



# In-band Managed Multi-service Platform FRM220

The FRM220 is a 2U high 19" Rack, 20 slot modular media converter rack. It provides an economic solution in 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. The hot-swappable power modules can be chosen from AC100-240V, DC18-36. or DC 36-75V. The chassis also has a pair of alarm relays and is able to stack up to 10 chassis as one management IP address. A number of cards are available that support different protocols including Ethernet, Voice, Data, transponders, FOM and IMUX.

### Specifications

#### Connectors

Console RS232(DB9)  
LAN 10/100 Base TX RJ45

#### Physical Specifications

Dimensions: 303mm x 438mm x 88mm (W x D x H)  
Weight: 5.2kg w/o P/S

#### Power Characteristics

AC : 100 ~ 240VAC  
DC24 : 18 ~ 36VDC, DC48: 36 ~ 75VDC

#### Environmental Specifications

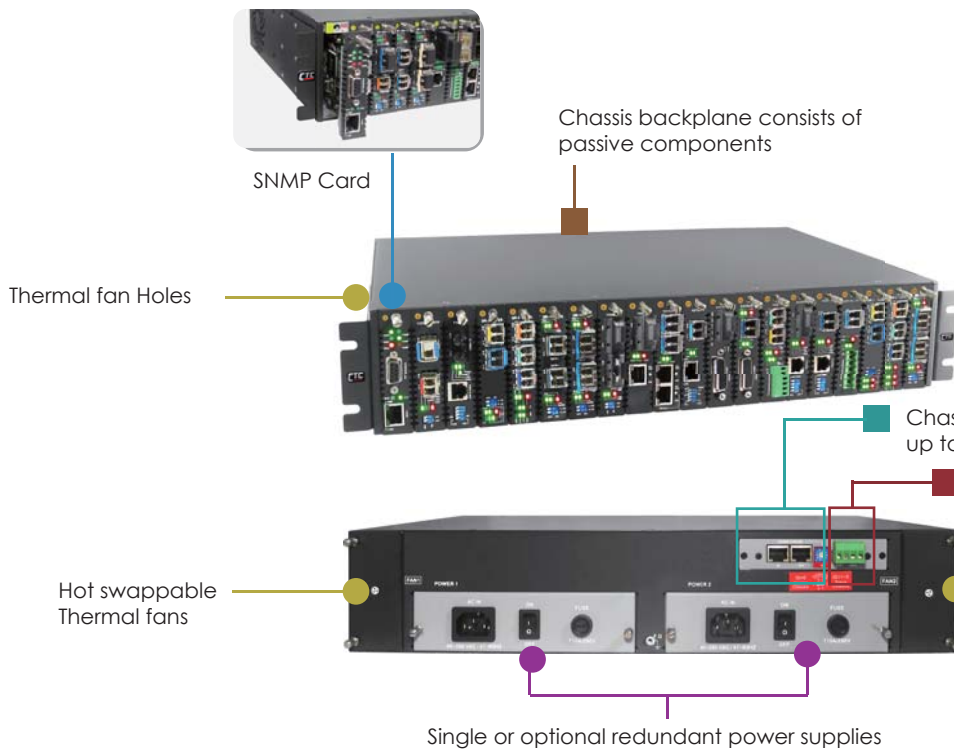
Operating 0°C ~ 60°C  
Storage -10°C ~ 70°C  
Relative humidity 5% ~ 90% non-condensing

Predicted MTBF : 65,000 hrs

#### Certification

FCC class A, VCCI class A, CE, RoHS

### 2U High 19" 20-slot modular media converter Chassis overview



- 10G, 2.7G 3R Transponder
- Gigabit Ethernet Converter
- Fast Ethernet Converter
- Fiber Multiplexer
- POTS Fiber Converter
- Fiber Repeater
- E1/T1 Fiber Modem
- V35/X21/RS530 Fiber Modem
- Serial RS485/422 Fiber Converter
- CWDM Mux/DeMUX
- E1/T1 Cross Rate Converter
- Gigabit Ethernet Switch

### Ordering Information

#### FRM220 Chassis










- FRM220-CH20 : 2U 19" 20 slot chassis
- FRM220-AC : 100 ~ 240 AC power card
- FRM220-DC24 : 18 ~ 36 DC power card
- FRM220-DC48 : 36 ~ 72 DC power card

#### Smart View Element Management System(EMS)

Platform server	Device Agents	Managed Modules
SV-PLF-05: 5 Client user admission	SV-AGT-50: 50 Device agents	SV-Fiber: FRM220
SV-PLF-25: 25 Client user admission	SV-AGT-100: 100 Device agents	
SV-PLF-50: 50 Client user admission	SV-AGT-200: 200 Device agents	
	SV-AGT-500: 500 Device agents	

Example: SV-PLF-05, SV-AGT-50, SV-Fiber

Slide-in card overview

<p><b>Ethernet over Fiber</b></p>  <p><b>Fast Ethernet</b> 1.In-Band Managed FE MC 2.OAM/IP FE Switch ■ FRM220-10/100A</p> <p><b>Gigabit Ethernet</b> 1.GbE OAM/IP MC 2.Managed GbE MC 3.GbE OAM/IP Switch ■ FRM220-1000EAS ■ FRM220-1000EAS/X</p>	<p><b>Transponder/ Repeater</b></p>  <p><b>2.7G 3R Transponder</b> <b>10G 3R Transponder</b> ■ FRM220-10G ■ FRM220-2.7G</p> <p><b>155Mbps Transponder</b> ■ FRM220-155MS</p>	<p><b>Mux/Demux</b></p>  <p><b>4ch CWDM Mux/Demux</b> <b>8ch CWDM Mux/Demux</b> ■ FRM220-MD40 ■ FRM220-MD80</p>
<p><b>Fiber Multiplexer</b></p>  <p><b>Fiber Optical Multiplexer</b> ■ FOM04</p>	<p><b>POTS over Fiber</b></p>  <p><b>FXO/FXS</b> ■ FRM220-FXO/FXS</p>	<p><b>V.35 Datacom/ RS485 over Fiber</b></p>  <p><b>V.35 / X.21 / RS530 Fiber Modem</b> ■ FRM220-Data</p> <p><b>RS485 / RS422 / RS232 Fiber Modem</b> ■ FRM220-Serial</p>
<p><b>PDH over Fiber</b></p>  <p><b>E1/T1 Fiber Modem</b> ■ FRM220-E1/T1</p>	<p><b>Ethernet over PDH</b></p>  <p><b>5E1, 8E1, 16E1 Inverse Multiplexer</b> ■ FRM220-ET100</p>	<p><b>E1/T1 Cross Rate Converter</b></p>  <p><b>E1 To Data converter</b> <b>E1 To T1 Converter</b> ■ FRM220-FTEC</p>

Power Redundancy

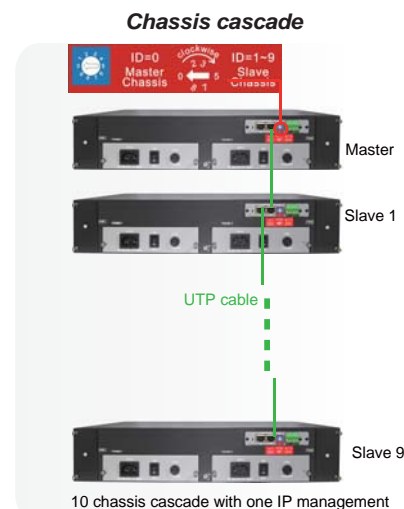
All the FRM220 chassis power supplies are hot swappable and modular, installing two into a chassis provides redundancy should a single power supply fail. A fully loaded chassis can run continuously with only one power module fitted into the chassis.

Cooling Fan

To further increase system reliability, the FRM220 chassis is fitted with two hot swappable fan modules. Both fan modules can be easily removed from the rear of the chassis, without interruption to the operation of the line cards. A fully loaded chassis can run continuously with only one fan module fitted into the chassis.

Chassis cascade

The FRM220 features cascadeable management which allows managing a stack (up to 10 chassis) from a single IP address. Chassis are interconnected with standard UTP cables that carry control signals. Each chassis has its own ID, starting with the master chassis ID0 and cascading up to ID9.



Network Management

The FRM220 chassis provides an NMC (Network Management Controller) card which must be installed into the first slot of chassis. The NMC card allows a network administrator with the ability to configure and monitor the status of the blades.

Management can be achieved locally over RS232, or over the network by Telnet, Web or SNMP if the blades support Ethernet in the First Mile (IEEE 802.3ah), then the management module can also configure and monitor the status of a remote blade.

Protocol Supported

The FRM220 chassis has been designed as a Multi-service platform. This allows network administrators to deploy the chassis in a wide range of networks. Technologies supported by the chassis included Fast/Gigabit Ethernet, E1/T1, V35/X21/RS530, Serial RS485/422, Voice FXO/FXS, Repeater, Fiber Multiplexer, E1 Inverse Multiplexer and 10G, 2.7G Transponder.

Ordering Information

FRM220 Slide-in card	
FRM220-NMC	:Network Management Controller
FRM220-1000EAS	:2-port 10/100/1000T + 2-port 1000X OAM/IP Switch
FRM220-1000EAS/X	:2-port 10/100/1000T + 2-port 1000X GE Switch
FRM220-1000EAS-1	:10/100/1000T to 1000X OAM/IP MC
FRM220-1000E(S)-1	:10/100/1000T to 1000X MC
FRM220-1000TS	:1000T to 1000X MC
FRM220-10/100A	:2-port 10/100TX to 100FX OAM/IP MC
FRM220-10/100AS-2	:2-port 10/100TX + 2-port 100FX OAM/IP Switch
FRM220-10/100i	:10/100TX to 100FX with In-band management
FRM220-10/100iS-2	:Dual channels 10/100TX to 100FX with In-band management
FRM220-10/100i-2E	:2-port 10/100T to 100X In-band Management MC
FRM220-FXO/FXS	:POTS over fiber FXO/FXS 2-wire MC
FRM220-Data	:V35/ X21/ RS530/ RS449/ RS232 Fiber modem
FRM220-Serial	:RS485/422/232 Fiber Converter
FRM220-E1/T1	:E1/T1 Fiber modem
FRM220-ET100	:Ethernet over E1 Fiber modem
FRM220-FOM04	:4-port E1/T1+100M Ethernet Fiber Multiplexer
FRM220-FTEC	:E1/T1 Cross Rate Converter
FRM220-E1/Data	:V35/ X21/ RS530/ RS449/ RS232 to fractional E1
FRM220-10G	:10G 3R Transponder
FRM220-2.7G-2S	:2.7G 3R Transponder
FRM220-2.7G-3S	:2.7G 3R Transponder with Optical Fiber Protection
FRM220-TR21	:2R 2.5G Transponder
FRM220-155MS	:155Mbps Fiber Repeater
FRM220-MD40/80	:4ch/8ch Mux/DeMUX

## FRM220 Stand-alone Chassis Overview

The FRM220 Chassis Product line includes various metal chassis sizes, which can hold from one to twenty FRM220 slide-in modules. The FRM220-CH01 is one slot chassis, which can be installed with one single width blade card for stand-alone applications. The available power options are external AC adapter, built-in AC, DC power or built-in AC+DC, AC+AC, DC+DC dual power. The FRM220-CH01M is one slot chassis with DB9 console port for local management, which can be installed with one single width blade card for stand-alone applications. The available power options are built-in AC, DC or built-in AC+DC dual power. The FRM220-CH02 is a two slot chassis, which can be installed with one double width blade card for stand-alone applications. The only available power supply option is an external AC adapter.

The FRM220-CH02M is a two slot chassis with DB9 console port for local management, which can be installed with either one or two single width blade cards or one double width blade card. The available power supplies are built-in AC, DC or AC+DC dual power. The FRM220-CH02/NMC is a two slot chassis and the FRM220-CH04/NMC is a four slot chassis. Both chassis can be SNMP managed when installing one FRM220-NMC card for Web, Telnet, Console and SNMP management. The FRM220-CH02/NMC and FRM220-CH04/NMC can be installed with either one or two single width blade cards or one double width blade card. The FRM220-CH02/NMC available power options are built-in AC, DC or AC+DC dual power. The FRM220-CH04/NMC is only available with external AC adapter.

## FRM220 One Slot Chassis

### FRM220- CH01

#### Features

- One slot chassis for FRM220 Single width blade line cards.
- Available in six types: external power adapter or power built-in AC, DC, AC+DC, AC+AC or DC+DC.
- Fanless
- Dimensions  
external adapter: 160 x 88 x 24mm (D x W x H)  
internal power: 180 x 135 x 35mm (D x W x H)

#### Power Input

- External adapter:  
Input voltage 100 ~ 240VAC 50/60Hz  
Output voltage 12VDC 1A
- AC power 100 ~ 240VAC
- DC power 24VDC, 48VDC, 72VDC



#### Ordering Information

Line card model                      Power type  
FRM220-       -CH01-

Example: FRM220-10/100i-CH01-AC      DC12 : AC adapter  
AC : AC power  
DC : DC power  
AD : AC+DC power  
AA : AC+AC power  
DD : DC+DC power

## FRM220 One Slot Chassis with Console port

### FRM220-CH01M

#### Features

- One slot chassis for FRM220 Single width blade line cards.  
(include: E1/T1, Data, 10/100i, iMax5/ 8/ 16, Eoe1, E1/Data)
- Supports DB9 console port for Local management
- Available in three types: power built-in AC, DC, AC+DC.
- Fanless
- Dimensions : 201 x 135 x 35mm (D x W x H)

#### Power Input

- AC power 100 ~ 240VAC
- DC power 24VDC, 48VDC, 72VDC



#### Ordering Information

Line card model                      Power type  
FRM220-       -CH01M-

Example: FRM220-10/100i -CH01M-AC      AC : AC power  
DC : DC power  
AD : AC+DC power



**Ordering Information**

**FRM220-CH02-**  Power type  
 DC12 : chassis for one AC adapter  
 Example: FRM220-CH02-DC12

**FRM220 Two Slot Chassis**

**FRM220-CH02**

**Features**

- Two slot chassis for FRM220 line cards. (include: FOM04, iMUX16, MD50/80)
- Supports one double width blade card.
- Power type: external power adapter
- Fanless
- Dimensions : 139 x 88 x 44mm (D x W x H)

**Power Input**

Power adapter :  
 Input voltage 100 ~ 240VAC 50/60Hz, Output voltage 12VDC 1A



**Ordering Information**

**FRM220-CH02M-**  Power type  
 AC : AC power  
 DC : DC power  
 AD : AC+DC power  
 Example: FRM220-CH02M-AC

**FRM220 Two Slot Chassis with Console port**

**FRM220-CH02M**

**Features**

- Two slot chassis for FRM220 line cards. (include: 10G, 2.7G, iMUX16, FOM04)
- Supports backplane connection between two slots
- Supports DB9 console port for local management
- Supports either one or two single width blades or one double width blade.  
 Available in three types: built-in AC, DC, AC+DC.
- Cooling Fan
- Dimensions : 220 x 168 x 45mm (D x W x H)

**Power Input**

AC power: 100 ~ 240VAC, DC power: 24VDC, 48VDC, 72VDC



**Ordering Information**

**FRM220-CH02/NMC-**  Power type  
 AC : AC power  
 DC :DC power  
 AD : AC+DC power  
 Example: FRM220-CH02/NMC-AC

**FRM220 SNMP manageable Two Slot Chassis**

**FRM220-CH02/NMC**

**Features**

- Two slot chassis for FRM220 line cards
- Supports backplane connection between two slots
- Telnet, Web, Console, SNMP manageable via NMC card
- Supports either one or two single width blades or one double width blade.  
 Available in three types: built-in AC, DC, AC+DC.
- Cooling Fan
- Dimension : 220 x 168 x 45mm (D x W x H)

**Power Input**

AC power: 100 ~ 240VAC, DC power: 24VDC, 48VDC, 72VDC



**Ordering Information**

FRM220-CH04/NMC-DC12: 4 Slot Chassis with external adapter

**FRM220 SNMP manageable Four Slot Chassis**

**FRM220-CH04/NMC**

**Features**

- Four slot chassis for FRM220 line cards
- Supports backplane connection between four slots
- Telnet, Web, Console, SNMP manageable via NMC card
- Supports one to four single width blades or two double width blades.
- Available with external power only
- Fanless
- Dimension : 162 x 87 x 88mm (D x W x H)

**Power Input**

Power adapter:  
 Input voltage: 100 ~ 240VAC 50/60Hz, Output voltage: 12VDC 2A

# Network Management Controller FRM220-NMC



The FRM220-NMC is a Network Management Controller card that can be placed in a compatible FRM220 series chassis to provide network management functions. The management interface supports a local RS-232 serial console or remote TCP/IP management by Telnet, HTTP or SNMP protocols. The card is designed to be hot swapped so that it may be field replaced without affecting any online service of any other rack cards. The card also supports online firmware upgrade from TFTP server, using any user interface. Support for any standard NMS is provided by the included enterprise MIB file.

