0            0        0
main 3     susp 0000c658  2060cf38  65536  0            0        1
itc 6     susp 0000c658  20610af0  16384  0            0        1
tmr 5     susp 0000c658  206a7638  16384  0            0        1
ip_rx 5     susp 0000c658  206aef48  16384  0            0        1
scp 5     susp 0000c658  206b3638  16384  0            0        1
console 5     susp 0000c658  206bf628  32768  0            0        1
vlan 5     susp 0000c658  206c6628  16384  0            0        1
mac_mgr 5     susp 0000c658  206d5638  16384  0            0        1
mrp_mgr 5     susp 0000c658  206db638  16384  0            0        1
vsrp 5     susp 0000c658  206e1630  16384  0            0        1
snms 5     susp 0000c658  206e5638  16384  0            0        1
rtm 5     susp 0000c658  20756638  16384  0            0        1
ip_tx 5     run  0000c658  20763638  16384  0            0        1
mcast 5     susp 0000c658  20767638  16384  0            0        1
l4 5     susp 0000c658  2076b630  16384  0            0        1
stp 5     susp 0000c658  20970628  16384  0            0        1
gvrp_mgr 5     susp 0000c658  20979638  16384  0            0        1
snmp 5     susp 0000c658  20982638  32768  0            0        1
web 5     susp 0000c658  2098d638  32768  0            0        1
lACP 5     susp 0000c658  20991638  16384  0            0        1
hw_access 5     susp 0000c658  20996638  16384  0            0        1
telnet_0 5     run  0000c658  209db638  32768  0            0        1
```

Syntax: show tasks

Examine the CPU Usage (%) field to determine the percentage of the management module's CPU used by each task.

NOTE: The total CPU usage may not add up to 100 percent. The total may not include resources used by the management processes.

A problem could exist if the CPU usage is distributed unevenly to one task, other than the idle task, for a prolonged period. If this situation occurs, contact Foundry's technical support for assistance.

Enabling and Disabling Packet Logging for Management and Interface Modules

You can enable the logging of packets transmitted, received, or both transmitted and received by a management or interface module in the BigIron MG8 chassis. If you enable packet logging, you can display the packet log using

the **show packet-logging** command. (For information about displaying the contents of the packet log, see “Displaying a Packet Log” on page 7-26.) Typically, the packet log is used for debugging purposes.

By default, packet logging is disabled for all management and interface modules. For example, to enable packet logging of packets transmitted and received by the interface module installed in chassis slot 1, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# packet-logging 1 start 0
```

Syntax: packet-logging <slot-number> start <packet-direction>

For the <slot-number> parameter, you can specify 1 – 10. 1 – 8 indicate interface modules: 1 indicates the interface module installed in the leftmost chassis slot, while 8 indicates the module installed in the rightmost chassis slot. 9 – 10 indicate management modules: 9 indicates the module installed in the top slot, while 10 indicates the module installed in the bottom slot.

Specify the **start** keyword to start packet logging and write the log to the system’s memory. You must also specify the direction of packets that you want logged by entering one of the following for the <packet-direction> parameter:

- 0 – Logs packets transmitted and received by the specified module.
- 1 – Logs packets received by the specified module.
- 2 – Logs packets transmitted by the specified module.

After enabling packet logging using the **start** keyword, you can optionally specify the **flash** keyword to copy the packet log in the system’s memory to the management module’s flash memory. The name of the packet log in the management module’s flash memory is pktlog.txt. For example, to copy a log of packets transmitted and received by the interface module installed in chassis slot 1 to the management module’s flash memory, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# packet-logging 1 flash 0
```

Syntax: packet-logging <slot-number> flash <packet-direction>

For the <slot-number> parameter, you can specify 1 – 10. 1 – 8 indicate interface modules: 1 indicates the interface module installed in the leftmost chassis slot, while 8 indicates the module installed in the rightmost chassis slot. 9 – 10 indicate management modules: 9 indicates the module installed in the top slot, while 10 indicates the module installed in the bottom slot.

You must specify the direction of packets that you want logged:

- 0 – Logs packets transmitted and received by the specified module.
- 1 – Logs packets received by the specified module.
- 2 – Logs packets transmitted by the specified module.

For example, to disable packet logging for the interface module installed in chassis slot 1, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# packet-logging 1 stop
```

Syntax: packet-logging <slot-number> stop

For the <slot-number> parameter, you can specify 1 – 10. 1 – 8 indicate interface modules: 1 indicates the interface module installed in the leftmost chassis slot, while 8 indicates the module installed in the rightmost chassis slot. 9 – 10 indicate management modules: 9 indicates the module installed in the top slot, while 10 indicates the module installed in the bottom slot.

Specify the **stop** keyword to stop packet logging.

NOTE: When finished gathering packet logging information for debugging purposes, Foundry recommends disabling the generation of a packet log, which is CPU-intensive and can affect the performance of the management module.

Displaying a Packet Log

You can use the following methods to display the contents of a packet log:

- You can use the **show packet-logging** command, which is discussed in this section.
- If you decided to write the log (pktlog.txt) to the management module flash memory, in addition to using the **show packet-logging** command, you can access and view the log using flash memory file management commands. For more information, see “Flash Memory and PCMCIA Flash Card File Management Commands” on page 6-11.

For example, to display a packet log for the interface module in chassis slot 1 that has been written to the system's memory, enter the following command at any CLI level:

```
BigIron MG8# show packet-logging 1 memory
..Total 31 packet records...
-----
--> TX
(Assist Header 0x11f: ver-0, priority-0, pkt_type-ARP packet)
(Foundry Header: fid-0x82, priority-3, sac-0, monitor-0, ipc_flag-0x1f, reserved-
0, pri_tagged-0, multicast_vid-0, protocol_type-0x2, us-0, brd-0, dav-0, sav-0,
dvp-0, sv-0, error-0, txa-0, sas-0, tagged-0, offset-16, vlan_prio-0, cfi- 0,
vlan_id-1)

011f0082 cf820010 000107c0 0060800b 020000e0 52ealf00 000cdb80 32820806
00010800 06040002 000cdb80 32820101 010100e0 52ealf00 01010102 5204ab10
-----
--> RX
(Assist Header 0x0: ver-0, priority-0, pkt_type-IP packet)
(LP2MP_ALT_FDRY_HDR 10 bytes: data-8 bytes, source_port-130, pkt_data_offset-30,
virtual_src_int-130)

0000bfff cf808810 00012087 80824de9 4001000c db803282 00e052ea 1f000800
4500002c 28e40000 40014de9 01010102 01010101 08003916 abcd0001 61626364
-----
==> TX
(Assist Header 0xf: ver-0, priority-0, pkt_type-IP packet)
(Foundry Header: fid-0x82, priority-3, sac-0, monitor-0, ipc_flag-0x1f, reserved-
0, pri_tagged-0, multicast_vid-0, protocol_type-0x1, us-0, brd-0, dav-0, sav-0,
dvp-0, sv-0, error-0, txa-0, sas-1, tagged-0, offset-16, vlan_prio-0, cfi- 0,
vlan_id-1)

000f0082 cf810090 000107c0 004c800b 020000e0 52ealf00 000cdb80 32820800
4500002c 86a20000 4001f02a 01010101 01010102 00004116 abcd0001 61626364
-----
...
```

Syntax: show packet-logging <slot-number> memory | flash pktlog.txt

For the <slot-number> parameter, you can specify 1 – 10. 1 – 8 indicate interface modules: 1 indicates the interface module installed in the leftmost chassis slot, while 8 indicates the module installed in the rightmost chassis slot. 9 – 10 indicate management modules: 9 indicates the module installed in the top slot, while 10 indicates the module installed in the bottom slot.

The **memory** | **flash pktlog.txt** keyword specifies that the packet log is written to the system's memory or to a file (pktlog.txt) written to the system's flash memory.

The display shows the following information:

Table 7.6: Packet Log Fields

This Field...	Displays...
...Total <number> packet records...	The total number of packets recorded in the packet log for a specified module.
TX or RX	TX indicates the packet was transmitted by the module, while RX indicates the packet was received by the module.
Assist Header <number>	A Foundry header associated with the packet.
pkt_type	The packet type, which can be one of the following: <ul style="list-style-type: none"> • IP – An IP packet. • ARP – An ARP packet. • STP – An STP packet. • TCP – A TCP packet. • UDP – A UDP packet. • IPC packet – An interprocessor communication packet. • ITC packet – An intertask communication packet.
<hexadecimal numbers>	The contents of the packet.

Removing MAC Address Entries

You can remove learned MAC address entries from the BigIron MG8's MAC address table. You can remove the following:

- All MAC address entries.
- All MAC address entries for a specified interface module.
- All MAC address entries for a specified Ethernet port.
- All MAC address entries for a specified VLAN.
- A specified MAC address entry in all VLANs.

For example, to remove entries for the MAC address 000d.cb80.00d0 in all VLANs, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# clear mac-address 000d.cb80.00d0
```

Syntax: clear mac-address <mac-address> | ethernet <slot>/<port> | module <slot> | vlan <number>

If you enter the **clear mac-address** command without any parameters, the software removes all MAC entries.

Use the <mac-address> parameter to remove a specified MAC address from all VLANs. Specify the MAC address in the following format: HHHH.HHHH.HHHH.

Use the **ethernet** <slot>/<port> parameter to remove all MAC addresses for a specified Ethernet port. For the <slot> parameter, enter the number of the chassis slot in which the Ethernet interface module is installed. For the <port> parameter, enter the Ethernet port for which to remove all MAC addresses.

Use the **module** <slot> parameter to remove all MAC addresses for an interface module in a specified chassis slot.

Use the **vlan** <number> parameter to remove all MAC addresses for a specified VLAN.

Setting Maximum Frame Size Per PPCR

In software release 02.1.00 and later, when you set a maximum frame size, that maximum applies to all ports that are associated with the same packet processor (PPCR). Table shows the ports of each Interface module.

Table 7.7: Ports available per PPCR

Module Type	Number of Packet Processors (PPCR)	Module Port Range Belonging to each PPCR							
		PPCR 1	PPCR 2	PPCR 3	PPCR 4	PPCR 5	PPCR 6	PPCR 6	PPCR 8
2 x 10G	2	1	2	N/A	N/A	N/A	N/A	N/A	N/A
4 x 10G	4	1	2	3	4	N/A	N/A	N/A	N/A
8 x 10G	8	1	2	3	4	5	6	7	8
10 x 1G	1	1 - 10	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20 x 1G	2	1 - 10	11 - 20	N/A	N/A	N/A	N/A	N/A	N/A
40 x 1G	4	1 - 10	11 - 20	21 - 30	31 - 40	N/A	N/A	N/A	N/A
60 x 1G	3	1 - 20	21 - 40	41 - 60	N/A	N/A	N/A	N/A	N/A

To set a maximum frame size for all the ports attached to a PPCR, enter a command such as the following at the Interface Configuration level:

```
BigIron MG8(config)#interface ethernet 6/4
BigIron MG8(config-if-e1000-6/4)#max-frame-size 1500 bytes.
```

In this example the maximum frame size is applied to port 4 of a 40 x 1G Ethernet Interface module. That means that this maximum will apply to ports 1 to 10 on the interface module.

Syntax: [no] max-frame-size <frame-size>

The <frame-size> variable specifies the maximum frame size for each port that is connected the same PPCR as described in Table . Values can be from 64 to 9212 bytes.

Chapter 8

Configuring Basic Software Features

This chapter describes how to configure basic, non-protocol software features on the BigIron MG8 using the CLI. This chapter contains procedures for configuring the following parameters:

- Basic system parameters – see “BigIron Configuring Basic System Parameters” on page 8-2.
- Basic port parameters – see “Configuring Basic Port Parameters” on page 8-13.
- Basic Layer 2 parameters – see “Configuring Basic Layer 2 Parameters” on page 8-15.
- Basic Layer 3 parameters – see “Enabling or Disabling Routing Protocols” on page 8-19.
- System defaults and table sizes – see “Displaying and Modifying System Parameter Default Settings” on page 8-19.
- Mirror ports (for traffic diagnosis and troubleshooting) – see “Assigning a Mirror Port and Monitor Ports” on page 8-21.

The BigIron MG8 is configured at the factory with default parameters that allow you to begin using the basic features of the system immediately. However, many of the advanced features such as VLANs or routing protocols for the router must first be enabled at the system (global) level before they can be configured.

If you use the Command Line Interface (CLI) to configure system parameters, you can find these system level parameters at the Global CONFIG level of the CLI.

If you use the Web management interface, you enable or disable the system level parameters on the System configuration panel, which is displayed by default when you start a management session.

NOTE: Before assigning or modifying any router parameters, you must assign the IP subnet (interface) addresses for each port.

NOTE: This chapter does not describe how to configure Virtual LANs (VLANs) or link aggregation. For information about these features, see the “Configuring Virtual LANs (VLANs)” and “Configuring Trunk Groups and Dynamic Link Aggregation” chapters, respectively, in the *Foundry Switch and Router Installation and Basic Configuration Guide*.

NOTE: For information about configuring IP addresses, DNS resolver, DHCP assist, and other IP-related parameters, see the “Configuring IP” chapter of the *Foundry Enterprise Configuration and Management Guide*.

For information about the Syslog buffer and messages, see the “Using Syslog” appendix in the *Foundry Switch and Router Installation and Basic Configuration Guide*.

Using the Web Management Interface for Basic Configuration Changes

The Web management interface enables you to easily make numerous configuration changes by entering or changing information on configuration panels.

This example is for a Layer 3 Switch. Layer 2 Switches do not have routing options but do have some additional options not available on Layer 3 Switches.

Identification	Policy Based VLANs <input type="checkbox"/> Port <input type="checkbox"/> L3 Protocol
IP Address	Spanning Tree <input checked="" type="radio"/> Disable <input type="radio"/> Enable <input type="checkbox"/> Single <input checked="" type="checkbox"/> Fast
Clock	QOS <input type="radio"/> Strict <input checked="" type="radio"/> Weighted
NTP	L2 Switching <input type="radio"/> Disable <input checked="" type="radio"/> Enable
MAC Filter	OSPF <input checked="" type="radio"/> Disable <input type="radio"/> Enable
Module	RIP <input checked="" type="radio"/> Disable <input type="radio"/> Enable
Max-Parameter	IPX <input checked="" type="radio"/> Disable <input type="radio"/> Enable
RADIUS	DVMRP <input checked="" type="radio"/> Disable <input type="radio"/> Enable
TACACS	PIM <input checked="" type="radio"/> Disable <input type="radio"/> Enable
Management	SRP <input checked="" type="radio"/> Disable <input type="radio"/> Enable
	APPLETALK <input checked="" type="radio"/> Disable <input type="radio"/> Enable
	BGP <input checked="" type="radio"/> Disable <input type="radio"/> Enable Local AS <input type="text" value="0"/>
	VRRP <input checked="" type="radio"/> Disable <input type="radio"/> Enable
	Advance... <input type="button" value="Apply"/> <input type="button" value="Reset"/>

[\[Home\]](#) [\[Site Map\]](#) [\[Logout\]](#) [\[Save\]](#) [\[Frame Enable\]](#) [\[Disable\]](#) [\[TELNET\]](#)

- Review or modify the IP, mask, and gateway addresses (Layer 2 Switches only).
- (Layer 3 Switches only) Assign DHCP gateway lists for DHCP Assist operation (Layer 2 Switches only).
- Enable IP Layer 3 router acceleration (Stackable backbone Layer 2 Switches only).
- Enable or disable IP Multicast Traffic Reduction (Layer 2 Switches only).
- Enable or disable IGMP (Layer 2 Switches only).
- (Layer 3 Switches only) Assign Layer 4 QoS Priority (Layer 2 Switches only).

NOTE: Layer 4 priority for routers is set using the IP policy command found at the global CONFIG level of the CLI and the IP configuration sheet for the Web management interface.

- (Layer 3 Switches only) (Chassis devices only) Apply base (system) default values (Layer 2 Switches only).

BigIron Configuring Basic System Parameters

The procedures in this section describe how to configure the following basic system parameters:

- System name, contact, and location – see “Entering System Administration Information” on page 8-3
- SNMP trap receiver, trap source address, and other parameters – see “Configuring Simple Network

Management (SNMP) Parameters” on page 8-3

- System time using a Simple Network Time Protocol (SNTP) server or local system counter – see “” on page 8-7 and “Setting the System Clock” on page 8-9
- Broadcast, multicast, or unknown-unicast limits, if required to support slower third-party devices – see “Limiting Broadcast, Multicast, or Unknown-Unicast Rates” on page 8-10
- Banners that are displayed on users’ terminals when they enter the Privileged EXEC CLI level or access the device through Telnet – see “Configuring CLI Banners” on page 8-11.
- Terminal display length – see “Configuring Terminal Display” on page 8-12.

NOTE: For information about the Syslog buffer and messages, see the “Using Syslog” appendix in the *Foundry Switch and Router Installation and Basic Configuration Guide*.

Entering System Administration Information

You can configure a system name, contact, and location for the BigIron MG8 and save the information locally in the configuration file for future reference. This information is not required for system operation but is suggested. When you configure a system name, the name replaces the default system name in the CLI command prompt. For example, the system name you configure replaces “BigIron MG8” in the command prompt.

The name, contact, and location each can be up to 32 alphanumeric characters.

NOTE: If you install Layer 2 Switch code on a Layer 3 Switch, the CLI command prompt begins with “SW-” to indicate the software change. This is true even if you change the system name.

Here is an example of how to configure a system name, contact, and location:

```
BigIron MG8(config)# hostname zappa
zappa (config)# snmp-server contact Suzy Q
zappa (config)# snmp-server location Centerville
zappa (config)# end
zappa# write memory
```

Syntax: hostname <string>

Syntax: snmp-server contact <string>

Syntax: snmp-server location <string>

The text strings can contain blanks. The SNMP text strings do not require quotation marks when they contain blanks but the host name does.

Configuring Simple Network Management (SNMP) Parameters

Use the procedures in this section to perform the following configuration tasks:

- Specify an SNMP trap receiver.
- Specify a source address and community string for all traps sent by the device.
- Change the holddown time for SNMP traps.
- Disable individual SNMP traps. (All traps are enabled by default.)
- Disable traps for CLI access that is authenticated by a local user account, a RADIUS server, or a TACACS/TACACS+ server.

NOTE: To add and modify “get” (read-only) and “set” (read-write) community strings, see the *Foundry Security Guide*.

Specifying an SNMP Trap Receiver

You can specify a trap receiver to ensure that all SNMP traps sent by the BigIron MG8 go to the same SNMP trap receiver or set of receivers, typically one or more host devices on the network. When you specify the host, you also specify a community string. The device sends all the SNMP traps to the specified host(s) and includes the specified community string. Administrators can therefore filter for traps from the BigIron MG8 based on IP address or community string.

When you add a trap receiver, the software automatically encrypts the community string you associate with the receiver when the string is displayed by the CLI or Web management interface. If you want the software to show the community string in the clear, you must explicitly specify this when you add a trap receiver. In either case, the software does not encrypt the string in the SNMP traps sent to the receiver.

To specify an SNMP trap receiver and change the UDP port that will be used to receive traps, enter a command such as the following:

```
BigIron MG8(config)# # snmp-server host 2.2.2.2 1 mypublic port 200
BigIron MG8(config)# write memory
```

Syntax: snmp-server host <ip-addr> [0 | 1] <string> [port <value>]

The <ip-addr> parameter specifies the IP address of the trap receiver.

The **0 | 1** parameter specifies whether you want the software to encrypt the string (**1**) or show the string in the clear (**0**). The default is **0**.

The <string> parameter specifies an SNMP community string configured on the device. The string can be a read-only string or a read-write string. The string is not used to authenticate access to the trap host but is instead a useful method for filtering traps on the host. For example, if you configure each of your Foundry devices that use the trap host to send a different community string, you can easily distinguish among the traps from different Foundry devices based on the community strings.

The command in the example above adds trap receiver 2.2.2.2 and configures the software to encrypt display of the community string. When you save the new community string to the startup-config file (using the **write memory** command), the software adds the following command to the file:

```
snmp-server host 2.2.2.2 1 <encrypted-string>
```

The **port <value>** parameter allows you to specify which UDP port will be used by the trap receiver. This parameter allows you to configure several trap receivers in a system. With this parameter, IronView Network Manager and another network management application can coexist in the same system. Foundry devices can be configured to send copies of traps to more than one network management application.

Specifying a Single Trap Source

You can specify a single trap source to ensure that all SNMP traps sent by the BigIron MG8 use the same source IP address. When you configure the SNMP source address, you specify the Ethernet port, loopback interface, or virtual interface that is the source for the traps. The device then uses the lowest-numbered IP address configured on the port or interface as the source IP address in the SNMP traps sent by the device.

Identifying a single source IP address for SNMP traps provides the following benefits:

- If your trap receiver is configured to accept traps only from specific links or IP addresses, you can use this feature to simplify configuration of the trap receiver by configuring the device to always send the traps from the same link or source address.
- If you specify a loopback interface as the single source for SNMP traps, SNMP trap receivers can receive traps regardless of the states of individual links. Thus, if a link to the trap receiver becomes unavailable but the receiver can be reached through another link, the receiver still receives the trap, and the trap still has the source IP address of the loopback interface.

To configure the device to send all SNMP traps from the first configured IP address on port 1/1, enter the following commands:

```
BigIron MG8(config)# snmp-server trap-source ethernet 1/1
BigIron MG8(config)# write memory
```

Syntax: snmp-server trap-source loopback <num> | ethernet <slot>/<port> | ve <num>

The <num> parameter is a loopback interface or virtual interface number. If you specify an Ethernet interface, the <slot>/<port> parameter specifies the slot and port number of the Ethernet interface.

To specify a loopback interface as the device's SNMP trap source, enter commands such as the following:

```
BigIron MG8(config)# int loopback 1
BigIron MG8(config-lbif-1)# ip address 10.0.0.1/24
BigIron MG8(config-lbif-1)# exit
BigIron MG8(config)# snmp-server trap-source loopback 1
```

The commands in this example configure loopback interface 1, assign IP address 10.0.0.1/24 to the loopback interface, then designate the interface as the SNMP trap source for the device. Regardless of the port the device uses to send traps to the receiver, the traps always arrive from the same source IP address.

Setting the SNMP Trap Holddown Time

When a BigIron MG8 starts up, the software waits for Layer 2 convergence (STP) and Layer 3 convergence (OSPF) before beginning to send SNMP traps to external SNMP servers. Until convergence occurs, the device might not be able to reach the servers, in which case the messages are lost.

By default, a BigIron MG8 uses a one-minute holddown time to wait for the convergence to occur before starting to send SNMP traps. After the holddown time expires, the device sends the traps, including traps such as "cold start" or "warm start" that occur before the holddown time expires.

You can change the holddown time to a value from one second to ten minutes.

To change the holddown time for SNMP traps, enter a command such as the following at the global CONFIG level of the CLI:

```
BigIron MG8(config)# snmp-server enable traps holddown-time 30
```

The command in this example changes the holddown time for SNMP traps to 30 seconds. The device waits 30 seconds to allow convergence in STP and OSPF before sending traps to the SNMP trap receiver.

Syntax: [no] snmp-server enable traps holddown-time <secs>

The <secs> parameter specifies the number of seconds and can be from 1 – 600 (ten minutes). The default is 60 seconds.

Disabling SNMP Traps

The BigIron MG8 comes with SNMP trap generation enabled by default for all traps. You can selectively disable one or more of the following traps.

NOTE: By default, all SNMP traps are enabled at system startup.

Layer 2 Switch Traps

The following traps are generated on the Layer 2 Switches:

- Authentication
- Power supply failure
- Fan failure
- Cold start
- Link up
- Link down
- New root
- Topology change
- Locked address violation

- Module inserted
- Module removed

Layer 3 Switch Traps

The following traps are generated on the Layer 3 Switches:

- Authentication
- Power supply failure
- Fan failure
- Cold start
- Holddown time
- Link up
- Link down
- New root
- Topology change
- Locked address violation
- Metro ring
- Module inserted
- Module removed
- Redundant module
- Temperature
- BGP
- OSPF
- VRRP
- VSRP

To stop link down occurrences from being reported, enter the following:

