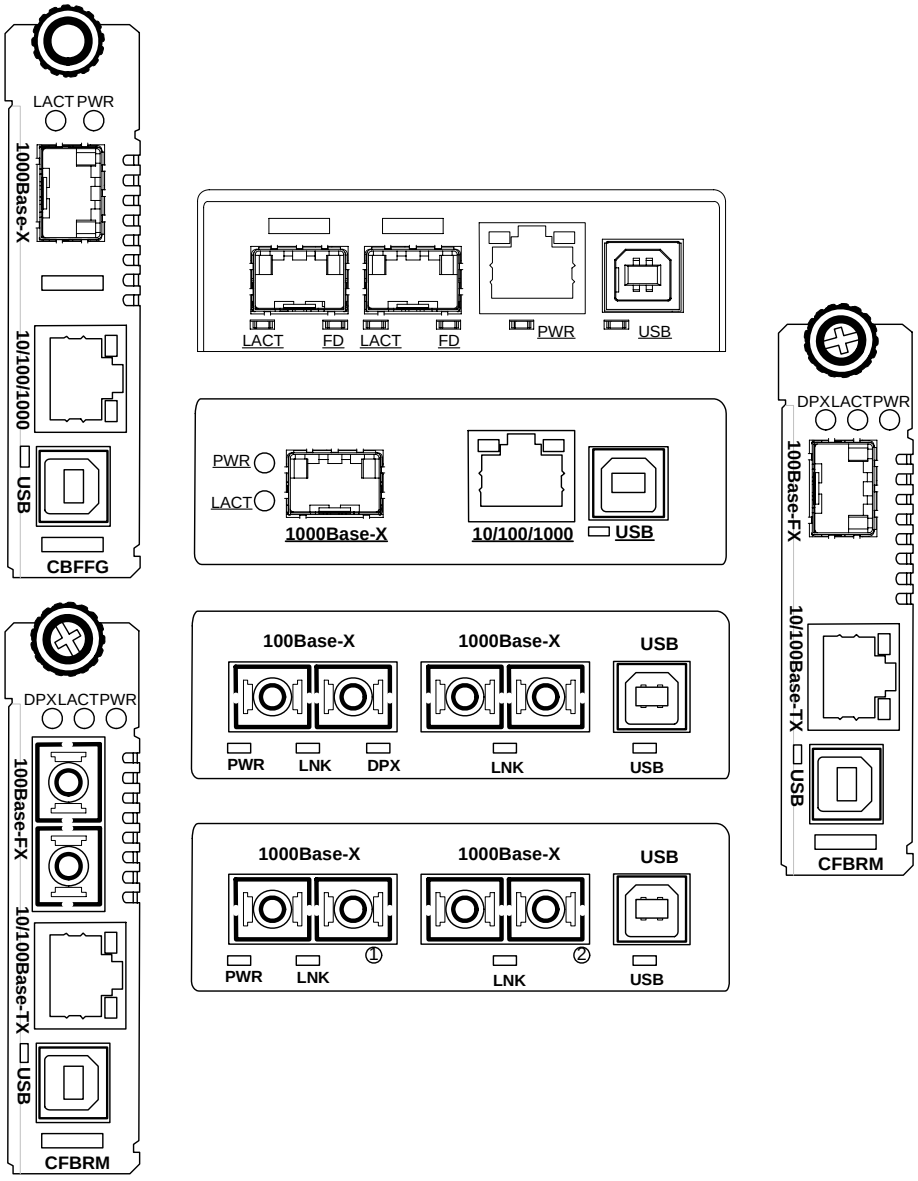

FBRM1xxx-1xx & BFFG1xxx-1xx Chassis & Stand-Alone Remotely Managed Devices

Manual

33345, Revision D

Table of contents

Continued on next page

Table of contents, *continued*

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Trademark

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Copyright restrictions

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About this manual

This manual is designed to help you find the information you need quickly. It is structured as follows:

- Table of Contents (TOC)
- Section TOC: Shows all the major topics in the section
- Side Headings: Shows all the sub topics on each page
- Index

Caution and warnings

Definitions

Cautions indicate that there is the possibility of poor equipment performance or damage to the equipment. The symbol below identifies cautions

Warnings indicate that there is the possibility of injury to person.

Cautions and Warnings appear here and may appear throughout this manual where appropriate. Failure to read and understand the information identified by the symbol could result in poor equipment performance, damage to the equipment, or injury to persons.

Cautions

When handling chassis Devices observe electrostatic discharge precautions. This requires proper grounding; i.e., wear a wrist strap.

Copper based media ports, e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are intended to be connected to intra-building *(inside plant)* link segments that are not subject to lightening transients or power faults.

Copper based media ports, e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are NOT to be connected to inter-building *(outside plant)* link segments that are subject to lightening.

DO NOT install the Devices in areas where strong electromagnetic fields (EMF) exist. Failure to observe this caution could result in poor Device performance.

Warnings

Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

Visible and invisible laser radiation when open. DO NOT stare into the beam or view the beam directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

Section I:
Product Description

In this section These are the topics:

General description

Design and configuration

The FBRM and BFFG Devices are designed as standalone models, and also as slide-in Devices for the Point System chassis. These Devices can be managed through SNMP via the Focal Point software *(free)*, Web-based management, Local SNMP, and USB interfaces.

The CFBRM and CBFFG *(chassis Devices)*, and SFBRM and SBFFG *(standalone Devices)* are designed to manage Devices remotely through the copper and fiber ports.

The FBRM or BFFG Devices installed on a network should be configured one as the local peer and the other as a remote peer for management.

Remote management is accomplished using OAM *(Operation Administration and Maintenance)* per the IEEE 802.3ah, 2004 standard. Standalone Devices can also be managed via IP *(Web-based)* or Telnet.

What is OAM?

These Devices implement the IEEE 802.3ah standard or (OAM) in the Ethernet first mile. OAM is a group of network management functions that provide network fault indications, performance information, data, and diagnosis. These Devices implement remote management via OAM as per the IEEE 802.3ah standard.

In-band management

These Devices implement complete Real-Time Multi-Threaded Operating System (RTOS) with a TCP/IP stack for in-band management.

USB interface

The USB *(Universal Serial Bus)* type “B” serial port is used mainly to configure Device-basic setup before installation and operation on a network.

Point System mgmt interface

Implements the current Point System management I^2C interface. This allows managing the Device via SNMP, using the existing Point System method.

Product features

Supported features

The following is a list of the major FBRM and BFFG Device supported features:

- Remote Management via OAM *(IEEE 802.3ah)* and IP-based management
- AutoCross
- Transparent Link pass-through with automatic link restoration
- Far end fault detection on fiber ports
- OAM IEEE 802.3ah
- Auto-Negotiation *(enable/disable)*
- Force 10 Mbs or 100 Mbs speed *(non-gigabit models only)*
- Force half or full duplex
- Pause capability
- Automatic firmware upgrade via OAM
- Forwards all IEEE multicast frames including STP/LACP/LAMP
- Enable/disable USB port access
- Enable/disable SNMP queries
- Enable/disable system-level IP management or on a per port basis
- IEEE 802.1q VLAN *(virtual local area network)*
- Management VLAN for all management frames
- IEEE 802.1x port-based network access control
- Radius authentication for management
- Remote and local firmware upgrades via TFTP *(Trivial File Transfer Protocol)* or Xmodem

Management methods

Management

The FBRM and BFFG Devices support the following management methods:

- USB CLI *(Command Line Interface)*
- Telnet
- MMU *(Management Module Unit)* chassis web-based
- IP-based *(web-based directly to the Device)*

USB

USB management requires a direct connection to the Device via a computer. This method is used to set up initially or to troubleshoot Devices in the field.

Telnet

Telnet management requires that the Device be connected to a network. Then from the CPU command line type Telnet and the Device IP address as shown as follows:

Telnet nnn.nnn.nnn.nnn *(represents Device IP address).*

MMU

The MMU *(Management Module Unit)* is the heart of the Point System chassis' management capability. It has the ability to monitor and manage all its installed Devices. The MMU communicates through the CLI presented at the serial port, or through SNMP, Telnet CLI, and Web interface available via the Ethernet port.

IP-based *(web-based)*

The switch provides complete management through IP via an SNMP interface, web-browser, or Telnet. The Device provides an embedded web server for web-based management. It also offers advanced management features and enables Device management from anywhere on the network through a standard browser, such as Microsoft Internet Explorer or Netscape.

Hardware description

Front panel CFBRM

The front panel of the CFBRM10xx-1xx Devices has the following ports and LEDs:

Ports	Front Panel LEDs
One RJ-45 auto-sensing of 10Base or 10/100Base-TX UTP connections	• Power *(one)* • RJ-45 port *(two)*
One 100Base-FX/LX/BX fiber either SC or ST connectors	• LACT *(one)* • DPX *(one)*
One USB	• USB *(one)*

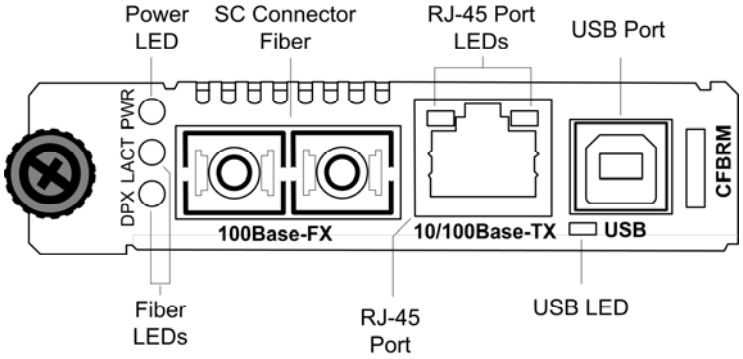

Figure 1: Chassis CFBRM10xx-1xx Device Front Panel

Note: The LEDs and ports are the same on the SFBRM10xx-1xx standalone models.

Continued on next page

Hardware description, continued

Front panel CFBRM

The front panel of the CFBRM 1040-140 Devices has the following ports and LEDs:

Ports	Front Panel LEDs
	• Power *(one)*
100Base-FX SFP port 10/100 Base-T copper port One USB	• Link/Active • Speed • Duplex *(one)* • USB *(one)*

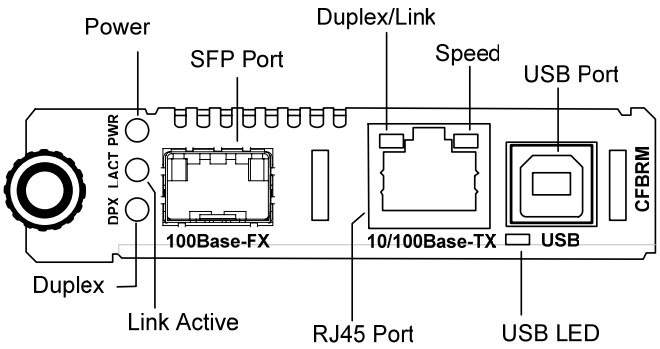

Figure 2: CFBRM1040-100 Front Panel

Note: The LEDs and ports are the same on the SFBRM1040-140 standalone models.

Continued on next page

Hardware description, continued

Front panel CFBRM Gbit

The front panel of the CFBRM13xx-1xx Devices has the following ports and LEDs:

Ports	Front Panel LEDs
	• Power *(one)*
One 100 Base-T	• Fiber-Port Link *(one)*
One 1000Base-FX/LX/BX fiber either SC or ST connectors	• Fiber-Port Link *(one)*
One USB	• USB *(one)*

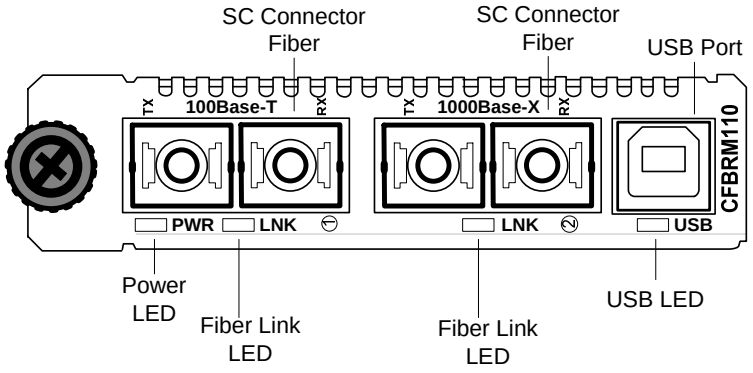

Figure 3: Chassis CFBRM13xx-1xx Device Front Panel

Note: The LEDs and ports are the same on the SFBRM13xx-1xx standalone models.

Continued on next page

Hardware description, continued

Front panel CBFFG Gbit

The front panel of the CBFFG10xx-1xx Devices has the following ports and LEDs:

Ports	Front Panel LEDs
	• Power *(one)*
1000Base-SX/LX/BX fiber SC port 10/100/1000Base-T copper port One USB	• Link/Active • Speed • Duplex *(one)* • USB *(one)*

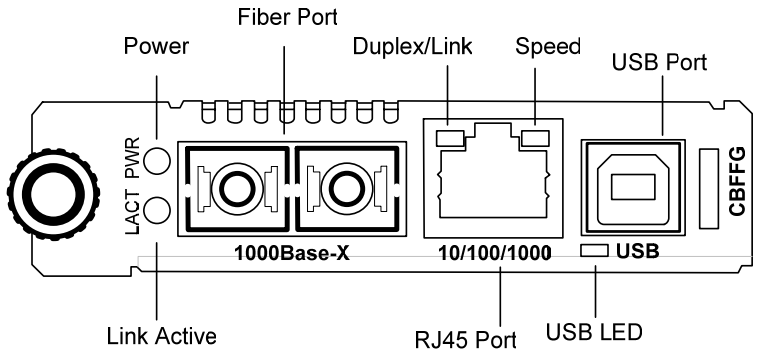

Figure 4: CBFFG10xx-1xx Device Front Panel

Note: The LEDs and ports are the same on the SBFFG10xx-1xx standalone models.

Continued on next page

Hardware description, continued

Front panel CBFFG Gbit

The front panel of the CBFFG1040-1xx Devices has the following ports and LEDs:

Ports	Front Panel LEDs
	• Power *(one)*
1000Base SFP port 10/100/1000Base-T copper port One USB	• Link/Active • Speed • Duplex *(one)* • USB *(one)*

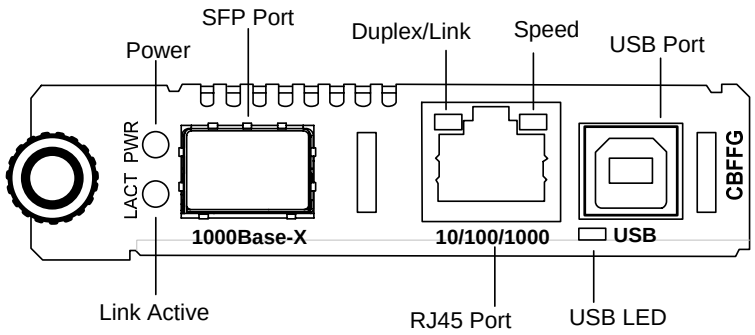

Figure 5: CBFFG1040-1xx Device Front Panel

Note: The LEDs and ports are the same on the SBFFG1040-1xx standalone models.

Continued on next page

Hardware description, continued

Front panel CBFFG Gbit

The front panel of the CBFFG13xx-1xx Devices has the following ports and LEDs:

Ports	Front Panel LEDs
Two 1000Base-FX/LX/BX fiber either SC or ST connectors One USB	• Power *(one)* • Fiber-Port Link *(two)* • Duplex *(one)* • USB *(one)*

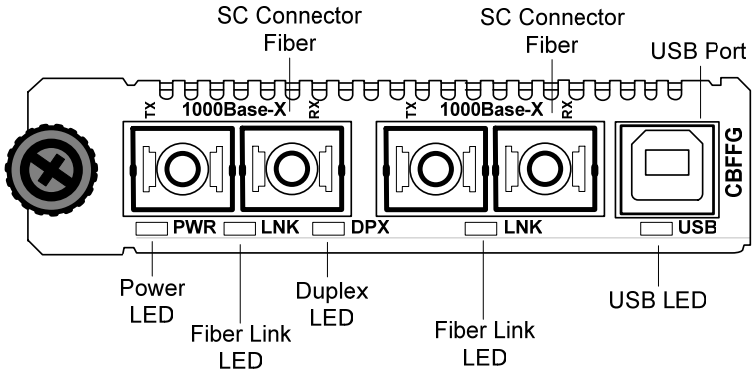

Figure 6: Chassis CBFFG13xx-1xx Device Front Panel

Note: The LEDs and ports are the same on the SBFFG13xx-1xx standalone models.

Continued on next page

Hardware description, continued

Front panel SFBRM

The front panel of the SFBRM1040-140 redundant Devices has the following ports and LEDs:

Ports	Front Panel LEDs
	• Power *(one)*
1000Base SX/LX SFP ports *(2 and 3)*	• Link/Active • Duplex
10/100/1000Base-T copper port *(1)*	• Speed • Duplex *(one)*
One USB	• USB *(one)*

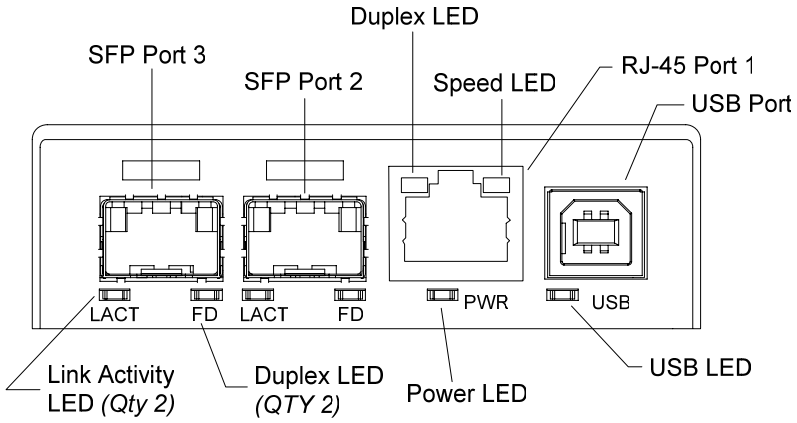

Figure 7: CBFFG1040-140 Device Front Panel

Continued on next page

Hardware description, continued

Rear panel *(standalone)*

On the standalone SFBRM and SBFFG Devices only, the rear panel consists of a power-barrel connector for connecting power via a power adaptor. See Figure 8.

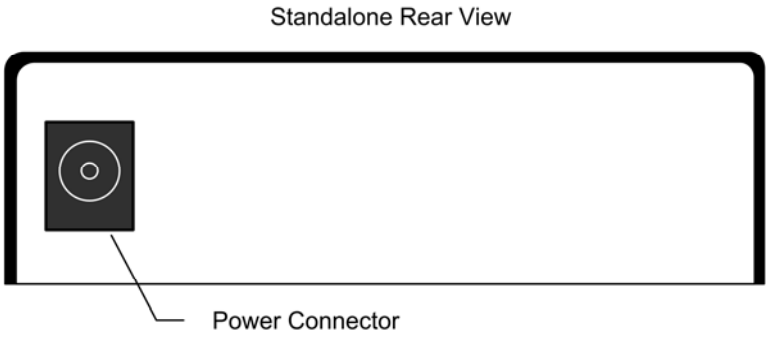

Figure 8: SFBRM/SBFFG 1xxx-1xx Device Real Panel *(Standalone Only)*

Note: The Point System chassis powers the CFBRM and CBFFG chassis Devices.

FBRM/BFFG13xx-1xx fiber-to-fiber gigabit models

Gigabit *(Gbit)* models

The FBRM100Base-FX-to-1000Base-X and the BFFG 1000Base-X-to-1000Base-X are the Gbit versions of the IEEE 802.3ah managed Devices. The BFFG models link Gbit fiber connections; the FBRM models convert 100Base-Fx 100 Mbit/s to Gbit. These Devices function generally in the same manner as copper-to-fiber FBRMs, the difference is the way the ports are configured. See Tables 1 and 2.

Table 1: FBRM13xx-1xx 100Base-FX-to-1000Base-X Device

Port	Configuration
Port 1: 100Base-FX	• Default setting: 100Mbs and full duplex. • FEFI *(Far-end fault indication)* is configurable.
Port 2: 1000Base-X	Default: • Auto-Negotiation enabled. • OAM enabled and in Active Mode if chassis Device *(passive if standalone).*

Table 2: BFFG13xx-1xx 1000Base-X-to-1000Base-X Device

Port	Configuration
Port 1: 1000Base-X	Default: Auto-Negotiation enabled.
Port 2: 1000Base-X	Default: • Auto-Negotiation enabled. • OAM is enabled and in Active Mode if chassis Device *(passive if standalone).*

Continued on next page

FBRM/BFFG13xx-1xx fiber-to-fiber gigabit models, continued

Connectivity

The different versions of the FBRM and BFFG can be connected and set up to manage a remote peer completely. In a mixed setup with other FBRM or BFFG Devices, consider the connectivity scenarios in Figure 9, and the explanation that follows:

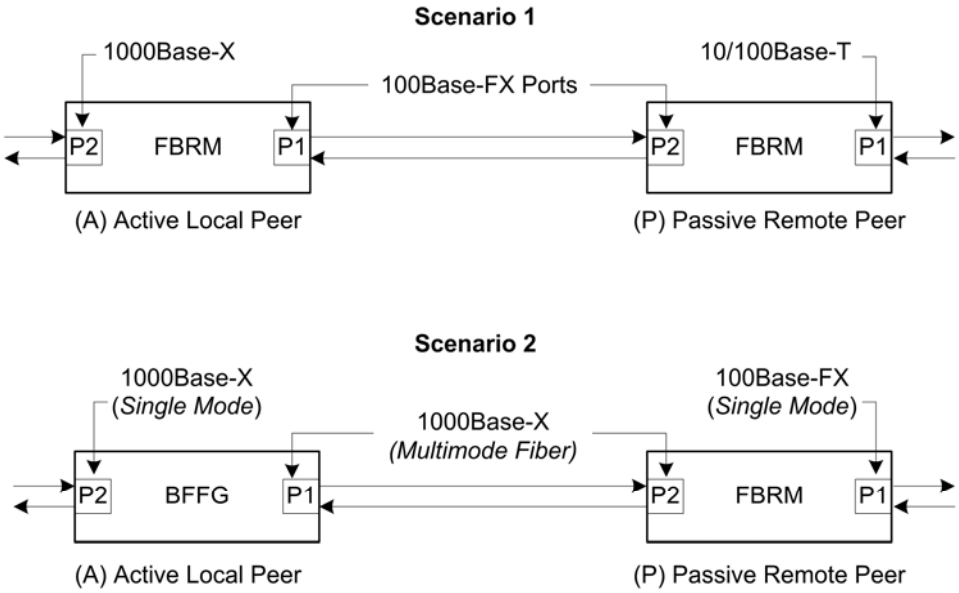

Figure 9: Connectivity Scenarios

Connection scenario explanation

In Figure 9, P2 of the active local peer in both scenarios is “OAM enabled” and “Active” by default. To manage the remote passive peer via OAM, configure P1 of the active local peer as follows:

- Enable OAM
- Select Active mode

If the connection to the passive remote peer is made thru P2 of the active local peer, OAM occurs without human intervention.

Note: Automatic firmware upgrades will not occur with different types of FBRM or BFFG Device configurations.

Redundant SFBRM1040-140 models

Redundant models

These SFBRM SFP Devices support fiber redundancy. They have two (2) fiber SFP ports and one (1) copper port. When you tag the fiber ports as primary and secondary with redundancy enabled, any fault on the primary port results in the secondary port becoming operational. There is an option for reverting back to the primary once it has been restored, or you can continue using the secondary port—these are user selectable features. See Figure 10.

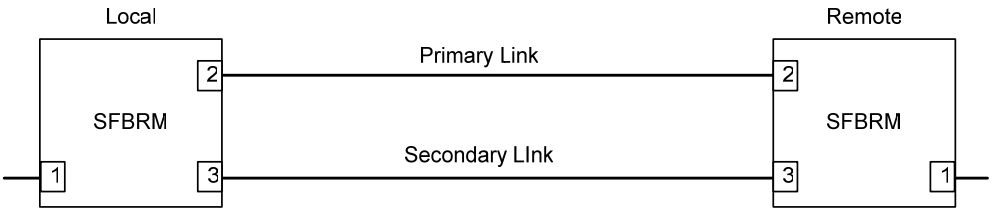

Figure 10: SFBRMs in Redundant Mode

Explanation

With Port 3 as the secondary port in Redundancy Mode and Port 2, the primary goes down, the following will happen:

Stage	Description
A.	All Physical layer and OAM configurations of Port 2 will be applied to Port 3.
B.	Port 2 is disabled, and Port 3 initialized to take over.
C.	An SNMP trap is sent indicating that the ports have switched.
D.	OAM reinitializes *(resets all OAM counters and event logs).*
E.	All the dynamic MAC entries in the ATU are flushed and the active port has to relearn the entries.

Note: If the configuration option “revert” is set, when the primary port link is restored the session will revert back to the primary port. If the “revert’ option is NOT SET and the primary link is restored, the secondary port remains in operation until the user intervenes.

Continued on next page

Redundant SFBRM1040-140 models, continued

3-port switch mode

In this mode, the Device acts as a 3-port switch with the fiber port connected to 2 remote Devices. See Figure 11.

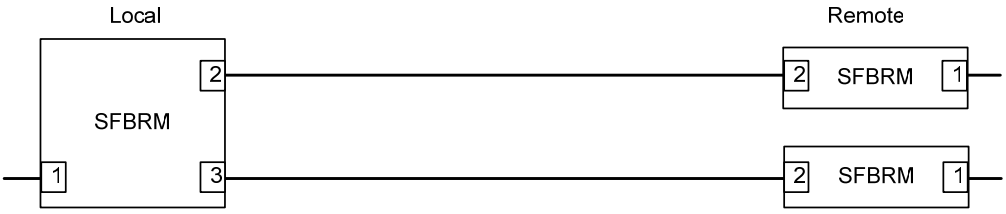

Figure 11: 3-Port Switch Mode

Note: In 3-port switch mode:

- Only one OAM session can be active at anytime.
- Transparent Link pass through is not applicable in this scenario. The port link status from the Devices is received only as SNMP traps.

Section II:
Hardware Installation

Introduction

This section describes how to install the CFBRM and CBFFG Devices into a Point System chassis with a remotely managed SFBRM or CFBRM standalone Device. Also, shows how to install two SFBRM Devices or two SBFFG standalone Devices on a network, one as a local Device and the other as a remotely managed Device.

Caution

When handling chassis Devices observe electrostatic discharge precautions. This requires proper grounding; i.e., wear a wrist strap. Failure to observe this caution could result in damage to the chassis Device.