### Features

- Supports local / remote monitor and configuration
- Supports local / remote online TFTP f/w upgrade
- Fiber transceiver status & info display
- Supports multiple accesses for SNMP management
- Supports Web GUI management, Telnet, Serial console
- Supports console RS-232 port and 10/100Base-T Ethernet port
- Supports SNMP standard MIB II and enterprise MIB
- Supports NTP time synchronization
- Supports 100 entries system log

CTC Union also provides and maintains their own EMS (Element Management System) which is a Java based client/server manager for monitoring and maintaining a large number of network elements over a long period of time.

### Electrical Interface

- Console RS232 port
- LAN 10/100Base-TX

### Management Interface

- In-band management: provide all system OAM/IP functions: software updates, and management system interaction through Ethernet port.

- Out-band management: supports Web, Telnet and SNMP, EMS management

### OAM/IP

- Configuration Management
- Performance Management
- Fault Management
- Status Monitoring.

### Indications

- PWR, Fan, Alarm Act, STK, LAN LNK/SPD

### Dimensions

- 155 x 88 x 23mm (DxWxH)

### Weight

- 120g

### Temperature

- 0 ~ 60°C (Operating), -10 ~ 70°C (Storage)

### Humidity

- 10 ~90% non-condensing

### Certification

- CE, FCC, LVD, RoHS

### MTBF

- 65,000 hrs (25°C)

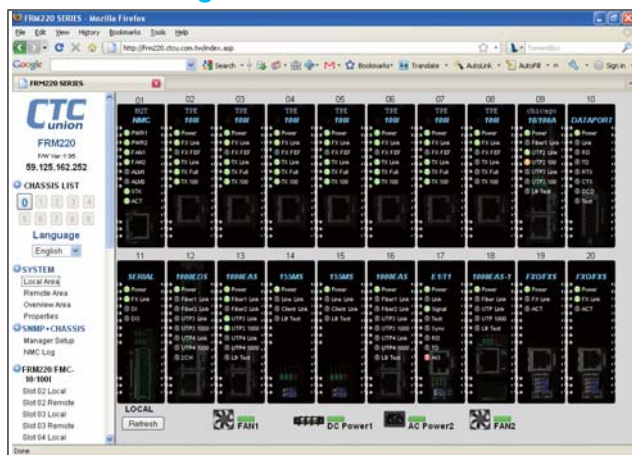
### Serial Console Management

```

*****
*** CTC UNION TECHNOLOGIES CO., LTD. ***
*** FRM220 NMC VER. 1.95 ***
*****

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 > FRM220-1000EAS
<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 > FRM220-1000EAS
<7>:SLOT #07 > FRM220-10/100I <H>:SLOT #17 > FRM220-E1/T1
<8>:SLOT #08 > FRM220-10/100I <I>:SLOT #18 > FRM220-1000EAS-1
<9>:SLOT #09 > FRM220-10/100A <J>:SLOT #19 > FRM220-PXO/FXS
<A>:SLOT #10 > FRM220-DATAPORT <K>:SLOT #20 > FRM220-PXO/FXS
<->:Monitor Previous Chassis
<L>:SNMP System Configuration Setup
<M>:SNMP Manager Configuration Setup
<P>:Password Setup
<R>:Reboot <Z>:Logout
Please select a item
    
```

### Web GUI Manager



### Ordering Information

FRM220-NMC: Network Management Controller

## FRM220-NMC Management Application

### NMC Management Application

When a standalone unit with Dip switch for setting connects by fiber to CH20 or CH02/NMC chassis with NMC management card:

When the standalone is powered on, the operation first follows the configuration set by Dip Switch setting. After the NMC card starts polling the standalone unit, the Dip switch settings are ignored and the standalone unit will follow the configuration stored in the NMC card. The DIP switch settings are in vain.

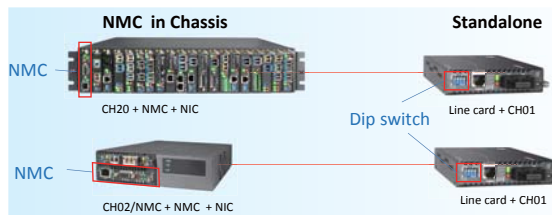
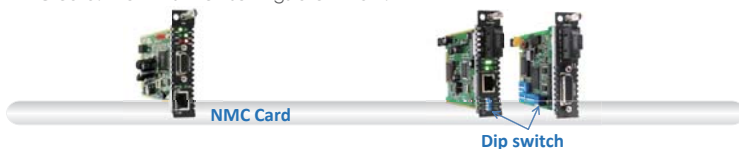


fig.1-1: NMC Management & Dip Switch Application

When a standalone unit with a RS232 console connects by fiber to CH20 or CH02/NMC chassis with NMC card:

When the standalone unit is powered on, the configuration will first follow the previously saved console setting. After the NMC card starts polling the standalone unit, the local console settings are ignored and the standalone unit will follow the configuration stored in the NMC card. The console settings are then in vain.

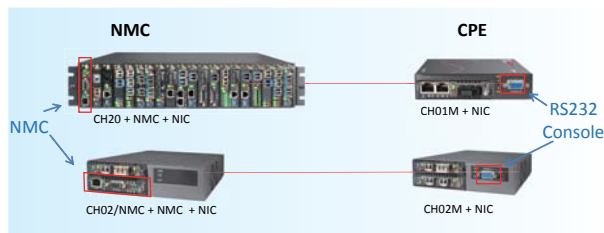


fig.1-2: NMC Management & RS232 Console Application

### Console Management Application

When a standalone unit with Console port connects to a remote standalone that also has console port:

- User can use RS-232 Console to setup both CO or CPE unit and save configuration in CO or CPE unit.
- When powering on the standalone, the standalone configuration will follow console setting. Any DIP switch settings are ignored and are in vain.



fig.2-1: Console Management Application

When a standalone with Dip Switch connects to a standalone with console port:

- User can use RS-232 Console to setup both CO or CPE unit and save configuration in CO or CPE unit.
- When powering on the standalone, the standalone configuration will follow the saved console settings. The dip switch configuration will be in vain.

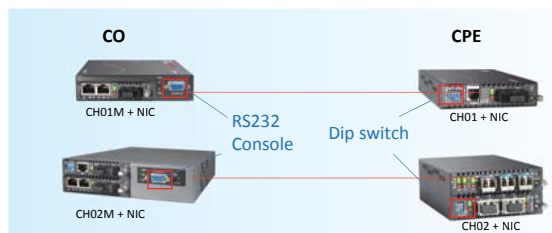


fig.2-2: Console Management & Dip Switch Application

### Dip Switch Management Application

When a standalone with Dip Switch connects to standalone with Dip switch:

- User can use CO Unit dip switch to setup CO unit configuration or use CPE unit dip switch to setup CPE unit configuration.
- When CO unit is powered on, the configuration will follow dip switches on the CO unit.
- When CPE unit is powered on, the configuration will follow dip switches on the CPE unit.

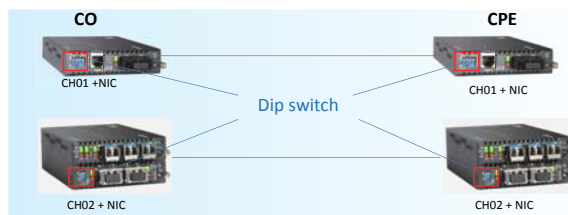
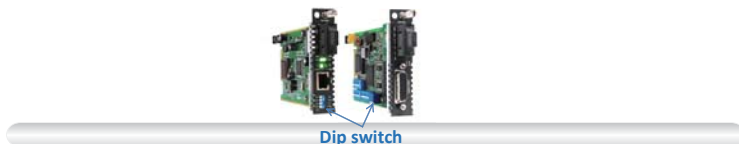


fig.3-1: Dip Switch Management

## FRM220 NMC Management Application

### NMC Management Application

When a standalone unit with Dip switch for setting connects by fiber to CH20 or CH02/NMC chassis with NMC management card:

When the standalone is powered on, the operation first follows the configuration set by Dip Switch setting. After the NMC card starts polling the standalone unit, the Dip switch settings are ignored and the standalone unit will follow the configuration stored in the NMC card. The DIP switch settings are in vain.



fig.1-1: NMC Management & Dip Switch Application

When a standalone unit with a RS232 console connects by fiber to CH20 or CH02/NMC chassis with NMC card:

When the standalone unit is powered on, the configuration will first follow the previously saved console setting. After the NMC card starts polling the standalone unit, the local console settings are ignored and the standalone unit will follow the configuration stored in the NMC card. The console settings are then in vain.

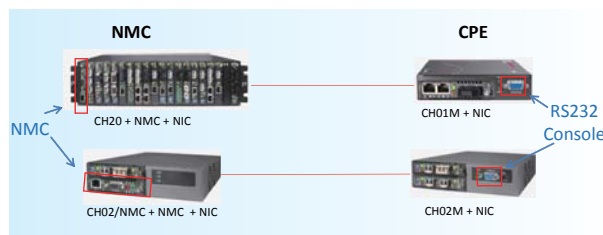


fig.1-2: NMC Management & RS232 Console Application

### Console Management Application

When a standalone unit with Console port connects to a remote standalone that also has console port:

- User can use RS-232 Console to setup both CO or CPE unit and save configuration in CO or CPE unit.
- When powering on the standalone, the standalone configuration will follow console setting. Any DIP switch settings are ignored and are in vain.



fig.2-1: Console Management Application

When a standalone with Dip Switch connects to a standalone with console port:

- User can use RS-232 Console to setup both CO or CPE unit and save configuration in CO or CPE unit.
- When powering on the standalone, the standalone configuration will follow the saved console settings. The dip switch configuration will be in vain.

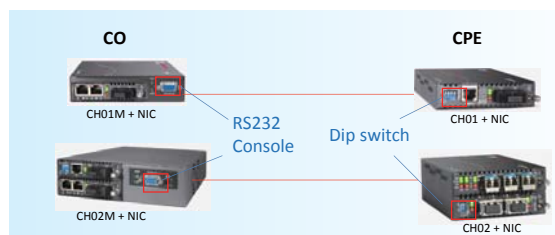


fig.2-2: Console Management & Dip Switch Application

### Dip Switch Management Application

When a standalone with Dip Switch connects to standalone with Dip switch:

- User can use CO Unit dip switch to setup CO unit configuration or use CPE unit dip switch to setup CPE unit configuration.
- When CO unit is powered on, the configuration will follow dip switches on the CO unit.
- When CPE unit is powered on, the configuration will follow dip switches on the CPE unit.

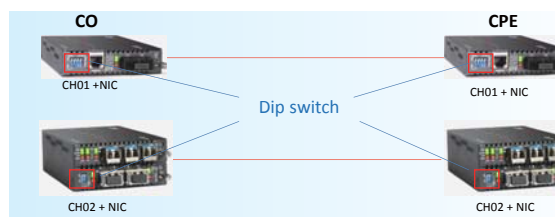
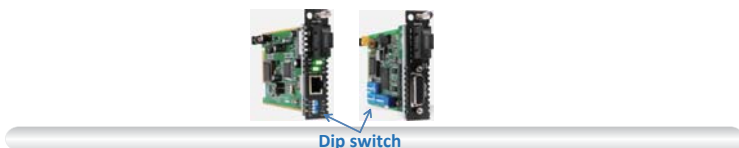


fig.3-1: Dip Switch Management

### Ordering Information

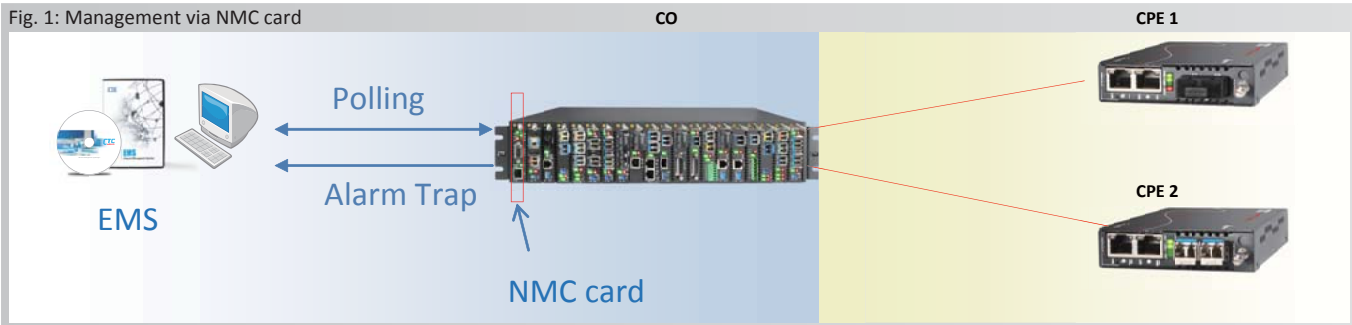
FRM220-NMC: Network Management Card

# Smart View EMS Example for FRM220 SV-Fiber



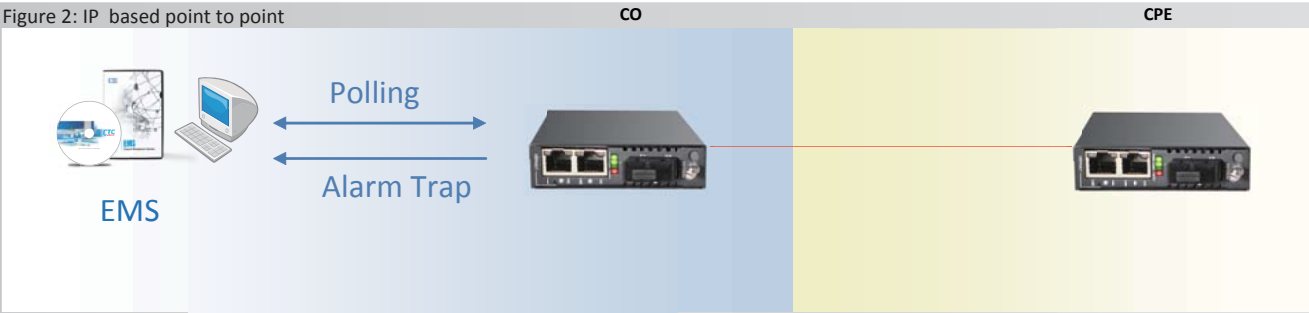
## Management Via NMC Card

Example 1:  
EMS manage FRM220 chassis NIC with NMC card  
NMC collects NIC status from chassis backplane.  
EMS does polling NMC SNMP function for FRM220 NIC management.  
EMS receive SNMP alarm trap from NMC.



