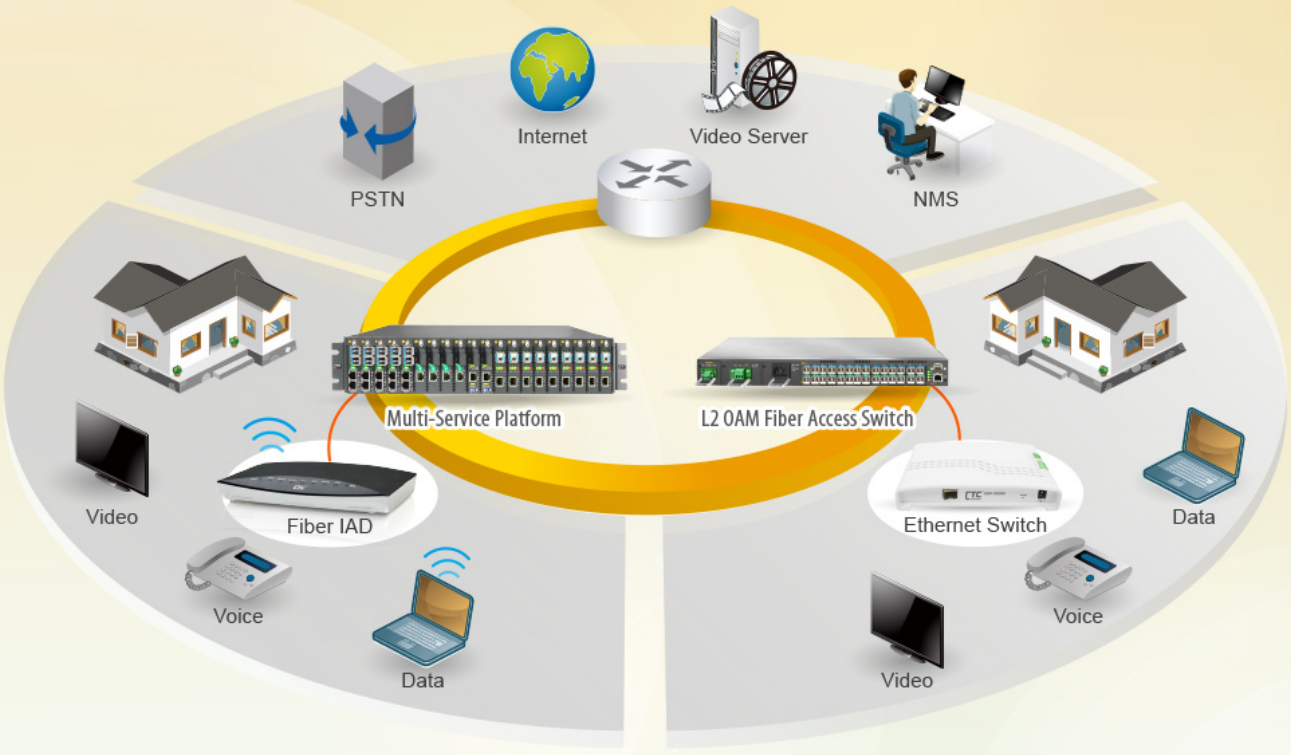
FIBER Family

Multi-Service Platform
Metro Ethernet
Mobile Backhaul for 4G LTE
FTTx
Triple Play Service (Data/Voice/Video)



10G Ethernet, Multiplexer, Fiber IAD, CWDM, L2 Ethernet Access Switch, FOM, SDH

FRM220-CH20 & FRM220-CH08

In-Band Managed Multi-Service Platform

The FRM220 series is a multi-service chassis platform, which provides a reliable solution of high density media converter modules for applications such as telecom operator, enterprise, long haul transmission and factory automation. All of critical components of FRM220 series chassis solution such as power modules, fans, management module and interface cards are hot swappable, allowing online field replacement.

FRM220 series is offered in two chassis densities, a 2U 20-slot (FRM220-CH20) and a 1U 8-slot (FRM220-CH08).

Common Features

- Supports AC/DC power module hot swappable and power redundancy
- Two alarm relays contact for critical events warning
- All modules and interface cards are hot swappable
- Chassis backplane consists of passive components

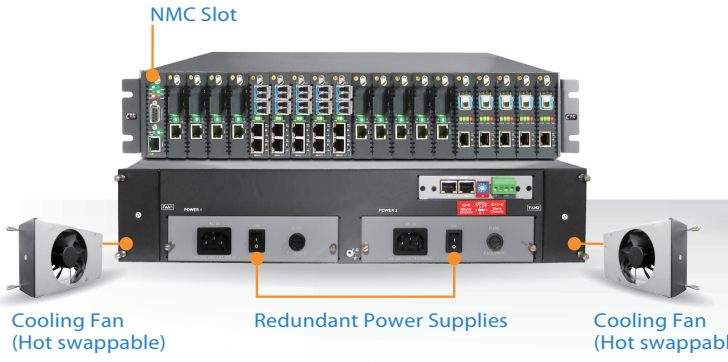
Specifications

Connectors	Console: RS232 (DB9)	
	LAN 10/100Base-TX RJ45	
Physical Specifications	Dimensions (D x W x H)	303 x 438 x 88 mm (CH20)
		310 x 440 x 44 mm (CH08)
	Weight (w/o Power)	5.2kg (CH20)
		3.5kg (CH08)
Power	AC	18~240VAC
	DC24	18~36VDC
	DC48	36~75VDC

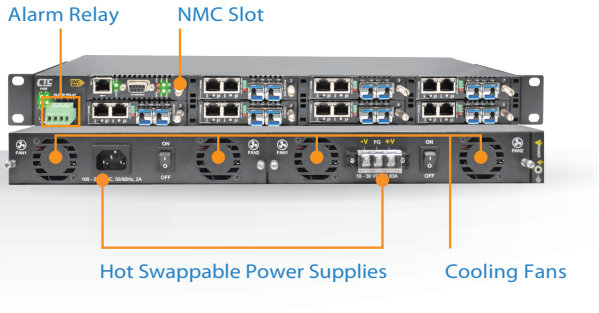
Temperatures	Operating 0~60°C
	Storage -10~70°C
Humidity	5%~90% non-condensing
MTBF	65,000 hrs
Certification	FCC Class A, VCCI Class A, CE, RoHS compliant
Safety	UL 60950-1 (FRM220-CH20)

Chassis Overview

- ***FRM220-CH20*** (2U 19" 20 Slots)



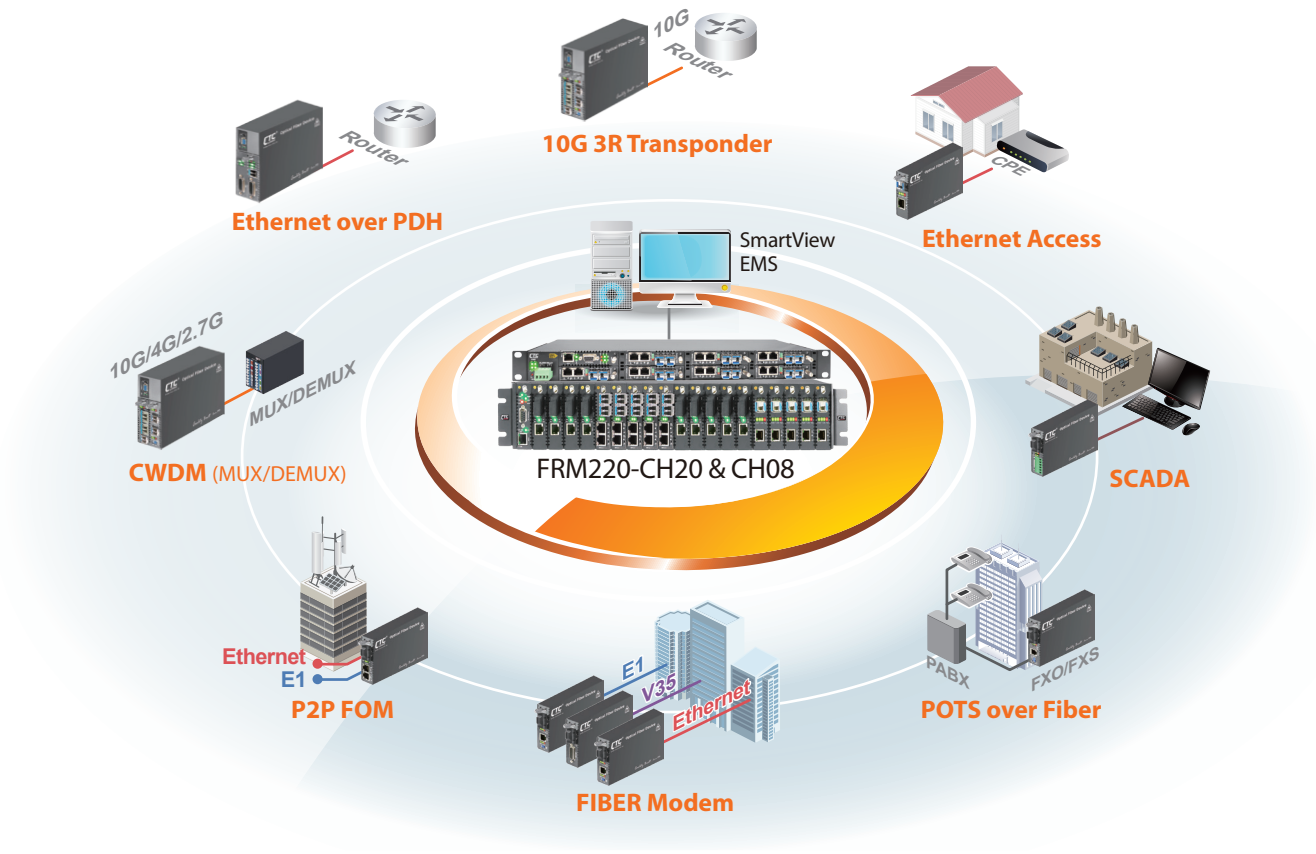
- ***FRM220-CH08*** (1U 19" 8 Slots)