```
BigIron MG8(config)# no snmp-server enable traps link-down
```

Syntax: [no] snmp-server enable traps <trap-type>

NOTE: For a list of the trap values, see the *Foundry Switch and Router Command Line Interface Reference*.

Disabling Syslog Messages and Traps for CLI Access

The BigIron MG8 sends Syslog messages and SNMP traps when a user logs into or out of the User EXEC or Privileged EXEC level of the CLI. The feature applies to users whose access is authenticated by an authentication-method list based on a local user account, RADIUS server, or TACACS/TACACS+ server.

NOTE: The Privileged EXEC level is sometimes called the “Enable” level, because the command for accessing this level is **enable**.

The feature is enabled by default.

Examples of Syslog Messages for CLI Access

When a user whose access is authenticated by a local user account, a RADIUS server, or a TACACS/TACACS+ server logs into or out of the CLI’s User EXEC or Privileged EXEC mode, the software generates a Syslog message and trap containing the following information:

- The time stamp

- The user name
- Whether the user logged in or out
- The CLI level the user logged into or out of (User EXEC or Privileged EXEC level)

NOTE: Messages for accessing the User EXEC level apply only to access through Telnet. The device does not authenticate initial access through serial connections but does authenticate serial access to the Privileged EXEC level. Messages for accessing the Privileged EXEC level apply to access through the serial connection or Telnet.

The following examples show login and logout messages for the User EXEC and Privileged EXEC levels of the CLI:

```
BigIron MG8(config)# show logging

Syslog logging: enabled (0 messages dropped, 0 flushes, 0 overruns)
Buffer logging: level ACDMEINW, 12 messages logged
level code: A=alert C=critical D=debugging M=emergency E=error
I=informational N=notification W=warning

Static Log Buffer:
Dec 15 19:04:14:A:Fan 1, fan on right connector, failed

Dynamic Log Buffer (50 entries):
Oct 15 18:01:11:info:dg logout from USER EXEC mode
Oct 15 17:59:22:info:dg logout from PRIVILEGE EXEC mode
Oct 15 17:38:07:info:dg login to PRIVILEGE EXEC mode
Oct 15 17:38:03:info:dg login to USER EXEC mode
```

Syntax: show logging

The first message (the one on the bottom) indicates that user “dg” logged in to the CLI’s User EXEC level on October 15 at 5:38 PM and 3 seconds (Oct 15 17:38:03). The same user logged into the Privileged EXEC level four seconds later.

The user remained in the Privileged EXEC mode until 5:59 PM and 22 seconds. (The user could have used the CONFIG modes as well. Once you access the Privileged EXEC level, no further authentication is required to access the CONFIG levels.) At 6:01 PM and 11 seconds, the user ended the CLI session.

For more information about the output displayed by the **show logging** command, see “Displaying the Syslog Configuration and Static and Dynamic Buffers” on page 7-5.

Disabling the Syslog Messages and Traps

Logging of CLI access is enabled by default. To disable logging of CLI access, enter the following commands:

```
BigIron MG8(config)# no logging enable user-login
BigIron MG8(config)# write memory
BigIron MG8(config)# end
BigIron MG8# reload
```

Syntax: [no] logging enable user-login

Specifying a Simple Network Time Protocol (SNTP) Server

You can configure the BigIron MG8 to consult SNTP servers for the current system time and date.

NOTE: The BigIron MG8 does not retain time and date information across power cycles. Unless you want to reconfigure the system time counter each time the system is reset, Foundry Networks recommends that you use the SNTP feature.

To identify an SNTP server with IP address 208.99.8.95 to act as the clock reference for the device, enter the following:

```
BigIron MG8(config)# sntp server 208.99.8.95
```

Syntax: sntp server <ip-addr> | <hostname> [<version>]

The <version> parameter specifies the SNTP version the server is running and can be from 1 – 4. The default is 1. You can configure up to three SNTP servers by entering three separate **sntp server** commands.

By default, the device polls its SNTP server every 30 minutes (1800 seconds). To configure the device to poll for clock updates from a SNTP server every 15 minutes, enter the following:

```
BigIron MG8(config)# sntp poll-interval 900
```

Syntax: [no] sntp poll-interval <1-65535>

To display information about SNTP associations, enter the following command:

```
BigIron MG8# show sntp associations
address          ref clock      st  when  poll  delay  disp
~207.95.6.102    0.0.0.0       16  202   4     0.0    5.45
~207.95.6.101    0.0.0.0       16  202   0     0.0    0.0
* synced, ~ configured
```

Syntax: show sntp associations

The following table describes the information displayed by the **show sntp associations** command.

Table 8.1: Output from the show sntp associations Command

This Field...	Displays...
(leading character)	One or both of the following: * Synchronized to this peer ~ Peer is statically configured
address	IP address of the peer
ref clock	IP address of the peer's reference clock
st	NTP stratum level of the peer
when	Amount of time since the last NTP packet was received from the peer
poll	Poll interval in seconds
delay	Round trip delay in milliseconds
disp	Dispersion in seconds

To display information about SNTP status, enter the following command:

```
BigIron MG8# show sntp status
Clock is unsynchronized, stratum = 0, no reference clock
precision is 2**0
reference time is 0      .0
clock offset is 0.0     msec, root delay is 0.0 msec
root dispersion is 0.0 msec, peer dispersion is 0.0 msec
sntp poll-interval is 900 sec
```

Syntax: show sntp status

The following table describes the information displayed by the **show sntp status** command.

Table 8.2: Output from the show sntp status Command

This Field...	Indicates...
unsynchronized	System is not synchronized to an NTP peer.
synchronized	System is synchronized to an NTP peer.
stratum	NTP stratum level of this system.
reference clock	IP Address of the peer (if any) to which the unit is synchronized.
precision	Precision of this system's clock (in Hz).
reference time	Reference time stamp.
clock offset	Offset of clock to synchronized peer.
root delay	Total delay along the path to the root clock.
root dispersion	Dispersion of the root path.
peer dispersion	Dispersion of the synchronized peer.
sntp poll-interval	Setting of the sntp poll-interval command.

Setting the System Clock

In addition to SNTP support, the BigIron MG8 also allows you to set the system time counter. The time counter setting is not retained across power cycles and is not automatically synchronized with an SNTP server. The counter merely starts the system time and date clock with the time and date you specify.

NOTE: You can synchronize the time counter with your SNTP server time by entering the **sntp sync** command from the Privileged EXEC level of the CLI.

NOTE: Unless you identify an SNTP server for the system time and date, you will need to re-enter the time and date following each reboot.

For more details about SNTP, see "" on page 8-7.

To set the system time and date to 10:15:05 on July 15, 2005, enter the following command:

```
BigIron MG8# clock set 10:15:05 7-15-05
```

Syntax: [no] clock set <hh:mm:ss> <mm-dd-yy> | <mm-dd-yyyy>

By default, the device does not change the system time for daylight savings time.

To enable daylight savings time, enter the following command:

```
BigIron MG8# clock summer-time
```

Syntax: clock summer-time

Although SNTP servers typically deliver the time and date in Greenwich Mean Time (GMT), you can configure the device to adjust the time for any one-hour offset from GMT or for one of the following U.S. time zones:

- US Pacific (default)
- Alaska
- Aleutian
- Arizona
- Central
- East-Indiana
- Eastern
- Hawaii
- Michigan
- Mountain
- Pacific
- Samoa

The default is US Pacific.

To change the time zone to Australian East Coast time (which is normally 10 hours ahead of GMT), enter the following command:

```
BigIron MG8(config)# clock timezone gmt gmt+10
```

Syntax: clock timezone gmt gmt | us <time-zone>

You can enter one of the following values for <time-zone>:

- US time zones (**us**): alaska, aleutian, arizona, central, east-indiana, eastern, hawaii, michigan, mountain, pacific, samoa.
- GMT time zones (**gmt**): gmt+12, gmt+11, gmt+10...gmt+01, gmt+00, gmt-01...gmt-10, gmt-11, gmt-12.

NOTE: on Chassis devices Software release 05.2.00 and later also adds a version line to the running-config file on Stackable devices. However, the command syntax and default behavior for Gigabit Ethernet ports on Stackable devices is unchanged from earlier software releases.

Limiting Broadcast, Multicast, or Unknown-Unicast Rates

The BigIron MG8 can forward all traffic at wire speed. However, some third-party networking devices cannot handle high forwarding rates for broadcast, multicast, or unknown-unicast packets. You can limit the number of broadcast, multicast, or unknown-unicast packets the Foundry device forwards each second using the following methods.

The limits are individually configurable for broadcasts, multicasts, and unknown-unicasts. You can configure limits globally and on individual ports. The valid range is 1 – 4294967295 packets per second. If you specify 0, limiting is disabled. By default, the rate for broadcast, multicast, and unknown-unicast packets is 4294967295 packets per second.

Limiting Broadcasts

To globally limit the number of broadcast packets a BigIron MG8 forwards to 100,000 per second, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# broadcast limit 100000
BigIron MG8(config)# write memory
```

To limit the number of broadcast packets sent on port 1/3 to 80,000, enter the following commands:

```
BigIron MG8(config)# interface ethernet 1/3
BigIron MG8(config-if-e10000-1/3)# broadcast limit 80000
BigIron MG8(config-if-e10000- 1/3)# write memory
```

Limiting Multicasts

To globally limit the number of multicast packets a BigIron MG8 forwards to 120,000 per second, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# multicast limit 120000
BigIron MG8(config)# write memory
```

To limit the number of multicast packets sent on port 3/1 to 55,000, enter the following commands:

```
BigIron MG8(config)# interface ethernet 3/1
BigIron MG8(config-if-e10000-3/1)# multicast limit 55000
BigIron MG8(config-if-e10000-3/1)# write memory
```

Limiting Unknown Unicasts

To globally limit the number of unknown unicast packets a BigIron MG8 forwards to 110,000 per second, enter the following command at the global CONFIG level of the CLI:

```
BigIron MG8(config)# unknown-unicast limit 110000
BigIron MG8(config)# write memory
```

To limit the number of unknown unicast packets sent on port 4/2 to 40,000, enter the following commands:

```
BigIron MG8(config)# interface ethernet 4/2
BigIron MG8(config-if-e10000-4/2)# unknown-unicast limit 40000
BigIron MG8(config-if-e10000-4/2)# write memory
```

NOTE: The following limit commands are only supported at the global level and not at the interface level:

- broadcast limit
- multicast limit
- unknown-unicast limit

The values entered are applied to the management module (slot) installed in the device.

Configuring CLI Banners

You can configure the BigIron MG8 to display a greeting message on users' terminals when they enter the Privileged EXEC CLI level or access the device through Telnet. In addition, the device can display a message on the Console when an incoming Telnet CLI session is detected.

Setting a Message of the Day Banner

You can configure the BigIron MG8 to display a message on a user's terminal when he or she establishes a Telnet CLI session. For example, to display the message "Welcome to BigIron MG8!" when a Telnet CLI session is established:

```
BigIron MG8(config)# banner motd $ (Press Return)
Enter TEXT message, End with the character '$'.
Welcome to BigIron MG8! $
```

A delimiting character is established on the first line of the **banner motd** command. You begin and end the message with this delimiting character. The delimiting character can be any character except " (double-quotation mark) and cannot appear in the banner text. In this example, the delimiting character is \$ (dollar sign). The text in

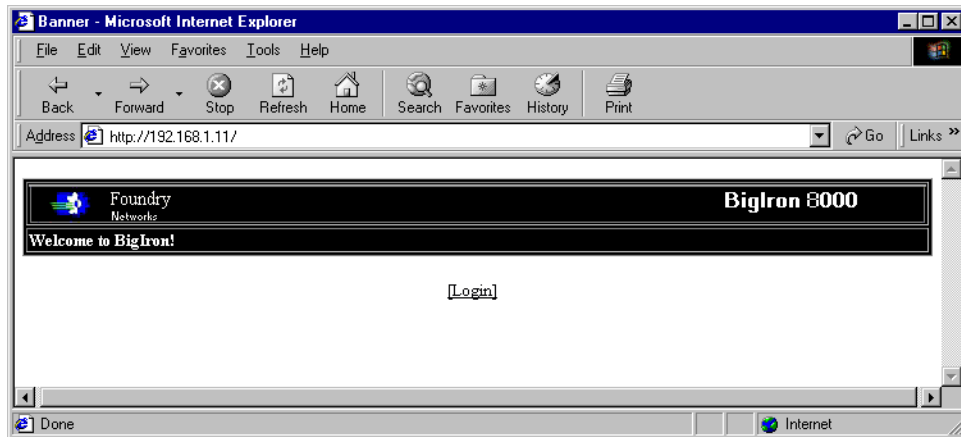
between the dollar signs is the contents of the banner. The banner text can be up to 2048 characters long and can consist of multiple lines. To remove the banner, enter the **no banner motd** command.

Syntax: [no] banner <delimiting-character> | [motd <delimiting-character>]

NOTE: The **banner <delimiting-character>** command is equivalent to the **banner motd <delimiting-character>** command.

When you access the Web management interface, the banner is displayed.

Setting a Privileged EXEC CLI Level Banner



You can configure the BigIron MG8 to display a message when a user enters the Privileged EXEC CLI level. For example:

```
BigIron MG8(config)# banner exec # (Press Return)
Enter TEXT message, End with the character '#'.
You are entering Privileged EXEC level
Don't foul anything up! #
```

As with the **banner motd** command, you begin and end the message with a delimiting character; in this example, the delimiting character is # (pound sign). To remove the banner, enter the **no banner exec** command.

Syntax: [no] banner exec <delimiting-character>

Displaying a Message on the Console When an Incoming Telnet Session Is Detected

You can configure the BigIron MG8 to display a message on the Console when a user establishes a Telnet session. This message indicates where the user is connecting from and displays a configurable text message.

For example:

```
BigIron MG8(config)# banner incoming $ (Press Return)
Enter TEXT message, End with the character '$'.
Incoming Telnet Session!! $
```

When a user connects to the CLI using Telnet, the following message appears on the Console:

```
Telnet from 209.157.22.63
Incoming Telnet Session!!
```

Syntax: [no] banner incoming <delimiting-character>

To remove the banner, enter the **no banner incoming** command.

Configuring Terminal Display

You can configure and display the number of lines displayed on a terminal screen during the current CLI session.

The **terminal length** command allows you to determine how many lines will be displayed on the screen during the current CLI session. This command is useful when reading multiple lines of displayed information, especially those that do not fit on one screen.

To specify the maximum number of lines displayed on one page, enter a command such as the following:

```
BigIron MG8# terminal length 15
```

Syntax: terminal length <number-of-lines>

The <number-of-lines> parameter indicates the maximum number of lines that will be displayed on a full screen of text during the current session. If the displayed information requires more than one page, the terminal pauses. Pressing the space bar displays the next page.

The default for <number-of-lines> is 24. Entering a value of 0 prevents the terminal from pausing between multiple output pages.

Checking the Length of Terminal Displays

The **show terminal** command specifies the number of lines that will be displayed on the screen as specified by the **terminal length**, **page display**, and **skip-page-display** commands. It also shows if the **enable skip-page-display** command has been configured. The **enable skip-page-display** command allows you to use the **skip-page-display** command to disable the configured page-display settings.

```
BigIron MG8# show terminal
Length: 24 lines
Page display mode (session): enabled
Page display mode (global): enabled
```

Configuring Basic Port Parameters

The procedures in this section describe how to configure the following port parameters:

- Name – see “Assigning a Port Name” on page 8-13.
- Status – see “Disabling or Re-Enabling a Port” on page 8-14.
- Flow control – see “Disabling or Re-Enabling Flow Control” on page 8-14.
- QoS priority – see “Modifying Port Priority (QoS)” on page 8-15.

NOTE: To modify Layer 2, Layer 3, or Layer 4 features on a port, see the appropriate section in this chapter or in the *Foundry Switch and Router Installation and Basic Configuration Guide*. For example, to modify Spanning Tree Protocol (STP) parameters for a port, see “Modifying STP Bridge and Port Parameters” on page 8-15.

To configure trunk groups or dynamic link aggregation, see the *Foundry Switch and Router Installation and Basic Configuration Guide*.

All BigIron MG8 ports are pre-configured with default values that allow the device to be fully operational at initial startup without any additional configuration. However, in some cases, changes to the port parameters may be necessary to adjust to attached devices or other network requirements.

Assigning a Port Name

A port name can be assigned to help identify interfaces on the network. You can assign a port name to physical ports, virtual interfaces, and loopback interfaces.

To assign a name to a port:

```
BigIron MG8(config)# interface ethernet 3/1
BigIron MG8(config-if-e10000-3/1)# port-name Marsha the Marketing Pro
```

Syntax: port-name <text>

The <text> parameter is an alphanumeric string. The name can be up to 255 characters long. The name can contain blanks. You do not need to use quotation marks around the string, even when it contains blanks.

Disabling or Re-Enabling a Port

The port can be made inactive (disable) or active (enable) by selecting the appropriate status option. The default value for a port is enabled.

To disable port 1 on module 3, enter the following:

```
BigIron MG8(config)# interface ethernet 3/1
BigIron MG8(config-if-e10000-3/1)# disable
```

Syntax: disable

Syntax: enable

You also can disable or re-enable a management interface. To do so, enter commands such as the following:

```
BigIron MG8(config)# interface management 1
BigIron MG8(config-if-mgmt-1)# disable
```

Syntax: disable

To re-enable a management interface, enter the **enable** command at the Interface configuration level. For example, to re-enable management interface 1, enter the following command:

```
BigIron MG8(config-if-mgmt-1)# enable
```

Syntax: enable

Disabling or Re-Enabling Flow Control

You can configure full-duplex ports on a system to operate with or without flow control (802.3x). Flow control is enabled by default.

To disable flow control on full-duplex ports on a system, enter the following:

```
BigIron MG8(config)# no flow-control
```

To turn the feature back on:

```
BigIron MG8(config)# flow-control
```

Syntax: [no] flow-control

Specifying Threshold Values for Flow Control

The 802.3x flow control specification provides a method for slowing traffic from a sender when a port is receiving more traffic than it can handle. Specifically, the receiving device can send out 802.3x PAUSE frames that request that the sender stop sending traffic for a period of time.

The BigIron MG8 generates 802.3x PAUSE frames when the number of buffers available to a module's Buffer Manager (BM) drops below a threshold value. A module's BM can start running out of buffers when a port receives more traffic than it can handle. When the number of available buffers returns to a higher level, the device sends out another PAUSE frame that tells the sender to resume sending traffic normally. You can specify values for the threshold.

NOTE: To use this feature, 802.3x flow control must be enabled globally on the device. By default, 802.3x flow control is enabled on the Foundry device, but can be disabled with the **no flow-control** command.

To specify threshold values for flow control, enter the following command:

```
BigIron MG8(config)# qd-flow sink 75
```

Syntax: qd-flow sink <sinking-threshold>

The threshold value is a percentage of the total number of buffers available to a module's Buffer Manager.

When the <sinking-threshold> is reached, the Foundry device sends out 802.3x PAUSE frames telling the sender to stop sending traffic for a period of time.

Modifying Port Priority (QoS)

You can give preference to the inbound traffic on specific ports by changing the Quality of Service (QoS) level on those ports. For information and procedures, see the “Configuring Quality of Service” chapter in the *Foundry Enterprise Configuration and Management Guide*.

Configuring Basic Layer 2 Parameters

The procedures in this section describe how to configure the following Layer 2 parameters.

- Spanning Tree Protocol (STP) – see “Enabling or Disabling the Spanning Tree Protocol (STP)” on page 8-15.

NOTE: The procedures in this chapter describe how to configure basic STP parameters. For more information about STP, see the *Foundry Switch and Router Installation and Basic Configuration Guide*.

- Layer 2 switching of unsupported router protocols (Layer 3 Switches only) – see “Enabling or Disabling Layer 2 Switching (Layer 3 Switches only)” on page 8-16
- Aging time for learned MAC address entries – see “Changing the MAC Age Time” on page 8-17.
- Static, non-aging MAC address entries – see “Configuring Static MAC Entries” on page 8-17.
- Port-based VLANs – see “Enabling Port-Based VLANs” on page 8-18.

Enabling or Disabling the Spanning Tree Protocol (STP)

The STP (IEEE 802.1d bridge protocol) is supported on the BigIron MG8. STP detects and eliminates logical loops in the network. STP also ensures that the least cost path is taken when multiple paths exist between ports or VLANs. If the selected path fails, STP searches for and then establishes an alternate path to prevent or limit retransmission of data.

STP must be enabled at the system level to allow assignment of this capability on the VLAN level. On the BigIron MG8, STP is disabled by default.

NOTE: The procedures in this chapter describe how to configure basic STP parameters. For more information about STP, see the *Foundry Switch and Router Installation and Basic Configuration Guide*

To enable a single STP for all ports on the Foundry device, enter the following command:

```
BigIron MG8(config)# spanning-tree single
```

Syntax: [no] spanning-tree single

The **single** parameter configures a single STP.

Modifying STP Bridge and Port Parameters

You can modify the following STP Parameters:

- Bridge parameters – forward delay, maximum age, hello time, and priority
- Port parameters – priority and path cost

STP Bridge Parameters

You can configure the following STP bridge parameters:

- Forward Delay – The period of time a bridge will wait (the listen and learn period) before forwarding data packets. Possible values: 4 – 30 seconds. Default is 15.
- Maximum Age – The interval a bridge will wait for receipt of a hello packet before initiating a topology change. Possible values: 6 – 40 seconds. Default is 20.

- Hello Time – The interval of time between each configuration BPDU sent by the root bridge. Possible values: 1 – 10 seconds. Default is 2.
- Priority – A parameter used to identify the root bridge in a network. The bridge with the lowest value has the highest priority and is the root. Possible values: 0 – 65,535. Default is 32,768.

STP Port Parameters

Spanning Tree Protocol port parameters priority and path cost are preconfigured with default values. If the default parameters meet your network requirements, no other action is required.

You can configure the following STP port parameters:

- Port Priority – This parameter can be used to assign a higher (or lower) priority to a port. In the event that traffic is re-routed, this parameter gives the port forwarding preference over lower priority ports within a VLAN or on the Layer 2 Switch or Layer 3 Switch (when no VLANs are configured for the system). Ports are re-routed based on their priority. A higher numerical value means a lower priority; thus, the highest priority is 0. Possible values: 0 – 252, in increments of 4. Default is 128.
- Path Cost – This parameter can be used to assign a higher or lower path cost to a port. This value can be used to bias traffic toward or away from a certain path during periods of rerouting. For example, if you wish to bias traffic away from a certain port, assign it a higher value than other ports within the VLAN or all other ports (when VLANs are not active on the Layer 2 Switch or Layer 3 Switch). Possible values are 1 – 65535. The default values for a 10 Gigabit port is 2.

EXAMPLE:

Suppose you want to enable STP on a system in which no port-based VLANs are active and change the hello-time from the default value of 2 to 8 seconds. Additionally, suppose you want to change the path and priority costs for port 3/1 only. To do so, enter the following commands.