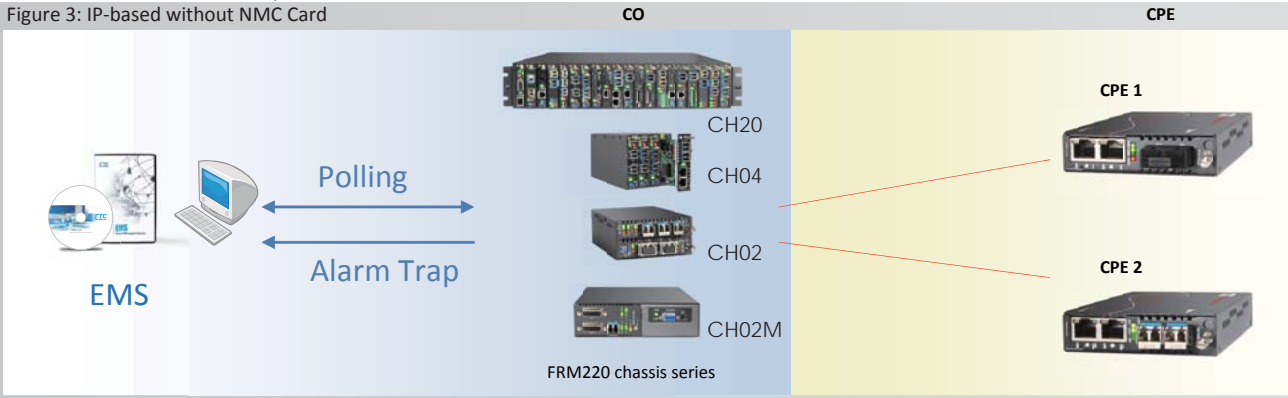
## IP-based point to point

Example 2:  
EMS manage FRM220 IP-based stand-alone (10/100A, 1000EAS series.)  
EMS does polling from FRM220 IP-based stand-alone with SNMP for management.  
EMS receives real-time alarm trap from FRM220 IP-based stand-alone.



## IP-based without NMC Card

Example 3:  
EMS manage FRM220 chassis IP-based NIC without NMC card  
EMS does polling from FRM220 IP-based NIC with SNMP for management.  
EMS receives real-time alarm traps from FRM220 IP-based NIC.





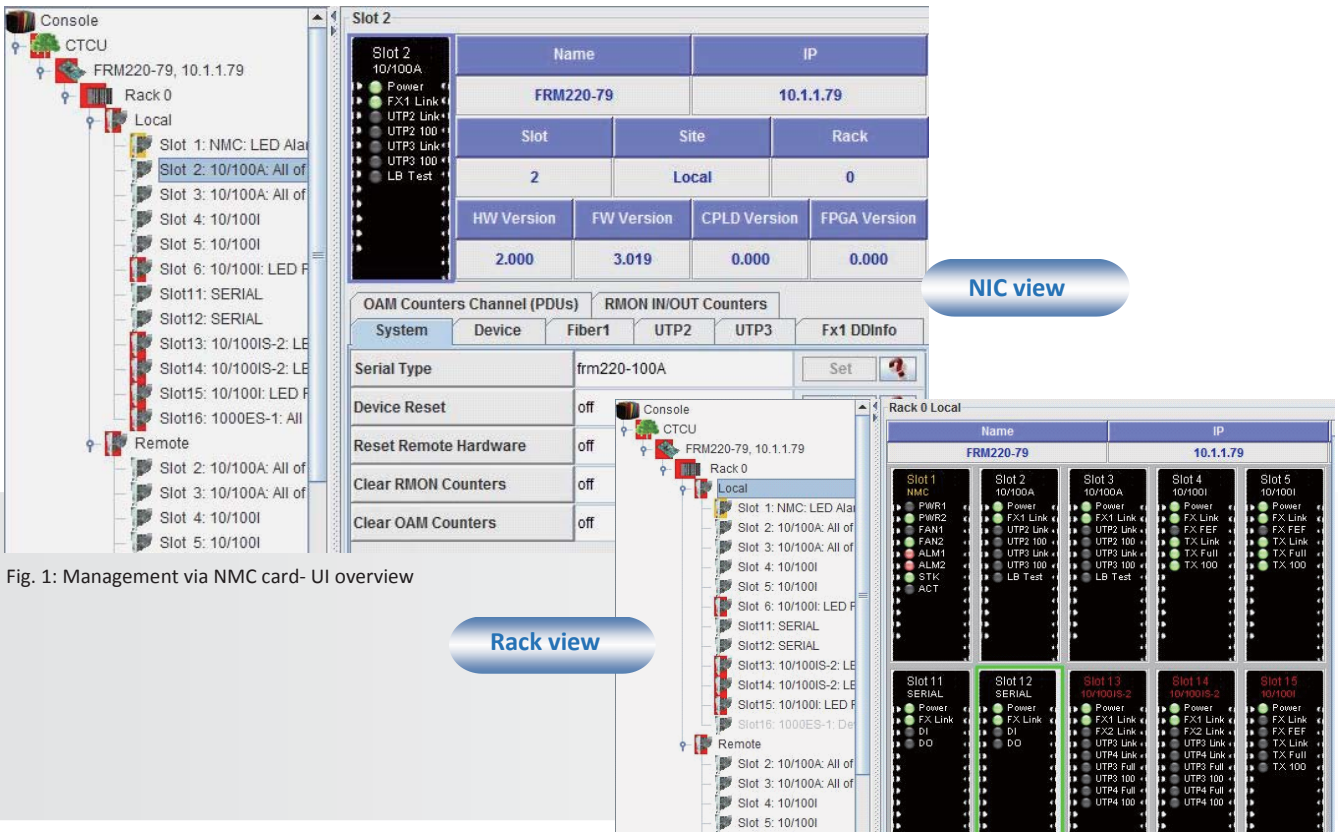


Fig. 1: Management via NMC card- UI overview

overview

Configuration view

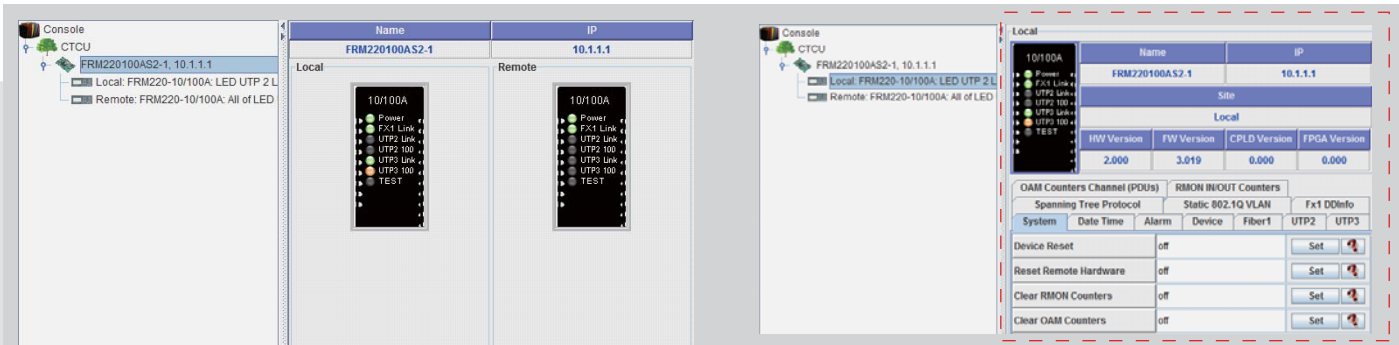


Figure 2: IP-based point to point- UI overview

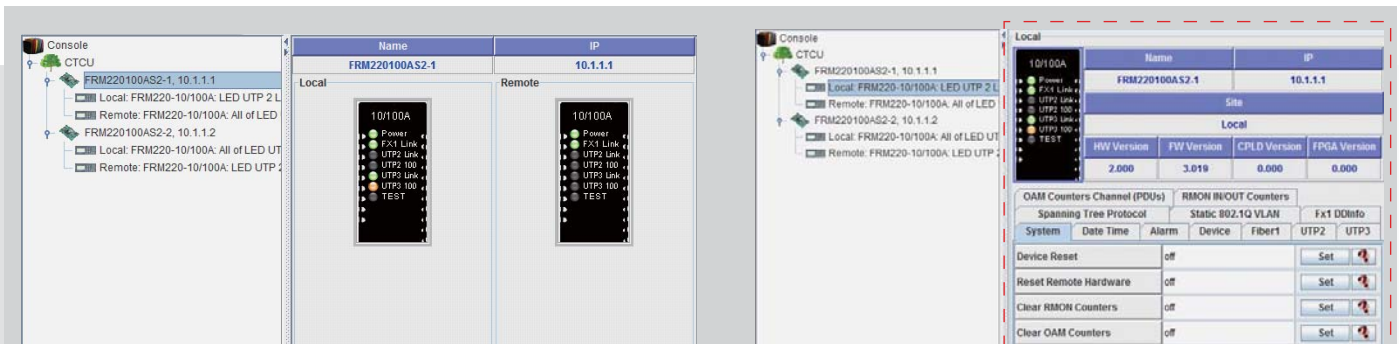


Figure 3: IP-based without NMC Card UI overview

## Ordering Information

### Smart View Element Management System (EMS)

Platform server	Device Agents	Managed Modules
SV-PLF-05: 5 Client user admission	SV-AGT-50: 50 Device agents	SV-Fiber: FRM220, FRM220A
SV-PLF-25: 25 Client user admission	SV-AGT-100: 100 Device agents	
SV-PLF-50: 50 Client user admission	SV-AGT-200: 200 Device agents	
	SV-AGT-500: 500 Device agents	

Example: SV-PLF-05, SV-AGT-50, SV-Fiber

# 10G 3R Transponder FRM220-10G-SS



The FRM220-10G is a series of managed 10G fiber to fiber 3R repeater and 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 (Re-amplification, Re-shaping and Re-clocking) 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 brings you the best and simplest solution for your 10G conversion between fiber and fiber.

### Features

- Multiple protocol supported 10G Ethernet, STM-64, OC-192, G.709 OTU2, Fiber Channel (1xFC, 2xFC, 4xFC, 8xFC, 10xFC)
- Network management via Web, Telnet, SNMP in central FRM220-CH20 chassis
- Protocol transparent 3R fiber media transponder / repeater (Re-amplification, Re-shaping and Re-clocking)
- Promotes flexibility and eases management with pluggable SFP+ or XFP transceiver
- Features two 10G ports offering multiservice 10G transponder and regenerator function
- Provides superior optics capabilities resulting in extended transport distances for regional application.
- 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 CH02M Single Slot Chassis
- Power supplies: +5.0V, -5.2V, +3.3V and +1.8V
- Support reference clock output

### Optical Interface

Connector	FRM220-10G-SS LC, 1x Line SFP+ to 1x Client SFP+ FRM220-10G-XX LC, 1x Line XFP to 1x Client XFP FRM220-10G-SX LC, 1x Line SFP+ to 1x Client XFP
Traffic Format	OC-192/STM-64 (9.95328Gbps) 10 Gigabit Ethernet LAN(10.3125Gbps) G.709 OTU2 (10.709225Gbps)
Fiber Channel	1xFC(1.062 Gbps); 2xFC(2.125 Gbps); 4xFC(4.25 Gbps); 8xFC(8.5 Gbps); 10xFC(10 Gbps)
Regeneration	Re-amplification Re-shaping, Re-timing
Loopback	Line / Client
Fiber	SM 9/125um
Wavelength	CWDM 1470 ~ 1610nm DWDM 1529.55 ~ 1565.50nm

### Indications

LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm)

### Power Input

Card : 12VDC , Standalone : AC,DC option

### Power Consumption

<10W

### Dimensions

155 x 88 x 23mm ( D x W x H)

### Weight

150g

### Temperature

0 ~ 60°C (Operating), -10 ~ 70°C (Storage)

### Humidity

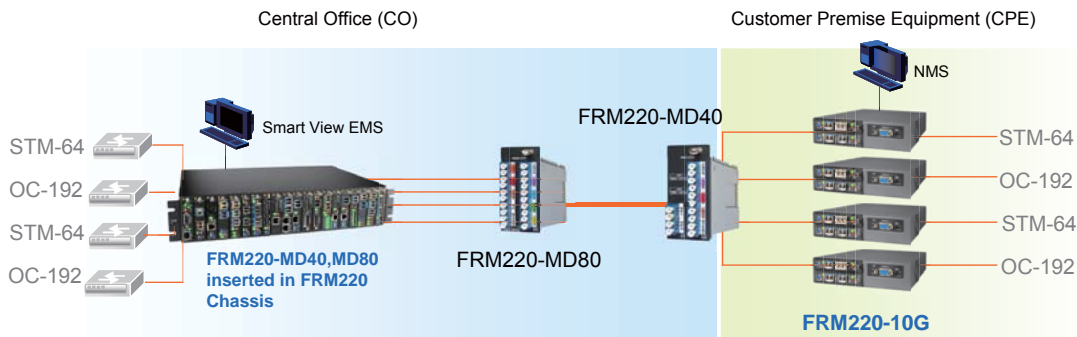
10 ~90% non-condensing

### Certification

CE, FCC, LVD, RoHS

### MTBF

65,000 hrs (25°C)



### Ordering Information

FRM220-10G-SS : 10G 3R Transponder SFP+ to SFP+

Smart View Element Management System(EMS)

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module



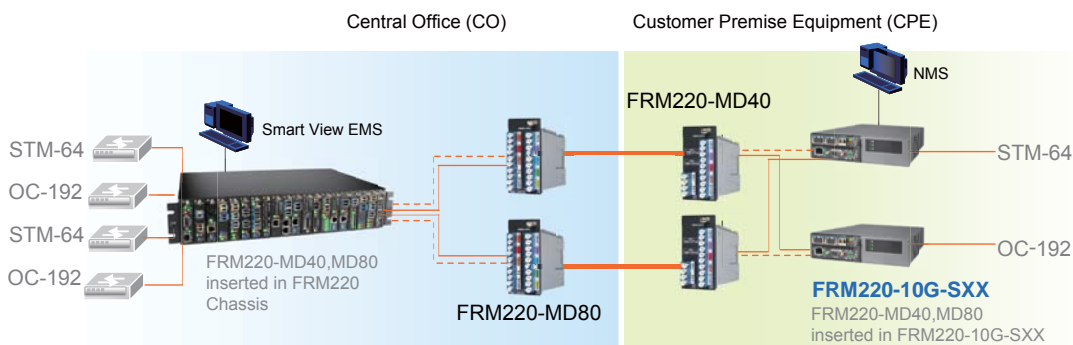
# 10G 3R Transponder with Optical line Protection FRM220-10G-SXX

The FRM220-10G-SXX is a managed 10G fiber to fiber 3R repeater and transponder. Based on 10 Gigabit Fiber standards, the transponder support SFP+ to XFP (SX) fiber connections. 1+1 Automatic optical line Protection Switching are supported for the aggregate XFP fiber ports. The transponder is protocol transparent, providing 3R (Re-amplification, Re-shaping and Re-clocking) 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-SXX brings you the best and simplest solution for your 10G conversion between fiber and fiber.

