

# User Manual



## FRM220

### Hardware Installation



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## **FRM220 Hardware Installation Manual**

Fiber In-band Managed  
Media Platform Rack, 20 Slot, 2U

Version 1.0 Dec. 2008 (Release)  
Version 1.1 July 8, 2009 (Update, added card introductions)  
Version 1.11 July 20, 2009 (Update, add management quick start)  
Version 1.12 July 31, 2009 (Update, add 3R and 10G card introductions)  
Version 1.13 March 4, 2010 (Update, power modules changed to 200 watt)  
Version 1.14 March 22, 2010 (Update, 2.7G power consumption rating)

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## **CISPR PUB.22 Class A COMPLIANCE:**

This device complies with EMC directive of the European Community and meets or exceeds the following technical standard. EN 55022 - Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment. This device complies with CISPR Class A.

## **CE NOTICE**

Marking by the symbol CE indicates compliance of this equipment to the EMC and LVD directives of the European Community. Such marking is indicative that this equipment meets or exceeds the following technical standards: EN 55022:2006, Class A, EN55024:1998+A1:2001+A2:2003, and EN60950-1:2001

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## Chapter 1 Introduction

### 1.0 Introduction

Thank you for choosing the **FRM220** Platform Fiber Media Converter Rack. If you would like to skip right to the installation of the Converter Chassis, proceed to Chapters 2.

This manual is used to explain the hardware installation procedures for the **FRM220**, and present its capabilities and specifications. This manual is divided into 2 Sections, the Introduction and Installation, plus the Appendix. The Appendix includes further information on options for placing the device in service.

Installers should carefully read the Chapter 2, Installation and the Cabling Specification Appendix. The companion document, the **FRM220 NMC Configuration Manual**, is available in electronic format only. The divisions in that manual are intended for use by personnel to answer questions in general areas. Planners and potential purchasers may read the Introduction to determine the suitability of the product to its intended use; Operating Personnel would use the Operations and Web Based Management Chapters and Appendices to become familiar with the line cards and settings. Network Administrators should read the chapters on Operation, Web Based Management and Trouble Shooting to become familiar with the diagnostic capabilities, network settings and management strategies for the SNMP managed chassis.

### 1.1 Functional Description

The **FRM220-CH20** is a 2U high 19" Rack, 20 slot modular media converter center. The **FRM220** provides an economic solution for high density Fiber Converter installations in enterprises or central offices. All critical components, Power, fans, management module and interface cards are hot swappable allowing online field replacement. An additional feature allows the **FRM220** to detect the working or failing status either of power module or any fan assembly in the unit and activate relays that can be used to control external alarm devices.

There are 19 slots available for installation of FRM220 Converter Cards in the **FRM220** compact rack. An SNMP Card is installed in the far left hand, or first slot, for local and remote management purposes. Each **FRM** Card is an independent fiber to copper converter. When linked to a compatible FRM stand-alone or "I" series FMC (Fiber Media Converter) stand-alone converter, complete in-band management is supported. All settings of the line card and remote connected stand-alone device may be managed through any of the available management interfaces. A variety of cards are or will be available that support multi-mode or single-mode fiber types and connections to SC, ST, FC or even the latest bi-directional single fiber WDM (Wave Division Multiplexing) in ranges from 2Km to 120Km. Converter cards will include Fast Ethernet, Gigabit Ethernet, Serial (RS-485, RS-232 and RS-422), ITU-T G.703 E1 and T1, Synchronous and Asynchronous Datacom (V.35, RS-530, X.21, RS-449, and RS-232), 155.52M STM-1 repeater, FXO/FXS over fiber and more as the product matures.

The **FRM220** optionally incorporates redundant power modules. The supply, depending on the model, derives its power from either an AC power source (90 ~ 264VAC) and/or DC power source. Two available DC power modules provide either 18-36VDC or 36-72VDC range. When two modules are installed, they provide for power redundancy and are hot swappable even during the FRM220 Line Cards' transmissions. The **FRM220** provides all copper interface connections on the face of each FRM220 Line Card. The fiber interface connectors are also located on the individual FRM220 Line Card's face, along with status indicator LEDs. The status LED indicators provide for quick indications of both copper and fiber link statuses and fault detection.

### 1.2 Chassis Front Description

The front of the **FRM220** contains the line card slots. They are numbered 1 through 20, from left to right as viewed from the front. The typical configuration is with one NMC (**Network Management Controller**) card in slot number 1 and in-band manageable line cards in any other slot numbered 2 through 20.

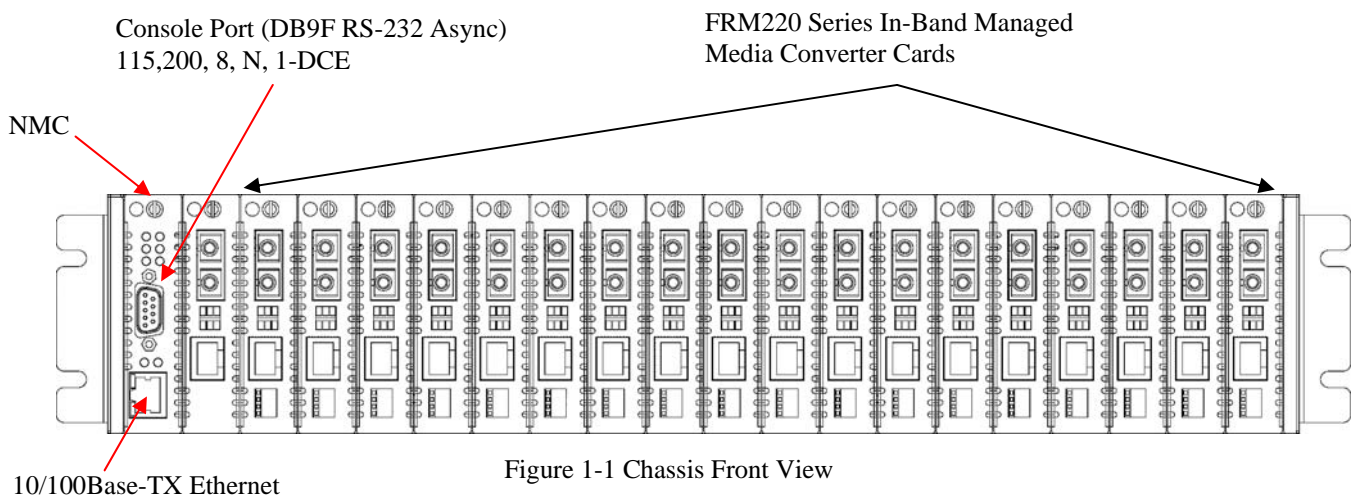


Figure 1-1 Chassis Front View

### 1.3 Chassis Rear Description

The rear panel holds the chassis interface, the hot-swappable cooling fan modules, and the hot-swappable power modules. The pluggable modules do not require any tools for removal and replacement.

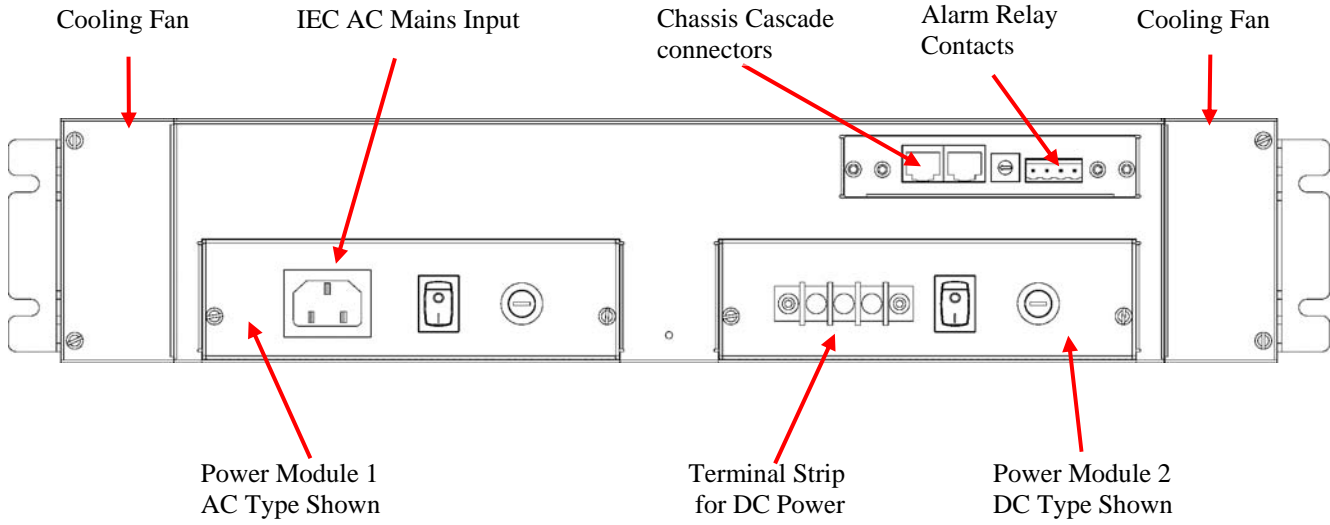


Figure 1-2 Chassis Rear View

### 1.4 Chassis Physical Dimensions

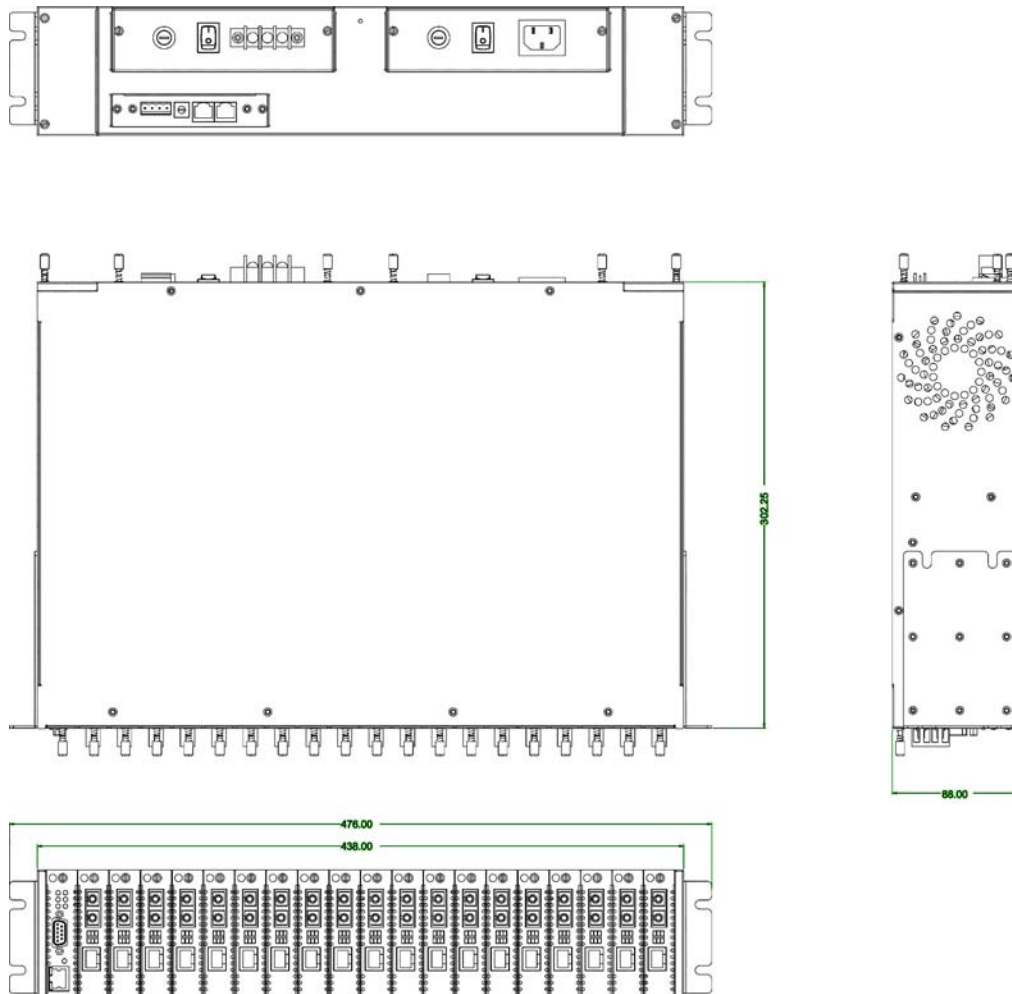


Figure 1-3 Chassis Dimensions, in millimeters



## 1.5 Chassis Specifications

### Environment

Temperature -10 - 65°C (14-150°F)  
Humidity 5-95% non condensing

### Alarm relay contact ratings

125VAC	1A
110VDC	0.6A
30VDC	4A

### Power Module Specifications

#### AC Power Module

Input : Universal, 90 (Min.) ~ 264 (Max.) VAC; Frequency : 47~63 Hz  
Output : DC 12V, 200W maximum rating

#### DC Power Module

Input : -36~-75 VDC (option 1)  
Input : -18~-36VDC (option 2)  
Output : DC 12V, 200W maximum rating

### Power Consumption

~60 watts (fully loaded chassis, with random mix of line card types)

### Heat Generation

~210 BTU (fully loaded chassis, with random mix of line card types)

### Compliance

European Union : EN55022:2006, Class A, EN55024:1998+A1:2001+A2:2003, and EN60950-1:2001  
FCC : part 15, subpart B, class A

### Reliability

MTTB : >65,000 hours (25°C)

### Physical Specifications

Dimensions : 438mm (Width) x 302mm (Depth) x 88mm (Height)  
(US: 17 1/4" wide x 11 7/8" deep x 3 1/2" high)  
Weight : 4.5Kg (US: ~10 lbs)

AC module weight : 690g (US 1.5 lbs)  
DC module weight : 505g (US 1.2 lbs)  
Fan module weight : 200g (US 0.5 lbs)  
NMC card weight : 120g (US 0.25 lbs)

Net Weight : 6.2kgs (US 13 lbs 11 oz)  
(with 1 NMC, 2 fan modules, 1 AC +1 DC power module & two bracket panels for 19" rack-mounting)

Fully Populated Reference Net Weight: 8.4Kg (US 18.5 lbs.)  
(fully loaded, two powers, NMC and 19 pcs 10/100i line cards)

## 1.6 NMC (SNMP)

The **FRM220** must be ordered with an NMC Card. The card is placed in the far left, number one card slot. Management is accomplished either via local control on the asynchronous RS-232 port with an ASCII terminal or via Ethernet and any standard SNMP network management software that supports MIB-II. The WEB GUI based interface provides an easy method for the user to operate and monitor the whole system. Almost all FRM line cards support remote in-band configuration when paired with the same type FRM220 stand-alone in-band converter.