Main Features

• Module Cards for Deployment Scenarios

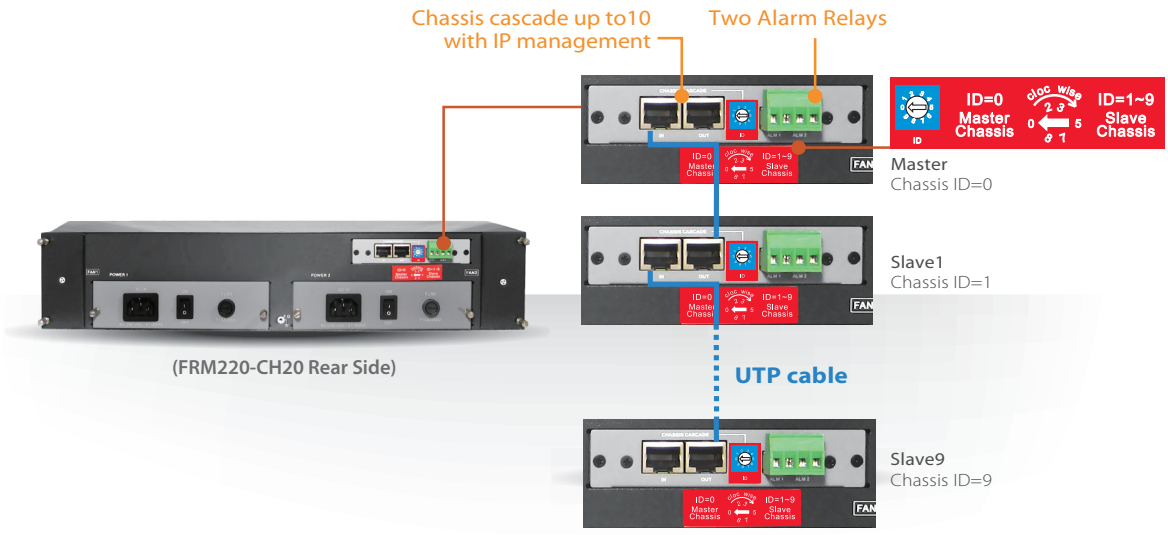
The FRM220-CH20 has been designed as a Multi-service platform. This allows network administrators to deploy the chassis in a wide range of networks.
Technologies supported by the chassis include Fast/Gigabit Ethernet, E1/T1, V35/X21/RS-530, Serial RS-485/RS-422, Voice FXO/FXS, Repeater, Fiber Multiplexer, E1 Inverse Multiplexer, CWDM Mux/DeMUX and 10G 3R Transponder



• Chassis Cascade (FRM220-CH20)

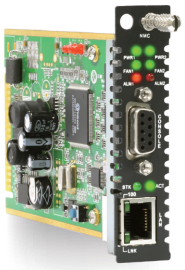
The FRM220-CH20 Chassis features cascadable management which allows managing a stack (up to 10 chassis) from a single IP address. Chassis are interconnected with standard UTP cables that carry control signals. Each chassis has its own ID, starting with the master chassis ID0 and cascading up to ID9

- Single IP managed chassis with 10 units cascaded max.
- Beneficial to centralizes management in one rack
- Scalability as the demand grows



• Network Management

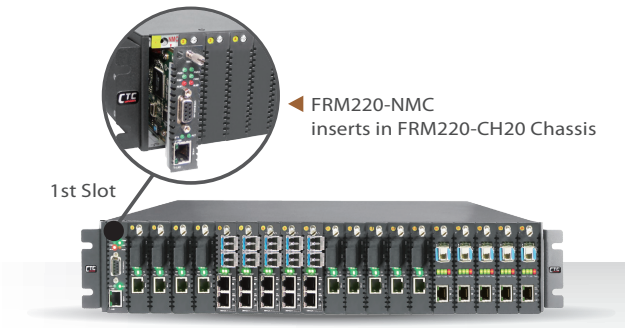
Both FRM220-CH20 and FRM220-CH08 require a NMC (Network Management Controller **FRM220-NMC**) card which must be installed into the first slot of chassis. The NMC card allows a network administrator the ability to configure and monitor the status of the blades. Management can be achieved locally over 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 be monitored the status of a remote CPE.



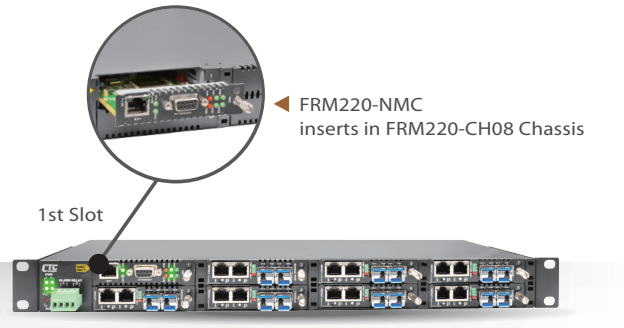
FRM220-NMC

FRM220-NMC 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 syslog
- Supports 255 entries system log



FRM220-CH20



FRM220-CH08

Ordering Information

Model Name	Type	Description
FRM220-CH20	Chassis	2U 20-Slot rack mount chassis with 20 line card blank plate
FRM220-AC	Power	Chassis power module 100 ~ 240 VAC, IEC connector 200W
FRM220-DC24	Power	Chassis power module 18 ~ 36 VDC, 3 pin terminal block 200W
FRM220-DC48	Power	Chassis power module 36 ~ 72 VDC, 3 pin terminal block 200W
FRM220-CH08	Chassis	1U 8 slots rack mount chassis with 8 line card blank plate
FRM220-CH08-AC	Power	Chassis power module 100 ~ 240 VAC, IEC connector
FRM220-CH08-DC24	Power	Chassis power module 18 ~ 36 VDC, 3 pin terminal block
FRM220-CH08-DC48	Power	Chassis power module 36 ~ 72 VDC, 3 pin terminal block
FRM220-NMC	Card	Network Management Controller card, support web, telnet, console, SNMP functions

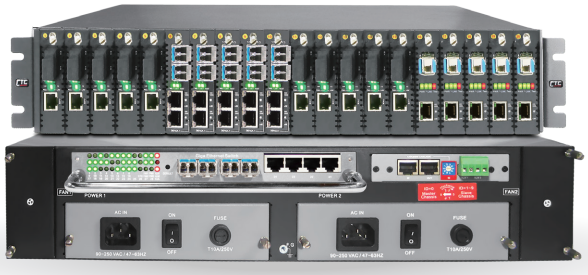
Chassis
FRM220 – □□□□
Example: FRM220 – CH20

Power Type
FRM220 – □□□□
Example: FRM220 – DC24

10G Ethernet uplink

FRM220A

Ethernet Aggregation Platform



The FRM220A series is a IP based Ethernet aggregation platform, which incorporates a 24+4 port L2 Gigabit Ethernet switch (FRM220A-GSW/SNMP) or a new 20+4 port L2 Gigabit Ethernet switch with 4x10Gigabit uplink (FRM220A-GSW/SNMP-10G). The FRM220A has a built-in Gigabit Ethernet backplane to interconnect the Ethernet access and E1 TDM based inverse multiplexer module cards with the FRM220-GSW/SNMP card. The L2 switch card supports many advanced Layer 2 switch technologies including port and tag based VLAN, QoS, LACP, RSTP to name just a few. The FRM220A chassis solution significantly lowers the OPEX for operator and service provider when deploying fiber access networks.

The product lists designed to be adequately to the FRM220A-CH20 Ethernet aggregation application such as Ethernet access and Ethernet over PDH are included

- FRM220A-1000EAS/X : 2x 10/100/1000Base-T + 2x1000Base-X OAM/IP Managed Switch
- FRM220A-1002ES : 2x 10/100/1000Base-T + 2x100/1000Base-X Managed Switch
- FRM220A-iMux Series : E1 inverse multiplexer module card
- FRM220A-FSW103 : 3x 10/100Base-TX + 100Base-FX Managed Switch

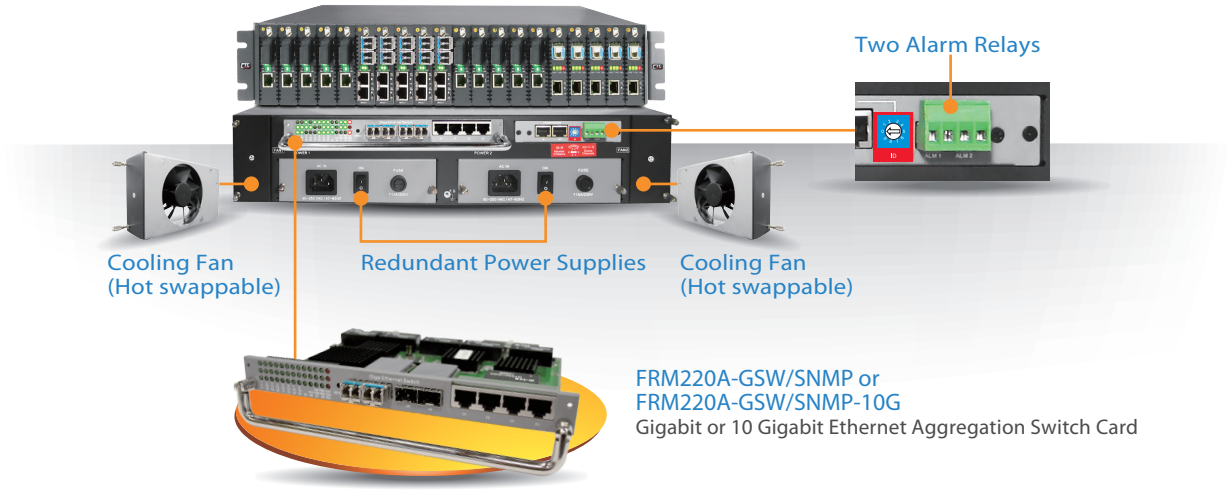
Specifications

Connectors	Consoles RS232 (DB9)	
	LAN 10/100Base-TX RJ45	
Physical Specifications	Dimensions	303 x 438 x 88 mm (D x W x H)
	Weight (w/o Power)	5.2kg
Power	AC	18~240VAC
	DC24	18~36VDC
	DC48	36~72VDC

Temperatures	Operating 0~60°C
	Storage -10~70°C
Humidity	5%~90% non-condensing
MTBF	65,000 hrs
Certification	FCC Class A, VCCI Class A, CE, RoHS compliant