In this section

These are the topics:

Installing CFBRM/CBFFG Devices into point system chassis

IMPORTANT

The CFBRM/CBFFG Device product family IS NOT compatible with the CPSMM-200 and CPSMM-210 MGMT modules when used in a cascaded application. The CFBRM/CBFFG can be installed in the "master" chassis with the CPSMM-200 MGMT module, but they can not be installed in a cascaded chassis using the CPSMM-210 MGMT module.

Alternatively, the CFBRM/CBFFG can be used with the CPSMM120 MGMT module, which does not support chassis cascading.

Caution

Wear a grounding strap and observe electrostatic discharge precautions when installing the CFBRM/CBFFG Device into the Point System chassis. Failure to observe this caution could result in damage to the Device.

Chassis Device installation

To install the chassis Device into the Point System chassis, do the following:

Step	Action
1.	Locate an empty slot in the Point System chassis.
2.	Grasp the edges of the Device by its front panel.
3.	Align the Device with the slot guides and carefully insert the Device into the installation slot.
4.	Firmly seat the Device against the chassis back panel.
5.	Push IN and ROTATE clockwise the panel-fastener screw to secure the Device to the chassis. See Figure 12.

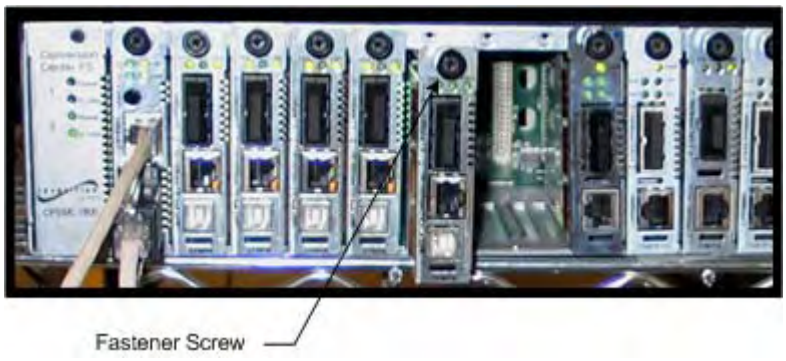

Figure 12: CFBRM/CBFFG Device Chassis Installation

Installing SFBRM/SBFFG standalone models

Standalone installation

Figure 13 shows a typical installation involving two (2) SFBRM/SBFFG standalone Devices on a network.

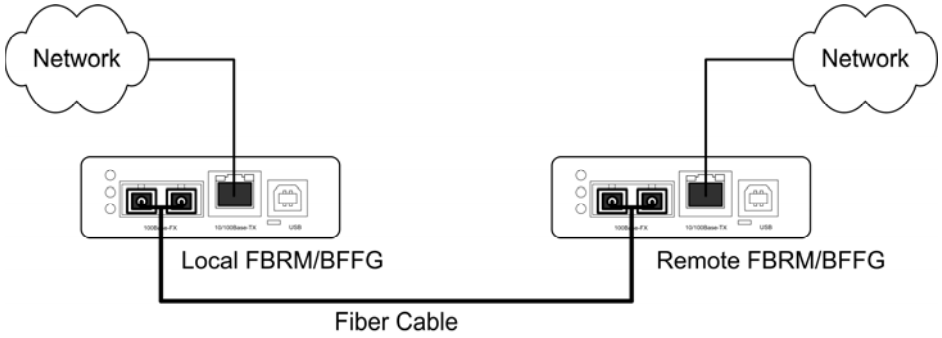

Figure 13: Installation with Two SFBRM/SBFFG Standalone Devices

Note: With the local active standalone Device connected to a remote standalone passive Device and with "Mode Control" set to "Auto," the local *(active)* Device will manage the remote *(passive)* Device. This relationship is established automatically.

Installing fiber and copper cables

Warning

Use of controls, any adjustments, or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

Visible and invisible laser radiation when open: DO NOT stare into the laser-light beam or view the beam directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

Fiber cable

To install the fiber cable, do the following:

Step	Action
1.	Locate a 100/1000Base-FX/SX/LX compliant fiber cable with male, two-stranded connectors installed at both ends. See Figure 14.
2.	Connect the fiber cables to the FBRM or BFFG Devices as shown in Figure 14.

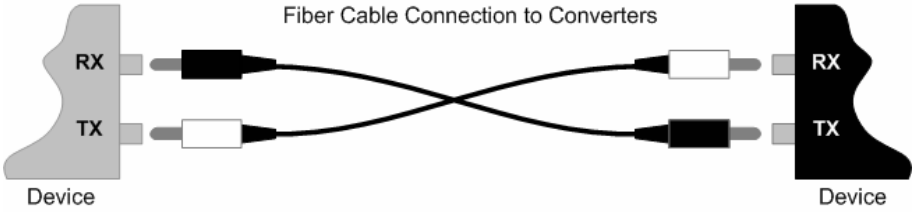

Figure 14: Fiber Cable Installation

Continued on next page

Installing fiber and copper cables, continued

Caution

Copper based media ports, e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc. are intended to be connected to intra-building *(inside building)* link segments that are not subject to lightening transients or power faults. Failure to observe this caution could result in damage to equipment.

Copper cable

To install the copper cable, do the following:

Step	Action
1.	Locate a 10/100 or 10/100/1000Base-T compliant copper cable with male, RJ-45 connectors installed at both ends.
2.	Connect the RJ-45 connector at one end of the cable to the Device's RJ-45 ports.
3.	Connect the RJ-45 connector at the other end of the cable to the 10/100 or 10/100/1000Base-T RJ-45 port on the other Device *(switch, workstation, etc.)*. See Figure 15.

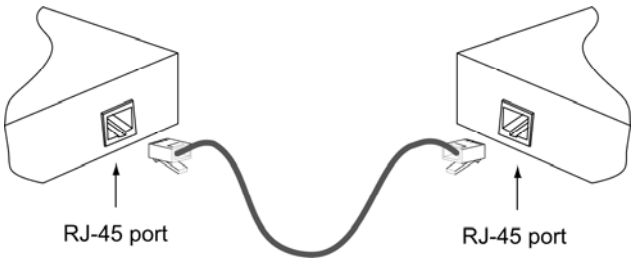

Figure 15: Copper Cable Installation

Connecting power *(standalone models)*

Chassis powers slide-in Device

Transition Networks' Point System chassis powers the CFBRM/CBFFG chassis Devices.

Adapter powers standalone

Use an AC power adaptor to power the SFBRM/SBFFG standalone Device. To connect power to the Device, do the following:

Step	Action
1.	Connect the barrel connector on the power adapter cord to the power connector on the Device *(located on the rear of the Device)*. See Figure 16.

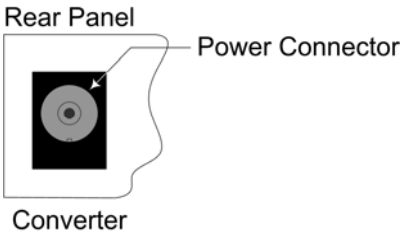

Figure 16: Standalone Device Power Connector

2.	Connect the power adapter plug into AC power.
3.	Verify that the Device has powered UP—the power indicator LED will be lit.

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Section III:
USB Driver Installation & COM Port Setup

Introduction This section shows how to install the USB driver and configure COM ports.

In this section These are the topics:

Installing USB driver

USB driver

The driver installation instructions are for Windows XP only. Installing the USB driver using Windows 2000 is similar, but not necessarily identical to the following Windows XP driver-installation procedure.

Note: The following USB drivers are provided with the product on a CD, also available at www.ftdichip.com *(click on drivers)*: WinXP64, Win Server 2003, Win 2002, Win ME/98, Mac OS X, 9, 8, and Linux.

Installing USB driver

To install the USB driver on a computer with a Windows XP OS, do the following:

Step	Action
1.	Extract the driver *(provided CD or from website)* and place it in an accessible folder on the local drive.
2.	Plug the Device into the USB port on the PC to bring up the “found new hardware” wizard dialog box, shown in Figure 17.
3.	Select RADIO button, “No, not this time” as shown in Figure 17.

Figure 17: Found New Hardware Wizard Dialog Box

Continued on next page

Installing USB driver, continued

Installing USB driver *(continued)*

Step	Action
4.	Click the NEXT button to launch the "installation options" dialog box.
5.	Select RADIO button "Install from a list or specific location *(Advanced)*" as shown in Figure 18.

Figure 18: Installation Options Dialog Box

6.	Click the NEXT button to bring up the "driver search installation options" dialog boxes shown in Figure 19.

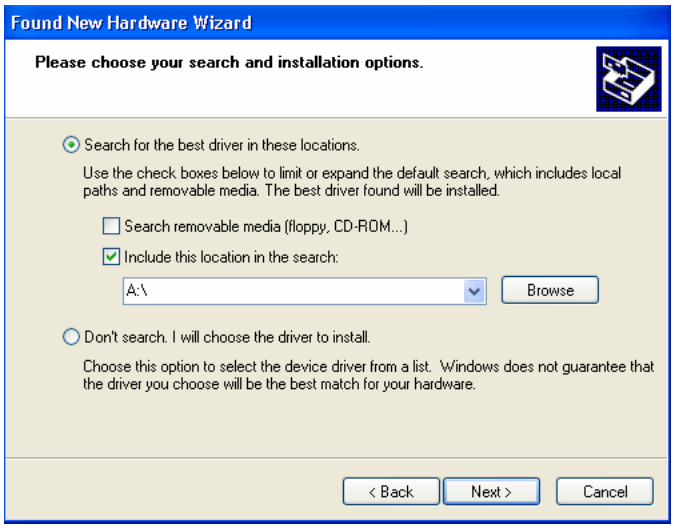


Figure 19: Driver Search Installation Options Dialog Box

Continued on next page

Installing USB driver, continued

Step	Action
7.	Use the BROWSE button to locate the USB driver, as shown in Figure 20.

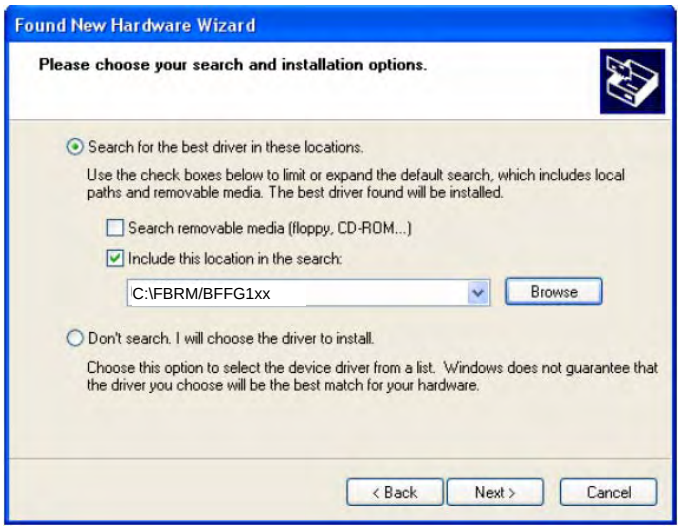


Figure 20: Driver Location

8.	Click the NEXT button to start installing the driver and the driver-install screen will appear as XP copies the Device driver. See Figure 21.

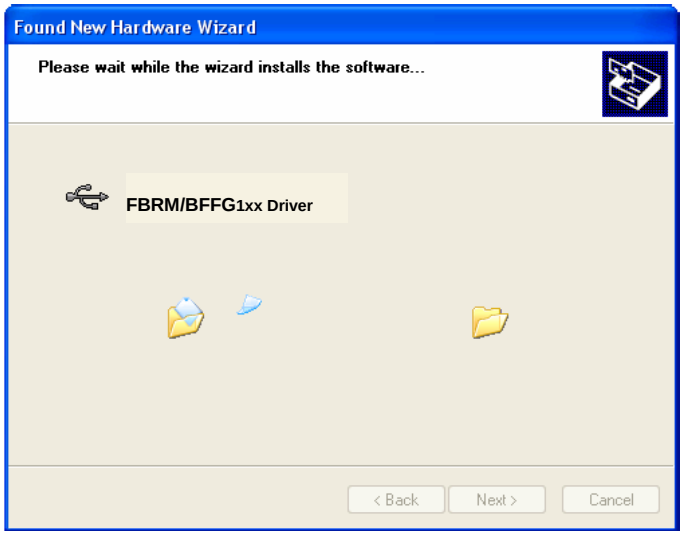


Figure 21: Windows XP Installing Driver Box

Continued on next page

Installing USB driver, continued

Step	Action
9.	After the driver installation is successful, the “finished installing” dialog box will appear, as shown in Figure 22.

Figure 22: Finish Installing Driver Dialog Box

10.	Click the FINISH button and a “found new hardware” message will appear on the lower right side of the screen, as shown in Figure 23.

Figure 23: New Hardware Installed and Ready to Use

Configuring COM port

Getting COM port number

You need the COM port number to configure the terminal emulator. To get the COM port number, do the following:

Step	Action
1.	On the desktop, right click on the “my computer” icon and select “Device manager” to open the “computer management” window.
2.	Click on “Device manager” to open the Device manager’s panel *(screen right panel)* shown in Figure 24.

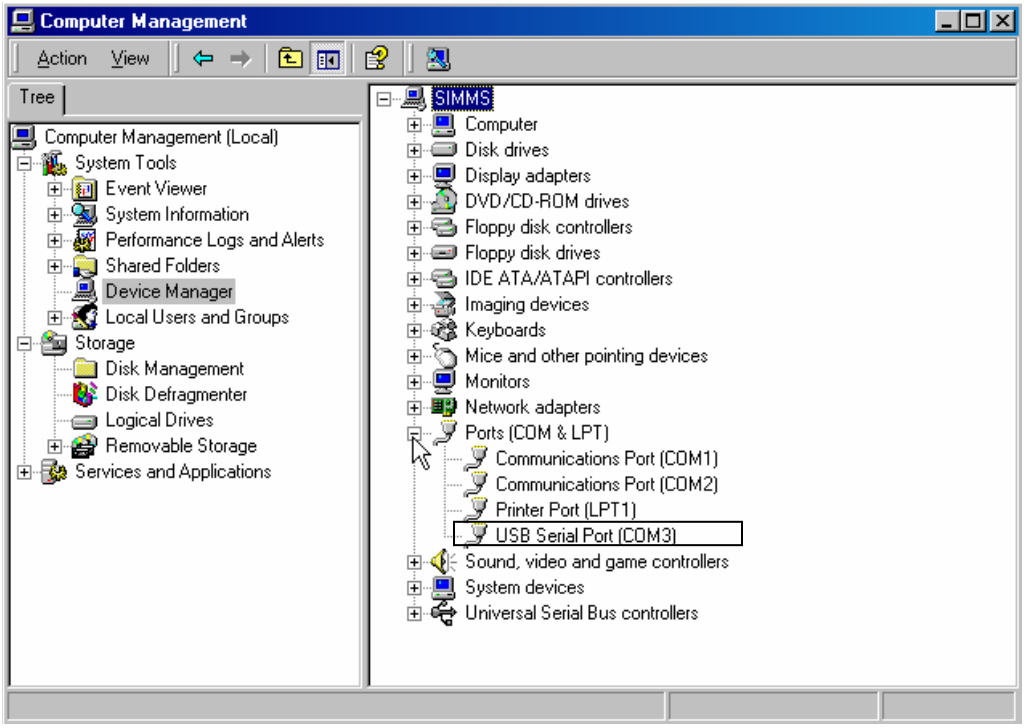


Figure 24: Computer Management Window

3.	Expand the Ports *(COM & LPT)* in the right column and write down the USB COM port number for configuring the terminal emulator software used for the USB Device.

Continued on next page

Configuring COM port, continued

Terminal emulator setup

To set up the terminal emulator software, e.g., HyperTerminal to use the USB COM port, do the following:

Step	Action
1.	Activate the “HyperTerminal” software to bring up the “connection description” dialog box, shown in Figure 25.

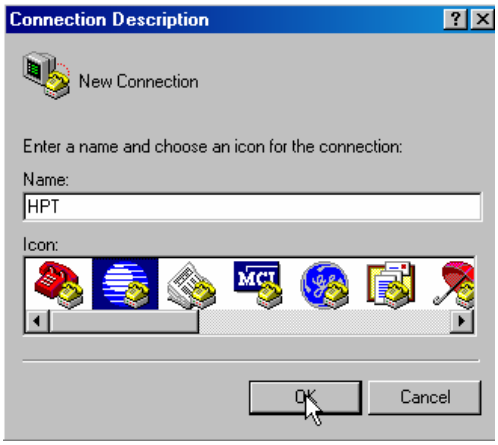


Figure 25: Connexion Description Diallo Box

2.	Type in a name and select an icon.
3.	Click the OK button to launch the “connect to” dialog box, shown in Figure 26.

Figure 26: Connect To Dialog Box

Continued on next page

Configuring COM port, continued

Terminal emulator setup *(continued)*

Step	Action
4.	Select the COM port identified for the USB Device shown in the Device manager.
5.	Click the OK button to bring up the "port settings" dialog box, shown in Figure 27.

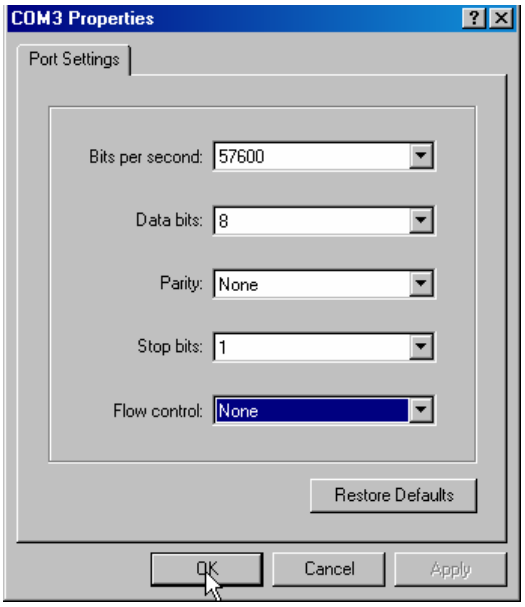


Figure 27: COM Port Settings Dialog Box

6.	Set the COM port properties as follows: • Baud: 57600 • Data length: 8 • Parity: None • Stop bit: 1 • Flow Control: None
7.	Click the OK button and the Device login prompt will appear.

Section live:
Initial Device Setup

Introduction

There are four ways to set up the FBRM/BFFG 1xxx-1xx Devices before the Device can be operated and managed:

- USB CLI
- Telnet
- Chassis MMU *(chassis model)*
- IP-based *(directly to FBRM/BFFG)*

The factory default IP configuration is the following:

- IP address: 192.168.1.1
- Subnet Mask: 255.255.255.0
- Gateway: 192.168.1.2

In this section

These are the topics:

USB CLI access

Accessing the USB CLI

To access the USB CLI, do the following:

Step	Action
1.	Connect the Device to a computer via the USB port.
2.	Activate the terminal emulator software to launch the emulator screen.
3.	Press the ENTER key to bring up the "password" prompt.
4.	Enter the password and then the login *(default is "root" in both cases)* to bring up the Device **console>** prompt, shown in Figure 28.

```
Password :
Login : root
Password :
Console:/>_
```

Figure 28: Device Console Prompt

5.	To access the commands list, at the **console> prompt** type **help or "?"**
6.	Press the ENTER key to launch the "commands" screen, shown in Figure 29.

```
Password :
Login : root
Password :
Console:/>help

Commands are:
  arp                   sys contact           set usb
  netstat               set                   set l3capability
  ps                    set dhcp              set snmpaccess
  exit                  set gateway           set mgmtvlan
  help                  set ip                ifconfig
  ?                     set netmask           ifoam
  cls                   set trapmgr           show
  ping                  set community         show ifconfig
  reboot                set groupstring       show ifcabletest
  save                  set radius            show ifstats
  factorydefaults       set radiusip          show ifrmonstats
  tftpupgrade           set radiussecret      show ifoam
  xmodemupgrade         set tftpserver        show oamstatistics
  sys                   set tftpfile          show oampeer
  sys name              set username          show oamloopback
  sys location          set password

Console:/>_
```

Figure 29: Commands for FBRM/BFFGs Models

Note: See Appendix C for a complete list of the configuration commands and definitions. All CLI commands are case sensitive.

Continued on next page

USB CLI access, *continued*

Redundant The following is the screen of commands for the redundant SFP Devices.

```
  arp                   set netmask           set l2cp
  netstat               set trapmgr           set fiberredund
  ps                    set community         set fiberrevert
  exit                  set groupstring       ifconfig
  help                  set uploadcfg         ifoam
  ?                     set downloadcfg       show
  cls                   set radius            show version
  ping                  set radiusip          show redundancy
  reboot                set radiussecret      show ifconfig
  save                  set tftpserver        show ifcabletest
  factorydefaults       set tftpfile          show ifstats
  tftpupgrade           set username          show ifrmonstats
  xmodemupgrade         set password          show ifoam
  clearcounter          set usb               show oamstatistics
  sys                   set l3capability      show oampeer
  sys name              set snmpaccess        show oamloopback
  sys location          set mgmtvlan          show niecho
  sys contact           set niecho            show l2cp
  set                   set autoupg           snmpget
  set dhcp              set forceupg          snmpset
  set gateway           set slpt              snmpgetn
  set ip                set tlpt              snmpwalk

Console:/>_
```

Figure 30: Commands for Redundant SFP Models

Initial Device setup via USB CLI

IP configuration

Use the 'set' commands to set the IP configuration through the USB port. Configure the Device with a network IP address, subnet mask, and default gateway. Set the IP address via USB CLI *(Command Line Interface)*, or via DHCP *(Dynamic Host Configuration Protocol)*, which is disabled by default.

Factory default IP config

The factory default IP configuration shipped with the Device is as follows:

- IP address: 192.168.1.1
- Subnet Mask: 255.255.255.0
- Gateway: 192.168.1.2

Note: Type "**help set <command>**" to display the format used to set the commands.

Set IP config via USB CLI

To set the IP via the USB CLI, do the following:

Step	Action
1.	At the console> prompt type **set ip=nnn.nnn.nnn.nnn**
2.	Press the ENTER key to set the IP address.
3.	At the console> prompt type **set netmask=nnn.nnn.nnn.nnn**
4.	Press the ENTER key to set the netmask.
5.	At the console> prompt type **set gateway=nnn.nnn.nnn.nnn**
6.	At the console> prompt type **save**
7.	Press the ENTER key to save the new IP configuration.

Continued on next page

Initial Device setup via USB CLI, continued

DHCP method To set the IP configuration via the DHCP in console mode, do the following:

Note: A DHCP server must be on the network and accessible before using this method.

Step	Action
1.	At the console> prompt type **set dhcp=enable**
2.	Press the ENTER key and the screen will appear as shown in Figure 31.

```
Console:/>set dhcp=enable
DHCP      : Enabled after reboot
Console:/>
```

Figure 31: Enable DHCP

3.	Type **reboot**
4.	Press the ENTER key to reboot the Device and start the DHCP process.

Note: DHCP "successful" will appear on the screen when completed, or "failed" if not successful.

Continued on next page

Initial Device setup via USB CLI, continued

Show system configuration

To show the Device system configuration, do the following:

Step	Action
1.	At the console> prompt type **show**
2.	Press the ENTER key to bring up the Device system configuration screen, shown in Figure 32.

```
System configuration:
        System name             : CFBRM10-100
        System location         : Not Initialized
        System contact          : support@transition.com
        Bootloader Version      : A
        Firmware Version        : 1
        DHCP                    : Enabled
        IP address              : 192.251.144.137
        Subnet mask             : 255.255.255.0
        Default gateway         : 192.168.1.2
        MAC address             : 00:C0:F2:00:D1:C2
        System UpTime (d:h:m:s) : 0:0:59:20
        SNMP Trap Manager       : 0.0.0.0
        SNMP Community Name     : private
        Group string            : <NOT SET>
        RADIUS authentication   : Disabled
        RADIUS server           : 0.0.0.0
        Layer 3 Capability      : Enabled
        SNMP Access             : Enabled
        TFTP Server             : 192.251.144.242
        TFTP Filename           : FBRM_FULL.BIN
        Management VLAN ID      : 0

Console:/>_
```

Figure 32: Example System Configuration Screen

Initial Device setup via telnet *(directly to Device)*

To set up the Device initially via telnet directly to the Device, do the following:

Initial setup via Telnet to Device

Step	Action
1.	At the command line type: **Telnet nnn.nnn.nnn.nnn** *(IP address of the Device)* to bring up the password prompt, shown in Figure 33.

Figure 33: Password Prompt

2.	Type the case-sensitive username and password *(default is 'root' for both).*
3.	Press the ENTER key to launch the console prompt, shown in Figure 34.

Figure 34: Console Prompt

Continued on next page

Initial Device setup via telnet (directly to Device), continued

Step	Action
4.	At the console:/> prompt type **show**
5.	Press the ENTER key to display the system configuration, as shown in Figure 35.

```
Console:/>show

System configuration:
        System name               : xFBRM100
        System location           : Not Initialized
        System contact            : techsupport@transition.com
        Board Version             : 1
        Bootloader Version        : D
        Firmware Version          : C[1]
        DHCP                      : Disabled
        IP address                : 192.251.144.150
        Subnet mask               : 255.255.255.0
        Default gateway           : 192.251.144.2
        MAC address               : 00:C0:F2:01:0A:96
        System UpTime (d:h:m:s)   : 2:16:6:18
        SNMP Trap Manager         : 0.0.0.0
        SNMP Community Name       : private
        Group string              : <NOT SET>
        RADIUS authentication     : Disabled
        RADIUS server             : 0.0.0.0
        Layer 3 Capability        : Enabled
        SNMP Access               : Enabled
        TFTP Server               : 0.0.0.0
        TFTP Filename             : <NOT SET>
        Management VLAN ID        : 0

Console:/>
```

Figure 35: System Configuration Screen

Continued on next page

Initial Device setup via telnet (directly to Device), continued

Step	Action
6.	At the console prompt type: **help**
7.	Press the ENTER key to show the commands, shown in Figure 36.

```
Console:/>help

Commands are:
  arp                   set dhcp              set autoupg
  netstat               set gateway           set forceupg
  ps                    set ip                ifconfig
  exit                  set netmask           ifoam
  help                  set trapmgr           show
  ?                     set community         show version
  cls                   set groupstring       show ifconfig
  ping                  set radius            show ifcabletest
  reboot                set radiusip          show ifstats
  save                  set radiussecret      show ifrmonstats
  factorydefaults       set tftpserver        show ifoam
  tftpupgrade           set tftpfile          show oamstatistics
  xmodemupgrade         set username          show oampeer
  clearcounter          set password          show oamloopback
  sys                   set usb               show niecho
  sys name              set l3capability      snmpget
  sys location          set snmpaccess        snmpset
  sys contact           set mgmtvlan          snmpgetn
  set                   set niecho            snmpwalk

Console:/>
```

Figure 36: Device Command Screen

Note: The CLI and Telnet interface commands are structured in the same manner.