### Features

- Multiple protocol supported 10G Ethernet, STM-64, OC-192, G.709 OTU2, Fiber Channel (1xFC, 2xFC, 4xFC, 8xFC, 10xFC)
- Network management via Web, Telnet, SNMP in central FRM220-CH20 chassis
- Protocol transparent 3R fiber media transponder / repeater (Re-amplification, Re-shaping and Re-clocking)
- Promotes flexibility and eases management with pluggable SFP+ or XFP transceiver
- Features two 10G ports offering multiservice 10G transponder and regenerator function
- Provides superior optics capabilities resulting in extended transport distances for regional application.
- 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 CH02M Single Slot Chassis
- Power supplies: +5.0V, -5.2V, +3.3V and +1.8V
- Support reference clock output
- Support 1+1 optical Line Protection

Optical Interface	Connector	FRM220-10G-SXX LC, 1x Line SFP+ to 2x Client XFP
	Traffic Format	OC-192/STM-64 (9.95328Gbps) 10 Gigabit Ethernet LAN(10.3125Gbps) G.709 OTU2 (10.709225Gbps)
	Fiber Channel	1xFC(1.062 Gbps); 2xFC(2.125 Gbps); 4xFC(4.25 Gbps); 8xFC(8.5 Gbps); 10xFC(10 Gbps)
	Regeneration	Re-amplification Re-shaping, Re-timing
Loopback	Line / Client	
Fiber	SM 9/125um	
Wavelength	CWDM	1470 ~ 1610nm
	DWDM	1529.55 ~ 1565.50nm
Indications	LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm)	
Power Input	Card : 12VDC , Standalone : AC,DC option	
Power Consumption	<10W	
Dimensions	155 x 88 x 23mm ( D x W x H)	
Weight	150g	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~90% non-condensing	
Certification	CE, FCC, LVD, RoHS	
MTBF	65,000 hrs (25°C)	



### Ordering Information

FRM220-10G-SXX : 10G 3R Transponder SFP+ to XFP with optic fiber protection  
**Smart View Element Management System(EMS)**  
 SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)  
 SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)  
 SV-Fiber: FRM220 Managed Module

## 2.7G 3R Transponder FRM220-2.7G-2S



The FRM220-2.7G-2S is a 2.7G 3R optical regeneration device, which consists of Re-amplification, Re-shaping and Re-timing. 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 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

- Multiple protocol supported at bit rates 34.3Mbps to 2.7Gbps (Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2)
- Network management via Web, Telnet, SNMP in central FRM220 chassis
- Local configuration via DB9 craft port In Stand-alone
- Digital Diagnostic monitoring of SFP module
- Perform optical repeater function (Re-amplification, Re-shaping, and Re-clocking)
- Facility loopback on both Client / Line sides
- Link Fault Pass through (LFP)
- Auto Laser Shutdown (ALS)
- Dip Switch setting data rate
- Detect fiber transmitter error Alarm

### Optical Interface

Connector	SFP LC
Data rate	E3 to OC-48
Duplex mode	Full duplex
Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
Distance	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) CWDM 1470 ~ 1610nm

### Indications

LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)

### Power Input

Card : 12VDC  
Standalone : AC, DC options

### Power Consumption

< 12W

### Dimension

155 x 88 x 23mm (D x W x H)

### Weight

120g

### Temperature

0 ~ 60°C (Operating), -10 ~ 70°C (Storage)

### Humidity

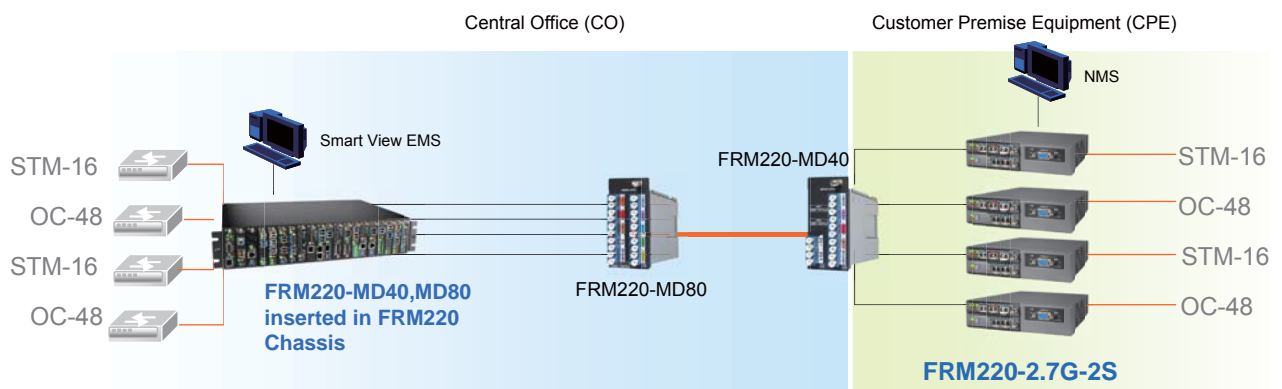
10 ~ 90% non-condensing

### Certification

CE, FCC, LVD, RoHS

### MTBF

65,000 hrs (25°C)



### 2.7G 3R Repeater



### Ordering Information

FRM220-2.7G-2S: 2.7G 3R Transponder

Smart View Element Management System (EMS)

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module



## 2.7G 3R Transponder with Fiber Protection

### FRM220-2.7G-3S

The FRM220-2.7G-3S is a 3R 2.7G optical regeneration device, which consists of Re-amplification, Re-shaping and Re-timing. 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. 1+1 Automatic optical line Protection Switching are supported for the aggregate fiber ports. When the FRM220-2.7G-3S 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

- Multiple protocol supported at bit rates 34.3Mbps to 2.7Gbps (Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2)
- Network management via Web, Telnet, SNMP in central FRM220-CH20 chassis
- Local configuration via DB9 craft port In Stand-alone
- Digital Diagnostic monitoring of SFP module
- Perform optical repeater function (Re-amplification, Re-shaping, and Re-clocking)  
Facility loopback on both Client / Line sides
- 1+1 Optic fiber protection
- Link Fault Pass through (LFP)
- Auto Laser Shutdown (ALS)
- Dip Switch setting data rate
- Detect fiber transmitter error Alarm

#### Optical Interface

Connector	SFP LC
Data rate	34M E3 to OC-48
Regeneration	Re-amplification Re-shaping Re-clocking
Loop back	Line/Client
Fiber	MM 62.2/125µm, 50/125µm. SM 9/125µm
Wavelength	MM 850, 1310nm SM 1310, 1550nm WDM 1310T/1550R, 1550T/1310R CWDM 1470 ~ 1610nm
Indications	LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input	Card : 12VDC , Standalone : AC,DC option
Power Consumption	< 10W
Dimensions	155 x 88 x 23mm ( D x W x H)
Weight	120g
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs (25°C)

### Managed 2.7G 3R Transponder with Fiber Protection



Client: Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2

#### Ordering Information

FRM220-2.7G-3S : 2.7G 3R Transponder with optic fiber protection  
**Smart View Element Management System (EMS)**  
 SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)  
 SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)  
 SV-Fiber: FRM220 Managed Module

## 2.5G 2R Transponder FRM220-TR21



The transponder card converts a data signal to the correct wavelength for transmission on a specific CWDM channel. By supporting SFP optics on both line side and client side interfaces, the transponder provides a truly flexible and easy to deploy solution for all applications. The transponder supports 2R regeneration, which consists of re-amplification and reshaping.

### Features

- 2R regeneration (Re-amplification and reshaping)
- Line rate support from 100Mbps up to 2.5Gbps
- Client Side Wavelengths: 851/ 1311/ 1551nm
- Line Side CWDM Wavelengths: 1471/ 1491/ 1511/ 1531 / 1551/ 1571/ 1591/ 1611nm
- Optical Connector: SFP-LC ( On both Line & Client Side)

### Optical Interface :

Connector : SFP LC

Data rate : 100Mbps, 1.25Gbps, 2.5Gbps

Fiber : MM 62.2/125µm, 50/125µm.

Distance : SM 9/125µm

Wavelength : 850, 1311, 1471 ~ 1611nm

Power, Link(Line), Link(Client), TX/Act, Loopback

Card: 12 VDC

Stand-alone: AC, DC option

### Indication

Power Input

### Power Consumption

<5W

### Dimensions

155 x 88 x 23mm(D x W x H)

### Weight

120g

### Temperature

0~60°C (Operating), -10~70°C (Storage)

### Humidity

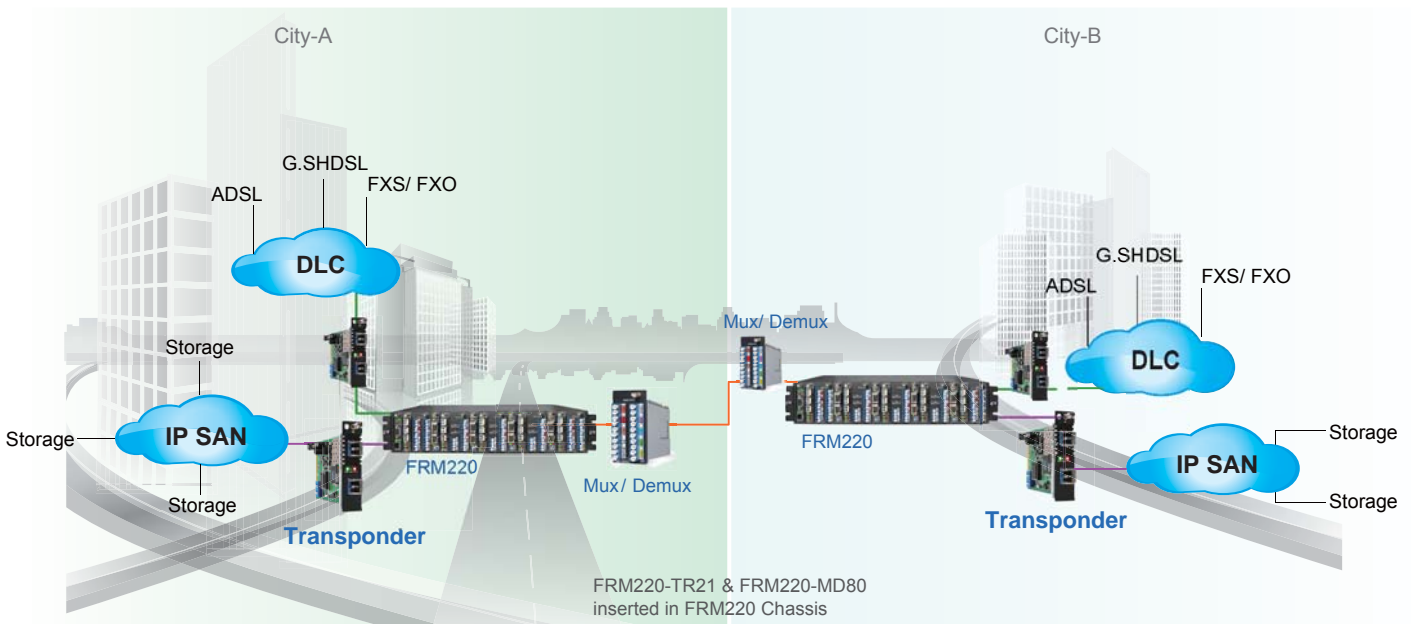
10~90% non-condensing

### Certification

CE, FCC, RoHS

### MTBF

57,000 hours



### Ordering Information

FRM220-TR21: 2.5G 2R Transponder

Smart View Element Management System (EMS)

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module



## CWDM Mux/DeMux

# FRM220-MD40

# FRM220-MD80

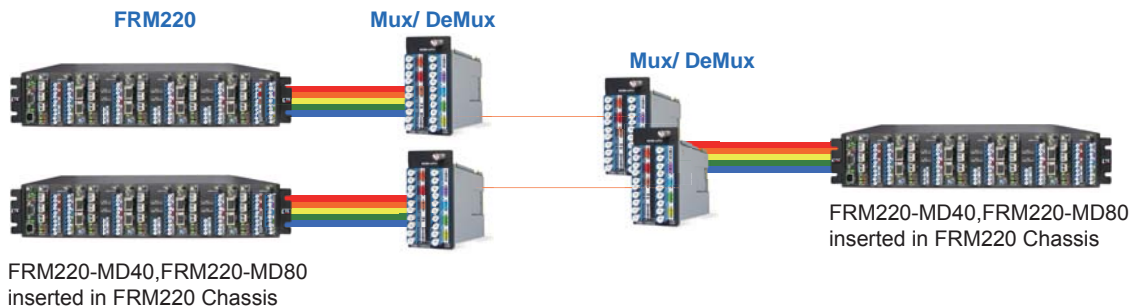
The FRM220-MD40 is 4 channels MUX/DEMUX, modular design card for CWDM wavelengths including 1510nm, 1530nm, 1550nm, 1570nm. The FRM220-MD40-2UP is 4 channels MUX/DEMUX, modular design card for CWDM wavelengths including 1470nm, 1490nm, 1590nm, 1610nm and two upgrade ports for CWDM wavelength ranges of 1503nm ~ 1577nm and 1260nm ~ 1457nm. The FRM220-MD80-1UP is 8 channels MUX/DEMUX, modular design card for CWDM wavelengths including 1470nm, 1490nm, 1510nm, 1530nm, 1550nm, 1570, 1590, 1610nm and one upgrade port for CWDM wavelength range of 1260nm ~ 1457nm. The MUX/DEMUX cards provide the primary wave division and combination functions for CWDM. Line side wave lengths require translation to client side equipment via a transponder card.

### Features

- Full native mode performance
- Optical connectors
- Passive model requires no power
- Protocol transparent, no limitation
- Utilizes industry standard ITU CWDM wavelength

Connector	LC
Standard	ITU-T G.694.2
Wavelength	1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610nm
Upgrade Port	1503nm ~ 1577nm, 1260nm ~ 1457nm
Insertion Loss	MD40 : < 1.8dB MD40-2UP : < 2.2dB MD80-1UP : < 2.8dB
Return Loss	>45dB
Dimensions	MD40 155 x 88 x 23 mm (D x W x H) MD40-2UP, MD80-1UP 155 x 88 x 42 mm (D x W x H)
Weight	MD40 : 200g MD40-2UP : 360g MD80-1UP : 380g
Temperature	0 ~ 60 °C (Operating) -10 ~ 70 °C (Storage)
Humidity	0 ~95% non-condensing
Certification	RoHS
MTBF	75,000 hours

### CWDM Mux/DeMux



### Ordering Information

FRM220-MD40: 4ch Mux/Demux

FRM220-MD80: 8ch Mux/Demux

Smart View Element Management System (EMS)

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50, 100, 200, 500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module

# 155Mbps Transponder FRM220-155MS



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

### Optical Interface

Connector	1x9 (SC, ST, FC) or SFP LC
Data rate	Up to 155.52Mbps ( Fast Ethernet, OC3, STM-1)
Duplex mode	Full duplex
Fiber	MM 50/125µm, 62.5/125µm. SM 9/125µm
Distance	MM 62.2/125µm, 50/125µm. SM 9/125µm
Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)

### Indications Power Input

LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link )  
Card : 12VDC  
Standalone : AC, DC options

### Power Consumption

< 5W

### Dimension

155 x 88 x 23mm (D x W x H)

### Weight

120g

### Temperature

0 ~ 60°C (Operating), -10 ~ 70°C (Storage)

### Humidity

10 ~ 90% non-condensing

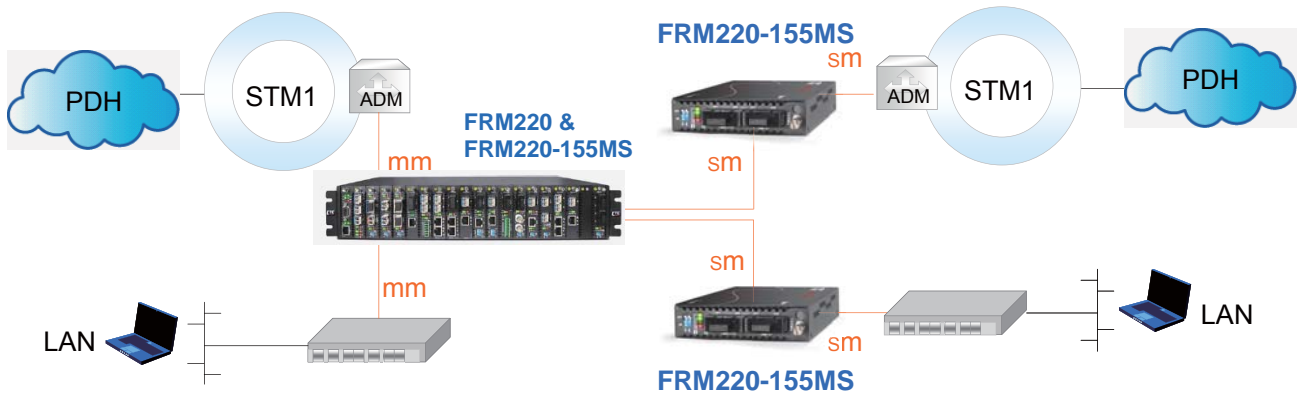
### Certification

CE, FCC, LVD, RoHS

### MTBF

65,000 hrs (25°C)