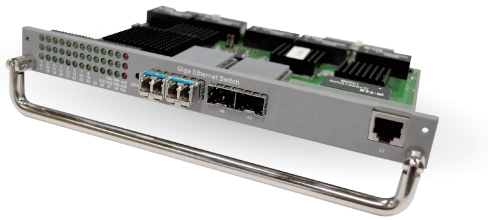
Chassis Overview

Gigabit or 10G Ethernet uplink



10G Ethernet uplink

NEW

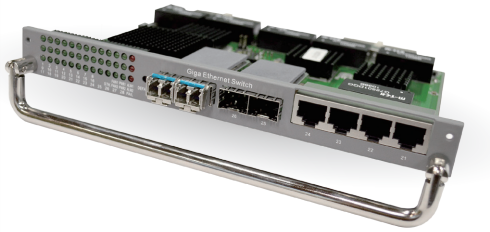


Ethernet Aggregate Switch Card

- **FRM220A-GSW/SNMP-10G**

10G uplink Ethernet Aggregate Switch Card

The FRM220A-GSW/SNMP-10G is the next generation management module card of FRM220A chassis. It is built in gigabit Ethernet interface to connect with backplane and link to each slot of FRM220A chassis.
To aim at the Metro Ethernet application, the specifications of FRM220A-GSW/SNMP-10G fully meet the attributes of Carrier Ethernet proposed by MEF (Metro Ethernet Forum). It comply MEF 9 standard to support E-Line/E-LAN service, MEF 14 standard to enable the bandwidth profile configuration delivering SLA (Service Level Agreement) for end-to-end performance characteristics as well as MEF21 to support carrier grade service OAM management rapidly detecting and recovering from the network incidents in real time.



- **FRM220A-GSW/SNMP**

Gigabit Ethernet Aggregate Switch Card

The FRM220A incorporates a 24+4 Gigabit Ethernet Switch. Twenty ports supply each slot of the 2U 20-slot chassis with an electrical gigabit Ethernet uplink with the remaining four electrical gigabit ports accessible via the rear of the chassis. The additional four ports are provided by SFP sockets. All eight Gigabit ports (4+4) are usable without restrictions for uplink aggregate to the Ethernet Metropolitan Area Network (E-MAN). The FRM220A-GSW/SNMP card transmits Ethernet between the subscriber equipment (bridge/ modem or network interface card) and the E-MAN. The card provides a user-networking interface with Ethernet packets. This card is capable of providing high bandwidth for assembling Ethernet traffic. The FRM220A-GSW/SNMP card is not only the system aggregate/trunk module, but also the system's control module, providing OAM Management functions.

Features

- Provides chassis aggregation via 4x1000Base-X SFP uplink slots (FRM220A-GSW/SNMP)
- Provides chassis aggregation via 4x10Gigabit Base-X SFP+ uplink slots (FRM220A-GSW/SNMP-10G)
- Supports ITU-T G.8032 Ethernet ring protection (FRM220A-GSW/SNMP-10G)
- Supports IEEE 802.1p HW based 8 priority queues and L2~L4 QoS functions (FRM220A-GSW/SNMP-10G)
- Supports IEEE 802.3ah/IEEE 802.1ag/ITU-T Y.1731 Ethernet OAM features (FRM220A-GSW/SNMP-10G)
- Supports IPv6 management (FRM220A-GSW/SNMP-10G)
- Compliant to MEF 9/MEF 14 standards for E-Line, E-LAN services (FRM220A-GSW/SNMP-10G)
- Fiber optical ports supports ring or chain topology
- Built-in gigabit Ethernet interface to link with each slot of FRM220A chassis
- Provides Web, Telnet, SNMP management interface
- Supports IEEE802.1D/802.1w/802.1s for ring protection on the trunk interfaces
- Supports IEEE 802.1Q tagged VLAN and IEEE 802.1ad Q-in-Q application

Specifications

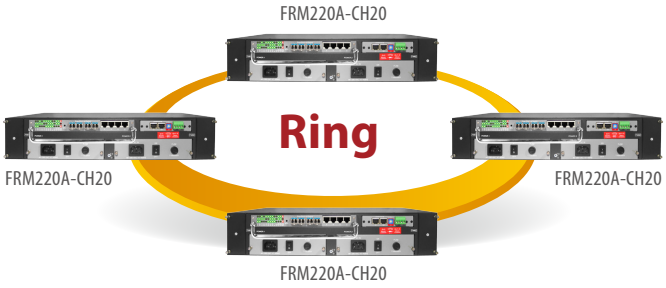
Trunk Interface	4x10/100/1000Base-T plus 4x1000Base-X/2500Base-X GbE switch trunk card (FRM220-GSW/SNMP)	
	4x10G Base-X switch trunk card (FRM220-GSW/SNMP-10G)	
	Supports full-duplex mode for 1000Mbps (FRM220A-GSW/SNMP)	
	Supports full-duplex mode for 10G Mbps (FRM220-GSW/SNMP-10G)	
Capacity	Supports up to 20 service cards	
Temperature	0~60°C (Operating), -10~70°C (Storage)	
Humidity	5~90% non-condensing	
Certification	CE, FCC, RoHS compliant	

Physical Specifications	In-band management	Provides all system OAM functions: software updates, and management system interaction through Ethernet trunk port
	Out-band management	Supports Web, Telnet and SNMP, EMS management
Indications	PWR, FAN, Alarm, STK	
Dimensions	142 x 200 x 26 mm (D x W x H)	
Weight	0.5kg	
MTBF	65,000 hrs	

Benefits of FRM220A Chassis Platform

Enabling IP Transportation Protection Mechanism

- STP/RSTP Featured Ring Protection

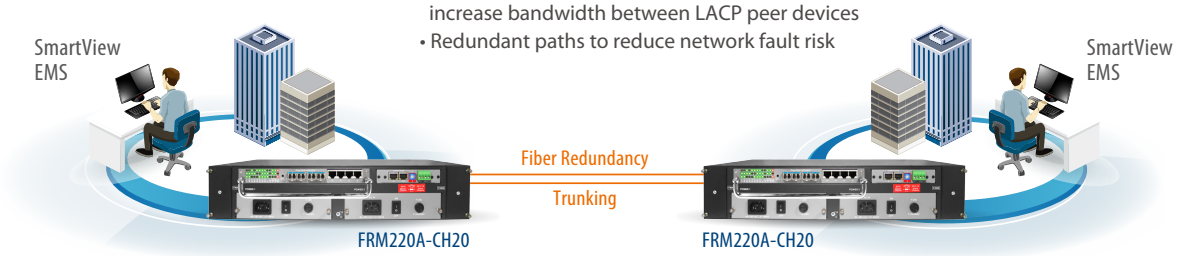


- Standard based but advanced fault protection systems
- Rapidly recovery path from failed connection (1-2 seconds min. recovery time)

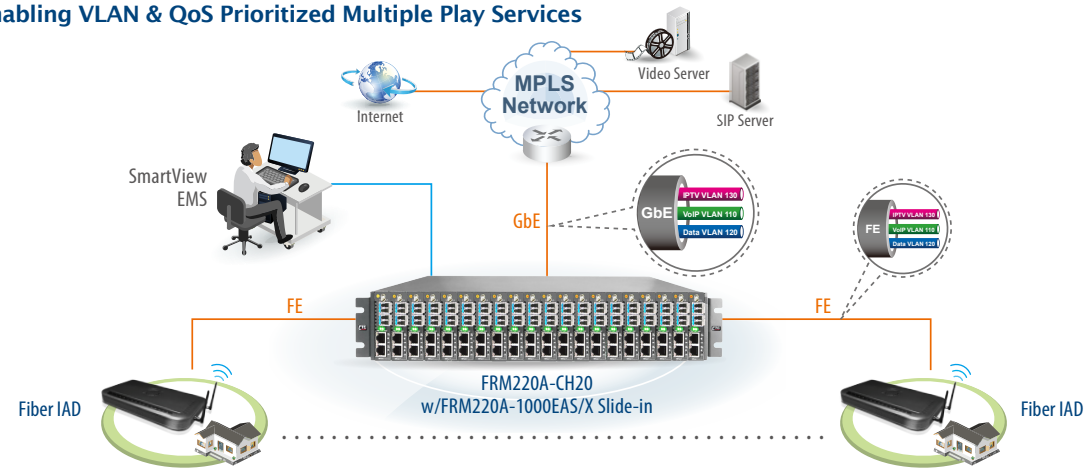
LACP Enabled Traffic Aggregation

- Fiber Redundant / Trunking Application

- Dynamically port aggregation or trucking to increase bandwidth between LACP peer devices
- Redundant paths to reduce network fault risk

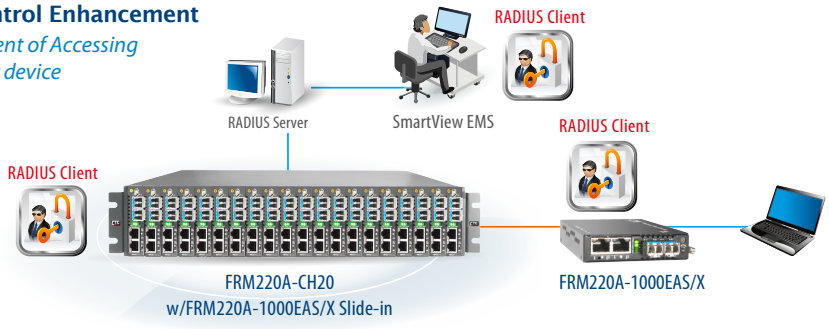


Enabling VLAN & QoS Prioritized Multiple Play Services



Secured Access Control Enhancement

- Centralized Management of Accessing the Network for user or device



Ordering Information

Model Name	Type	Description
FRM220A-CH20	Chassis	2U 20-Slot rack mount chassis with 20 line card blank plate
FRM220A-GSW/SNMP	Card	Gigabit Ethernet Aggregate switch card supports web, telnet, SNMP management interface
FRM220A-GSW/SNMP-10G	Card	10G Ethernet Aggregate switch card supports web, telnet, SNMP management interface
FRM220A-AC	Power	Chassis power module 100 ~ 240 VAC, IEC connector
FRM220A-DC24	Power	Chassis power module 18 ~ 36 VDC, 3 pin terminal block
FRM220A-DC48	Power	Chassis power module 36 ~ 72 VDC, 3 pin terminal block

FRM220A – □□□□ (Chassis)

Example: FRM220A – CH20

FRM220A – □□□ / □□□□ (Card)

Example: FRM220A – GSW/SNMP

Standalone Chassis for FRM220 Series

The FRM220 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 redundant power. The FRM220-CH01M is one slot chassis with DB9 console port for local management on supported cards, 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 redundant 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 redundant power. The FRM220-CH02/NMC(SNMP) is a two slot chassis and can be SNMP managed when installing one FRM220-NMC card for Web, Telnet, Console and SNMP management. The FRM220-CH02/NMC(SNMP) should always be used with an NMC card for management and one single width blade card. The FRM220-CH02/NMC(SNMP) available power options are built-in AC, DC or AC+DC redundant power.