## 1.7 Line card options

The **FRM220** is capable of supporting a variety of in-band managed or non-managed line card types which may be mixed and matched in any slot of the rack. See below for a brief of the linecards at the time of this printing. Please refer to the latest version of **FRM220 NMC User Manual** for details of all the line card options for the **FRM220**.

### 1.7.1 FRM220-10/100i In-band managed 10/100 Fiber Media Converter

The FRM-10/100i (in-band converter) is a In-band Managed (OAM) Fiber Ethernet media converter (MC) that supports 10Base-T or 100Base-TX and converts to 100Base-FX (fiber). The UTP side supports auto-negotiation or forced settings for speed and duplex by setting as well as auto-MDIX. When the FRM-10/100i is placed in the **FRM220** with NMC, the settings are controlled by the chassis management system. The remote FRM-10/100i stand-alone may also be configured from the **FRM220** through the in-band management features (OAM). An optional console manageable single slot chassis, the CH01M, is also available with DB9F connector for stand-alone serial console management.

#### Features

- Supports Loop Back Test
- Auto-Cross over for MDI/MDIX in TP port
- Supports far end fault (FEF) function via OAM
- Auto-Negotiation or Manual mode in TP port
- Supports link fault pass through (LFP) function
- Bandwidth control (32K or 512Kbps x N)
- Forward 2046 bytes (max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports forwarding mode option
- Store and forward (switch) mode, Convert mode (small latency)
- Supports local or remote In-band management (Monitor and Configure status) by the SNMP manager in FRM220
- Supports remote CPE power fail detection (Dying gasp)
- Provides Auto Laser Shutdown (ALS) function
- Supports Fiber Hardware Reset (FHR) function
- Provides fiber transceiver information for management
- Supports On-Line In-band F/W upgrade (local or remote) by the SNMP manager in FRM220

#### Specifications

Complies with IEEE 802.3 and IEEE 802.3u  
 288kb packet buffer in switch mode  
 1K MAC address table in switch mode  
 Supports IEEE802.3x flow control in switch mode  
 OAM is based on TS-1000 protocol

#### 10Base-T UTP Cable Requirement

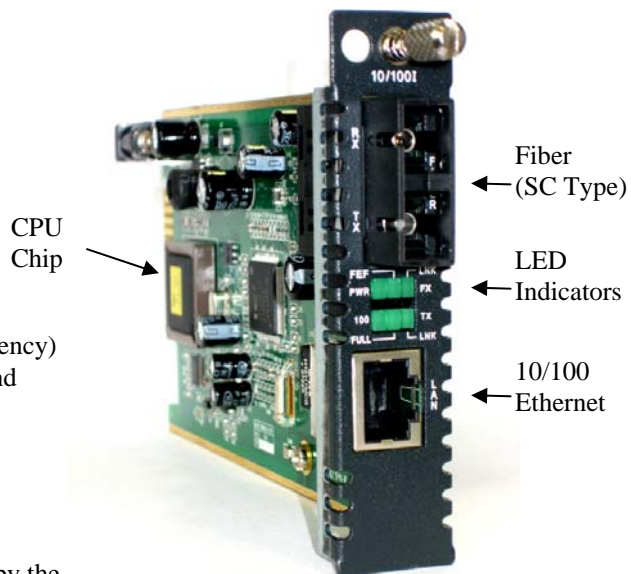
Cable type: Category 3, 4 or 5. Maximum distance: 100 meters (328 feet)

#### 100Base-TX UTP Cable Requirement

Cable type: Category 5, minimum. Maximum distance: 100 meters (328 feet)

#### Management

The 10/100i line card is managed by an on-card CPU when installed in the FRM220 CH20 chassis. **There are no DIP switches or manual settings.** If the MC is placed stand-alone, without local or remote connection to FRM220 NMC management, the MC runs with default parameter. The default parameters are: switch mode, auto-negotiation, LFP disabled, ALS (Auto Laser Shutdown) disabled, and no bandwidth limit. An optional console manageable single slot chassis, the CH01M, is available with DB9F connector for stand-alone serial console management.



10/100i is a media converter that must be placed in FRM220-CH20 for management. It utilizes fixed transceiver for 100Base-FX fiber connection and one 10/100 Ethernet electrical port.

## 1.7.2 FRM220-10/100iS-2 Dual Channel In-band managed 10/100 Fiber Media Converter

The FRM-10/100iS-2 (in-band converter) is Dual Channel (2 converters in 1 card) In-band Managed (OAM) Fiber Ethernet media converter (MC) that supports 10Base-T or 100Base-TX and converts to 100Base-FX (fiber). The UTP side supports auto-negotiation or forced settings for speed and duplex by setting as well as auto-MDIX. When the FRM-10/100iS-2 is placed in the **FRM220** with NMC, the settings are controlled by the chassis management system. The remote FRM-10/100i stand-alone may also be configured from the **FRM220** through the in-band management features (OAM).

### Features

- Dual Converter on a single card (2 independent channels)
- Supports Loop Back Test
- Auto-Cross over for MDI/MDIX in TP port
- Supports far end fault (FEF) function via OAM
- Auto-Negotiation or Manual mode in TP port
- Supports link fault pass through (LFP) function
- Bandwidth control (32K or 512Kbps x N)
- Forward 2046 bytes (max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports forwarding mode option
- Store and forward (switch) mode, Convert mode (small latency)
- Supports local or remote In-band management (Monitor and Configure status) by the SNMP manager in FRM220
- Supports remote CPE power fail detection (Dying gasp)
- Provides Auto Laser Shutdown (ALS) function
- Supports Fiber Hardware Reset (FHR) function
- Provides fiber transceiver information for management
- Supports On-Line In-band F/W upgrade (local or remote) by the SNMP manager in FRM220

### Specifications

Complies with IEEE 802.3 and IEEE 802.3u  
 288kb packet buffer in switch mode  
 1K MAC address table in switch mode  
 Supports IEEE802.3x flow control in switch mode  
 OAM is based on TS-1000 protocol  
**Compliance:** FCC part 15, Subpart B, Class A,  
 ANSI C63.4:2003  
 CE EN55022:2006, Class A  
 EN55024:1998+A1:2001+A2:2003  
 LVD: EN60950-1:2001  
 MTBF: 65,000 h (25°C)

### 10Base-T UTP Cable Requirement

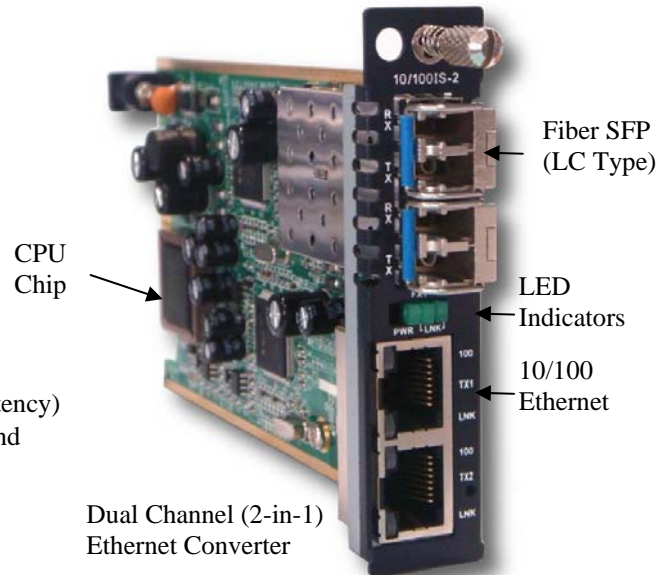
Cable type: Category 3, 4 or 5. Maximum distance: 100 meters (328 feet)

### 100Base-TX UTP Cable Requirement

Cable type: Category 5, minimum. Maximum distance: 100 meters (328 feet)

### Management

The 10/100iS-2 card is managed by an on-card CPU when installed in the FRM220 CH20 chassis. **There are no DIP switches or manual settings.** If the MC is placed stand-alone, without local or remote connection to FRM220 NMC management, the two separate MC run with default parameters. The default parameters are: switch mode, auto-negotiation, LFP disabled, ALS (Auto Laser Shutdown) disabled, and no bandwidth limit. When a fully populated CH20 (with 19 10/100iS-2) is deployed, a total of 38 loops are available from the 2U FRM220-CH20. Due to dimension limitations, the 10/100iS-2 is only available for SFP based fiber optics.



10/100iS-2 is a dual channel media converter that must be placed in FRM220-CH20 for management. It utilizes SFP for fiber connection and two 10/100 Ethernet electrical ports.

### 1.7.3 FRM220-10/100A(S) 802.3ah In-band managed 10/100 Fiber Media Converter

This IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution is designed to make conversion between 10/100Base-TX and 100Base-FX with SC or ST connector. With SNMP agent and GUI Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each 802.3ah series line card. This 802.3ah OAM Compliant media converter, with its Q-in-Q and maximum interoperability will enable carriers and service providers to have a clear vision of their network and conveniently manage their demarcation point.

#### Features

- 10/100Mbps auto-negotiation or forced mode operation on the TP interface
- Fiber 100Mbps/Full
- Supports Flow control function
- Supports OAM remote loopback to assist in diagnosing network problems
- Supports bandwidth control
- Supports Dying Gasp Reporting for power outage
- Supports QoS Classification
- Supports local / remote monitor
- Supports local / remote Configuration
- Supports Q in Q double tagged frame transparent
- Supports remote firmware upgrade
- Supports IEEE 802.1q Tag VLAN pass thru
- Compatible with FRM220 Managed Chassis

#### LAN Interface Specification

One RJ-45 female connector for straight or cross-over connection.

Supports 10/100Base-TX, n-way (Auto-Negotiation).

Transmission Packet Rate for 10Base-T: 14880 per second

100Base-TX: 148800 per second

Copper TP cable 4 pair Cat. 3 4, 5e or 6 UTP

#### Optical Interface Specification

Transceiver Connector type : ST or SC, or LC with SFP

Supports Full 100Mbps speed

Supports auto-receive sensitivity function, no extra attenuators needed.

#### General Specification

IEEE 802.3ah In-band OAM management compliant

6 diagnostic LEDs : Power/FX-Link ,TX-Speed/TX-Duplex/TX-Link/Test (loopback)

Temperature: 0 - 50° C (Operating); 0 - 70° C (Storage).

Humidity: 20-80% non-condensing (Operating); 10-90% (Storage).

Power: DC Jack : Switching adaptor (12V, 400mA)

Consumption: < 4W

Dimensions: 155mm x 88mm x 23mm (LxWxH).

Weight: 120g.

**Compliance:** FCC part 15, Subpart B, Class A,

ANSI C63.4:2003

CE EN55022:2006, Class A

EN55024:1998+A1:2001+A2:2003

LVD: EN60950-1:2001

MTBF: 65,000 h (25°C)

#### This product includes the following models:

- FRM220-10/100AS-2 (2 electrical plus 2 SFP 4-port fiber switch)
- FRM220-10/100A (2 electrical plus 1 fixed transceiver 3 port fiber switch)



10/100AS-2 is a stand-alone manageable 4 port Fast Ethernet fiber switch, utilizing SFP for 100Base-FX fiber connection and two 10/100 Ethernet electrical ports.