### Ethernet Repeater



### Ordering Information

FRM220-155MS : 155Mbps Fiber Repeater

Smart View Element Management System (EMS)

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module





## Gigabit Ethernet OAM/IP In-band Converter/Switch

# FRM220-1000EAS

The FRM220-1000EAS is an IEEE802.3ah OAM compliant dual copper to dual 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 802.3ah series card and remotely connected OAM compliant converter. By offering 802.3ah OAM Compliant in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

### Features

- Supports local / remote 802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- 2-port 10/100/1000Base-T to 2-port 1000Base-SX/LX SFP
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1632 bytes (max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag and Port based VLAN
- Supports Flow control (Pause)
- Supports OAM remote loopback to assist in diagnosing network problems
- Supports bandwidth control (70K ~ 250Mbps)
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade
- Fiber Redundant
- VLAN
- Spanning Tree
- Port Trunking
- Default port and 802.1p tag priority QoS
- Fixed or weighted priority QoS

### Optical Interface

Connector	SFP LC
Data rate	1000Mbps
Duplex mode	Full duplex
Fiber	MM 50/125µm, 62.5/125µm. SM 9/125µm
Distance	MM 550m, 2km, SM 15/30/50/80/120km WDM 20/40/60km
Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)

### Electrical Interface

Connector	RJ45
Data rate	10Mbps, 100Mbps, 1000Mbps
Duplex mode	Half / Full duplex
Cable	10Base-T Cat.3, 4, 5, UTP 100Base-TX Cat.5, 5e or higher 1000Base-T Cat.5, 5e or higher

### Standard

IEEE 802.3, IEEE 802.3u, IEEE802.1q  
LED (Power, FX-Link, Test, TX-Link, TX-SPD)

### Indications

Card : 12VDC

### Power Input

Standalone : AC, DC options

### Power Consumption

< 8W

### Dimension

155 x 88 x 23mm (D x W x H)

### Weight

120g

### Temperature

0 ~ 60°C (Operating), -10 ~ 70°C (Storage)

### Humidity

10 ~ 90% non-condensing

### Certification

CE, FCC, LVD, RoHS

### MTBF

65,000 hrs (25°C)

## Ordering Information

FRM220-1000EAS: 2-port 10/100/1000Base-T to 2-port 1000Base-X SFP OAM/IP media converter

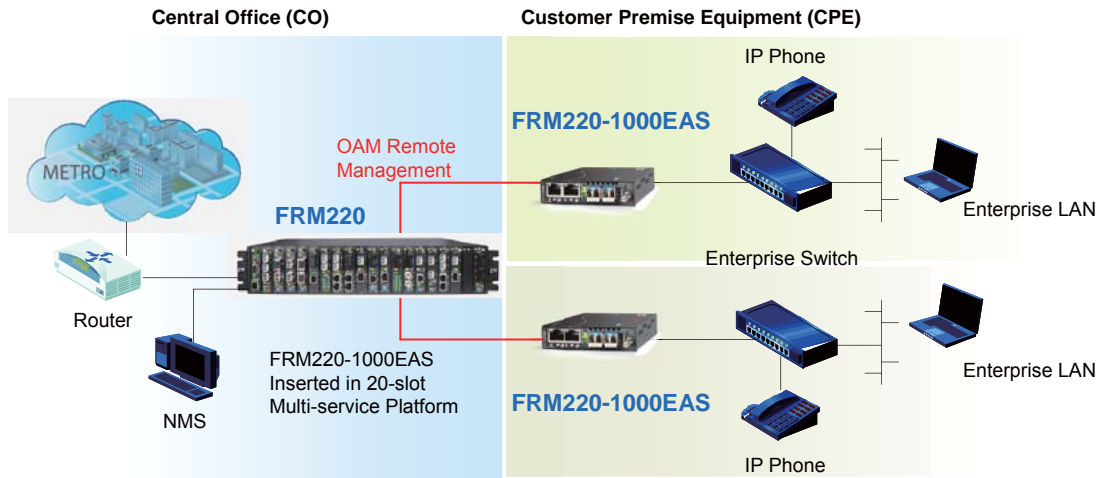
**Smart View Element Management System (EMS)**

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

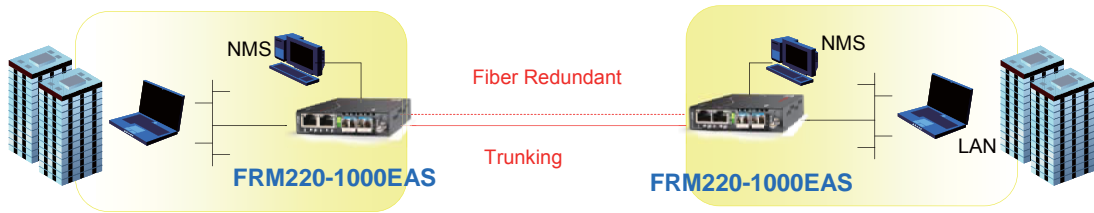
SV-AGT-50 (50, 100, 200, 500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module

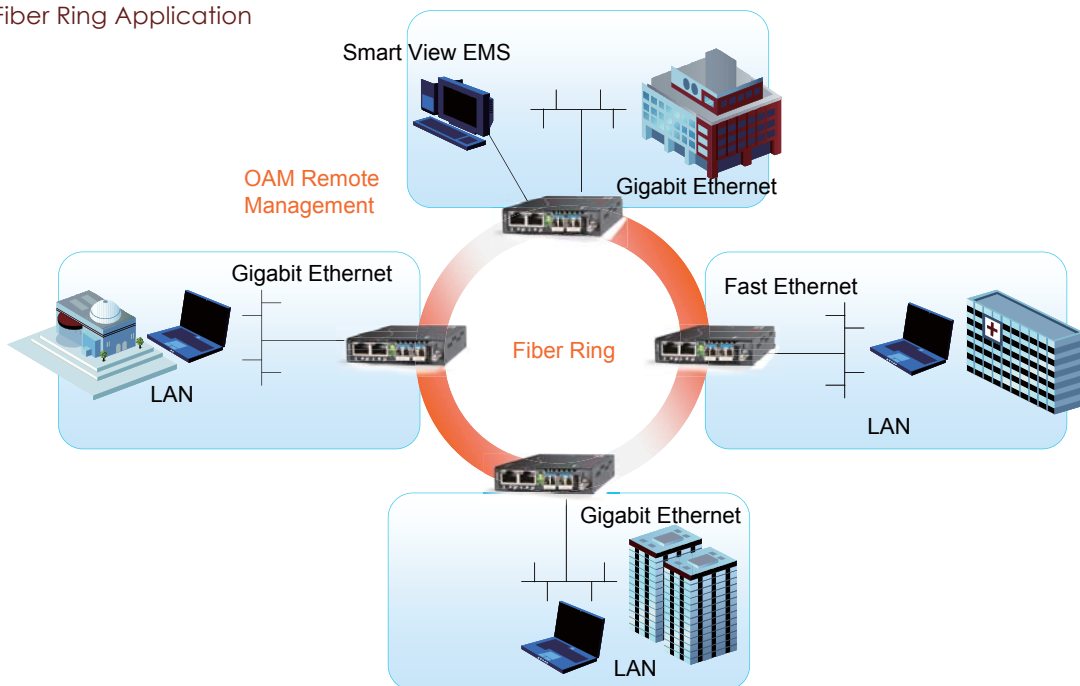
FRM220-1000EAS Application



Fiber Redundant / Trunking Application



Fiber Ring Application





The FRM220-1000EAS-1 is an IEEE802.3ah OAM compliant 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 802.3ah series card and remotely connected OAM compliant converter. By offering 802.3ah OAM Compliant In-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

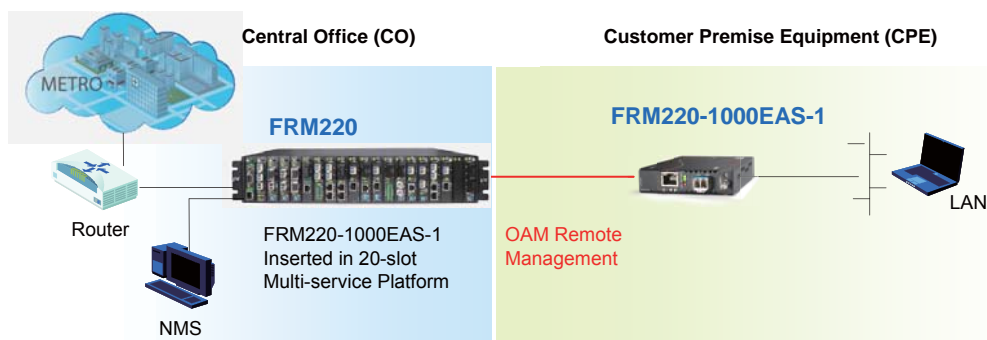
### Features

- Supports local / remote 802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- 10/100/1000Base-T to 1000Base-SX/LX SFP
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1632 bytes (max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag and Port based VLAN
- Supports Flow control (Pause)
- Supports OAM remote loopback to assist in diagnosing network problems
- Supports bandwidth control
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Support QoS Port Priority
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

## Gigabit Ethernet OAM/IP In-band Converter

### FRM220-1000EAS-1

Optical Interface	Connector	SFP LC
	Data rate	1000Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125µm, 62.5/125µm. SM 9/125µm
Distance	MM	550m, 2km, SM 15/30/50/80/120km
	WDM	20/40/60km
Wavelength	MM	1310nm, SM 1310,1550nm
	WDM	1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP 100Base-TX Cat.5, 5e or higher 1000Base-T Cat.5, 5e or higher
Standard Indications		IEEE 802.3, IEEE 802.3u, IEEE 802.1q
		LED Power, FX-Link, Test, TX-Link, TX-SPD
Power Input	Card	: 12VDC
	Standalone	: AC, DC options
Power Consumption		< 4W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		120g
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
	MTBF	



### Ordering Information

FRM220-1000EAS-1: 1-port 10/100/1000Base-T to 1-port 1000Base-X SFP OAM/IP media converter

Smart View Element Management System (EMS)

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module

# Gigabit Ethernet Converter

## FRM220-1000ES-1



The FRM220-1000ES-1 is a copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000 Base-TX and 1000Base-SX/LX with SC or SFP LC 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.

### Features

- Network Management via FRM220 chassis
- 10/100/1000Base-T to 1000Base-SX/LX SFP Managed card
- Auto-negotiation or forced mode
- Auto MDI/MDIX
- Forward 1632 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 f/w upgrade

### Optical Interface

Connector	SFP LC
Data rate	1000Mbps
Duplex mode	Full duplex
Fiber	MM 50/125µm, 62.5/125µm. SM 9/125µm
Distance	MM 550m, 2km, SM 15/30/50/80/120km WDM 20/40/60km
Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)

### Electrical Interface

Connector	RJ45
Data rate	10Mbps, 100Mbps, 1000Mbps
Duplex mode	Half / Full duplex
Cable	10Base-T Cat.3, 4, 5, UTP 100Base-TX Cat.5, 5e or higher 1000Base-T Cat.5, 5e or higher

### Standard

IEEE 802.3, IEEE 802.3u

### Indications

LED Power, FX-Link, LFP, TX-Link, TX-SPD

### Power Input

Card : 12VDC  
Standalone : AC, DC options

### Power Consumption

< 4W

### Dimension

155 x 88 x 23mm (D x W x H)

### Weight

120g

### Temperature

0 ~ 60°C (Operating), -10 ~ 70°C (Storage)

### Humidity

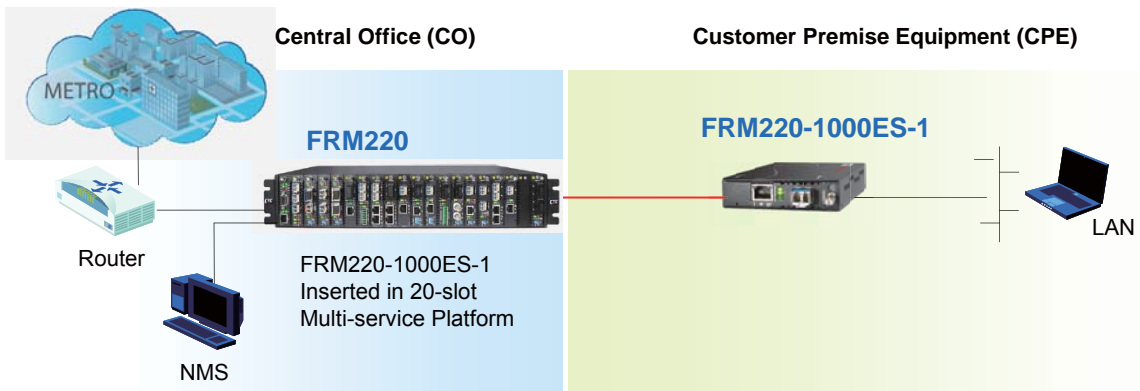
10 ~ 90% non-condensing

### Certification

CE, FCC, LVD, RoHS

### MTBF

65,000 hrs (25°C)



### Ordering Information

FRM220-1000ES-1: 1-port 10/100/1000Base-T to 1-port 1000Base-X SFP media converter

**Smart View** Element Management System (**EMS**)

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50, 100, 200, 500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module



# Gigabit Ethernet Converter FRM220-1000TS

The FRM220-1000TS is a transparent Gigabit Ethernet 1000Base-T to 1000Base-SX/LX SFP converter. They are managed (when installed in FRM220 with NMC) or non-managed stand-alone media converters, which give you the options to choose from a wide range of industry standard SFP modules with LC connectors. SFPs in multi-mode and single mode types are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. Because they are completely transparent to Ethernet packets, they are able to support any size frames, including undersized or jumbo packets (9K bytes). LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status.