Terminating telnet

To disconnect the Telnet client from the management module server, press the CTRL-D keys, or at the console prompt type: **exit** or **logoff**

Initial Device setup via chassis agent MMU, web-based

Setup via Web to MMU

To set up the Device initially via the MMU web-based, do the following:

Step	Action
1.	Open a web browser.
2.	At the URL type the IP address of the chassis (MMU).
3.	Click the GO button to bring up the password screen, shown in Figure 37.

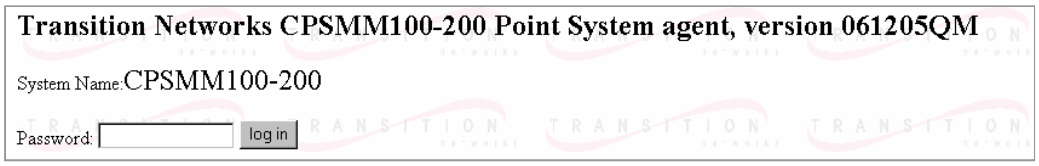


Figure 37: Chassis Agent (MMU) Log In Screen

4.	Type the password *(default is private)*.
5.	Press the ENTER key to launch the chassis agent's main menu, shown in Figure 38.

Figure 38: Chassis Agent (MMU) Main Menu

6.	Click the VIEW button to show the Devices in the chassis and the screen will appear, as shown in Figure 39.

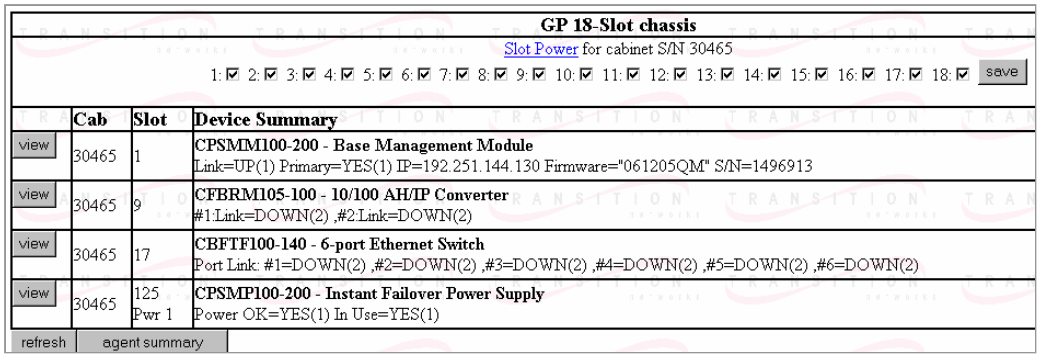


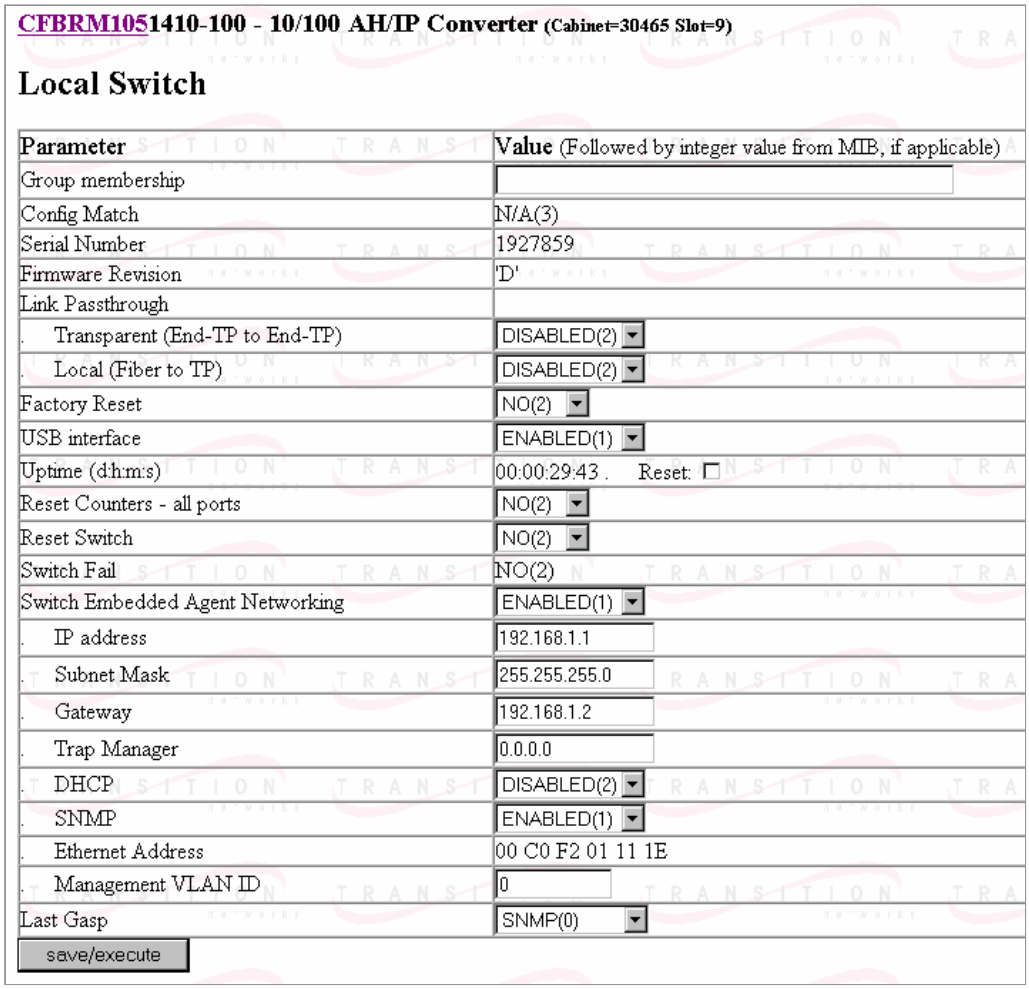
Figure 39: Point System Chassis Main Menu

Continued on next page

Initial Device setup via chassis agent MMU, web-based, continued

Step	Action
7.	Click the VIEW button of the CFBRM/CBFFG Device in slot 9 to show the local configuration screen for the Device. See Figure 40.

Note: You can configure the IP along with other Device parameters on this screen.



CFBRM1051410-100 - 10/100 AH/IP Converter (Cabinet=30465 Slot=9)

Local Switch

Parameter	Value (Followed by integer value from MIB, if applicable)
Group membership	
Config Match	N/A(3)
Serial Number	1927859
Firmware Revision	'D'
Link Passthrough	
. Transparent (End-TP to End-TP)	DISABLED(2)
. Local (Fiber to TP)	DISABLED(2)
Factory Reset	NO(2)
USB interface	ENABLED(1)
Uptime (d:h:m:s)	00:00:29:43 . Reset:
Reset Counters - all ports	NO(2)
Reset Switch	NO(2)
Switch Fail	NO(2)
Switch Embedded Agent Networking	ENABLED(1)
. IP address	192.168.1.1
. Subnet Mask	255.255.255.0
. Gateway	192.168.1.2
. Trap Manager	0.0.0.0
. DHCP	DISABLED(2)
. SNMP	ENABLED(1)
. Ethernet Address	00 C0 F2 01 11 1E
. Management VLAN ID	0
Last Gasp	SNMP(0)

save/execute

Figure 40: Local Switch FBRM/BFFG Configuration Screen

Note: DO NOT use the browser BACK button to navigate the screens. This will cause the connection to drop.

Continued on next page

Initial Device setup via chassis agent MMU, web-based, continued

IP config via DHCP

To configure the IP via DHCP, do the following:

Step	Action
1.	A DHCP server must be on the network and accessible.
2.	On the local switch configuration screen, enable DHCP.
3.	On the local switch configuration screen set item Reset Switch to “Yes.”
4.	Click the SAVE/EXECUTE button to start the DHCP process.

Note: To verify that the DHCP IP configuration was successful, check the IP configuration for the Device on the local switch screen and note the changes to the IP configuration.

Initial Device setup IP web-based *(directly to Device)*

Initial setup via IP to Device

To set up the Device initially via a IP web-based, do the following:

Step	Action
1.	Open a web browser.
2.	At the URL type in the FBRM/BFFG default IP address.
3.	Click the GO button to launch the password screen shown in Figure 41.

Figure 41: Login Screen

4.	Type the password *(default is private)*.
5.	Press the ENTER key to launch the FBRM/BFFG main menu, as shown in Figure 42.

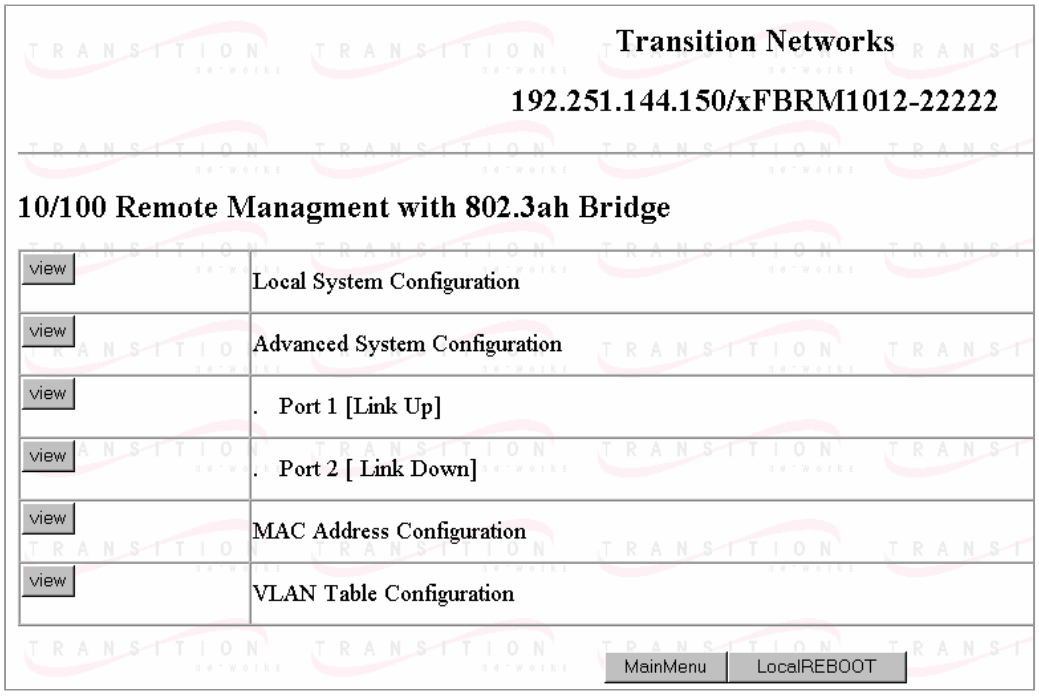


Figure 42: FBRM/BFFG Main Menu

Continued on next page

Initial Device setup IP web-based (directly to Device), continued

Step	Action
6.	Click the local system configuration VIEW button to show the local system configuration menu, shown in Figure 43.

Note: You can configure the IP along with other Device parameters on this screen.

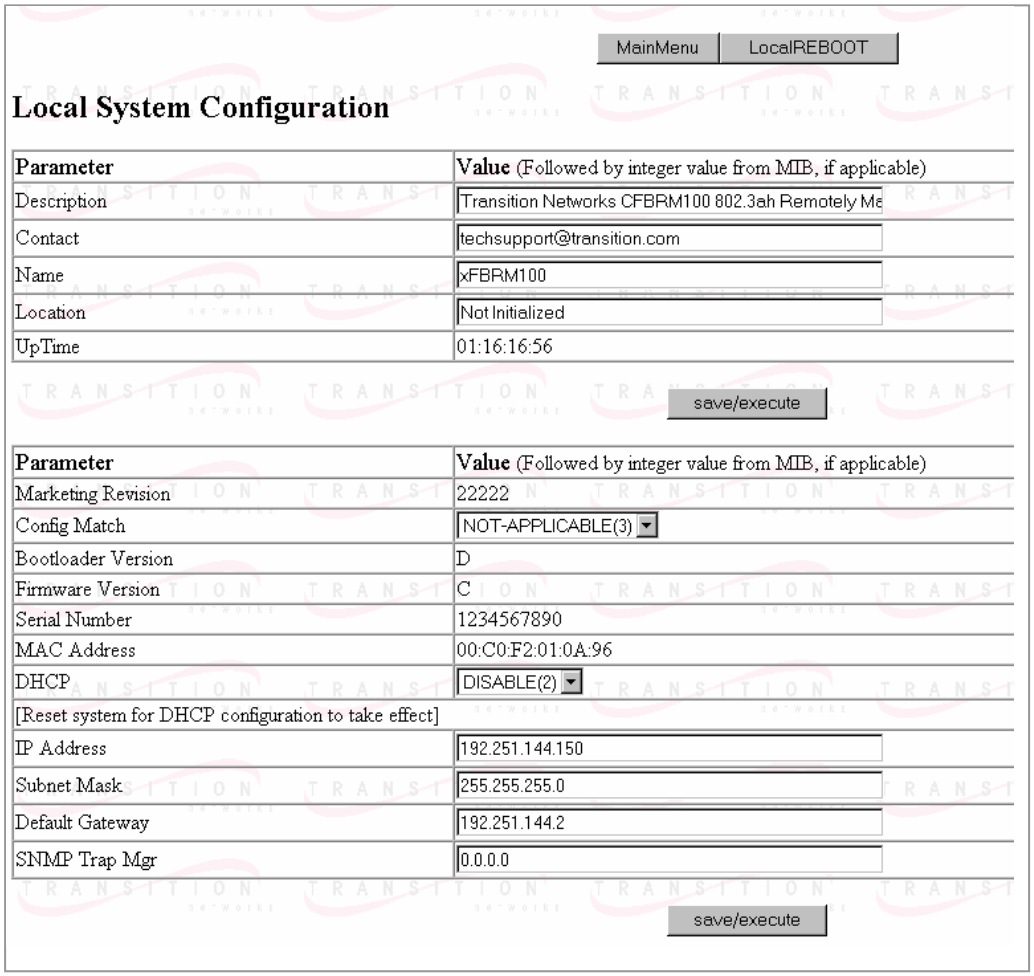


Figure 43: FBRM/BFFG Local System Configuration Screen

Note: DO NOT use the browser BACK button to navigate the screens. This will cause the connection to drop.

Continued on next page

Initial Device setup IP web-based (directly to Device), continued

IP config via DHCP

To set up the IP configuration via DHCP, do the following:

Step	Action
1.	A DHCP server must be on the network and accessible.
2.	On the local switch configuration screen, enable DHCP as shown in Figure 44.

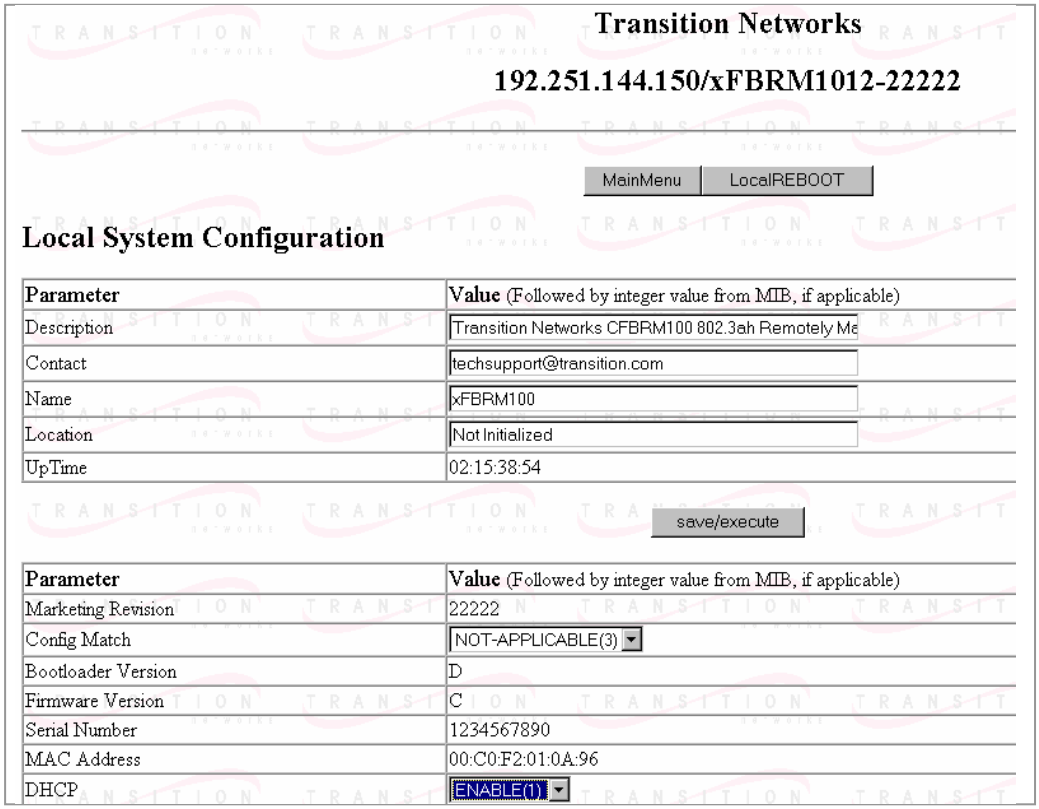


Figure 44: IP-based Local System Configuration Screen

3.	Click the Local REBOOT button at the top of the screen to start the DHCP process.

Note: To verify that the DHCP IP configuration was successful, check the IP configuration for the Device on the local system configuration screen and note the changes to the IP configuration.

Continued on next page

Initial Device setup IP web-based (directly to Device), continued

Redundant Devices

To set up the redundant feature for the stand-alone 3-port FBRM SFP Device via IP web-based, do the following:

Step	Action
1.	Open a web browser.
2.	At the URL type in the SFBRM default IP address.
3.	Click the GO button to launch the password screen shown in Figure 45.

Figure 45: Login Screen

4.	Type the password *(default is private)*.
5.	Press the ENTER key to launch the SFBRM main menu, as shown in Figure 46.

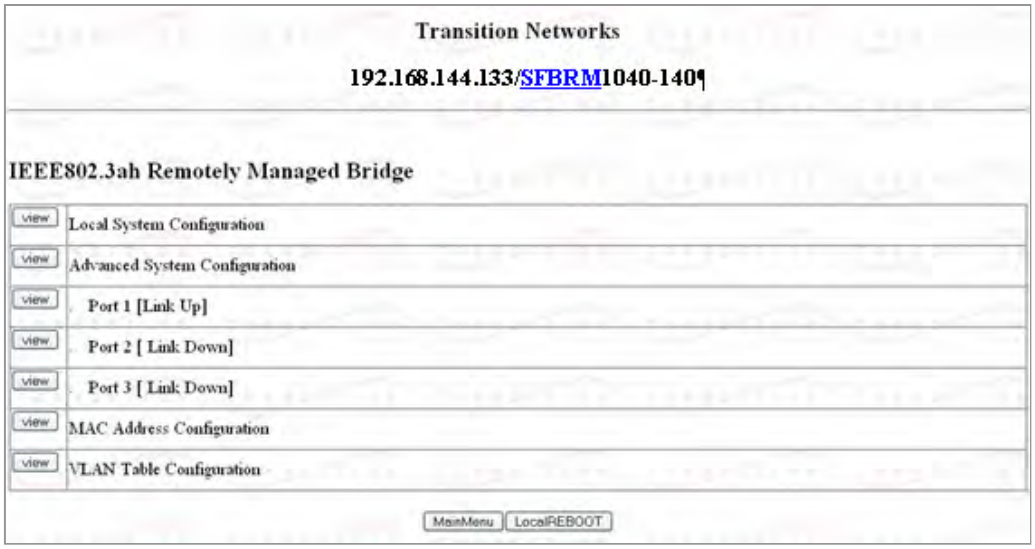


Figure 46: Redundant Device Main Menu

Continued on next page

Initial Device setup IP web-based (directly to Device), continued

Step	Action
6.	Click the advance system configuration VIEW button to show the redundancy configuration parameters, shown in Figure 47.

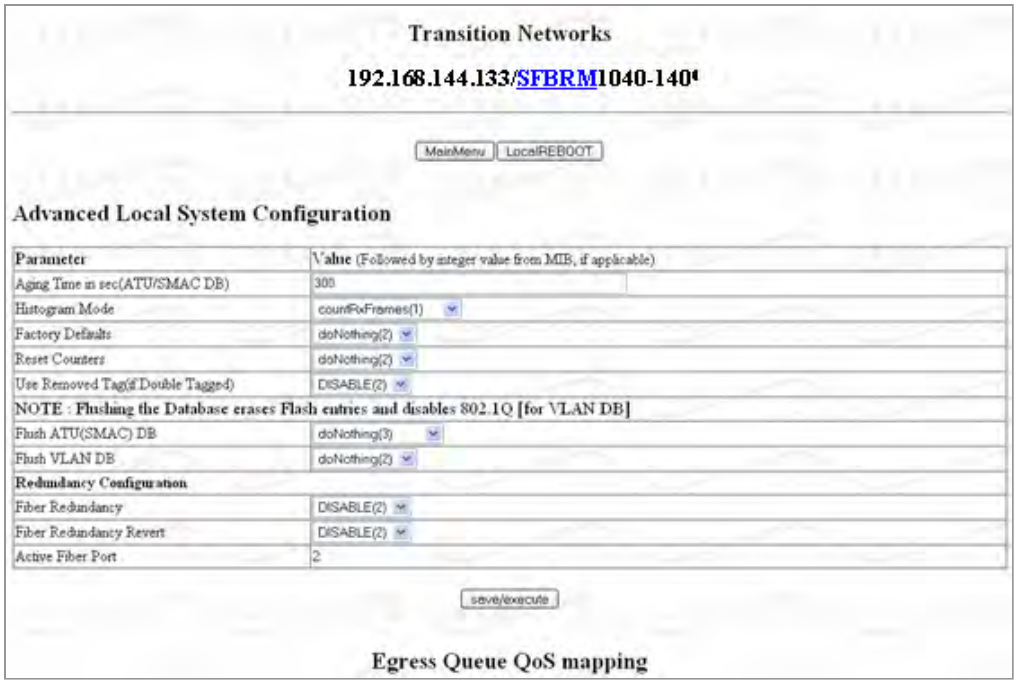


Figure 47: Redundancy Configuration Screen

Note: The redundancy features are specific to the 3-port SFBRM SFP Device only.

Sections V:
Device Management

In this section These are the topics:

SNMP IP-based management

SNMP

The FBRM/BFFG Device provides complete management through the SNMP interface. It supports the following standard MIBs for management, using SNMPv1:

- RFC 1213 *(MIB- II)*
- RFC 2819 *(RMON – statistics group)*
- RFC 2863 *(IF MIB counters)*
- RFC 3635 *(Ether-like MIB counters)*
- RFC 1493 *(Bridge MIB objects counters)*
- RFC 2674 *(Bridge extension counters)*

I-D: draft-ietf-hubmib-efm-mib *(EFM OAM mib – the EFM hub mib is added to the TN private tree since it has not been added to the ISO tree.)* Use the provide version shipped on the CD with your Device.

See Figure 48.

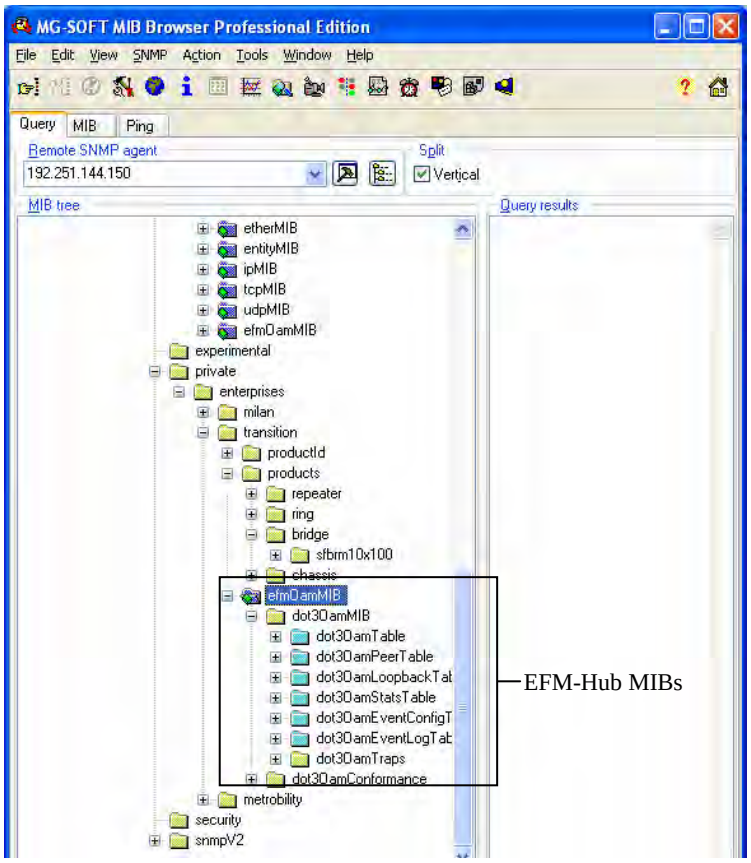


Figure 48: EFM Hub MIBs Added to Private Tree

Continued on next page

SNMP IP-based management, continued

TN private MIBs

The TN private MIBs for SNMP IP-based management feature extensive management options. Some of the features are the following:

- Copper and fiber link status
- Copper and fiber port duplex
- Administratively enable/disable port
- Copper port speed
- Enable/disable Auto-Negotiation *(copper)*
- Enable/disable Pause
- Enable/disable capability advertisement for speed and duplex
- RMON statistics
- AutoCross on copper port
- Remote fault detect
- Enable/disable far-end fault on fiber
- Transparent link-pass through
- 802.3ah OAM enable/disable on all ports
- OAM channel statistics
- OAM remote loopback
- Rate limiting/band width allocation using fixed rate sets
- IP traffic class priority
- 802.1q VLAN support
- Virtual cable test

The remote Device can be managed completely through OAM. Figure 49 shows an example of a private MIB objects tree.

Continued on next page

SNMP IP-based management, continued

MIB objects Figure 49 shows the placement of the MIB objects on the private tree.

