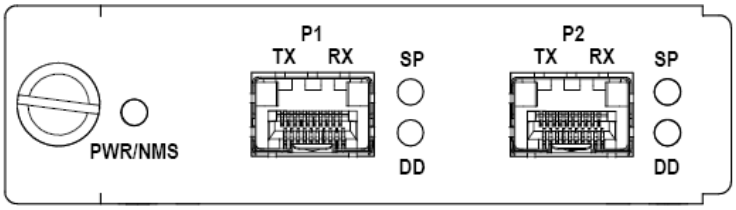
FC400

Fiber Channel Repeater
with Fiber Driver Management

User Guide
Revision A3



July 3, 2007

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1 Preliminary Considerations

1.1 Trademarks

All trademarks are the property of their respective holders.

1.2 Copyright

MRV Communications reserves the right to make changes to products and documentation without notice in order to improve reliability, function, or design. The user assumes sole responsibility for applying the information supplied herein.

1.3 Customer Support

Before contacting customer support, look for software updates, technical specifications, and frequently asked questions (FAQ) online at the MRV support website: http://service.mrv.com.
The website includes information regarding software updates, technical specifications, and frequently asked questions (FAQ) as well as contact information.

Contact help online by sending email to support@mrv.com or through the website request link at http://service.mrv.com/support/forms/supportcall.cfm

For direct MRV customer support by telephone, call your local sales representative, system engineer, or one of the following numbers.

MRV Americas (US, Canada, and Latin America)	+1-800-435-7997
	+1-978-952-4888
MRV Europe	+49-6105-2070
MRV International	+972-4-993-6200

Include the following important information when opening a support case.

- Site ID or company name
- Contact information
- Model or product name
- Serial number
- Top assembly revision (see label on board)
- Brief problem or question including a description of the host network environment
- Attenuation data for applicable high-speed fiber links
- Urgency of the issue

1.4 MRV Regulatory Compliance

Contact your sales representative for more regulatory compliance information regarding specific MRV products or product families.

Fiber Driver Chassis
Compliance: FCC Part 15 (Class A); IC (Class A); EMC Directive: Emission (Class A) and Immunity; LVD Directive: Electrical Safety; CE Marking; TUV CUE Mark (Canada, USA, EU); GOST; RoHS Directive, WEEE Directive: Wheelie Bin Mark; ETSI, NEBS, C-Tick (selected products)

Fiber Driver Modules
Compliance: FCC Part 15 (Class A); IC (Class A); EMC Directive: Emission (Class A) and Immunity; LVD Directive: Electrical Safety; RoHS Directive, WEEE Directive: Wheelie Bin Mark; ETSI

Optical Transceivers
Compliance: FCC Part 15 (Class A); IC (Class A); EMC Directive: Emission (Class A) and Immunity; LVD Directive: Electrical Safety; CE Marking; TUV; UL, CSA, RoHS Directive, ETSI, NEBS, compliant with EN 60825-1/A1:2002 Safety of Laser Products

China RoHS Disclosure　　中国 RoHS 声明

Component Name 部件名称	Pollution Control Logo 污染控制标志	Hazardous Substance Name 有毒有害物质或元素					
		Lead 铅 (Pb)	Mercury 汞 (Hg)	Cadmium 镉 (Cd)	Hexavalent Chromium 六价铬 Cr (VI)	Polybrominated Biphenyls 多溴联苯 (PBB)	Polybrominated Diphenyl Ethers 多溴二苯醚 (PBDE)
Fiber Driver Chassis, Modules and Accessories 光纤驱动器机箱, 组件和附件		X	O	O	O	O	O
Pluggable Optics 插入式光学器件		X	O	O	O	O	O
Power Supplies 电源		X	O	O	O	O	O

O: Indicates that this hazardous substance contained in all of the homogeneous materials for this component is below the limit requirement in SJ/T11363-2006.

O: 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。

X: Indicates that this hazardous substance contained in at least one of the homogeneous materials used in this component is above the limit in ST/T11363-2006. Contain lead in solder.

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求，焊锡中含铅。

Table of Hazardous Substances Name and Concentration　有毒有害物质名称及含量的标识格式

1.5 General Safety

1.5.1 Cautions and Warnings

Disconnect all power from electronic devices before servicing. Some equipment may have multiple power cords requiring disconnection.

1.5.2 Laser Safety

WARNING: Fiber optic equipment may emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to a laser light source.

CAUTION: Do not install or terminate fibers when a laser may be active.

WARNING: Never look directly into a live optical fiber. Always wear appropriate laser safety glasses when working with open fiber cables that might be connected to an operational laser transmitter. Direct open fibers ends away from faces.

CAUTION: Use of controls or adjustments or performing procedures other than those specified herein may result in hazardous radiation exposure.

If a fiber optic laser device output is recognized as a higher than Class 1 product (Class 1M, for example), the device is evaluated, labeled, and certified by TUV. Class 1 and 1M outputs are not considered hazardous, but laser safety practices should always be observed.

A fiber optic transceiver emits either single-mode or multi-mode light into a fiber optic strand. Take the following precautions when handling optical fibers.

- Wear safety glasses when you install optical fibers.
- Be aware of the risk of laser radiation exposure.
- Because transmitted light is invisible to the human eye, always assume that a fiber optic transceiver is on and operational.
- Never look directly into a beam (T_X part of a transmitter) or open fiber ends. The invisible light can damage your eyes.
- Place optical fibers in a safe location during installation.
- Protect optical fiber connectors with clean dust caps for safety and cleanliness.
- Follow the manufacturer instructions when using optical test equipment.

1.5.3 Static Electricity

Eliminate static electricity in the workplace by grounding operators, equipment, and devices including components and computer boards. Grounding prevents static charge buildup and electrostatic potential differences. Transporting products in special electrostatic shielding packages reduces electrical field damage potential.

1.5.4 Workplace Preparation

A safe and effective workplace provides the following items.

- ESD protective clothing/smocks: Street clothing must not come in contact with components or computer boards since the various materials in clothing can generate high static charges. ESD protective smocks, manufactured with conductive fibers, are recommended.
- Electrostatic shielding containers or totes: These containers (bags, boxes, etc.) are made of specially formulated materials, which protect sensitive devices during transport and storage.
- Antistatic or dissipative carriers: These provide ESD protection during component movement in the manufacturing process. It must be noted that antistatic materials alone will not provide complete protection. They must be used in conjunction with other methods such as totes or electrostatic shielding bags.
- Dissipative tablemat: The mat should provide a controlled discharge of static voltages and must be grounded. The surface resistance is designed such that sliding a computer board or component across its surface will not generate more than 100 V.
- Operator grounding: Keep a wrist strap or ESD cuff in constant contact with bare skin with a cable for attaching it to the ESD ground. The wrist strap drains off the static charge of the operator. The wrist strap cord has a current-limiting resistor for personnel safety. Wrist straps must be tested frequently to ensure that they are undamaged and operating correctly. Use special grounding heel straps or shoes when a wrist strap is impractical. These items are effective only when used in conjunction with a dissipative floor.
- ESD protective floor or mat: The mat must be grounded through a current-limiting resistor. The floor or mat dissipates the static charge of personnel approaching the workbench. Special conductive tile or floor treatment can be used when mats are not practical or cause a safety hazard. Chairs should be conductive or grounded to the floor with a drag chain.