### Features

- 1000Base-T to 1000Base-SX/LX
- Network management via terminal or SNMP in FRM220 chassis
- Auto-negotiation or force mode
- Auto MDI/MDIX
- Forward > 9K bytes packets
- Support Link Fault Pass Through (LFP) function
- Auto Laser Shutdown (ALS)

#### Optical Interface

Connector	SFP LC
Data rate	1000Mbps
Duplex mode	Full duplex
Fiber	MM 50/125µm, 62.5/125µm. SM 9/125µm
Distance	MM 550m, 2km, SM 15/30/50/80/120km WDM 20/40/60km
Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)

#### Electrical Interface

Connector	RJ45
Data rate	1000Mbps
Duplex mode	Full duplex
Cable	10Base-T Cat.3, 4, 5, UTP

#### Standard

IEEE 802.3ab

#### Indications

LED (Power, FX-Link, FX Duplex, TX-SPD, TX-Duplex, TX-Link)

#### Power Input

Card : 12VDC  
Standalone : AC, DC options

#### Power Consumption

< 4W

#### Dimension

155 x 88 x 23mm (D x W x H)

#### Weight

120g

#### Temperature

0 ~ 60°C (Operating), -10 ~ 70°C (Storage)

#### Humidity

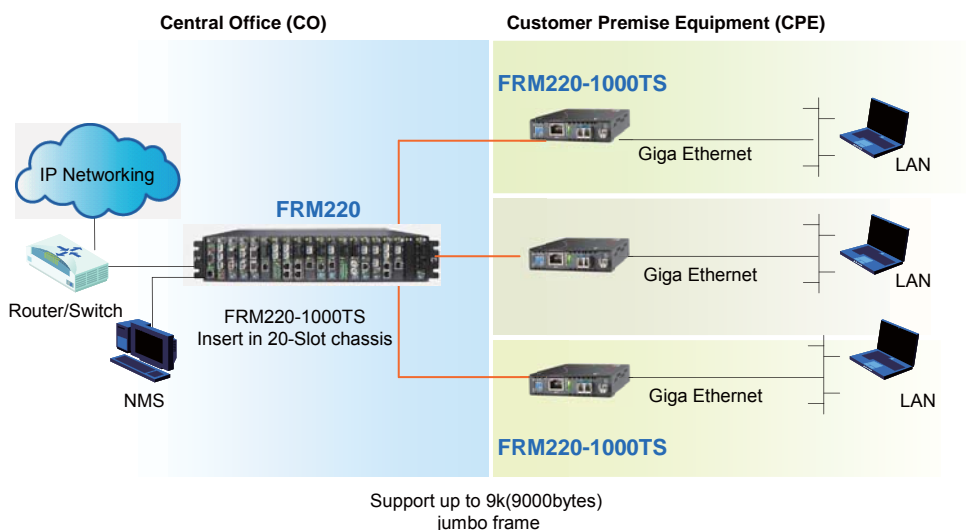
10 ~ 90% non-condensing

#### Certification

CE, FCC, LVD, RoHS

#### MTBF

65,000 hrs (25°C)



### Ordering Information

- FRM220-1000TS: 1000Base-T to 1000Base-X SFP media converter
- Smart View Element Management System(EMS)
- SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)
- SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)
- SV-Fiber: FRM220 Managed Module

## Fast Ethernet OAM/IP In-band Media Converter

# FRM220-10/100A



The FRM220-10/100A is an IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution designed to make conversion between 10/100Base-TX and 100Base-FX with SC, FC or ST connector. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each 802.3ah series card and remotely connected OAM compliant converter. By offering 802.3ah OAM Compliant in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

### Features

- Supports local / remote 802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- 10/100BASE-TX to 100BASE-FX
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1536 bytes (max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Bandwidth control Ingress (128K ~ 64M), Egress (128K ~ 8M)
- Support flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports QoS Port Priority
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online remote f/w upgrade

### Optical Interface

Connector	1x9 (SC, ST, FC)
Data rate	100Mbps
Duplex mode	Full duplex
Fiber	MM 50/125µm, 62.5/125µm, SM 9/125µm
Distance	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)

### Electrical Interface

Connector	RJ45
Data rate	10Mbps, 100Mbps
Duplex mode	Half / Full duplex
Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher

### Standard

Standard	IEEE 802.3, IEEE 802.3u
Indications	LED (Power, Test, FX-Link, TX-Speed, TX-Link)
Power Input	Card : 12VDC, Standalone : AC, DC options

### Power Consumption

< 4W

### Dimension

155 x 88 x 23mm (D x W x H)

### Weight

120g

### Temperature

0 ~ 60°C (Operating), -10 ~ 70°C (Storage)

### Humidity

10 ~ 90% non-condensing

### Certification

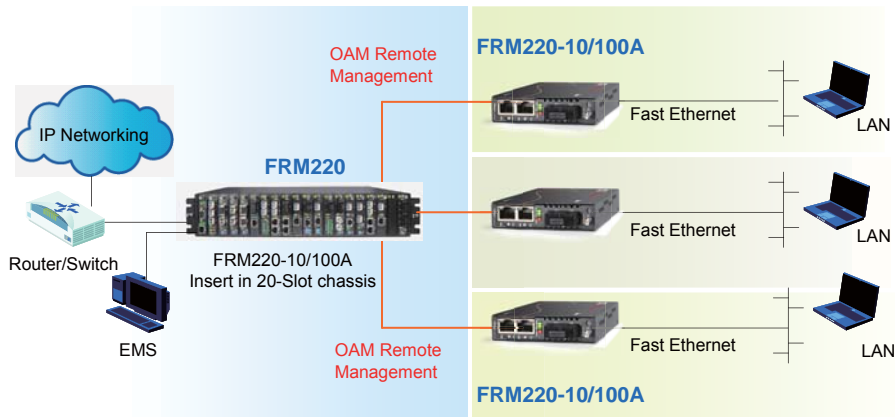
CE, FCC, LVD, RoHS

### MTBF

65,000 hrs (25°C)

### Central Office (CO)

### Customer Premise Equipment (CPE)



### Ordering Information

FRM220-10/100A: 2-port 10/100Base-TX to 1-port 100Base-FX, OAM/IP media converter

#### Smart View Element Management System (EMS)

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module



The FRM220-10/100AS-2 is an IEEE802.3ah OAM compliant two copper to two fiber Fast Ethernet solution designed to make conversion between 10/100Base-TX and 100Base-FX with SFP. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each 802.3ah series card and remotely connected OAM compliant converter. By offering 802.3ah OAM Compliant in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

### Features

- Supports local / remote 802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- 2-port 10/100Base-TX plus 2-port 100Base-FX SFP
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1536 bytes (max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag and Port based VLAN
- Supports port trunking
- Bandwidth control Ingress (128K ~ 64M), Egress (128K ~ 8M)
- Support flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports QoS Port Priority
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade
- Fiber Redundant
- Port Trunking
- Spanning Tree

### Ordering Information

FRM220-10/100AS-2: 2-port 10/100Base-TX to 2-port 100Base-FX, OAM/IP media converter

Smart View Element Management System (EMS)

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module

## Dual Channel Fast Ethernet OAM/IP In-band Media Converter FRM220-10/100AS-2

### Optical Interface

Connector	SFP LC
Data rate	100Mbps
Duplex mode	Full duplex
Fiber	MM 50/125 $\mu$ m, 62.5/125 $\mu$ m, SM 9/125 $\mu$ m
Distance	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)

### Electrical Interface

Connector	RJ45
Data rate	10Mbps, 100Mbps
Duplex mode	Half / Full duplex
Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher

### Standard

IEEE 802.3, IEEE 802.3u

### Indications

LED (Power, Test, FX-Link, TX-Speed, TX-Link)

### Power Input

Card : 12VDC  
Standalone : AC, DC options

### Power Consumption

< 4W

### Dimension

155 x 88 x 23mm (D x W x H)

### Weight

120g

### Temperature

0 ~ 60°C (Operating), -10 ~ 70°C (Storage)

### Humidity

10 ~ 90% non-condensing

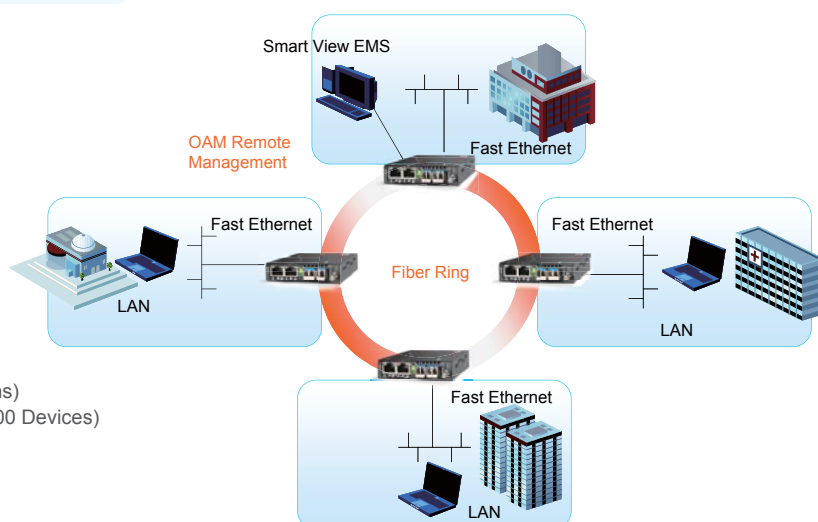
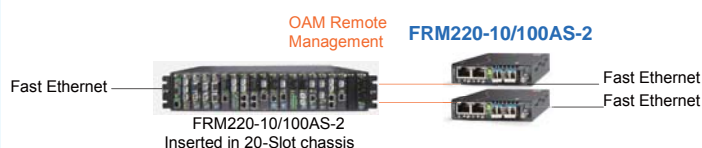
### Certification

CE, FCC, LVD, RoHS

### MTBF

65,000 hrs (25°C)

### Dual Channel 802.3ah OAM/ IP Fast Ethernet Point to Multi-Point



# Fast Ethernet In-band Media Converter FRM220-10/100i



The FRM220-10/100i is a 10/100Base Ethernet to 100Base-FX fiber slide-in card converter designed for central and remote applications. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

### Features

- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager.
- Bandwidth control (Nx32K or Nx512Kbps)
- Support flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

### Optical Interface

Connector	1x9 (SC, ST, FC)
Data rate	100Mbps
Duplex mode	Full duplex
Fiber	MM 50/125µm, 62.5/125µm. SM 9/125µm
Distance	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)

### Electrical Interface

Connector	RJ45
Data rate	10Mbps, 100Mbps
Duplex mode	Half / Full duplex
Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard	IEEE 802.3, IEEE 802.3u,TS-1000
Indications	LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input	Card : 12VDC Standalone : AC, DC options

### Power Consumption

< 4W

### Dimension

155 x 88 x 23mm (D x W x H)

### Weight

120g

### Temperature

0 ~ 60°C (Operating), -10 ~ 70°C (Storage)

### Humidity

10 ~ 90% non-condensing

### Certification

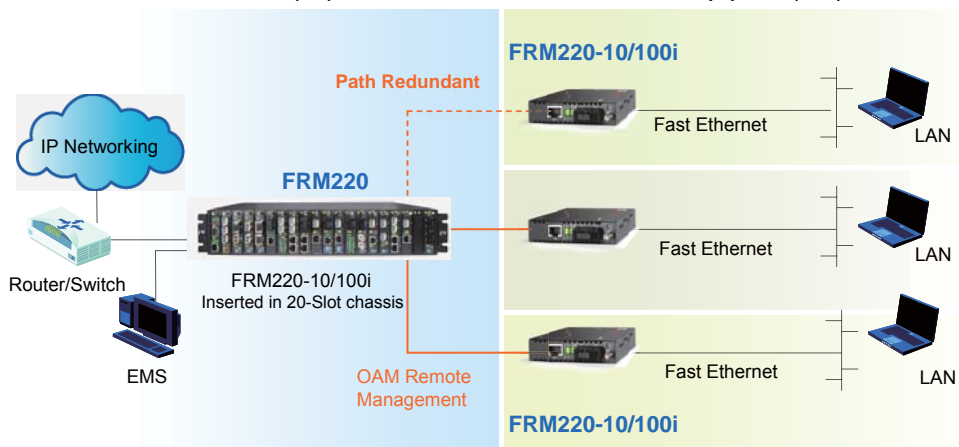
CE, FCC, LVD, RoHS

### MTBF

65,000 hrs (25°C)

### Central Office (CO)

### Customer Premise Equipment (CPE)



Support up to 9k(9000bytes) jumbo frame

### Ordering Information

FRM220-10/100i : 10/100Base-TX to 100Base-FX media converter

Smart View Element Management System (EMS)

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module





The FRM220-10/100iS-2 is a dual channel (two in one) 10/100Base Ethernet to 100Base-FX fiber slide-in card converter designed for central and remote applications. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

### Features

- Dual Converter 10/100Base-TX to 100Base-FX
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager.
- Bandwidth control (Nx32K or Nx512Kbps)
- Support flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

## Dual Channel Fast Ethernet In-band Media Converter FRM220-10/100iS-2

### Optical Interface

Connector	SFP LC
Data rate	100Mbps
Duplex mode	Full duplex
Fiber	MM 50/125 $\mu$ m, 62.5/125 $\mu$ m, SM 9/125 $\mu$ m
Distance	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)

### Electrical Interface

Connector	RJ45
Data rate	10Mbps, 100Mbps
Duplex mode	Half / Full duplex
Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher

### Standard

IEEE 802.3, IEEE 802.3u,TS-1000

### Indications

LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)

### Power Input

Card : 12VDC  
Standalone : AC, DC options

### Power Consumption

< 4W

### Dimension

155 x 88 x 23mm (D x W x H)

### Weight

120g

### Temperature

0 ~ 60°C (Operating), -10 ~ 70°C (Storage)

### Humidity

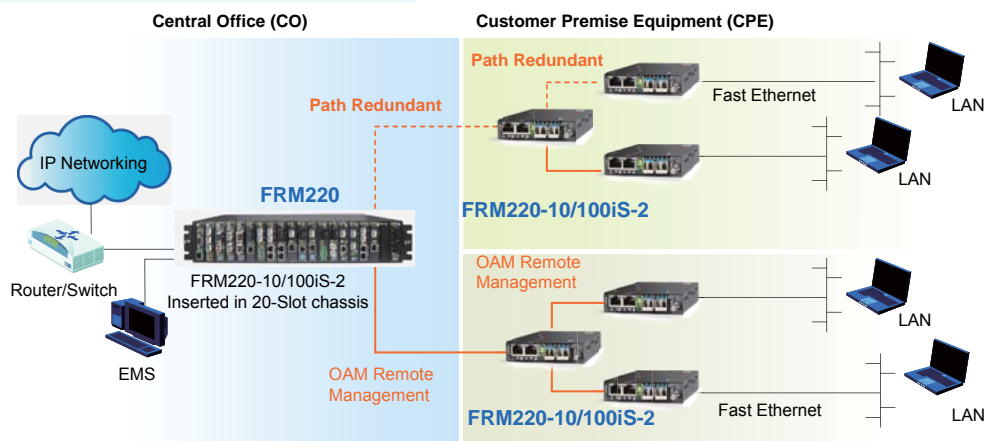
10 ~ 90% non-condensing

### Certification

CE, FCC, LVD, RoHS

### MTBF

65,000 hrs (25°C)



Support up to 9k(9000bytes) jumbo frame

### Ordering Information

FRM220-10/100iS-2: Dual Channels 10/100Base-TX to 100Base-FX SFP media converter

Smart View Element Management System (EMS)

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50, 100, 200, 500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module

# Fast Ethernet In-band Media Converter FRM220-10/100i-2E



The FRM220-10/100i-2E is a 2-port 10/100Base Ethernet to 100Base-FX fiber slide-in card converter designed for central and remote applications. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering in-band management, this converter can be completely controlled and monitored from a centrally located managed standalone chassis controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

### Features

- 2-port 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local / remote In-band management (Monitor and Configure) by local management with CH01M standalone chassis.
- Bandwidth control (Nx32K or Nx512Kbps)
- Support flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Supports Link Fault Pass through (LFP)
- Supports Fiber Loop Back Test
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)

### Optical Interface

Connector	1x9 (SC,FC,ST)
Data rate	100Mbps
Duplex mode	Full duplex
Fiber	MM 50/125µm, 62.5/125µm. SM 9/125µm
Distance	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)

### Electrical Interface

Connector	RJ45
Data rate	10Mbps, 100Mbps
Duplex mode	Half / Full duplex
Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher

### Standard

IEEE 802.3, IEEE 802.3u

### Indications

LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)

### Power Input

Card : 12VDC

Standalone : AC, DC options

### Power Consumption

< 5W

### Dimension

155 x 88 x 23mm (D x W x H)

### Weight

120g

### Temperature

0 ~ 60°C (Operating), -10 ~ 70°C (Storage)