## 1.7.4 FRM220-1000EA(S) 802.3ah In-band managed Gigabit Fiber Media Converter

This IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution is designed to make conversion between 10/100/1000Base-TX and 1000Base-SX/LX with SFP-LC connector. With SNMP agent and GUI Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each 802.3ah series line card. This 802.3ah OAM Compliant media converter, with its Q-in-Q and maximum interoperability will enable carriers and service provider to have a clear vision of their network and conveniently manage their demarcation point.

### Features

- 802.3ah In-band OAM management compliant
- 2 ports 10/100/1000Base-T and 2 ports GbE fiber (SFP)
- Supports Flow control function
- Supports OAM remote loopback
- Supports spanning tree function
- Supports bandwidth control
- Supports Dying Gasp Reporting for power outage
- Supports local / remote monitor
- Supports local / remote Configuration
- Supports Q in Q double tagged frame transparent
- Supports remote F/W upgrade (In-band)
- Supports IEEE 802.1q Tag VLAN pass thru and port-base VLAN
- Provides fiber transceiver information for management
- Compatible with FRM220 Managed Chassis

### LAN Interface Specification

Two RJ-45 female connectors for straight or cross-over connection.  
 Supports 2-port 10/100/1000Base, n-way (Auto-Negotiation).  
 Supports Full, Half duplex, 10/100/1000 speed force mode selections.  
 Transmission Packet Rate for 10Base-T: 14880 per second  
 100Base-TX: 148800 per second ; 1000Base-T: 1488000 per second  
 Copper TP cable 4 pair Cat. 5e or 6 UTP

### Optical Interface Specification

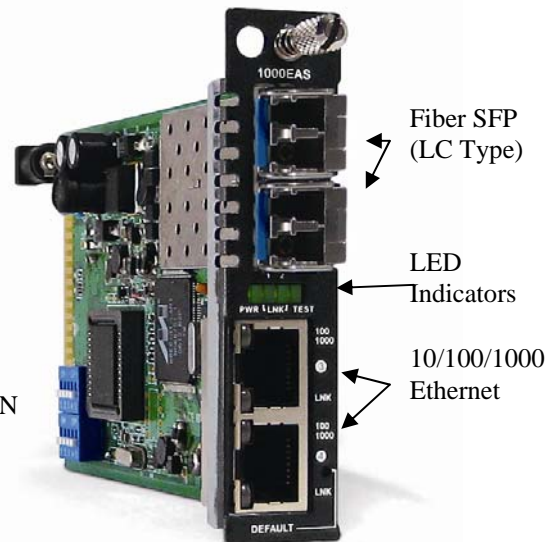
Transceiver Connector type : SFP-LC  
 Supports 2-port, 1000Mbps SFP slot  
 Supports auto-receive sensitivity function, no extra attenuators needed.

### General Specification

Standards IEEE 802.3 10Base-T,  
 IEEE 802.3u 100Base-TX , 100Base-FX,  
 IEEE 802.3ab, 802.3z 1000Base-T, 1000Base-SX/LX  
 IEEE 802.3ah In-band OAM management compliant  
 6 diagnostic LEDs : Power / FX-Link ,TX-Speed / TX-Duplex/ TX-Link / Test (loopback)  
 Temperature: -10 - 60° C (Operating);-20 - 70° C (Storage).  
 Humidity: 0-95% non-condensing (Operating); 10-90% (Storage).  
 Power: DC Jack : Switching adaptor (12V, 1A)  
 Consumption: < 12W  
 Dimensions: 155mm x 88mm x 23mm (LxWxH).  
 Weight: 120g.  
**Compliance:** FCC part 15, Subpart B, Class A,  
 ANSI C63.4:2003  
 CE EN55022:2006, Class A  
 EN55024:1998+A1:2001+A2:2003  
 LVD: EN60950-1:2001  
 MTBF: 65,000 h (25°C)

### This product includes the following models:

- 1000EAS (2 electrical plus 2 SFP)
- 1000EAS-1 (1 electrical plus 1 SFP)
- 1000EA-1 (1 electrical plus 1 fixed fiber)
- 1000EAS-2F (2 SFP)



1000EAS is a stand-alone manageable 4 port Gigabit Ethernet fiber switch, utilizing SFP for 1000Base-SX/LX fiber connection and two 10/100/1000 Ethernet electrical ports.

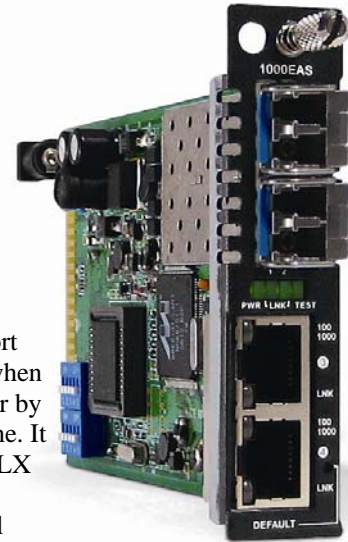
## 1.7.5 FRM220-1000EDS Managed Gigabit Fiber Media Converter

The FRM220-1000EDS is a dual channel (two in one) copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-TX and 1000Base-SX/LX with SFP connector. With SNMP and Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each card in the chassis. This converter also supports features such as ingress/egress bandwidth control, auto or forced mode setting for copper Ethernet as well as auto laser shutdown. The FRM220-1000E(s)-1 is a single copper to single fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-TX and 1000Base-SX/LX with SC or SFP LC connector.

### Features

- 2-port 10/100/1000Base-T to 2-port 1000Base-SX/LX (EDS)
- 1-port 10/100/1000Base-T to 1 port 1000Base-SX/LX (ES-1)
- Supports dual converter mode or switch mode
- Auto-negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (Max.) packets
- Support Bandwidth Control (70k ~ 250Mbps)
- Supports Flow control (Pause)
- Support Link fault pass through (LFP) function
- Supports remote CPE power fail detect (dying gasp)
- Auto Laser Shutdown (ALS)
- Online local f/w upgrade

1000EDS is a manageable 4 port Gigabit Ethernet fiber switch when placed in the FRM220-CH20 or by DIP switches if used stand-alone. It utilizes SFP for 1000Base-SX/LX fiber connection and two 10/100/1000 Ethernet electrical ports.



### Specifications

Ports	Optical Interface Connector : SFP LC Data rate : 1000Mbps Duplex mode : Full duplex Cable type : MM 62.2/125 $\mu$ m, 50/125 $\mu$ m. SM 9/125 $\mu$ m Distance : MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km Wavelength: 1310nm, 1550nm,
	Electrical Interface Connector : RJ45 Data rate : 10Mbps, 100Mbps, 1000Mbps Duplex mode: Half / Full duplex Cable type: 10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e, 1000Base-T Cat. 5e or higher Distance: 100 meters
Standards	IEEE 802.3, IEEE 802.3u, IEEE802.3ab, IEEE802.3z
LEDs	Power, FX-Link 1/2, 2Ch, TX-Link, TX-SPD
Power	DC In 12V
Power Consumption	< 5W
Dimension (D x W x H) mm	155 x 88 x 23mm
Weight	120g
Temperature	-10~60° C (Operating) , -20~70° C (Storage)
Humidity	10~95% non-condensing
Certification	CE LVD/EMI, FCC, RoHS
MTBF	65,000 h (25° C)

### This product includes the following models:

- 1000EDS (2 electrical plus 2 SFP)
- 1000ES (1 electrical plus 1 SFP)
- 1000E (1 electrical plus 1 fixed optical)

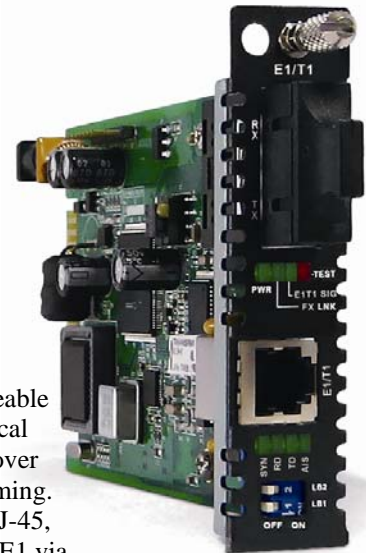
## 1.7.6 FRM220-E1/T1 In-band managed G.703 E1/T1(DS1) Fiber Modem

The FRM220-E1/T1 is a fiber modem transport for G.703 E1 or T1(DS1) transmission. The BNC model (E1 only) provides unbalanced 75 Ohm coaxial connections while the RJ-45 model provides balanced 100/120 Ohm connections over twisted pair wiring. When the FRM220-E1/T1 card is placed in the FRM220 rack with in-band management, the card status, type, version, fiber link status, E1 or T1 link status and alarms can all be displayed. Configuration is also available to enable or disable the port, reset the port, do far end fault setting, and initiate local or far end loop-back tests. When configured in G.703 E1 mode, this model also supports fractional E1 (G.704) as well as remote connection to FRM220-Data (V.35, RS-530/449, X.21) fiber modem for either unframed (2048Kbps) or fractional (nx64kbps where n=1 to 31) transmissions.

### Features

- Network Management via Terminal or SNMP in FRM220 chassis
- T1/E1 RJ-45 (USOC RJ-48C) or Coax (BNC) Fiber Modem
- Supports AMI or B8ZS/HDB3 line codes
- Unframed (transparent clear channel) mode
- N x 64K (fractional E1) mode
- Supports point to point (CPE) solution with FRM220-DATA
- User selectable Loop back tests
- Far End Fault (FEF) detection

E1/T1 is a stand-alone manageable G.703 E1/DS1(T1) Fiber Optical Modem that can carry E1/T1 over fiber transparently or with framing. One model is designed with RJ-45, while another model supports E1 via coaxial BNC connections.



### Specifications

<i>Ports</i>	Connector	1x9 (SC, ST, FC) or SFP LC
<i>Optical Interface</i>	Cable type	MM 62.2/125µm, 50/125µm. SM 9/125µm
	Cable length	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310, 1550nm, WDM 1310Tx/1550Rx(type A), 1550Tx/1310Rx(type B)
	Data rate	36.864Mbps
<i>Electrical Interface</i>	Connector	RJ45 E1-120ohm, T1-100ohm, BNC E1-75ohm
	Data rate	E1: 2.048Mbps, T1:1.544Mbps
	Line Code	E1 HDB3/AMI, T1 B8ZS/AMI
	Cable type	Cat.3 or higher Twisted-Pair cable
<i>Standards</i>		E1 ITU-T G.703, G.704, G.706, G.732, G.823 T1 ITU-T G.703, G.704, AT&T, TR-62411, ANSI T1.403
<i>LEDs</i>		Power, FX-Link, E1/T1 SIG, Test, SYN, RD, TD, AIS
<i>Power</i>		DC In 12V
<i>Consumption</i>		< 5W
<i>Dimensions</i>		155 x 88 x 23mm (D x W x H)mm
<i>Weight</i>		120g
<i>Temperature</i>		-10~60°C (Operating) , -20~70°C (Storage)
<i>Humidity</i>		10~95% non-condensing
<i>Certification</i>		CE, FCC, LVD, RoHS
<i>MTBF</i>		65,000 h (25°C)

### This product includes the following models:

- E1/T1R (RJ-45 electrical plus fixed optical)
- E1T1RS (RJ-45 electrical plus SFP)
- E1B (Dual BNC plus fixed optical)
- E1BS (Dual BNC plus SFP)

## 1.7.7 FRM220-Data In-band managed V.35, X.21, RS-530/449/232 Fiber Modem

The FRM220-DATA is a fiber modem for high-speed (up to 8.192Mbps) synchronous or low speed synchronous and asynchronous data transmissions (V.35, RS-232, RS-530, X.21 or RS-449) over fiber optical media. When the FRM220-DATA card is placed in the FRM220 rack with SNMP management, in-band management allows viewing the card and remote modem's status, type, version, fiber link status, data link status and alarms. Both card and remote can be configured to enable or disable the port, reset the port, set the data rate, modify the clock mode, and initiate local or far end loop back tests. The FRM220-Data Fiber Modem may also be paired with the FRM220-E1/T1 for Nx64K transmissions.