1.6 Specific Document Information

Document Number: P/N 3010001-001 Rev A3

Document: FC400 User Guide

Release Date: July 3, 2007, 3:19:06 PM

1.7 Latest Revision and Related Documents

The latest revision of MRV documents may be found at http://www.mrv.com.

Release Notes for Fiber Driver products are produced as required.

MegaVision User Guide: Describes management of Fiber Driver modules and other MRV Communications SNMP manageable products using MRV Communication's MegaVision® Pro® Network Management System.

EM316LNXNM-OT User Guide: Linux-based Fiber Driver network management module.

2 Product Overview

The FC400 transparent repeater contains two MSA compliant SFP sockets connected back-to-back. The module is considered transparent because the traffic is not modified as it passes internally from receiver to transmitter. The FC400 supports speed ratings of 1, 2, and 4 Gbps where speed-matching or multi-rate SFPs are required in both ports. The module includes a clock data recovery (CDR) mechanism which locks onto a data stream with no configuration change at 4 Gbps or the primary harmonics at 1 Gbps or 2 Gbps. The FC400 repeater supports hot-swapping, and it is managed in a powered Fiber Driver chassis from a network management (NM) module.

The SFP sockets support a wide range of SFP units available from MRV to address any network situation.

- Single-mode
- Multi-mode
- Multi-rate
- Single fiber bi-directional
- Coarse and Dense Wave Division Multiplexing (CWDM and DWDM)

2.1 Management features

2.1.1 Link Integrity Notification (LIN)

LIN propagates an EM316FC400 link failure through the other SFP port link by disabling the transmitter to notify dependent devices of the dropped service.

Accurate link status propagation is especially important in mission critical environments requiring high-availability. If a module link fails, dependent module ports are also disabled. Link status is determined directly through the Rx portion of all ports, sometimes providing further information about the link failure source. EM316FC400 LIN also sends SNMP traps for remote network administration.

The FC400 uses half LIN instead of full LIN. Full LIN might allow both transmitters to shut down if the remote transmitters are also disabled, which would require operator intervention for recovery. This condition is known as a “deadly embrace” or deadlock. Half LIN will disable only one transmitter at a time.

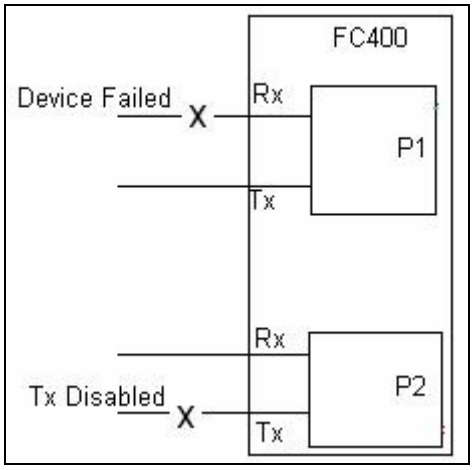


Figure 1 -- Half LIN disables only one port transmitter

The figure above shows a failure of the device connected to P1. The FC400 disables the P2 transmitter to notify devices listening to that port of the P1 link loss. Unlike full LIN, a failure on the P2 port will not allow the EM316FC400 P1 transmitter to disable until the link on that port is reestablished and the P2 transmitter is enabled. With at least one transmitter enabled, the EM316FC400 is never deadlocked.

LIN is supported in both managed and unmanaged modes. It applies globally to the module rather than to individual ports.

LIN is not supported between a copper SFP link and a fiber SFP link. Disable LIN on the module if a copper SFP and an optical SFP are installed.

Refer to Network Management section or online documents for further details regarding LIN.

2.1.2 Loopback

The FC400 module supports loopback either by DIP switch setting or controlled through the CLI or SNMP software settings. Loopback is one way to assure that the fiber optical communication path is healthy. Packets sent to a loopback port should be received by the sender without any modification to the original data packet.

3 Preparation and Installation

3.1 Unpacking the Fiber Driver Module

Follow the steps below as illustrated in the figure.

Step 1. Open the cardboard box.

Step 2. Remove the static bag containing the device.

Step 3. Check for additional accessories in the box that may move beneath the module tray during transit.

In the unlikely event that anything is missing, contact your authorized dealer or representative. If it becomes necessary to return the unit, repackage the unit in its original box.