1 Slot Chassis

FRM220-CH01

• Adapter Type

FRM220-CH01M

• Power Build-in Type

FRM220-CH01M

• Power Build-in Type

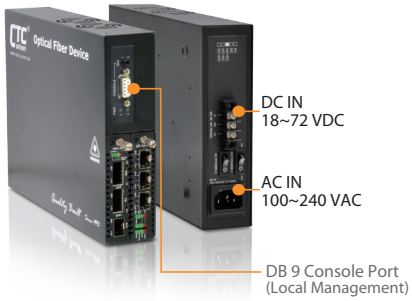
2 Slots Chassis

FRM220-CH02

• Adapter Type

FRM220-CH02M/CH02M-2

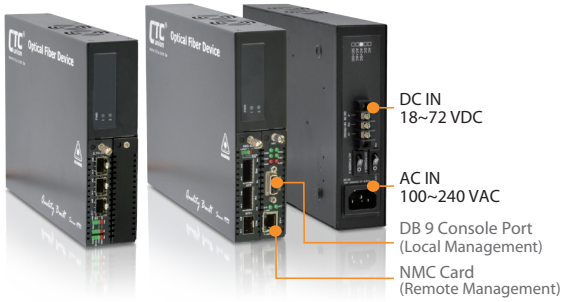
• Power Build-in Type



• Cooling Fan (CH02M) : 30 Watt
• Fanless (CH02M-2) : 12 Watt

FRM220-CH02/NMC(SNMP)

• Power Build-in Type



Features

- Fanless (CH01, CH01M, CH02, CH02M-2)
- Cooling Fan (CH02M & CH02/NMC(SNMP))
- Supports DB9 console port for local management (CH01M ,CH02M)
- Telnet, Web, Console, SNMP management via NMC Card (not included) (CH02/NMC(SNMP))
- Power Type:
  - External Power: DC12
  - Internal Power: AC, DC, AD, AA or DD redundant power (option)

Specifications

Power Input (Option)	External Adapter	Input Voltage 100~240VAC 50/60Hz
		Output Voltage 120VDC 1A
	Internal Power	AC: 100~240VAC
		DC: 18~72VDC
Weight	0.5~0.8kg (CH01) , 0.9kg (CH01M)	
	0.8kg (CH02) , 1.3kg (CH02M) , 1.2kg (CH02M-2) , 1kg (CH02/NMC(SNMP))	

Dimensions (D x W x H)	External Adapter	160 x 88 x 24mm (CH01)
		139 x 88 x 44mm (CH02)
	Internal Power	180 x 135 x 35mm (CH01)
		201 x 135 x 35mm (CH01M)
		220 x 168 x 45mm (CH02M, CH02M-2, CH02/NMC(SNMP))

FRM220 Slide-In Card Chassis Order Information

Model Name	Description
CH01	1 Slot Chassis with 100 ~240VAC to 12VDC Adapter, Fanless
CH01-AC, DC, AD	1 Slot Chassis with AC: 100 ~240VAC DC: 18 ~72VDC or Dual Power (AC+DC), Fanless
CH01M-AC, DC, AD	1 Slot Chassis with **Console** port and AC: 100 ~240VAC, DC: 18 ~72VDC or Dual Power (AC+DC), Fanless
CH02	2 Slots Chassis with 100 ~240VAC to 12VDC Adapter, Fanless
CH02M-AC, DC, AD	2 Slots Chassis with **Console** port and AC: 30W 100 ~240VAC, DC:30W 18 ~72VDC or Dual Power (AC+DC), with Cooling Fan
CH02M-2-AC, DC, AD	2 Slots Chassis with **Console** port and AC:12W 100 ~240VAC, DC:12W 18 ~72VDC or Dual Power (AC+DC), Fanless
CH02/NMC(SNMP)-AC, DC, AD	2 Slots Chassis with NMC card and AC:100 ~240VAC, DC:18 ~72VDC or Dual Power (AC+DC), with Cooling Fan

How to order

1. Local Console Management Order: CH01M, CH02M and CH02M-2
2. Remote Web/SNMP Management Order: CH02/NMC(SNMP)
3. DIP Switch Configuration Order: CH01 and CH02
4. Model name with "**M**", it means the chassis with Console Management

FRM220 – □□□□ – □□

Example: FRM220 – CH01–AD

Power Type

FRM220 – CH02/NMC(SNMP) – □□

Example: FRM220 – CH02/NMC(SNMP) – AD

Slide-in Card vs Standalone Chassis Compatible Table

Card Name	Product Name	Page	FRM220 -CH20	FRM220A -CH20	CH08	CH02M	CH02M-2
FRM220-NMC	Network Management Controller	2-3	✓		✓		
FRM220A-GSW/SNMP	Gigabit Ethernet Aggregate Switch Card	2-5		✓			
FRM220-10G-SXX	10G 3R Transponder SFP+ to XFP Fiber Protection	2-11	✓		✓	✓	
FRM220-10G-SS	10G 3R Transponder SFP+ to SFP+	2-12	✓		✓	✓	
FRM220-4G-3S	4G Multi-Rate 2R Transponder SFP to SFP Fiber Protection	2-13	✓		✓	✓	
FRM220-2.7G-3S	2.7G Multi-Rate 3R Transponder SFP to SFP Fiber Protection	2-14	✓		✓	✓	
FRM220-1000DS	1000Base-X to 1000Base-X SFP media converter	2-15	✓		✓		
FRM220-10GE-TS	10G Ethernet Converter 10G Base-T to SFP+	2-16	✓		✓	✓	
FRM220-10GE-TX	10G Ethernet Converter 10G Base-T to XFP	2-17	✓		✓	✓	
FRM220-MD40	4-Ch CWDM Mux/Demux (1551, 1571, 1591, 1611)nm	2-18	✓		✓		
FRM220-MD80	8-Ch CWDM Mux/Demux (1471 ~ 1611)nm	2-18	✓		✓		
FRM220-MD40 WA/WB	4-Ch single fiber CWDM MUX/DEMUX	2-19	✓		✓		
FRM220-MD80 WA/WB	8-Ch single fiber CWDM MUX/DEMUX	2-19	✓		✓		
FRM220-Protection	1+1 Fiber Optical Protection Switch	2-20	✓		✓	✓	✓
FRM220-MX210	2-Port Gigabit Ethernet Multiplexer	2-21	✓		✓	✓	
FRM220-1000M	10/100/1000Base-T to 1000Base-X Web Smart OAM/IP Managed Converter	2-22	✓		✓	✓	✓
FRM220-1000MS	10/100/1000Base-T to 100/1000Base-X SFP Web Smart OAM/IP Managed Converter	2-23	✓		✓	✓	✓
FRM220-1000EAS/X-1	OAM/IP-Based Managed Gigabit Ethernet Media Converter	2-24	✓		✓	✓	✓
FRM220-10/100i	10/100Base-TX to 100Base-FX In-band Managed Converter	2-25	✓		✓	✓	✓
FRM220-10/100iS	10/100Base-TX to 100Base-FX SFP In-band Managed Converter	2-26	✓		✓	✓	✓
FRM220-10/100iS-2	Dual Channels 10/100Base-TX to 100Base-FX SFP Media Converter	2-27	✓		✓	✓	
FRM220A-1000EAS/X	2-Port 10/100/1000Base-T + 2-Port 1000Base-X OAM/IP Managed Switch	2-28	✓	✓	✓	✓	
FRM220A-1002ES	Hardened Gigabit Ethernet Managed Switch	2-30	✓	✓	✓	✓	
FRM220A-FSW103	3x 10/100Base-TX + 100Base-FX Managed Converter	2-31	✓	✓	✓	✓	✓
FRM220-DS3/E3	DS3/E3 over Fiber	2-32	✓		✓	✓	✓
FRM220-ET100	Ethernet over E1 Fiber Modem	2-33	✓		✓	✓	✓
FRM220-Data	V.35/X.21/RS530/449/232 Fiber Modem	2-34	✓		✓	✓	✓
FRM220-E1/T1	E1/T1 Fiber Modem	2-35	✓		✓	✓	✓
FRM220-Serial	RS485/232 Media Converter	2-36	✓		✓	✓	✓
FRM220-FXO/FXS-4	4xPOTS over Fiber	2-37	✓		✓	✓	✓
FRM220-FXO/FXS	POTS over Fiber	2-38	✓		✓	✓	✓
FRM220A-Eoe1	Ethernet Bridge over E1	2-39	✓	✓	✓	✓	✓
FRM220A-Eoe1/G	Ethernet Bridge over E1 (GFP)	2-40	✓	✓	✓	✓	✓
FRM220-E1/Data	E1 to Data	2-43	✓		✓	✓	✓
FRM220-FTEC	E1/T1 Cross Rate Converter	2-44	✓		✓	✓	✓
FRM220A-iMux4	Ethernet to 4 E1 Mux NIC	2-45	✓	✓	✓	✓	✓
FRM220A-iMux8	Ethernet to 8 E1 Mux NIC	2-46	✓	✓	✓	✓	✓
FRM220A-iMux16	Ethernet to 16 E1 Mux NIC	2-47	✓	✓	✓	✓	✓
FRM220-GFOM04	4-Port E1/T1+10/100/1000M Ethernet Fiber Multiplexer	2-48	✓		✓	✓	
FRM220-FOM04	4-Port E1/T1+100M Ethernet Fiber Multiplexer	2-49	✓		✓	✓	✓
FRM220-FOM01	E1/T1+100M Ethernet Fiber Multiplexer	2-50	✓		✓	✓	✓