### Features

- Synchronous or Asynchronous data over fiber
- In-band network management
- Manage via terminal, web or SNMP in FRM220-CH20 chassis
- Software selectable interface, V.35, X.21, RS530, RS449, RS232
- Software selectable DCE or DTE mode
- User selectable data rate n x 64kbps, up to 9Mbps
- Independent clock mode setting
- TC RC clock (internal, external, or recovery)
- Electrical and optical loop back tests
- Compatible with FRM220-E1 on same fiber link for N x 64k
- Stand-Alone Console management with CH01M single slot chassis



### Specifications

#### Ports

#### Optical Interface

Connector : 1x9 (SC, ST, FC) or SFP LC  
 Data rate : 36.864Mbps  
 Line coding: Scrambled NRZ  
 Bit Error Rate: Less than 10<sup>-10</sup>  
 Cable type : MM 62.2/125μm, 50/125μm. SM 9/125μm  
 Distance : MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km  
 Wavelength: 1310nm, 1550nm,

#### Electrical Interface

Connector : **HDB26F w/ adapter cable for V35, X21, RS530, RS449,RS232**

Line Code: NRZ  
 Baud Rate: RS-232 up to 384K sync and async  
           V.35/RS-530 up to 9152k sync, async up to 2048k  
           N\*64Kbps , where n=1 to 143 (64K ~ 9152Kbps)  
 Receive and Transmit Clock source :Internal, Recovery, External

#### Standards

ITU-T  
 Power, FX Link, RTS, Test , TD, RD, CTS, DCD

#### LEDs

#### Power

#### Power Consumption

#### Dimension (D x W x H) mm

#### Weight

#### Temperature

#### Humidity

#### Certification

#### MTBF

DC In 12V

< 5W

155 x 88 x 23mm

120g

-10~60° C (Operating) , -20~70° C (Storage)

10~95% non-condensing

CE LVD/EMI, FCC, RoHS

65,000 h (25° C)

### This product includes the following models:

- FRM220-Data/XXX (Fiber Modem with fixed optical and adapter cable)
- FFRM220-DataS/XXX (Fiber Modem with SFP and adapter cable)

Where XXX equals:

232 for RS-232 cable (DB25F)

530 for RS-530 cable (DB25F)

V35 for V.35 cable (MB34F)

X21 for X.21 cable (DB15F)

449 for RS-449 cable (DB37F)



## 1.7.8 FRM220-Serial/485 In-band managed RS-485/422/232 Fiber Modem

The FRM220-Serial/485 provides an Asynchronous Fiber Modem solution to extend RS-485 or RS-232 transmission distance up to 2km over multimode fiber or up to 120km over single mode fiber. The modem is equipped with multiple interface circuits for connection to RS-232 or RS-485/422 (2 or 4 wire, full or half duplex). The FRM220-Serial/485 secures data transmission over EMI resistant fiber at speeds up to 460kbps for RS-232 or up to 1024kbps for RS-485/422. When the FRM220-Serial/485 card modem is placed in the FRM220 rack with SNMP management, in-band management allows viewing the card and remote modem's status, type, version, fiber link status, data link status and alarms. Both card and remote can be configured to enable or disable the port, reset the port and set the interface type.

### Features

- Extend asynchronous serial transmission from 2km to 120km over fiber
- In-band network management
- Manage via terminal, web or SNMP in FRM220-CH20 chassis
- Software selectable data interface for RS232/ 422/ 485
- Software selectable two wires (half duplex) or four wires (full duplex) RS485
- Software selectable three or five wires RS232
- Speeds up to 460kbps for RS232 (Async. mode)
- Speeds up to 1Mbps for RS485/ 422 (Async)

### Specifications

#### Ports

#### Optical Interface

Connector : 1x9 (SC, ST, FC) or SFP LC

Data rate : 36.864Mbps

Line coding: Scrambled NRZ

Bit Error Rate: Less than  $10^{-10}$

Cable type : MM 62.2/125 $\mu$ m, 50/125 $\mu$ m. SM 9/125 $\mu$ m

Distance : MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km

Wavelength: 1310nm, 1550nm,

#### Electrical Interface

Connector : 6 pins Terminal block

Data Signal Formats

RS485 2-wire

RS422 4-wire

RS232 RTS/CTS 5-wire

RS232 3-wire

Baud Rate:

RS422, RS485 up to 1024kbps

RS232 up to 256kbps

EIA/TIA RS485, RS422, RS232

Power, FX Link, DI, DO, Test

DC In 12V

Standard

LEDs

Power

Power Consumption

Dimension (D x W x H) mm

Weight

Temperature

Humidity

Certification

MTBF

< 5W

155 x 88 x 23mm

120g

-10~60° C (Operating) , -20~70° C (Storage)

10~95% non-condensing

CE LVD/EMI, FCC, RoHS

65,000 h (25° C)



### This product includes the following models:

- FRM220-Serial/485 (6 pin terminal block and fixed fiber transceiver)
- FRM220-Serial/485S (6 pin terminal block with SFP)

## 1.7.9 FRM220-FXO/FXS In-band managed POTS (Voice) over Fiber Modem

FRM220-FXO/FXS POTS phone line converter extender is used to connect PSTN voice signals to distant Plain Old Telephone (POTS) devices. FRM220-FXO/FXS provides a fiber media transport for POTS transmission and features an RJ-11C for copper connection. A pair of FRM220-FXO/FXS is required to implement an end to end system. FXO mode connects to a telephone line or PBX and has ability to detect ringing voltages and to act as a telephone. FXS mode is the reciprocal unit and has ability to act as PSTN and connects to a telephone device. When the FRM220-FXO/FXS card is placed in the FRM220 rack with SNMP management, in-band management allows viewing the card and remote converter's status, type, version, fiber link status, on hook status and alarms. Both card and remote can be configured to enable or disable the port, reset the port and set the FXO or FXS mode.

### Features

- Extend telephone voice transmission from 2km to 120km over fiber
- Management via terminal, web or SNMP in FRM220-CH20 chassis
- Manage stand-alone via DIP Switch
- Supports telephone voice transmission
- Supports caller ID pass through
- Selectable FXO or FXS mode
- Supports FXS to FXS hot line

### Specifications

#### Ports

#### Optical Interface

Connector : 1x9 (SC, ST, FC) or SFP LC  
 Cable type : MM 62.2/125 $\mu$ m, 50/125 $\mu$ m. SM 9/125 $\mu$ m  
 Distance : MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km  
 Wavelength: 1310nm, 1550nm,

#### Electrical Interface

Connector : RJ-11

#### FXO mode

Impedance : 600 ohms  
 Coding : 16 bits liner  
 Loop Current : 10~100mA  
 Ring Frequency : Acceptable 20 ~50Hz  
 Insertion Loss: 0.0  $\pm$  1.0dB at 1000Hz

#### FXS mode

Impedance : 600 ohms  
 Coding : 16 bits liner  
 Dial: DTMF and Dial Paul  
 Battery Source: 48VDC  $\pm$  4V  
 Ringing Waveform : Sine wave  
 Ringing Frequency : 20/25/30/50 Hz selectable  
 Ring Cadence: FXS to FXS : On / 1 sec, Off / 2 sec  
 FXO to FXS; Reproduces the cadence detected by FXO

Insertion Loss 0.0  $\pm$  1.0dB at 1000Hz  
 REN: 4.0B(Ring Equivalence Number)

Power, FX Link, Phone Act, Test

DC In 12V

LEDs  
 Power  
 Power Consumption  
 Dimension (D x W x H) mm  
 Weight  
 Temperature  
 Humidity  
 Certification  
 MTBF

< 5W  
 155 x 88 x 23mm  
 120g  
 -10~60° C (Operating) ,-20~70° C (Storage)  
 10~95% non-condensing  
 CE LVD/EMI, FCC, RoHS  
 65,000 h (25° C)



### This product includes the following models:

- FRM220-FXO/FXS (POTS over Fiber fixed transceiver)
- FRM220-FXO/FXS-S (POTS over Fiber SFP)

## 1.7.10 FRM220-155MS SM/MM, MM/SM converter / repeater

The FRM220-155MS is a fiber to fiber optical media converter and repeater that allows data rates up to 155Mbps. FRM220-155MS supports 2R regeneration, which consists of re-amplification and reshaping. This converter is compatible with fiber interfaces such as 100Mbps Fast Ethernet, 155Mbps STM1 and OC3. The FRM220-155MS works well with FRM220-CH20 chassis as slide-in card or with FRM220-CH01, one slot chassis as a stand-alone fiber converter. When the FRM220-155MS card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port or enable/disable Auto Laser Shutdown.

### Features

- Transparent fiber media converter / repeater
- Speed up to 155Mbps ( Fast Ethernet, OC3, STM-1)
- Manage via terminal, web or SNMP in FRM220-CH20 chassis
- Extend transmission from 2km to 120km over fiber
- Perform optical repeater function (Re-amplification & Reshaping)
- Supports Client / Line loop back test
- Link Fault Pass through (LFP)
- Auto Laser Shutdown (ALS)



### Specifications

#### Ports

#### Optical Interface

Connector : 1x9 (SC, ST, FC) or SFP LC  
 Data rate: Up to 155Mbps ( Fast Ethernet, OC3, STM-1)  
 Regeneration type: 2R  
 Loop back: Line/Client  
 Cable type : MM 62.2/125µm, 50/125µm. SM 9/125µm  
 Wavelength: 1310nm, 1550nm,  
 Power, Line Link, Client Link, Test  
 DC In 12V  
 < 5W  
 Dimension (D x W x H) mm 155 x 88 x 23mm  
 Weight 120g  
 Temperature -10~60° C (Operating) , -20~70° C (Storage)  
 Humidity 10~95% non-condensing  
 Certification CE LVD/EMI, FCC, RoHS  
 MTBF 65,000 h (25° C)

LEDs

Power

Power Consumption

Dimension (D x W x H) mm

Weight

Temperature

Humidity

Certification

MTBF

#### This product includes the following models:

- FRM220-155MS (STM-1 Fiber Repeater with fixed transceivers)
- FRM220-155MS-SFP (STM-1 Fiber Repeater with SFP)

## 1.7.11 FRM220-2.7G-2S, 2.7Gbps 3R Fiber Transponder

The FRM220-2.7G-2S is an optical 3R regeneration device, which provides re-amplification, reshaping and retiming. The transponder card converts a data signal to the correct wavelength for transmission on a specific channel by supporting SFP optics on both line side and client side interfaces. When the FRM220-2.7G-2S 3R card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port and set the desired data rate.

### Features

- Protocol transparent fiber media converter / repeater
- Up to 2.7Gbps
- Clocking for Fast Ethernet, OC3, STM-1,STM-4, STM-16,FC-1, FC-2
- Network management via terminal, web or SNMP in FRM220-CH20 chassis
- Extend transmission from 2km to 120km over fiber
- Perform 3R optical repeater function (Re-amplification & Reshaping, Re-clocking)
- Supports Client / Line loop back test
- Link Fault Pass through (LFP)
- Auto Laser Shutdown (ALS)
- Serial console for stand-alone management  
When used with CH01M one slot chassis

### Specifications

#### Ports

#### Optical Interface

Connector : LC (SFP)

Data rate: Up to 2.7Gbps

Fixed rates for:

Fast Ethernet (125M)

STM-1/OC3 (155.52M)

STM-4/OC12 (622.080M)

STM-16/OC48 (2,488.32M)

FC-1 (1.0625G)

FC-2 (2.125G)

Regeneration type: 3R

Loop back: Line/Client

Cable type : SM 9/125 $\mu$ m, MM 50/125 $\mu$ m, 62.2/125 $\mu$ m

Wavelength: 850, 1310,1550nm,

Power, Line Link, Client Link, Test, Alarm

DC In 12V

< 10W

LEDs  
Power  
Power Consumption  
Dimension (D x W x H) mm

155 x 88 x 23mm

Weight

120g

Temperature

-10~60° C (Operating) ,-20~70° C (Storage)

Humidity

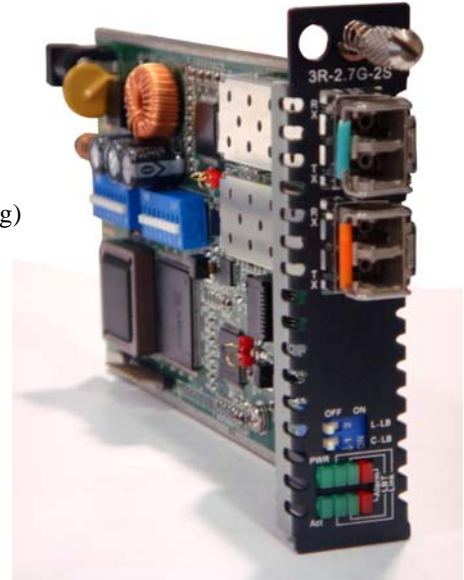
10~95% non-condensing

Certification

CE, FCC, LVD, RoHS

MTBF

65,000 h (25° C)

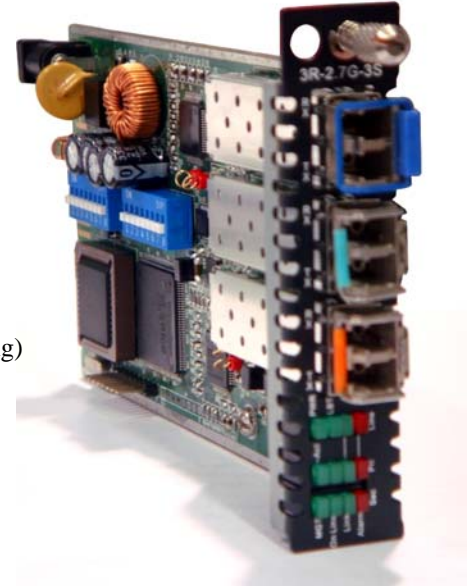


## 1.7.12 FRM220-2.7G-3S 3R Transponder with Protection

The FRM220-2.7G-3S is an optical 3R regeneration device, which provides re-amplification, reshaping and retiming and offers fiber protection. The transponder card converts a data signal to the correct wavelength for transmission on a specific channel by supporting SFP optics on line side to Primary or Secondary interfaces. When the FRM220-2.7G-3S 3R card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port and set the desired data rate.