```
BigIron MG8(config)# spanning-tree single hello-time 8
BigIron MG8(config)# spanning-tree single ethernet 3/1 path-cost 15 priority 64
```

Here is the syntax for global STP parameters.

Syntax: spanning-tree single [forward-delay <value>] | [hello-time <value>] | [max-age <time>] | [priority <value>]

Here is the syntax for STP port parameters.

Syntax: spanning-tree single ethernet <slot>/<port-num> path-cost <value> | priority <value>

Enabling or Disabling Layer 2 Switching (Layer 3 Switches only)

By default, the BigIron MG8 supports Layer 2 switching. This device switches the routing protocols that are not supported on the device. If OSPF routing is not enabled, then OSPF traffic also is switched. By default OSPF routing is disabled. If you want to disable Layer 2 switching, you can do so globally or on individual ports.

NOTE: Make sure you really want to disable all Layer 2 switching operations before you use this option. Consult your reseller or Foundry Networks for information.

To globally disable Layer 2 switching on a BigIron MG8, enter commands such as the following:

```
BigIron MG8(config)# route-only
BigIron MG8(config)# exit
BigIron MG8# write memory
BigIron MG8# reload
```

To re-enable Layer 2 switching on a BigIron MG8, enter the following:

```
BigIron MG8(config)# no route-only
BigIron MG8(config)# exit
BigIron MG8# write memory
BigIron MG8# reload
```

Syntax: [no] route-only

To disable Layer 2 switching only on a specific interface, go to the Interface configuration level for that interface, then disable the feature. The following commands show how to disable Layer 2 switching on port 3/2:

```
BigIron MG8(config)# interface ethernet 3/1
BigIron MG8(config-if-e10000-3/1)# route-only
```

Syntax: [no] route-only

To re-enable Layer 2 switching, enter the command with “no”, as in the following example:

```
BigIron MG8(config-if-e10000-3/1)# no route-only
```

Changing the MAC Age Time

This parameter sets the aging period for ports on the device, defining how long a port address remains active in the address table. This parameter value can be 0 or a number from 60 – 65535 seconds. The zero value results in no address aging. The default value for this field is 300 (seconds).

To change the aging period for MAC addresses from the default value of 300 seconds to 600 seconds:

```
BigIron MG8(config)# mac-age-time 600
```

Syntax: [no] mac-age-time <age-time>

The <age-time> can be 0 or a number from 60 – 65535.

Configuring Static MAC Entries

Static MAC addresses can be assigned to the BigIron MG8.

NOTE: The device also supports the assignment of static IP Routes, static ARP, and static RARP entries. For details on configuring these types of static entries, see the “Configuring Static Routes” and “Creating Static ARP Entries” sections in the “Configuring IP” chapter of the *Foundry Enterprise Configuration and Management Guide*.

You can manually input the MAC address of a device to prevent it from being aged out of the system address table.

This option can be used to prevent traffic for a specific device, such as a server, from flooding the network with traffic when it is down. Additionally, the static MAC address entry is used to assign higher priorities to specific MAC addresses.

You can specify port priority (QoS) and VLAN membership (VLAN ID) for the MAC Address as well as specify device type of either router or host.

The default and maximum configurable MAC table sizes can differ depending on the device. To determine the default and maximum MAC table sizes for your device, display the system parameter values. See “Displaying and Modifying System Parameter Default Settings” on page 8-19.

EXAMPLE:

To add a static entry for a server with a MAC address of 1145.5563.67FF and a priority of 7 to port 3 of module 1 of a BigIron MG8:

```
BigIron MG8(config)# static-mac-address 1145.5563.67FF ethernet 1/3 priority 7
```

Syntax: [no] static-mac-address <mac-addr> ethernet <slot>/<port> priority <number>

The priority can be 0 – 7 (0 is lowest priority and 7 is highest priority).

NOTE: The location of the **static-mac-address** command in the CLI depends on whether you configure port-based VLANs on the device. If the device does not have more than one port-based VLAN (VLAN 1, which is the default VLAN that contains all the ports), the **static-mac-address** command is at the global CONFIG level of the CLI. If the device has more than one port-based VLAN, then the **static-mac-address** command is not available at the global CONFIG level. In this case, the command is available at the configuration level for each port-based VLAN.

Configuring Static ARP Entries

Foundry recommends that you configure a static ARP entry to match the static MAC entry. In fact, the software automatically creates a static MAC entry when you create a static ARP entry.

NOTE: When a static MAC entry has a corresponding static ARP entry, you cannot delete the static MAC entry unless you first delete the static ARP entry.

To create a static ARP entry for a static MAC entry, enter a command such as the following:

```
BigIron MG8(config)# arp 1 192.53.4.2 aaaa.bbbb.cccc ethernet 1/1
```

The **arp** command allows you to specify only one port number. To create a static ARP entry for a static MAC entry that is associated with multiple ports, specify the first (lowest-numbered) port associated with the static MAC entry.

Syntax: [no] arp <num> <ip-addr> <mac-addr> ethernet <slot>/<port>

The <num> parameter specifies the entry number.

Enabling Port-Based VLANs

Port and protocol VLANs must first be enabled at the system (global) level before they can be configured at the VLAN level. For details on configuring VLANs, see the *Foundry Switch and Router Installation and Basic Configuration Guide*.

Port and protocol-based VLANs are created by entering one of the following commands at the global CONFIG level of the CLI.

To create a port-based VLAN, enter commands such as the following:

```
BigIron MG8(config)# vlan 222 by port
BigIron MG8(config)# vlan 222 name Mktg
```

Syntax: vlan <num> by port

Syntax: vlan <num> name <string>

The <num> parameter specifies the VLAN ID. The valid range for VLAN IDs is 1 – 4095.

The <string> parameter is the VLAN name and can be a string up to 32 characters. You can use blank spaces in the name if you enclose the name in double quotes (for example, “Product Marketing”).

NOTE: The second command is optional and also creates the VLAN if the VLAN does not already exist. You can enter the first command after you enter the second command if you first exit to the global CONFIG level of the CLI.

Assigning IEEE 802.1q Tagging to a Port

When a port is tagged, it allows communication among the different VLANs to which it is assigned. A common use for this might be to place an email server that multiple groups may need access to on a tagged port, which in turn, is resident in all VLANs that need access to the server.

NOTE: Tagging is disabled by default on individual ports.

NOTE: Tagging does not apply to the default VLAN.

For details on configuring port-based VLANs, see the *Foundry Switch and Router Installation and Basic Configuration Guide*.

When using the CLI, ports are defined as either tagged or untagged at the VLAN level.

EXAMPLE:

Suppose you want to make port 4 on module 1 a member of port-based VLAN 4, a tagged port. To do so, enter the following:

```
BigIron MG8(config)# vlan 4
BigIron MG8(config-vlan-4)# tagged ethernet 1/4
```

Syntax: tagged ethernet <port> [to <port> [ethernet <port>]]

Enabling or Disabling Routing Protocols

The BigIron MG8 supports the following protocols:

- BGP4
- DVMRP
- IP
- OSPF
- PIM
- RIP
- VRRP
- VRRPE

By default, IP routing is enabled on the BigIron MG8. All other protocols are disabled, so you must enable them to configure and use them.

NOTE: The following protocols require a system reset before the protocol will be active on the system: PIM, DVMRP, and RIP. To reset a system, enter the **reload** command at the Privileged EXEC level of the CLI.

To enable a protocol on the BigIron MG8, for example, OSPF, enter a command such as the following:

```
BigIron MG8(config)# router ospf
BigIron MG8(config)# end
BigIron MG8# write memory
BigIron MG8# reload
```

Syntax: router bgp | dvmrp | ospf | pim | rip | vrrp | vrrpe

Displaying and Modifying System Parameter Default Settings

The BigIron MG8 has default table sizes for the following parameters. The table sizes determine the maximum number of entries the tables can hold. You can adjust individual table sizes to accommodate your configuration needs.

- MAC address entries
- Layer 2 Port VLANs supported on a system
- Layer 3 Protocol VLANs supported on a system
- Layer 4 sessions supported
- IP cache size
- ARP entries
- IP routes
- IP route filters
- IP subnets per port and per device
- Static routes
- IGMP

- DVMRP routes

NOTE: If you increase the number of subnet addresses you can configure on each port to a higher amount, you might also need to increase the total number of subnets that you can configure on the device.

NOTE: Changing the table size for a parameter reconfigures the device's memory. Whenever you reconfigure the memory on the Foundry device, you must save the change to the startup-config file, then reload the software to place the change into effect.

To display the configurable tables and their defaults and maximum values, enter the following command at any level of the CLI:

```
BigIron MG8# show default values
sys log buffers:50          mac age time:300 sec          telnet sessions:5

ip arp age:10 min          bootp relay max hops:4       ip ttl:64 hops
ip addr per intf:24

when multicast enabled :
igmp group memb.:140 sec   igmp query:60 sec

when ospf enabled :
ospf dead:40 sec           ospf hello:10 sec           ospf retrans:5 sec
ospf transit delay:1 sec

when bgp enabled :
bgp local pref.:100        bgp keep alive:60 sec       bgp hold:180 sec
bgp metric:10              bgp local as:1              bgp cluster id:0
bgp ext. distance:200     bgp int. distance:200      bgp local distance:200
```

System Parameters	Default	Maximum	Current
mac	128000	2048000	128000
vlan	512	4095	512
spanning-tree	32	128	32
rstp	32	128	32
ip-arp	8192	64000	8192
ip-static-arp	2048	4096	2048
multicast-route	8192	150000	8192
dvmrp-route	2048	128000	2048
dvmrp-mcache	2048	8192	2048
pim-mcache	2048	8192	2048
igmp-max-group-addr	2048	8192	2048
ip-cache	150000	1024000	150000
ip-route	150000	1024000	150000
ip-subnet-port	24	128	24
virtual-interface	255	4095	255
session-limit	32768	160000	32768
mgmt-port-acl-size	20	100	20
vlan-multicast-flood	0	4095	0

Information for the configurable tables appears under the columns that are shown in bold type in this example. To simplify configuration, the command parameter you enter to configure the table is used for the table name. For example, to increase the capacity of the IP route table, enter the following commands:

```
BigIron MG8(config)# system-max ip-route 120000
BigIron MG8(config)# write memory
BigIron MG8(config)# exit
```

```
BigIron MG8# reload
```

NOTE: If you accidentally enter a value that is not within the valid range of values, the CLI will display the valid range for you.

Assigning a Mirror Port and Monitor Ports

You can monitor traffic on BigIron MG8 ports by configuring another port to “mirror” the traffic on the ports you want to monitor. By attaching a protocol analyzer to the mirror port, you can observe the traffic on the monitored ports.

Monitoring traffic on a port is a two-step process:

- Enable a port to act as the mirror port. This is the port to which you connect your protocol analyzer.
- Enable monitoring on the ports you want to monitor.

You can monitor input traffic, output traffic, or both. Any port can operate as a mirror port and you can configure more than one mirror port. You can configure up to 64 mirror ports. You can configure the mirror ports on different modules and you can configure more than one mirror port on the same module.

Each mirror port can have its own set of monitored ports. For example, you can configure ports 1/1 and 5/1 as mirror ports, and monitor ports 1/2 – 1/4 on port 1/1 and ports 5/2 – 5/4 on port 5/1. The mirror ports and monitored ports also can be on different slots.

Configuration Guidelines for Monitoring Inbound Traffic

Use the following considerations when configuring mirroring for inbound traffic on the BigIron MG8. The guidelines are applicable whether you configure multiple mirror ports or just one mirror port.

- Configure only one mirror port to monitor input traffic on a given module. If you configure multiple mirror ports on the same module, the inbound traffic for all the monitored ports on the module is sent to all the mirror ports on the same module. For example, if you configure ports 1/1 and 1/4 as mirror ports, then enable monitoring of inbound traffic on ports 1/2 and 1/3, the traffic from both ports is mirrored to both the mirror ports, 1/1 and 1/4. This occurs regardless of the mirror ports you assign to the monitor ports.
- When inbound traffic on a monitored port on one module is switched normally to another module, the switched traffic will be mirrored to the mirror ports on the other module. For example, if inbound traffic on a monitored port on the module in slot 1 is switched to the module in slot 2, mirror ports on the module in slot 2 will receive copies of the traffic. These guidelines do not apply to outbound traffic.

Notes Regarding Monitoring of Router Traffic

- For inbound traffic that is routed (not switched), if the traffic is forwarded by the hardware and thus bypasses the CPU, the port that receives the traffic changes the source and destination MAC addresses of the packet before sending the packet to its outbound port and the mirror port.
- For outbound traffic that is routed (not switched), the source MAC address of the traffic that is copied to the mirror port has the MAC address of the mirror port rather than the monitored port's MAC address.

This happens because the routed traffic sent by the router interface must address itself as the sender of the packet, to the neighboring router. This behavior cannot be turned off for the monitored traffic, so the mirror port's MAC address is substituted for the mirror copy of the packet. In this case, the source MAC address of the mirror port is equivalent to that of the monitored port.

Configuring Port Mirroring and Monitoring

Suppose you want to diagnose the in and out traffic on port 3 on a module in slot 4 of a BigIron MG8, and use port 1 in slot 4 as the mirror port. To do so, enter the following commands:

```
BigIron MG8(config)# mirror-port ethernet 4/1
BigIron MG8(config)# interface ethernet 4/3
```

```
BigIron MG8(config-if-e10000-4/3)# monitor ethernet 4/1 both
```

Syntax: [no] mirror-port ethernet <slot>/<port>

The <slot>/<port> parameter specifies the slot and port numbers. You can configure up to 64 mirror ports on the BigIron MG8.

Syntax: [no] monitor ethernet <port> [ethernet <slot>/<port>...] both | input | output

The <slot>/<port> parameter specifies the mirror port(s).

The **both | input | output** parameter specifies the traffic direction you want to monitor on the mirror port. There is no default.

NOTE: You can configure multiple mirror ports on the same module. However, if you mirror inbound traffic to any of the mirror ports on the module, the traffic is mirrored to all the mirror ports on the module. If you plan to mirror outbound traffic only, you can use multiple mirror ports on the same module without the traffic being duplicated on the other mirror ports on the module.

NOTE: If you configure the device to monitor inbound traffic on multiple ports and use a single mirror port for the traffic, disabling monitoring on one of the ports also disables monitoring on the other ports. For example, if you configure the device to monitor inbound traffic on ports 1/1 and 1/2 and to mirror the traffic to port 2/1, if you then disable monitoring of inbound traffic on port 1/2, the software also disables monitoring of inbound traffic on port 1/1.

This guideline does not apply to monitoring outbound traffic. Disabling monitoring for outbound traffic does not affect other ports that use the same mirror port.

If you specify **both** for the traffic direction to be monitored, only the inbound traffic monitoring is disabled on the other ports.

The following example configures two mirror ports on the same module and one mirror port on another module. It will illustrate how inbound traffic is mirrored to the two mirror ports on the same module even if the traffic is configured to be mirrored to only one mirror port on the module.

```
BigIron MG8(config)# mirror-port ethernet 1/1
BigIron MG8(config)# mirror-port ethernet 1/2
BigIron MG8(config)# mirror-port ethernet 3/4
BigIron MG8(config)# interface ethernet 1/4
BigIron MG8(config-if-e10000-1/4)# monitor ethernet 3/4 output
BigIron MG8(config-if-e10000-1/4)# interface ethernet 3/1
BigIron MG8(config-if-e10000-3/1)# monitor ethernet 1/1 both
BigIron MG8(config-if-e10000-3/1)# interface ethernet 3/2
BigIron MG8(config-if-e10000-3/2)# monitor ethernet 3/4 both
BigIron MG8(config-if-e10000-3/2)# interface ethernet 3/3
BigIron MG8(config-if-e10000-3/3)# monitor ethernet 1/2 input
```

This example configures two mirror ports (1/1 and 1/2) on the same module. It also configures input and output traffic from port 3/1 to be mirrored to mirror port 1/1 and input traffic from port 3/3 to be mirrored to mirror port 1/2. Because mirror ports 1/1 and 1/2 are configured on the same module, mirror port 1/1 will receive the input traffic from port 3/3 and mirror port 1/2 will receive input traffic from port 3/1 even if they are not explicitly configured to do so. The outbound traffic from port 3/1 is mirrored to port 1/1 only, as configured.

This example also configures one mirror port (3/4) on another module, to which inbound and outbound traffic from port 3/2 and outbound traffic from port 1/4 are mirrored. Because only one mirror port is configured on this module, the traffic is mirrored as configured.

To display the inbound and outbound traffic mirrored to each mirror port as configured in this example, enter the following command at any level of the CLI:

```
BigIron MG8# show monitor config
Port 1/4
  Output mirrored by: 3/4
Port 3/1
  Input mirrored by: 1/1
  Output mirrored by: 1/1
Port 3/2
  Input mirrored by: 3/4
  Output mirrored by: 3/4
Port 3/3
  Input mirrored by: 1/2
```

Syntax: show monitor config

This output does not display the input traffic mirrored to mirror port 1/2 from port 3/1 and mirrored to mirror port 1/1 from port 3/3 because the mirroring of this traffic is not explicitly configured.

To display the actual traffic mirrored to each mirror port despite the configuration in this example, enter the following command at any level of the CLI:

```
BigIron MG8# show monitor actual
Mirror port 1/1:
  Input Traffic from port: 3/1 3/3
  Output Traffic from port: 3/1
Mirror port 1/2:
  Input Traffic from port: 3/1 3/3
Mirror port 3/4:
  Input Traffic from port: 3/2
  Output Traffic from port: 1/4 3/2
```

Syntax: show monitor actual

This output displays the input traffic mirrored to mirror port 1/2 from port 3/1 and mirrored to mirror port 1/1 from port 3/3, which are not explicitly configured.

Monitoring an Individual Trunk Port

By default, when you monitor the primary port in a trunk group, aggregated traffic for all the ports in the trunk group is copied to the mirror port. You can configure the device to monitor individual ports in a trunk group. You can monitor the primary port or a secondary port individually.

NOTE: You can use only one mirror port for each monitored trunk port.

To monitor traffic on an individual port in a trunk group, enter commands such as the following:

```
BigIron MG8(config)# mirror ethernet 2/1
BigIron MG8(config)# trunk switch ethernet 4/1 to 4/4
BigIron MG8(config-trunk-4/1-4/4)# config-trunk-ind
BigIron MG8(config-trunk-4/1-4/4)# monitor ethe-port-monitored 5/1 ethernet 2/1 in
```

Syntax: [no] config-trunk-ind

Syntax: [no] monitor ethe-port-monitored <port> | named-port-monitored <port-name>
ethernet <port> in | out | both

The **config-trunk-ind** command enables configuration of individual ports in the trunk group. You need to enter the **config-trunk-ind** command only once in a trunk group. After you enter the command, all applicable port configuration commands apply to individual ports only.

NOTE: If you enter **no config-trunk-ind**, all port configuration commands are removed from the individual ports and the configuration of the primary port is applied to all the ports. Also, once you enter the **no config-trunk-ind** command, the **enable**, **disable**, and **monitor** commands are valid only on the primary port and apply to the entire trunk group.

The **monitor ethe-port-monitored** command in this example enables monitoring of the inbound traffic on port 5/1.

- The **ethe-port-monitored** <port> | **named-port-monitored** <port-name> parameter specifies the trunk port you want to monitor. Use **ethe-port-monitored** <port> to specify a port number. Use **named-port-monitored** <port-name> to specify a trunk port name.
- The **ethernet** <port> parameter specifies the port to which the traffic analyzer is attached.
- The **in** | **out** | **both** parameter specifies the traffic direction to be monitored.

Chapter 9

Maintaining a BigIron MG8

This chapter provides the following information:

- A recommended hardware maintenance schedule
- Replacing an air filter
- Cleaning the fiber-optic connectors
- Replacing a management module
- Replacing an interface module
- Replacing a switch fabric module
- Replacing a fiber-optic module
- Replacing an AC power supply
- Replacing cooling system components

WARNING: The procedures in this manual are for qualified service personnel.

Hardware Maintenance Schedule

The BigIron MG8 requires minimal maintenance for its hardware components. Foundry recommends doing the following:

- Replacing the air filter every 6 months.
- Cleaning the fiber-optic connectors on a fiber-optic port and the connected fiber cable each time you disconnect the cable.

Otherwise, you can replace the following hardware components as needed:

- All modules (management, interface, and switch fabric)
- Fiber-optic modules
- AC power supplies
- Cooling system:
 - Two fans
 - Two fan controller modules (each module controls one fan)

CAUTION: Do not remove the switch fabric module while the BigIron MG8 chassis is powered on and running. If you attempt to remove this module while the chassis is powered on and running, communication between the installed modules will stop.

Replacing an Air Filter

Foundry recommends replacing the air filter that filters air entering the BigIron MG8 chassis every 6 months. Replacing this filter regularly prevents the accumulation of dust on module components.

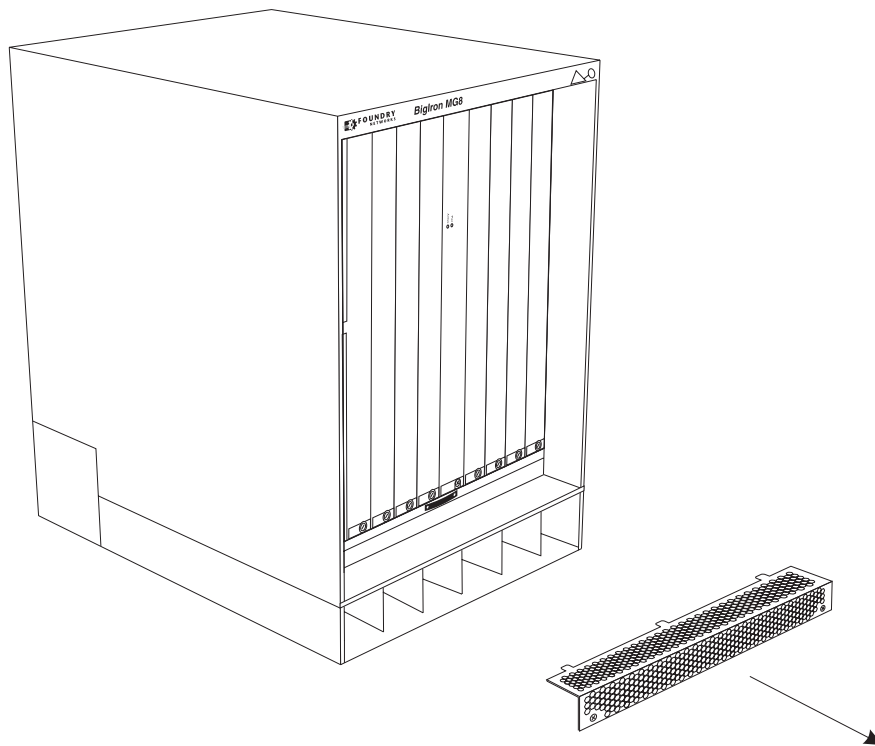
You can replace the air filter while the BigIron MG8 chassis is powered on and running. To perform this task, you need the following:

- A small flathead screwdriver
- A replacement air filter, which you can order from Foundry.

To replace the air filter, do the following:

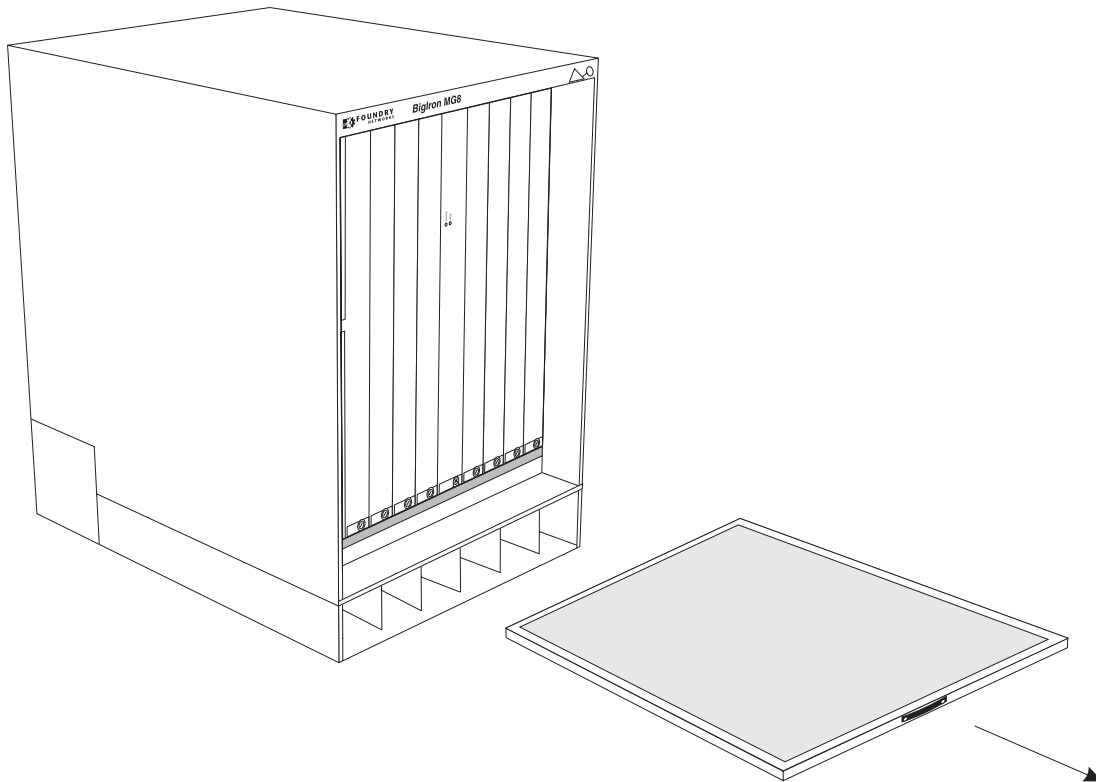
1. Loosen the two screws from the front of the air intake grill.
2. Remove the air intake grill by pulling it away from the chassis as shown in Figure 9.1.

Figure 9.1 Removing Air Intake Grill



3. Using the handle on the air filter bracket, slide the air filter out of the chassis as shown in Figure 9.2.

Figure 9.2 Removing Air Filter



4. Insert the replacement air filter by sliding it along the metal guides until the front of the air filter bracket is flush with the front of the module rack.
5. Replace the air intake grill (the tabs at the back of the grill must mate with the slots in the module rack).
6. Secure the air intake grill with the two screws.

Cleaning the Fiber-Optic Connectors

To avoid problems with the connection between the fiber-optic module connectors and the fiber cable connectors, Foundry strongly recommends cleaning both connectors each time you disconnect and reconnect them. In particular, dust can accumulate in the connectors and cause problems such as reducing the optic launch power.

To clean the fiber cable connectors, Foundry recommends using a fiber-optic reel-type cleaner. You can purchase this type of cleaner from the following Website:

http://www.fisfiber.com/Home_Page.asp

When not using a fiber-optic module connector, make sure to keep the protective covering on.

Replacing a Management Module

You can remove a management module and replace it with a new one while the BigIron MG8 chassis is powered on and running.

This section provides information about the following tasks:

- Removing a management module
- Installing a new management module

Removing a Management Module

You can remove a management module while the BigIron MG8 chassis is powered on and running.

NOTE: Before removing and replacing an active or standby management module, you need to understand how these actions affect management module redundancy. For more information, see “Removal and Replacement of a Management Module” on page 6-3.

Before removing a management module from the BigIron MG8 chassis, have the following on hand:

- An ESD wrist strap with a plug for connection to the ESD connector on the BigIron MG8 chassis.

WARNING: For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

- A large flat-head screwdriver.

To remove a management module from the BigIron MG8 chassis, do the following:

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the upper right corner of the chassis front.
2. Using the flathead screwdriver if necessary, loosen the two thumbscrews on the ends of the module.
3. Pull the card ejectors towards you, and away from the module front panel. This action unseats the module from the backplane.
4. Pull the module out of the chassis, and place in an anti-static bag for storage if desired.
5. Install a new module in the slot. For information about performing this task, see “Installing a New Management Module”.

CAUTION: If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.

Installing a New Management Module

You can install a management module while the BigIron MG8 chassis is powered on and running.

Before installing a module into the BigIron MG8 chassis, have the following on hand:

- A new management module, which you can order from Foundry.
- An ESD wrist strap with a plug for connection to the ESD connector on the BigIron MG8 chassis.

WARNING: For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

- A large flat-head screwdriver.

To install a new management module in the BigIron MG8 chassis, do the following:

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the upper right corner of the chassis front.
2. Remove the module from its packaging.
3. Insert the module into the chassis slot, and slide the card along the card guide until the ejectors on either side of the module move close to the module front panel.
4. Push the ejectors even closer until they are flush with the module front panel. This action will fully seat the module in the backplane.
5. Tighten the two screws at either end of the module front panel by pushing them in and turning them clockwise. If desired, tighten the screws further using the flat-head screwdriver.

Replacing an Interface Module

You can remove an interface module and replace it with a new one while the BigIron MG8 chassis is powered on and running.

This section provides information about the following tasks:

- Removing an interface module
- Installing a new interface module

Removing an Interface Module

You can remove an interface module while the BigIron MG8 chassis is powered on and running.

Before removing an interface module from the BigIron MG8 chassis, you must disable the module, which prevents the remaining interface modules in the chassis from dropping user packets.

To perform this task, you must have the following on hand:

- An ESD wrist strap with a plug for connection to the ESD connector on the BigIron MG8 chassis.

WARNING: For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

- A large flat-head screwdriver.

To remove an interface module from the BigIron MG8 chassis, do the following:

1. Disable the module by entering the **power-off lp** <slot-number> command at the Privileged EXEC level of the CLI. For the <slot-number> parameter, specify 1 – 8: 1 indicates the leftmost chassis slot, while 8 indicates the rightmost chassis slot.
2. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the upper right corner of the chassis front.
3. Using the flathead screwdriver if necessary, loosen the two thumbscrews on the ends of the module.
4. Pull the card ejectors towards you, and away from the module front panel. This action unseats the module from the backplane.
5. Pull the module out of the chassis, and place in an anti-static bag for storage if desired.
6. Install a new module in the slot. For information about performing this task, see “Installing a New Interface Module”.

CAUTION: If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.

Installing a New Interface Module

You can install a new interface module while the BigIron MG8 chassis is powered on and running.

Before installing one of these modules into the BigIron MG8 chassis, have the following on hand:

- A new interface module, which you can order from Foundry.
- An ESD wrist strap with a plug for connection to the ESD connector on the BigIron MG8 chassis.

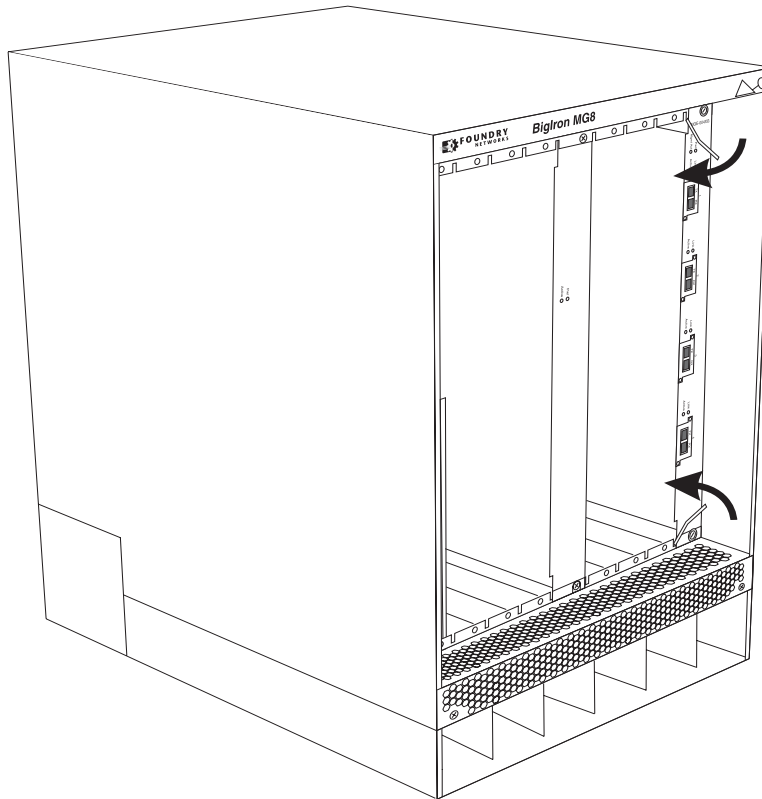
WARNING: For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

- A large flat-head screwdriver.

To install a new interface module in the BigIron MG8 chassis, do the following:

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the upper right corner of the chassis front.
2. Remove the module from its packaging.
3. Insert the module into the chassis slot, and slide the card along the card guide until the ejectors on either side of the module move close to the module front panel.
4. Push the ejectors in the directions shown in Figure 9.3 until they are flush with the module front panel. This action will fully seat the module in the backplane.
5. Tighten the two screws at either end of the module front panel by pushing them in and turning them clockwise. If desired, tighten the screws further using the flat-head screwdriver.

Figure 9.3 Installing a Module



Replacing a Switch Fabric Module

You can remove a switch fabric module and replace it with a new one. Before performing the tasks in this section, you must power off the BigIron MG8 chassis.

CAUTION: Do not remove the switch fabric module while the BigIron MG8 chassis is powered on and running. If you attempt to remove this module while the chassis is powered on and running, all traffic being handled by the system will stop.

This section provides information about the following tasks:

- Removing a switch fabric module
- Installing a new switch fabric module

Removing a Switch Fabric Module

Before removing a switch fabric module from the BigIron MG8 chassis, have the following on hand:

- An ESD wrist strap with a plug for connection to the ESD connector on the BigIron MG8 chassis.

WARNING: For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

- A large flat-head screwdriver.

To remove a switch fabric module from the BigIron MG8 chassis, do the following:

1. Power off the BigIron MG8 chassis. If your power source is Foundry's AC power supplies, disconnect each power supply cord from the wall outlet. If you are providing your own DC power source, disconnect or turn off the power source.
2. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the upper right corner of the chassis front.
3. Using the flathead screwdriver if necessary, loosen the two thumbscrews on the ends of the module.
4. Pull the card ejectors towards you, and away from the module front panel. This action unseats the module from the backplane.
5. Pull the module out of the chassis, and place in an anti-static bag for storage if desired.
6. Install a new switch fabric module in the slot. For information about performing this task, see "Installing a New Switch Fabric Module" on page 9-7.

Installing a New Switch Fabric Module

Before installing a new switch fabric module, you must power off the BigIron MG8 chassis. For information about powering off the chassis, see "Removing a Switch Fabric Module" on page 9-7.

CAUTION: Do not remove the switch fabric module while the BigIron MG8 chassis is powered on and running. If you attempt to remove this module while the chassis is powered on and running, all traffic being handled by the system will stop.

Before installing a new switch fabric module into the BigIron MG8 chassis, have the following on hand:

- A new switch fabric module, which you can order from Foundry.
- An ESD wrist strap with a plug for connection to the ESD connector on the BigIron MG8 chassis.

WARNING: For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

- A large flat-head screwdriver.

To install a new switch fabric module in the BigIron MG8 chassis, do the following:

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the upper right corner of the chassis front.
2. Remove the new module from its packaging.
3. Insert the module into the chassis slot, and slide the card along the card guide until the ejectors on either side of the module move close to the module front panel.
4. Push the ejectors even closer until they are flush with the module front panel. This action will fully seat the module in the backplane.
5. Tighten the two screws at either end of the module front panel by pushing them in and turning them clockwise. If desired, tighten the screws further using the flat-head screwdriver.
6. If your power source is Foundry's AC power supplies, plug the AC power cord into the wall outlet. Repeat this step for each installed power supply.

NOTE: Make sure you apply power to all AC power supplies (or at least the three primary power supplies) at the same time. Otherwise, the device either will not boot at all, or will boot and then repeatedly display a warning message stating that you need to add more power supplies.

7. If you are supplying your own DC power source, power on the source.
8. Verify that the BigIron MG8 has initialized successfully. For information, see “Verifying Proper Operation” on page 3-14.

Replacing a Fiber-Optic Module

You can remove a fiber-optic module from a 10 Gigabit Ethernet port and replace it with a new one while the BigIron MG8 chassis is powered on and running.

This section provides information about the following tasks:

- Removing the fiber-optic module
- Installing a new fiber-optic module
- Cabling a fiber-optic module

Removing a Fiber-Optic Module

You can remove a fiber-optic module from a 10 Gigabit Ethernet port while the BigIron MG8 chassis is powered on and running.

Before removing a fiber-optic module, have the following on hand:

- An ESD wrist strap with a plug for connection to the ESD connector on the BigIron MG8 chassis.

WARNING: For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

- The protective covering that you removed from the fiber-optic module port when you initially installed the module.
- A small flathead screwdriver.

To remove a fiber-optic module from a 10 Gigabit Ethernet port, do the following:

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the upper right corner of the chassis front.
2. Disconnect the two fiber cable connectors from the port connectors.
3. Insert the protective covering into the port connectors.
4. Using the flathead screwdriver if necessary, loosen the two thumbscrews on the ends of the module.
5. Pull the module out of the port, and place it in an anti-static bag for storage if desired.
6. Install a new fiber-optic module in the port. For information about performing this task, see “Installing a New Fiber-Optic Module”.

Installing a New Fiber-Optic Module

You can install a new fiber-optic module in a 10 Gigabit Ethernet port while the BigIron MG8 chassis is powered on and running.

Before installing one of these modules into the port, have the following on hand:

- A new fiber-optic module, which you can order from Foundry.
- An ESD wrist strap with a plug for connection to the ESD connector on the BigIron MG8 chassis.

WARNING: For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

- A small flathead screwdriver.

To install a fiber-optic module into a 10 Gigabit Ethernet port, do the following:

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the upper right corner of the chassis front.
2. Remove the new module from its protective packaging.
3. Gently insert the fiber-optic module into the port until the module clicks into place. The fiber-optic modules are keyed to prevent incorrect insertion.
4. Secure the fiber-optic module by tightening the two thumb-screws. If desired, you can further tighten the thumb-screws using the flathead screwdriver.

Cabling a Fiber-Optic Module

To cable a fiber-optic module, do the following:

1. Remove the protective covering from the fiber-optic port connectors and store the covering for future use.
2. Before cabling a fiber-optic module, Foundry strongly recommends cleaning the cable connectors and the port connectors. For more information, see “Cleaning the Fiber-Optic Connectors” on page 9-3.
3. Gently insert the two cable connectors (a tab on each connector should face upward) into the port connectors until the tabs lock into place.
4. Observe the link and active LEDs to determine if the network connections are functioning properly. For more information about the LED indicators, see Table 4.2.

Replacing an AC Power Supply

You can replace an AC power supply while the BigIron MG8 chassis is powered on and running. The AC power supplies are located in slots along the bottom of the BigIron MG8 chassis as shown in Figure 2.5 on page 2-6.

This section provides information about the following topics:

- Determining which AC power supply has failed, if necessary.
- Replacing an AC power supply.

Determining Which Power Supply Failed

To determine which AC power supply has failed, enter the following command at any CLI command prompt:

```
BigIron MG8# show chassis
```

This command displays status information for the fans and power supplies, and temperature readings for various components in the chassis. The power supplies are numbered in the display. “Power 1” indicates the power supply installed in power supply slot 1, “power 2” indicates the power supply installed in slot 2, and so on.

If the display indicates “Installed (Failed)” for any of the slots, the power supply installed in that particular slot has failed.

Replacing an AC Power Supply

To replace an AC power supply, you need the following:

- A new AC power supply, which you can order from Foundry
- A small flathead or Phillips screwdriver

WARNING: The AC power supplies are hot swappable, which means they can be removed and replaced while the BigIron MG8 chassis is powered on and running. However, Foundry recommends that you disconnect the AC

power supply from the wall outlet before removing and replacing the supply. The BigIron MG8 chassis can be running while a power supply is being removed and replaced, but the power supply itself should not be connected to a power source. Otherwise, you could be injured or the AC power supply or other parts of the device could be damaged.

WARNING: The front panel of an AC power supply includes a handle that locks the power supply in the chassis. This handle is a locking mechanism only and should not be used to lift and carry the power supply. You may sustain physical injury or harm if you attempt to lift and carry a power supply using the locking handle.

To replace an AC power supply, do the following:

1. Disconnect the power supply's power cord from the wall outlet.
2. Disconnect the power cord from the power supply front panel.
3. Using the screwdriver, loosen the two screws on both side of the power supply front panel.
4. Slip your fingers under the handle, which is located between the two screws on the power supply faceplate. Pull the handle down and toward you. This action unlocks the power supply from its position in the chassis.
5. Continue to pull the power supply until it is removed from the chassis.
6. Insert the new power supply into the empty power supply slot, using the guides provided on either side of the slot.

CAUTION: Carefully follow the mechanical guides on each side of the power supply slot and make sure the power supply is properly inserted in the guides. Never insert the power supply upside down.

7. After the power supply is fully inserted, push the power supply front panel toward the back of the chassis until the power supply is fully seated.
8. Gently pull the handle on the power supply front panel upward and toward the top of the power supply front panel. This action locks the power supply in place.
9. Use the screwdriver to secure the two screws on either side of the power supply front panel.
10. Connect the AC power cord to the power supply front panel.
11. Connect the power cord to the wall outlet.
12. Observe the LED on the power supply front panel. The LED should be green (steady), which indicates the power supply is providing power to the chassis components. If it is amber or off, the power supply is not providing power to the chassis components. For information about troubleshooting this problem, see Table 3.4 on page 3-14.

Replacing Cooling System Components

The BigIron MG8 cooling system consists of the following replaceable components:

- Two fans
- Two fan control modules

If you have a fan failure, you must replace both the fan and its fan control module. For example, if the fan marked "Fan A" fails, you must also replace the fan control module marked "FCM A." Or, if the fan control module marked "FCM B" fails, you must also replace the fan marked "Fan B."

You can replace a fan or a fan control module while the BigIron MG8 chassis is powered on and running. The fans and fan control modules are located on rear panel of the BigIron MG8 chassis.

The following sections provide more information about replacing these components.

Replacing a Fan

WARNING: To avoid injury, refer to the installation instructions included with the fan replacement kit before removing the fan or fan control modules.

You can remove and replace a fan while the BigIron MG8 chassis is powered on and running.

CAUTION: To avoid overheating of the BigIron MG8 chassis, remove only one fan at a time. Do not remove both fans from the chassis at the same time.

To replace a fan, you need the following:

- A new fan replacement kit, which you can order from Foundry
 - A small flathead screwdriver
 - An ESD wrist strap with a plug for connection to the ESD connector on the BigIron MG8 chassis
-

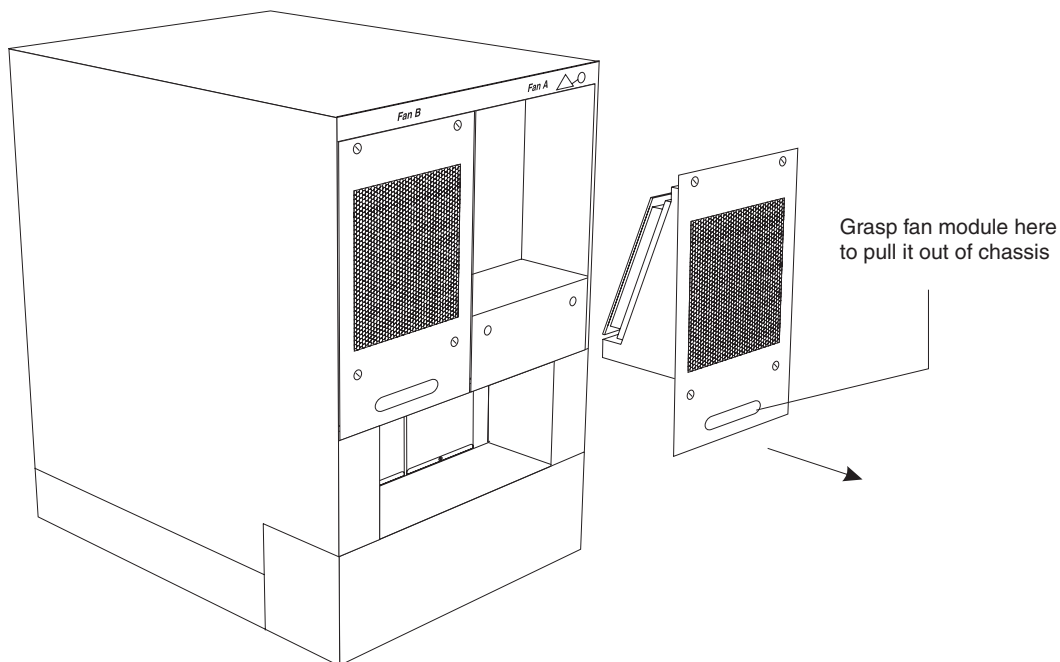
WARNING: For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

To replace a fan, do the following:

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the upper right corner of the chassis rear.
 2. Using the flathead screwdriver, remove the four screws that secure the fan (marked “Fan A” or “Fan B”) to the chassis rear.
 3. Remove the fan from the chassis by inserting your fingers underneath the fan enclosure and pulling the enclosure toward you as shown in Figure 9.4. Pulling the enclosure unseats the fan connector from a chassis connector.
-

WARNING: Be careful not to accidentally insert your fingers into the fan tray while removing it from the chassis. The fan may still be spinning at high speed.

Figure 9.4 Removing a Fan



4. Insert the new fan into the fan slot and push the enclosure in until the face plate is flush with the chassis. Pushing the enclosure in seats the fan connector with the chassis connector.
5. Secure the fan to the chassis by replacing the four screws.
6. Access the CLI, and enter the **show chassis** command to verify that the new fan is operating normally.

7. For information about replacing a fan control module, go on to the next section.

Replacing a Fan Control Module

You can remove and replace a fan control module while the BigIron MG8 chassis is powered on and running. To replace a fan control module, you need the following:

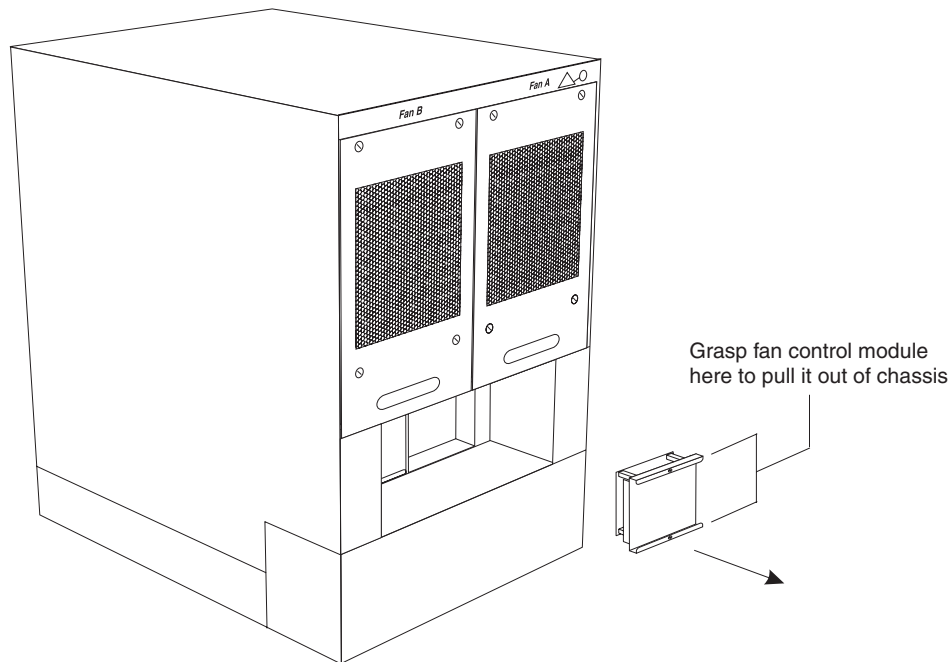
- A new fan control module, which you can order from Foundry
- A small Phillips screwdriver
- An ESD wrist strap with a plug for connection to the ESD connector on the BigIron MG8 chassis

WARNING: For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

To replace a fan control module, do the following:

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the upper right corner of the chassis rear.
2. Using the Phillips screwdriver, loosen the two screws that secure the fan control module (marked “FCM A” or “FCM B”) to the chassis rear.
3. Remove the fan control module from the chassis by grasping and pulling integral handles at the top and bottom of the fan control module face plate as shown in Figure 9.5. Pulling the fan control module unseats the fan control module connector from a chassis connector.

Figure 9.5 Replacing a Fan Control Module



4. Insert the new fan control module into the fan control module slot, making certain that the LED on the faceplate is closer to the top of the chassis than the bottom of the chassis.
5. Push the fan control module in until the face plate is flush with the chassis. Pushing the module in seats the module connector with the chassis connector.
6. Secure the fan control module to the chassis by tightening the two screws.

The BigIron MG8 initializes the replaced fan control module automatically.

7. Repeat Step 2 through Step 6 to replace the other control module.
8. Observe the LED on the fan control module face plate to verify that it is operating normally.

The LED should be a steady green, which indicates that the associated fan is working and responding to the fan control module. If for some reason a replaced fan control module does not initialize automatically, you can initialize it manually. For more information, see "Initializing the Fan Control Modules" on page 7-11.

Chapter 10

Upgrading Software Images and Configuration Files

This chapter provides the following information:

- A software upgrade overview.
- How to upgrade software images on the management and interface modules.
- How to upgrade field-programmable gate array (FPGA) images on a 4-port 10 Gigabit Ethernet module.
- How to load and save the startup configuration file and the running configuration.

Software Upgrade Overview

This section provides the following information:

- An overview of the boot flash and code flash.
- The upgradable images stored on the boot flash and code flash and the circumstances under which you need to upgrade them.
- The images provided on the CD that ships with the BigIron MG8 Layer 3 Switch.

Flash

Each management module and interface module includes a boot flash and a code flash. The boot flash stores the boot image or boot code for the respective module. The code flash stores the monitor image, the primary and/or secondary Terathon IronWare image, and configuration data for the respective module.

Each interface module includes an additional code flash that stores field-programmable gate array (FPGA) images.

Table 10.1 provides the size of the boot flash and code flash for each module.

Table 10.1: Boot and Code Flash Sizes

Module	Boot Flash Size	Code Flash Size
Management	512K	32M
Interface	512K	16M (for monitor, primary Terathon IronWare, and secondary Terathon IronWare images; and configuration data) 8M (for FPGA images)

Upgradable Software Images

You can upgrade several software images on the management and interface modules. Table 10.2 describes the upgradable images, their location, what they contain, and when to upgrade them.

Table 10.2: Upgradable BigIron MG8 Software Images

Module	Location	Image/Contents	When to Upgrade Image
Management	Boot flash	<ul style="list-style-type: none"> boot – The image from which the management module boots. 	Typically, you should not have to upgrade the boot image.
Management	Code flash	<ul style="list-style-type: none"> monitor – This image stores the management module's Real Time Operating System (RTOS) and a development-debugging agent. After the initial startup, the BigIron MG8 system loads the RTOS from this image, if present, or from the boot image, if not present. 	<p>Typically, you upgrade the monitor image when you upgrade your primary and/or secondary Terathon IronWare image.</p> <p>When a new type of interface module is installed in the BigIron MG8 chassis, you might need to upgrade the monitor image. Upgrading this image updates the management module's RTOS and enables the management module to recognize the new interface module.</p>
Management	Code flash	<ul style="list-style-type: none"> primary Terathon IronWare – This image contains the management module's primary Terathon IronWare Switch or Layer 3 Switch software. secondary Terathon IronWare – This image contains the management module's secondary Terathon IronWare Switch or Layer 3 Switch software. 	Typically, you upgrade the primary and/or secondary Terathon IronWare image when Foundry introduces a new version.

Table 10.2: Upgradable BigIron MG8 Software Images (Continued)

Module	Location	Image/Contents	When to Upgrade Image
Management	Code flash	<p>If you copy the primary and/or secondary Terathon IronWare image to all interface modules using the copy command with the all 0 keyword, the management module makes a copy of the image and stores it in its code flash as follows:</p> <ul style="list-style-type: none"> • lp-primary-0 – This image contains the interface module’s primary Terathon IronWare Switch or Layer 3 Switch software. • lp-secondary-0 – This image contains the interface module’s secondary Terathon IronWare Switch or Layer 3 Switch software. <p>NOTE: The management module stores this software for the interface modules; it does not run this software.</p> <p>If you copy the primary and/or secondary Terathon IronWare image to a specified chassis slot using the copy command with the <chassis-slot-number> parameter, the management module does not make a copy of the image.</p> <p>For more information about synchronizing these images, if present, between the management module and the interface module, see “Synchronizing the Interface Module’s Terathon IronWare Images Between Management and Interface Modules” on page 7-15.</p>	Typically, you upgrade the primary and/or secondary Terathon IronWare image when Foundry introduces a new version.
Interface	Boot flash	<ul style="list-style-type: none"> • boot – The image from which the management module boots. Upon first startup, the interface module loads its RTOS from the boot image or the monitor image in the interface module’s code flash. 	Typically, you should not have to upgrade the boot image.
Interface	Code flash	<ul style="list-style-type: none"> • monitor – This image contains the interface module’s RTOS. Upon subsequent startups, the interface module loads its RTOS from this image, if present, or the interface module’s boot image, if not present. 	Typically, you upgrade the monitor image when you upgrade your primary and/or secondary Terathon IronWare image.

Table 10.2: Upgradable BigIron MG8 Software Images (Continued)

Module	Location	Image/Contents	When to Upgrade Image
Interface	Code flash	<ul style="list-style-type: none"> primary Terathon IronWare – This image contains the interface module’s primary Terathon IronWare Switch or Layer 3 Switch software. secondary Terathon IronWare – This image contains the interface module’s secondary Terathon IronWare Switch or Layer 3 Switch software. 	Typically, you upgrade the primary and/or secondary Terathon IronWare image when Foundry introduces a new version.
Interface	Code flash	<p>The following are field-programmable gate array (FPGA) images:</p> <ul style="list-style-type: none"> PBIF XTM XPP 	Typically, you upgrade one or more of the FPGA images when Foundry introduces a new version.

Image File Types

Table 10.3 lists the image file types shipped with the BigIron MG8 Layer 3 Switch. For the latest information about supported images, see the release notes.

Table 10.3: BigIron MG8 Software Images

Module	Monitor Image	Terathon IronWare Image
Management	<ul style="list-style-type: none"> mb<xxxx>.bin – This image stores both the boot and monitor images for the management module. 	<ul style="list-style-type: none"> mpr<xxxx>.bin (Switching Router) mps<xxxx>.bin (Switch)
Interface	<ul style="list-style-type: none"> lb<xxxx>.bin – This image stores both the boot and monitor images for the interface module. 	<ul style="list-style-type: none"> lp<xxxx>.bin

NOTE: <xxxx> indicates the version number.

Overview of the Tasks in the Software Upgrade Process

To upgrade all or some of the BigIron MG8 software images, you must perform the following general steps:

1. Determine the versions of the software images currently installed and running on the BigIron MG8 system.

For information about performing this task, see “Determining the Currently Installed and Running Software Images” on page 10-5.

2. Copy the new software image from a source to a destination.

The source from which to copy the new image is usually a TFTP server to which the BigIron MG8 system has access or a PCMCIA flash card inserted in the management module’s slot 1 or 2. The destination to which to copy the new image is either the management module’s code flash or a flash card inserted in slot 1 or 2, or all

or one specified interface module.

For information about performing this task, see “Upgrading the Management Module’s Software Images” on page 10-11 and “Upgrading the Interface Module’s Images” on page 10-12.

3. Reboot the management module.

For information about performing this task, see “Rebooting the Management Module” on page 10-14.

Determining the Currently Installed and Running Software Images

This section describes how to use the following commands:

- **show flash** – This command displays the images currently installed in the management and interface modules’ code flash and boot flash.
- **show version** – This command displays the images currently running. The images can be loaded from a location other than the management and interface modules’ code flash or boot flash. For example, the management module’s primary Terathon IronWare image can be loaded from a flash card in a PCMCIA slot, or the interface module’s primary Terathon IronWare image can be loaded from a TFTP server.

Foundry recommends using both **show flash** and **show version** commands before and after upgrading the software images.

To determine the software image versions currently installed in code flash and boot flash, enter the following command at any level of the CLI:

```

BigIron MG8# show flash
Active Management Module (Top Slot)
Code Flash - Type MT28F128J3, Size 32 MB
  o Software Image (Primary)
    Version 1.0.0T103, Size 3140673 bytes, Check Sum e16c
    Compiled on Sep  2 2003 at 11:23:44 labeled as mpr01000
  o Software Image (Secondary)
    Version 1.0.0T101, Size 2076857 bytes, Check Sum 9480
    Compiled on Aug 29 2003 at 15:40:07 labeled as mps01000
  o LP Software Image (Primary for Module Type 0)
    Version 1.0.0T117, Size 875359 bytes, Check Sum ab5b
    Compiled on Sep  2 2003 at 11:12:09 labeled as lp01000
  o LP Software Image (Secondary for Module Type 0)
    Version 1.0.0T117, Size 856164 bytes, Check Sum 8bb9
    Compiled on Aug 12 2003 at 03:17:39 labeled as lp01000
  o Boot-Monitor Image
    Version 1.0.0T105, Size 396716 bytes, Check Sum 6521
    Compiled on Sep  2 2003 at 11:25:01 labeled as mb01000
  o Startup Configuration
    Size 401 bytes, Check Sum 615c
    Modified on Feb  5 2106 at 22:28:15
Boot Flash - Type AM29LV040B, Size 512 KB
  o Boot-Monitor Image
    Version 1.0.0T105, Size 396716 bytes, Check Sum 6521
    Compiled on Sep  2 2003 at 11:25:01 labeled as mb01000
~~~~~
Line Card Slot 1
Code Flash: Type M58LW064D, Size 16 MB
  o Software Image (Primary)
    Version 1.0.0T117, Size 875359 bytes, Check Sum ab5b
    Compiled on Sep  2 2003 at 11:12:09 labeled as lp01000
  o Software Image (Secondary)
    Version 1.0.0T117, Size 856164 bytes, Check Sum 8bb9
    Compiled on Aug 12 2003 at 03:17:39 labeled as lp01000
  o Boot-Monitor Image
    Version 1.0.0T115, Size 261247 bytes, Check Sum 703e
    Compiled on Sep  2 2003 at 11:12:34 labeled as lb01000
Boot Flash: Type AM29LV040B, Size 512 KB
  o Boot-Monitor Image
    Version 1.0.0T115, Size 261247 bytes, Check Sum 703e
    Compiled on Sep  2 2003 at 11:12:34 labeled as lb01000
FPGA Version: PBIF Ver 36 XTM Ver 89.0 XPP Ver 88.6
XTM File name: 10ge_xtm_top.ncd, Compile time: 2003/07/31 22:07:10
XPP File name: 10ge_xppe_top_6k.ncd, Compile time: 2003/07/31 11:29:58
~~~~~
...

```

Syntax: show flash

The highlighted lines in the display show information relevant to the upgradable software images. In general, the display shows the following information.

Table 10.4: Code Flash and Boot Flash Information

This Field...	Displays...
Management Modules	
<type> Management Module (<location>)	<p>The management module for which flash information is displayed.</p> <p>The <type> parameter indicates an active or standby management module.</p> <p>The <location> parameter indicates the top or bottom slot (M1 or M2, respectively).</p>
Code Flash	The model number and size of the management module's code flash.
IronWare Image (Primary or Secondary)	<p>Indicates the Terathon IronWare image installed in the primary or secondary location in the management module's code flash. The image can be one of the following:</p> <ul style="list-style-type: none"> • mpr<xxxx> – The Switching Router Terathon IronWare image. • mps<xxxx> – The Switch Terathon IronWare image. <p>The output displays the following information about the image:</p> <ul style="list-style-type: none"> • Version – “1.0.0Txy” indicates the image version number. The “Txy” is used by Foundry for record keeping. The “xx” indicates the hardware type, while the “y” indicates the image type. • Size – The size, in bytes, of the image. • Check sum – A unique ID for the image. If the contents of the image change, the check sum changes also. • Compilation date and time – The date and time that Foundry compiled the image .
LP IronWare Image (Primary or Secondary for Module Type 0)	<p>Indicates the interface modules' primary and/or secondary Terathon IronWare image stored in the management module's code flash if you copied the primary and/or secondary Terathon IronWare image to all interface modules using the copy command with the all 0 keyword. The management module stores these images only; it does not run the images.</p> <p>The image must be lp<xxxx>. The output displays the following information about the image:</p> <ul style="list-style-type: none"> • Version – “1.0.0Txy” indicates the image version number. The “Txy” is used by Foundry for record keeping. The “xx” indicates the hardware type, while the “y” indicates the image type. • Size – The size, in bytes, of the image. • Check sum – A unique ID for the image. If the contents of the image change, the check sum changes also. • Compilation date and time – The date and time that Foundry compiled the image .

Table 10.4: Code Flash and Boot Flash Information (Continued)

This Field...	Displays...
Boot-Monitor Image	<p>Indicates the monitor image installed in the management module's code flash. The image must be mb<xxxxx>. The output displays the following information about the image:</p> <ul style="list-style-type: none"> • Version – "1.0.0Txy" indicates the image version number. The "Txy" is used by Foundry for record keeping. The "xx" indicates the hardware type, while the "y" indicates the image type. • Size – The size, in bytes, of the image. • Check sum – A unique ID for the image. If the contents of the image change, the check sum changes also. • Compilation date and time – The date and time that Foundry compiled the image .
Startup Configuration	<p>The output displays the following information about the startup configuration, which is saved in the management module's code flash:</p> <ul style="list-style-type: none"> • Size – Size, in bytes, of the startup configuration. • Check sum – A unique ID for the file. If the contents of the file change, the check sum changes also. • Modification date and time – Date and time that the startup configuration was last saved.
Boot Flash	The model number and size of the management module's boot flash.
Boot-Monitor Image	<p>Indicates the boot image installed in the management module's boot flash. The image must be mb<xxxxx>. The output displays the following information about the image:</p> <ul style="list-style-type: none"> • Version – "1.0.0Txy" indicates the image version number. The "Txy" is used by Foundry for record keeping. The "xx" indicates the hardware type, while the "y" indicates the image type. • Size – The size, in bytes, of the image. • Check sum – A unique ID for the image. If the contents of the image change, the check sum changes also. • Compilation date and time – The date and time that Foundry compiled the image .
Interface Modules	
Line Card Slot <number>	<p>The interface module for which flash information is displayed.</p> <p>The <number> parameter indicates the number of the chassis slot, 1 – 8, in which the interface module is installed.</p>
Code Flash	The model number and size of the interface module's code flash.

Table 10.4: Code Flash and Boot Flash Information (Continued)

This Field...	Displays...
IronWare Image (Primary or Secondary)	<p>Indicates the Terathon IronWare image installed in the primary or secondary location in the interface module's code flash. The image must be lp<xxxxx>. The output displays the following information about the image:</p> <ul style="list-style-type: none"> • Version – "1.0.0Txy" indicates the image version number. The "Txy" is used by Foundry for record keeping. The "xx" indicates the hardware type, while the "y" indicates the image type. • Size – The size, in bytes, of the image. • Check sum – A unique ID for the image. If the contents of the image change, the check sum changes also. • Compilation date and time – The date and time that Foundry compiled the image.
Boot-Monitor Image	<p>Indicates the monitor image installed in the interface module's code flash. The image must be lb<xxxxx>. The output displays the following information about the image:</p> <ul style="list-style-type: none"> • Version – "1.0.0Txy" indicates the image version number. The "Txy" is used by Foundry for record keeping. The "xx" indicates the hardware type, while the "y" indicates the image type. • Size – The size, in bytes, of the image. • Check sum – A unique ID for the image. If the contents of the image change, the check sum changes also. • Compilation date and time – The date and time that Foundry compiled the image .
Boot Flash	The model number and size of the interface module's boot flash.
Boot-Monitor Image	<p>Indicates the boot image installed in the interface module's boot flash. The image must be lb<xxxxx>. The output displays the following information about the image:</p> <ul style="list-style-type: none"> • Version – "1.0.0Txy" indicates the image version number. The "Txy" is used by Foundry for record keeping. The "xx" indicates the hardware type, while the "y" indicates the image type. • Size – The size, in bytes, of the image. • Check sum – A unique ID for the image. If the contents of the image change, the check sum changes also. • Compilation date and time – The date and time that Foundry compiled the image .

Table 10.4: Code Flash and Boot Flash Information (Continued)

This Field...	Displays...
FPGA image Information	<p>The output displays the following information about the field-programmable gate array (FPGA) images, which are installed on the interface module:</p> <ul style="list-style-type: none"> • FPGA Version – The version number of the PBIF, XTM, and XPP images. • XTM image information – The name and compilation date and time of the XTM image. • XPP image information – The name and compilation date and time of the XPP image.

To determine the image versions currently running, enter the following command at any level of the CLI:

```
BigIron MG8# show version
HW: BigIron MG8 Router
=====
Active Management Module (Serial #: Not Exist, Part #: Not Exist):
Boot      : Version 1.0.0T105 Copyright (c) 1996-2003 Foundry Networks, IncFoundry.
Compiled on Sep  2 2003 at 11:25:01 labeled as mb01000
(396716 bytes) from boot flash
Monitor   : Version 1.0.0T105 Copyright (c) 1996-2003 Foundry Networks, IncFoundry.
Compiled on Sep  2 2003 at 11:25:01 labeled as mb01000
(396716 bytes) from code flash
IronWare  : Version 1.0.0T103 Copyright (c) 1996-2003 Foundry Networks, IncFoundry.
Compiled on Sep  2 2003 at 11:23:44 labeled as mpr01000
(3140673 bytes) from Primary

CPLD Version: 8
800 MHz Power PC processor 750FX (version 7000/0202) 133 MHz bus
512 KB Boot Flash (AM29LV040B), 32 MB Code Flash (MT28F128J3)
512 MB DRAM
Active Management uptime is 3 hours 45 minutes 31 seconds
=====
Backplane (Serial #: Not Exist, Part #: Not Exist)
Switch Fabric (Serial #: Not Exist, Part #: Not Exist, FPGA Version: 4)
=====
SL 1: BigIron MG8 4x10 (Serial #: abcd, Part #: Not Exist)
Boot      : Version 1.0.0T115 Copyright (c) 1996-2003 Foundry Networks, Inc Foundry.
Compiled on Sep  2 2003 at 11:12:34 labeled as lb01000
(261247 bytes) from boot flash
Monitor   : Version 1.0.0T115 Copyright (c) 1996-2003 Foundry Networks, Inc
Foundry.
Compiled on Sep  2 2003 at 11:12:34 labeled as lb01000
(261247 bytes) from code flash
IronWare  : Version 1.0.0T117 Copyright (c) 1996-2003 Foundry NetworksFoundry, Inc.
Compiled on Sep  2 2003 at 11:12:09 labeled as lp01000
(875359 bytes) from Primary
```

Syntax: show version

The highlighted lines in the output indicate the currently running boot, monitor, and Terathon IronWare images for the management and interface modules. In general, note the following:

- “1.0.0Txy” indicates the image version number. The “Txy” is used by Foundry for record keeping. The “xx” indicates the hardware type, while the “y” indicates the image type.
- “Compiled on <date> at <time>” indicates the date and time that Foundry compiled the image .
- mb<xxxx> indicates the boot and monitor images for the management module; mpr<xxxx> indicates the Switching Router Terathon IronWare software; mps<xxxx> indicates the Switch Terathon IronWare software; lb<xxxx> indicates the boot and monitor images for the interface module; and lp<xxxx> indicates the Terathon IronWare image for the interface module.
- “(<number> bytes)” indicates the size, in bytes, of the image.
- “from <location>” indicates the location from which the specified image is loaded.

Upgrading the Management Module’s Software Images

This section explains how to upgrade the following management module software images:

- Monitor
- Terathon IronWare

Upgrading the Management Module’s Monitor Image

To upgrade the management module’s monitor image in code flash, you must perform the following steps:

1. Place the new monitor image on a TFTP server to which the BigIron MG8 system has access or on a PCMCIA flash card inserted in slot 1 or 2.
2. Copy the new monitor image from the TFTP server or a flash card in slot 1 or 2 to the management module’s code flash or a flash card in slot 1 or 2. To perform this step, enter one of the following commands at the Privileged EXEC level of the CLI:
 - **copy tftp flash <ip-addr> <image-name> monitor**
 - **copy tftp slot1 | slot2 <ip-addr> <image-name> monitor**
 - **copy slot1 | slot2 flash <image-name> monitor**
 - **copy slot1 | slot2 slot1 | slot2 <image-name> <dest-name>**

For information about the image name to specify, see Table 10.3 or the release notes.

3. Verify that the new monitor image has been successfully copied to code flash or slot 1 or 2 by entering one of the following commands at the Privileged EXEC level of the CLI:
 - **show flash** (if the destination is code flash)
 - **dir /<path-name>/** (if the destination is slot 1 or 2)

Check for the monitor image and the date and time at which the new image was built.

If you want to upgrade other software images, go to the appropriate upgrade section for information. If you have completed upgrading the software images, you must reboot the management module to complete the upgrade process. For more information, see “Rebooting the Management Module” on page 10-14.

Upgrading the Management Module’s Terathon IronWare Software Image

To upgrade the management module’s Terathon IronWare image (primary or secondary), you must perform the following steps:

1. Place the new Terathon IronWare image on a TFTP server to which the BigIron MG8 system has access or on a PCMCIA flash card inserted in slot 1 or 2.
2. Copy the new Terathon IronWare image from the TFTP server or a flash card in slot 1 or 2 to the management module’s code flash or a flash card in slot 1 or 2. To perform this step, enter one of the following commands at the Privileged EXEC level of the CLI:

- **copy tftp flash** <ip-addr> <image-name> **primary** | **secondary**
- **copy tftp slot1** | **slot2** <ip-addr> <image-name> **primary** | **secondary**
- **copy slot1** | **slot2 flash** <image-name> **primary** | **secondary**
- **copy slot1** | **slot2 slot1** | **slot2** <image-name> <dest-name>

For information about the image name to specify, see Table 10.3 or the release notes.

3. Verify that the new Terathon IronWare image has been successfully copied to the specified destination by entering one of the following commands at the Privileged EXEC level of the CLI:

- **show flash** (if the destination was code flash)
- **dir /<path-name>/** (if the destination was slot 1 or 2)

Check for the primary or secondary image and the date and time that it was placed in the directory.

If you want to upgrade other software images, go to the appropriate upgrade section for information. If you have completed upgrading the software images, you must reboot the management module to complete the upgrade process. For more information, see “Rebooting the Management Module” on page 10-14.

Upgrading the Interface Module’s Images

This section explains how to upgrade the following interface module software images:

- Monitor
- Terathon IronWare

Upgrading the Interface Module’s Monitor Image

This section explains how to do the following:

- Upgrade the monitor image in code flash.
- Upgrade the boot image in boot flash.

Upgrading the Monitor Image in Code Flash

To upgrade the monitor image in code flash on all interface modules or an interface module in a specified chassis slot, you must perform the following steps:

1. Place the new monitor image on a TFTP server to which the BigIron MG8 system has access or on a PCMCIA flash card inserted in slot 1 or 2.
2. Copy the new monitor image from the TFTP server or a flash card in slot 1 or 2 to all interface modules or an interface module in a specified chassis slot. To perform this step, enter one of the following commands at the Privileged EXEC level of the CLI (example: `BigIron MG8#`):
 - **copy tftp lp** <ip-addr> <image-name> **monitor all 0**
 - **copy tftp lp** <ip-addr> <image-name> **monitor** <chassis-slot-number>
 - **copy slot1** | **slot2 lp** <image-name> **monitor all 0**
 - **copy slot1** | **slot2 lp** <image-name> **monitor** <chassis-slot-number>

For information about the image name to specify, see Table 10.3 or the release notes.

3. Verify that the new monitor image has been successfully copied to code flash of all or the specified interface module by entering the following command at any level of the CLI:

show flash

Check for the monitor image and the date and time at which the new image was built.

If you want to upgrade other software images, go to the appropriate upgrade section for information. If you have completed upgrading the software images, you must reboot the management module to complete the upgrade process. For more information, see “Rebooting the Management Module” on page 10-14.

Upgrading the Boot Image in Boot Flash

The procedure for upgrading the boot image in an interface module's boot flash assumes that you have previously upgraded the boot image in the same interface module's code flash. For information about upgrading the boot image in an interface module's code flash, see "Upgrading the Monitor Image in Code Flash" on page 10-12.

NOTE: You must perform this upgrade procedure from a PC or terminal that is directly connected to the management module's Console port. You cannot perform this procedure via a Telnet session.

To upgrade the boot image in an interface module's boot flash, perform the following steps:

1. Specify an immediate interactive boot for the interface module by entering the following command at the Privileged EXEC level of the CLI:

ip boot system interactive <chassis-slot-number>

2. Verify that the interface module is in interactive mode by entering the following command at any CLI level:

show module

In the output, the status of the interface module should be INTERACTIVE.

3. Open an rconsole session to the interface module by entering the following command at the Privileged EXEC level of the CLI.

rconsole <chassis-slot-number>

This command allows you to enter the interface module's monitor CLI.

4. Copy the monitor image from the interface module's code flash by entering the following command in the interface module's monitor CLI:

copy flash boot monitor

5. Return to the management module's CLI by entering the **exit** command, which is "Ctrl-Shift-6 X".

6. Verify that the monitor image has been successfully copied to the interface module's boot flash by entering the following command at any level of the CLI:

show flash

Compare the boot and monitor images for the interface module. The date and time at which the new image was built should be the same for both images.

If you want to upgrade other software images, go to the appropriate upgrade section for information. If you have completed upgrading the software images, you must reboot the management module to complete the upgrade process. For more information, see "Rebooting the Management Module" on page 10-14.

Upgrading the Interface Module's Terathon IronWare Image

To upgrade the Terathon IronWare image (primary or secondary) on all interface modules or an interface module in a specified chassis slot, you must perform the following steps:

1. Place the new Terathon IronWare image on a TFTP server to which the BigIron MG8 system has access or on a PCMCIA flash card inserted in slot 1 or 2.
2. Copy the new Terathon IronWare image from the TFTP server or a flash card in slot 1 or 2 to all interface modules or an interface module in a specified chassis slot. To perform this step, enter one of the following commands at the Privileged EXEC level of the CLI (example: `BigIron MG8#`):

- **copy tftp ip** <ip-addr> <image-name> **primary | secondary all 0**
- **copy tftp ip** <ip-addr> <image-name> **primary | secondary** <chassis-slot-number>
- **copy slot1 | slot2 ip** <image-name> **primary | secondary all 0**
- **copy slot1 | slot2 ip** <image-name> **primary | secondary** <chassis-slot-number>

For information about the image name to specify, see Table 10.3 or the release notes.

NOTE: If you copy the new Terathon IronWare image to all interface modules using the **all 0** keyword, the management module makes a copy of the image (called lp-primary-0 or lp-secondary-0) and stores it in its code flash, thereby synchronizing the new Terathon IronWare image on both the interface and management modules.

If you copy the new Terathon IronWare image to a specified chassis slot, the management module does not make a copy of the image or store it. In this case, the new Terathon IronWare image on the interface module is unsynchronized or different from the Terathon IronWare image on the management module.

For more information about synchronizing the new Terathon IronWare image or retaining unsynchronized versions of the Terathon IronWare image on the interface and management modules, see “Rebooting the Management Module” on page 10-14.

3. Verify that the new Terathon IronWare image has been successfully copied by entering the following command at any level of the CLI:

show flash

Check for the Terathon IronWare image and the date and time at which the image was built.

If you want to upgrade other software images, go to the appropriate upgrade section for information. If you have completed upgrading the software images, you must reboot the management module to complete the upgrade process. For more information, see “Rebooting the Management Module” on page 10-14.

Rebooting the Management Module

After upgrading one or more software images on the management or interface modules, you must reboot the management module. After the management module reboots, it in turn reboots the interface modules.

To reboot the management module, enter one of the following commands:

- **reload** (this command boots from the default boot source, which is the primary code flash)
- **boot system flash primary | secondary**

During the management module reboot, the following synchronization events occur:

- If you have a standby management module, the active management module compares the standby module’s monitor, primary, and secondary images to its own. If you have updated these images on the active module, the active module automatically synchronizes the standby module’s images with its own.
- If you copied the primary and/or secondary Terathon IronWare image to all interface modules using the **copy** command with the **all 0** keyword, the management module made a copy of the image and stored it in its code flash under the names lp-primary-0 or lp-secondary-0. By default, the BigIron MG8 system checks the interface modules’ Terathon IronWare images, which reside in the code flash of the interface modules and the management module to make sure they are the same in both locations. (These Terathon IronWare images are stored on the management module only and are not run by the management or interface modules.) If the Terathon IronWare images on the interface and management modules are different, the system prompts you to do the following:
 - If you want to update the Terathon IronWare images in the interface module’s code flash with the images in the management module’s code flash, enter the **lp cont-boot sync <slot-number>** command at the Privileged EXEC prompt.
 - If you want to retain the Terathon IronWare images in the interface module’s code flash, enter the **lp cont-boot no-sync <slot-number>** command at the Privileged EXEC prompt.

After the management module finishes booting, do the following:

- Enter the **show module** command at any CLI level, and verify that the status of all interface modules is CARD_STATE_UP.
- Enter the **show version** command at any CLI level, and verify that all management and interface modules are running the new image versions.

If you find that an interface module is in a waiting state or is running an older software image, then you may have forgotten to enter the **ip cont-boot sync <slot-number>** command at the Privileged EXEC prompt.

Upgrading an FPGA for a 4-port 10 Gigabit Ethernet Module

A 4-port 10 Gigabit Ethernet module contains the following upgradable field-programmable gate array (FPGA) images:

- PBIF
- XTM
- XPP

Overview of Tasks in the FPGA Image Upgrade Process

To upgrade one or more of the FPGA images on the interface modules, you must perform the following general steps:

1. Determine the versions of the images currently installed on the interface modules.

For information about performing this task, see “Determining the FPGA Image Versions” on page 10-15.

2. Copy the new image from a source to a destination.

The source from which to copy the new image is usually a TFTP server to which the BigIron MG8 system has access or a flash card in the management module’s slot 1 or 2. The destination to which to copy the new image is all or one specified interface module.

For information about performing this task, see “Upgrading the FPGA Images” on page 10-16.

3. Reboot the interface module upon which you upgraded the FPGA images.

For information about performing this task, see “Rebooting the Interface Module” on page 10-17.

Determining the FPGA Image Versions

To display the versions of the FPGA images currently installed on the 4-port 10 Gigabit Ethernet modules, enter the following command at any level of the CLI:

```

BigIron MG8# show flash
...
~~~~~
Line Card Slot 1
Code Flash: Type M58LW064D, Size 16 MB
  o IronWare Image (Primary)
    Version 1.0.0T117, Size 875359 bytes, Check Sum ab5b
    Compiled on Sep  2 2003 at 11:12:09 labeled as lp01000b327
  o IronWare Image (Secondary)
    Version 1.0.0T117, Size 856164 bytes, Check Sum 8bb9
    Compiled on Aug 12 2003 at 03:17:39 labeled as lp01000b278
  o Boot-Monitor Image
    Version 1.0.0T115, Size 261247 bytes, Check Sum 703e
    Compiled on Sep  2 2003 at 11:12:34 labeled as lb01000b327
Boot Flash: Type AM29LV040B, Size 512 KB
  o Boot-Monitor Image
    Version 1.0.0T115, Size 261247 bytes, Check Sum 703e
    Compiled on Sep  2 2003 at 11:12:34 labeled as lb01000b327
FPGA Version: PBIF Ver 36 XTM Ver 89.0 XPP Ver 88.6
XTM File name: 10ge_xtm_top.ncd, Compile time: 2003/07/31 22:07:10
XPP File name: 10ge_xppe_top_6k.ncd, Compile time: 2003/07/31 11:29:58
~~~~~
...

```

This highlighted lines in the output indicate that the interface module in chassis slot 1 currently has PBIF version 36, XTM version 89.0, and XPP version 88.6 installed. The output also displays the name and compilation date and time of the XTM and XPP images.

Upgrading the FPGA Images

To upgrade one or more FPGA images on a 4-port 10 Gigabit Ethernet module, perform the following steps:

1. Place the new FPGA image(s) on a TFTP server to which the BigIron MG8 system has access or on a PCMCIA flash card inserted in slot 1 or 2.
2. Copy the PBIF image from the TFTP server or a flash card in slot 1 or 2 to all interface modules or an interface module in a specified chassis slot. To perform this step, enter one of the following commands at the Privileged EXEC level of the CLI (example: `BigIron MG8#`):
 - **copy tftp ip <ip-addr> <image-name> fpga-pbif all 0**
 - **copy tftp ip <ip-addr> <image-name> fpga-pbif <chassis-slot-number>**
 - **copy slot1 | slot2 ip <image-name> fpga-pbif all 0**
 - **copy slot1 | slot2 ip <image-name> fpga-pbif <chassis-slot-number>**
3. Copy the XPP image from the TFTP server or a flash card in slot 1 or 2 to all interface modules or an interface module in a specified chassis slot. To perform this step, enter one of the following commands at the Privileged EXEC level of the CLI:
 - **copy tftp ip <ip-addr> <image-name> fpga-xpp all 0**
 - **copy tftp ip <ip-addr> <image-name> fpga-xpp <chassis-slot-number>**
 - **copy slot1 | slot2 ip <image-name> fpga-xpp all 0**
 - **copy slot1 | slot2 ip <image-name> fpga-xpp <chassis-slot-number>**

4. Copy the XTM image from the TFTP server or a flash card in slot 1 or 2 to all interface modules or an interface module in a specified chassis slot. To perform this step, enter one of the following commands at the Privileged EXEC level of the CLI:
 - **copy tftp lp** <ip-addr> <image-name> **fpga-xtm all 0**
 - **copy tftp lp** <ip-addr> <image-name> **fpga-xtm** <chassis-slot-number>
 - **copy slot1 | slot2 lp** <image-name> **fpga-xtm all 0**
 - **copy slot1 | slot2 lp** <image-name> **fpga-xtm** <chassis-slot-number>
5. Verify that the FPGA image(s) have been successfully copied to the specified interface module(s) by entering the following command at any level of the CLI:

show flash

Check for the FPGA image version numbers in the output.

Rebooting the Interface Module

After upgrading one or more FPGA images on one or more 4-port 10 Gigabit Ethernet modules, you must reboot each affected interface module.

To specify an immediate boot from the Terathon IronWare image in an interface module's code flash, enter the following command at the Privileged EXEC level of the CLI:

lp boot system flash primary | secondary <chassis-slot-number>

Loading and Saving Configuration Files

For easy configuration management, the BigIron MG8 Layer 3 Switch supports both the download and upload of configuration files between the Layer 3 Switch and a TFTP server on the network. You can also copy the startup configuration file locally between the management module's code flash and a PCMCIA flash card inserted in the management module's slot 1 or 2.

You can upload either the startup configuration file or the running configuration to the TFTP server, code flash, or a flash card for backup and use in booting the system.

- **Startup configuration file** – This file (startup-config) contains the configuration information that is currently saved in the management module's code flash. To display this file, enter the **show configuration** command at any CLI prompt.
- **Running configuration** – This active configuration is in the system RAM but not yet saved to code flash. These changes could represent a short-term requirement or general configuration change. To display this configuration, enter the **show running-config** or **write terminal** command at any CLI prompt.

Each device can have one startup configuration file and one running configuration. The startup configuration file is shared by both flash modules. The running configuration resides in DRAM.

Replacing the Startup Configuration with the Running Configuration

After you make configuration changes to the active system, you can save those changes by writing them to code flash. When you write configuration changes to code flash, you replace the startup configuration with the running configuration.

To replace the startup configuration with the running configuration, enter the following command at any Enable or CONFIG command prompt:

```
BigIron MG8# write memory
```

Replacing the Running Configuration with the Startup Configuration

If you want to back out of the changes you have made to the running configuration and return to the startup configuration, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# reload
```

When the system detects differences between the running and startup configurations, it prompts you as follows:

```
Are you sure? (enter 'y' or 'n'):
```

Enter y, and press the Enter key.

Logging Changes to the Startup-Config File

You can configure a BigIron MG8 Layer 3 Switch to generate a Syslog message when the startup-config file is changed. The trap is enabled by default.

The following Syslog message is generated when the startup-config file is changed:

```
startup-config was changed
```

If the startup-config file was modified by a valid user, the following Syslog message is generated:

```
startup-config was changed by <username>
```

To disable or re-enable Syslog messages when the startup-config file is changed, use the following command at the global CONFIG level of the CLI:

Syntax: [no] logging enable config-changed

Copying a Configuration File to or from a TFTP Server

To copy the startup-config or running-config file to or from a TFTP server, use one of the following methods.

NOTE: You can name the configuration file when you copy it to a TFTP server. However, when you copy a configuration file from the server to a BigIron MG8 Layer 3 Switch, the file is always copied as “startup-config” or “running-config”, depending on which type of file you saved to the server.

To initiate transfers of configuration files to or from a TFTP server, enter one of the following commands at the Privileged EXEC level of the CLI:

- **copy startup-config tftp** <tftp-ip-addr> <filename> – Use this command to upload a copy of startup-config from the Layer 3 Switch to a TFTP server.
- **copy running-config tftp** <tftp-ip-addr> <filename> – Use this command to upload a copy of the running configuration from the Layer 3 Switch to a TFTP server.
- **copy tftp startup-config** <tftp-ip-addr> <filename> – Use this command to download a copy of the startup-config from a TFTP server to a Layer 3 Switch.
- **copy tftp running-config** <tftp-ip-addr> <filename> [**overwrite**] – Use this command to download the running configuration from a TFTP server to the system’s runtime memory. The running configuration is then appended to the current configuration of a BigIron Layer 3 Switch.

Making Local Copies of the Startup Configuration File

You can copy the startup-config file in code flash to another location in code flash or to a PCMCIA flash card inserted in a the management module’s slot 1 or 2.

For example, to make a backup copy of the startup-config file and save the backup file in code flash, enter a command such as the following at the Privileged EXEC level in the CLI:

```
BigIron MG8# cp startup-config startup-config.bak
```

Syntax: cp <source-file-name> <dest-file-name>

For example, to make a backup copy of the startup-config file and save the backup file on a flash card in slot 2, enter a command such as the following at the Privileged EXEC level in the CLI:

```
BigIron MG8# cp startup-config /pcml/backups/startup-config.bak
```

Syntax: cp [/<source-dir-path>]/<source-file-name> [/<dest-dir-path>]/<dest-file-name>

NOTE: These examples assume that code flash has the current management focus. For information about this topic, see “Management Focus” on page 6-12.

Specify the <source-dir-path> parameter if the source file is in a file system that does not have current management focus. The <source-file-name> specifies the name of the file you want to copy.

Specify the <dest-dir-path> parameter if you want to copy the source file to a file system that does not have current management focus. The <dest-file-name> specifies the name of the file you copied to a new destination.

Dynamic Configuration Loading

You can load dynamic configuration commands (commands that do not require a reload to take effect) from a file on a TFTP server into the BigIron MG8 Layer 3 Switch’s running-config. You can make configuration changes offline, then load the changes directly into the device’s running-config, without reloading the software.

Usage Considerations

- Use this feature only to load configuration information that does not require a software reload to take effect. For example, you cannot use this feature to change statically configured memory (**system-max** command).
- Do not load port configuration information for secondary ports in a trunk group. Since all ports in a trunk group use the port configuration settings of the primary port in the group, the software cannot implement the changes to the secondary port.

Preparing the Configuration File

A configuration file that you create must follow the same syntax rules as the startup-config file the device creates.

- The configuration file is a script containing CLI configuration commands. The CLI reacts to each command entered from the file in the same way the CLI reacts to the command if you enter it. For example, if the command results in an error message or a change to the CLI configuration level, the software responds by displaying the message or changing the CLI level.
- The software retains the running-config that is currently on the device, and changes the running-config only by adding new commands from the configuration file. If the running config already contains a command that is also in the configuration file you are loading, the CLI rejects the new command as a duplicate and displays an error message. For example, if the running-config already contains a command that configures ACL 1, the software rejects ACL 1 in the configuration file, and displays a message that ACL 1 is already configured.
- The file can contain global CONFIG commands or configuration commands for interfaces, routing protocols, and so on. You cannot enter User EXEC or Privileged EXEC commands.
- The default CLI configuration level in a configuration file is the global CONFIG level. Thus, the first command in the file must be a global CONFIG command or “!”. The ! (exclamation point) character means “return to the global CONFIG level”.

NOTE: You can enter text following “!” as a comment. However, the “!” is not a comment marker. It returns the CLI to the global configuration level.

NOTE: The CLI changes to the global CONFIG level if you load the configuration as a startup-config file instead of the running-config (using the **copy tftp startup-config** <ip-addr> <filename> command or **ncopy tftp** <ip-addr> <from-name> **startup-config** command).

NOTE: If you copy-and-paste a configuration into a management session, the CLI ignores the “!” instead of changing the CLI to the global CONFIG level. As a result, you might get different results if you copy-and-paste a configuration instead of loading the configuration using TFTP.

- Make sure you enter each command at the correct CLI level. Since some commands have identical forms at both the global CONFIG level and individual configuration levels, if the CLI’s response to the configuration file results in the CLI entering a configuration level you did not intend, then you can get unexpected results.

For example, if a trunk group is active on the device, and the configuration file contains a command to disable STP on one of the secondary ports in the trunk group, the CLI rejects the commands to enter the interface configuration level for the port and moves on to the next command in the file you are loading. If the next command is a spanning-tree command whose syntax is valid at the global CONFIG level as well as the interface configuration level, then the software applies the command globally. Here is an example:

The configuration file contains these commands:

```
interface ethernet 4/2
no spanning-tree
```

The CLI responds like this:

```
BigIron MG8(config)# interface ethernet 4/2
Error - cannot configure secondary ports of a trunk
BigIron MG8(config)# no spanning-tree
BigIron MG8(config)#
```

- If the file contains commands that must be entered in a specific order, the commands must appear in the file in the required order. For example, if you want to use the file to replace an IP address on an interface, you must first remove the old address using “no” in front of the **ip address** command, then add the new address. Otherwise, the CLI displays an error message and does not implement the command. Here is an example:

The configuration file contains these commands:

```
interface ethernet 3/1
ip address 10.10.10.1/24
```

The running-config already has a command to add an address to 3/1, so the CLI responds like this:

```
BigIron MG8(config)# interface ethernet 3/1
BigIron MG8(config-if-e1000-3/1)# ip add 10.10.10.69/24
Error: can only assign one primary ip address per subnet
BigIron MG8(config-if-e1000-3/1)#
```

To successfully replace the address, enter commands into the file as follows:

```
interface ethernet 3/1
no ip address 10.10.10.1/24
ip address 10.10.10.69/24
```

This time, the CLI accepts the command, and no error message is displayed:

```
BigIron MG8(config)# interface ethernet 3/1
BigIron MG8(config-if-e1000-3/1)# no ip add 10.10.10.1/24
BigIron MG8(config-if-e1000-3/1)# ip add 10.10.10.69/24
BigIron MG8(config-if-e1000-3/1)
```

- Always use the **end** command at the end of the file. The **end** command must appear on the last line of the file, by itself.

Loading the Configuration Information into the Running-Config

You can load the configuration information from a TFTP server. To load the file from a TFTP server, use either of the following commands:

- **copy tftp running-config** <ip-addr> <filename> [**overwrite**]
- **ncopy tftp** <ip-addr> <filename> **running-config**

Using SNMP to Save and Load Configuration Information

You can use a SNMP management application such as IronView Network Manager to save and load a BigIron MG8 Layer 3 Switch’s configuration. To save and load configuration information using IronView Network Manager, use the following procedure.

NOTE: The syntax shown in this section assumes that you have installed IronView Network Manager in the “/usr” directory.

1. Configure a read-write community string on the Foundry device, if one is not already configured. To configure a read-write community string, enter the following command from the global CONFIG level of the CLI:

```
snmp-server community <string> ro | rw
```

where <string> is the community string and can be up to 32 characters long.

2. On the Foundry device, enter the following command from the global CONFIG level of the CLI:

```
no snmp-server pw-check
```

This command disables password checking for SNMP set requests. If a third-party SNMP management application does not add a password to the password field when it sends SNMP set requests to a Foundry device, by default the Foundry device rejects the request.

3. From the command prompt in the UNIX shell, enter the following command:

```
/usr/OV/bin/snmpset -c <rw-community-string> <-ip-addr> 1.3.6.1.4.1.1991.1.1.2.1.5.0  
ipaddress <tftp-ip-addr> 1.3.6.1.4.1.1991.1.1.2.1.8.0 octetstringascii <config-file-name>  
1.3.6.1.4.1.1991.1.1.2.1.9.0 integer <command-integer>
```

where:

<rw-community-string> is a read-write community string configured on the Foundry device.

<fdry-ip-addr> is the Foundry device's IP address.

<tftp-ip-addr> is the TFTP server's IP address.

<config-file-name> is the configuration file name.

<command-integer> is one of the following:

- 20** – Upload the startup-config file from the Foundry device's code flash to the TFTP server.
- 21** – Download a startup-config file from a TFTP server to the Foundry device's code flash.
- 22** – Upload the running-config from the Foundry device's code flash to the TFTP server.
- 23** – Download a configuration file from a TFTP server into the Foundry device's running-config.

NOTE: Command option **23** adds configuration information to the running-config on the device, and does not replace commands. If you want to replace configuration information in the device, use “no” forms of the configuration commands to remove the configuration information, then use configuration commands to create the configuration information you want. Follow the guidelines in “Dynamic Configuration Loading” on page 18-20.

Erasing Image and Configuration Files

To erase software images or configuration files, use the commands described below. These commands are valid at the Privileged EXEC level of the CLI.

- **erase flash primary** erases the image stored in primary flash of the system.
- **erase flash secondary** erases the image stored in secondary flash of the system.
- **erase startup-config** erases the configuration stored in the startup configuration file; however, the running

configuration remains intact until system reboot.

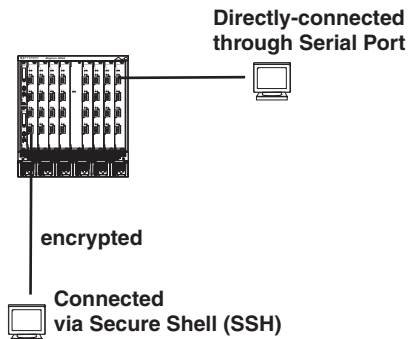
Upgrading via SSH

Because release 02.1.00 of the BigIron MG8 software provides support for SSHv2 and removes support for SSHv1, you can encounter problems if you perform a remote upgrade using SSH. For example, in Figure 10.1, the NetIron 40G is accessed directly through a serial port connection and remotely through an Ethernet port. The remote connection is configured to operate through SSHv1 using SSH authentication to grant access to the command line interface.

You can update the software through the SSHv1 connection and reboot the chassis. When the BigIron MG8 comes back up however it will no longer have SSHv1 available but instead will be SSHv2 capable. The encryption key used for SSHv1 authentication will not be functional with the new SSHv2 software. Consequently, you will be unable to get remote access to the BigIron MG8. Possible solutions to this problem include the following:

- If you have access, use a directly-connected terminal through the serial interface to set up SSHv2 security for access by the remote management client.
- Before performing the upgrade, remove SSH authentication from the router. You will then be able to access the router without authentication when it comes back up with the new software installed. You can then set-up SSHv2 authentication for the remote management client.
- Before performing the upgrade, set up the router for telnet access. Once the router is restarted with the new software, you can use the telnet connection to set up SSHv2 authentication for the remote management client. After this is accomplished, you can remove the telnet access to maintain security.

Figure 10.1 Upgrading via SSH



Scheduling a System Reload

In addition to reloading the BigIron MG8 system manually, you can configure the system to reload itself at a specific time or after a specific amount of time has passed.

NOTE: The scheduled reload feature requires the system clock. You can use a Simple Network Time Protocol (SNTP) server to set the clock or you can set the device clock manually. See "" on page 8-7 or "Setting the System Clock" on page 8-9.

Reloading at a Specific Time

To schedule a system reload for a specific time, use one of the following methods.

To schedule a system reload from the primary flash module for 6:00:00 AM, January 19, 2004, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# reload at 06:00:00 01-19-04
```

Syntax: reload at <hh:mm:ss> <mm-dd-yy> [primary | secondary]

<hh:mm:ss> is the hours, minutes, and seconds.

<mm-dd-yy> is the month, day, and year.

primary | secondary specifies whether the reload is to occur from the primary code flash module or the secondary code flash module. The default is **primary**.

Reloading after a Specific Amount of Time

To schedule a system reload to occur after a specific amount of time has passed on the system clock, use one of the following methods.

To schedule a system reload from the secondary flash one day and 12 hours later, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# reload after 01:12:00 secondary
```

Syntax: reload after <dd:hh:mm> [primary | secondary]

<dd:hh:mm> is the number of days, hours, and minutes.

primary | secondary specifies whether the reload is to occur from the primary code flash module or the secondary code flash module.