### Humidity

10 ~ 90% non-condensing

### Certification

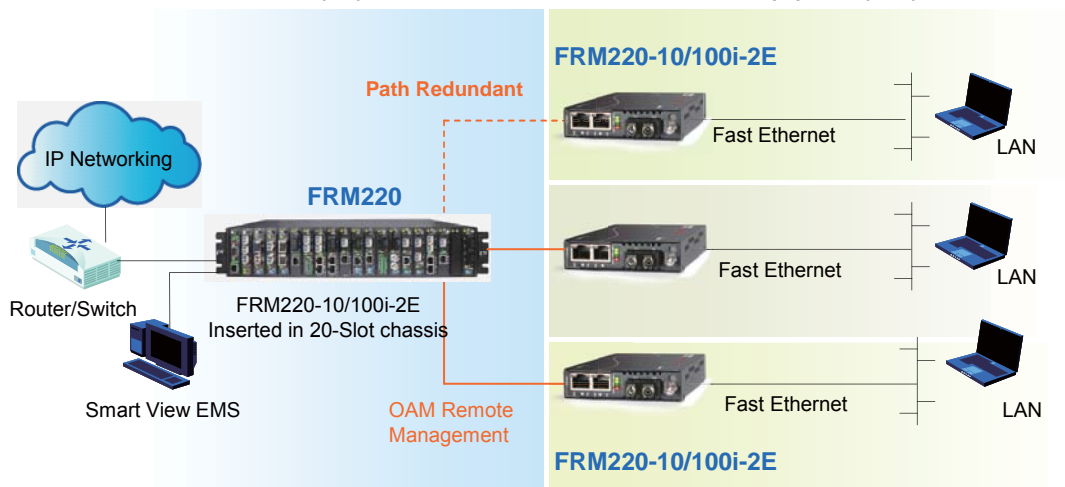
CE, FCC, LVD, RoHS

### MTBF

65,000 hrs (25°C)

### Central Office (CO)

### Customer Premise Equipment (CPE)



Support up to 9k(9000bytes) jumbo frame

### Ordering Information

FRM220-10/100i-2E: 2-port 10/100Base-T to 100Base-X SFP media converter

Smart View Element Management System (EMS)

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50, 100, 200, 500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module



## FXO/FXS 2-wire Fiber Converter FRM220-FXO/FXS

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
- Network management via terminal, web or SNMP in FRM220 chassis
- Supports telephone voice transmission
- Supports caller ID pass through
- Selectable FXO or FXS mode
- Supports FXS to FXS hot line

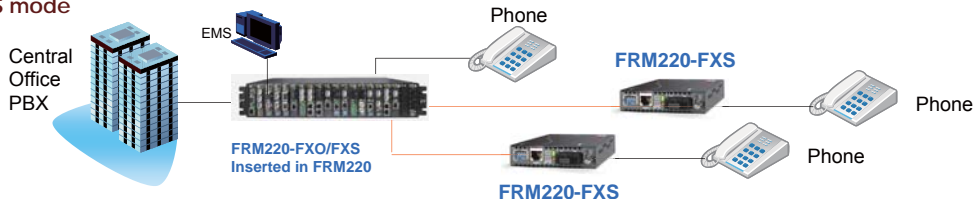
#### Automatic Ring down hotline



#### Voice transmission from 2km to 120km over fiber



#### Selectable FXO or FXS mode



#### Optical Interface

Connector	1x9 (SC)
Fiber	MM 62.2/125µm, 50/125µm, SM 9/125µm
Distance	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)

#### 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 ± 1.0dB at 1000Hz
FXS mode	Impedance : 600 ohms Coding : 16 bits liner Dial: DTMF and Dial Pulse Battery Source: 48VDC ± 4V Ringing Waveform : Sine wave Ringing Frequency : 20/25/30 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 ± 1.0dB at 1000Hz REN: 4.0B(Ring Equivalence Number)

#### Indications

LED (Power, FX Link, Phone Act, Test)

#### Power Input

Card : 12VDC  
Standalone : AC, DC options

#### Power Consumption

< 5W

#### Dimensions

155 x 88 x 23mm (D x W x H)

#### Weight

120g

#### Temperature

0 ~ 60°C (Operating), -10 ~ 70°C (Storage)

#### Humidity

10~90% non-condensing

#### Certification

CE, FCC, LVD, RoHS

#### MTBF

65,000 hrs (25°C)

### Ordering Information

FRM220-FXO/FXS: FXO/FXS 2-wire media converter

**Smart View** Element Management System (EMS)

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module

## V35 / X21 / RS530 / 449 / 232 Fiber modem FRM220-Data



The FRM220-DATA is a media converter 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 converter'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 converter may also be paired with the FRM220-E1/T1 for Nx64K transmissions.

### Features

- Synchronous or Asynchronous data over fiber
- In-band network management via terminal, web or SNMP in FRM220 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, (internal, external, or recovery) for transmit and receive
- Electrical and optical loop back tests
- Compatible with FRM220-E1 on same fiber link for N x 64k

### Optical Interface

Connector	1x9 (SC, ST, FC)
Data rate	36.864Mbps
Line coding	Scrambled NRZ
Bit Error Rate	Less than 10 <sup>-10</sup>
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 async V.35/RS-530 up to 9152k sync where n=1 to 143 (64K ~ 9152Kbps)
Clock source	Internal, Recovery, External

### Standard Indications

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

### Power Input

Card : 12VDC  
Standalone : AC, DC options

### Power Consumption

< 5W

### Dimensions

155 x 88 x 23mm (D x W x H)

### Weight

120g

### Temperature

0 ~ 60°C (Operating), -10 ~ 70°C (Storage)

### Humidity

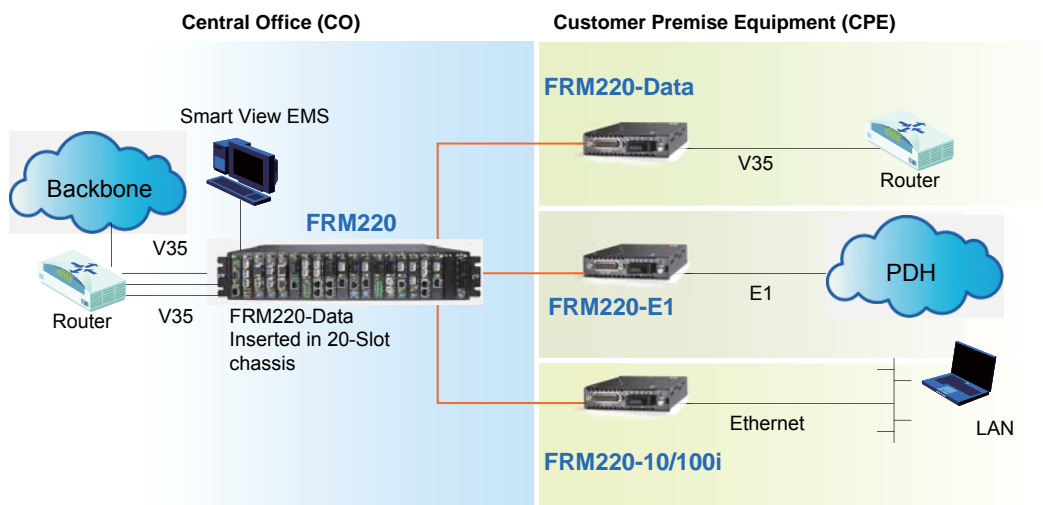
10~90% non-condensing

### Certification

CE, FCC, LVD, RoHS

### MTBF

65,000 hrs (25°C)



### Ordering Information

FRM220-DATA: V35/X21/RS530/449/232 Fiber modem  
**Smart View Element Management System (EMS)**  
 SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)  
 SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)  
 SV-Fiber: FRM220 Managed Module



# RS485 / 422 / 232 Fiber Converter FRM220-Serial

The FRM220-Serial/485 provides a fiber converter solution to extend asynchronous RS-485 or RS-232 transmission distance up to 2km over multimode fiber or up to 120km over single mode fiber. The converter 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 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 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, 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 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 256kbps for RS232 (Async. mode)
- Speeds up to 1Mbps for RS485/ 422

#### Optical Interface

Connector	1x9 (SC, ST, FC)
Data rate	36.864Mbps
Line coding	Scrambled NRZ
Bit Error Rate	Less than 10 <sup>-10</sup>
Fiber	MM 62.2/125µm, 50/125µm. SM 9/125µm
Distance	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)

#### Electrical Interface

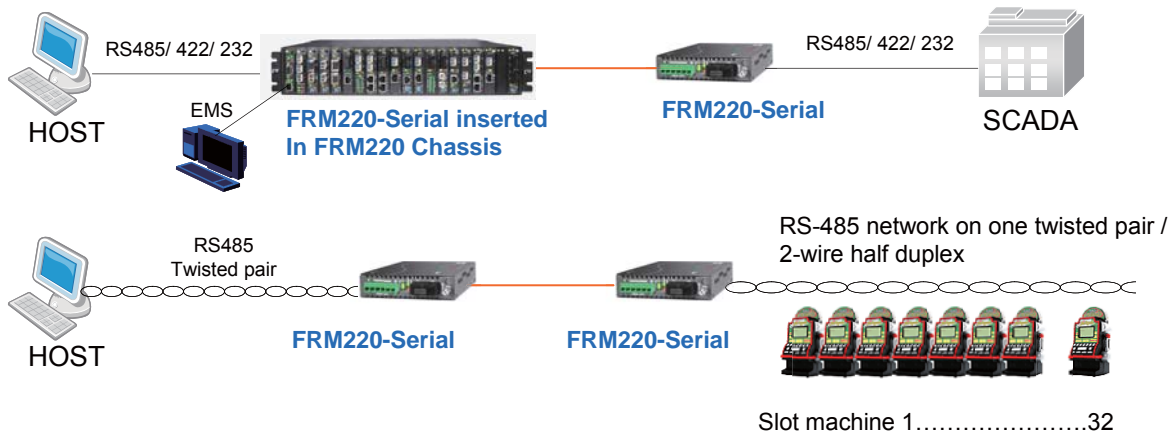
Connector	6 pins Terminal block
Data Signal Formats	RS485 2-wire RS422 4-wire RS232 RTS/CTS 5-wire RS232 3-wire
Baud Rate	RS422, RS485 up to 1024kbps RS232 up to 256kbps
Bit Error Rate	Less than 10 <sup>-10</sup>

#### Standard

LEDs	EIA/TIA RS485, RS422, RS232
Power Input	Card : 12VDC Standalone : AC, DC options

#### Power Consumption

Dimensions	< 5W
Weight	155 x 88 x 23mm (D x W x H)
Temperature	120g
Humidity	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Certification	10~90% non-condensing
MTBF	CE, FCC, LVD, RoHS 65,000 hrs (25°C)



### Ordering Information

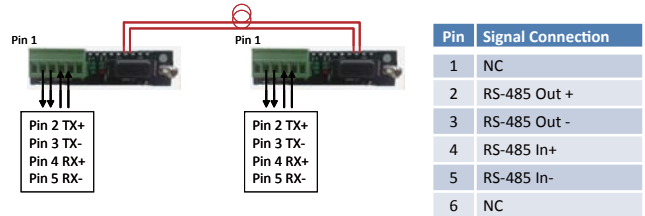
- FRM220-Serial: RS485/422/232 media converter
- Smart View Element Management System (EMS)
- SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)
- SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)
- SV-Fiber: FRM220 Managed Module

# RS485 / 422 / 232 Signal Connection FRM220-Serial

RS-485 Termination Termination is used to match impedance of a node to the impedance of the transmission line being used. When impedances are mismatched, the transmitted signal is not completely absorbed by the load and a portion is reflected back into the transmission line. This reflection may cause errors in the data. Termination resistors should be placed only at the extreme ends of the data line, and no more than two terminations should be placed in any system.

## RS-485 4 wires (Full duplex)

\* For RS-485 4 wires operation, TX+, TX-, RX+ and RX- are connected



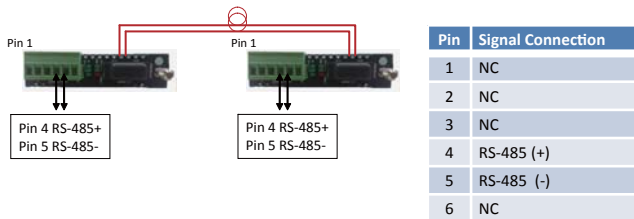
\* For RS-485 4 wires Dip Switch Setting

Pin	Function description	Dip Switch Setting
1	Interface Setting	Off
2	Interface Setting	Off
3	RS-485 TX Termination	On
4	RS-485 RX Termination	On
5	1K Ohm Pull-up	Off
6	1K Ohm Pull-Down	Off

\*On enable RX(-) pull down \*\*On enables RX(+) pull down

## RS-485 2 wires (Half duplex)

\* For RS-485 2 wires operation, RS-485(+) and RS-485 (-) are connected

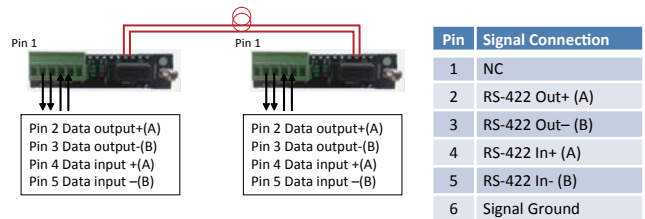


\* For RS-485 2 wires Dip Switch Setting

Pin	Function description	Dip Switch Setting
1	Interface Setting	On
2	Interface Setting	Off
3	RS-485 TX Termination	Off
4	RS-485 RX Termination	On
5	1K Ohm Pull-up	Off
6	1K Ohm Pull-Down	Off

## RS-422 4 wires

\* For RS-422 4 wires operation, TD+(A), TD-(B), RD+(A) and RD-(B) are connected

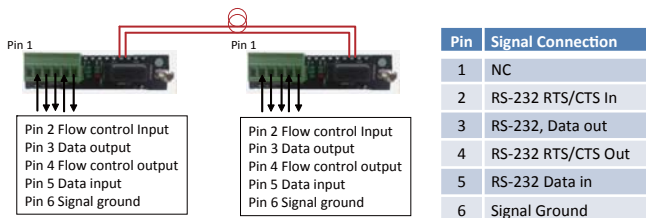


\* For RS-422 4 wires Dip Switch Setting

Pin	Function description	Dip Switch Setting
1	Interface Setting	Off
2	Interface Setting	Off
3	RS-485 TX Termination	Off
4	RS-485 RX Termination	Off
5	1K Ohm Pull-up	Off
6	1K Ohm Pull-Down	Off

## RS-232 5 wires

\* For RS-232 5 wires operation, TD, RD, and SG are connected, plus 1 handshaking pair

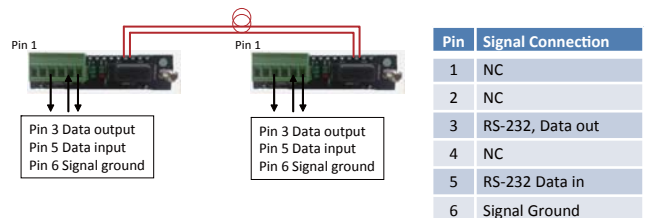


\* For RS-232 5 wires Dip Switch Setting

Pin	Function description	Dip Switch Setting
1	Interface Setting	Off
2	Interface Setting	On
3	RS-485 TX Termination	Off
4	RS-485 RX Termination	Off
5	1K Ohm Pull-up	Off
6	1K Ohm Pull-Down	Off

## RS-232 3 wires

\* For RS-232 3 wires operation, only TD, RD, and SG are connected



\* For RS-232 3 wires Dip Switch Setting

Pin	Function description	Dip Switch Setting
1	Interface Setting	On
2	Interface Setting	On
3	RS-485 TX Termination	Off
4	RS-485 RX Termination	Off
5	1K Ohm Pull-up	Off
6	1K Ohm Pull-Down	Off

# Slide-in card & stand-alone RS-485/422/232 Daisy Chain fiber converter FRM220-Serial/FDC

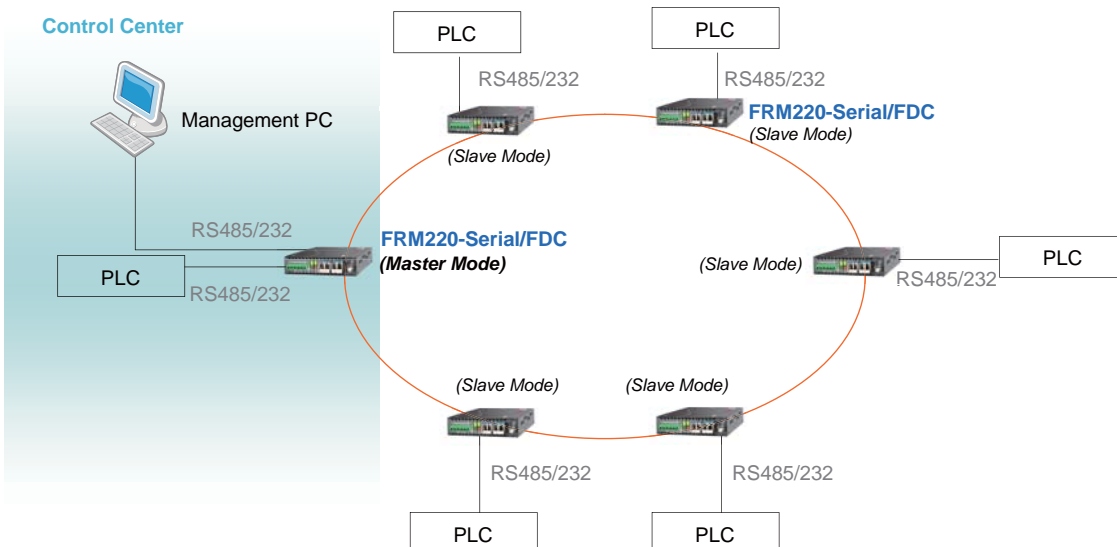


The FRM220-Serial/FDC provides a dual fiber connection converter solution to extend asynchronous RS-485 or RS-232 transmission distance up to 2km over multimode fiber or up to 120km over single mode fiber. The dual fiber inputs allow connecting multiple devices in a cascade or "daisy chain" fashion as well as creating ring architecture for fiber redundancy. The converter 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/FDC secures data transmission over EMI resistant fiber at speeds up to 256kbps for RS-232 or up to 1024kbps for RS-485/422. When the FRM220-Serial/FDC 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, data link status and alarms. Both card and remote can be configured to enable or disable the port and set the interface type.