### Features

- Protocol transparent fiber media converter / repeater
- Supports fiber redundancy by switching Primary to Secondary path
- Programmable receive optical threshold fiber protection
- Up to 2.7Gbps
- Clocking for Fast Ethernet, OC3, STM-1,STM-4, STM-16,FC-1, FC-2
- Network management via terminal, web or SNMP in FRM220-CH20 chassis
- Extend transmission from 2km to 120km over fiber
- Perform 3R optical repeater function (Re-amplification & Reshaping, Re-clocking)
- Supports Line / Primary / Secondary loop back test
- Link Fault Pass through (LFP)
- Auto Laser Shutdown (ALS)
- Serial console for stand-alone management  
When used with CH01M one slot chassis



### Specifications

#### Ports

#### *Optical Interface*

Connector : LC, 1 Line SFP, 1 Primary SFP, 1 Secondary SFP

Data rate: Up to 2.7Gbps

Fixed rates for:

- Fast Ethernet (125M)
- STM-1/OC3 (155.52M)
- STM-4/OC12 (622.080M)
- STM-16/OC48 (2,488.32M)
- FC-1 (1.0625G)
- FC-2 (2.125G)

Regeneration type: 3R

Loop back: Line / Primary or Secondary

Cable type : SM 9/125 $\mu$ m, MM 50/125 $\mu$ m, 62.2/125 $\mu$ m

Wavelength: 850, 1310,1550nm,

Power, Line Link, Primary Link, Secondary Link, Test, Alarm

DC In 12V

LEDs

Power

Power Consumption

< 10W

Dimension (D x W x H) mm

155 x 88 x 23mm

Weight

120g

Temperature

-10~60° C (Operating) ,-20~70° C (Storage)

Humidity

10~95% non-condensing

Certification

CE, FCC, LVD, RoHS

MTBF

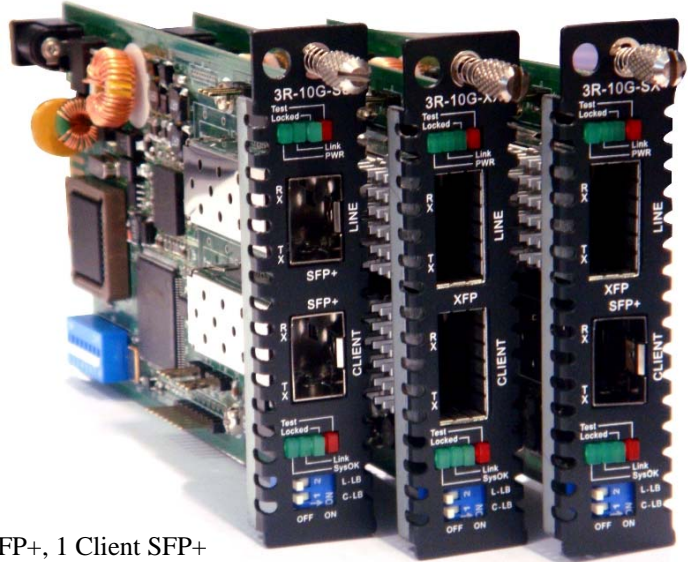
65,000 h (25° C)

## 1.7.13 FRM220-10G-xx 10Gbps 3R Fiber Transponder

The FRM220-10G-xx is a series of managed 10G fiber to fiber 3R repeater/transponders. Based on a number of 10 Gigabit Fiber standards, these transponders support XFP to XFP (XX), SFP+ to XFP (SX), or SFP+ to SFP+ (SS) fiber connections. The transponders are protocol transparent, providing 3R regeneration between these different optical module types. One of the major applications for this converter is in connecting proprietary transceiver equipment to CWDM or DWDM when these 'colored' optical modules are not available for the proprietary equipment. With full duplex wire speed forwarding capability between the 2 fiber media, the FRM220-10G-xx brings you the best and simplest solution for your 10G conversion between fiber and fiber.

### Features

- Protocol transparent 3R fiber media transponder/repeater
- Supports IEEE802.3ae, 10G Fiber Ethernet
- Supports 10G Fiber Channel, STM-64
- Network management via terminal, web or SNMP in FRM220-CH20 chassis
- Extend 10G Ethernet transmission over fiber
- Useful as a 'Transponder' in CWDM or DWDM systems for 10G Ethernet/Fiber Channel/STM-64
- Supports Client / Line loop back tests
- Serial console for stand-alone management  
When inserted in CH01M Single Slot Chassis



### Specifications

#### Ports

#### Optical Interface

##### FRM220-10G-SS

Connector : LC, 1 Line SFP+, 1 Client SFP+

##### FRM220-10G-XX

Connector : LC, 1 Line XFP, 1 Client XFP

##### FRM220-10G-SX

Connector : LC, 1 Line XFP, 1 Client SFP+

Data rates:

- 10G FC (10.51875G)
- 10G Base Ethernet (10.3125G)
- STM-64/OC192 (9.95328G)
- OTN G.709 OTU2 (10.709225G)

Loop back: Line/Client

Cable type : SM 9/125 $\mu$ m, MM 50/125 $\mu$ m, 62.2/125 $\mu$ m

Wavelength: 850, 1310, 1550nm,

Power, Line Link, Client Link, Test

DC In 12V

LEDs

Power

Power Consumption

Dimension (D x W x H) mm

Weight

Temperature

Humidity

Certification

MTBF

< 8W

155 x 88 x 23mm

120g

-10~60 $^{\circ}$  C (Operating) , -20~70 $^{\circ}$  C (Storage)

10~95% non-condensing

CE, FCC, LVD, RoHS

65,000 h (25 $^{\circ}$  C)

### This product includes the following models:

- FRM220-10G-SS (10G fiber 3R transponder/repeater, SFP+ to SFP+)
- FRM220-10G-XX (10G fiber 3R transponder/repeater, XFP to XFP)
- FRM220-10G-SX (10G fiber 3R transponder/repeater, SFP+ to XFP)

## Chapter 2 Installation

### 2.1 Introduction

The Installation chapter will cover the physical installation of the **FRM220**, Rack Mount In-Band Managed Series Fiber Converter Platform Chassis, the electrical connections, interface connections and cabling requirements. A brief overview of the functional components such as main unit and management options will also be outlined in this chapter.

#### Required Tools

You will need these tools to install the **FRM220**:

Number 2 Phillips screwdriver for the 3mm and the 12-24 rack installation screws.

Wrist strap or other personal grounding device to prevent ESD occurrences.

Antistatic mat or antistatic foam to set the equipment on.

### 2.2 Site Preparation

Install the **FRM220** within reach of an easily accessible grounded AC outlet or three wire (-48VDC, Power return, Earth Ground) central office power. The AC outlet should be capable of furnishing 90 to 250 VAC. Refer to 2.4 Electrical Installation. Allow at least 10cm (4 inch) clearance at the front of the **FRM220** for the Fiber and other copper cables.

### 2.3 Mechanical Assembly

The **FRM220** is designed for rack mount installation and will require 2U space in a standard EIA 19" or 23" rack. The **FRM220** has two removable fan units that install in the rear side of the chassis. Without fans, excessive temperatures within the unit might cause it to electrically shutdown. The **FRM220** chassis is delivered completely assembled, however power modules and converter cards may or may not be installed in the chassis upon delivery. The rack mount adapters may be placed along the front or centrally located on the chassis. The same brackets also allow installation into a 23" rack and in this configuration, central mounting is recommended.

#### 2.3.1 Rack mounting

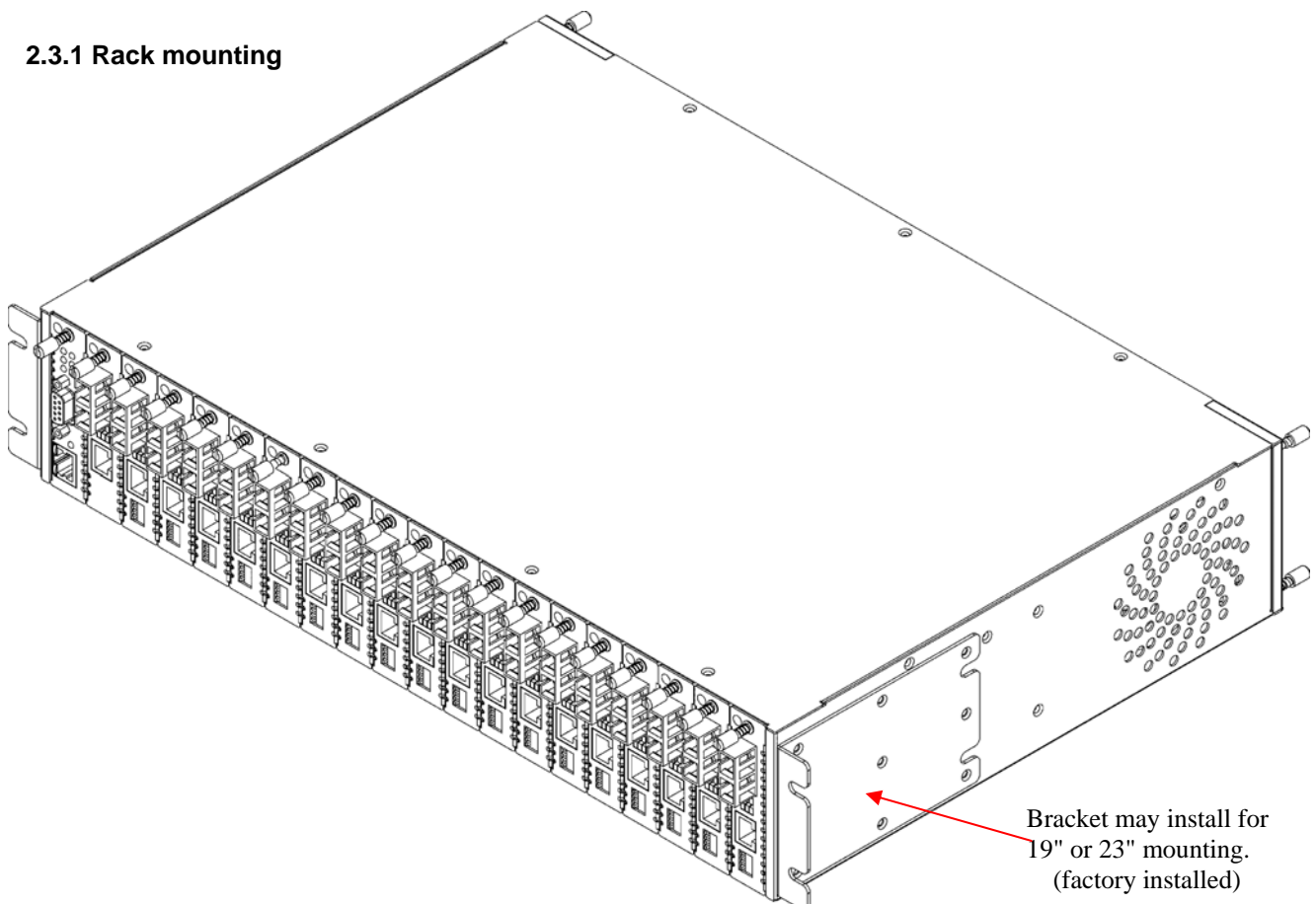


Figure 2-1 Standard 19" Rack-Mount Installation of **FRM220** Unit requires 2RU space