Displaying the Amount of Time Remaining Before a Scheduled Reload

To display how much time is remaining before a scheduled system reload takes place, use one of the following methods.

To display how much time is remaining before a scheduled system reload, enter the following command from any level of the CLI:

```
BigIron MG8# show reload
```

Canceling a Scheduled Reload

To cancel a scheduled system reload, enter the following command at the Privileged EXEC level of the CLI:

```
BigIron MG8# reload cancel
```

Diagnostic Error Codes and Remedies for TFTP Transfers

If an error occurs with a TFTP transfer to or from a BigIron MG8 Layer 3 Switch, one of the following error codes is displayed.

Error code	Message	Explanation and action
1	Flash read preparation failed.	A flash error occurred during the download. Retry the download. If it fails again, contact customer support.
2	Flash read failed.	
3	Flash write preparation failed.	
4	Flash write failed.	
5	TFTP session timeout.	TFTP failed because of a time out. Check IP connectivity and make sure the TFTP server is running.

Error code	Message	Explanation and action
6	TFTP out of buffer space.	The file is larger than the amount of space on the device or TFTP server. If you are copying an image file to flash, first copy the other image to your TFTP server, then delete it from flash. (Use the erase flash... CLI command at the Privileged EXEC level to erase the image in the flash.) If you are copying a configuration file to flash, edit the file to remove unneeded information, then try again.
7	TFTP busy, only one TFTP session can be active.	Another TFTP transfer is active on another CLI session, SNMP, or Web management session. Wait, then retry the transfer.
8	File type check failed.	You accidentally attempted to copy the incorrect image code into the system. Retry the transfer using the correct image.
16	TFTP remote - general error.	The TFTP configuration has an error. The specific error message describes the error. Correct the error, then retry the transfer.
17	TFTP remote - no such file.	
18	TFTP remote - access violation.	
19	TFTP remote - disk full.	
20	TFTP remote - illegal operation.	
21	TFTP remote - unknown transfer ID.	
22	TFTP remote - file already exists.	
23	TFTP remote - no such user.	

Downloading a New Image Using the Supplied Script

With software release 02.1.00 and later, you can create a script to download new software images to your BigIron MG8 and then specify its use. Any of the following CLI commands can be used to download an image using a script:

Syntax: copy tftp system <ip-addr> <download-script>

Syntax: copy slot1|slot2 system <download-script>

Syntax: copy flash system <download-script>

The **<ip-addr>** variable is used to identify the location of the tftp server where the script will be downloaded from.

If downloading from a PCMCIA card, use the **slot1** or **slot2** parameters to specify which PCMCIA slot on the management module to download the script from.

The **flash** parameter specifies that the script should be downloaded from the internal flash memory.

The **<download-script>** variable is the name of the script containing download specifications.

This CLI command first copies the download script specified to the system's memory. It then parses the script to perform the software download specified in the script.

The following section describes the download script syntax.

```
# download script syntax:
# <spec_line>
# ...
# <spec_line>
# where <spec_line> == KEYWORD:<val>;
#
# 1) Supported KEYWORD
#   SRC                               // specify source of the images, optional
#   DIR                               // image source directory, optional
#   MP_MON                            // MP monitor image
#   MP_APP                            // MP application image
#   LP_MON                            // LP monitor image
#   LP_APP                            // LP application image
#   XPP                               // FPGA XPP
#   XTM                               // FPGA XTM
#   PBIF                              // FPGA PBIF
# Note: If SRC is not specified, the images are taken from the server specified in
the CLI command line.
#
# 2) Syntax of <val>
#
# It depends on the KEYWORD preceding it:
#
# SRC:tftp:<ip_addr>;
# SRC:slot1;
# SRC:slot2;
#
# MP_MON:<image_name>:[boot]; // [boot] is the option to copy monitor to boot.
# MP_APP:pri:<image_name>;
# MP_APP:sec:<image_name>;
#
# LP_MON:all:<image_name>:[boot];
# LP_MON:<slot#>[[,-]<slot#>]:<image_name>:[boot];
#
# LP_APP:pri:all:<image_name>;
# LP_APP:pri:<slot#>[[,-]<slot#>]:<image_name>;
#
# LP_APP:sec:all:<image_name>;
# LP_APP:sec:<slot#>[[,-]<slot#>]:<image_name>;
#
# XPP:all:<image_name>;
# XPP:<slot#>[[,-]<slot#>]:<image_name>;
#
# XTM:all:<image_name>;
# XTM:<slot#>[[,-]<slot#>]:<image_name>;
#
# PBIF:all:<image_name>;
# PBIF:<slot#>[[,-]<slot#>]:<image_name>;
#
# XBRIDGE:all:<image_name>;
# XBRIDGE:<slot#>[[,-]<slot#>]:<image_name>;
#
# Note: If one <spec_line> fails to parse, or it fails to copy, the script is
aborted.
```


Sample download script

The following example is of a script that has been written to be downloaded:

```
SRC: slot1;
LP_MON:all:lb02100.bin:boot;
LP_APP:pri:all:lp02100.bin;
MP_MON:mb02100.bin:boot;
MP_APP:pri:mpr02100.bin;
```

```
XPP:all:xpp.bin;
XTM:all:xm.bin;
PBIF:all:pbif.bin;
XBRIDGE:1,3-4:xbridge.bin
```

The above script will do the following:

1. Download all files from the pcmcia card in slot 1 of the management module.
2. Download file lb02100.bin to all LP's monitor, and also copy to boot flash.
3. Download file lp02100.bin to all LP's primary.
4. Download file mb02100.bin to MP's monitor, and also copy to boot flash.
5. Download file mpr02100.bin to MP's primary.
6. Download FPGA file xpp.bin to all LPs.
7. Download FPGA file xtm.bin to all LPs.
8. Download FPGA file pbif.bin to all LPs.
9. Download FPGA file xbridge.bin to LP 1, 3 and 4.

Chapter 11

Hardware Specifications

This chapter provides the following specifications for the BigIron MG8 chassis:

- Hardware specifications
- Port specifications

Hardware Specifications

This section contains the following hardware specifications for the BigIron MG8 chassis:

- Power specifications
- Physical dimensions
- Operating environment
- Storage environment
- Safety agency approvals

Power Specifications

The following table lists the power consumption for the BigIron MG8 chassis.

Table 11.1: AC Power Supply Ratings

Minimum 100 – 120v AC Wall Outlet Circuit per Power Supply	14.23 A
Minimum 200 – 240v AC Wall Outlet Circuit per Power Supply	7.11 A
Minimum number of Power Supplies Required for Operation	3
Minimum number of Power Supplies for N+1 Redundancy	4
Maximum number of Power Supplies for 100% Redundancy	6

The following equation is used to calculate the values listed in Table 11.1:

$$\text{CurrentDraw} = \frac{\text{PowerOutput}}{(\text{VoltsIn})(\text{Efficiency})(\text{PowerFactor})}$$

Table 11.2 lists the current draw calculations for the BigIron MG8 chassis. The calculations are based on one AC power supply only.

Table 11.2: Current Draw Calculations

Current Draw	Formula
100 – 120 VAC	$\frac{1155}{(100)(0.82)(0.99)} = 14.23\text{A}$
200 – 240 VAC	$\frac{1155}{(200)(0.82)(0.99)} = 7.11\text{A}$
-72 to -40 VDC	$\frac{1155}{(36)} = 32.10\text{A}$

Table 11.3 provides the maximum power calculations for the BigIron MG8 chassis. It shows maximum power to chassis and modules from power supplies. These calculations are based on the total output of three AC power supplies.

Table 11.3: Maximum Power Calculations

Watts	BTU Per Hour
3465	1015.27

The maximum input power to system assuming three power supplies is 4225.61 watts.

Table 11.4 lists the maximum power consumption, in watts, for the BigIron MG8 modules.

Table 11.4: Wattage Consumed by Individual Modules

Module	Maximum Power Consumption, in Watts
Management	50W
Switch fabric	110W
10 Gigabit Ethernet interface with fiber-optic modules installed	300W

Electrical Rating per supply:

- 100-240Vac
- 14A - 6A

- 50/60Hz

Physical Dimensions

Table 11.5 provides the physical dimensions for the BigIron MG8 chassis.

Table 11.5: BigIron MG8 Physical Dimensions

Length (Height)	Width	Depth	Weight
22.75 in (AC chassis) 26.25 in (DC chassis)	17.5 in	24 in	242 lbs (AC chassis) 174 lbs (DC chassis)

Operating Environment

Table 11.6 provides the operating environment specifications for the BigIron MG8 chassis.

Table 11.6: BigIron MG8 Operating Environment

Operating Temperature	Relative Humidity	Operating Altitude
32° – 104° F (0° – 40° C)	5 to 90%, @ 104° F (40° C), non-condensing	0 – 10,000 ft (0 – 3,000 meters)

Storage Environment

Table 11.7 provides the storage environment specifications for the BigIron MG8 chassis.

Table 11.7: BigIron MG8 Storage Environment

Storage Temperature	Storage Humidity	Storage Altitude
-13 to 158 degrees F or -25 to 70 degrees C	95% maximum relative humidity, non-condensing	0 – 15,000 ft (0 – 4,500 meters)

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 Communications Systems
- EN 60950 Safety of Information Technology Equipment
- EN 60950 / IEC 950

Electromagnetic Approvals

- FCC Class A
- ICES-003 Class A
- EN 55022 Class A
- CISPR 22 Class A
- VCCI Class A

- AS/NZS 3548 Class A
- EN 55024
- EN 61000-3-2
- EN 61000-3-3

Port Specifications

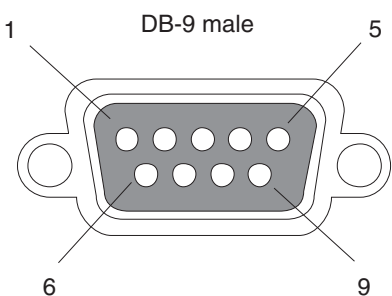
This section provides pin assignments for the following ports:

- Management module's Console port (serial connector)
- Management module's management port (RJ-45 unshielded twisted pair (UTP) connector)

Console Port Pin Assignments

The Console port is a standard male DB-9 connector, as shown in Figure 11.1. For information about how you can use this port, see "Console Port" on page 2-7.

Figure 11.1 Console Port Pin and Signalling Details

Pin Assignment	Pin Number	Switch Signal
	1	Reserved
	2	TXD (output)
	3	RXD (input)
	4	Reserved
	5	GND
	6	Reserved
	7	CTS (input)
	8	RTS (output)
	9	Reserved

Most PC serial ports require a cable with a female DB-9 connector. However, terminal connections will vary, requiring a cable with either a DB-9 or DB-25 connector, male or female.

Serial cable options between the BigIron MG8 chassis and a PC or terminal are shown in Figure 11.2.

NOTE: As indicated in Figure 11.1 and Figure 11.2, some of the wires should not be connected. If you do connect the wires that are labeled "Reserved", you might get unexpected results with some terminals.

Figure 11.2 Console Port Pin Assignments Showing Cable Connection Options to a Terminal or PC

DB-9 to DB-9 Female Switch			Terminal or PC	DB-9 to DB-25 Female Switch			Terminal or PC
1	Reserved		1	1	Reserved	8	
2	→		2	2	→	3	
3	←		3	3	←	2	
4	Reserved		4	4	Reserved	20	
5	→		5	5	→	7	
6	Reserved		6	6	Reserved	6	
7	←		7	7	←	4	
8	→		8	8	→	5	
9	Reserved		9	9	Reserved	22	

Management Port Pin Assignments

The management port is an RJ-45 UTP connector. Table 11.8 describes the connector's pin assignments. For information about how you can use this port, see "10/100 Ethernet Port" on page 2-7.

Table 11.8: Management Port Pin Assignments

Pin Number	MDI Ports
1	TD+
2	TD-
3	RD+
4	Not used (10BaseT) CMT (100BaseTX)
5	Not used (10BaseT) CMT (100BaseTX)
6	RD-
7	Not used (10BaseT) CMT (100BaseTX)
8	Not used (10BaseT) CMT (100BaseTX)

Appendix A

Regulatory Statements

U.S.A.

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Industry Canada Statement

This Class A digital apparatus complies with Canadian ICES-003.

Europe and Australia

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Japan

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

English Translation of above statement

This is Class A product based on the standard of the Voluntary Control Council For Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Appendix B

Cautions and Warnings

The cautions and warnings that appear in this manual are listed below in English, German, French, and Spanish.

Cautions

A caution calls your attention to a possible hazard that can damage equipment.

"Vorsicht" weist auf eine mögliche Beschädigung des Geräts hin. Sie finden die folgenden Vorsichtshinweise in diesem Handbuch.

Une mise en garde attire votre attention sur un risque possible d'endommagement de l'équipement. Ci-dessous, vous trouverez les mises en garde utilisées dans ce manuel.

Un mensaje de precaución le advierte sobre un posible peligro que pueda dañar el equipo. Las siguientes son precauciones utilizadas en este manual.

CAUTION:	All devices with DC power supplies are intended for installation in restricted access areas only. A restricted access area is where access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.
VORSICHT:	Alle Geräte mit DC-Netzteil sind nur für die Installation in Bereichen mit beschränktem Zugang gedacht. Ein Bereich mit beschränktem Zugang ist ein Bereich, zu dem nur Wartungspersonal mit Spezialwerkzeug, Schlüssel oder anderen Sicherheitsvorrichtungen Zugang hat. Dieser Zugang wird von für den Bereich zuständigen Personen überwacht.
MISE EN GARDE:	Tous les dispositifs avec bloc d'alimentation C.C. sont conçus pour l'installation dans des zones à accès réglementé uniquement. Une zone à accès réglementé est une zone dont l'accès n'est possible qu'au personnel de service utilisant un verrou, une clé ou un outil spécial, ou d'autres moyens de sécurité, et qui est contrôlée par les autorités responsables du site.
PRECAUCIÓN:	Todos los instrumentos con suministros de corriente continua han sido diseñados únicamente para instalación en áreas restringidas. Se entiende como área de acceso restringido un lugar al que solo puede acceder personal de servicio mediante el uso de una herramienta especial, llave y cerrojo u otro medio de seguridad similar, y que esté controlado por la autoridad responsable de esa ubicación.

- CAUTION:** Carefully follow the mechanical guides on each side of the power supply slot and make sure the power supply is properly inserted in the guides. Never insert the power supply upside down.
- VORSICHT:** Beachten Sie mechanischen Führungen an jeder Seite des Netzteils, das ordnungsgemäß in die Führungen gesteckt werden muss. Das Netzteil darf niemals umgedreht eingesteckt werden.
- MISE EN GARDE:** Suivez attentivement les repères mécaniques de chaque côté du slot du bloc d'alimentation et assurez-vous que le bloc d'alimentation est bien inséré dans les repères. N'insérez jamais le bloc d'alimentation à l'envers.
- PRECAUCIÓN:** Siga cuidadosamente las guías mecánicas de cada lado de la ranura del suministro de energía y verifique que el suministro de energía está insertado correctamente en las guías. No inserte nunca el suministro de energía de manera invertida.
-

- CAUTION:** Do not add or remove a flash card while a file operation involving the flash card's slot is in progress. Doing so can result in corruption of the flash card. If this occurs, you may need to reformat the flash card to make it usable again. Reformatting the card erases all data stored on the card.
- VORSICHT:** Eine Flash-Karte darf nur dann eingesteckt oder herausgenommen werden, wenn keine Dateifunktion läuft, die der Flash-Karte bedarf. Wenn dies nicht beachtet wird, kann dies zur Korruption der Flash-Karte führen. Die Karte kann dann erst nach Neuformatierung wieder benutzt werden. Bei Neuformatierung gehen alle auf der Karte gespeicherten Daten verloren.
- MISE EN GARDE:** N'ajoutez pas ou ne supprimez pas une carte mémoire au cours d'une opération de fichier dans laquelle le slot de carte mémoire est impliqué. Vous risquez sinon de corrompre la carte mémoire. Si cela se produit, vous devrez peut-être reformater la carte mémoire pour qu'elle soit à nouveau utilisable. Le reformatage de la carte efface toutes les données qui y sont stockées.
- PRECAUCIÓN:** No añada ni quite una tarjeta flash mientras una operación de archivo que conlleve el uso de una ranura de tarjeta flash se encuentre en uso. De hacerlo así se podría dar lugar a la corrupción de la tarjeta flash. Si esto ocurriera, podría ser necesario que vuelva a formatear la tarjeta flash para hacer que vuelva sea utilizable. Cuando se formatea la tarjeta se borran todos los datos almacenados en la tarjeta.
-

- CAUTION:** Do not install the device in an environment where the operating ambient temperature might exceed 40° C (104° F).
- VORSICHT:** Das Gerät darf nicht in einer Umgebung mit einer Umgebungsbetriebstemperatur von über 40° C (104° F) installiert werden.
- MISE EN GARDE:** N'installez pas le dispositif dans un environnement où la température d'exploitation ambiante risque de dépasser 40° C (104° F).
- PRECAUCIÓN:** No instale el instrumento en un entorno en el que la temperatura ambiente de operación pueda exceder los 40°C (104°F).
-

- CAUTION:** Ensure that the device does not overload the power circuits, wiring, and over-current protection. To determine the possibility of overloading the supply circuits, add the ampere (amp) ratings of all devices installed on the same circuit as the device. Compare this total with the rating limit for the circuit. The maximum ampere ratings are usually printed on the devices near the input power connectors.
- VORSICHT:** Stromkreise, Verdrahtung und Überlastschutz dürfen nicht durch das Gerät überbelastet werden. Addieren Sie die Nennstromleistung (in Ampere) aller Geräte, die am selben Stromkreis wie das Gerät installiert sind. Somit können Sie feststellen, ob die Gefahr einer
-

Überbelastung der Versorgungsstromkreise vorliegt. Vergleichen Sie diese Summe mit der Nennstromgrenze des Stromkreises. Die Höchstnennströme (in Ampere) stehen normalerweise auf der Geräterückseite neben den Eingangsstromanschlüssen.

MISE EN GARDE: Assurez-vous que le dispositif ne risque pas de surcharger les circuits d'alimentation, le câblage et la protection de surintensité. Pour déterminer le risque de surcharge des circuits d'alimentation, additionnez l'intensité nominale (ampères) de tous les dispositifs installés sur le même circuit que le dispositif en question. Comparez alors ce total avec la limite de charge du circuit. L'intensité nominale maximum en ampères est généralement imprimée sur chaque dispositif près des connecteurs d'entrée d'alimentation.

PRECAUCIÓN: Verifique que el instrumento no sobrecargue los circuitos de corriente, el cableado y la protección para sobrecargas. Para determinar la posibilidad de sobrecarga en los circuitos de suministros, añada las capacidades nominales de corriente (amp) de todos los instrumentos instalados en el mismo circuito que el instrumento. Compare esta suma con el límite nominal para el circuito. Las capacidades nominales de corriente máximas están generalmente impresas en los instrumentos, cerca de los conectores de corriente de entrada.

CAUTION: Make sure the air flow around the front, sides, and back of the device is not restricted.

VORSICHT: Stellen Sie sicher, dass an der Vorderseite, den Seiten und an der Rückseite der Luftstrom nicht behindert wird.

MISE EN GARDE: Vérifiez que rien ne restreint la circulation d'air devant, derrière et sur les côtés du dispositif et qu'elle peut se faire librement.

PRECAUCIÓN: Asegúrese de que el flujo de aire en las inmediaciones de las partes anterior, laterales y posterior del instrumento no esté restringido.

CAUTION: Make sure the flash card is empty or does not contain files you want to keep. Formatting a flash card completely erases all files on the card.

VORSICHT: Stellen Sie sicher, dass die Flash-Karte leer ist oder keine Dateien auf ihr gespeichert sind, die Sie behalten möchten. Die Formattierung einer Flash-Karte löscht alle Dateien auf der Karte.

MISE EN GARDE: Vérifiez que la carte mémoire est vide ou ne contient pas de fichiers que vous voulez conserver. Le reformatage de la carte mémoire efface tous les fichiers qui s'y trouvent.

PRECAUCIÓN: Verifique que la tarjeta flash esté vacía o que no contenga archivos que desee conservar. Al formatear una tarjeta flash todos los archivos de ésta se borran.

CAUTION: Never leave tools inside the chassis.

VORSICHT: Lassen Sie keine Werkzeuge im Chassis zurück.

MISE EN GARDE: Ne laissez jamais d'outils à l'intérieur du châssis.

PRECAUCIÓN: No deje nunca herramientas en el interior del chasis.

CAUTION: Once you start the formatting process, you cannot stop it. Even if you enter CTRL-C to stop the CLI output and a new prompt appears, the formatting continues. Make sure you want to format the card before you enter the command.

VORSICHT: Wenn Sie mit dem Formattieren beginnen, können Sie diesen Prozess nicht anhalten. Selbst wenn zum Anhalten der CLI-Ausgabe Strg-C drücken und eine neue Aufforderung gezeigt

wird, wird mit dem Formattieren fortgefahren. Stellen Sie sicher, dass Sie die Karte formatieren wollen, bevor Sie den Befehl eingeben.

MISE EN GARDE: Une fois le processus de formatage commencé, vous ne pouvez pas l'interrompre. Même si vous appuyez sur CTRL-C pour arrêter la sortie CLI et si une nouvelle invite apparaît, le formatage continue. Soyez bien sûr de vouloir formater la carte avant d'entrer la commande.

PRECAUCIÓN: Una vez que empieza con el proceso de formateado, no se puede detener. Incluso si pulsa CTRL-C para detener la salida de CLI y aparece un nuevo indicador, el formateado continuará. Esté seguro que desea formatear la tarjeta antes de introducir el comando.

CAUTION: Use the erase startup-config command only for new systems. If you enter this command on a system you have already configured, the command erases the configuration. If you accidentally do erase the configuration on a configured system, enter the write memory command to save the running configuration to the startup-config file.

VORSICHT: Verwenden Sie den Befehl "Erase startup-config" (Löschen Startup-Konfig) nur für neue Systeme. Wenn Sie diesen Befehl in ein bereits konfiguriertes System eingeben, löscht der Befehl die Konfiguration. Falls Sie aus Versehen die Konfiguration eines bereits konfigurierten Systems löschen, geben Sie den Befehl "Write Memory" (Speicher schreiben) ein, um die laufende Konfiguration in der Startup-Konfig-Datei zu speichern.

MISE EN GARDE: N'utilisez la commande erase startup-config que pour les nouveaux systèmes. Si vous entrez cette commande sur un système que vous avez déjà configuré, elle efface la configuration. Si vous effacez la configuration par accident sur un système configuré, entrez la commande write memory pour enregistrer la configuration actuelle dans le fichier startup-config.

PRECAUCIÓN: Use el comando erase startup-config (borrar configuración de inicio) para sistemas nuevos solamente. Si usted introduce este comando en un sistema que ya ha configurado, el comando borrará la configuración. Si usted borra accidentalmente la configuración en un sistema ya configurado, introduzca el comando write memory (escribir memoria) para guardar la configuración en ejecución en el archivo startup-config.

CAUTION: Do not remove the switch fabric module while the BigIron MG8 chassis is powered on and running. If you attempt to remove this module while the chassis is powered on and running, all traffic being handled by the system will stop.

VORSICHT: Wenn das BigIron MG8-Gehäuse eingeschaltet ist und sich im Betrieb befindet, darf die Rückwand-Schaltmodul aus Hartgewebe nicht entfernt werden. Wenn dieses Modul bei eingeschaltetem und laufendem Gehäuse entfernt wird, kommt der gesamte, vom System gehandhabte Verkehr zum Stillstand.