Power Type vs Standalone Chassis Compatible Table

Power Type (option)						
	AC: AC Power	**DC**: DC Power		AC, DC	AC, DC	AC, DC
	AD: AC+DC Power	**AA**: AC+AC Power	**DD**: DC+DC Power	AD, AA, DD	AD, AA, DD	AD, AA, DD

Slide-in Card vs Standalone Chassis Compatible Table

Card Name	Product Name	Page	CH02/NMC (SNMP)	CH02	CH01	CH01M
FRM220-NMC	Network Management Controller	2-3	✓			
FRM220A-GSW/SNMP	Gigabit Ethernet Aggregate Switch Card	2-5				
FRM220-10G-SXX	10G 3R Transponder SFP+ to XFP Fiber Protection	2-11	✓			
FRM220-10G-SS	10G 3R Transponder SFP+ to SFP+	2-12	✓			
FRM220-4G-3S	4G Multi-Rate 2R Transponder SFP to SFP Fiber Protection	2-13	✓		✓	✓
FRM220-2.7G-3S	2.7G Multi-Rate 3R Transponder SFP to SFP Fiber Protection	2-14	✓			
FRM220-1000DS	1000Base-X to 1000Base-X SFP media converter	2-15	✓			✓
FRM220-10GE-TS	10G Ethernet Converter 10G Base-T to SFP+	2-16	✓			
FRM220-10GE-TX	10G Ethernet Converter 10G Base-T to XFP	2-17	✓			
FRM220-MD40	4-Ch CWDM Mux/Demux (1551, 1571, 1591, 1611)nm	2-18			✓	
FRM220-MD80	8-Ch CWDM Mux/Demux (1471 ~ 1611)nm	2-18		✓		
FRM220-MD40 WA/WB	4-Ch single fiber CWDM MUX/DEMUX	2-19			✓	
FRM220-MD80 WA/WB	8-Ch single fiber CWDM MUX/DEMUX	2-19		✓		
FRM220-Protection	1+1 Fiber Optical Protection Switch	2-20	✓			✓
FRM220-MX210	2-Port Gigabit Ethernet Multiplexer	2-21			✓	✓
FRM220-1000M	10/100/1000Base-T to 1000Base-X Web Smart OAM/IP Managed Converter	2-22	✓		✓	✓
FRM220-1000MS	10/100/1000Base-T to 100/1000Base-X SFP Web Smart OAM/IP Managed Converter	2-23	✓		✓	✓
FRM220-1000EAS/X-1	OAM/IP-Based Managed Gigabit Ethernet Media Converter	2-24			✓	✓
FRM220-10/100i	10/100Base-TX to 100Base-FX In-band Managed Converter	2-25	✓		✓	✓
FRM220-10/100iS	10/100Base-TX to 100Base-FX SFP In-band Managed Converter	2-26	✓		✓	✓
FRM220-10/100iS-2	Dual Channels 10/100Base-TX to 100Base-FX SFP Media Converter	2-27	✓		✓	✓
FRM220A-1000EAS/X	2-Port 10/100/1000Base-T + 2-Port 1000Base-X OAM/IP Managed Switch	2-28			✓	✓
FRM220A-1002ES	Hardened Gigabit Ethernet Managed Switch	2-30	✓			✓
FRM220A-FSW103	3x 10/100Base-TX + 100Base-FX Managed Converter	2-31	✓			✓
FRM220-DS3/E3	DS3/E3 over Fiber	2-32	✓			✓
FRM220-ET100	Ethernet over E1 Fiber Modem	2-33	✓		✓	✓
FRM220-Data	V.35/X.21/RS530/449/232 Fiber Modem	2-34	✓		✓	✓
FRM220-E1/T1	E1/T1 Fiber Modem	2-35	✓		✓	✓
FRM220-Serial	RS485/232 Media Converter	2-36	✓		✓	✓
FRM220-FXO/FXS-4	4x POTS over Fiber	2-37	✓			✓
FRM220-FXO/FXS	POTS over Fiber	2-38	✓		✓	✓
FRM220A-Eoe1	Ethernet Bridge over E1	2-39	✓		✓	✓
FRM220A-Eoe1/G	Ethernet Bridge over E1 (GFP)	2-40	✓		✓	✓
FRM220-E1/Data	E1 to Data	2-43	✓		✓	✓
FRM220-FTEC	E1/T1 Cross Rate Converter	2-44	✓			✓
FRM220A-iMux4	Ethernet to 4 E1 Mux NIC	2-45	✓		✓	✓
FRM220A-iMux8	Ethernet to 8 E1 Mux NIC	2-46	✓		✓	✓
FRM220A-iMux16	Ethernet to 16 E1 Mux NIC	2-47		✓		
FRM220-GFOM04	4-Port E1/T1+10/100/1000M Ethernet Fiber Multiplexer	2-48				
FRM220-FOM04	4-Port E1/T1+100M Ethernet Fiber Multiplexer	2-49		✓		
FRM220-FOM01	E1/T1+100M Ethernet Fiber Multiplexer	2-50	✓			✓

Power Type vs Standalone Chassis Compatible Table

Power Type (option)	**DC12**: AC Adapter **AD**: AC+DC Power	**AC**: AC Power **AA**: AC+AC Power	**DC**: DC Power **DD**: DC+DC Power					
	AC, DC, AD	AC, DC, AD	DC12	DC12, AC, DC, AD, AA, DD	AC, DC, AD			

FRM220-10G-SXX

10G Transponder (3R) with Optical Line Protection

The FRM220-10G-SXX is a 10G fiber to fiber 3R repeater and transponder. Based on 10 Gigabit fiber standards, this transponder supports SFP+ to XFP (SX) or XFP to XFP (XX) fiber connections. 1+1 Automatic optical line Protection Switching is supported for the aggregate XFP fiber ports. The transponder is protocol transparent, providing 3R (Re-amplification, Re-shaping and Re-clocking) 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 transparent bi-directional 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

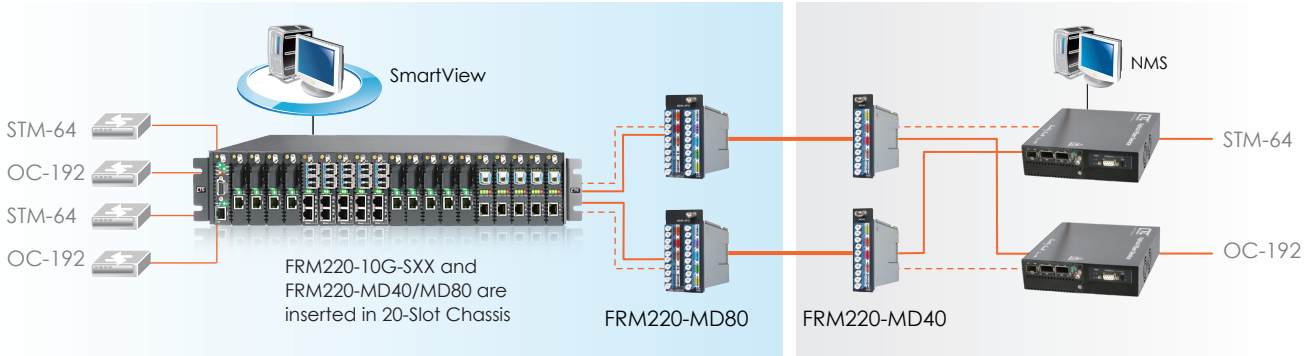
- Multiple protocol supported 10G Ethernet, STM-64, OC-192, G.709 OTU2, Fiber Channel (8 x FC)
- Network management via Web, Telnet, SNMP in central FRM220-CH20 chassis (10 cards in chassis max.)
- Protocol transparent 3R fiber media transponder / repeater
- (Re-amplification, Re-shaping and Re-clocking)
- Promotes flexibility and eases management with pluggable SFP+ or XFP transceiver
- Features two 10G ports offering multiservice 10G transponder and regenerator function
- Supports 1+1 optical line protection
- Built-in self test (BIST) 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 dual slot chassis
- XFP power supplies: +5.0V, -5.2V, +3.3V and +1.8V
- Supports reference clock output

Specifications

Optical Interface	Connector	LC
		1x Line SFP+ to 2x Client XFP
		1x Line SFP+ to 1x Client XFP
		1x Line XFP to 1x Client XFP
	Traffic Format	OC-192/STM-64 (9.95328Gbps)
		1 Gigabit Ethernet (1.25Gbps)
		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

Power	Loopback	Line / Client
	Fiber	SM 9/125µm
		MM 50/125µm or 62.5/125µm
	Wavelength	Depends on SFP+ or XFP
Indications	LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm)	
Power Input	12VDC	
Power Consumption	<10W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	150g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220-10G-SXX	10G 3R SFP+ to XFP fiber protection (optional SFP+, XFP module)

Note: This card MUST be placed in CH02M chassis.
For standalone SNMP management, place this card in CH02/SNMP chassis.

FRM220-10G-SS

10G Transponder (3R)

The FRM220-10G-SS is a 10G fiber to fiber 3R repeater and transponder. Based on a number of 10 Gigabit Fiber standards, these transponders support 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 transparent bi-directional forwarding capability between the 2 fiber media, the FRM220-10G-SS brings you the best and simplest solution for your 10G conversion between fiber and fiber.