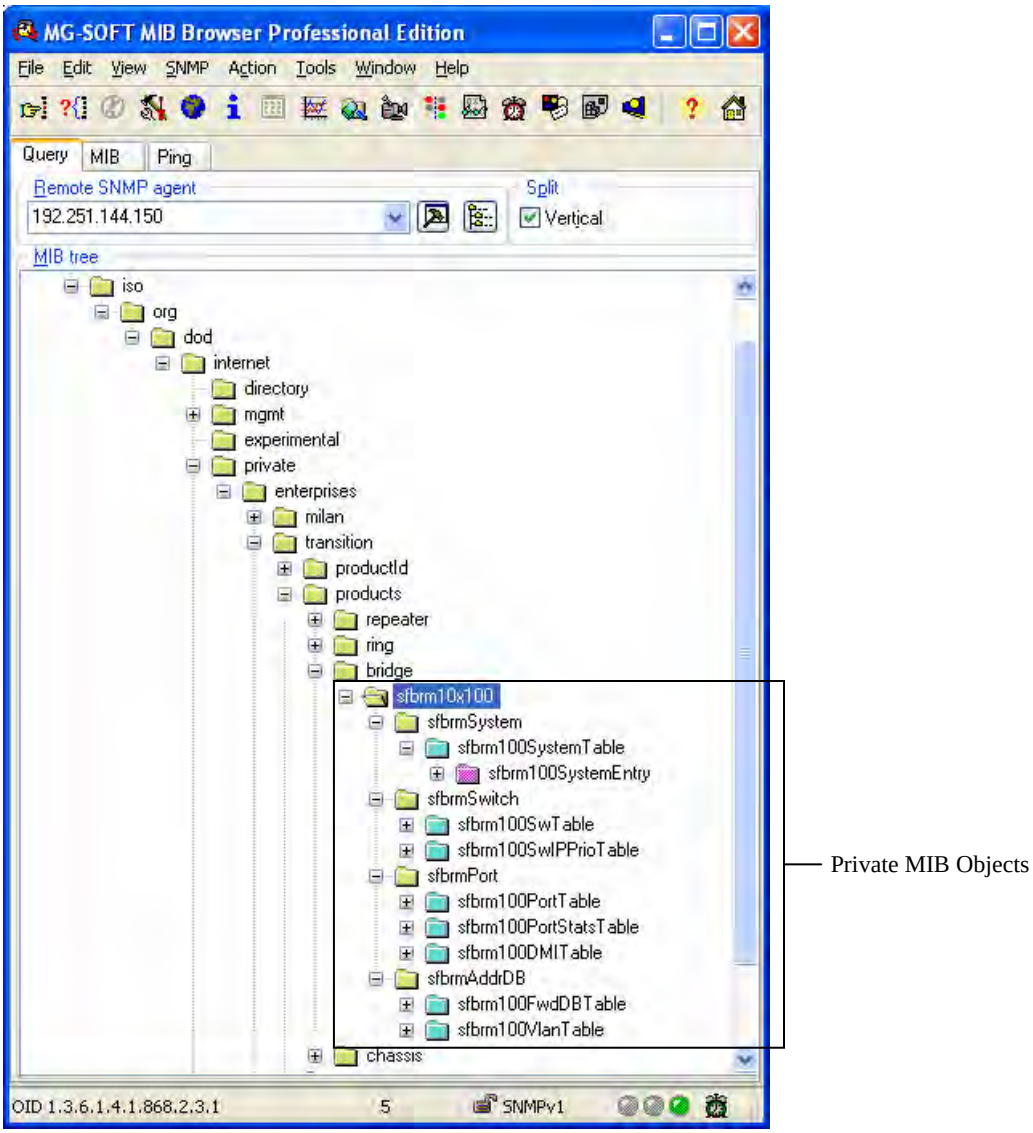


Figure 49: Private MIB Objects

Device management via chassis agent (MMU) web-based

Management via MMU

To set up the FBRM/BFFG initially via the MMU, do the following:

Step	Action
1.	Open a web browser.
2.	At the URL type the IP address of the chassis (MMU).
3.	Click the GO button to launch the password screen. See Figure 50.

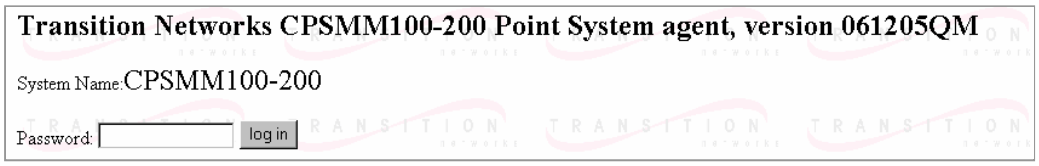


Figure 50: Chassis Agent (MMU) Login Screen

4.	Type the password *(default is private).*
5.	Press the ENTER key to launch the chassis agent's main menu, as shown in Figure 51.

Figure 51: Chassis Agent (MMU) Main Menu

6.	Click the VIEW button to show the Devices in the cabinet slots, as shown in Figure 52.

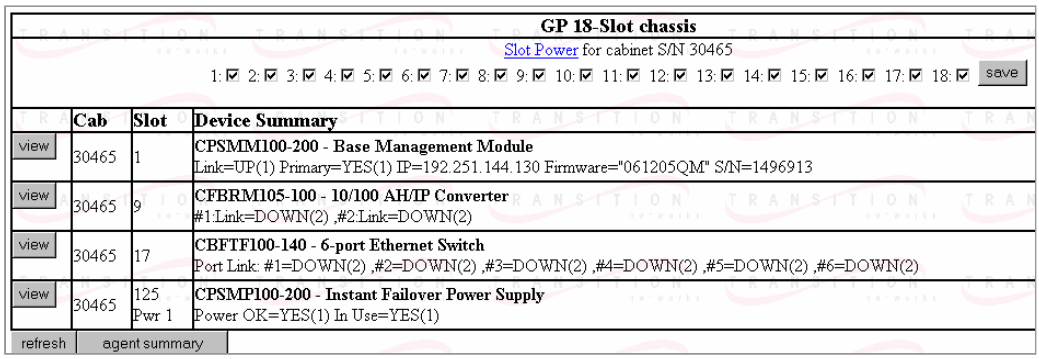


Figure 52: Devices in Chassis Slots

Continued on next page

Device management via chassis agent (MMU) web-based, continued

Step	Action
7.	Click the VIEW button of the CFBRM/CBFFG Device to bring up the local switch management screen. See Figure 53.

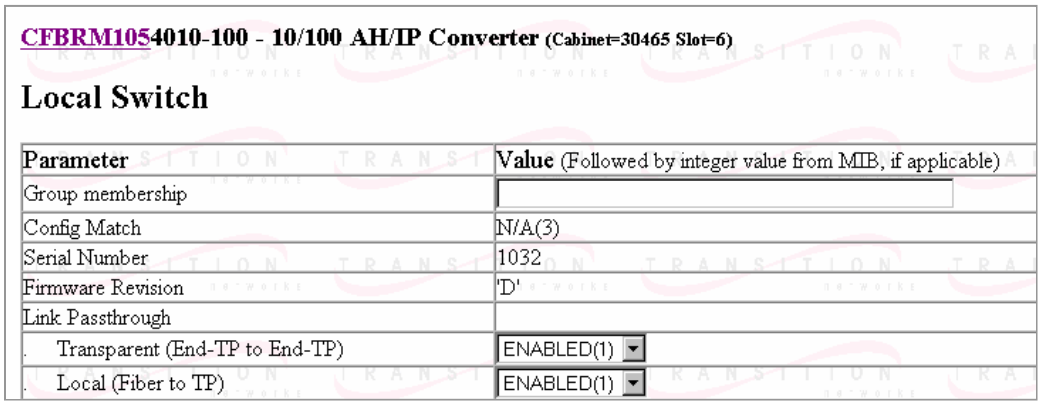


Figure 53: Local Switch Configuration Screen

8.	Scroll down to the LOCAL PORT buttons, shown in Figure 54.

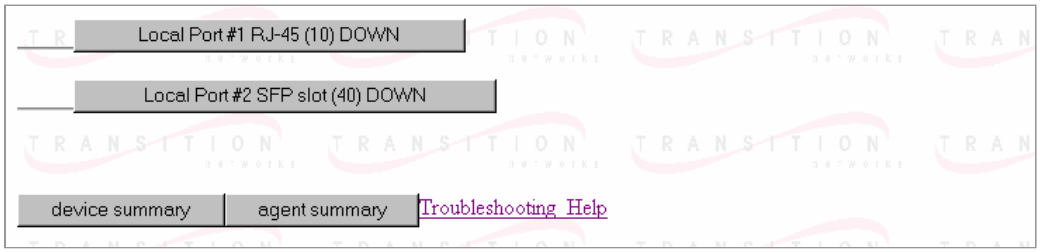


Figure 54: Local System Configuration Local Port Buttons

Note: DO NOT use the browser BACK button to navigate the screens. This will cause the connection to drop.

Continued on next page

Device management via chassis agent (MMU) web-based, continued

Step	Action
9.	Click a PORT BUTTON to bring up the local port switch configuration screen, shown in Figure 55.
10.	Scroll down the screen to see the remaining parameters.

Note: You can set OAM and other parameters on this screen.

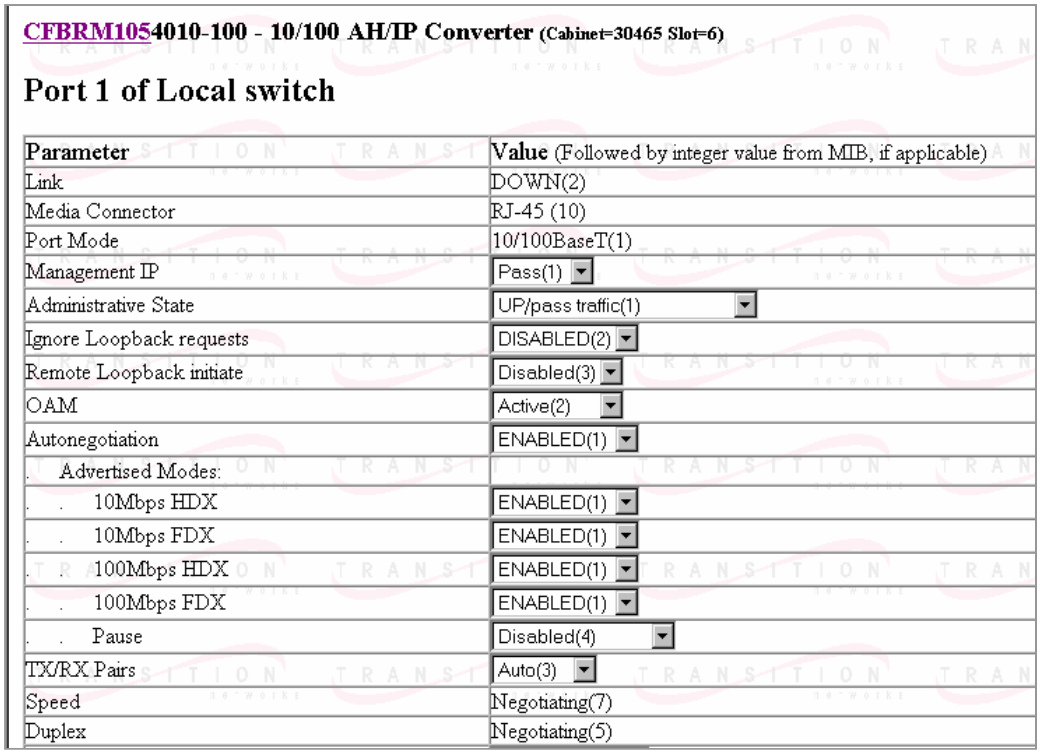


Figure 55: Port 1 Local Switch

Note: DO NOT use the browser BACK button to navigate the screens. This will cause the connection to drop.

Device management via IP web-base *(directly to Device)*

Introduction

The FBRM/BFFG Device supports complete Web-based management for viewing statistics and configuring the Device. See the help file on Transition Networks website for more details about different configuration variables.

IP web-based management

To manage the Device via the IP web-based, do the following:

Step	Action
1.	Open a web browser.
2.	At the URL type the IP address of the Device.
3.	Click the GO button to bring up the password screen, shown in Figure 56.
4.	Enter the password *(default password is "private")*.

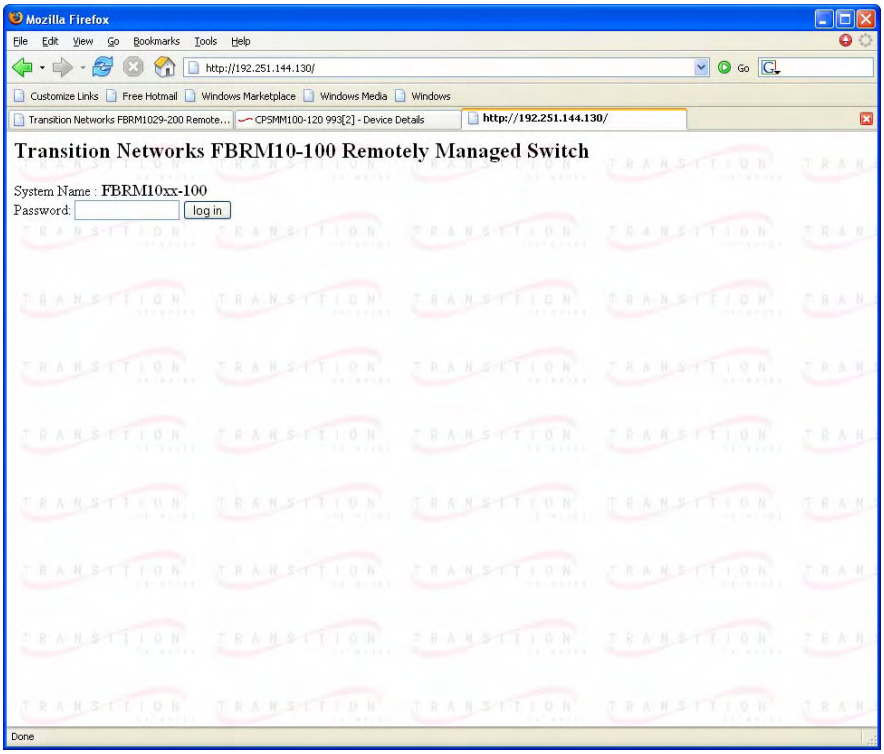


Figure 56: Device Password Screen

Note: DO NOT use the browser BACK button to navigate the screens. This will cause the connection to drop.

Continued on next page

Device management via IP web-base (directly to Device), continued

IP web-based management *(continued)*

Step	Action
5.	Click the LOG IN button to bring up the main menu of the Device. See Figure 57.

Note: Any Transition Networks FBRM/BFFG remote peer can be completely managed by an FBRM/BFFG local peer through OAM.

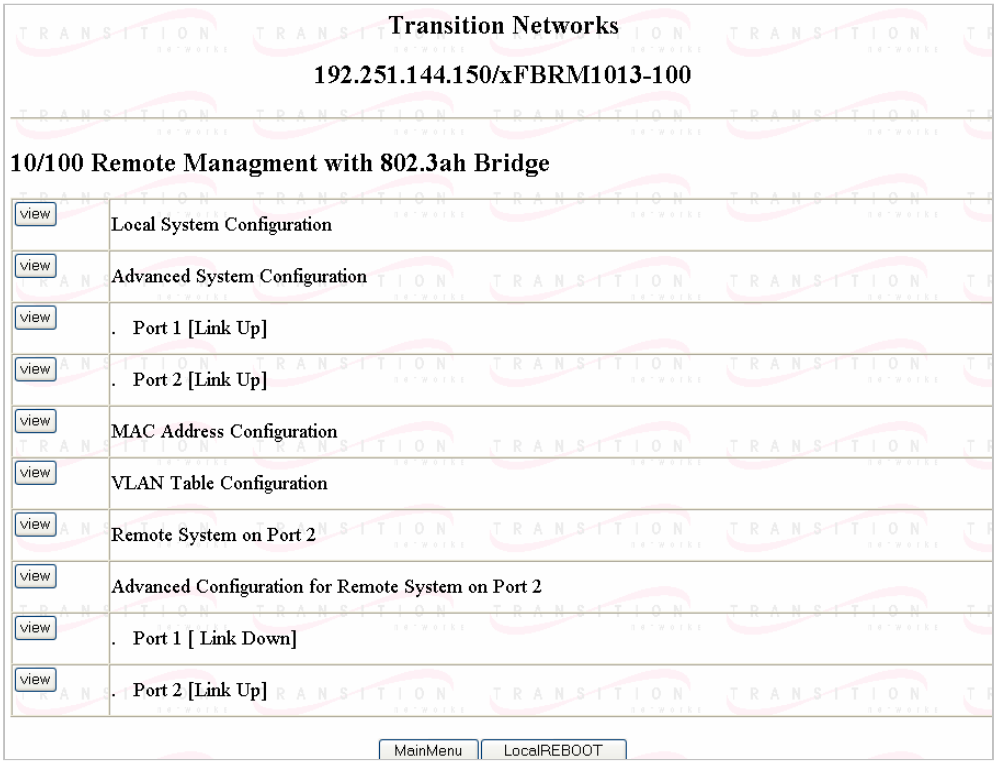


Figure 57: FBRM/BFFG Main Menu

Note: DO NOT use the browser BACK button to navigate the screens. This will cause the connection to drop.

Continued on next page

Device management via IP web-base (directly to Device), continued

OAM configuration

The OAM configuration screen allows enabling or disabling OAM by setting the mode to "active" or "passive." If the remote Device is a Transition Networks FBRM/BFFG Device, the main menu *(PORT button with the remote Device connected)* will show the options for managing the remote OAM peer.

The Devices are interoperable with other IEEE 802.3ah compliant Devices. Standard OAM discovery, loopback, dying gasp, link and other critical events are supported. The OAM configuration screen for that port will show the following:

- OAM state
- MAC address
- OUI *(unique identifier)*

Note: On the SFBRM1040-1xx redundant models, there can be only one (1) OAM session at a time—the OAM enabled port is user selected. Port 2 fiber is the default port.

OAM config screen

To view the OAM configuration screen for non-transition networks IEEE 802.3ah compliant Devices, do the following:

Step	Action
1.	Click any port VIEW button on the CFBRM/CBFFG main menu to bring up configure screen of that port.
2.	Click the OAM Config button and the screen will appear, as shown in Figure 58.
3.	You can set up OAM parameters on this screen.

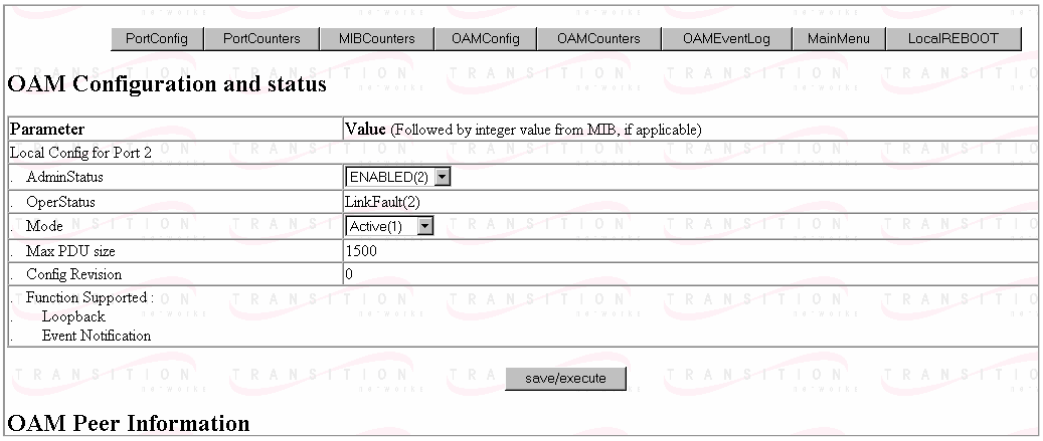


Figure 58: OAM Configuration and Status Screen *(OAM Config Button)*

Section VI:
Software Features

Introduction This section explains the operational status LEDs and what they indicate, along with product features, and the three (3) methods used to upgrade the software.

In this section These are the topics:

Software feature descriptions

Note: The FBRM/BFFG Devices does not have configuration switches.

Firmware activated features

The FBRM/BFFG series Devices features can be configured via USB, MMU, or IP. Table 3 explains the configurable parameters of the Devices.

Table 3: Device Software Configurable Features

Feature	Description
AutoCross *(10/100Base-T or 10/100/1000Base-T)*	When the AutoCross feature is active, it allows the use of a straight-through (MDI) or crossover (MDI-X) copper cable when connecting to 10/100Base-T or 10/100/1000Base-T Devices. AutoCross determines the characteristics of the connection and configures the Devices to link up automatically. This occurs regardless of the cable configuration: MDI or MDI-X. *(Transition networks recommends leaving AutoCross in default mode, "enabled.")*
Automatic Firmware Upgrades	The Device has an automatic firmware upgrade feature. This feature applies to a communication link between a local peer and its remote peer Devices connected via a fiber optic cable. If the remote passive peer Device is not in Active Mode and a local active peer Device detects a different firmware revision on its remote passive peer Device, the local active Device will force a bootload condition and download its firmware revision to its remote passive peer Device. **Note** The local Device could have a different firmware revision *(newer or older)* than its remote peer. In either case, the firmware revision on the local Device will replace that of its remote passive peer. **Note:** The firmware of the local active peer Device should be upgraded before the remote passive peer Device to ensure that the correct firmware version is on both Devices.

Continued on next page

Software feature descriptions, continued

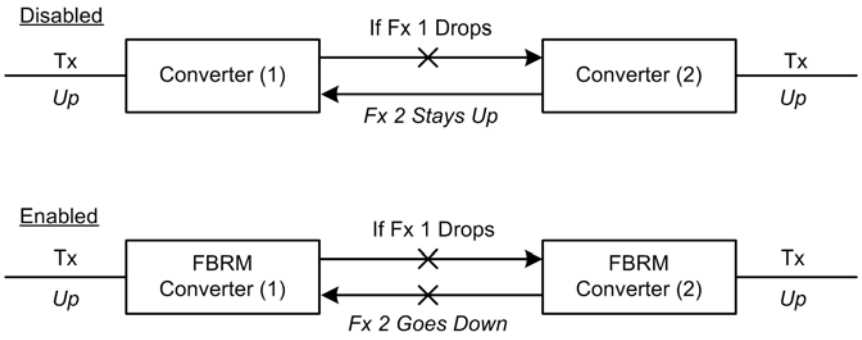
Table 3: Device Software Configurable Features *(continued)*

Feature	Description
Auto-Negotiation	This feature allows the two Devices to configure themselves to achieve the best possible mode of operation over a link, automatically. The Device broadcasts its speed and duplex *(full or half)* capabilities to the other Device and negotiates the best mode of operation. Auto-Negotiation allows quick connections because the optimal link between the Devices is established automatically. In a scenario where the Device links to a non-negotiating Device, disable Auto-Negotiations. In this instance, the mode of operation will drop to the lowest common denominator between the two Devices; e.g., 10 Mb/s at half-duplex. Disabling this feature allows forcing the connection to the desired speed and duplex mode of operation.
Backup Configuration	The firmware uses TFTP to upload its present configuration onto a TFTP server, and can also download the configuration from the TFTP server and update its settings. This is useful when you want to program more than one unit to the same configuration. One unit can be programmed and that configuration can be used to populate the other units. Care should be taken on some settings such as IP address and VLAN settings.
Bandwidth Allocation by priority *(ingress/egress)*	This feature can be used with 'ingress/egress' frames. It allows setting the bandwidth in varied increments, starting at 64kps to full bandwidth. Rate Limiting based on frame priorities can also be configured. Each higher priority frame can be configured to get twice the bandwidth of lower priority frames; e.g., priority "3" frame configurations can get twice the bandwidth of priority "2" frames. Egress bandwidth allocation in 64Kbits/sec increments: • Rate limit all frames Ingress bandwidth allocation in 64Kbits/sec increments with four filter selections: • Rate limit all frames • Rate limit multicast, flooded unicast, and broadcast • Rate limit multicast and broadcast • Rate limit broadcast

Continued on next page

Software feature descriptions, continued

Table 3: Device Software Configurable Features *(continued)*

Feature	Description
Congestion Reduction	The FBRM and BFFG Devices do not forward collision signals or error packets between collision domains, which improves baseline network performance. In addition, the Devices filter packets destined for local Devices, which reduces network congestion.
Far-End Fault (FEF)	FEF is a troubleshooting feature. With FEF enabled, if the receiver on the fiber port goes "down" on one Device, a FEF idle pattern is sent to the other Device to terminate data transmission. Then an SNMP trap is sent to the administrator, identifying the fiber link loss. If FEF is disabled, a "down" Rx link on one Device does not transmit to its peer, the down link notification will not be passed on. For FEF enabled and disabled scenarios, see illustration below. 
Far-End Fault Detection (FEFD) Fiber Ports	If FEFD is enabled when the receiver on the fiber port goes down on one Device, it sends a far-end-fault pattern to the other side to bring down the fiber port on both ends. An SNMP trap will be sent to the administrator, indicating the fiber link loss. If FEFD is disabled, a "down" Rx link on one Device is not transmitted to the other Device; the link down signal will not be passed over the link.

Continued on next page

Software feature descriptions, continued

Table 3: Device Software Configurable Feature *(continued)*

Feature	Description
Full Duplex	In a full-duplex network, maximum cable lengths are determined by the cable type. See the Cable Specifications section for the different FBRM and BFFG models. The 512-Bit Rule does not apply in a full-duplex network.
Firmware upgrades *(bootloader)*	Auto firmware upgrade enable/disable: In some cases, there may not be a requirement for automatic firmware upgrades. For example, one might connect a remote peer Device with the latest firmware version before upgrading the local peer Device. Typically, the local peer Device would detect a different firmware version and will downgrade the firmware on the remote peer Device. To prevent this, disable automatic upgrade on the remote peer Device. The remote peer Device will reject all upgrade requests from the local peer Device—you can then upgrade the local Device. Force upgrade: This is used to force a firmware upgrade on the remote peer Device when the auto-upgrade feature is disabled on the remote peer Device. This gives the local peer Device authority to override the auto-upgrade feature of its remote peer Device.
Half Duplex	In a half-duplex network, the maximum cable lengths are determined by the round trip delay limitations of each Fast Ethernet collision domain. *(A collision domain is the longest path between any two terminal Devices, e.g., terminal, switch, or router.)* The 512-Bit Rule determines the maximum length of cable permitted by calculating the round-trip delay in bit-times (BT) of a particular collision domain. If the result is less than or equal to 512 BT, the path is good. For more information on the 512-Bit Rule, see the white paper titled “Collision Domains” on Transition Networks’ website at: www.transition.com

Continued on next page

Software feature descriptions, continued

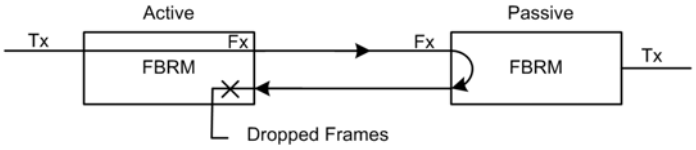
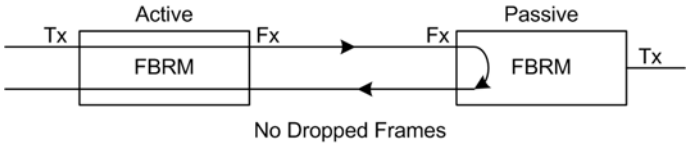
Table 3: Device Software Configurable Features *(continued)*

Feature	Description
Operation Administration and Maintenance *(OAM, IEEE 802.3ah-2004 standard)*	**Note:** On the SFBRM1040-1xx redundant models, there can be only one (1) OAM session at a time—the OAM enabled port is user selected. Port 2 fiber is the default port. The Device implements the IEEE OAM 802.3ah standard for troubleshooting and remote management. This product implements OAM on both the fiber and twisted pair interfaces. It implements the following OAM features: • Discovery • Remote Loop Back • Exchange of configuration information and remote firmware upgrades with organization specific PDUs • Link status failure indication The Device implements the draft-ietf-hubmib-efm-mib *(EFM OAM MIB)*. Use the version provided on the CD.
Critical Event *(OAM, IEEE 802.3ah-2004 standard)*	When the link on the other port fails, the Device sends an OAM critical event signal to its peer, indicating the fault condition.
Discovery *(OAM, IEEE 802.3ah-2004 standard)*	An active-state Device initiates OAM communications by sending PDUs across the link connected to an OAM enabled port. The Device at the other end *(if OAM capable)* responds to the request from the active Device by establishing an OAM communications channel.
Event Notification with Log In *(OAM, IEEE 802.3ah-2004 standard)*	An OAM link event notifies its OAM peer of any symbol or frame errors that occurred on its link. The window used for error monitoring, along with the threshold value are configurable. At the end of the window, if the errors are greater than or equal to the threshold value, an OAM event notification is sent to its peer. If the threshold is set to zero, then at the end of each window an event notification is sent—this acts more like an asynchronous update of the link statistics.