MISE EN GARDE: Ne retirez pas le module d'interrupteur de la face arrière lorsque le châssis BigIron MG8 est allumé et en cours de fonctionnement. Si vous essayer de retirer ce module lorsque le châssis est allumé et en cours de fonctionnement, tout le trafic traité par le système sera interrompu.

PRECAUCIÓN: No desmonte el módulo de conmutación de la tarjeta base mientras el chasis del BigIron MG8 esté activado y en funcionamiento. Si trata de desmontarlo mientras el chasis está activado y en funcionamiento, todo el tráfico que esté manejando el sistema se detendrá.

CAUTION:	To avoid overheating of the BigIron MG8 chassis, remove only one fan tray at a time. Do not remove both fan trays from the chassis at one time.
VORSICHT:	Es darf nur ein Ventilatorblech zur Zeit entfernt werden, um ein Überhitzen des BigIron MG8-Gehäuses zu vermeiden. Es dürfen nicht beide Ventilatorbleche auf einmal entfernt werden.
MISE EN GARDE:	Pour éviter la surchauffe du châssis BigIron MG8, n'enlevez qu'un seul boîtier de ventilateur à la fois. N'enlevez pas les deux boîtiers du châssis en même temps.
PRECAUCIÓN:	Para evitar el sobrecalentamiento del chasis BigIron MG8, desmonte solamente una bandeja de ventilador a la vez. No retire las dos bandejas de ventilador del chasis a la vez.

CAUTION:	Foundry recommends using a separate branch circuit for each AC power cord, which provides redundancy in case one of the circuits fails.
VORSICHT:	Foundry empfiehlt die Installation eines separaten Stromkreisweiges für jede Wechselstrom-Elektroschnur als Redundanz im Fall des Ausfalls eines Stromkreises.
MISE EN GARDE:	Foundry conseille l'utilisation d'un circuit de dérivation différent pour chaque cordon d'alimentation C.A. Ainsi, il y aura un circuit redondant en cas de panne d'un des circuits.
PRECAUCIÓN:	Foundry recomienda usar un circuito derivado por separado para cada cable de corriente continua, que proporciona redundancia en caso de fallas en los circuitos.

CAUTION:	For a DC system, use a grounding wire of at least 6 American Wire Gauge (AWG). The 6 AWG wire should be attached to an agency-approved crimp connector (provided on the BigIron MG8 chassis rear), crimped with the proper tool. The single crimp connector should allow for securement to both ground screws on the enclosure.
VORSICHT:	Für ein Gleichstromsystem ist ein Erdungsdraht (wenigstens 6 AWG) erforderlich. Der 6 AWG-Draht sollte an einen behördlich genehmigten Crimpverbinder (an der Rückseite des BigIron MG8-Gehäuses) angebracht werden, der mit einem ordnungsgemäßen Werkzeug gecrimpt wurde. Der einzelne Crimpverbinder dient der Sicherung beider Erdungsschrauben am Gehäuse.
MISE EN GARDE:	Pour les systèmes C.C., utilisez un fil de mise à la terre de calibre 6 AWG (American Wire Gauge) minimum. Ce fil doit être relié à un connecteur à sertir homologué (fourni à l'arrière du châssis BigIron MG8), sertit avec l'outil approprié. Le connecteur à sertir unique devrait permettre le rattachement aux deux vis de borne de terre sur l'enveloppe.
PRECAUCIÓN:	Para un sistema de corriente continua, utilice cable de conexión a tierra de calibre 6 AWG (Calibración de cables americana), por lo menos. El cable de AWG deberá acoplarse a un conector ondulado normalizado (que se provee en la parte posterior del chasis BigIron MG8), ondulado con la herramienta apropiada. El conector ondulado simple deberá permitir fijación a los dos tornillos de conexión a tierra en el armario.

CAUTION:	For the DC input circuit to the system, make sure there is a 60 amp circuit breaker on the input to the terminal block.
VORSICHT:	Für den Eingangs-Gleichstromkreis zum System ist ein 60 A-Leistungsschalter am Eingang zur Reihenklemme zu installieren.
MISE EN GARDE:	Pour le circuit d'alimentation C.C. du système, assurez-vous de la présence d'un disjoncteur de 60 ampères sur l'entrée vers le bloc d'alimentation.
PRECAUCIÓN:	Para el circuito de entrada de corriente continua al sistema, verifique que exista un cortacircuitos de 60 amperios en la entrada al bloque terminal.

- CAUTION:** If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.
- VORSICHT:** Falls kein Modul im Steckplatz installiert wird, muss die Steckplatztafel angebracht werden. Wenn ein Steckplatz nicht abgedeckt wird, läuft das System heiß.
- MISE EN GARDE:** Si vous n'installez pas de module dans un slot, vous devez laisser le panneau du slot en place. Si vous faites fonctionner le châssis avec un slot découvert, le système surchauffera.
- PRECAUCIÓN:** Si no instala un módulo en la ranura, deberá mantener el panel de ranuras en su lugar. Si pone en funcionamiento el chasis con una ranura descubierta, el sistema sufrirá sobrecalentamiento.
-

- CAUTION:** For the DC input circuit to the system, make sure there is a Listed 60 amp circuit breaker, minimum -48Vdc, double pole, on the input to the terminal block. The input wiring for connection to the product should be Listed copper wire, 6 AWG, marked VW-1, and rated minimum 90° C.
-

Warnings

A warning calls your attention to a possible hazard that can cause injury or death. The following are the warnings used in this manual.

"Achtung" weist auf eine mögliche Gefährdung hin, die zu Verletzungen oder Tod führen können. Sie finden die folgenden Warnhinweise in diesem Handbuch:

Un avertissement attire votre attention sur un risque possible de blessure ou de décès. Ci-dessous, vous trouverez les avertissements utilisés dans ce manuel.

Una advertencia le llama la atención sobre cualquier posible peligro que pueda ocasionar daños personales o la muerte. A continuación se dan las advertencias utilizadas en este manual.

WARNING:	The procedures in this manual are for qualified service personnel.
ACHTUNG:	Die Verfahren in diesem Handbuch sind nur für qualifiziertes Wartungspersonal gedacht.
AVERTISSEMENT:	Les procédures décrites dans ce manuel doivent être effectuées par le personnel de service qualifié uniquement.
ADVERTENCIA:	Los procedimientos de este manual se han hecho para personal de servicio cualificado.

WARNING:	Before beginning the installation, see the precautions in "Power Precautions" on page 3-4.
ACHTUNG:	Vor der Installation siehe Vorsichtsmaßnahmen unter " Power Precautions " (Vorsichtsmaßnahmen in Bezug auf elektrische Ablagen) auf den Seiten 3 - 4.
AVERTISSEMENT:	Avant de commencer l'installation, consultez les précautions décrites dans " Power Precautions " (Précautions quant à l'alimentation), pages 3-4.
ADVERTENCIA:	Antes de comenzar la instalación, consulte las precauciones en la sección " Power Precautions " (Precauciones sobre corriente) que se encuentra en las páginas 3-4.

WARNING:	Disconnect the power cord from all power sources to completely remove power from the device.
ACHTUNG:	Ziehen Sie das Stromkabel aus allen Stromquellen, um sicherzustellen, dass dem Gerät kein Strom zugeführt wird.
AVERTISSEMENT:	Débranchez le cordon d'alimentation de toutes les sources d'alimentation pour couper complètement l'alimentation du dispositif.
ADVERTENCIA:	Para desconectar completamente la corriente del instrumento, desconecte el cordón de corriente de todas las fuentes de corriente.

WARNING:	If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.
ACHTUNG:	Falls für die Installation ein anderes Stromkabel erforderlich ist (wenn das mit dem Gerät gelieferte Kabel nicht passt), müssen Sie sicherstellen, dass Sie ein Stromkabel mit dem Siegel einer Sicherheitsbehörde verwenden, die für die Zertifizierung von Stromkabeln in Ihrem Land zuständig ist. Das Siegel ist Ihre Garantie, dass das Stromkabel sicher mit Ihrem Gerät verwendet werden kann.
AVERTISSEMENT:	Si l'installation nécessite un cordon d'alimentation autre que celui fourni avec le dispositif, assurez-vous d'utiliser un cordon d'alimentation portant la marque de l'organisation responsable de la sécurité qui définit les normes et réglementations pour les cordons d'alimentation dans votre pays. Cette marque vous assure que vous pouvez utiliser le cordon d'alimentation avec le dispositif en toute sécurité.

ADVERTENCIA: Si la instalación requiere un cordón de corriente distinto al que se ha suministrado con el instrumento, verifique que usa un cordón de corriente que venga con la marca de la agencia de seguridad que defina las regulaciones para cordones de corriente en su país. Esta marca será su garantía de que el cordón de corriente puede ser utilizado con seguridad con el instrumento.

WARNING: Make sure that the power source circuits are properly grounded, then use the power cord supplied with the device to connect it to the power source.

ACHTUNG: Stellen Sie sicher, dass die Stromkreise ordnungsgemäß geerdet sind. Benutzen Sie dann das mit dem Gerät gelieferte Stromkabel, um es an die Stromquelle anzuschließen.

AVERTISSEMENT: Vérifiez que les circuits de sources d'alimentation sont bien mis à la terre, puis utilisez le cordon d'alimentation fourni avec le dispositif pour le connecter à la source d'alimentation.

ADVERTENCIA: Verifique que circuitos de la fuente de corriente están conectados a tierra correctamente; luego use el cordón de potencia suministrado con el instrumento para conectarlo a la fuente de corriente.

WARNING: Make sure the rack or cabinet housing the device is adequately secured to prevent it from becoming unstable or falling over.

ACHTUNG: Stellen Sie sicher, dass das Gestell oder der Schrank für die Unterbringung des Geräts auf angemessene Weise gesichert ist, so dass das Gestell oder der Schrank nicht wackeln oder umfallen kann.

AVERTISSEMENT: Vérifiez que le bâti ou le support abritant le dispositif est bien fixé afin qu'il ne devienne pas instable ou qu'il ne risque pas de tomber.

ADVERTENCIA: Verifique que el bastidor o armario que alberga el instrumento está asegurado correctamente para evitar que pueda hacerse inestable o que caiga.

WARNING: Mount the devices you install in a rack or cabinet as low as possible. Place the heaviest device at the bottom and progressively place lighter devices above.

ACHTUNG: Montieren Sie die Geräte im Gestell oder Schrank so tief wie möglich. Platzieren Sie das schwerste Gerät ganz unten, während leichtere Geräte je nach Gewicht (je schwerer desto tiefer) darüber untergebracht werden.

AVERTISSEMENT: Montez les dispositifs que vous installez dans un bâti ou support aussi bas que possible. Placez le dispositif le plus lourd en bas et le plus léger en haut, en plaçant tous les dispositifs progressivement de bas en haut du plus lourd au plus léger.

ADVERTENCIA: Monte los instrumentos que instale en un bastidor o armario lo más bajos posible. Ponga el instrumento más pesado en la parte inferior y los instrumentos progresivamente más livianos más arriba.

WARNING: For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

ACHTUNG: Aus Sicherheitsgründen sollte ein EGB-Armband zum Schutz von elektronischen gefährdeten Bauelementen mit einem 1 Megaohm-Reihenwiderstand ausgestattet sein.

AVERTISSEMENT: Pour des raisons de sécurité, la dragonne ESD doit contenir une résistance de série 1 méga ohm.

ADVERTENCIA: Por razones de seguridad, la correa de muñeca ESD deberá contener un resistor en serie de 1 mega ohmio.

- WARNING:** The AC power supplies are hot swappable, which means they can be removed and replaced while the BigIron MG8 chassis is powered on and running. However, Foundry recommends that you disconnect the AC power supply from wall outlet before removing and replacing the supply. The BigIron MG8 chassis can be running while a power supply is being removed and replaced, but the power supply itself should not be connected to a power source. Otherwise, you could be injured or the AC power supply or other parts of the device could be damaged.
- ACHTUNG:** Die Wechselstrom-Netzteile können während des Betriebs des BigIron MG8-Gehäuse abgenommen und ausgetauscht werden. Allerdings empfiehlt Foundry, den Stecker des Wechselstrom-Netzteils aus der Steckdose zu ziehen, bevor das Netzteil abgenommen und ausgetauscht wird. Ein Netzteil kann während des Betriebs des BigIron MG8-Gehäuses abgenommen und ausgetauscht werden. Allerdings sollte das Netzteil nicht an eine Stromquelle angeschlossen sein. Bei Nichtbeachtung könnte dies zu Verletzungen des Bedieners oder Beschädigung des Wechselstrom-Netzteils oder anderer Geräteteile führen.
- AVERTISSEMENT:** Les blocs d'alimentation C.A. peuvent être changés à chaud, ce qui signifie qu'ils peuvent être enlevés et remplacés pendant que le châssis BigIron MG8 est allumé et en cours de fonctionnement. Cependant, Foundry vous conseille de débrancher le bloc d'alimentation C.A. de l'alimentation avant d'enlever ou de remplacer le bloc d'alimentation. Le châssis BigIron MG8 peut être en cours de fonctionnement pendant que vous enlevez et remplacez un bloc d'alimentation, mais le bloc d'alimentation lui-même ne doit pas être connecté à une source d'alimentation. Sinon, vous risquez d'être blessé ou le bloc d'alimentation ou d'autres pièces du dispositif risquent d'être endommagés.
- ADVERTENCIA:** Los suministros de corriente alterna pueden desmontarse y reemplazarse cuando el chasis del BigIron MG8 está activado y en funcionamiento. No obstante, Foundry recomienda que se desconecte el suministro de corriente alterna del tomacorriente antes de desmontar y reemplazar el suministro. El chasis del BigIron MG8 puede estar en funcionamiento cuando un suministro de corriente esté siendo desmontado y reemplazado, pero el suministro de corriente en sí no deberá estar conectado a la corriente. De lo contrario, podría sufrir daños personales o el suministro de corriente alterna u otras partes del dispositivo podrían sufrir desperfectos.

-
- WARNING:** All fiber-optic interfaces use Class 1 Lasers.
- ACHTUNG:** Alle Glasfaser-Schnittstellen verwenden Laser der Klasse 1.
- AVERTISSEMENT:** Toutes les interfaces en fibres optiques utilisent des lasers de classe 1.
- ADVERTENCIA:** Todas las interfaces de fibra óptica utilizan láser de clase 1.

-
- WARNING:** The front panel of an AC power supply includes a handle that locks the power supply in the chassis. This handle is a locking mechanism only and should not be used to lift and carry the power supply. You may sustain physical injury or harm if you attempt to lift and carry a power supply using the locking handle.
- ACHTUNG:** Die Vorderabdeckung eines Wechselstrom-Netzteils verfügt über einen Griff, mit dem das Netzteil im Gehäuse verriegelt werden kann. Dieser Griff dient nur der Verriegelung. Mit ihm sollte das Netzteil weder angehoben noch getragen werden. Anheben und Tragen eines Netzteils mit dem Verriegelungsgriff kann zu Verletzungen führen.
- AVERTISSEMENT:** Le panneau avant d'un bloc d'alimentation C.A. comprend une poignée qui permet de verrouiller le bloc d'alimentation dans le châssis. Cette poignée est un mécanisme de verrouillage uniquement, elle ne doit pas être utilisée pour soulever et transporter le châssis. Vous risquez d'être blessé si vous essayez de soulever et de transporter un bloc d'alimentation avec la poignée de verrouillage.

ADVERTENCIA: El panel delantero de un suministro de corriente alterna incluye un mango que bloquea el suministro de corriente al chasis. El mango es un mecanismo de bloqueo solamente y no deberá usarse para alzar ni transportar el suministro de corriente. De hacerlo así, podría sufrir daños personales.

WARNING: A fully populated chassis is heavy. TWO OR MORE PEOPLE ARE REQUIRED WHEN LIFTING, HANDLING, OR MOUNTING THESE DEVICES.

ACHTUNG: Ein voll bestücktes Gehäuse ist schwer. ZUM ANHEBEN, HANDHABEN ODER MONTIEREN DIESER GERÄTE SIND MINDESTENS ZWEI PERSONEN ERFORDERLICH.

AVERTISSEMENT: Les châssis sont lourds quand ils sont entièrement remplis. POUR SOULEVER, MANIPULER OU MONTER CES DISPOSITIFS, DEUX PERSONNES MINIMUM SONT NÉCESSAIRES.

ADVERTENCIA: Un chasis muy concurrido es muy pesado. SE REQUIEREN DOS O MÁS PERSONAS CUANDO SE VAYA A ALZAR, MANEJAR O MONTAR ESTE DISPOSITIVO.

WARNING: Make sure to choose the appropriate circuit device depending on the number of AC power supplies installed in the chassis. The maximum current draw is three AC power supplies.

ACHTUNG: Je nach Anzahl der Wechselstrom-Netzteile im Gehäuse muss das passende Stromgerät ausgewählt werden. Es sollte nicht mehr als der von drei Wechselstrom-Netzteilen bereitgestellte Strom entnommen werden.

AVERTISSEMENT: Assurez-vous de choisir le dispositif de circuit approprié selon le nombre de blocs d'alimentation C.A. installés dans le châssis. L'appel de courant maximum est de trois blocs d'alimentation C.A.

ADVERTENCIA: Asegúrese de que elige el dispositivo de circuitos apropiado dependiendo del número de suministros de corriente alterna instalados en el chasis. La llamada de corriente máxima es de tres suministros de corriente alterna.

WARNING: Be careful not to accidentally insert your fingers into the fan tray while removing it from the chassis. The fan may still be spinning at a high speed.

ACHTUNG: Die Finger dürfen nicht versehentlich in das Ventilatorblech gesteckt werden, wenn dieses vom Gehäuse abgenommen wird. Der Ventilator kann sich unter Umständen noch mit hoher Geschwindigkeit drehen.

AVERTISSEMENT: Faites attention de ne pas accidentellement insérer vos doigts dans le boîtier du ventilateur lorsque vous l'enlevez du châssis. Il est possible que le ventilateur tourne encore à grande vitesse.

ADVERTENCIA: Procure no insertar los dedos accidentalmente en la bandeja del ventilador cuando esté desmontando el chasis. El ventilador podría estar girando a gran velocidad.

Appendix C

Software Specifications

This appendix lists the following information for the BigIron MG8:

- IEEE compliance
- RFC support
- Internet draft support

IEEE Compliance

The BigIron MG8 supports the following standards:

- 802.1d Bridging
- 802.1p/q VLAN Tagging
- 802.1w Rapid Spanning Tree (RSTP)
- 802.3, 10BaseT
- 802.3ad Link Aggregation
- 802.3ae 10000BaseX
- 802.3u, 100BaseTX, 100BaseFX
- 802.3z 1000BaseSX, 1000BaseLX
- 802.3x Flow Control

RFC Support

The following sections list the RFCs supported by the BigIron MG8.

General Protocols

- 791 – Internet Protocol (IP)
- 792 – Internet Control Message Protocol (ICMP)
- 793 – Transmission Control Protocol (TCP)
- 783 – Trivial File Transfer Protocol (TFTP)
- 768 – User Datagram Protocol (UDP)

- 826 – Ethernet Address Resolution Protocol (ARP)
- 854, 855, and 857 – TELNET
- 894 – IP over Ethernet
- 903 – RARP
- 906 – Bootstrap loading using TFTP
- 919 – Broadcast Internet datagrams
- 920 – Domain requirements
- 922 – Broadcast Internet datagrams in the presence of subnets
- 950 – Internet standard subnetting procedure
- 951 – Bootstrap Protocol (BootP)
- 1027 – Proxy ARP
- 1042 – IP datagrams over IEEE 802 networks (for Ethernet)
- 1122 and 1123 – Requirements for Internet Hosts (routers)
- 1141 – Incremental updating of the Internet checksum
- 1256 – ICMP Router Discovery Protocol (IRDP)
- 1267 – Border Gateway Protocol version 3
- 1321 – The MD5 Message-Digest Algorithm
- 1340 – Assigned numbers (where applicable)
- 1377 – The PPP OSI Network Layer Control Protocol (OSINLCP)
- 1519 – Classless Inter-Domain Routing (CIDR): an Address Assignment and Aggregation Strategy
- 1541 and 1542 – Dynamic Host Configuration Protocol (DHCP)
- 1591 – Domain Name System Structure and Delegation
- 1812 – Requirements for IP version 4 routers
- 2131 – Dynamic Host Configuration Protocol (BootP/DHCP Helper)
- 2338 – Virtual Routing Redundancy Protocol (VRRP)

BGP

- 1269 – Definitions of Managed Objects for the Border Gateway Protocol: Version 3
- 1745 – OSPF interactions
- 1771 – Border Gateway Protocol version 4 (BGPv4)
- 1997 – BGP Communities Attributes
- 2283 – Multiprotocol Extensions for BGP-4
- 2385 – TCP MD5 Signature Option (for BGP4)
- 2439 – BGP Route Flap Dampening
- 2796 – BGP Route Reflection
- 2842 – BGP Capability Advertisement
- 2918 – Route Refresh Capability for BGP4
- 3065 – BGP Confederations

OSPF

- 1583 – Open Shortest Path First (OSPF)
- 1587 – OSPF Not-So-Stubby Areas (NSSAs)
- 1745 – OSPF Interactions
- 1765 – OSPF Database Overflow
- 1850 – Open Shortest Path First (OSPF) version 2 MIB
- 2154 – OSPF with Digital Signatures (Password, MD-5)
- 2178 – Open shortest Path First (OSPF)
- 2328 – Open Shortest Path First (OSPF) version 2
- 2370 – OSPF Opaque LSA Option

RIP

- 1058 – Routing Information Protocol (RIP) version 1
- 1723 – RIP version 2
- 1812 – Requirements for IP version 4 routers

IP Multicast

- 1075 – Distance Vector Multicast Routing Protocol
- 1112 – Internet Gateway Management Protocol (IGMP)
- 2236 – Internet Group Management Protocol (IGMP) version 2
- 2362 – IP Multicast PIM Sparse
- 2336 – IGMP v2

Management

- 1155 – Structure and Identification of Management Information (SMI)
- 1157 – Simple Network Management Protocol (SNMP) version 1
- 1212 – Concise MIB Definitions
- 1213 – MIB II Definitions
- 1215 – SNMP generic traps
- 1398 – Ethernet-Like MIB
- 1492 – An Access Control Protocol, Sometimes Called TACACS
- 1493 – Bridge MIB (excluding filtering of objects)
- 1657 – Definitions of Managed Objects for the Fourth Version of the Border Gateway Protocol (BGP-4) using SMIv2
- 1724 – RIP Version 2 MIB Extension
- 1757 – Remote Monitoring (RMON) Groups 1,2,3,9
- 1905 – Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)
- 1906 – Transport Mappings for Version 2 of the Simple Network Management Protocol (SNMPv2)
- 1966 – BGP Route Reflection
- 2030 – Simple Network Time Protocol (SNTP)

- 2068 – HTTP
- 2096 – IP Forwarding MIB
- 2138 – Remote Authentication Dial In User Server (RADIUS)
- 2139 – RADIUS Accounting
- 2233 – The Interfaces Group MIB using SMIv2
- 2570 – Introduction to Version 3 of the Internet-standard Network Management Framework
- 2571 – An Architecture of Describing SNMP Management Frameworks
- 2572 – Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)
- 2574 – User-based Security (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)
- 2575 – View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)
- 2578 – Shernet Like MIB (incorporates RFC 1398)
- 2674– Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering and Virtual LAN Extensions
- 2787 – Definitions of Managed Objects for the Virtual Router Redundancy Protocol
- 2869 – RADIUS Extensions
- 2932 – IPv4 Multicast Routing MIB
- 2933 – Internet Group Management Protocol MIB
- 2934 – Protocol Independent Multicast MIB for IPv4
- 3176 – InMon Corporation's sFlow: A Method for Monitoring Traffic in Switched and Routed Networks

Internet Drafts

In addition to the RFCs listed in “RFC Support” on page C-1, the BigIron MG8 supports the following Internet drafts:

- ietf-idmr-dvmp version 3.05, obsoletes RFC 1075
- draft-ietf-pim-dm-05 (V1)
- draft-ietf-pim-v2-dm-03 (V2)
- The TACACS+ Protocol version 1.78
- MSDP