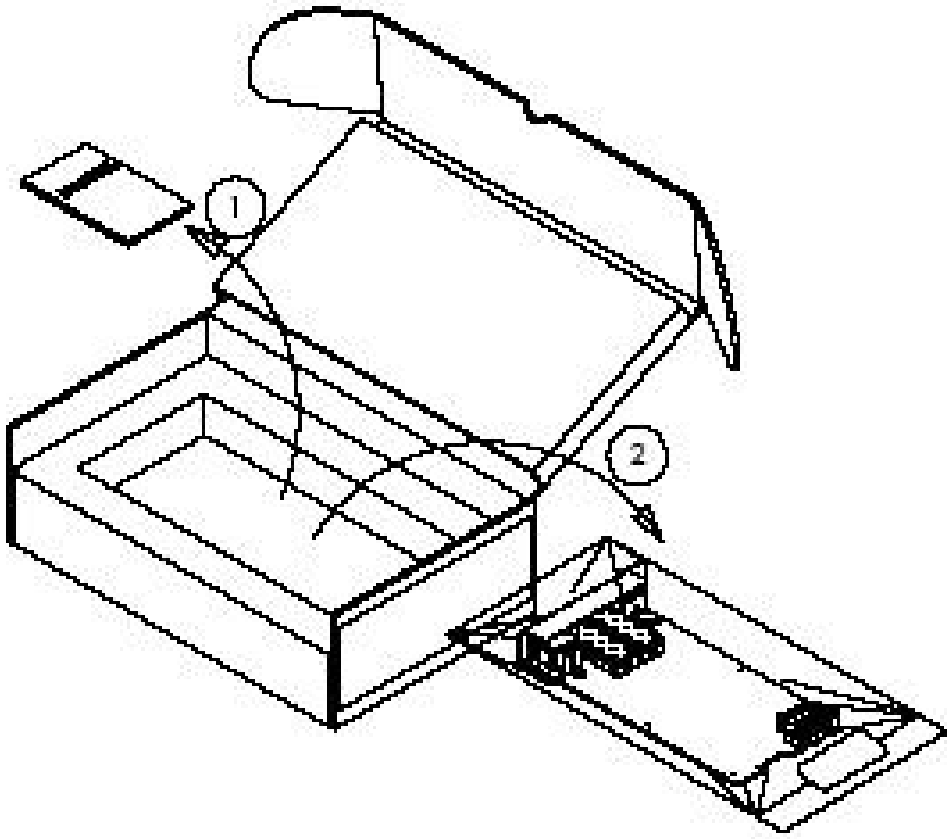


Figure 2 -- Unpacking

3.2 Front Panel Description

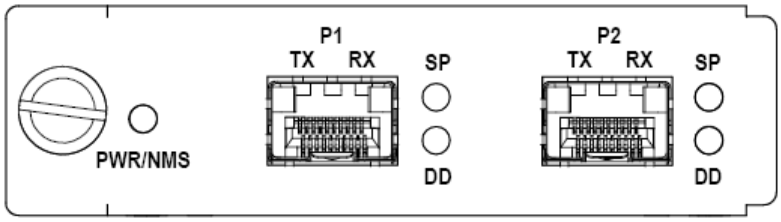


Figure 3 -- Front Panel of the FC400

The FC400 module is equipped with the following interfaces:

Port 1 (P1): SFP port rated 1, 2, or 4 Gbps depending on SFP interface

Port 2 (P2): SFP port rated 1, 2, or 4 Gbps depending on SFP interface

Cable Lengths

The maximum cable length for SFP links is dependent upon the optical characteristic of the SFP transceivers, but independent from the FC400 module.

3.2.1 LED Display Information

PWR/NMS: Indicates power and management support

SP (each port): Indicates presence of an SFP with or without a link signal present.
DD (each port): Digital Diagnostic indicator for the SFP inserted.

LED	Color	Explanation
PWR/NMS	Off	No power to unit
	Green	Power OK; user wire port active
	Green Blink	Loopback mode
SP	Off	No SFP Present
	Green	Signal/Link present
	Amber	SFP inserted, no link/signal present
	Green Blink	Loopback mode
DD	Off	Digital Diagnostics not supported
	Green	No alarm
	Amber	Alarm

Figure 4 -- LED Legend

3.3 Hardware Configuration

The FC400 is factory configured to work “out of the box” with no additional setup required. The latest firmware version and the settings described below are appropriate to most installations.

Network Management = Enabled
LIN = disabled
Loopback = disabled

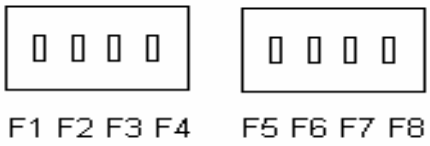
This configuration optimizes the FC400 module in most cases. If it is necessary to modify these settings based on specific user needs, they may be edited through the network management command line interface (CLI) after installation. Network management configuration overrides hardware DIP switch settings except for:

- Network Management Enable

This setting can only be changed using the DIP switch on the FC400 module, regardless of previously card installations and network management configuration.

For additional information and commands regarding board configurations using the CLI, refer to the Network Management section discussing the Command Line Interface.

DIP Switch Settings



DIP Switch Number	Setting	Description
F1	On	Enable Module Loopback
	Off*	Disable Module Loopback
F5	On*	Enable Management
	Off	Disable Management
F6	On	Enable LIN
	Off*	Disable LIN

Figure 5 – DIP switch settings

The asterisks indicate factory default settings. All switches not shown in table 4 are reserved for factory use only. They must remain OFF.

3.4 Module Installation

FC400 cards are hot-swappable, and they are designed to insert into a powered Fiber Driver chassis. Install the FC400 module into a single slot or multiple slot chassis by aligning the edge of the card with the rail of the chassis and hand-tighten the thumb screw.

The thumb screw points to the left in the BU-1, BU-2, BU-3, and BU-4 chassis. The thumb screw points to the bottom in the BU-16 chassis.

Tools

- 6-inch Phillips screwdriver (for some module screws)
- 6-inch flat-tip screwdriver

Procedure

Follow all guidelines to eliminate static electricity while handling the module and other electronic devices. Refer to the front of this manual for some suggestions.

Step 1. Remove blank panels covering target slots by unfastening the screws with a Phillips screwdriver.

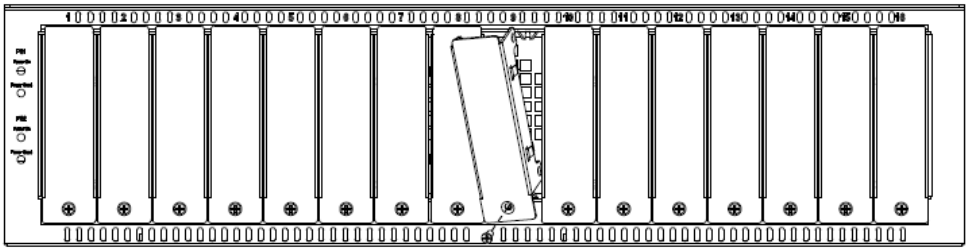


Figure 6 -- Remove the required blank panels

To comply with FCC regulations and to optimize air flow, a cover panel or a module must cover every chassis slot. No chassis slot should remain open when the unit is operational or signals will radiate externally and can cause interference. Securing modules and panels with appropriate screws is also important for grounding and compliance.

Step 2. Install the module inside a Fiber Driver chassis by aligning the edge of the card with the rail of the chassis. Tighten the thumbscrew by hand.

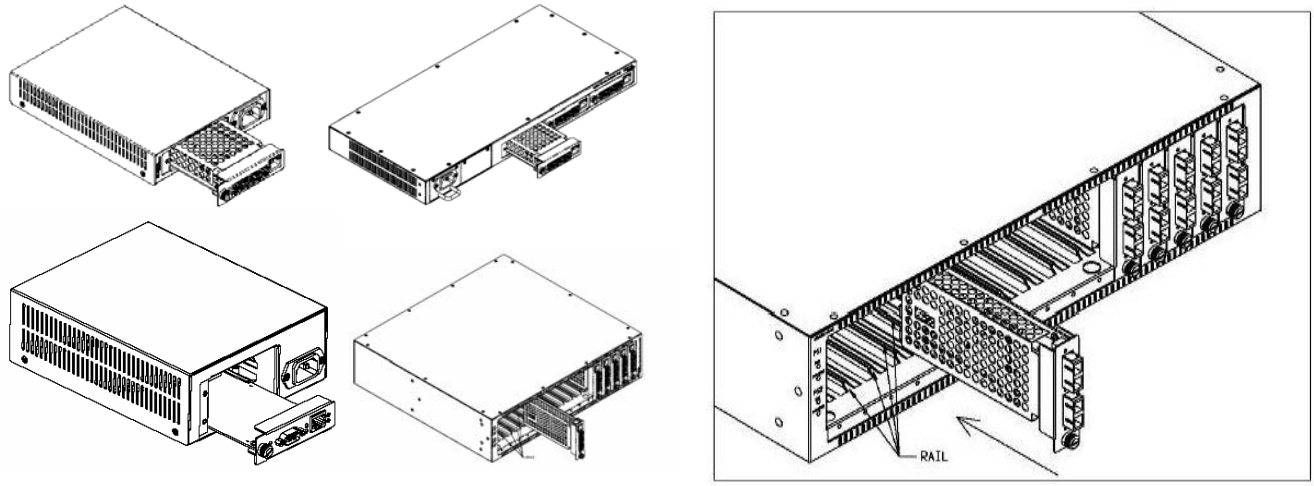


Figure 7 -- Module installation (not all chassis are shown)