Features

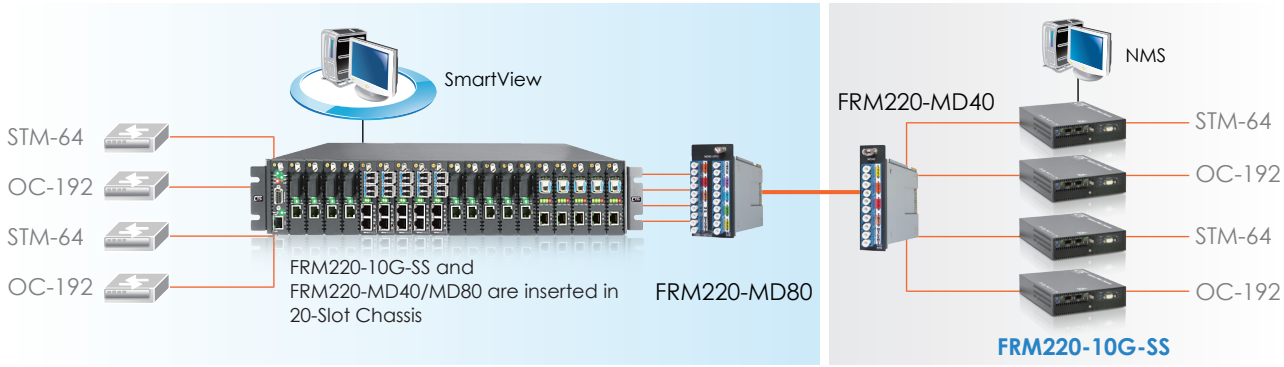
- Multiple protocol supported 10G Ethernet, STM-64, OC-192, G.709 OTU2, Fiber Channel (8 x FC)
- Network management via Web, Telnet, SNMP in central FRM220 chassis(10 cards in chassis max.)
- Protocol transparent 3R fiber media transponder / repeater (Re-amplification, Re-shaping and Re-clocking)
- Promotes flexibility and eases management with pluggable SFP+ 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
- SFP+ power supplies: +3.3V

Specifications

Optical Interface	Connector	LC, 1x Line SFP+ to 1x Client SFP+
	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 (10.51875 Gbps)
	Regeneration	Re-amplification
		Re-shaping, Re-timing
	Loopback	Line / Client
	Fiber	SM 9/125µm
		MM 50/125µm or 62.5/125µm

Optical Interface	Wavelength	CWDM 1470 ~ 1610nm
		DWDM 1529.55 ~ 1565.50nm
Indications	LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm)	
Power Input	12VDC	
Power Consumption	<10W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	150g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220-10G-SS	10G 3R transponder, SFP+ to SFP+ (optional SFP+ module)

Note: This card may be set by DIP switch or console, but MUST be placed in CH02M chassis.
For standalone SNMP management, place this card in CH02/NMC(SNMP) chassis.

FRM220-4G-3S

4G Transponder (2R) with Optical Line Protection

The FRM220-4G-3S is a 2R 4G optical regeneration device, which consists of Re-amplification and Re-shaping. 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 is supported for the aggregate fiber ports. When the FRM220-4G-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 perform diagnostic loop backs.

Features

- Multiple protocol supported at bit rates 28Mbps to 4.25Gbps (Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, STM-1, STM-4, STM-16, FC-1, FC-2, FC-4)
- Network management via Web, Telnet, SNMP in central FRM220 chassis
- Local configuration via DB9 console port (when placed in CH01M or CH02M)
- Digital diagnostic monitoring of SFP module
- Perform optical repeater function (Re-amplification, Re-shaping)
- Facility loopback on both Client / Line sides
- 1+1 optic fiber protection
- Link Fault Pass-Through (LFPT)
- Auto Laser Shutdown (ALS)
- Detect transceiver transmitter error alarm

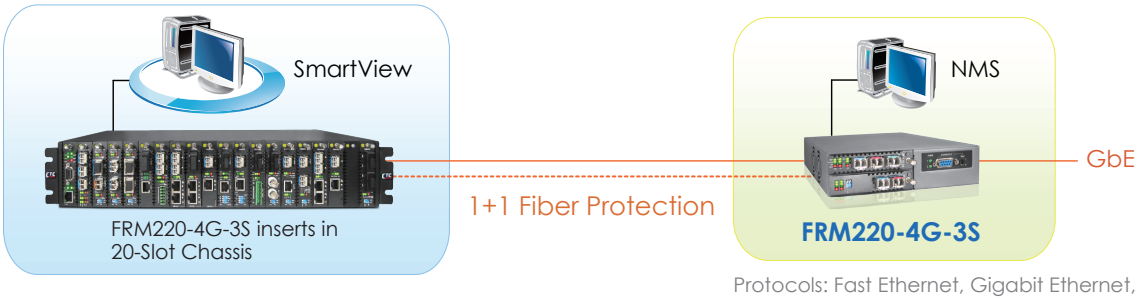
Specifications

Optical Interface	Connector	SFP LC
	Data rate	28Mbps to 4.25Gbps
	Regeneration	Re-amplification
		Re-shaping
	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	12VDC
Power Consumption	< 8W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application

Managed 4G 2R Transponder with Fiber Protection



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

Ordering Information

Model Name	Description
FRM220-4G-3S	4G 2R Transponder with fiber protection, (optional SFP module)

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis

FRM220-2.7G-3S

2.7G Transponder (3R) with Optical Line Protection

The FRM220-2.7G-3S is a 3R 2.7G optical repeater and transponder, 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 to match the transmitted protocol.

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
- Link Fault Pass-Through (LFPT)
- Auto Laser Shutdown (ALS)
- 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
- Dip switch setting data rate
- Detect transceiver transmitter error alarm

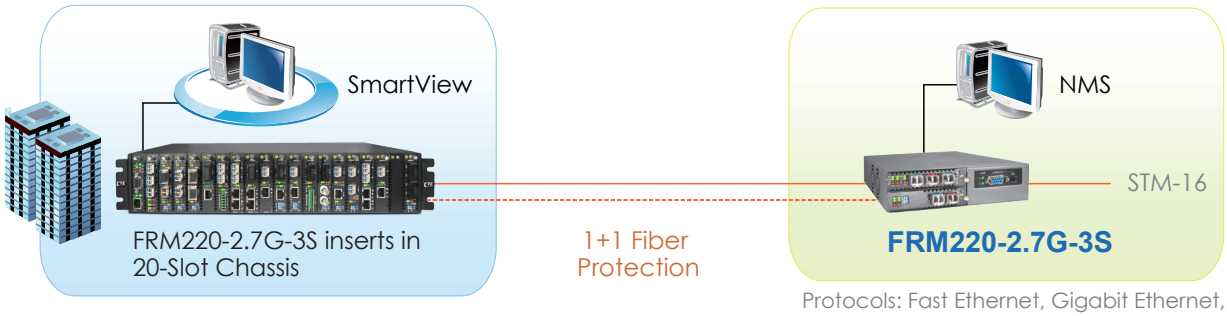
Specifications

Optical Interface	Connector	SFP LC
	Data rate	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	12VDC
Power Consumption	< 10W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application

Managed 2.7G 3R Transponder with Fiber Protection



Protocols: 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

Model Name	Description
FRM220-2.7G-3S	2.7G 3R Transponder with fiber protection, (optional SFP module)

Note: This card may be set by DIP switch or console, but MUST be placed in CH02M chassis.
For standalone SNMP management, place this card in CH02/NMC(SNMP) chassis.

FRM220-1000DS

1G (2R) Transponder

The FRM220-1000DS is a fiber to fiber optical media converter and repeater that allows data rates up to 1Gbps. FRM220-1000DS supports 2R regeneration, which consists of re-amplification and reshaping. This converter is compatible with fiber interfaces such as 100Mbps Fast Ethernet, STM-1, 4, Fiber Channel 1, 2, 4 and OC3, 12. The FRM220-1000DS works as an FRM220 slide-in card, while the FRM220-1000DS plus FRM220-CH01 work as a stand-alone fiber converter. When the FRM220-1000DS card is placed in the FRM220-CH20 rack with SNMP management, the management can view the converter card's status, type and fiber link status.

Features

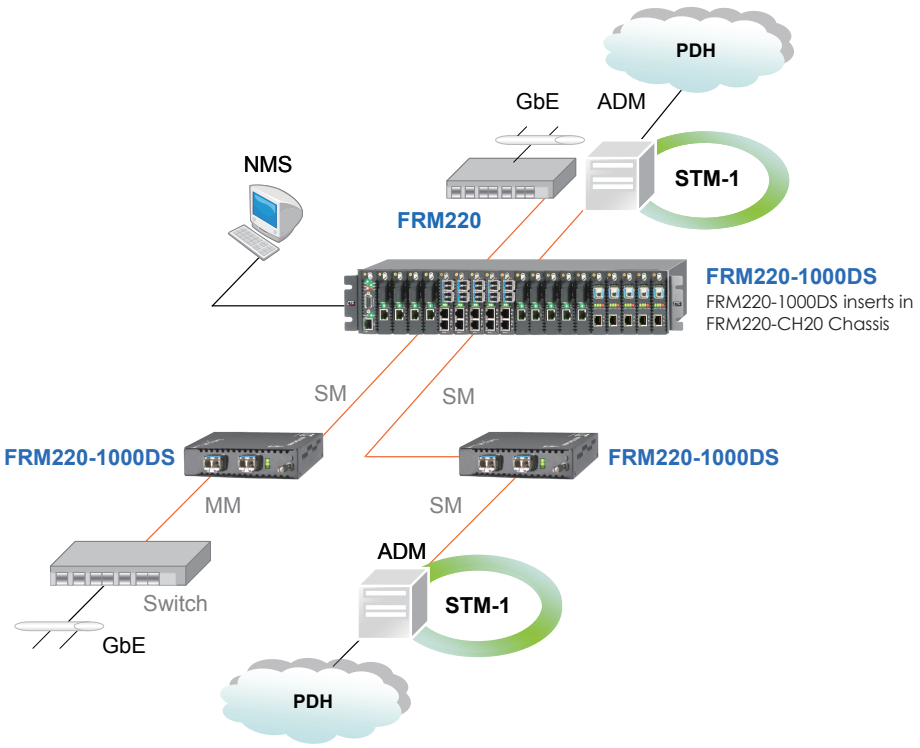
- Transparent fiber media converter / repeater
- Data rate up to 1G
- Network management via terminal or SNMP in FRM220 chassis
- Extend transmission from 2km to 120km over fiber
- Perform optical repeater function (Re-amplification & Reshaping)
- Digital diagnostic monitoring of SFP modules

Specifications

Optical Interface	Connector	SFP LC x 2
	Data rate	Up to 1G
	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)

Indications	LED (Power, FX-Link1, FX-Link2)
Power Input	12VDC
Power Consumption	< 5W
Dimensions	123 x 86 x 20 mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-1000DS	1000Base-X SFP to 1000Base-X SFP 2R Transponder

Note: This card must use CH01M, with serial console, to configure standalone settings

FRM220-10GE-TS

10G Ethernet Media Converter
10G Base-T to 10G Base-R SFP+

The FRM220-10GE-TS is a copper to fiber 10G Ethernet media converter based on IEEE802.3an and IEEE802.3ae. 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 uses Cat.6a/Cat 7 twisted pair cable as copper transmission media with RJ-45 and 10G optical solution with SFP+ LC connector. The data stream can be converted bi-directionally from 10GBase-T to 10GBase-R and vice versa. With full duplex wire speed forwarding capability between these two media, the FRM220-10GE-TS brings you the best and simplest solution for the 10G Ethernet conversion between copper wire and fiber.