### Features

- Extend asynchronous serial transmission from 2km to 120km over fiber
- In-band management via terminal, GUI or SNMP in FRM220 chassis
- Two fiber ports support daisy chain and ring architecture
- Multi-drop operation over fiber ring
- 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 256kbps for RS232 (Async. mode)
- Speeds up to 1Mbps for RS485/422

Optical Interface	Connector : 1x9 (SC, ST, FC) Data rate : 31.104Mbps Line coding : Scrambled NRZ Bit Error Rate : Less than 10 <sup>-11</sup> Cable type : MM 62.2/125µm, 5/125µm SM 9/125µm 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 RS485/422 2-wire , 4-wire RS232 RTS/CTS 5-wire, 3-wire RS423 RTS/CTS 5-wire, 3-wire TTL 3-wire Baud Rate : RS422, RS485 up to 1024kbps RS232 up to 256kbps TTL up to 1024kbps
Standard	EIA/TIA RS485, RS422, RS232
LEDs	Power, FX-Link1, FX-Link2, Test, Master, Ring TD, RD
Power Input	AC adapter: 100~240VAC to 12VDC AC 100~240V, DC -18~75V
Power Consumption	< 5W
Dimensions	DC12 : 160x88x24mm(DxWxH) AC/DC48/AD: 201x135x35mm(DxWxH)
Weight	580g
Temperature	0~60°C (Operating) ,-10~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 h (25°C)



### Ordering Information

FRM220-Serial/RS485: RS485 Daisy Chain Fiber Converter  
FRM220-Serial/RS422: RS422 Daisy Chain Fiber Converter  
FRM220-Serial/RS232: RS232 Daisy Chain Fiber Converter

## 4-port E1/T1+100M Ethernet Fiber Multiplexer

# FRM220-FOM04

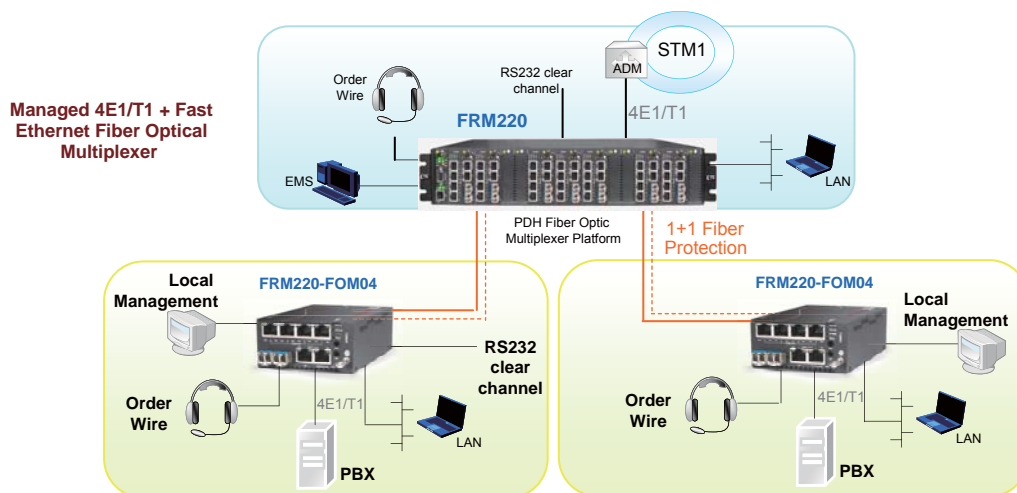


FRM220-FOM04 is a modular design for 4x E1/T1 + Fast Ethernet multi-service to dual strand fiber PDH multiplexer. FRM220-FOM04 provides E1/T1 transmission transparently, pure 100Mbps Fast Ethernet simultaneously. The fiber optic line is based on the SFP technology that allows a flexible use of Multimode or Single mode lines and enable the support of different wavelengths and distances. The use of bi-directional SFPs maximizes the utilization of the fiber optic line and results in saving line costs. The multiplexer is equipped by default with redundant AC and DC power supplies for redundant operation. 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.

### Features

- 4 channels unframed E1/T1
- 10/100Base-TX Ethernet
- Auto MDI/MDIX
- Auto-Negotiation or Force mode
- Supports flow control
- Supports 9K jumbo packets
- Supports Link fault pass through (LFP)
- One clear channel RS232 up to 250Kbps(Async)
- 1+1 fiber protection, less than 50ms
- Supports Digital Diagnostics Monitoring Interface (DDMI)
- AIS on signal loss on E1/T1 and fiber port
- Loopback test on E1/T1, LAN, RS232, fiber ports
- Supports Dying Gasp
- Supports local or remote In-band management (Monitor or Configure status) by SNMP manager and console port.
- Supports Order wire Ear / Microphone port.
- Supports On-Line F/W upgrade.

E1/T1 ports	Unframed (transparent)
Framing	E1: 2.048 Mb/s, T1: 1.544 Mb/s
Bit Rate	E1: AMI/HDB3, T1: AMI/B8ZS
Line Code	E1: Unbalanced 75 ohms (BNC cable)
Line Impedance	E1: Balanced 120 ohms (RJ-45)
	T1: Balanced 100 ohms (RJ-45)
Receiver sensitivity	Short haul
"Pulse" Amplitude	Nominal 2.37V +/- 10% for 75 ohms
	Nominal 3.00V +/- 10% for 120 ohms
	Nom
"Zero" Amplitude	+/- 0.3V
Transmit Frequency Tracking	w/external clock card option
Internal Timing	+/- 30 ppm
Jitter Performance	According to ITU-T G.823
Performance monitoring	According to ITU-T G.821
Standard	ITU-T G.703, G.704, G.706 and G.732
Interface Connectors	RJ-45, BNC
Test Loops	LLB (Local Loop Back)
	NELB (Near End Loop Back)
	RLB (Remote Loop Back)
	RRLB (Request Remote Loop Back)
Ethernet	
Interface Type	10/100Base-TX
Connector	RJ-45
Standard	IEEE 802.3, 802.3u
Duplex modes	full/half
Test	Loop back test
Indications	FX1 Link, FX2 link, E1/T1 Mode/Link/Loopback test, Order wire phone indicator, LAN Link/Speed.
Power Input	AC adapter, 12VDC
Dimensions	88 x 42 x 139mm (DxWxH)
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% RH (non-condensing)
Certifications	CE, FCC, RoHS



### Ordering Information

FRM220-FOM04: 4-port E1/T1+100M Ethernet Fiber Multiplexer

**Smart View Element Management System (EMS)**

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50, 100, 200, 500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module





## E1/T1 Cross Rate Converter FRM220-FTEC

The FRM220-FTEC is a slide-in card T1 (US Standard), E1 (European Standard) converter and timeslot cross connect which enables conversion between one T1 signal and one E1 signal. T1 and E1 signals with frames employ u-Law and A-Law compander encoding principles respectively and encode those analog signals into 64kbps digital data. The E1 interface supports CCS (PCM31) or CAS (PCM30) frames with or without CRC-4 and with HDB3 line coding. The T1 interface supports D4 or ESF frame formats with B8ZS or AMI line code. Multiple clock source selection provides maximum flexibility in connecting both T1 and E1. The clock source may be from the T1 recovery clock, from the E1 recovery clock, from the internal oscillator, from an external clock or via transparent timing. All setup controls can be performed via FRM220 CH01M RS-232 console port and ASCII terminal. Tests and diagnostics can easily be performed. Diagnostics include T1 local/remote and E1 local/remote loop back.

When FRM220-FTEC card is placed in the FRM220 chassis, SNMP management allows viewing the card converter's status, type, link status, data link status and alarms.

### Features

- Converts between T1 and E1 data and signaling
- Enable equipment to operate at T1 and E1 rates
- Support G.802 Annex B (T1 over E1)
- Configures A-law/ $\mu$ -law and signaling conversion
- Transparent conversion at 64kbps timeslot level
- Controlled slip for buffer over or under flow
- 24 timeslots of T1 Nx64 can be inserted into E1 Nx64, 30/CAS or 31/CCS timeslots

<b>E1 interface</b>		
Framing	CAS/PCM30 or CCS/PCM31 selectable	
Bit rate	2.048Mbps	
Line Code	HDB3	
Line Impedance	75 ohm (BNC) / 120 ohm (RJ-45)	Voice channel sample rule A-Law
CRC check	CRC-4 enable/disable	
Pulse amplitude	Nominal 2.37V $\pm$ 10% for 75ohm, Nominal 3.00V $\pm$ 10% for 120ohm	
Zero amplitude	$\pm$ 0.1V	
Connector	RJ-45 and BNC pair	
<b>T1 interface</b>		
Framing	D4, ESF selectable	
Bit rate	1.544Mbps	
Line Code	B8ZS / AMI	
Equalization	0 ~655 feet settable	Voice channel sample rule $\mu$ -Law
CRC check	CRC-6 when ESF	
Line Impedance	100 ohms	
Transmit Pulse level	3.0V $\pm$ 10%,	
Receive signal level	0 ~-10dB	
Connector	RJ-45 and Bantam Jacks	
LEDs	Power Alarm	
Standard	ITU-T G.703, G.704, G.706, G.823, G.824, ANSI T1.403	
Power	Card: 12VDC Standalone: AC, DC Option	
Power Consumption	<15W	
Dimensions	160 x 88 x 24mm(D x W x H)	
Weight	280g	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	57,000 hours	



### Ordering Information

FRM220-FTEC: E1/T1 Cross Rate Converter

Smart View Element Management System (EMS)

SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)

SV-AGT-50 (50, 100, 200, 500): Device Agent (50, 100, 200, 500 Devices)

SV-Fiber: FRM220 Managed Module

## Data to fractional E1

# FRM220-E1/Data



The FRM220-E1/DATA slide in card DSU/CSU is a digital access unit for Unframed or Fractional E1 services. The FRM220-E1/DATA data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 64kbps or 56kbps, up to a maximum 2.048Mbps (unframed), for a line attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220-E1/DATA front panel provides status LEDs for monitoring the CSU and DSU conditions for initiating local and remote loopback with integral BERT. The FRM220-E1/DATA features a Data cable adapter for connection to industry standard routers. When the FRM220-E1/DATA card is Paced in the FRM220 rack with SNMP management, in-band management allows viewing the card and remote converter's status, type, version, 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 test.

### Features

- Supports Fractional E1 and Unframed E1 services with V.35/X21/RS530 adapter cable
- I/O connectors all located on front panel
- Multiple clock source selection and remote loopback ( Internal or External: E1 recovery, DTE or DCE )
- Built-in BERT with V.54 diagnostic capabilities for performing local
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220-CH20 chassis
- SNMP management with FRM220-CH20 chassis
- LED Alarm indication

### E1 Interface

Framing Framed/Unframed  
 Standard ITU-T G.703/G.704/G.706 & G.732, G.823  
 Bit rate 2.048Mbps± 50ppm  
 Line code HDB3  
 Clock setting Internal OSC or recovery clock  
 Receive level -43dB  
 Line impedance 75 ohm (BNC) / 120 ohm (RJ45)  
 Jitter Performance Complies with ITU-T G.823  
 Pulse Mask Complies with ITU-T G.703  
 Pulse amplitude Nominal 2.37V ± 10%  
 Delay Variance 8ms

### Ethernet Interface

Connector BNC / RJ45  
 Diagnostics Digital remote loopback  
 Standard ITU-T  
 Data rate Nx56 / Nx64  
 Connector HDB26F w/ adapter cable for Data

### LEDs

Power, TD, RD, RTS, DCD, TX Clock loss, Signal loss, Sync loss, Alarm, test error

### Power

AC adapter : 100~240VAC to 12VDC  
 AC 100 ~ 240V, DC -18 ~ 75V

### Power Consumption

< 12W

### Dimensions

DC12 : 160 x 88 x 24mm (D x W x H)  
 AC/DC48/AD : 201 x 135 x 35mm (D x W x H)

### Weight

DC 12 : 280g, AC/DC48/AD : 580g

### Temperature

0 ~ 60°C (Operating), -10 ~ 70 °C (Storage)

### Humidity

10 ~ 90% RH (non-condensing)

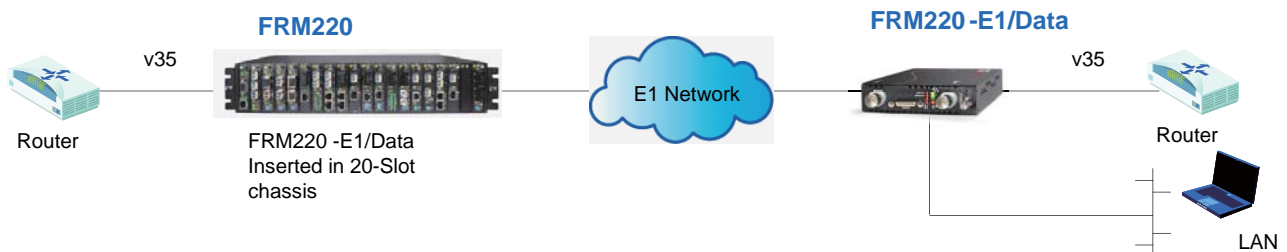
### Certifications

CE, FCC, RoHS

### MTBF

65,000 hrs (25°C)

### Managed E1 Access Unit



### Ordering Information

FRM220-E1/Data-R: V35/ X21/ RS530/ 449/ 232 to frame E1 with RJ45 Connector  
 FRM220-E1/Data-B: V35/ X21/ RS530/ 449/ 232 to frame E1 with BNC Connector

#### Smart View Element Management System (EMS)

- SV-PLF-05 (5, 25, 50): Platform Server (5, 25, 50 admissions)
- SV-AGT-50 (50,100,200,500): Device Agent (50, 100, 200, 500 Devices)
- SV-Fiber: FRM220 Managed Module