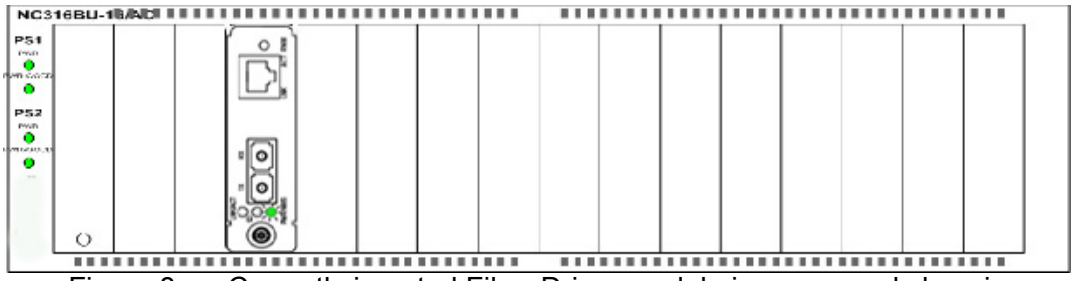


Figure 8 -- Correctly inserted Fiber Driver module in a powered chassis

Handle the module by the edges to avoid damaging any components. Use your thumb to push it securely into the chassis slot. Do not use excessive force, but make sure the module connector is fully inserted in the chassis. Secure the module by hand using the thumbscrew.

3.5 Small Form Pluggables (SFP): Handling and Installation

The FC400 accepts any SFP that complies with the MSA standard. The SFP you select to use should support rates of at least 1Gbps, or as appropriate for your application.

3.5.1 Cleaning Fibers

Fiber optic components and cables are very sensitive to dirt, dust and mishandling, especially in high-speed networks. Dirty or mistreated fiber may cause errors and an unwanted degradation of signal quality.

Prior to an installation the fiber and fiber optic transceivers should be cleaned following the procedure below.

Cleaning Supplies

• Optical cleaner cartridge • Can of compressed air	 Figure 9 -- Cleaning cartridge

Cleaning Procedure

1. Blow a stream of compressed air on the fiber ends while the caps are in place.
2. Remove the caps, and blow the ends of the fibers again.
3. Clean the ends of the fibers using the cleaner cartridge; follow the instructions included with the cartridge.

Fiber Inspection

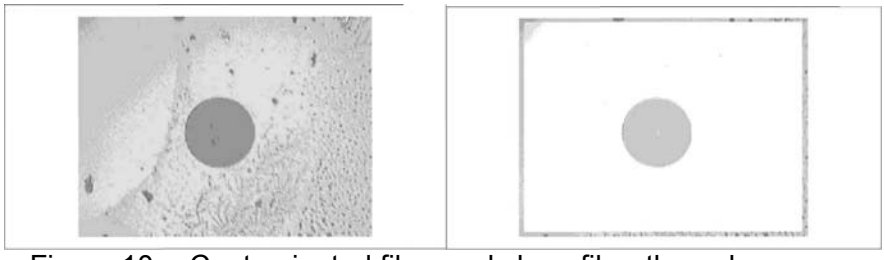


Figure 10 -- Contaminated fiber and clean fiber through a scope

3.5.2 Working with SFPs

The pluggable optics modules used in the EM316xx products are extremely portable, and consequently may be easily mistreated. If SFPs are not protected against dust, remove the dust caps and clean them with 1.25 millimeter cleaners.

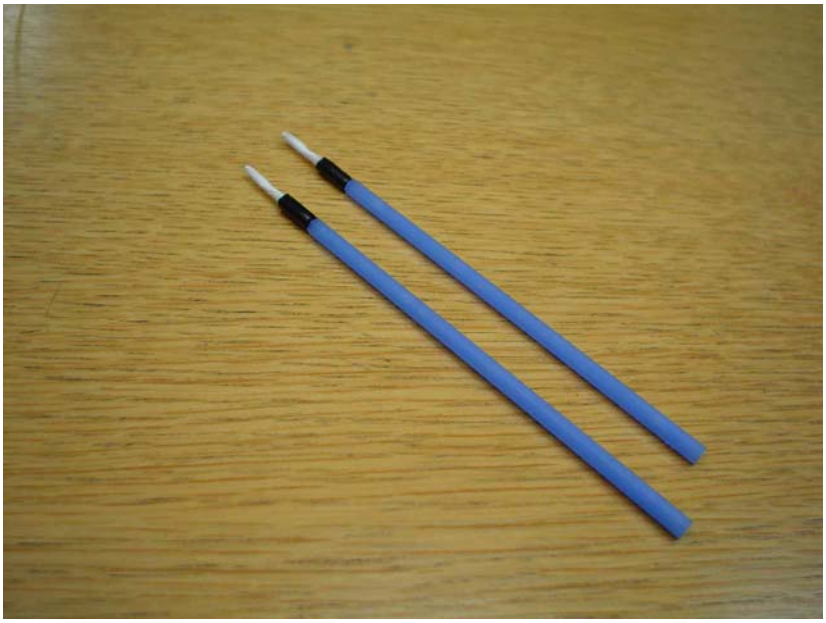


Figure 11 -- SFP cleaners

3.5.2.1 Cleaning SFPs

(1) Requirements:

SFP to be cleaned
1.25 mm cleaners

(2) Procedure:

- Insert the 1.25mm cleaner into the SFP
- Turn ¼ turn
- Remove the 1.25mm cleaner and discard
- Repeat the process

Do not stretch optical fibers or bend them too tightly. Install optical cables with as little fiber stress as possible.

3.5.2.2 Mylar Tab SFP Modules

The Mylar tab or nail latch on the module has a tab that you must pull in order to remove the module from a switching module port.

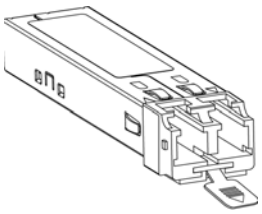


Figure 12 -- Mylar Tab on SFP Module

(3) Inserting a Mylar Tab SFP Module

To insert the Mylar tab SFP module into a switching module port, line up the SFP module with the port, and slide it into place.