Continued on next page

Software feature descriptions, continued

Table 3: Device Software Configurable Features *(continued)*

Feature	Description
Last Gasp/Dying Gasp*(OAM, IEEE 802.3ah-2004 standard)*	All FBRM/BFFG Devices come equipped with a Last Gasp/OAM Dying Gasp feature. This feature enables the Device to store a small amount of power to enable sending an SNMP trap to alert the management console of a power failure. Feature benefits are the following: • Notification of an impending power loss before it happens • Allows for quicker resolution of the power loss The default action for last gasp/OAM dying gasp is to send an SNMP Trap. If the desire is to send a dying gasp through OAM, it must be configured through the SNMP/Web interface. It requires choosing the port on which to send the Dying Gasp command since both ports are OAM capable. This feature helps communicate with OAM peers that are not TN Devices.
Remote Loop Back *(OAM, IEEE 802.3ah-2004 standard)*	OAM remote loop back can be used to test link health by sending a loop back request from the active peer Device to the remote passive peer Device. Once the remote passive peer enters loop back mode, all frames coming into that port are looped back, yet not forwarded to other ports. The OAM frames are still exchanged between the local and remote peer Devices—only OAM frames get through. The active peer Device discards the frames coming out of its remote peer Device to prevent flooding the network. See the illustration below. 
Alternate Loop back	This feature can be used to verify end-to-end connectivity. 

Continued on next page

Software feature descriptions, continued

Table 3: Device Software Configurable Feature *(continued)*

Feature	Description
OAM Exchange of configuration information and remote upgrades with organizational specific PDUs *(IEEE 802.3ah-2004 standard)*	The remote peer Device *(only if a TN FBRM/BFFGDevice)* set to passive mode can be completely managed through the SNMP/Web management by its active peer Device when set to Active Mode. This is done using organizational specific PDUs. When the active peer upgrades to a new revision of firmware, it detects the firmware configuration of its remote peer Device and upgrades it automatically. If the active peer is in a chassis, the remote peer can be managed through Point System management by the management module unit (MMU).
Link Status Failure Indications	Link status failure indication with OAM PDU flags fielded and sent as an OAM critical event *(refer to 57.4.2.1 of the standard).*
Standard MIB Counters	The Device provides complete management through the SNMP interface. It supports the following standard MIBs for management using SNMPv1: • RFC 1213 *(MIB-II)* • RFC 2819 *(RMON – statistics group)* • RFC 2863 *(IF MIB counters)* • RFC 3635 *(Ether-like MIB counters)* • RFC 1493 *(Bridge MIB object counters)* • RFC 2674 *(Bridge extensions counters)*

Continued on next page

Software feature descriptions, continued

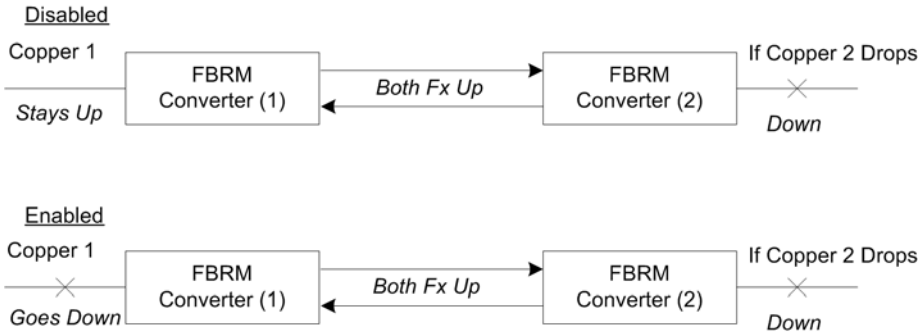
Table 3: Device Software configurable Features *(continued)*

Feature	Description
Pause *(flow control)* and Back Pressure	Pause is used to suspend data transmission temporarily to relieve buffer congestion. If a Device needs sometime to clear network congestion, it will send a pause signal to the Device at the other end, then that Device will wait a predetermined amount of time before re-transmitting its data. This feature reduces data bottlenecks and allows efficient use of network Devices, preventing data losses. The pause feature is set in Firmware mode, using the SNMP interface. It can be set to one of four settings: • Disable *(no pause)* • Symmetrical pause • Asymmetric TX *(transmit)* pause • Asymmetric RX *(receive)* pause **Note:** Enable the "pause feature" if available on ALL network Devices attached to the media Device(s), otherwise disable this feature. Back pressure is used in half duplex mode. Back pressure ensures the retransmission of incoming packets when a port using half-duplex is temporarily not able to receive in coming frames.
Point System Management	The slide-in Device plugs into the chassis to provide management through the I^2C interface. This provides SNMP and Web-based management through the MMU.

Continued on next page

Software feature descriptions, *continued*

Table 3: Device Software Configurable Features *(continued)*

Feature	Description
Transparent Link-Pass Through (TLPT) and Auto Link Restoration **Note:** In the redundant models *(SFBRM1040-1xx)* this feature only works when the Device is in redundant mode.	With OAM enabled, TLPT with automatic link restoration is available for the copper ports on the local and remote peer Devices. When a copper port goes "down," the information is passed to the other Device and the copper port on that Device will go "down." When the link is restored, the link on the other port is also restored—the fiber ports remain UP. When TLPT is disabled, if the copper port link drops it does not affect its peer's copper port links. Auto Link Restoration will restore the broken link automatically upon correcting the fault condition. For TLPT disabled and enabled scenarios, see the illustrations below.
	
Selective Link Pass Through	The feature monitors the fiber Rx port for signal loss. If the fiber Rx goes "down," the copper port stops transmitting. See illustration below.
	

Software security feature descriptions

Table 4: Device Software Configurable Security Features

Security Feature	Description
802.1x MAC filtering	When enabled on a port, stops learning all MAC addresses. To allow any frame with a MAC address not in the Static MAC database access, the user needs to add the new address or it will be discarded. This allows filtering any unauthorized access to the network by unknown MAC addresses.
CLI Timeout on Idle	If the CLI session on USB/Telnet is idle for more than two (2) minutes, the session will time out requiring logging in to re-gain access to the CLI.
IP access *(system level/port level)*	Any management of the system via IP can be locked at the system level, or only on certain ports. For example management can occur via web/SNMP only on Port 1, so that access via other ports can be blocked.
MAC addresses blocking	The MAC address can be added to the static MAC address database with the 'connected port' as zero. This will cause any frames from that MAC address database to cause an ATU-member violation on that port, resulting in sending a trap. This could cause excessive traps *(overload the CPU with interrupts)* depending on the traffic generated by that MAC. The user can disable all traps by setting the Ignore SA Violation on the port that is receiving the MAC address under Advanced Port Configuration on the web page.
Management VLAN	In a VLAN enabled network, the administrator can assign a VLAN as a management VLAN. This VLAN ID will be used in all management frames. This separates the management traffic from the data.
SNMP access	The administrator can stop all SNMP access to the Device, if not used. This will prevent unauthorized access to the system configuration, but the SNMP traps will still be sent.
Radius authentication	The Device supports authentication using the RADIUS protocol. When enabled, RADIUS authentication is used for Web login, serial port, and Telnet authentication. The Radius server and the shared secret needs to be configured using CLI/Web/SNMP before enabling RADIUS authentication.

Continued on next page

Software security feature descriptions, continued

Table 4: Device Software Configurable Security Features *(continued)*

Security Feature	Description
Select Link-Pass Through (LTP) **Note:** In the redundant models *(SFBRM1040-1xx)* this feature only works when the Device is in redundant mode.	When enabled, a link change on Port 2 is passed on to Port 1 *(twisted pair)*. For example on a 10/100BaseT-to-100Base FX Device, when the *(monitored port)* fiber goes DOWN, LPT forces the twisted pair DOWN. The LPT Port binding allows the user to choose which port to monitor for LPT.
USB access	The USB port can be turned OFF to prevent unauthorized access to the system.
Username/password for CLI	The username and password on the CLI *(USB/Telnet)* is configurable and can be set by the administrator.

Section VII:
Operations

Introduction

This section explains the operational status LEDs and what they indicate, along with product features, and the three methods use to upgrade the firmware.

In this section

These are the topics:

Status LEDs

Status monitoring LEDS

The FBRM series Devices are designed to operate without user intervention. Use the status LEDs to monitor Device operation, once it has been installed in the network. See Figure 59.

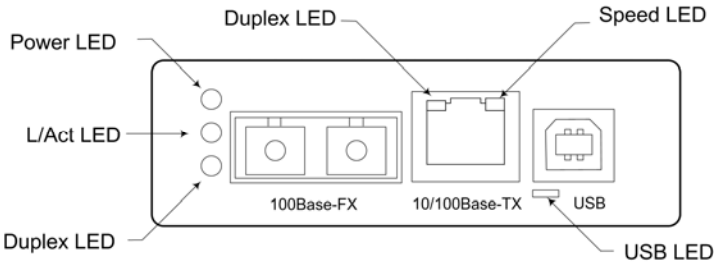


Figure 59: FBRM Device LEDs

LED status tables

Tables 5, 6, and 7 explain the status of the power, USB, twisted pair (TP), and fiber LEDs.

Table 5: Power and USB LEDs FBRM Devices

LEDs	Color	Status
Power	Green	ON has power/OFF no power
USB	Green	Blinking activity/OFF no activity

Table 6: TP Bi-Color LEDs FBRM Devices

TP LEDs	Color	Status
Duplex	Yellow Green	Half duplex TPLink/activity: ON link, BLINK activity Full duplex TPLink/activity: ON link, BLINK activity
Half Duplex/Link/Active	Yellow	ON Link, blinking activity
Full Duplex/Link/Active	Green	ON Link, blinking activity
Speed	Yellow Green	ON 10Mbs ON 100Mbs

Table 7: Fiber LEDs FBRM Devices

Fiber LEDs	Color	Status
Link Active	Green	ON link, blinking activity
Duplex	Green	ON full, OFF half

Continued on next page

Status LEDs, continued

Status monitoring LEDS

The BFFG copper-to-fiber Gbit series Devices are designed to operate without user intervention. Use the status LEDs to monitor Device operation, once it has been installed in the network. See Figure 60.

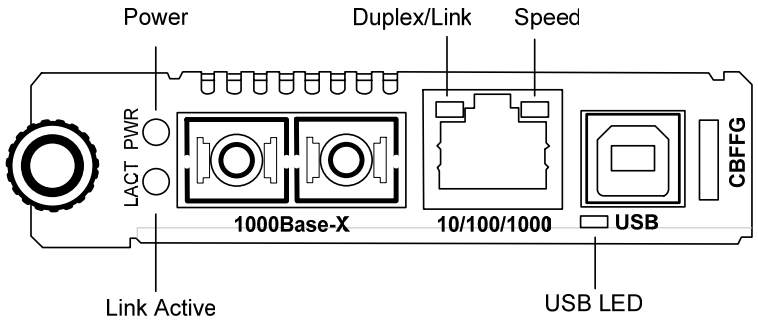


Figure 60: BFFG Device LEDs

LED status tables

Tables 8, 9, and 10 explain the status of the power, USB, twisted pair (TP), and fiber LEDs.

Table 8: Power and USB LEDs BFFG Devices

LEDs	Color	Status
Power	Green	ON has power/OFF no power
USB	Green	Blinking activity/OFF no activity

Table 9: Twisted Pair Bi-Color LEDs BFFG Devices

TP LEDs	Color	Status
Duplex	Yellow Green	Half duplex TPLink/activity: ON link, BLINK activity Full duplex TPLink/activity: ON link, BLINK activity
Half Duplex/Link/Active	Yellow	ON Link, blinking activity
Full Duplex/Link/Active	Green	ON Link, blinking activity
Speed	OFF Yellow Green	10Mbs ON 100Mbs ON 1000 Mbs

Table 10: Fiber LEDs BFFG Devices

Fiber LEDs	Color	Status
Link Active	Green	ON link, blinking activity
Duplex	Green	ON full, OFF half

Continued on next page

Status LEDs, continued

Status monitoring LEDs

The FBRM Gbit and BFFG Gbit fiber series Devices are designed to operate without user intervention. Use the status LEDs to monitor media-Device operation once installed in the network. See Figure 61.

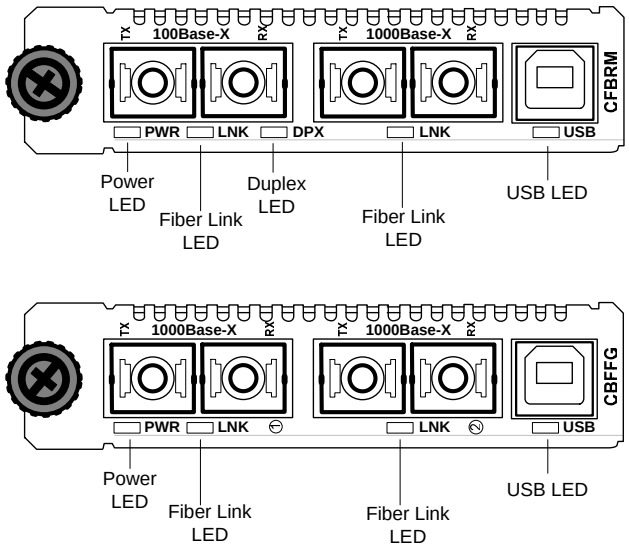


Figure 61: CBFFG/CFBRM1xxx-xx Gbit Device LEDs

LED status table *(Gbit)*

Tables 11 and 12 explain the status of the power, USB, link, duplex LEDs for Gbit FBRM/BFFG Devices.

Table 11: Power and USB LEDs

LEDs	Color	Status
Power	Green	ON has power, OFF no power
USB	Green	Blinking activity, OFF no activity

Table 12: Fiber LEDs

Fiber-LEDs	Color	Status
Link	Green	ON link; blinking activity
Duplex	Green	ON full; OFF half *(BFFG models only)*

OAM Device management configuration options

OAM mgmt. configuration options

OAM Mode control is a feature of the FBRM/BFFG Devices. It can be set to 'Auto' *(default)* or set manually *(Active/Passive/Disabled)*:

- In 'Auto' Mode, the Device decides the OAM operation
- In Manual Mode, the user decides the OAM Mode *(Active/Passive/Disabled)*

Table 13 lists the default configuration.

Table 13: OAM Device Configurations

Chassis Device	Standalone	OAM Capability
Active	Passive	The active Device manages the passive Device.
Active	Active	The Devices exchange status information through OAM, but cannot be managed through OAM.
Passive	Active	The chassis Device needs to be in Active Mode since it is being managed by the point system agent. Management through 'OAM and the chassis simultaneously will cause configuration errors.

Note: A chassis Device in a single slot chassis without the Point System agent functions as a standalone Device.

Firmware upgrades

Introduction

The firmware image on the Device can be upgraded by these methods:

- TFTP protocol
- XModem
- OAM

When enabled, OAM is done automatically when the active peer detects that its remotely managed peer is running a different version of the firmware. TFTP and XModem are initiated by the user. All firmware upgrades are done by the "bootloader."

Note: The bootloader recognizes incompatible FBRM/BFFG BIN files when upgrading. Since there are different FBRM/BFFG Device types, it is possible that the user could download the wrong BIN file; when it receives an incorrect file through TFTP or XMODEM, the following message will appear on the screen:

```
Bootloader: Hardware and BIN file mismatch, upgrade
aborted.
```

XModem method

To upgrade the firmware via XModem, do the following:

Step	Action
1.	At the console **prompt>** type **xmodemupgrade**
2.	Press the ENTER key and a decision prompt will appear as shown in Figure 62.

```
Console:/>xmodemupgrade
Do you wish to proceed to upgrading (y/n):_
```

Figure 62: Decision Prompt for Firmware Upgrades

Note: If you select "Y," the firmware image on the targeted Device will be erased.

Continued on next page

Firmware upgrades, continued

XModem method *(continued)*

Step	Action
3.	Type “Y” at the prompt.
4.	Press the ENTER key to launch the firmware upgrade screen, shown in Figure 63.

```
10/100BaseT to 100BaseFX IPBased 802.3ah Bridge
Version A
Copyright (c) 2006 Transition Networks

Reading config from flash........done

Erasing Application Memory
Start sending file through XModem...
Transfer completed
Checking CRC. . . . . .
```

Figure 63: Firmware Upgrade via Xmodem

5.	Choose the ‘send file’ option from Hyperterminal with ‘XModem’ as the protocol. After the download, the bootloader verifies the CRC of the file and resets itself to start the user application.

Continued on next page

Firmware upgrades, continued

TFTP method

The Device can be upgraded remotely using TFTP. A valid IP address, subnet, gateway, TFTP server IP address, and filename must be configured before starting the upgrade process.

TFTP can be started in the following ways:

- 'tftpupgrade' command at the CLI
- On the web using → "Local System Configuration" → 'TFTP upgrade' [perform(1)]
- Using SNMP, set 'sfbrm100SysTFTPCmd' to '1' *(perform)*

After initiating the command, the system resets to start the bootloader, and then the tftp upgrade will start. A message will appear like the example shown Figure 64.

```
10/100BaseT to 100BaseFX IPBased 802.3ah Bridge
Version A
Copyright (c) 2006 Transition Networks

Reading config from flash........done

Erasing Application Memory
Set to TFTP Boot from Server nnn.nnn.nnn.nnn
Getting File : FBRM.bin . . . . . done
Checking CRC. . . . . .
```

Figure 64: Firmware Upgrade via TFTP

After a successful upgrade, the application will start up.

Continued on next page

Firmware upgrades, continued

OAM method

OAM firmware upgrades are done by the local active peer Device to its remote passive peer Device automatically. This occurs when the active peer Device finds that its remote peer has a firmware revision different from its own. The active peer Device sends a bootloader command to its remote peer. When the firmware upgrade on the remote peer Device is completed, it will perform a "reset" to activate the new firmware—no user intervention is required. *(Active and passive peer relationships are established during configuration.)*

What happens when the upgrade fails?

The FBRM/BFFG Devices can have a corrupted image for a variety of reasons. If the image is corrupt, the following will occur: The bootloader checks the CRC to make sure the image is good; if the check fails, it will re-initiate each method *(XMODEM, TFTP, OAM)* in an attempt to accomplish the upgrade. The sequences is a follows:

Stage	Description
A.	XMODEM will re-initiate if there is no input from the console; it will try the OAM method.
B.	OAM initiates to locate an active peer on the network to get the upgrade image; if an active peer is not available, it will try the TFTP method.
C.	TFTP initiates a request to the TFTP server to get the upgrade image for the Device.
D.	This process continuously loops through these upgrade methods until one of the methods successfully upgrades the firmware image.

Admin intervention

To do a firmware upgrade from the console, before the bootloader moves to the next method, it waits for '2' seconds for user input displaying the following message:

```
"Moving to XMODEM upgrade, Hit 'ESC' to skip or ctrl-C
for CLI."
```

Bootloader CLI

The "bootloader" has a CLI to configure network setting, such as the TFTP server address, filename, and the boot method to use for upgrading the firmware.

The CLI can be started by pressing any key within '2' seconds before it starts the CRC validation, or by pressing the CTRL-C keys when it shows the following message:

```
Transfer Failed
Moving to OAM, XMODEM or TFTP upgrade, Hit 'ESC' to skip/
<ctrl-c> for CLI.
```

Continued on next page

Firmware upgrades, continued

Accessing the bootloader CLI

To access the bootloader CLI to upgrade the firmware, do the following:

Step	Action
1.	When "`Transfer Failed`" appears on the screen, within '2' seconds, press the CTRL-C keys to bring up the bootloader CLI, as shown in Figure 65.

```
10/100BaseT to 100BaseFX IP-Based 802.3ah Bridge
Version A [Mar 2 2006 09:56:02]
Copyright (c) 2006 Transition Networks

Reading config from flash........done.

BOOT LOADER CLI

Type 'h' for help
BOOT:>
```

Figure 65: Bootloader CLI

2.	At the **BOOT:>** prompt type the letter "h" to bring up the help screen, shown in Figure 66.

```
  h     Display this help
  p     Ping a host
  z     Clear entire Application flash
  x     Set boot method as xmodem
  t     Set boot method as tftp
  o     Set boot method as OAM
  s     Show system information
  n     configure network information
  r     reset system
  q     Exit Boot CLI
BOOT:>
```

Figure 66: Bootloader Help Screen

Note: When you press the LETTER key of any command it might not appear at the **BOOT:>** prompt, but the result will appear on the screen.

Continued on next page

Firmware upgrades, continued

Accessing the bootloader CLI *(continued)*

Step	Action
3.	At the **BOOT:>** prompt type the letter "t" to establish TFTP as the reboot method.
4.	At the **BOOT:>** prompt type the letter "s" to view system information, as shown in Figure 67.

```
System configuration:
IP Address                : 192.251.144.150
Subnet Mask               : 255.255.255.0
Default Gateway           : 192.251.144.2
MAC Address               : 00:c0:f2:00:d1:bc
TFTP Server address       : 0.0.0.0
TFTP Filename             :
BOOT:>
```

Figure 67: System Configuration Information

5.	If system configuration parameters are entered incorrectly or missing as shown above, at the **BOOT:>** prompt type the letter "n."
6.	Press the ENTER key until the desired parameter appears on the screen *(TFTP Filename [])*. See Figure 68.

```
BOOT:>
Enter the Network configuration -
IP Address [192.251.144.150]:
Subnet Mask [255.255.255.0]:
Gateway [192.251.144.2]:
TFTP Server IP [0.0.0.0]:
TFTP Filename []:
```

Figure 68: Network Configuration Screen

7.	Enter the necessary data.
8.	When done, press the letter "r" key to reboot the Device. The firmware image will be burned to flash memory of the Device. When completed, the Device will reboot and return to the **Login>** prompt.

Section Vlll:
Troubleshooting

Introduction

This section provides basic troubleshooting information for the FBRM/BFFG Device via a problem and corrective action table. The problems are stated in the problem column and the action(s) to take for the problem is stated in the corrective action column. If the corrective measures listed do not correct the problem, contact our 24-Hour Technical Support department at 1-800-260-1312, International: 00-1-952-941-7600.

In this section

These are the topics:

Troubleshooting problem and corrective action table

Problem	Corrective Action
Device does not power up	• Is the Device power LED ON? • Is the power adapter's barrel inserted fully into the Device? • Is the power adapter plugged into an AC outlet? • Is the AC outlet active; if not, check the outlet's circuit breaker? • Contact Technical Support. US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.
Cannot detect or communicate with the xFBRM/xBFFG	• If CFBRM/CBFFG is in a cascaded chassis move the CFBRM/CBFFG to the master chassis • Upgrade to the latest version of firmware • Contact Technical Support. US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.
Cannot access the Device via USB port	• Is the USB driver installed? • Is the serial access disabled? • Is the USB cable connected to the Device and to the host computer? • Is the terminal emulator software configured properly for the USB port and launched? See Driver Installation and COM Port Setup: Terminal Emulator section. • Contact Technical Support. US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.
The local Device LACT LED is ON but no data transfer is detected *(LED flashing)*	• Is the input source to the local Device active? • Is the RJ-45 network cable fully inserted into the local Device, also into the network Device? • Is the fiber cable properly inserted into the local Device and the end source Device? • Contact Technical Support. US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.
Ports do not link up	• Check the cable type needed for the Device and make sure the right cable is used. • Check Auto-Negotiation setting. • Check if TPLT or remote fault-detect condition was triggered. • Contact Technical Support. US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.

Continued on next page

Troubleshooting problem and corrective action table, *continued*

Problem	Corrective Action
The Trap Server does not record traps	• Ensure the Trap Server application is running. o In the Windows environment, if the "TN" icon is displayed in the lower right corner of the monitor, then the Trap Server is running. • SNMP traps may be blocked by a router or firewall. Consult your Network administrator to determine if this is the case. • The SNMP trap manager may not be configured properly. The result is that the SNMP agent does not know the proper IP address. Use the "set" command to configure the trap manager. Enter the following command on a single line: **CPSMM100> set=cpsmm100SNMPTrapMgr.<cabinet serial number>.<slot number of the MM>,ip,<new IP Address of NMS>** • Alternatively, use the "getnext" command to "get" much of this information and then use the "set=*" command to issue the set request. The following is an example. Enter "Super-User Mode": **CPSMM100> su=<private community name>** **[su] CPSMM>** Enter the "getnext" command: **[su] CPSMM100> getnext=cpsmm100snmptrapmgr** The response is: **SNMP: GETNEXT [192.251.144.229] id=D2EE6F3F ind=0 cpsmm100snmptrapmgr.1758208.1** **IP Address [4/0x4] 192.251.144.235** Enter the set request: **[su] CPSMM100> set=*,ip,172.16.45.105** The response is: **SNMP: SET [192.251.144.229] id=D2EE6F3F ind=0 cpsmm100SNMPTrapMgr.1758208.1** **IP Address [4/0x4] 172.16.45.105** Save the changes: **[su] CPSMM100> save**

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Troubleshooting problem and corrective action table, *continued*

Problem	Corrective Action
The Trap Server does not record traps,(continued)	The response is: **FLASH: Saving configuration, please wait up to one minute...** **Writing Flash *(04004500,05E8,00FE0000,00FFFFFE)*** **Erasing** . **Done Erasing/Verifying** **Writing [000005E8]** **#[0000FFFF]** **Done Writing** **Verifying** **FLASH: Write complete.**
Cannot activate IP-based management	• Are the IP, Gateway, and subnet mask configured correctly? • With DHCP enabled, DHCP could have failed leaving the system with the old static IP config. Verify the configuration via the USB port. • Make sure IP-based access is not turned OFF in the system. • Contact Technical Support. US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.
TLPT and SLDP are not working	• Are the TLPT and SLDP enabled on both systems? Refresh web pages to make sure they are set. • Check if port binding for TLPT/RFD is set to the active OAM channel. • With 100Base-Fx, make sure “far end fault” is enabled. • Contact Technical Support. US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.
OAM session is not active	• If OAM is enabled, check the ports on the local and remote Devices. • Make sure the local Device is in OAM “Active” Mode.
OAM remote Device is detected on local, but cannot configure remote from local	• Make sure the remote peer Device is set to “Passive” Mode. **Note:** OAM session can be formed between Devices with both set to Active Mode, but this prevents remote management. The remote Device should be in “Passive” Mode for management. • Contact Technical Support. US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.