### 2.3.2 Fan Units Removal/Replacement

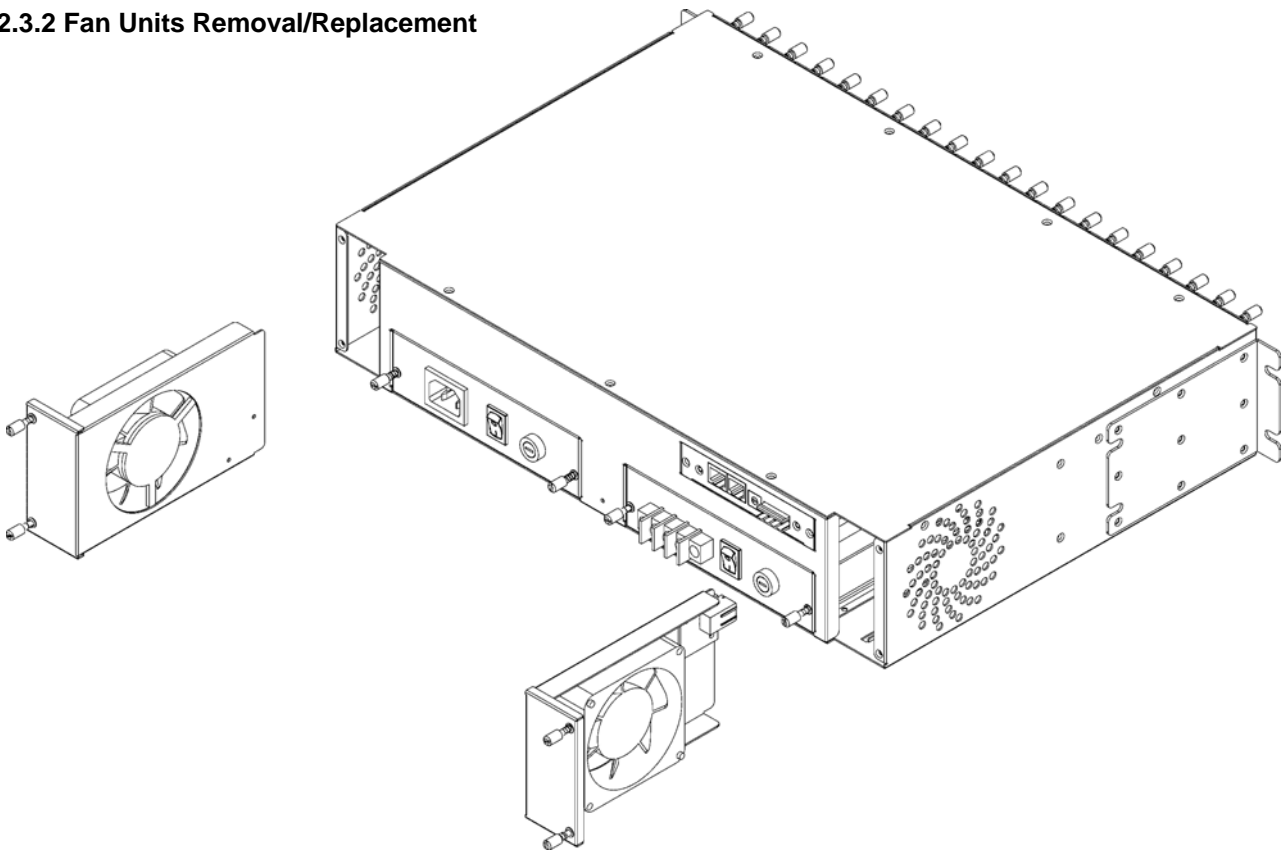
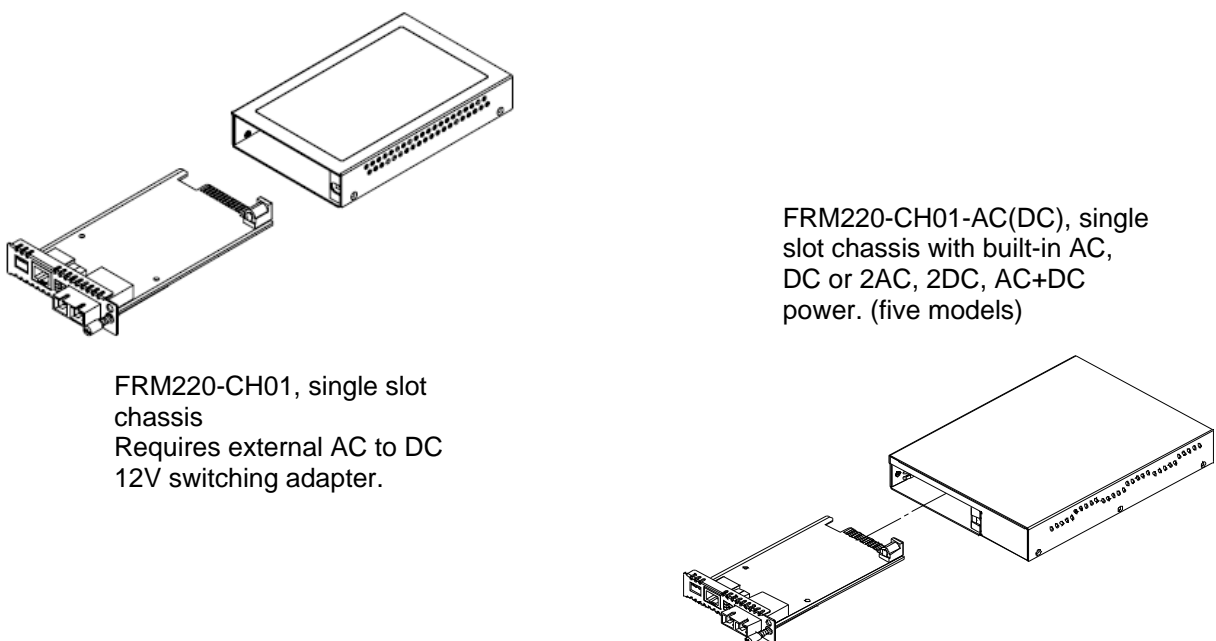


Figure 2-2 Removal/Replacement of **FRM220** Fan Units

### 2.3.3 Line Card Conversion, Stand-alone/Rack

The **FRM220** Media Converter Line Card may be mounted in the **FRM220-CH20** chassis or serve as a stand-alone unit. When installing in the **FRM220-CH01** single slot chassis, the outer cover holds the line card. The unit then serves as a stand-alone media converter that can be linked to a line card in the **FRM220** chassis.



FRM220-CH01, single slot chassis  
Requires external AC to DC  
12V switching adapter.

FRM220-CH01-AC(DC), single slot chassis with built-in AC, DC or 2AC, 2DC, AC+DC power. (five models)

Figure 2-3 Converting **FRM220** line card for stand-alone use



## 2.4 Electrical Installation

With an AC power module, AC power is supplied to the **FRM220** through a standard IEC C14 3-prong receptacle, located on the rear of the module. Any national power cord with IEC C13 line plug may be used to connect AC power to the power module. With a DC module, DC -48V is connected to the terminal block located on the rear of the module, observing the proper polarity. The **FRM220** should always be grounded through the protective earth lead of the power cable in AC installations, or via the frame ground connection for DC installations.

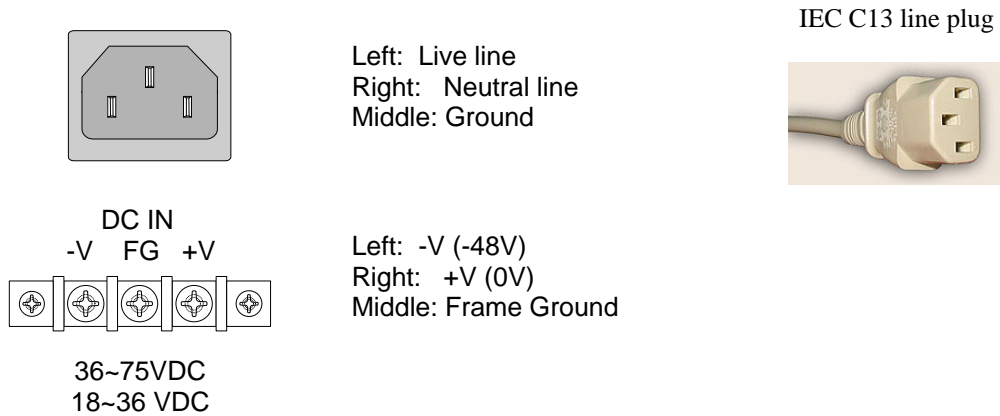


Figure 2-4 IEC (AC) & terminal block (DC) power connector pin assignment

## 2.5 Alarm Installation

The alarm relay provides one set of Power Failure contacts (normally open) and another set of FAN Failure contacts (normally open) contacts for monitoring the power and fans condition of the **FRM220**. The alarm contacts may also be programmed through the management interface to react to different fault conditions.

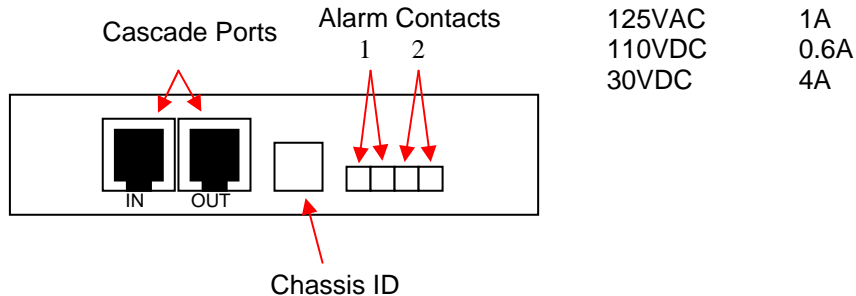


Figure 2-5 Alarm Relay Contacts and Cascade Ports

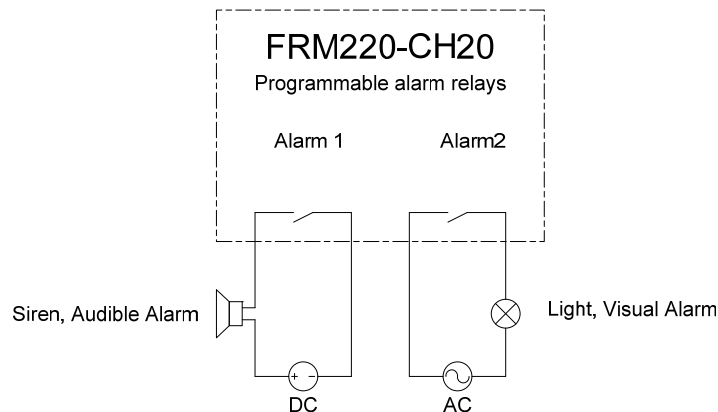


Figure 2-6 Example of electrical circuit for visual and audible alarms

### 2.6 Chassis Cascade

The **FRM220** chassis may be cascaded in such a manner that only one single IP address is required to manage up to 10 chassis in a single location. The connection diagram is shown below. Each chassis is assigned a unique ID starting at zero for the master chassis and incrementing for each cascaded chassis, up to an ID of nine. The "out" of the parent chassis connects to the "in" of the slave using any standard UTP cable with RJ-45 connectors.

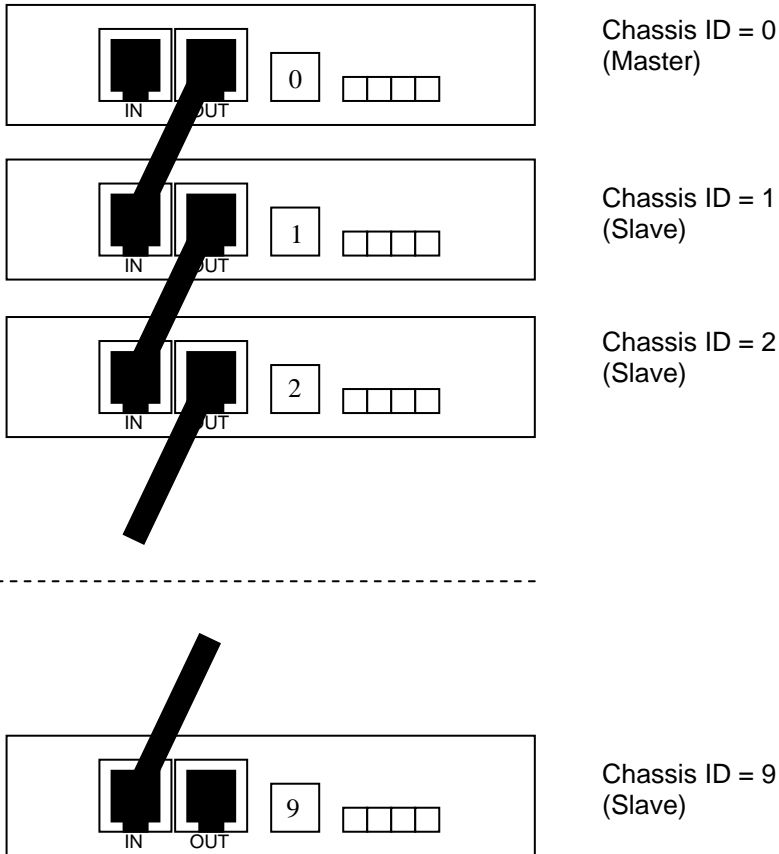


Figure 2-7 Cascade Ports Connections and ID assignment

Figure 2-8 Cascade Ports Detailed Pin Assignment

### 2.7 Power Modules Removal/Replacement

The Power Supply Modules in the **FRM220** are available in three versions, one AC and two DC types. The universal AC version supports input voltages of 90 to 264 volts at frequencies of 47 to 63 Hertz. The DC version supports either a standard 36 to 72VDC or an optional 18 to 36VDC input voltage. Only one power supply module is required to power a completely full rack. When two Power Supply Modules are installed, the supplies are hot swappable and redundant, meaning any one supply may be removed and replaced without impacting the operation of the **FRM220** Rack.