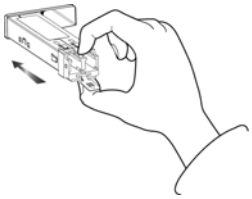


Figure 13 -- Insertion of a Mylar Tab SFP Module

(4) Removing a Mylar Tab SFP Module

To remove the SFP module from the switching module port, pull the tab gently until the SFP module disengages from the port, and then pull the SFP module out.

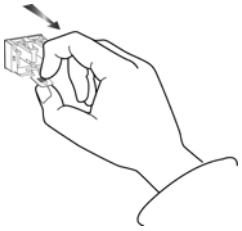


Figure 14 -- Removal of a Mylar Tab SFP Module

Caution When pulling the tab to remove the SFP module, be sure to pull in a straight outward motion. Do not twist or forcibly pull the tab because you may disconnect it from the SFP module.

3.5.2.3 Actuator/Button SFP Modules

The actuator/button SFP module has a button that you must push in order to remove the SFP module from a switching module port.

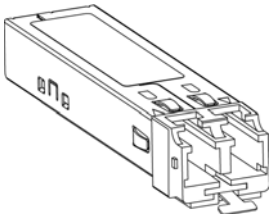


Figure 15 – Actuator/Button SFP Module

3.5.2.4 Inserting an Actuator/Button SFP Module

To insert the actuator/button SFP module into a switching module port, line up the SFP module with the port and slide it in until the actuator/button clicks into place. Be sure not to press the actuator/button as you insert the SFP module because you might inadvertently disengage the SFP module from the port.

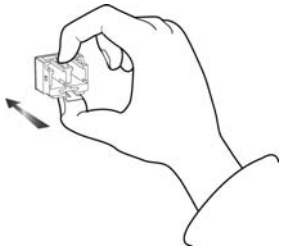


Figure 16 -- Insertion of an Actuator/Button SFP Module

(5) Removing an Actuator/Button SFP Module

Step 1 Gently press the actuator/button on the front of the SFP module until it clicks and the latch mechanism activates, releasing the SFP module from the port.

Step 2 Grasp the actuator/button between your thumb and index finger and carefully pull the SFP module from the port.

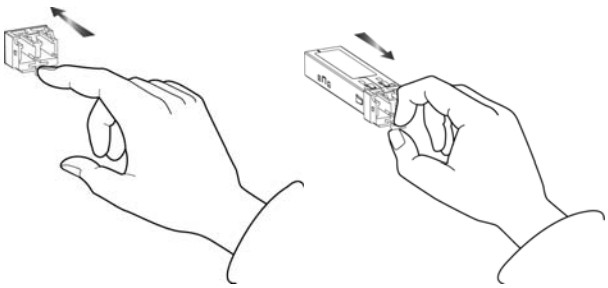


Figure 17 -- Removal of an Actuator/Button SFP Module

3.5.2.5 Bale Clasp SFP Module

The bale clasp SFP module has a bale clasp that you use to secure the SFP\XFP module in a switching module port.

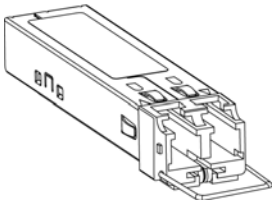


Figure 18 -- Bale Clasp SFP Module

(6) Inserting a Bale Clasp SFP/XFP Module into a Switching Module Port

Step 1 Close the bale clasp in the upward direction before inserting the SFP module.

Step 2 Line up the SFP module with the port and slide it into the port.

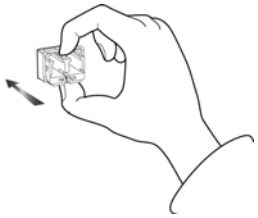


Figure 19 -- Insertion of a Bale Clasp SFP Module

(7) Removing a Bale Clasp SFP Module

Step 1 Open the bale clasp on the SFP module: With your index finger, press the clasp downward as shown. If the bale clasp is obstructed and you can not use your index finger to open it, use a small, flat-blade screwdriver or other long, narrow instrument to open the bale clasp as shown.

Step 2 Grasp the SFP module between your thumb and index finger and carefully remove it from the switching module port as shown.

Open a Bale Clasp with a Flat-Blade Screwdriver if needed.

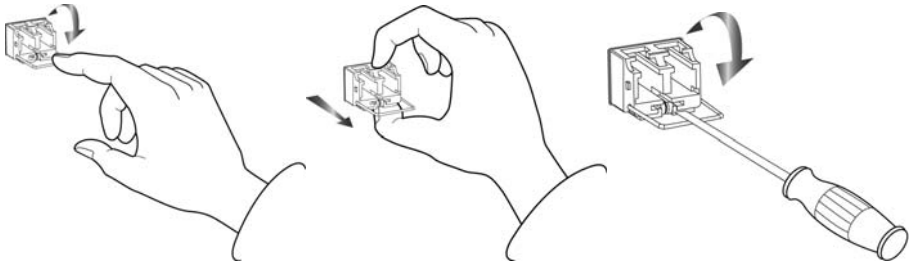


Figure 20 -- Removal of a Bale Clasp SFP Module

4 Network Management

The FC400 may be managed by a Fiber Driver network management module. Although the factory settings are appropriate for most installations, network management through the EM316LNXNM-OT manager is highly recommended. Network environments are unpredictable, and Fiber Driver network management is a critical tool for proactive administration as well as reduced operating expenses.

The network management module provides a command line interface (CLI), accessible either through a local serial port or from the IP network, using a terminal emulation environment. Some CLI commands specific to the FC400 in a managed environment are discussed in this section. Refer to the network manager manual for further details regarding the management module.

The network management module also provides Simple Network Management Protocol (SNMP) support to allow control through any industry standard network management system (NMS). To maximize the graphical remote management control of Fiber Driver modules, MRV offers MegaVision® Pro. It is a unique and full-featured NMS with graphical user interfaces (GUI) for all managed MRV network components including Fiber Driver. A limited version of MegaVision called “Configurator” is available for trial through the MRV website (http://www.mrv.com). Refer to MegaVision Pro documentation for more information on the benefits offered with the product.

4.1 EM316LNXNM-OT Command Line Interface (CLI)

The Linux-based Fiber Driver network manager provides Fiber Driver system management for its host chassis. Some commands applicable to the FC400 module are illustrated in this section in sample session output after the login exchange. The figure below lists the partial set of commands addressed in this document.

- show
- show version
- show slots
- show x.x
- ?
- list
- lin / no lin
- show digital-diagnostics
- show config
- show defaults
- description <name>
- shutdown / no shutdown
- loopback / no loopback

Figure 21 -- EM316LNXNM-OT commands for the FC400

Some of these commands apply to both slot-level and port-level contexts or ‘nodes’. Refer to EM316LNXNM-OT documentation for more complete discussion of the Linux-based interface and available commands.

4.1.1 Serial Console Interface

After the EM316LNXNM-OT management module is installed, power up the chassis and attach the serial cable (RS-232) to the PC.