Features

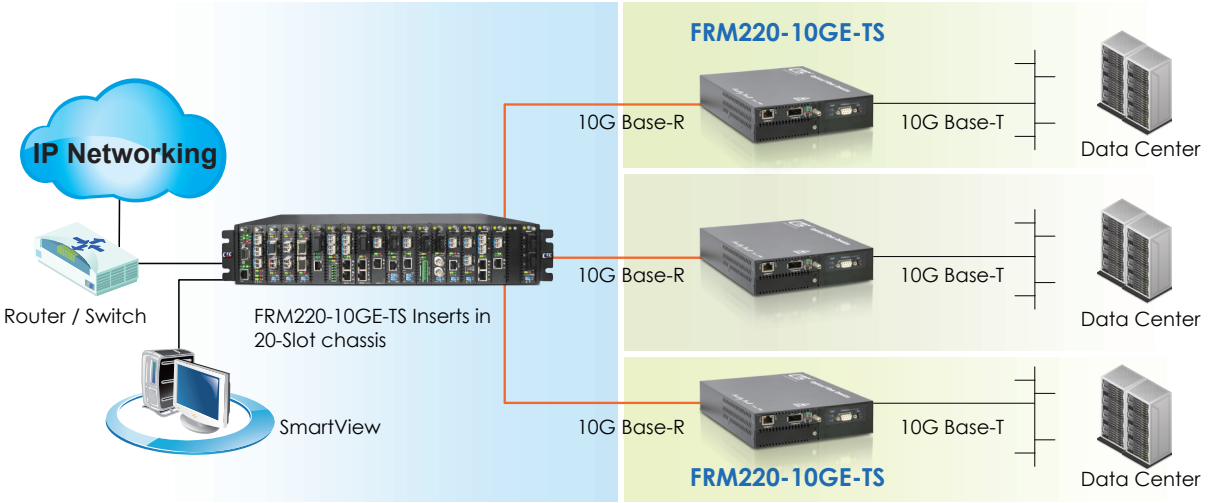
- Network Management via FRM220 Chassis
- Complies with IEEE802.3an 10GBase-T and IEEE802.3ae 10GBase-R
- Real-Time conversion between 10GBase-T and 10GBase-R
- Common used SFP+ fiber interface and RJ45 connector
- Full duplex wire speed forwarding
- Subsidiary device for 10G Ethernet transmission without fiber
- Loopback Test
- Standalone Local Management via CH02M
- Forwarding l0k bytes jumbo packet

Specifications

Optical Interface	Connector	SFP+ LC
	Data rate	10,3125Gbps
	Distance	300m, 10km, 40km, 80km
	Wavelength	1550nm
Electrical Interface	Connector	RJ45
	Data rate	10Gbps
	Cable type	Cat.6a, 7
	Distance	95 meters (Cat.7)
Management	Console port	RS-232 via CH02M
Standards	IEEE 802.3an, IEEE 802.3ae	
LEDs	SFP+, LR, Link/Act, LBK A/B, SYS	

Power	12VDC
Power Consumption	< 15W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	0 ~ 85% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	57,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-10GE-TS	10G Base-T RJ45 to 10G Base-R SFP+, (optional SFP+)

Note: This card MUST be placed in CH02M chassis.
For standalone SNMP management, place this card in CH02/NMC(SNMP) chassis.

FRM220-10GE-TX

10G Ethernet Media Converter
10G Base-T to 10G Base-R XFP

The FRM220-10GE-TX is a copper to fiber 10G Ethernet media converter based on IEEE802.3an and IEEE802.3ae. 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 uses Cat.6a/Cat 7 twisted pair cable as copper transmission media with RJ-45 and 10GE optical solution with XFP LC connector. The data stream can be converted bi-directionally from 10GBase-T to 10GBase-R and vice versa. With full duplex wire speed forwarding capability between these two media, The FRM220-10GE-TX brings you the best and simplest solution for the 10G Ethernet conversion between copper wire and fiber.

Features

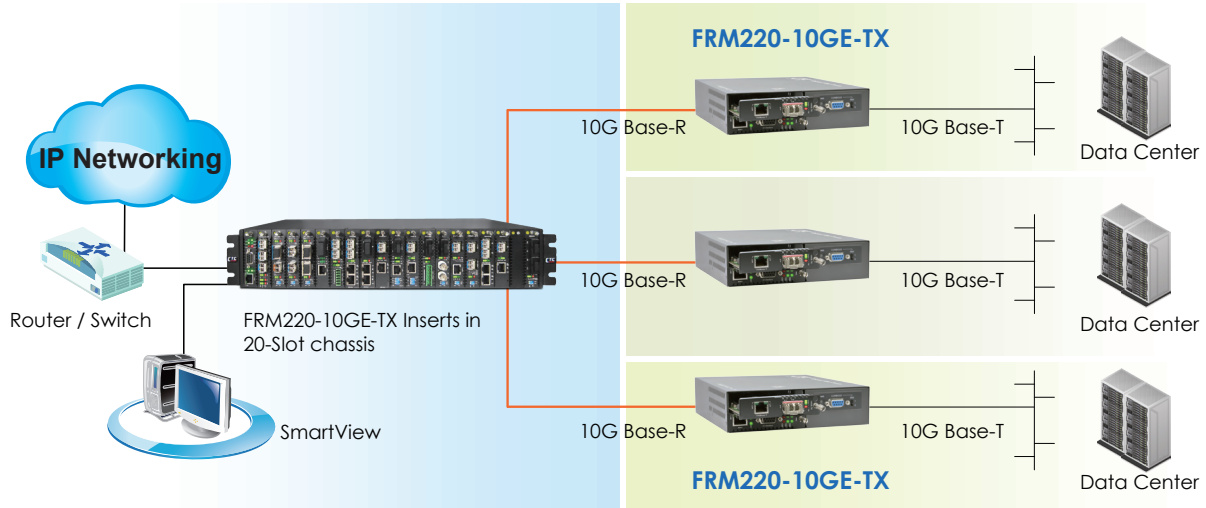
- Network Management via FRM220 Chassis
- Complies with IEEE802.3an 10GBase-T and IEEE802.3ae 10GBase-R
- Real-Time conversion between 10GBase-T and 10GBase-R
- Common used XFP fiber interface and RJ45 connector
- Full duplex wire speed forwarding
- Loopback Test
- Standalone Local Management via CH02M
- Forward 10k bytes jumbo packet

Specifications

Optical Interface	Connector	XFP LC
	Data rate	10,3125Gbps
	Distance	300m, 10km, 40km, 80km
	Wavelength	1550nm
Electrical Interface	Connector	RJ-45
	Data rate	10Gbps
	Cable type	Cat.6a, 7
	Distance	95 meters (Cat.7)
Management	Console port	RS-232 via CH02M
Standards	IEEE 802.3an, IEEE 802.3ae	
LEDs	SFP+, LR, Link/Act, LBK A/B, SYS	

Power	12VDC
Power Consumption	< 15W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	0 ~ 85% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	57,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-10GE-TX	10G Base-T RJ45 to 10G-Base-R XFP, (optional XFP)

Note: This card MUST be placed in CH02M chassis.
For standalone SNMP management, place this card in CH02/NMC(SNMP) chassis.

CWDM (FRM220 MUX/DeMUX)

4 and 8 Channel MUX/DeMUX

The FRM220 CWDM MUX/DEMUX is modular design cards that support ITU-T G.694.2 wavelengths between 1271nm to 1611nm in 20nm increments. The FRM220 CWDM modules are protocol and rate transparent allowing different services such as 10G Ethernet, 10GFC, STM-64, OC-192 to be transported across the same fiber link. The passive FRM220 CWDM MUX/DEMUX modules are available in 4 and 8-Channel (wavelength) models, supporting a variety of wavelength combinations and port configurations. The small and compact size of the CWDM modules yields one of the highest port densities in the industry. A 2U high 19-module FRM220 chassis populated with modules can yield up to 120 channels of capacity. FRM220 CWDM modules are passive devices that require no external power. They can also be installed in an FRM220 powered chassis with a NMC management module[1] and can be managed using SmartView EMS network management software, third-party SNMP software, Telnet or a serial console port. The modules can be installed in any FRM220 chassis equipped with other FRM220 media converters and transponders to provide a multi-service platform capable of delivering Ethernet, TDM, Voice and other services across a CWDM fiber common link.

Features

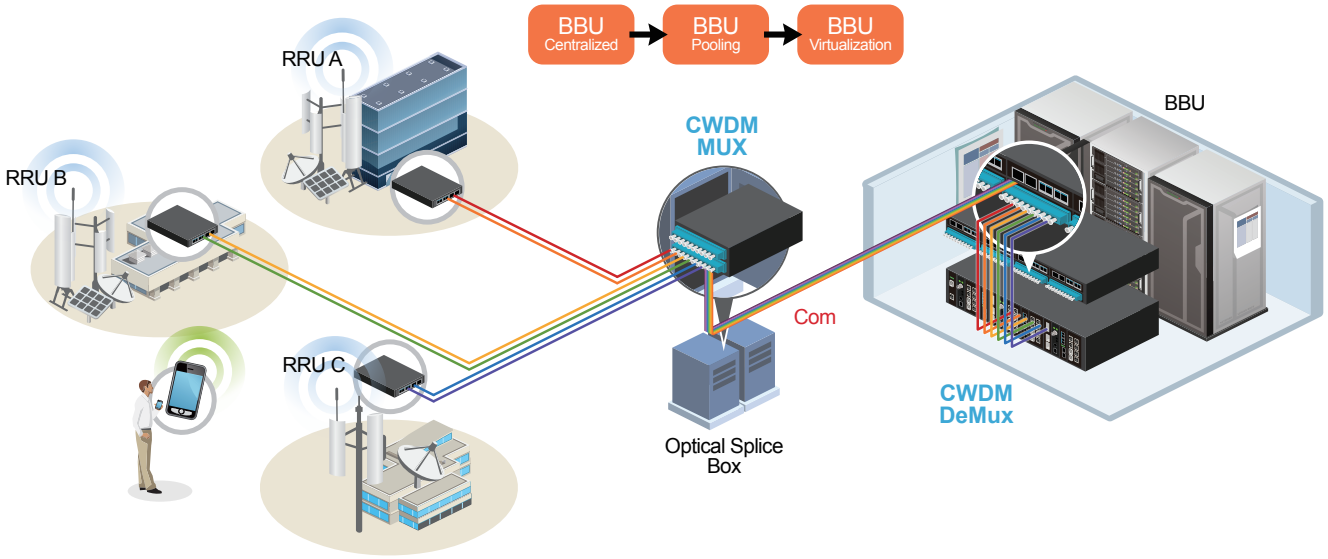
- Full native mode performance
- Passive model requires no power
- Protocol transparent, no limitation
- Utilizes industry standard ITU CWDM wavelength
- Standard LC connectors
- Passive device that can be installed in a powered chassis for managed applications
- Integration with Transponder in FRM220 chassis for CWDM application