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Troubleshooting problem and corrective action table, *continued*

Problem	Corrective Action
Unable to do configuration directly using IP based management on Remote Device	• If the OAM session is active, the active local peer Device sends configuration information; if the user attempts to go directly to the remote passive peer Device, the configuration will be overwritten by the OAM update from the local active peer. It is advisable to always use the local active peer Device to manage its remote passive peer Device. • Contact Technical Support. US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.
Chassis FBRM/BFFG not recognized by the chassis agent	• Make sure the Point System agent has the latest firmware version for the CFBRM/CBFFG Device. Use the FEATSUPP command to see if the Devices are supported. • Contact Technical Support. US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.
Chassis FBRM/BFFG is in a single-slot chassis, but the Port 2 comes up in OAM "Passive" Mode with OAM Mode control is set to 'auto'	• The chassis Devices in single-slot chassis function as a standalone Device. • Chassis Device needs a Point System management module in a chassis to switch to "Active" Mode, or to set OAM Mode manually. • Contact Technical Support. US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.

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Section IX:
Copper Cable & Fiber Optic Specifications

Introduction This section provides copper and fiber cable specifications.

In this section These are the topics:

Copper cables

Characteristics

Cooper cable physical characteristics must meet or exceed IEEE 802.3™ specifications.

Copper cable specification

Category 5:	minimum
Gauge:	24 to 22 AWG
Attenuation:	22.0 dB/100m @ 100 MHz
Maximum cable distance:	100 meter *(328 ft.)*

- Straight-through or crossover twisted-pair cable may be used. See Figure 69.
- Shielded twisted-pair (STP) or unshielded twisted-pair (UTP) may be used.
- Pins 1&2 and 3&6 are the two active pairs in an Ethernet network.
- RJ-45 pin-outs on MDI cable: Pin 1 = TD+, Pin 2 = TD-, Pin 3 = RD+, Pin 6 = RD-
- Use only dedicated wire pairs for the active pins.
  (e.g., blue/white & white/blue, orange/white & white/orange, etc.)
- DO NOT use flat or silver satin wire.

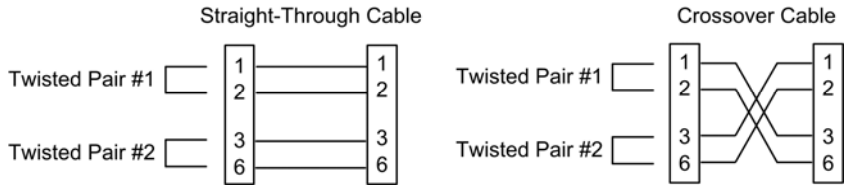

Figure 69: MDI Straight Through and MDI-X Crossover Cables

Fiber optic cable and connector specifications

Fiber cable characteristics

Cable physical characteristics must meet or exceed IEEE 802.3™ specifications.

Parameter	Specification
Bit Error Rate:	<10-9
Single mode fiber:	9 µm
Multimode fiber:	62.5/125 µm
Multimode fiber:	100/140, 85/140, 50/125 µm

Copper-to-fiber connectors

The following are FBRM10xx-1xx copper-to-fiber connector specifications.

Fiber Optics	Specifications
CFBRM1011-100	
SFBRM1011-100	1300 nm multimode
Fiber-optic transmitter power:	min: -19.0 dBm max: -14.0 dBm
Fiber-optic receiver sensitivity:	min: -30.0 dBm max: -14.0 dBm
Link budget:	11 dB
CFBRM1013-100	
SFBRM1013-100	1300 nm multimode
Fiber-optic transmitter power:	min: -19.0 dBm max: -14.0 dBm
Fiber-optic receiver sensitivity:	min: -30.0 dBm max: -14.0 dBm
Link budget:	11 dB
CFBRM1014-100	
SFBRM1014-100	1310 nm single mode
Fiber-optic transmitter power:	min: -15.0 dBm max: -8.0 dBm
Fiber-optic receiver sensitivity:	min: -31.0 dBm max: -8.0 dBm
Link budget:	16 dB
CFBRM1015-100 *(long haul)*	
SFBRM1015-100 *(long haul)*	1310 nm single mode
Fiber-optic transmitter power:	min: -8.0 dBm max: -2.0 dBm
Fiber-optic receiver sensitivity:	min: -34.0 dBm max: -7.0 dBm
Link budget:	26 dB

WARNING: Visible and invisible laser radiation when open. Do not stare into the beam or view the beam directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

WARNING: Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

Continued on next page

Fiber optic cable and connector specifications, continued

Copper-to-fiber connectors *(continued)*

Fiber Optics	Specifications
CFBRM1016-100 (extra long haul)	
SFBRM1016-100 (extra long haul)	1310 nm single mode
Fiber-optic transmitter power:	min: -5.0 dBm max: 0.0 dBm
Fiber-optic receiver sensitivity:	min: -34.0 dBm max: -7.0 dBm
Link budget:	29 dB
CFBRM1017-100 (*long wave length)*	
SFBRM1017-100 *(long wave length)*	1550 nm single mode
Fiber-optic transmitter power:	min: -5.0 dBm max: 0.0 dBm
Fiber-optic receiver sensitivity:	min: -34.0 dBm max: -7.0 dBm
Link budget:	29 dB
CFBRM1035-100	
SFBRM1035-100	1550 nm single mode
Fiber-optic transmitter power:	min: -0.0 dBm max: 5.0 dBm
Fiber-optic receiver sensitivity:	min: -36.0 dBm max: -3.0 dBm
Link budget:	36 dB
CFBRM1029-100	1310 nm (TX)/1550 nm (RX) simplex
CFBRM1029-101	1550 nm (TX)/1310 nm (RX) simplex
SFBRM1029-100	1310 nm (TX)/1550 nm (RX) simplex
SFBRM1029-101	1550 nm (TX)/1310 nm (RX) simplex
Fiber-optic transmitter power:	min: -14.0 dBm max: -8.0 dBm
Fiber-optic receiver sensitivity:	min: -33.0 dBm max: -3.0 dBm
Link budget:	19 dB
CFBRM1029-102	1310 nm (TX)/1550 nm (RX) simplex
CFBRM1029-103	1550 nm (TX)/1310 nm (RX) simplex
SFBRM1029-102	1310 nm (TX)/1550 nm (RX) simplex
SFBRM1029-103	1550 nm (TX)/1310 nm (RX) simplex
Fiber-optic transmitter power:	min: -8.0 dBm max: -3.0 dBm
Fiber-optic receiver sensitivity:	min: -33.0 dBm max: -3.0 dBm
Link budget:	25 dB

Note: The fiber optic transmitters on these Devices meet Class I Laser safety requirements per IEC-825/CDRH standards and comply with 21 CFR1040.10 and 21CFR1040.11.

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Fiber optic cable and connector specifications, continued

Copper-to-Copper-to-fiber connectors with DMI

Fiber Optics	Specifications
CFBRM1011-110 DMI SFBRM1011-110 DMI Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1300 nm multimode min: -19.0 dBm max: -14.0 dBm min: -30.0 dBm max: -14.0 dBm 11 dB
CFBRM1013-110 DMI SFBRM1013-110 DMI Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1300 nm multimode min: -19.0 dBm max: -14.0 dBm min: -30.0 dBm max: -14.0 dBm 11 dB
CFBRM1014-110 DMI SFBRM1014-110 DMI Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1310 nm single mode min: -15.0 dBm max: -8.0 dBm min: -31.0 dBm max: -8.0 dBm 16 dB
CFBRM1015-110 DMI *(long haul)* SFBRM1015-110 DMI*(long haul)* Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1310 nm single mode min: -8.0 dBm max: -2.0 dBm min: -34.0 dBm max: -7.0 dBm 26 dB
CFBRM1016-110 DMI SFBRM1016-110 DMI *(extra long haul)* Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1310 nm single mode min: -5.0 dBm max: 0.0 dBm min: -34.0 dBm max: -7.0 dBm 29 dB
CFBRM1017-110 DMI SFBRM1017-110 DMI *(long wave length)* Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1550 nm single mode min: -5.0 dBm max: 0.0 dBm min: -34.0 dBm max: -7.0 dBm 29 dB
CFBRM1035-110 DMI SFBRM1035-110 DMI Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1550 nm single mode min: -0.0 dBm max: 5.0 dBm min: -36.0 dBm max: -3.0 dBm 36 dB

Continued on next page

Fiber optic cable and connector specifications, continued

Copper-to-fiber connectors with DMI *(continued)*

Fiber Optics	Specifications
CFBRM1029-110 DMI	1310 nm (TX)/1550 nm (RX) simplex
CFBRM1029-111 DMI	1550 nm (TX)/1310 nm (RX) simplex
SFBRM1029-110 DMI	1310 nm (TX)/1550 nm (RX) simplex
SFBRM1029-111 DMI	1550 nm (TX)/1310 nm (RX) simplex
Fiber-optic transmitter power:	min: -14.0 dBm max: -8.0 dBm
Fiber-optic receiver sensitivity:	min: -33.0 dBm max: -3.0 dBm
Link budget:	19 dB
CFBRM1029-112 DMI	1310 nm (TX)/1550 nm (RX) simplex
CFBRM1029-113 DMI	1550 nm (TX)/1310 nm (RX) simplex
SFBRM1029-112 DMI	1310 nm (TX)/1550 nm (RX) simplex
SFBRM1029-113 DMI	1550 nm (TX)/1310 nm (RX) simplex
Fiber-optic transmitter power:	min: -8.0 dBm max: -3.0 dBm
Fiber-optic receiver sensitivity:	min: -33.0 dBm max: -3.0 dBm
Link budget:	25 dB

Note: The fiber optic transmitters on these Devices meet Class I Laser safety requirements per IEC-825/CDRH standards and comply with 21 CFR1040.10 and 21CFR1040.11.

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WARNING: Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

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Fiber optic cable and connector specifications, continued

FBRM fiber-to-fiber Gbit connector

Fiber Optics	Port 1 Specification	Port 2 Specification
CFBRM1313-100 SFBRM1313-100 Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1310 nm multimode min: -19.0 dBm max: -14.0 dBm min: -30.0 dBm max: -14.0 dBm 11 dB	 850 nm multimode min: -10.0 dBm max: -14.0 dBm min: -17.0 dBm max: 0.0 dBm 7 dB
CFBRM1314-100 SFBRM1314-100 Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1310 nm multimode min: -19.0 dBm max: -14.0 dBm min: -30.0 dBm max: -14.0 dBm 11 dB	 1310 nm single mode min: -13.0 dBm max: -3.0 dBm min: -20.0 dBm max: -3.0 dBm 7 dB
CFBRM1315-100 SFBRM1315-100 Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1310 nm multimode min: -19.0 dBm max: -14.0 dBm min: -30.0 dBm max: -14.0 dBm 11 dB	 1310 nm single mode min: -5.0 dBm max: 0.0 dBm min: -20.0 dBm max: -3.0 dBm 15 dB
CFBRM1317-100 SFBRM1317-100 Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1310 nm multimode min: -19.0 dBm max: -14.0 dBm min: -30.0 dBm max: -14.0 dBm 11 dB	 1550 nm single mode min: -3.0 dBm max: 2.0 dBm min: -24.0 dBm max: -3.0 dBm 21 dB
CFBRM1329-100 CFBRM1329-101 SFBRM1329-100 SFBRM1329-101 Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1310 nm multimode min: -19.0 dBm max: -14.0 dBm min: -30.0 dBm max: -14.0 dBm 11 dB	1310 nm (TX)/1490 nm (RX) 1490 nm (TX)/1310 nm (RX) 1310 nm (TX)/1490 nm (RX) 1490 nm (TX)/1310 nm (RX) min: -8.0 dBm max: 3.0 dBm min: -22.0 dBm max: -3.0 dBm 14 dB
CFBRM1329-102 CFBRM1329-103 SFBRM1329-102 SFBRM1329-103 Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1310 nm multimode min: -19.0 dBm max: -14.0 dBm min: -30.0 dBm max: -14.0 dBm 11 dB	1310 nm (TX)/1490 nm (RX) 1490 nm (TX)/1310 nm (RX) 1310 nm (TX)/1490 nm (RX) 1490 nm (TX)/1310 nm (RX) min: -3.0 dBm max: 2.0 dBm min: -23.0 dBm max: -3.0 dBm 20 dB

Note: The fiber optic transmitters on these Devices meet Class I Laser safety requirements per IEC-825/CDRH standards and comply with 21 CFR1040.10 and 21CFR1040.11.

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Fiber optic cable and connector specifications, continued

FBRM fiber-to-fiber Gbit connectors*(continued)*

Fiber Optics	Port 1 Specification	Port 2 Specification
CFBRM1335-100		
SFBRM1335-100	1310 nm multimode	1550 nm single mode
Fiber-optic transmitter power:	min: -19.0 dBm max: -14.0 dBm	min: 0.0 dBm max: 5.0 dBm
Fiber-optic receiver sensitivity:	min: -30.0 dBm max: -14.0 dBm	min: -27.0 dBm max: -3.0 dBm
Link budget:	11 dB	27 dB

FBRM fiber-to-fiber Gbit with DMI connectors

Fiber Optics	Port 1 Specification	Port 2 Specification
CFBRM1313-110 DMI		
SFBRM1313-110 DMI	1300 nm multimode	850nm single mode
Fiber-optic transmitter power:	min: -19.0 dBm max: -14.0 dBm	min: -9.5 dBm max: -4.0 dBm
Fiber-optic receiver sensitivity:	min: -30.0 dBm max: -14.0 dBm	min: -18.0 dBm max: -3.0 dBm
Link budget:	11 dB	8.5 dB
CFBRM1314-110 DMI		
SFBRM1314-110 DMI	1300 nm multimode	1310 nm single mode
Fiber-optic transmitter power:	min: -19.0 dBm max: -14.0 dBm	min: -9.0 dBm max: -3.0 dBm
Fiber-optic receiver sensitivity:	min: -30.0 dBm max: -14.0 dBm	min: -21.0 dBm max: -3.0 dBm
Link budget:	11 dB	12 dB
CFBRM1315-110 DMI		
SFBRM1315-110 DMI	1300 nm multimode	1310 nm single mode
Fiber-optic transmitter power:	min: -19.0 dBm max: -14.0 dBm	min: -5.0 dBm max: 0.0 dBm
Fiber-optic receiver sensitivity:	min: -30.0 dBm max: -14.0 dBm	min: -24.0 dBm max: -3.0 dBm
Link budget:	11 dB	19 dB
CFBRM1329-110 DMI		1310 nm (TX)/1490 nm (RX)
CFBRM1329-111 DMI		1490 nm (TX)/1310 nm (RX)
SFBRM1329-110 DMI		1310 nm (TX)/1490 nm (RX)
SFBRM1329-111 DMI	1300 nm multimode	1490 nm (TX)/1310 nm (RX)
Fiber-optic transmitter power:	min: -19.0 dBm max: -14.0 dBm	min: -9.0 dBm max: 3.0 dBm
Fiber-optic receiver sensitivity:	min: -30.0 dBm max: -14.0 dBm	min: -20.0 dBm max: -3.0 dBm
Link budget:	11 dB	11 dB
CFBRM1329-112 DMI		1310 nm (TX)/1490 nm (RX)
CFBRM1329-113 DMI		1490 nm (TX)/1310 nm (RX)
SFBRM1329-112 DMI		1310 nm (TX)/1490 nm (RX)
SFBRM1329-113 DMI	1300 nm multimode	1490 nm (TX)/1310 nm (RX)
Fiber-optic transmitter power:	min: -19.0 dBm max: -14.0 dBm	min: -9.0 dBm max: 3.0 dBm
Fiber-optic receiver sensitivity:	min: -30.0 dBm max: -14.0 dBm	min: -20.0 dBm max: -3.0 dBm
Link budget:	11 dB	11 dB

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Fiber optic cable and connector specifications, continued

Copper-to-fiber connectors

The following are BFFG10x40-100 copper-to-fiber connector specifications.

Fiber Optics	Specifications
CBFFG1040-100	
SBFFG1040-100	Empty Slot
Fiber-optic transmitter power:	
Fiber-optic receiver sensitivity:	
Link budget:	

Note: The fiber optic transmitters on these Devices meet Class I Laser safety requirements per IEC-825/CDRH standards and comply with 21 CFR1040.10 and 21CFR1040.11.

WARNING: Visible and invisible laser radiation when open. Do not stare into the beam or view the beam directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

WARNING: Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

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Fiber optic cable and connector specifications, continued

BFFG fiber-to-fiber Gbit connectors

Fiber Optics	Port 1 Specification	Port 2 Specification
CBFFG1313-100 SBFFG1313-100 Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1300 nm multimode min: -19.0 dBm max: -14.0 dBm min: -30.0 dBm max: -14.0 dBm 11 dB	 850 nm single mode min: -10.0 dBm max: -14.0 dBm min: -17.0 dBm max: 0.0 dBm 7 dB
CBFFG1314-100 SBFFG1314-100 Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1300 nm multimode min: -19.0 dBm max: -14.0 dBm min: -30.0 dBm max: -14.0 dBm 11 dB	 1310 nm single mode min: -13.0 dBm max: -3.0 dBm min: -20.0 dBm max: -3.0 dBm 7 dB
CBFFG1315-100 SBFFG1315-100 Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1300 nm multimode min: -19.0 dBm max: -14.0 dBm min: -30.0 dBm max: -14.0 dBm 11 dB	 1310 nm single mode min: -5.0 dBm max: 0.0 dBm min: -20.0 dBm max: -3.0 dBm 15 dB
CBFFG1317-100 SBFFG1317-100 Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1300 nm multimode min: -19.0 dBm max: -14.0 dBm min: -30.0 dBm max: -14.0 dBm 11 dB	 1310 nm single mode min: -3.0 dBm max: 2.0 dBm min: -24.0 dBm max: -3.0 dBm 21 dB
CBFFG1329-100 CBFFG1329-101 SBFFG1329-100 SBFFG1329-101 Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1300 nm multimode min: -19.0 dBm max: -14.0 dBm min: -30.0 dBm max: -14.0 dBm 11 dB	1310 nm (TX)/1490 nm (RX) 1490 nm (TX)/1310 nm (RX) 1310 nm (TX)/1490 nm (RX) 1490 nm (TX)/1310 nm (RX) min: -8.0 dBm max: 3.0 dBm min: -22.0 dBm max: -3.0 dBm 14 dB
CBFFG1329-102 CBFFG1329-103 SBFFG1329-102 SBFFG1329-103 Fiber-optic transmitter power: Fiber-optic receiver sensitivity: Link budget:	 1300 nm multimode min: -19.0 dBm max: -14.0 dBm min: -30.0 dBm max: -14.0 dBm 11 dB	1310 nm (TX)/1490 nm (RX) 1490 nm (TX)/1310 nm (RX) 1310 nm (TX)/1490 nm (RX) 1490 nm (TX)/1310 nm (RX) min: -3.0 dBm max: 2.0 dBm min: -23.0 dBm max: -3.0 dBm 20 dB

Note: The fiber optic transmitters on these Devices meet Class I Laser safety requirements per IEC-825/CDRH standards and comply with 21 CFR1040.10 and 21CFR1040.11.

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Fiber optic cable and connector specifications, continued

BFFG fiber-to-fiber Gbit connector *(continued)*

Fiber Optics	Port 1 Specification	Port 2 Specification
CBFFG1335-100		
SBFFG1335-100	1300 nm multimode	1310 nm single mode
Fiber-optic transmitter power:	min: -19.0 dBm max: -14.0 dBm	min: 0.0 dBm max: 5.0 dBm
Fiber-optic receiver sensitivity:	min: -30.0 dBm max: -14.0 dBm	min: -27.0 dBm max: -3.0 dBm
Link budget:	11 dB	27 dB

BFFG fiber-to-fiber Gbit with DMI connector

Fiber Optics	Port 1 Specification	Port 2 Specification
CBFFG1313-110 DMI		
SBFFG1313-110 DMI	1300 nm multimode	1310 nm single mode
Fiber-optic transmitter power:	min: -19.0 dBm max: -14.0 dBm	min: -9.5 dBm max: -4.0 dBm
Fiber-optic receiver sensitivity:	min: -30.0 dBm max: -14.0 dBm	min: -18.0 dBm max: -3.0 dBm
Link budget:	11 dB	8.5 dB
CBFFG1314-110 DMI		
SBFFG1314-110 DMI	1300 nm multimode	1310 nm single mode
Fiber-optic transmitter power:	min: -19.0 dBm max: -14.0 dBm	min: -9 dBm max: -3.0 dBm
Fiber-optic receiver sensitivity:	min: -30.0 dBm max: -14.0 dBm	min: -21.0 dBm max: -3.0 dBm
Link budget:	11 dB	12 dB
CBFFG1315-110 DMI		
SBFFG1315-110 DMI	1300 nm multimode	1310 nm single mode
Fiber-optic transmitter power:	min: -19.0 dBm max: -14.0 dBm	min: -5 dBm max: 0 dBm
Fiber-optic receiver sensitivity:	min: -30.0 dBm max: -14.0 dBm	min: -24.0 dBm max: -3.0 dBm
Link budget:	11 dB	19 dB
CBFFG1329-110 DMI		1310 nm (TX)/1490 nm (RX)
CBFFG1329-111 DMI		1490 nm (TX)/1310 nm (RX)
SBFFG1329-110 DMI		1310 nm (TX)/1490 nm (RX)
SBFFG1329-111 DMI	1300 nm multimode	1490 nm (TX)/1310 nm (RX)
Fiber-optic transmitter power:	min: -19.0 dBm max: -14.0 dBm	min: -9.0 dBm max: 3.0 dBm
Fiber-optic receiver sensitivity:	min: -30.0 dBm max: -14.0 dBm	min: -20.0 dBm max: -3.0 dBm
Link budget:	11 dB	11 dB

Note: The fiber optic transmitters on these Devices meet Class I Laser safety requirements per IEC-825/CDRH standards and comply with 21 CFR1040.10 and 21CFR1040.11.

WARNING: Visible and invisible laser radiation when open. Do not stare into the beam or view the beam directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

WARNING: Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

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Fiber optic cable and connector specifications, continued

BFFG fiber-to-fiber Gbit with DMI connector *(continued)*

Fiber Optics	Port 1 Specification	Port 2 Specification
CBFFG1329-112 DMI		1310 nm (TX)/1490 nm (RX)
CBFFG1329-113 DMI		1490 nm (TX)/1310 nm (RX)
SBFFG1329-112 DMI		1310 nm (TX)/1490 nm (RX)
SBFFG1329-113 DMI	1300 nm multimode	1490 nm (TX)/1310 nm (RX)
Fiber-optic transmitter power:	min: -19.0 dBm max: -14.0 dBm	min: -9.0 dBm max: 3.0 dBm
Fiber-optic receiver sensitivity:	min: -30.0 dBm max: -14.0 dBm	min: -20.0 dBm max: -3.0 dBm
Link budget:	11 dB	11 dB

Note: The fiber optic transmitters on these Devices meet Class I Laser safety requirements per IEC-825/CDRH standards and comply with 21 CFR1040.10 and 21CFR1040.11.