- Adapter (part number 350-0308 REV-B MRG/20028-2)
- Cable (part number 151-3028 REV-F AI 04/04)

The device has at least one Ethernet port, which is typically used to connect to a Local Area Network (LAN). The factory default IP address is 192.168.14.201 with netmask 255.255.255.0, sometimes written as 192.168.14.201/24. From the network, connect to the EM316LNXNM-OT command line interface (CLI) using SSH (secure shell) to an available module IP address. Telnet services are disabled by default, but they may be enabled for additional CLI access.

The device has an RS-232 interface that is used for serial communications to the CLI. This connection is recommended for setup, and it offers the advantage of “out-of-band” management for greater network autonomy.

Configure the serial parameters with the following RS-232 parameters.

- • 38400 baud
- • 8 data bits
- • 1 stop bit
- • no parity
- • no flow control

4.1.2 Session Login

Connect to the CLI using the local serial port or from the network using SSH or Telnet. By default, SSH is enabled and Telnet is disabled for optimal security.

A login prompt appears in the CLI terminal window. Sign into the CLI as shown below. The EM316LNXNM-OT factory configuration includes a super user with username admin and password admin.

```
MRV EM316LNXNM

login: admin
Password:

Please wait, initializing...now ready.
EM316LNXNM v4.0 fdr 51 (Apr  3 2007 - 11:41:43).
U-Boot 1.0.3.1 (Nov  3 2006 - 22:00:50).
Linux kernel v2.4.26 (#1 Wed Dec 13 16:55:59 PST 2006).
EM316LNXNM (firmware 5c.13) (00:20:1a:02:16:a2).
MegaVisionJ not installed.
Copyright (c) MRV Corp. 1993-2007
You are a SUPER user!
fiberdriver#
```

The example above shows a login as SUPER user.

Type the following command to enter "configuration" mode.

```
Fiberdriver# configure terminal
```

Note that each command is completed with the <CR> or <Enter> key, which is not printable.

Once the mode is changed, the prompt also changes. Change the *admin* user password using the "username" command.

```
fiberdriver(config)# username admin password <new
password>
```

Set the IP configuration using the "ip" command group. Set IP address and IP mask information using the following command.

```
fiberdriver(config)# ip interface 169.254.88.200/16
```

The IP address (169.254.88.200) and the netmask (16) are examples only. Use the IP address and netmask appropriate for the EM316LNXNM-OT on your network. Classless Inter-Domain Routing (CIDR) notation is used to specify the address (169.254.88.200) and mask (16) corresponding to 255.255.0.0.

Set specific gateway information using the following command:

```
fiberdriver(config)# ip default-gateway 169.254.88.1
```

The IP information configured does not load until restarting the system or using the command:

```
ip interface update
```

Use the following command to save the configuration into permanent (non-volatile) storage:

```
fiberdriver(config)# write file
fiberdriver(config)# exit
```

The system does not automatically save configurations to permanent storage. Use the **`write file`** command to save a configuration before restarting the system. Now the IP configuration is complete. The default SNMP community names are "public" for read and "private" for write.

Use the description command to change names of the chassis, slot, and port. Use the show command to verify the change. Chassis names are limited to nine characters.

4.1.3 Show Commands

4.1.3.1 Show Version

```
fiberdriver#
fiberdriver# show version

EM316LNXNM v4.0 fdr 51 (Apr  3 2007 - 11:41:43).
U-Boot 1.0.3.1 (Nov  3 2006 - 22:00:50).
Linux kernel v2.4.26 (#1 Wed Dec 13 16:55:59 PST 2006).
EM316LNXNM (firmware 5c.13) (00:20:1a:02:16:a2).
MegaVisionJ not installed.
Copyright (c) MRV Corp. 1993-2007
fiberdriver#
```

4.1.3.2 Show Slots

```
fiberdriver#
fiberdriver# show slots
Slot  Model          Name                Serial Number
====  =============  ================    ============================
1.1   EM316LNXNM-OT  myslot1.1           00:20:1a:02:16:a2
1.2   EM316FC400     EM316FC400 at 1.2   N/A
1.3   EM316FC400     EM316FC400 at 1.3   N/A

fiberdriver#
```

4.1.3.3 Show a Port

```
fiberdriver#
fiberdriver# show 1.2
             Slot: 1.2
            Model: EM316FC400
             Name: EM316FC400 at 1.2
Hardware Revision: 1, FPGA 0x5b (MRV)


Sw Configurable: yes  Operation Type: converter

Number Of Ports: 2
Port   Enable  Link           LIN     DDiags  WL(nm)  Name
=====  ======  =============  ======  ======  ======  ============
1.2.1  enable  signal Detect  enable  Ok      850     SFP at 1.2.1
1.2.2  enable  signal Detect  enable  Ok      850     SFP at 1.2.2
fiberdriver#
```

4.1.4 Slot-Level Command Session

4.1.4.1 Change to Slot Context

```
fiberdriver# configure terminal
fiberdriver(config)#
fiberdriver(config)# slot 1.1
fiberdriver(slot/1.1)#
```

4.1.4.2 Slot Command Lists

```
# Command list (type '?' at the prompt)

fiberdriver(slot/1.2)#
  clear-type   Clear Type, if locking types
  default      Restore parameter(s) to defaults
  description  Set slot name
  echo         Display text for scripting
  end          End current mode and go down to enable node
  exit         Exit current mode and go down to previous mode
  list         Print command list
  logout       Logout of the system
  next         Configure next element
  no           Negate a command
  pager        Pause scrolling when screen is full
  port         Configure a port
  previous     Configure previous element
  quit         Exit current mode and go down to previous mode
  show         Show basic info
  sleep        Pause CLI for scripting
  slot         Configure a slot
  up           Configure parent element
  who          Find out who is connected to the system
  whoami       Who am I?
  write        Write running configuration to memory or terminal
fiberdriver(slot/1.2)#
```

```
fiberdriver(slot/1.2)#
fiberdriver(slot/1.2)# list
  clear-type
  default all
  default description
  default me
  description .LINE
  echo
  echo .LINE
  end
  exit
  list
  logout
  next
  no description
  no pager
  pager
  port (PORT-NUM|PORT)
  previous
  quit
  show
  show config
  show defaults
  show digital-diagnostics
  show running-config
  show statistics
  sleep <0-10>
  slot SLOT
  up
  who
  who am i
  whoami
  write file
  write terminal
fiberdriver(slot/1.2)#
```