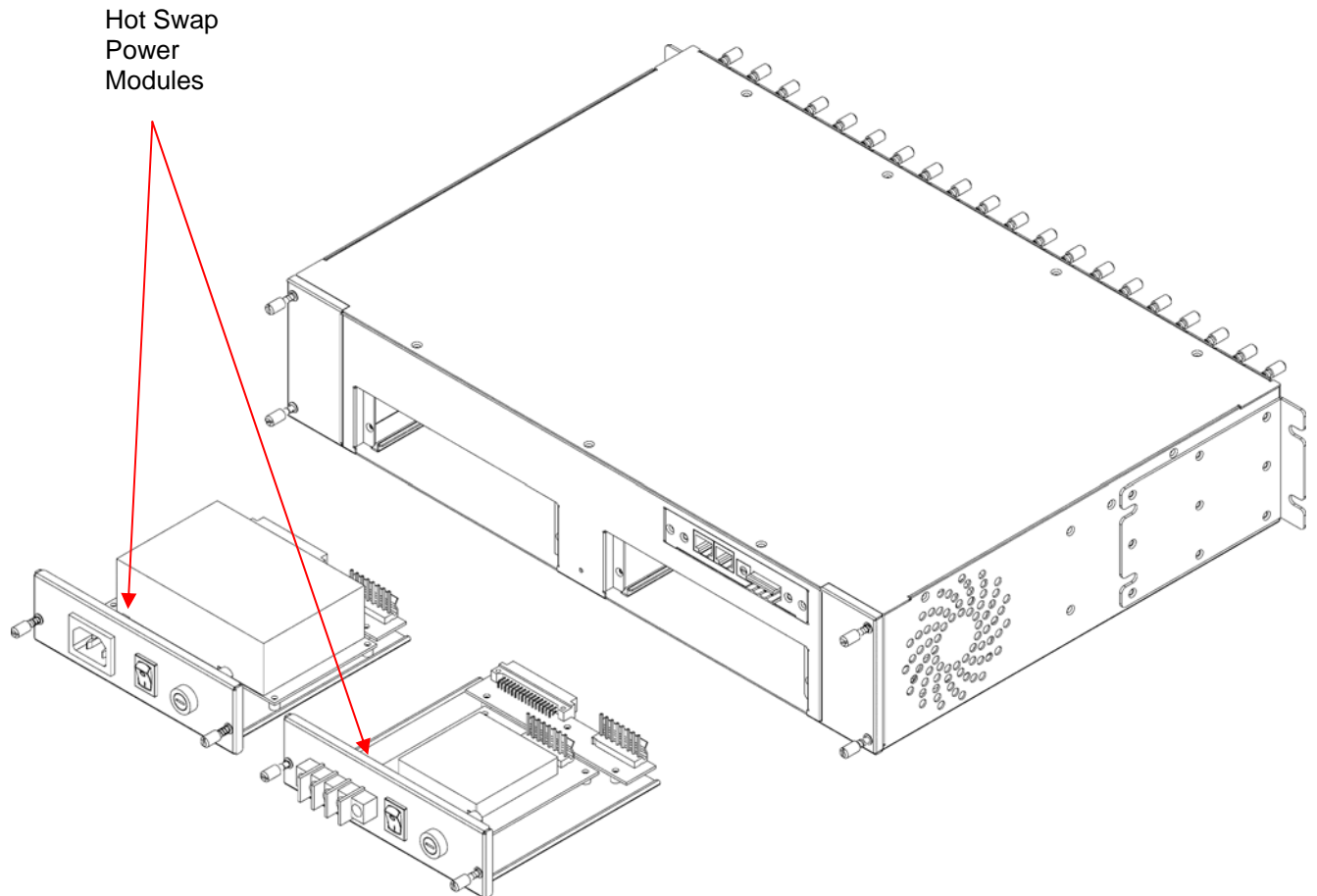


Figure 2-7 Power Modules for **FRM220**

### 2.8 Installation

#### 2.6.1 Line Card Installation

The Line Cards for the **FRM220** are Fiber Media Converter Cards which slide into the **FRM220** chassis, and interface with the pack panel "main board". The back panel provides a connection to the converter cards for power and serial control.

The media converter cards are designed to be "hot" swappable, meaning the **FRM220** chassis need not be powered off in order to remove or replace a card. Removal and installation of converter cards with the rack chassis under power will not effect the operation of other converter cards.

Removal of a converter card is accomplished by loosening the one (1) captive screw (upper) and then pulling the card straight out of the chassis with the same screw. Replace the card by reversing the procedure, align in the slot groove and gently seat the card, retightening the captive screw.

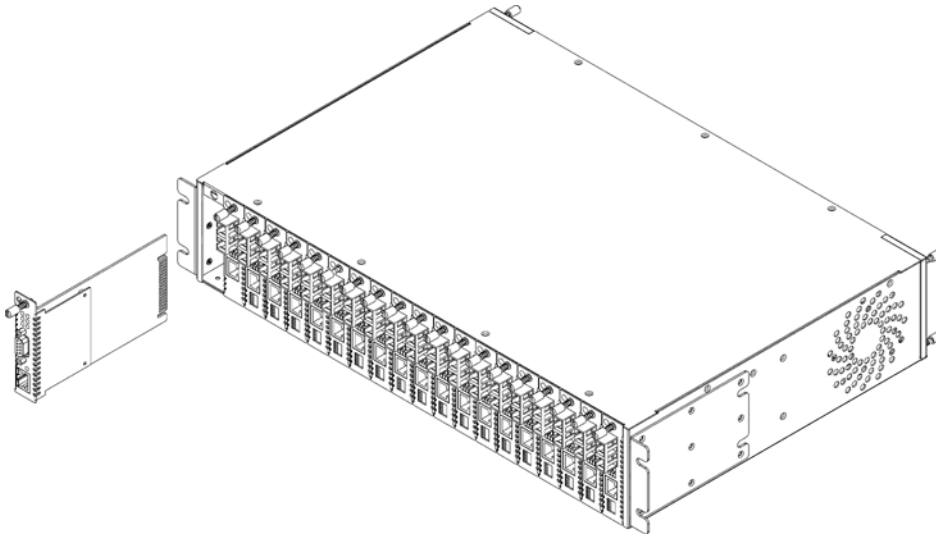


Figure 2-7 Line card removal/replacement

#### 2.6.2 NMC Card Installation

Slot number 1 of the chassis is reserved for the Network Management Controller (NMC). The NMC card provides the full network management features. When the NMC is installed, the rack and all line cards become manageable by industry standard SNMP protocol. (Please refer to Chapter 3 for more information on the operation of the network management features). The remaining slots, numbered 2 through 20, may contain any other FRM220 In-band Managed fiber media converter card.

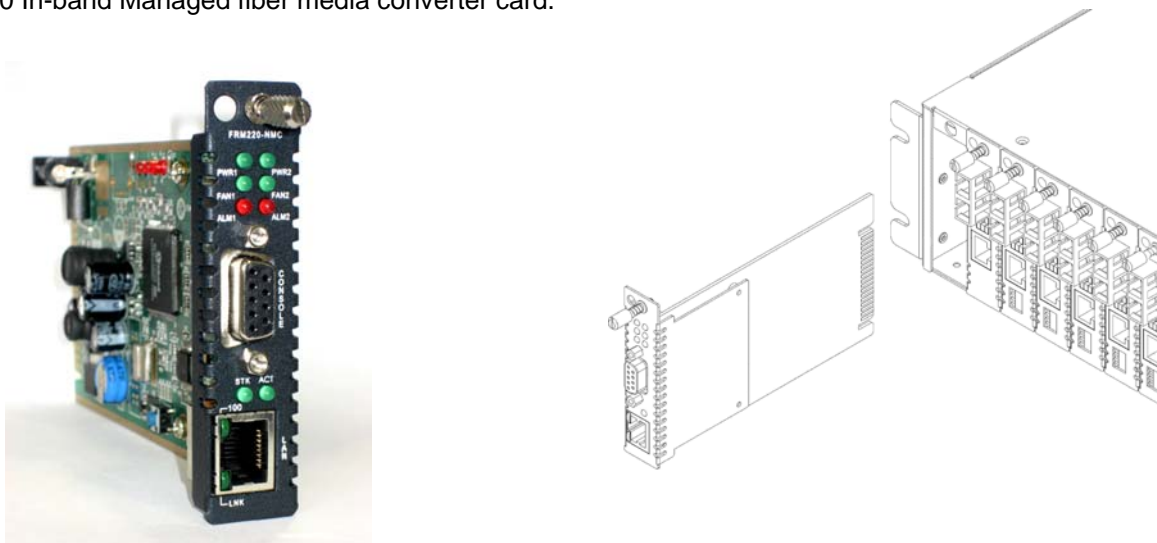


Figure 2-8 NMC removal/replacement in slot number 1

**IMPORTANT:** In the FRM220 In-Band Managed Rack, slot number 1 must contain an NMC card. In a chassis where non-managed line cards are employed (cards that use DIP switch settings), slot number 1 may then be used for a non-managed media converter line card.

## Chapter 3. Management Quick Start

### 3.1 Introduction

The information here is only a brief introduction to the management interfaces and methodologies for managing the FRM220. For in-depth use of the management features of the FRM220, please refer to the FRM220 Network Manager Controller User Manual.

### 3.2 Management Methods

The management methods for the FRM220 include textual based serial console, IP based textual console (Telnet), web based GUI management through web browser, SNMP management through proprietary MIB and via CTC Union's Element Management System (EMS).

### 3.3 Console Terminal

The NMC card has a DB9F RS-232 serial console port for local management purposes. The console provides a menu driven display, with simple keyboard item selections and the ability to control all aspects of management in the FRM220. The console interface also provides the initial provisioning to setup the TCP/IP interface (the Ethernet RJ-45 10/100Base-TX port) for remote management by Telnet, Web, SNMP and EMS.

#### 3.3.1 Terminal Connection & Settings

The DB9F port on the NMC is a DCE (Data Communications Equipment) wired device that allows for direct 1:1 cable connection to the DTE (Data Terminal Equipment) of PC's COM port. The FRM220 includes the 1:1 DB9F to DB9M serial cable for connection to PC's COM port or laptop's USB to RS-232 adapter. Any VT100 terminal emulation program for Windows may be used, including HyperTerminal™, TeraTerm, or PuTTY.

The terminal settings must follow these communication parameters:

115200 data rate  
8 bits  
No parity bit  
1 Stop bit  
No Flow Control

#### 3.3.2 Terminal Login

Connect the console cable to PC and power up the FRM220. Start your favorite terminal emulation program. The terminal screen is refreshed every few seconds. By default, no password is set from the factory, so you should immediately see a screen similar to that below.

```

1  {
    {
        *****
        *** CTC UNION TECHNOLOGIES CO., LTD. ***
        *** FRM220 NMC VER. 1.85 ***
        *****
    }
2  {
    This Chassis ID: [00] Cascaded: [Yes] Monitored Chassis ID: [00]
    Chassis List: [Master]
    #0: [X] #1: [ ] #2: [ ] #3: [ ] #4: [ ] #5: [ ] #6: [ ] #7: [ ] #8: [ ] #9: [ ]
3  {
    <1>: SLOT #01 > NMC & Chassis <B>: SLOT #11 > FRM220-SERIAL
    <2>: SLOT #02 > FRM220-10/100I <C>: SLOT #12 > FRM220-1000EDS
    <3>: SLOT #03 > FRM220-10/100I <D>: SLOT #13 > FRM220-1000EAS
    <4>: SLOT #04 > FRM220-10/100I <E>: SLOT #14 > FRM220-155MS
    <5>: SLOT #05 > FRM220-10/100I <F>: SLOT #15 > FRM220-155MS
    <6>: SLOT #06 > FRM220-10/100I <G>: SLOT #16 > FRM220-E1/T1
    <7>: SLOT #07 > FRM220-10/100I <H>: SLOT #17 > FRM220-E1/T1
    <8>: SLOT #08 > FRM220-10/100IS-2 <I>: SLOT #18 > FRM220-FX0/FXS
    <9>: SLOT #09 > FRM220-10/100A <J>: SLOT #19 > FRM220-FX0/FXS
    <A>: SLOT #10 > FRM220-10/100AS-2 <K>: SLOT #20 > FRM220-FX0/FXS
4  {
    <->: Monitor Previous Chassis <+>: Monitor Next Chassis
    <L>: SNMP System Configuration Setup
    <M>: SNMP Manager Configuration Setup
    <P>: Password Setup
    <R>: Reboot <Z>: Logout
    Please select an item.
    }
    }
}

```

Items of interest:

1. This is the display header. The version shown reflects the currently installed 'romfs.gz' or file system version (1.85).
2. These rows indicate which chassis in a cascaded stack is being managed. The default is the local chassis zero (0).
3. This block supports selecting any of the installed cards, numbered in slots 1~20.
4. In this block of commands is the all important 'SNMP System Configuration Setup'. The TCP/IP settings are done through this selected menu.