WARNING: Visible and invisible laser radiation when open. Do not stare into the beam or view the beam directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

WARNING: Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

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Section X:

Contact Us, Warranty, & Conformity Information

Introduction

This section explains how to contact Transition Networks via Phone, fax, email, and direct mail. It also explains:

- What the warranty covers
- Who to contact to return product
- How and where to return the product

In this section

These are the topics:

Contact us

Technical support	Technical Support is available 24 hours a day. United States: 1-800-260-1312 International: 00-1-952-941-7600
Live Web chat	Chat live via the Web with a Transition Networks Technical Support Specialist. Log onto www.transition.com and click the Transition Now link.
Web-based training	Transition Networks provides 12-16 seminars per month via live web-based training. Log onto www.transition.com and click the Learning Center link.
E-Mail	Ask a question anytime by sending an e-mail message to our technical support staff: techsupport@transition.com
Address	Transition Networks 10900 Red Circle Drive Minnetonka, MN 55343, U.S.A. Telephone: 952-941-7600 Toll free U.S.A & Canada: 800-526-9267 Fax: 952-941-2322

Conformity declaration

Declaration of Conformity

Name of Mfg:	Transitions Networks 6427 City West Parkway, Minneapolis MN 55344 U.S.A.
Model:	xFBRM1xxx-1xx and xBFFG1xxx-1xx Media
Part Numbers:	CFBRM1011-100, CFBRM1013-100, CFBRM1014-100, CFBRM1015-100, CFBRM1016-100, CFBRM1017-100, CFBRM1035-100, CFBRM1040-100, CFBRM1029-100, CFBRM1029-101, CFBRM1029-102, CFBRM1029-103 CFBRM1011-110, CFBRM1013-110, CFBRM1014-110, CFBRM1015-110, CFBRM1016-110, CFBRM1017-110, CFBRM1035-110, CFBRM1040-110, CFBRM1029-110, CFBRM1029-111, CFBRM1029-112, CFBRM1029-113, CFBRM1313-100, CFBRM1314-100, CFBRM1315-100, CFBRM1317-100, CFBRM1035-110, CFBRM1040-100, CFBRM1029-100, CFBRM1029-100, CFBRM1029-100, CFBRM1029-100 CFBRM1313-110, CFBRM1314-110, CFBRM1315-110, CFBRM1317-110, CFBRM1035-110, CFBRM1040-110, CFBRM1029-110, CFBRM1029-111, CFBRM1029-112, CFBRM1029-113 SFBRM1011-100, SFBRM1013-100, SFBRM1014-100, SFBRM1015-100, SFBRM1016-100, SFBRM1017-100, SFBRM1035-100, SFBRM1040-100, SFBRM1029-100, SFBRM1029-101, SFBRM1029-102, SFBRM1029-103 SFBRM1011-110, SFBRM1013-110, SFBRM1014-110, SFBRM1015-110, SFBRM1016-110, SFBRM1017-110, SFBRM1035-110, SFBRM1040-110, SFBRM1029-110, SFBRM1029-111, SFBRM1029-112, SFBRM1029-113, SFBRM1313-100, SFBRM1314-100, SFBRM1315-100, SFBRM1317-100, SFBRM1335-110, SFBRM1340-100, SFBRM1329-100, SFBRM1029-100, SFBRM1329-100, SFBRM1329-100 SFBRM1313-110, CFBRM1314-110, SFBRM1315-110, SFBRM1317-110, CFBRM1335-110, SFBRM1340-110, SFBRM1329-110, CFBRM1329-111, CFBRM1329-112, SFBRM1329-113 CBFFG1013-100, CBFFG1014-100, CBFFG1015-100, CBFFG1017-100, CBFFG1024-100, CBFFG1035-100, CBFFG1040-100, CBFFG1029-100, CBFFG1029-101, CBFFG1029-102, CBFFG1029-103 CBFFG1313-100, CBFFG1314-100, CBFFG1315-100, CBFFG1317-100, CBFFG1335-100, CBFFG1340-100, CBFFG1329-100, CBFFG1329-101, CBFFG1329-102, CBFFG1029-103 CBFFG1313-110, CBFFG1314-110, CBFFG1315-110, CBFFG1317-110, CBFFG1335-110, CBFFG1340-110, CBFFG1329-100, CBFFG1329-111, CBFFG1329-112, CBFFG1029-113

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Conformity declaration, *continued*

	SBFFG1313-100, SBFFG1314-100, SBFFG1315-100, SBFFG1317-100, SBFFG1335-100, SBFFG1340-100, SBFFG1329-100, SBFFG1329-101, SBFFG1329-102, SBFFG1029-103
	SBFFG1313-110, SBFFG1314-110, SBFFG1315-110, SBFFG1317-110, SBFFG1335-110, SBFFG1340-110, SBFFG1329-110, SBFFG1329-111, CBFFG1329-112, SBFFG1029-113
Regulations:	EMC Directive 89/336/EEC
Purpose:	To declare that the CFBRM1xxx-1xx, SFBRM1xxx-1xx, CBFFG1xxx-1xx and SBFFG1xxx-1xx Devices to which this declaration refers is in conformance with the following standards:
	CISPR22:1993; EN55022:1994+A1:1995+A2:1997 Class A; FCC Part 15 Subpart B; UL1950; 21 CFR Subpart J

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

Steven Anderson, Vice President of Engineering — July, 2008 (Date)

Warranty

Limited lifetime warranty

Effective for products shipped May 1, 1999 and after. Every Transition Networks' labeled product purchased after May 1, 1999 will be free from defects in material and workmanship for its lifetime. This warranty covers the original user only and is not transferable.

What the warranty does not cover

This warranty does not cover damage from accident, acts of God, neglect, contamination, misuse or abnormal conditions of operation or handling, including over-voltage failures caused by use outside the product's specified rating, or normal wear and tear of mechanical components. If the user is unsure of the proper means of installing or using the equipment, contact Transition Networks' free technical support services.

Establishing original ownership

To establish original ownership and provide date of purchase, please complete and return the registration card accompanying the product or register the product on-line on our product registration page.

Transition Networks will at its option:

- Repair the defective product to functional specifications at no charge
- Replace the product with an equivalent functional product
- Refund the purchase price of a defective product

Who to contact for returns

To return a defective product for warranty coverage, contact Transition Networks' technical support department for a return authorization number (RAN). Transition's technical support department can be reached through any of the following means:

Technical Support is available 24 hours a day:

- Tel: 800-260-1312 x200 or 952-941-7600 x200
- Fax: 952-941-2322
- Email: techsupport@transition.com
- Live web chat: Transition Now
- Voicemail: 800-260-1312, x579 or 952-941-7600, x579
- All messages will be answered within one hour

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Warranty, continued

How and where to send the returns

Send the defective product postage and insurance prepaid to the following address:

CSI Material Management Center

c/o Transition Networks
6103 Blue Circle Drive

Minnetonka, MN 55343, U.S.A.

Attn: RETURNS DEPT: Credit Return Authorization (CRA)# or Return Material Authorization (RMA) # _____

Failure to protect the product during shipping may void this warranty. The return authorization number must be written on the outside of the carton to ensure its acceptance. We cannot accept delivery of any equipment sent to us without a CRA or RMA number.

Customer pays non-compliant return costs

The customer must pay the non-compliant product(s) return transportation cost to Transition Networks for evaluation of said product(s) for repair or replacement. Transition Networks will pay for shipping the repaired or replaced in-warranty product(s) back to the customer *(any and all customs charges, tariffs, or/and taxes are the customer's responsibility).*

Non-warranty repair costs

Before making any non-warranty repair, Transition Networks requires a $200 charge, plus actual shipping costs to and from the customer. If the repair is greater than $200, an estimate is issued to the customer for authorization before making the repair. If no authorization is obtained, or the product is deemed not repairable, Transition Networks will retain the $200 service charge and return the product to the customer not repaired.

Repaired non-warranty products

Non-warranted products repaired by Transition Networks for a fee will carry a 180-day limited warranty. All warranty claims are subject to the restrictions and conventions set forth by this document.

Transition Networks reserves the right to charge for all testing and shipping incurred, if after testing, a return is classified as "No Problem Found."

This warranty is your only remedy

This warranty is your only remedy. No other warranties, such as fitness for a particular purpose, are expressed or implied. Transition Networks is not liable for any special, indirect, incidental or consequential damages or losses, including loss of data, arising from any cause or theory. Authorized resellers are not authorized to extend any different warranty on transition networks' behalf.

Compliance information

Standards	CISPR22/EN55022 Class A, CE Mark
FCC Regulations	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 the user's own expense.
Canadian Regulations	This digital apparatus does not exceed the Class A limits for radio noise from digital apparatus set out on the radio interference regulations of the Canadian Department of Communications. Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.
European Regulations	WARNING: This is a Class A product. In a domestic environment, this product could cause radio interference in which case the user may be required to take adequate measures. Achtung ! Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten. In diesem Fäll ist der Benutzer für Gegenmaßnahmen verantwortlich. Attention ! Ceci est un produit de Classe A. Dans un environment domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilsateur de prende les measures spécifiques appropriées.

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Compliance information, *continued*

European Regulations, *(continued)*

In accordance with European Union Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003, Transition Networks will accept post usage returns of this product for proper disposal. The contact information for this activity can be found in the 'Contact Us' portion of this document.

CAUTION: RJ connectors are NOT INTENDED FOR CONNECTION TO THE PUBLIC TELEPHONE NETWORK. Failure to observe this caution could result in damage to the public telephone network.

Der Anschluss dieses Gerätes an ein öffentlickes Telekommunikationsnetz in den EG-Mitgliedstaaten verstösst gegen die jeweligen einzelstaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einschliesslich der gegenseitigen Anerkennung ihrer Konformität.

Appendix A: FBRM/BFFG Part Numbers

FBRM copper-to-fiber part numbers

Standard models

The models shown in Table 14 perform as described in this manual. The 110 in the model designation means DMI functionality.

Table 14: FBRM10xx-1xx Model Numbers

Part Number	Port 1: Copper 10/100Base-T	Port 2: Fiber 100Base-FX
CFBRM1011-100 CFBRM1011-110 DMI SFBRM1011-100 SFBRM1011-110 DMI	RJ-45 100m *(328ft)*	ST, 100Base-FX 1300nm MM 2 km *(1.2 miles)*
CFBRM1013-100 CFBRM1013-110 DMI SFBRM1013-100 SFBRM1013-110 DMI	RJ-45 100m *(328ft)*	SC, 100Base-FX 1300nm MM 2 km *(1.2 miles)*
CFBRM1014-100 CFBRM1014-110 DMI SFBRM1014-100 SFBRM1014-110 DMI	RJ-45 100m *(328ft)*	SC, 100Base-LX10 1310nm SM 10 km *(6.2 miles)*
CFBRM1015-100 CFBRM1015-110 DMI SFBRM1015-100 SFBRM1015-110 DMI *(long haul)*	RJ-45 100m *(328ft)*	SC, 100Base-FX 1310nm SM 40 km *(24.9 miles)*
CFBRM1016-100 CFBRM1016-110 DMI SFBRM1016-100 SFBRM1016-110 DMI *(extra long haul)*	RJ-45 100m *(328ft)*	SC, 100Base-FX 1310nm SM 60 km *(37.3 miles)*
CFBRM1017-100 CFBRM1017-110 DMI SFBRM1017-100 SFBRM1017-110 DMI *(long wave)*	RJ-45 100m *(328ft)*	SC, 100Base-FX 1550nm SM 80 km *(49.7 miles)*
CFBRM1035-100 CFBRM1035-110 DMI SFBRM1035-100 SFBRM1035-110 DMI *(long wave length)*	RJ-45 100m *(328ft)*	SC, 100Base-FX 1550nm SM 120km *(74.6 miles)*

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FBRM copper-to-fiber part numbers, continued

Single-fiber model pairs

The models shown in Table 15 are single-fiber and must be installed in pairs.

Table 15: FBRM10xx-1xx Single-Fiber Model Pairs

Part Number	Port 1: Copper 10/100Base-T	Port 2: Fiber 100Base-FX
CFBRM1029-100** CFBRM1029-110** DMI SFBRM1029-100** SFBRM1029-110** DMI	RJ-45 100m *(328ft)*	SC, 100Base-FX BX-U 1310 nm TX/1550nm RX SM 20 km *(12.4 miles)*
CFBRM1029-101** CFBRM1029-111** DMI SFBRM1029-101** SFBRM1029-111** DMI	RJ-45 100m *(328ft)*	SC, 100Base-FX BX-D 1550 nm TX/1310 nm RX SM 20 km *(12.4 miles)*
CFBRM1029-102*** CFBRM1029-112*** DMI SFBRM1029-102*** SFBRM1029-112*** DIM	RJ-45 100m *(328ft)*	SC, 100Base-FX BX-U 1310 nm TX/1550nm RX SM 40 km *(24.9 miles)*
CFBRM1029-103*** CFBRM1029-113*** DMI SFBRM1029-103*** SFBRM1029-113*** DMI	RJ-45 100m *(328ft)*	SC, 100Base-FX BX-D 1550 nm TX/1310nm RX SM 40 km *(24.9 miles)*

BX-D *(down stream)* BX-U *(up stream)*

Note: The distances for Port 1 listed in Table 15 are typical maximum distances; the physical characteristics of the network dictate actual distances.

**FBRM-100 and -101, -110 and -111 Device pairs require installation in the same network, where one is the local Device and the other its remote peer.

***FBRM-102 and -103, -112 and -113 Device pairs require installation in the same network, where one is the local Device and the other its remote peer.

Continued on next page

FBRM copper-to-fiber part numbers, continued

SFP models

The models shown in Table 16 use SFP *(small form factor pluggable)* Devices sold separately from Transition networks.

Table 16: FBRM1040-1xx *(SFP Models)*

Part Number	Port 1: Copper 10/100Base-T	Port 2: Empty
CFBRM1040-100 CFBRM1040-110 DMI SFBRM1040-100 SFBRM1040-110 DMI	RJ-45 100m *(328ft)*	Empty SFP slot*

Note: The distances for Port 1 listed in Table 21 are typical maximum distances; the physical characteristics of the network dictate actual distances.

*****Compatible SFP transceiver Devices for the FBRM1040-1xx Devices are available from Transition Networks *(sold separately).* See the TN-SFP-xxx series SFP manual # 33308 at www.transiton.com for available options.

FBRM fiber-to-fiber part numbers

FBRM Gbit models

The models shown in Table 17 are dual-fiber port models. The 11x in the model designation means DMI functionality.

Table 17: FBRM13xx-1xx Gbit Models

Part Number	Port 1: Fiber 100Base-FX	Port 2: Fiber 1000Base-SX/LX
CFBRM1313-100 CFBRM1313-110 DMI SFBRM1313-100 SFBRM1313-110 DMI	100Base-FX 1300 nm MM SC 2Km *(1.2 miles)*	SC, 1000Base-SX 850 nm MM 300/500 m *(985/1,640 ft)*
CFBRM1314-100 CFBRM1314-110 DMI SFBRM1314-100 SFBRM1314-110 DMI	100Base-FX 1300 nm MM SC 2Km *(1.2 miles)*	SC, 1000Base-LX 1310 nm SM 10 Km *(6.2 miles)*
CFBRM1315-100 CFBRM1315-110 DMI SFBRM1315-100 SFBRM1315-110 DMI	100Base-FX 1300 nm MM SC 2Km *(1.2 miles)*	SC, 1000Base-LX 1310 nm SM 25 km *(15.5 miles)*
CFBRM1317-100 CFBRM1317-110 DMI SFBRM1317-100 SFBRM1317-110 DMI	100Base-FX 1300 nm MM SC 2Km *(1.2 miles)*	SC, 1000Base-LX 1310 nm SM 65 km *(40.3 miles)*
CFBRM1335-100 SFBRM1335-110 DMI CFBRM1335-100 SFBRM1335-110 DMI	100Base-FX 1300 nm MM SC, 2 Km *(1.2 miles)*	SC, 1000Base-LX 1310 nm SM 120 km *(74.6 miles)*

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FBRM fiber-to-fiber part numbers, continued

Single-fiber models

The models shown in Table 18 are single-fiber models and must be installed in pairs.

Table 18: FBRM13xx-1xx Single Fiber Model Pairs

Part Number	Port 1: Fiber 100Base-FX	Port 2: Fiber 1000Base-SX/LX
CFBRM1329-100* CFBRM1329-110* DMI SFBRM1329-100* SFBRM1329-110* DMI	100Base-FX 1300 nm MM SC, 2 Km *(1.2 miles)*	SC, 1000Base-LX BX-U 1310 nm TX/1490 nm RX SM 20km *(12.4 miles)*
CFBRM1329-101* CFBRM1329-111* DMI SFBRM1329-101* SFBRM1329-111* DMI	100Base-FX 1300 nm MM SC, 2 Km *(1.2 miles)*	SC, 1000Base-LX BX-D 1490nm TX/1310 nm RX SM 20 km *(12.4 miles)*
CFBRM1329-102** CFBRM1329-112** DMI SFBRM1329-102** SFBRM1329-112** DIM	R100Base-FX 1300 nm MM SC, 2 Km *(1.2 miles)*	SC, 100Base-LX BX-U 1310 nm TX/1490 nm RX SM 40 km *(24.9 miles)*
CFBRM1329-103** CFBRM1329-113** DMI SFBRM1329-103** SFBRM1329-113** DMI	100Base-FX 1300 nm MM SC, 2 Km *(1.2 miles)*	SC, 100Base-LX BX-D 1490 nm TX/1310 nm RX SM 40 km *(24.9 miles)*

BX-D *(down stream)* BX-U *(up stream)*

*FBRM-100 and -101, -110 and -111 Device pairs require installation in the same network, where one is the local Device and the other its remote peer.

**FBRM-102 and -103, -112 and -113 Device pairs require installation in the same network, where one is the local Device and the other its remote peer.

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FBRM fiber-to-fiber part numbers, continued

SFP models

The models shown in Table 19 use SFP *(small form factor pluggable)* Devices sold separately from Transition Networks.

Table 19: FBRM1340-1xx *(SFP Models)*

Part Number	Port 1: Copper 10/100Base-T	Port 2: Empty
CFBRM1340-100 SFBRM1340-100	RJ-45 100m *(328ft)*	Empty SFP slot

Note: The distances for Port 1 listed in Table 19 are typical maximum distances; the physical characteristics of the network dictate actual distances.

Note: Compatible SFP transceiver Devices for the FBRM1040-1xx Devices are available from Transition Networks *(sold separately).* See the TN-SFP-xxx series SFP manual # 33308 at www.transiton.com for available options.

BFFG copper-to-fiber part numbers

Standard models

The models shown in Table 20 perform as described in this manual.

Table 20: xBFFGxx-1xx Model Numbers

Part Number	Port 1: Copper 10/100/1000Base-T	Port 2: Fiber 1000Base-X
CBFFG1040-100 SBFFG1040-100	RJ-45 100m *(328ft)*	Empty Slot

Note: The distances for Port 1 listed in Table 20 are typical maximum distances; the physical characteristics of the network dictate actual distances.

Note: Compatible SFP transceiver Devices for the FBRM1040-1xx Devices are available from Transition Networks *(sold separately).* See the TN-SFP-xxx series SFP manual # 33308 at www.transiton.com for available options.

Continued on next page

BFFG fiber-to-fiber part numbers

Gbit models The models shown in Table 21 perform as described in this manual.

Table 21: BFFG13xx-1xx Gbit Models

Part Number	Port 1: Fiber 1000Base-SX	Port 2: Fiber 1000Base-SX/LX
CBFFG1313-100 CBFFG1313-110 DMI SBFFG1313-100 SBFFG1313-110 DMI	SC, 1000Base-SX 850 nm MM 220/550 m *(722/1,804 ft)**	SC, 1000Base-SX 850 nm MM 220/550 m *(722/1,804 ft)*
CBFFG1314-100 CBFFG1314-110 DMI SBFFG1314-100 SBFFG1314-110 DMI	SC, 1000Base-SX 850 nm MM 220/550 m *(722/1,804 ft)* *	SC, 1000Base-LX 1310 nm SM 10 Km *(6.2 miles)*
CBFFG1315-100 CBFFG1315-110 DMI SBFFG1315-100 SBFFG1315-110 DMI	SC, 1000Base-SX 850 nm MM 220/550 m *(722/1,804 ft)* *	SC, 1000Base-LX 1310 nm SM 25 km *(15.5 miles)*
CBFFG1317-100 CBFFG1317-110 DMI SBFFG1317-100 SBFFG1317-110 DMI	SC, 1000Base-SX 850 nm MM 220/550 m *(722/1,804 ft)* *	SC, 1000Base-LX 1310 nm SM 65 km *(40.3 miles)*
CBFFG1335-100 SBFFG1335-110 DMI CBFFG1335-100 SBFFG1335-110 DMI	SC, 1000Base-SX 850 nm MM 220/550 m *(722/1,804 ft)* *	SC, 1000Base-LX 1310 nm SM 120 km *(74.6 miles)*

*220 *(722 ft)*: 62.5/125µ fiber

*550 m *(1,804 ft)*: 50/125µ fiber

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BFFG fiber-to-fiber part numbers, continued

Single-fiber models

The models shown in Table 22 are single-fiber models and must be installed in pairs.

Table 22: BFFG13xx-1xx Single Fiber Model Pairs

Part Number	Port 1: Fiber 1000Base-SX	Port 2: Fiber 1000Base-SX/LX
CBFFG1329-100** CBFFG1329-110** DMI SBFFG1329-100** SBFFG1329-110** DMI	SC, 1000Base-SX 850 nm MM 220/550 m *(722/1,804 ft)**	SC, 1000Base-LX BX-U 1310 nm TX/1490 nm RX SM 20km *(12.4 miles)*
CBFFG1329-101** CBFFG1329-111** DMI SBFFG1329-101** SBFFG1329-111** DMI	SC, 1000Base-SX 850 nm MM 220/550 m *(722/1,804 ft)**	SC, 1000Base-LX BX-D 1490 nm TX/1310 nm RX SM 20 km *(12.4 miles)*
CBFFG1329-102*** CBFFG1329-112*** DMI SBFFG1329-102*** SBFFG1329-112*** DIM	SC, 1000Base-SX 850 nm MM 220/550 m *(722/1,804 ft)**	SC, 100Base-LX BX-U 1310 nmTX/1490 nm RX SM 40 km *(24.9 miles)*
CBFFG1329-103*** CBFFG1329-113*** DMI SBFFG1329-103*** SBFFG1329-113*** DMI	SC, 1000Base-SX 850 nm MM 220/550 m *(722/1,804 ft)**	SC, 100Base-LX BX-D 1490 nm TX/1310 nm RX SM 40 km *(24.9 miles)*

BX-D *(down stream)* BX-U *(up stream)*

*220 *(722 ft)*: 62.5/125µ fiber

*550 m *(1,804 ft)*: 50/125µ fiber

**BFFG-100 and -101, -110 and -111 Device pairs require installation in the same network, where one is the local Device and the other its remote peer.

***BFFG-102 and -103, -112 and -113 Device pairs require installation in the same network, where one is the local Device and the other its remote peer.

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BFFG fiber-to-fiber part numbers, continued

SFP models

The models shown in Table 23 use SFP *(small form factor pluggable)* Devices sold separately from Transition Networks.

Table 23: BFFG1340-1xx *(SFP Models)*

Part Number	Port 1: Fiber 1000Base-SX	Port 2: Empty
CBFFG1340-100 SBFFG1340-100	SC, 1000Base-SX 850 nm MM 220/500 m *(728/1,640 ft)*	Empty SFP slot*

*****Compatible SFP transceiver Devices for the BFFG1340-1xx Devices are available from Transition Networks *(sold separately).* See the TN-SFP-xxx series SFP manual # 33308 at www.transiton.com for available options.

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Appendix B:
FBRM/BFFG Technical Specification

Specifications, notices, and warnings

For use with Transition Networks' Models FBRM and BFFG or equivalent.

Parameter	Description
IEEE Standards	IEEE 802.3-2000 IEEE 802.3ah-2004 clause 57, 58 IEEE 802.1q-2003 IEEE 802.1x-2004 IEEE 802.1D IEEE 802.1P
RFC compliance	See Appendix D
Regulatory Compliance for Emission	EN55022 Class A
Regulatory Compliance for Immunity	EN55024
Safety Compliance	Unit: CE Mark Wall-Mount Power Supply: UL Approved, UL60950, and CSA Certified
Power Consumption	4 watts
MTBF* CFBRM & CBFFG models	141,526 MIL217F2 hours 518,418 Bellcore hours
SFBRM & SBFFG models	39,895 MIL217F2 hours 106,056 Bellcore hours
Power Source	7.5 to 15.9 VDC – Wall-mount AC Adapter or Point System Backplane *(provided)*
Max Frame Size	1628 bytes
Size *(width x height x depth)*	3.3 x 1 x 4.75 in *(83.8 x 25.4 x 120.65 mm)*
Weight	Standalone: 4oz *(113.4 grams)*
Operating Temperature	0 to 45º C *(32 to 113º F)*
Storage Temperature	-25 to 65º C *(-13 to 149ºF)*
Altitude	0-10,000 feet
Operating Humidity	5% to 95% *(non-condensing)*

MTBF criteria

*MTBF is estimated using the predictability method. This method is based on MIL-104°F at 40°C ambient temperature, typical enclosure heat rise of 10°C, and nominal operating conditions and parameters. Installation and configuration specific MTBF estimates are available upon request: Contact Technical Support.

Continued on next page

Specifications, notices, and warnings, continued

Notices

- The information in this user's guide is subject to change. For the most up-to-date information on the FBRM/BFFG Devices, see the user's guide on-line at: www.transition.com**.**
- Product is certified by the manufacturer to comply with DHHS Rule 21/CFR, Subchapter J applicable at the date of manufacture.
- IMPORTANT Copper based media ports: e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are intended to be connected to intra-building *(inside plant)* link segments that are not subject to lightening transients or power faults.

CAUTION: Copper-based media ports, e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are NOT to be connected to inter-building *(outside plant)* link segments that are subject to lightening transients or power faults. Failure to observe this caution could result in damage to equipment.

Warnings

WARNING: Visible and invisible laser radiation when open: DO NOT stare into the beam or view the beam directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

WARNING: Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

WARNING: If the media Device is an IEEE802.3-2005 Powered Device (PD) capable of receiving power via the Medium Dependent Interface (MDI) leads, the power source, connector, and cabling attached to the barrel power connector must meet the isolation requirement specified in IEEE802.3-2005. Failure to observe this warning could result in an electrical shock.

IMPORTANT

The xFBRM/xBFFG Device product family is not compatible with the CPSMM-200 and CPSMM-210 management modules when they are used in a cascaded application. The xFBRM/xBFFG can be installed in the "master" chassis with the CPSMM-200, but they can not be installed in a cascaded chassis using the CPSMM-210.

Alternatively, the xFBRM/xBFFG can be used with the CPSMM-120 base management module, which does not support cascading of the chassis.

Appendix C:
Device Commands & Descriptions

Command	Descriptions
arp	Displays the arp cache.
clear counter	Clears counters on all ports or on a specific port. Usage: clearcounter **[port=<portno>]**
cls	Clears the screen.
exit	Exits the CLI/Telnet session.
factory defaults	Resets the Device to factory default settings—all current configurations will be erased.
help or ?	Help or ?: Displays the available commands. help <cmd >: Displays the command usage in detail.
ifconfig port=<portno>	Used to configure port parameters. The port number for the configured port must be specified. Valid port numbers start at "1." Usage: **ifconfig port=<portno>** **[adminstate=<enable | disable]** **[autoneg=<enable | disable>]** **[duplex=<full | half>]** **[speed=<10 | 100 | 1000>]** **[portstring=<"value">(*max=64*)]** **[iptraffic=<enable | disable>]** The configurable parameters are as follows: adminstate: The port can be disabled or enabled. autoneg: Enable/disable Auto-Negotiation on this port. duplex: When Auto-Negotiation is disabled, Duplex Mode of the port can be set to full/half duplex. speed: The port speed can be set to 10/100 Mbps when Auto-Negotiation is disabled. portstring: A unique name can be assigned to each port. iptraffic: The IP traffic can be enabled/disabled on each port individually.

Continued on next page

Command	Description
ifoam port=<portno>	OAM configuration for the specified port. Usage: **ifoam port=<portno>** **[oam=enable | disable]** **[oammode=active | passive]** **[oamrmtloop=enable | disable]** OAM: OAM can be enabled/disabled. Oammode: OAM Mode can be set to Passive/Active Mode. Oamrmtloop: OAM loopback can be enabled/disable on the remote Device peer.
netstat	Displays all active and passive sockets.
ping	Pings the host to check if it is reachable using ICMP requests.
ps	Displays the system processes.
reboot	Saves the current configuration and reboots the system.
save	Saves the current configuration to non-volatile memory.
set	Sets network settings and system configuration. Usage: **set** **[dhcp=<enable | disable>]** **[ip=nn.nn.nn.nn]** **[netmask=nn.nn.nn.nn]** **[gateway=nn.nn.nn.nn]** **[trapmgr=nn.nn.nn.nn]** **[community=<"value">*(max=64)*]** **[groupstring=<"value">*(max=64)*]** **[radius=<enable | disable)]** **[radiusip=nn.nn.nn.nn]** **[radiussercret=<"value">*(max=64)*]** **[username=<"value">*(max=64)*]** **[password=<"value">*(max=64)*]** **[usb=<enable | disable>]** **[l3capability=<enable | disable)]** **[snmpaccess=<enable | disable)]** **[tftpserver=nn.nn.nn.nn]** **[tftpfile=<"value">*(max=64)*]** **[mgmtvlan=<vlanid>*(2-4096)***
set autoupg	Enable/disable auto upgrade. When enabled, automatically upgrades the firmware. Usage: **set autoupg=<enable | disable>**. This locks/unlocks firmware upgrades from an active OAM Device peer.