4.1.4.3 Slot Show Commands

```
fiberdriver(slot/1.2)# show
             Slot: 1.2
            Model: EM316FC400
             Name: EM316FC400 at 1.2
Hardware Revision: 1, FPGA 0x5b (MRV)


Sw Configurable: yes  Operation Type: converter

Number Of Ports: 2
Port   Enable  Link           LIN     DDiags  WL(nm)  Name
=====  ======  =============  ======  ======  ======  ============
1.2.1  enable  signal Detect  enable  Ok      850     SFP at 1.2.1
1.2.2  enable  signal Detect  enable  Ok      850     SFP at 1.2.2

fiberdriver(slot/1.2)#
```

```
fiberdriver(slot/1.2)# show digital-diagnostics
Port   DDiags  Temp(C)  Supply(V)  TxPower(dBm)  RxPower(dBm)  Bias(mA)
=====  ======  =======  =========  ============  ============  ========
1.2.1  Ok      33       3.291      -4.242        -5.158        8.744
1.2.2  Ok      33       3.271      -4.263        -8.365        8.973

fiberdriver(slot/1.2)#
```

```
fiberdriver(slot/1.2)# show config
slot 1.2
 ! Configured parameters that override defaults:
 ! Configured parameters that match defaults:
 ! Parameters that will follow defaults:
 ! description EM316FC400 at 1.2
fiberdriver(slot/1.2)#
```

```
fiberdriver(slot/1.2)# show defaults
slot 1.2
 ! description EM316FC400 at 1.2
fiberdriver(slot/1.2)#
```

4.1.4.4 Slot Description

```
Notice that a slot is assigned a user defined name.
Then the slots name is read back.


fiberdriver(slot/1.2)# description myslot1.2
fiberdriver(slot/1.2)# show
             Slot: 1.2
            Model: EM316FC400
             Name: myslot1.2
Hardware Revision: 1, FPGA 0x5b (MRV)


Sw Configurable: yes  Operation Type: converter

Number Of Ports: 2
Port   Enable  Link           LIN     DDiags  WL(nm)  Name
=====  ======  =============  ======  ======  ======  ============
1.2.1  enable  signal Detect  enable  Ok      850     SFP at 1.2.1
1.2.2  enable  signal Detect  enable  Ok      850     SFP at 1.2.2

fiberdriver(slot/1.2)#
```

4.1.5 Port-Level Command Session

4.1.5.1 Change to Port Context

By changing context we are effectively focusing the area of interest to a particular object. In this case the object of interest is port number 1 of the card which is in slot number 2.

```
fiberdriver(slot/1.2)# port 1.2.1
fiberdriver(port/1.2.1)#
```

4.1.5.2 Port Command Lists

Command list (type '?' at the prompt)

```
fiberdriver(port/1.2.1)# list
  default all
  default description
  default lin
  default loopback
  default me
…   << lines skipped >>
  whoami
  write file
  write terminal
fiberdriver(port/1.2.1)#
```

```
default all              list                        rm-slot <0-4294967294>
default description      logout                      show
default lin              loopback                    show config
default loopback         next                        show defaults
default me               no description              show digital-diagnostics
default rm-chassis       no lin                      show running-config
default rm-port          no loopback                 show statistics
default rm-slot          no pager                    shutdown
default shutdown         no shutdown                 sleep <0-10>
description .LINE        pager                       up
echo                     port PORT                   who
echo .LINE               previous                    who am i
end                      quit                        whoami
exit                     rm-chassis <0-4294967294>   write file
lin                      rm-port <0-4294967294>      write terminal
```

Figure 22 -- Port commands - full list

4.1.5.3 Port Show Commands

```
fiberdriver(port/1.2.1)# show
      Port: 1.2.1
      Name: SFP at 1.2.1
Part #/Rev: SFP-TGD-SX/A
  Protocol: FibreChannel
      Rate: 1-4GFC 1/2/4 Gbps

Enable: enable             LIN: enable
  Link: signal Detect
                        Nom. BR: 4200

     Loopback: off
Serial Number: U9700RG
  Vendor Info: MRV

Connector: fo LC  Medium: multi Mode
Wavelength(nm): 850
  TxPower(dBm): -4.242  RxPower(dBm): -5.158   Bias(mA): 8.748
       DDiags: Ok           Temp(C): 33      Supply(V): 3.292

fiberdriver(port/1.2.1)#
```

```
fiberdriver(port/1.2.1)# show config
port 1.2.1
 ! Configured parameters that override defaults:
 lin
 ! Configured parameters that match defaults:
 no loopback
 ! Parameters that will follow defaults:
 ! no shutdown
 ! description SFP at 1.2.1
 ! rm-chassis 0
 ! rm-slot 0
 ! rm-port 0
fiberdriver(port/1.2.1)#
```

```
fiberdriver(port/1.2.1)# show defaults
port 1.2.1
 ! no loopback
 ! no shutdown
 ! no lin
 ! description SFP at 1.2.1
 ! rm-chassis 0
 ! rm-slot 0
 ! rm-port 0
fiberdriver(port/1.2.1)#
```

4.1.5.4 Port Description

```
Notice that a port is assigned a user defined name.
Then the ports name is read back.

fiberdriver(port/1.2.1)# description SFP_in_slot2_port1
fiberdriver(port/1.2.1)# show
      Port: 1.2.1
      Name: SFP_in_slot2_port1
Part #/Rev: SFP-TGD-SX/A
  Protocol: FibreChannel
      Rate: 1-4GFC 1/2/4 Gbps

Enable: enable             LIN: enable
  Link: signal Detect
                      Nom. BR: 4200

     Loopback: off
Serial Number: U9700RG
  Vendor Info: MRV

Connector: fo LC  Medium: multi Mode
Wavelength(nm): 850
  TxPower(dBm): -4.241  RxPower(dBm): -5.188   Bias(mA): 8.715
        DDiags: Ok           Temp(C): 33      Supply(V): 3.29


fiberdriver(port/1.2.1)#
```

4.1.5.5 Shutdown

The “shutdown” command disables the ports transmitter.

```
fiberdriver(port/1.2.1)#
fiberdriver(port/1.2.1)# shutdown
fiberdriver(port/1.2.1)#     fdrd[60]|TRAP|    err|Jan 08 08:41:21 Port 1.2.2 Rx
 Power Too Low, -33.979 Chassis Name: NC316BU-3 Slot Name: myslot1.2 Port Name:
SFP at 1.2.2
    fdrd[60]|TRAP|    err|Jan 08 08:41:25 Port 1.2.1 Amps Too Low, 0.006 Chassis
 Name: NC316BU-3 Slot Name: myslot1.2 Port Name: SFP_in_slot2_port1
    fdrd[60]|TRAP|    err|Jan 08 08:41:25 Port 1.2.1 Tx Power Too Low, -inf Chas
sis Name: NC316BU-3 Slot Name: myslot1.2 Port Name: SFP_in_slot2_port1
    fdrd[60]|TRAP|   warn|Jan 08 08:41:25 Port 1.2.1 Disabled, Chassis Name: NC3
16BU-3 Slot Name: myslot1.2 Port Name: SFP_in_slot2_port1
    fdrd[60]|TRAP|    err|Jan 08 08:41:26 Port 1.2.2 Link Down, Chassis Name: NC
316BU-3 Slot Name: myslot1.2 Port Name: SFP at 1.2.2
fiberdriver(port/1.2.1)#
```