### 3.3.3 TCP/IP Setup

From the main menu, use the 'L' key to enter the 'SNMP System Configuration Setup' menu. An example menu is displayed below.

```

1 { *****
   | *** CTC UNION TECHNOLOGIES CO., LTD. ***
   | *** FRM220 NMC VER. 1.85 ***
   | *****
2 { << SNMP System Configuration Setup of Chassis 0 >>
   | Model = FRM220
   | S/N = 000000
   | Target MAC Address = 00:02:ab:06:20:20
3 { <1>: Target IP : 59.125.162.252
   | <2>: Target Netmask : 255.255.255.240
   | <3>: Target Gateway : 59.125.162.241
   | <4>: Target Name : FRM220
   | <5>: TFTP Server IP : 172.24.1.251
4 { <6>: TFTP Download Kernel : kernel12314.gz
   | <7>: TFTP Download File System : romfs185.gz
   | <8>: Load default settings and write to system.
   | <9>: Do TFTP and Flash Kernel function.
   | <A>: Do TFTP and Flash File System function.
5 { <T>: Adjust Date and Time.
   | <U>: Upgrade Line Card Menu.
   | <ESC>: Write to system and go to previous menu.
   | Please select an item.

```

Items of interest:

1. This is the display header. The version shown reflects the currently installed 'romfs.gz' or file system version (1.85).
2. The model name and serial number are shown in this section.
3. The TCP/IP settings for IP, subnet mask, default gateway and hostname and set using keyin 1~4.
4. Items 5~A handle setting and upgrading via TFTP protocol. Set the TFTP server's IP and names of the kernel and filesystem file names. Execute upgrade as directed in the upgrade procedure included with each update package.
5. Item 'T' is used to setup the SNTP time protocol so that this management can synchronize time with a time server. Item 'U' enters the menu to upgrade line cards in the FRM220.

Setup the default gateway, subnet mask and IP address as instructed by your network administrator. After any TCP/IP setting change, the NMC must be rebooted. So, ESC back to the main menu and key-in 'R' to reboot and confirm with 'Y' (yes).

### 3.3.4 Test TCP/IP Connection

Open a command window and ping the FRM220. Make sure the network settings are correct.

```

C:\WINDOWS\system32\cmd.exe
C:\>ping 59.125.162.252
Pinging 59.125.162.252 with 32 bytes of data:
Reply from 59.125.162.252: bytes=32 time=178ms TTL=50
Reply from 59.125.162.252: bytes=32 time=156ms TTL=50
Reply from 59.125.162.252: bytes=32 time=66ms TTL=50
Reply from 59.125.162.252: bytes=32 time=169ms TTL=50
Ping statistics for 59.125.162.252:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 66ms, Maximum = 178ms, Average = 142ms
C:\>_

```

### 3.4 Telnet Terminal

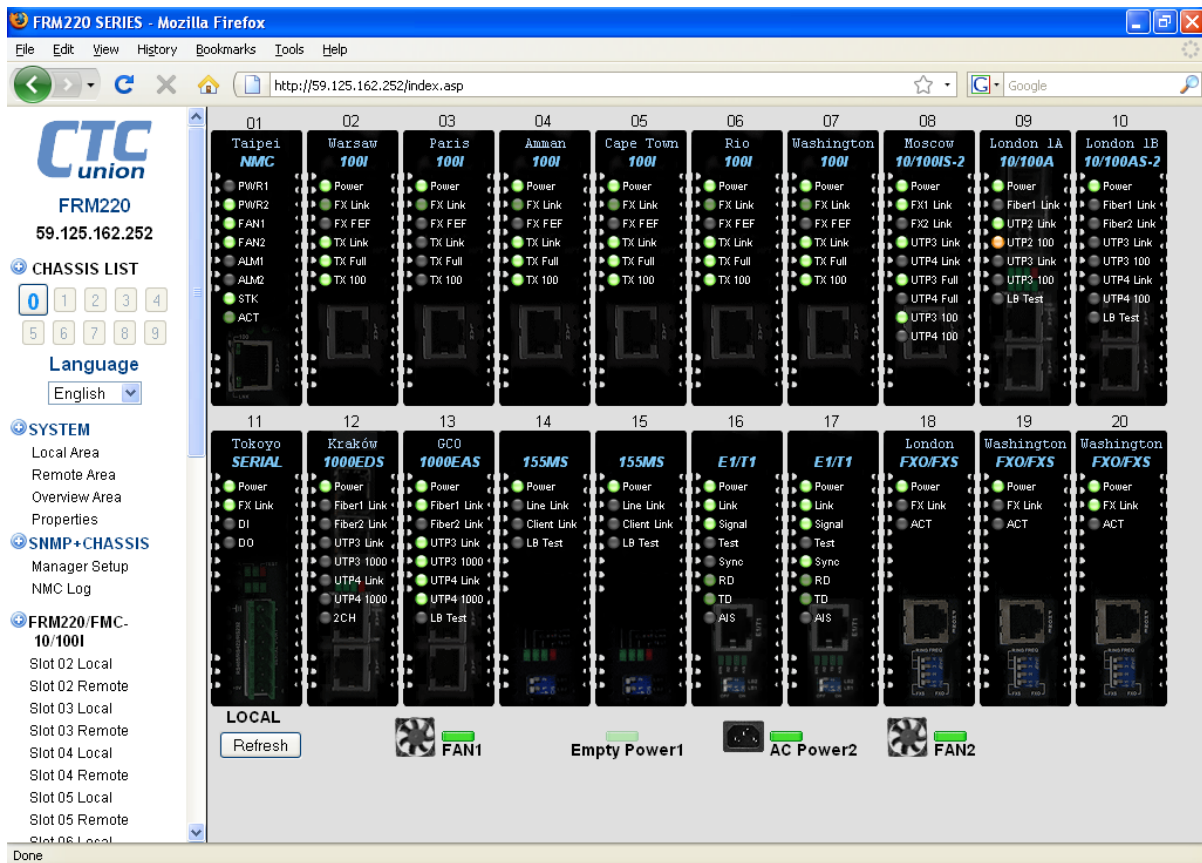
Use either a Windows® command window or Telnet client application and connect to the FRM220 NMC using the assigned management IP address. The following is an example of a Telnet screen. It is exactly the same as a local serial console screen, only it can be accessed remotely.

```

59.125.162.252 - PuTTY
*****
*** CTC UNION TECHNOLOGIES CO., LTD. ***
*** FRM220 NMC VER. 1.85 ***
*****
This Chassis ID:[00] Cascaded:[Yes] Monitored Chassis ID:[00]
Chassis List:[Master]
#0:[X] #1:[ ] #2:[ ] #3:[ ] #4:[ ] #5:[ ] #6:[ ] #7:[ ] #8:[ ] #9:[ ]
<1>:SLOT #01 > NMC & Chassis <B>:SLOT #11 > FRM220-SERIAL
<2>:SLOT #02 > FRM220-10/100I <C>:SLOT #12 > FRM220-1000EDS
<3>:SLOT #03 > FRM220-10/100I <D>:SLOT #13 > FRM220-1000EAS
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<5>:SLOT #05 > FRM220-10/100I <F>:SLOT #15 > FRM220-155MS
<6>:SLOT #06 > FRM220-10/100I <G>:SLOT #16 > FRM220-E1/T1
<7>:SLOT #07 > FRM220-10/100I <H>:SLOT #17 > FRM220-E1/T1
<8>:SLOT #08 > FRM220-10/100IS-2 <I>:SLOT #18 > FRM220-FXO/FXS
<9>:SLOT #09 > FRM220-10/100A <J>:SLOT #19 > FRM220-FXO/FXS
<A>:SLOT #10 > FRM220-10/100AS-2 <K>:SLOT #20 > FRM220-FXO/FXS
<->:Monitor Previous Chassis <+>:Monitor Next Chassis
<L>:SNMP System Configuration Setup
<M>:SNMP Manager Configuration Setup
<P>:Password Setup
<R>:Reboot <Z>:Logout
Please select an item.
    
```

### 3.5 Web Based Manager

The FRM220 NMC supports web based management. Use your favorite browser (Internet Explorer or Firefox) and connect to the FRM220 NMC by using the NMC's IP address. Refer to the FRM220 NMC User Manual for details.

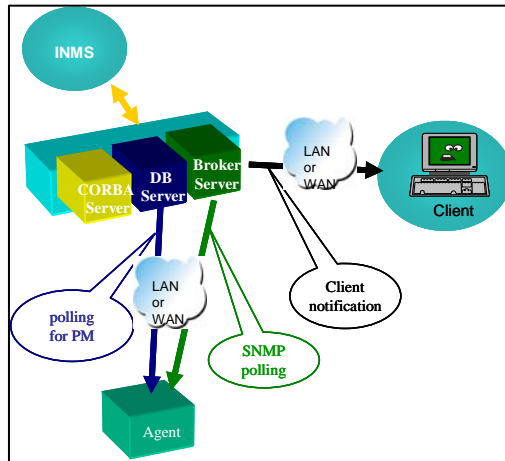


## 3.6 Element Management System (EMS)

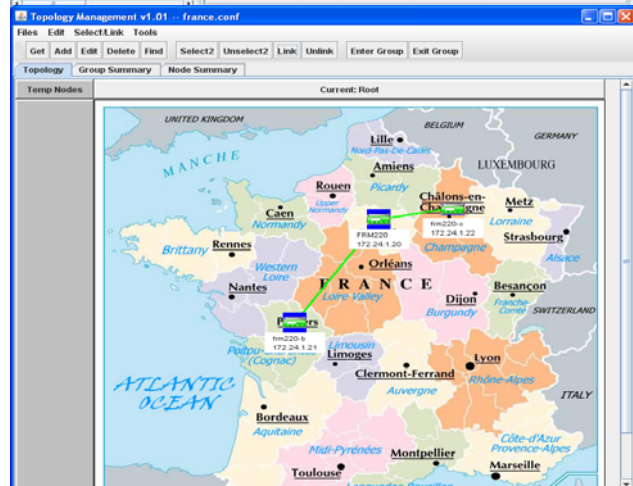
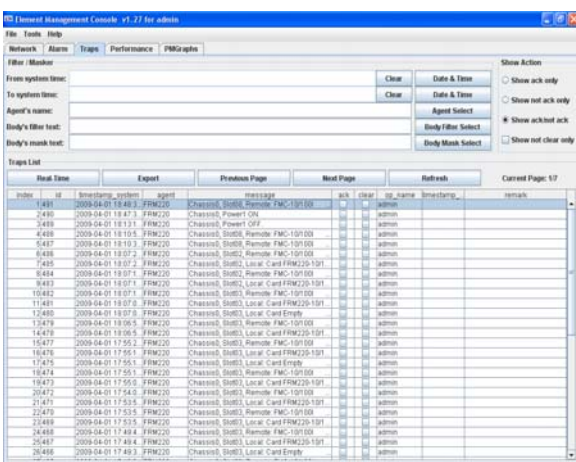
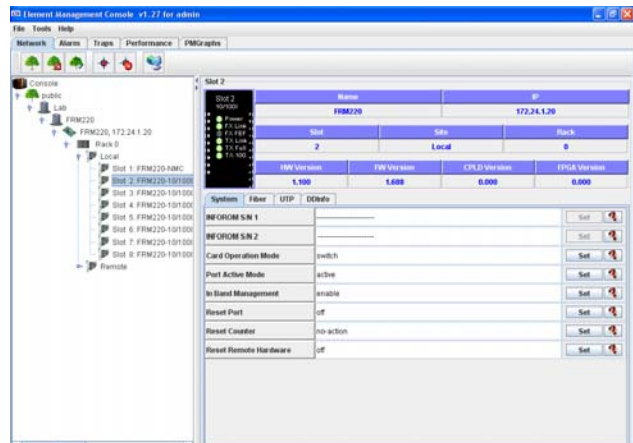
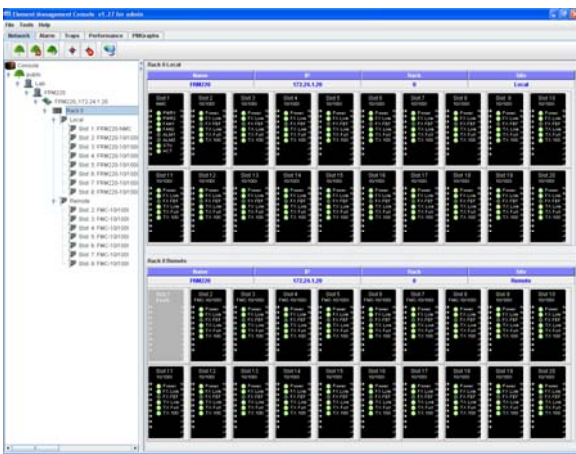
The objective of an Element Management System is to provide four major functions for telecommunication operators:

- Fault Management (FM)
- Performance Management (PM)
- Configuration Management (CM)
- Security Management (SM)

CTC Union's EMS is a proprietary management system designed to provision, monitor and maintain multiple equipments designed by CTC Union. It is a client/server architecture using a Windows® based server with Microsoft MS-SQL Server for a database and Java based server and client. The client software can be run on the server or remotely on another physical machine as long as there is an IP connection between the client and server. Refer to the EMS User Manual for details.



The EMS administrator creates users with different permissions and builds different management trees. Public trees can be seen by all users while private trees can only be seen by their creator. Client interface provides provisioning functions and the viewing and handling of Alarms, Traps and performance data.









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