Continued on next page

Command	Description
set community	Sets SNMP community name. Usage: **set community=<name>**
set dhcp	Enables/disables DHCP at boot time. In case DHCP failed during initialization, retry using the "restart" option. Usage: **set dhcp=<enable | disable | restart>**
set downloadcfg	Download the system configuration from a TFTP Server. Usage: Usage: **set downloadcfg=<"filename">** **[l3access=<enable | disable>] [ipsetting=<default | nochange>** **Note**: The '**l3access**' and '**ipsetting**' are options to turnOFF IP access once the upgrade is done, and to change the IP address, subnet and gateway to factory defaults.
set forceupg	Enable/disable forcing a firmware upgrade of the peer on specified port, automatically. Usage: **set forceupg port=<portno>**
set gateway	Sets gateway address. Usage: **set gateway=nn.nn.nn.nn**
set groupstring	Sets group string for the system. Usage: **set groupstring=<"name">** ***(max=64)***
set uploadcfg	Sets uploading the system configuration to a TFTP Server. Usage: **Usage: set uploadcfg=<"filename">**
set downloadcfg	Sets Downloading the system configuration from a TFTP Server. Usage**: Usage: set**
set ip	Sets IP address. Usage: **set ip=nn.nn.nn.nn**
set l3capability	Enables/disables all layer-3 traffic. Usage: **set l3capability=<enable | disable>**
set mgmtvlan	Sets management VLAN ID for management traffic. Usage: **set mgmtvlan=<vlanid>**
set niecho	Sets the number of echo frames to be sent, and start the non-intrusive echo frame generation on the interface. Usage**: set niecho port=<portno> count=<1-100>**
set autoupg	Enable/disable auto upgrade. When enabled, Auto firmware upgrade be done. Usage: **set autoupg=<enable | disable>**
set forceupg	Enable/disable Forcing Auto firmware upgrade on Peer on specified port Usage: **set forceupg port=<portno>**

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Command	Description
set slpt	Enable/disable Selective Link pass through. Usage: **set slpt=<enable | disable>**
set tlpt	Enable/disable Transparent Link pass through. Usage: **set tlpt=<enable | disable>**
set 12cp	Sets the L2CP protocol diposition per port if 'port' is given, else sets all ports forwarding rule for that protocol. Usage: **set l2cp="<stp | slow | dot1x | elmi | lldp | bmgmt | garp | other>" port=<portno> act="<forward | discard>"**
set fiberredund	Sets Enable/disable Fiber Redundancy. Usage: **set fiberredund=<enable | disable>**
Set fiberrevert	Enable/disable Fiber Redundancy revert. Usage: **set fiberrevert=<enable | disable>**
set netmask	Sets subnet mask. Usage: **set netmask=nn.nn.nn.nn**
set orceupg	Enable/disable forcing auto firmware upgrade on the peer of a specified port. Usage: **set forceupg port=<portno>**
set password	Sets password for CLI access through serial port/telnet. This is used when RADIUS is disabled. Usage: **set password=<"value">*(max=64)***
set radius	Enables/disables RADIUS authentication. RADIUS is disabled by default. Usage: set radius=<enable|disable>
set radiusip	Sets RADIUS server IP. Usage: set radiusip=nn.nn.nn.nn
set radiussecret	Sets RADIUS secret shared with the RADIUS server. Usage: set radiussecret=<"value">(max=64)
set snmpaccess	Enables/disables all SNMP access. Usage: set snmpaccess=<enable|disable>
set tftpfile	Sets tftp filename to be downloaded using upgrade with TFTP. Usage: set tftpfile=<"value">(max=64)
set tftpserver	Sets TFTP server IP address to be used for upgrading via TFTP. Usage: set tftpserver=nn.nn.nn.nn
set trapmgr	Sets trap manager address. Usage: set trapmgr nn.nn.nn.nn
set uploadcfg	Uploads the system configuration to a TFTP Server. Usage: set uploadcfg=<"filename">
set usb	Disables the USB port. This disables access through the USB port. It can be enabled using IP-based or Point System management. Usage: set usb=disable

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Command	Description
set username	Sets username for CLI access through serial port/telnet. This username is used when RADIUS is disabled. Usage: **set username=<"value">*(max=64)***
show	Displays all the current configurations at the system level, including installed firmware revisions, network configurations, system uptime, etc.
show version	Shows current version of the firmware build information.
Show redundancy	Shows fiber redundancy settings.
show ifcabletest	Performs cable tests and displays the cable status for all or a specified port. Usage: **show ifcabletest port=<all | port no>**
show ifconfig	Displays port configurations, including speed, duplex, and IP access for a specified port, or all ports. Usage: **show ifconfig [port=<all | port no>]**
show ifoam	Displays OAM configuration and status for all or a specified port. Usage: **show ifoam [port=<all | port no>]**
show ifrmonstats	Displays RMON statistics for all or a specified port. Usage: **show ifrmonstats [port=<all | port no>]**
show ifstats	Displays port statistics for all or a specified port. Usage: **show ifstats [port=<all | port no>]**
show oamloopback	Displays OAM Loopback status for all or a specified port. Usage: **show oamloopback [port=<all | port no>]**
show niecho	Displays Non-intrusive echo generation status for all or specified port Usage: **show niecho [port=<all | port no>]**
show 12cp is (L2cp)	Displays L2CP disposition for all or specified port Usage: **show l2cp [port=<all | port no>]**
show oampeer	Displays OAM peer information for all or a specified port. Usage: **show oamloopback [port=<all | port no>]**
show oamstatistics	Displays OAM PDU statistics for all or a specified port. Usage: show oamstatistics [port=<all | port no>]

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Command	Description
snmpget	SNMP GET on the OID is performed try "snmpget help" for more information. Usage: **snmpget [oid=1.2.3.4 | variable=<leaf var | tableEntry.x.y>]** • If the 'oid' option is used, the indices should be present for table variables and '0' for leaf variables. • If the 'variable' option is used, the leaf variables can be named as is, the table variables have the following format **<tableentry>.index1.index2** Ex: **snmpget variable=sysUpTime** **snmpget variable=ifEntry.<col>.<ifNumber>**
snmpgetn	SNMP get-next on the OID is performed if there is no OID specified. It uses OID from the last SNMP query, try "snmpgetn help" for more information. Usage: **snmpgetn [oid=1.2.3.4 | variable=<leaf var | tableEntry.x.y>]** • If the 'oid' option is used, the indices should be present for table variables and '0' for leaf variables. • If the 'variable' option is used, the leaf variables can be named as is, the table variables have the following format **<tableentry>.index1.index2.** Ex: **snmpgetn variable=sysContact** **snmpgetn variable=ifEntry ifEntry.<col>.<ifNumber>**
snmpset	SNMP SET on the OID is performed with the value, try "snmpset help" for more information. Usage: **snmpset oid=<x.y.z> type=<STR | IP | INT> value=<value>** • Strings must be enclosed in quotes (“”). If the 'oid' option is used, the indices should be present for table variables and '0' for leaf variables. • If the 'variable' option is used, the leaf variables can be named as is, the table variables have the following format **<tableentry>.index1.index2** Ex: **snmpset variable=sysContact type=STR value="techsupport@transition.com"** **snmpset variable=ifEntry.2.<ifNumber> type=STR value="Interface 1."**

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Command	Description
snmpwalk	SNMP walk of the entire MIB tree if no options are specified or from OID from the last query if 'continue' is specified. **Usage: snmpwalk <continue>**
sys	The system group variables of MIB-II can be configured using the 'sys' command. The system contact, name, and location can be set. Usage: **sys** **[contact=<"value">*(max=64)*]** **[name=<"value">*(max=64)*]** **[location=<"value">*(max=64)*]**
tftpupgrade	Upgrades the firmware running on the Device using TFTP protocol. The tftp server IP and tftp filename should be configured using the "set" command, or can be given as arguments to this command. Usage: t**ftpupgrade erver=nn.nn.nn.nn filename=<"filename">**
xmodemupgrade	Upgrades the firmware running on the Device, using XModem protocol. The command invokes the bootloader and start an XModem transfer to upgrade the firmware.

Appendix D:
IP-Based and Chassis Management Parameters

IP- and chassis-based management

The chassis Device version of the Devices plugs into a Point System chassis to provide management through the I^2C interface: SNMP and web-based management through the MMU. SNMP management is based on the Transition Networks enterprise MIBs. The chassis-based management *(via the MMU)* provides a subset of the IP-based management via ports. Tables 26, 27, and 28 present IP- and chassis-based configuration management parameters.

Note: The ✓ mark means available; a blank cell means not available.

Table 24: System Configuration Parameters

Parameter	IP based	Chassis	Description
BootLoader Version	✓	✓	The currently installed version of the Bootloader.
Config Match	✓	✓	Configuration management match.
Default Gateway	✓	✓	The gateway in a network that will be used to access another network if a gateway is not specified for use.
DHCP	✓	✓	DHCP *(Dynamic Host Configuration Protocol)* Enable/disable DHCP to obtain IP, subnet mask, and gateway data upon reboot.
Firmware Version	✓	✓	The currently installed version of the firmware.
IP Address	✓	✓	IP address of the Device.
IP Traffic Access	✓	✓	Enable/disable IP Traffic to the Device.
MAC Address	✓	✓	The MAC address is a unique identifier attached to most network adapter NICs. It is a number that acts like the name for a particular network adapter.
Management VLAN ID	Thru CLI only	✓	When 802.1q is enabled, the administrator can configure VLAN IDs used for all management traffic to and from the Device via the CLI or through the chassis management agent.
Marketing Revision	✓	✓	Marketing revision.
RADIUS Authentication	✓		Enable/disable RADIUS authentication. When enabled, the user is authenticated during login at the CLI or web interface.

Continued on next page

Table 26: System Configuration Parameters *(continued)*

Parameter	IP based	Chassis	Description
RADIUS Retry	✓		Retries after a network failure.
RADIUS Secret	✓		The shared secret between this Device and the RADIUS server.
RADIUS Server Address	✓		The IP address of the RADIUS server is used to get user information during authentication.
RADIUS timeout	✓		Timeout for each attempt to contact the server.
Serial Access	✓	✓	Enable/disable USB port access.
Serial Number	✓	✓	Serial number of the chassis that the Device is installed.
SNMP Access	✓	✓	Enable/disable SNMP management.
SNMP Trap Mgr	✓	✓	SNMP trap manager IP address.
Subnet Mask	✓	✓	Determines where the network number in an IP address ends and the node number in an IP address begins.
TFTP Filename	✓	✓	The filename used to upgrade, using TFTP *(local Device only)*.
TFTP Server Address	✓	✓	TFTP server IP address to use for firmware upgrades *(local Device only)*.
TFTP upgrade	✓	✓	Initiates TFTP firmware upgrades *(local Device only)*.
Transparent Link Pass-Through	✓	✓	Enable/disable TLPT. TLPT causes the loss of link on one side of a Device to be passed through to the other side so that the upstream Device can see fault conditions that would otherwise be hidden by Devices. **Note:** TLPT requires Auto-Negotiation to be enabled on the twisted pair interface.

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Table 25: Media Device Parameters

Parameter	IP based	Chassis	Description
Aging Time *(Forwarding DB)*	✓		The aging time *(in seconds)* for entries in the forwarding database of the switch.
Factory Defaults	✓	✓	This erases all configuration data and sets the Device to factory default settings.
Flush FDB	✓		Flushes all forwarding database entries.
Flush VLAN DB	✓		Flushes all VLAN database entries.
Histogram Mode	✓		This determines what frame types are accounted for in the port counters. The choices are “count only RX frames” or TX frames or both.
IEEE Priority class 'n' [0-7]	✓		IEEE 802.1p priority mapping. The value in this field is used as the priority of the frame if it has the tag ‘n.’
IP Traffic class 'n' [1-64]	✓		IP priority remapping. The value in this field is used as the priority of the frame if its IP TOS bits have a traffic class value between 0x00 and 0xE0, with 1 --> 0x00, 2 --> 0x04,...64 --> 0xE0.
Reset Counters	✓	✓	Resets all port counters to zero.

Table 26: Port Configuration Parameters

Parameter	IP based	Chassis	Description
Admin Status	✓	✓	The administrative status of the interface should be enabled for normal operation. When the admin state is disabled, the port goes into listening mode, the link will be UP, but the interface does not forward frames.
Advt 10 Full Duplex	✓	✓	Enable/disable advertising full duplex and 10Mbps capability on this port.
Advt 10 Half Duplex	✓	✓	Enable/disable advertising half duplex and 10Mbps capability on this port.
Advt 100 Full Duplex	✓	✓	Enable/disable advertising full duplex and 100Mbps capability on this port.
Advt 100 Half Duplex	✓	✓	Enable/disable advertising half duplex and 100Mbps capability on this port.
Advt Pause capability	✓	✓	Enable/disable advertising Pause capability on the interface.

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Table 28: Port Configuration Parameters *(continued)*

Parameter	IP based	Chassis	Description
Autocross	✓	✓	When enabled, detects and configures the twisted pair port on the Device to the correct MDI or MDI-X configuration automatically.
Auto-Negotiation	✓	✓	Allows Devices to configure themselves automatically to achieve the best possible mode of operation over a link.
Connector Type	✓	✓	Connector type of the port.
DA Priority Override	✓		When enabled, the DA *(destination address)* of the frame is used to get a hit on the address database with an entry matching the DA when priority override is enabled. The priority specified in the entry is the new priority of the frame. The DA override has a higher priority than the default priority of the frame, IP TOS, IEEE Priority tags, VTU override, and SA override. Normal frame priority processing occurs when disabled.
Default Forward	✓		When enabled, multicast frames with unknown destination addresses are allowed to 'egress' this port if VLAN is enabled. The VLAN setting also allows this port to 'egress.'
Default Priority	✓		The default priority of the frames entering the port when no other priorities are assigned and enabled.
Default VLAN ID	✓		When IEEE 802.1q is enabled, the default VID is used as the IEEE tagged VLAN ID to un-tag or priority tag frames when they 'egress of this port.
Description String	✓		Group string for this port with the maximum length of 64 characters.

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Table 28: Port Configuration Parameters *(continued)*

Parameter	IP based	Chassis	Description
Discard Tagged	✓		When enabled, all non-management frames processed as tagged are discarded. If double tagging is enabled, then this check is performed after Ingress double tag removal. Frames with priority and VLAN of "0" are considered tagged.
Discard Untagged	✓		When enabled, all non-management frames processed as untagged are discarded. If double tagging is enabled, then this check is performed after Ingress double tag removal. Frames with priority and VLAN of "0" are considered tagged.
Discard Untagged	✓		When enabled, all non-management frames processed as untagged are discarded. If double tagging is enabled, then this check is performed after 'ingress' double tag removal. Frames with priority and VLAN of "0" are considered tagged.
Double Tagging	✓		This enables 'ingress' double-tagging. It is a way to isolate one VLAN from another VLAN hierarchically. When enabled, also enables 'egress' double tagging. In this mode, the Ingress port removes the first IEEE 802.3ac tag that appears after the source address. If a frame is untagged, it is not modified. If it is single tagged it is removed; if it is double tagged, the first tag is removed.
Duplex	✓	✓	The Duplex Modeof the port *(half/full*).
Egress Monitor Port	✓		When enabled, all 'egress' frames that come from this port are sent to the 'egress' monitor destination port *(sfbrm100SwEgressMonPort)*.

Continued on next page

Table 28: Port Configuration Parameters *(continued)*

Parameter	IP based	Chassis	Description
Egress Rate	✓	✓	Controls the effective port transmission rates. The rate limit is provided as a list of pre-defined values: . noLimit(1) . rate64K(2) . rate96K(3) . rate128K(4) . rate160K(5) . rate192K(6) . rate224K(7) . rate256K(8) . rate320K(9) . rate384K(10) . rate512K(11) . rate768K(12) . rate1M(13) . rate1_2M(14) . rate1_5M(15) . rate2M(16) . rate3M(17) . rate4M(18) . rate5M(19) . rate8M(20) . rate10M(21) . rate20M(22) . rate30M(23) . rate40M(24) . rate60M(25) . rate80M(26)
Far-End Fault Indication	✓	✓	Far-End Fault (FEF) is a troubleshooting feature on the 100Base-TX port
Force Def VLAN ID	✓		When enabled, forces all ‘ingress’ frames with IEEE 802.3ac tags to have replacement VLAN IDs in the frame with the port's default VID. This is valid only if IEEE 802.1q is enabled.

Continued on next page

Table 28: Port Configuration Parameters *(continued)*

Parameter	IP based	Chassis	Description
Forward Unknown	✓		When enabled, unicast frames with unknown destination addresses are allowed to 'egress' this port if VLAN is enabled. The VLAN setting also allows this port to 'egress.'
IEEE Priority class 'n' [0-7]	✓		The priority remapping for frames that 'ingress' this port. The IEEE tagged frames with priority 'n' get this new remapped priority inside the switch; also if it egresses this port as tagged, the priority is set in the tag.
IGMP Snoop	✓		This enables IGMP frame forwarding to the CPU. IGMP is not supported in the present release.
Ignore Loopback	✓	✓	This corresponds to the EFM OAM MIB. It decides whether the OAM loopback on this port should be ignored.
Ignore Wrong Data	✓		This is related to the Port Lock. Enabling this parameter will stop source-address violations caused by Port Lock.
Ingress Limit mode	✓	✓	This determines what kinds of frames are limited and counted against 'ingress' limiting. Frames not limited by this setting are not counted against the limit.
Ingress Monitor Port	✓		When enabled, all 'ingress' frames are sent to the 'ingress' monitor destination port *(sfbrm100SwIngressMonPort)*.
IP Traffic	✓		When disabled, all IP traffic through this port to the CPU is restricted.
Link Partner Autoneg ability	✓		Speed and duplex capabilities of the Link Partner.
Link Partner Pause ability	✓		Pause frame capabilities of the Link Partner.
Link Status	✓	✓	The link status of the port.

Continued on next page

Table 28: Port Configuration Parameters *(continued)*

Parameter	IP based	Chassis	Description
OAM Mode Control	✓	✓	This determines how the OAM Modefor ports is configured *(manual/auto)*: • In auto mode, the port defaults to active if in a chassis; passive if a standalone. • In manual mode, the user can choose the OAM mode, using the EFM HUB MIB under the TN private MIB tree.
OAM State	✓	✓	Enable/disable IEEE 802.1ah OAM management on this port.
Port Index	✓		The index of the port in sfbrm100PortTable.
Port Lock	✓		IEEE 802.1x MAC authentication. All non-management frames received on this port are discarded if the source address is not in the learned-address database; this could cause continuous MAC address violation. To prevent this, an entry with all port vectors as '0' can be added to the address database. This disables learning new source addresses.

Continued on next page

Table 28: Port Configuration Parameters *(continued)*

Parameter	IP based	Chassis	Description
Pri0 Ingress Rate	✓	✓	Rate limit for Priority "0" frames. The rate limit is provided as a list of pre-defined values: . noLimit(1) . rate64K(2) . rate96K(3) . rate128K(4) . rate160K(5) . rate192K(6) . rate224K(7) . rate256K(8) . rate320K(9) . rate384K(10) . rate512K(11) . rate768K(12) . rate1M(13) . rate1_2M(14) . rate1_5M(15) . rate2M(16) . rate3M(17) . rate4M(18) . rate5M(19) . rate8M(20) . rate10M(21) . rate20M(22) . rate30M(23) . rate40M(24) . rate60M(25) . rate80M(26)
Pri1 Ingress Rate Control	✓	✓	Rate limit for Priority "1" frames to be the same or twice that of the Priority "0" frames.
Pri2 Ingress Rate Control	✓	✓	Rate limit for Priority "2" frames to be the same or twice that of the Priority "1" frames.

Continued on next page

Table 28: Port Configuration Parameters *(continued)*

Parameter	IP based	Chassis	Description
Pri3 Ingress Rate Control	✓	✓	Rate limit for Priority "3" frames to be the same or twice that of the Priority "2" frames.
Remote Loopback	✓	✓	Enable/disable OAM loopback on the remote.
Reset Port Counters	✓	✓	Resets the port counters.
SA Priority Override	✓		When enabled, the source address of the frame is checked against the address database entry with the matching source address with priority override enabled. When there is a match, the fame priority is the one found in the entry. The source address priority override has a higher priority than the default frame priority, IP TC, IEEE priorities, and the VLAN priority override values. Normal frame priority processing occurs when disabled.
Speed	✓	✓	The speed in Mbps for this interface. It is the resolved speed when Auto-Negotiation is enabled or the manually set the value when Auto-Negotiation is disabled.
Use Both Traffic class	✓		When a frame has an IEEE 802.ac tag and an IP TOS, then this depends on which priority is chosen, IP TOS or IEEE tag when both sfbrm100PortUseIPTC and sfbrm100PortUseTagTC are enabled.
Use IP Traffic class	✓		This enables the IP Traffic class priority if present. If disabled, the TOS bits are ignored.
Use Tag Traffic class	✓		This enables the IEEE 802.1p priority if the frame is IEEE 802.3ac tagged, or else it is ignored even if the tag is present.

Continued on next page

Table 28: Port Configuration Parameters *(continued)*

Parameter	IP based	Chassis	Description
Virtual Cable Test	✓	✓	The virtual cable test determines the quality of the cable, connectors, and terminations. Problems such as opens, shorts, and cable impendence mismatch can be diagnosed with this test.
VLAN Status	✓		802.1q VLAN can be disabled or enabled along with setting the following options: Secure: The VLAN ID must be contained in the VLAN database (Db) and the 'ingress' port must be a member of the VLAN or else it will be discarded. Check: The VLAN ID must be contained in the VLAN Db or the frame will be discarded. Fallback: The frames are not discarded if their VLAN ID is not in the VLAN Db. In all the above cases, the frames are allowed to exit ports that are members of the frame's VLAN, including the source port's VLAN table *(sfbrm100PortBasedVLANTbl)*. Also, frames that do not have a VLAN ID in the Db can exit only ports in the VLAN table. Disabled: 802.1q is disabled.
VLAN Table	✓		This is a bitmap that restricts the output ports that this input port can send frames to. To send frames through port '2,' bit '2' of this value must be set to '1.'
VLAN Tunnel	✓		When enabled, frames that have a source address in the forwarding database are allowed to bypass Port-based VLAN, IEEE 802.1q VLAN and trunk masking.

Continued on next page

Table 28: Port Configuration Parameters *(continued)*

Parameter	IP based	Chassis	Description
VTU Priority Override	✓		When enabled, the port checks the frames for VLAN IDs that have the VTU Priority override bit set in the VLAN database. It then replaces the priority of the frames with the priority specified in the VLAN entry, which has a higher priority than the default of the frame and IP/IEEE priorities. Normal frame priority processing occurs when disabled.

Static MAC and VLAN tables

The static MAC and VLAN tables are supported only through IP-based management and not through chassis-based management. The chassis supports RMON MIB counters only on ports. The IP-based management supports public MIB counters such as RMON, IFmib. Ether-like MIB, EFM OAM HUB MIB, and port counters directly from the switch.

Note: The MIBs used by the chassis agent for the FBRM/BFFG Device and the MIB used by IP-based management are different.

The chassis agent does not support the EFM hub MIB. If the remote Device is OAM capable, but not a FBRM/BFFG Device from Transition Networks, the EFM hub MIB will be queried for OAM status.

Appendix E:
Request for Comment (RFC) Compliance

RFC compliance

The following is a list of RFC compliances.

[IP] Postel, J. "Internet Protocol DARPA Internet Program Protocol Specification", RFC 791, USC Information Sciences Institute, September 1981.

[ICMP] J. Postel "Internet Control Message Protocol. RFC 792, September 1981.

[ARP] Plummer, David C., "An Ethernet Address Resolution Protocol", RFC 826. Symbolics Inc., November 1982.

[UDP] Postel, J., "Use Datagram Protocol", RFC 768. USC Information Sciences Institute, August 28, 1980.

[TCP] Postel, J., "Transmission Control Protocol DARPA Internet Program Protocol Specification", RFC 793. USC Information Sciences Institute, September 1981.

[950] Mogul, J. and Postel, J., "Internet Standard Subnetting Procedure", RFC 950. Network Working Group, August 1985.

[1122] Braden, R., "Requirements for Internet Hosts - Communications Layers", RFC 1122. Internet Engineering Task Force, October 1989.

[1123] Braden, R., "Requirements for Internet Hosts - Application and Support", RFC 1123. Internet Engineering Task Force, October 1989.

[DHCP] Droms, R., "Dynamic Host Configuration Protocol", RFC 2131. Bucknell University, March 1997.

[HTTP] Fielding, R. et al, "Hypertext Transfer Protocol - HTTP/1.1", RFC 2616. Network Working Group, June 1999.

[2617]Franks, J. et al, "HTTP Authentication: Basic and Digest Access Authentication", RFC 2617. Network Working Group, June 1999.

[2396]Berners-Lee, T. et al, "Uniform Resource Identifiers (URI): Generic Syntax", RFC 2396. MIT, August 1998.

[Telnet] Postel, J. and Reynolds, J., "Telnet Protocol Specification", RFC 854. USC Information Sciences Institute, May 1983.

Continued on next page

RFC compliance *(continued)*

[TFTP] Sollins, K., "The TFTP Protocol *(Revision 2)*", RFC 1350. MIT, July 1992.

[SMTP] Klensin, J. ed., "Simple Mail Transfer Protocol", RFC 2821. AT&T Laboratories, April 2001.
[SNMP] Case, J. et al, "A Simple Network Management Protocol (SNMP)", RFC 1157.

[1213] Management Information Base for Network Management of TCP/IP-based internets: MIB-II

[1493] Definitions of Managed Objects for Bridges. RFC 1493

[2674] Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering and Virtual LAN Extensions. RFC 2674

[2819] Remote Network Monitoring Management Information Base. RFC 2819

[2863] The Interfaces Group MIB. K. McCloghrie, F. Kastenholz. June 2000, RFC 2863

[3635] Definitions of Managed Objects for the Ethernet-like Interface Types. RFC 3635

Index