The “no shutdown” command enables the ports transmitter.

```
fiberdriver(port/1.2.1)# no shutdown
fiberdriver(port/1.2.1)#     fdrd[60]|TRAP|   warn|Jan 08 08:42:59 Port 1.2.1 Am
ps Ok, 8.532 Chassis Name: NC316BU-3 Slot Name: myslot1.2 Port Name: SFP_in_slot
2_port1
    fdrd[60]|TRAP|   warn|Jan 08 08:42:59 Port 1.2.1 Tx Power Ok, -4.249 Chassis
 Name: NC316BU-3 Slot Name: myslot1.2 Port Name: SFP_in_slot2_port1
    fdrd[60]|TRAP|   warn|Jan 08 08:42:59 Port 1.2.1 Enabled, Chassis Name: NC31
6BU-3 Slot Name: myslot1.2 Port Name: SFP_in_slot2_port1
    fdrd[60]|TRAP|   warn|Jan 08 08:42:59 Port 1.2.2 Rx Power Ok, -8.383 Chassis
 Name: NC316BU-3 Slot Name: myslot1.2 Port Name: SFP at 1.2.2
    fdrd[60]|TRAP|   warn|Jan 08 08:42:59 Port 1.2.2 Link Changed, signal Detect
 Chassis Name: NC316BU-3 Slot Name: myslot1.2 Port Name: SFP at 1.2.2
fiberdriver(port/1.2.1)#
```

4.1.5.6 Loopback

```
The “loopback” command enables port loopback of traffic.

fiberdriver(port/1.2.1)# loopback
    fdrd[60]|CORE|   warn|Jan 08 08:44:25 1.2.2: Auto-adjusted PortLoopback -> on Ok
fiberdriver(port/1.2.1)#     fdrd[60]|TRAP|   warn|Jan 08 08:44:28 Port 1.2.1 Loopback On,
Chassis Name: NC316BU-3 Slot Name: myslot1.2 Port Name: SFP_in_slot2_port1
    fdrd[60]|TRAP|   warn|Jan 08 08:44:28 Port 1.2.2 Loopback On, Chassis Name:NC316BU-3 Slot
Name: myslot1.2 Port Name: SFP at 1.2.2

fiberdriver(port/1.2.1)#


The “no loopback” command disables port loopback.


fiberdriver(port/1.2.1)# no loopback
    fdrd[60]|CORE|   warn|Jan 08 08:45:15 1.2.2: Auto-adjusted PortLoopback -> off Ok
fiberdriver(port/1.2.1)#     fdrd[60]|TRAP|   warn|Jan 08 08:45:19 Port 1.2.1 Loopback Off,
Chassis Name: NC316BU-3 Slot Name: myslot1.2 Port Name: SFP_in_slot2_port1
    fdrd[60]|TRAP|   warn|Jan 08 08:45:19 Port 1.2.2 Loopback Off, Chassis Name: NC316BU-3
Slot Name: myslot1.2 Port Name: SFP at 1.2.2

fiberdriver(port/1.2.1)#
```

4.1.5.7 LIN

```
fiberdriver(port/1.2.1)# lin
    fdrd[60]|CORE|   warn|Jan 08 08:47:20 1.2.2: Auto-adjusted PortLIN -> enable
 Ok
fiberdriver(port/1.2.1)#


fiberdriver(port/1.2.1)# no lin
    fdrd[60]|CORE|   warn|Jan 08 08:47:54 1.2.2: Auto-adjusted PortLIN -> disabl
e Ok
fiberdriver(port/1.2.1)#     fdrd[60]|TRAP|   warn|Jan 08 08:47:55 Port 1.2.1 LI
N Off, Chassis Name: NC316BU-3 Slot Name: myslot1.2 Port Name: SFP_in_slot2_port
1
    fdrd[60]|TRAP|   warn|Jan 08 08:47:56 Port 1.2.2 LIN Off, Chassis Name: NC31
6BU-3 Slot Name: myslot1.2 Port Name: SFP at 1.2.2

fiberdriver(port/1.2.1)#
```

5 Appendix

5.1 Technical Specifications

Physical Dimensions	25 mm x 75 mm x 175 mm deep (1" x 3" x 7" deep)
Weight	360 grams (9.6 ounces)
Power	5V DC at 2A maximum
Storage Temperature	-40° C to 70° C (-40° F to 158° F)
Operating Temperature	0° C to 50° C (32° F to 122° F)
Cooling Air	1 inch (25 millimeters) clearance from external chassis vents to allow unobstructed air flow through the unit
Relative Humidity	85% maximum, non-condensing
Regulatory Compliance	FCC - PART 15, SUBPART B, 1999, CLASS A; CE MARK - EN 50081-1:1992;EN 50082:1997; EN 55024:1998; EN 55022:1998; AS/NZS 3548:1995

5.2 Supported Data Rates

- Fibre Channel 1, 2, and 4 Gbps (FC-100, FC-200, and FC-400)

5.3 Recommended SFPs from MRV

Fiber Channel Multi Rate (1, 2 & 4Gbps) DWDM (LC connectors)		
New	SFPFC4DW01-XX	SFP 1\2\4 Gbps FC DWDM 10 km 100 Ghz (XX=ITU Channels 21-60)
New	SFPFC4DW04-XX	SFP 1/2/4 Gbps FC and 1 GE DWDM 40 km 100 Ghz (XX=ITU Channels 17-60)
Fiber Channel Multi Rate (1, 2 & 4Gbps) CWDM (LC connectors)		
New	SFPFC4CW04-XX	SFP 1\2\4 Gbps FC and 1 GE DWDM 40 km 100 Ghz
New	SFPFC4DW08-XX	SFP 1/2/4 Gbps FC and 1 GE CWDM 80 km 100 Ghz

	SFP-TGD-SX	SFP Triple Rate 1/2.1/4.2 Gbps SX, or 1000Base-SX GigE, MM, 850nm, 0-550m, with Digital Diagnostics
	SFP-TGD-SR4	SFP 1/2/4 Gbps FC, SM, 1310nm, 4 km at 4 Gbps FC and 10km at 2Gbps FC with Digital Diagnostics and RoHS Compliance

5.4 Troubleshooting

This section provides a few basic techniques to address some common issues with devices similar to the EM316FC400. Contact MRV Communications Customer Support or your local MRV sales representative for help beyond this document.

Basic Troubleshooting Checklist

- Ensure all chassis are powered and operating properly.
- Ensure all modules are inserted correctly and receiving power.
- Ensure SFPs are inserted properly and functioning correctly.
- Ensure User Links are functioning properly and sending the desired signal.
- Ensure Fiber Optic connections are correctly (R_x to T_x).
- Ensure DIP switches are set to the proper settings for your application.

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