Specifications

Model	FRM220-MD-XXX
Channel	4 or 8 channels
Standards	ITU-T G.694.2
Wavelength	1271 ~ 1611nm
Insertion Loss	4ch < 1.8dB, 8ch < 2.8dB
Return Loss	>45dB
Option	Upgrade port
	Wide 1310 ± 50 nm
Line Link	Single fiber or two fiber
Connector	LC / UPC
Dimension	MD40 : 155x 88 x23 mm (D x W x H)
	MD80 : 155x 88 x42 mm (D x W x H)
Weight	MD40 : 200g
	MD80 : 380g

Temperature	0 ~ 50 (Operating)
	-40 ~ 70 (Storage)
Humidity	0 ~95% (non-condensing)
Certification	RoHS compliant

Application



Ordering Information

Model Type	Model Name	Channel Port ITU Center Wavelength(nm)	Chassis Slots Required	Insertion Loss	Client	Line	Mointor	U/P
CWDM 4-Channel MUX/DeMUX	FRM220-MD4001	1511, 1531, 1551, 1571	1	<1.8dB	LC/UPC			
	FRM220-MD4002	1551, 1571, 1591, 1611	1	<1.8dB	LC/UPC			
	FRM220-MD4501	1471, 1491, 1591, 1611 + Upgrade port 1 (1531 ~ 1571nm)+ Upgrade port 2 (1261 ~ 1457nm)	2	<2.2dB	LC/UPC			LC/UPC
CWDM 8-Channel MUX/DeMUX	FRM220-MD8001	1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611	2	<2.8dB	LC/UPC			
	FRM220-MD8101	1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611 + monitor port	2	<2.8dB	LC/UPC		LC/UPC	
	FRM220-MD8201	1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611 + Upgrade port (1261 ~ 1451nm)	2	<2.8dB	LC/UPC			LC/UPC
Single fiber CWDM 4-Channel MUX/DeMUX	FRM220-MD4001A	TX/RX (1471/1491, 1511/1531, 1551/1571, 1591/1611)	1	<1.8dB	LC/UPC			
	FRM220-MD4001B	TX/RX (1491/1471, 1531/1511, 1571/1551, 1611/1591)	1	<1.8dB	LC/UPC			
Single fiber CWDM 8-Channel MUX/DeMUX	FRM220-MD8101A	TX/RX (1271/1471, 1291/1491, 1311/1511, 1331/1531, 1351/1551, 1411/1571, 1431/1591, 1451/161nm) + monitor port	2	<2.8dB	LC/UPC	SC/UPC	FC/UPC	
	FRM220-MD8101B	TX/RX (1471/1271, 1491/1291, 1511/1311, 1531/1331, 1551/1351, 1571/1411, 1591/1431, 1611/1451nm) + monitor port	2	<2.8dB	LC/UPC	SC/UPC	FC/UPC	

Naming rule

FRM220- **MD** **4** **0** **0** **1** **A**

- **MD**: MUX/DeMUX
  - **Mx**: MUX
  - **Dx**: DeMUX
- **4**: Channel
  - **4**: 4ch
  - **8**: 8ch
  - **G**: 16ch
- **0**: Port Type
  - **0**: X
  - **1**: Monitor port
  - **2**: Upgrade port
  - **3**: Mointor + Upgrade port
  - **4**: Mointor + 2 Upgrade port
  - **5**: 2 Upgrade port
  - **6**: wide 1310±50nm
- **01**: Model Type
- **A**: Single Fiber
  - **A**: A type
  - **B**: B type

Example :

FRM220-MD4001	MUX/DEMUX, 4 channel, model typel 01
FRM220-MD8101	MUX/DEMUX, 8 channel, monitor port, model type 01
FRM220-MD8201	MUX/DEMUX, 8 channel, upgrade port, model type 01
FRM220-MD8101A	MUX/DEMUX, 8 channel, monitor port, model type 01, Single fiber Type A

FRM220-Protection

1+1 Fiber Optical Protection Switch

FRM220-Protection Optical Line Protection (OLP) unit is able to provide fiber path redundancy on a channel by channel basis. These units are particularly well suited for protection in any type of fiber data transmission. This solution includes monitoring capabilities for both the working and protected path fibers. In case of a fiber cut in the active path, traffic will be switched over to the protected path in less than 50 ms. Monitoring is available through SNMP Management when FRM220-Protection card is placed in 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 configure receive threshold levels for path switching.

Features

- 1+1 full optical protection
- Low channel cross talk < -55dB
- Low insertion loss < 5.5dB
- Latch feature, if power is lost the switch remains in its current state
- Protection transition < 50 ms
- Works with any combination of 1 ~16 wavelengths
- Traffic is switched in one of three modes : revertive,non-revertive, manual
- Programmable Rx threshold setting for switch-over
- Optical Interface Type : LC connectors
- Working and protected lines are physically separated fiber

Specifications

Connecter	LC
LEDs	Power System, Working Path, Protection Path, Work mode
Power	DC 12V In
Restoration Time	50ms
Range	Input PWR : +3 ~ -15dBm(TX), -2~-29dBm(RX)
	Detection : -5 ~ -29dBm
Loss	Insertion Loss < 5.5dB, Return Loss > 45dB

Power Consumption	< 5W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hours

Application

Ordering Information

Model Name	Description
FRM220-Protection	1+1 Fiber Optical Protection Switch

Note: This card must use CH01M, with serial console, to configure standalone settings.

FRM220-MX210

2x Gigabit Ethernet Multiplexer

FRM220-MX210 is 4-port Gigabit Ethernet switch which able to aggregate two wire-speed Gigabit Ethernet services into one 2.5G uplink, reducing CAPEX by effectively increasing fiber utilization. The Multiplexer can be used either in point-to-point topology, functioning as a media converter for transporting 2 Gigabit Ethernet services over one fiber, or in CWDM systems working as a wavelength converter for extending transmission capacity. FRM220-MX210 is equipped with one 10/100/1000M RJ-45 network management port and three SFP based ports: two 1G Ethernet service ports and one 1G/2.5G uplink port. Additionally its advanced features such as downlink and uplink loop back, auto laser shutdown and remote network management provide carriers a flexible, reliable and cost-effective two Gigabit Ethernet over one wavelength conversion solution.

Features

- Local configuration via DB9 craft port in stand-alone (CH01M)
- Forward 9K bytes Jumbo Packets
- Transports two Gigabit Ethernet over one wavelength doubling the CWDM system transmission capacity
- Facility loopback on both Line / client sides
- Auto Laser Shutdown (ALS)
- Hot-swappable SFP module
- Detect transceiver error Alarm
- Network Management via web, Telnet, SNMP in central FRM220 chassis
- 10/100/1000M Network management port
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1Q Tagging and Port based VLAN
- Supports IEEE 802.1D STP
- Default port and 802.1p tag priority QoS

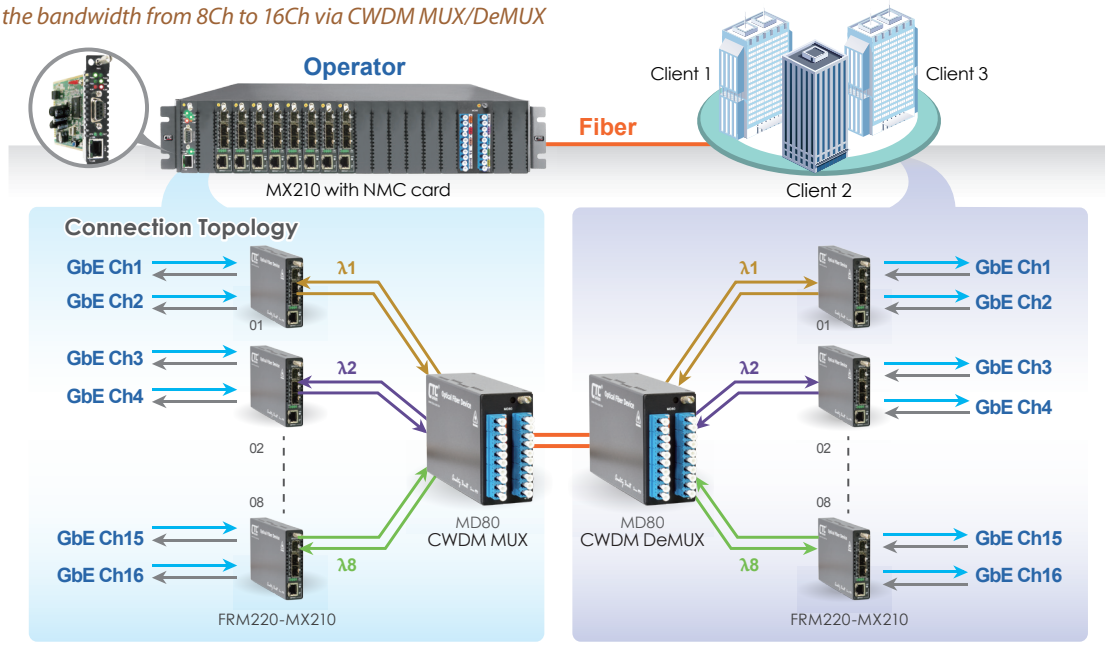
Specifications

Optical Interface	Port1/Port2	100Base-FX, 1000Base-X or 2500Base-X
Electrical Interface	Port3	100Base-FX or 1000Base-X
	Port4	RJ45
		10/100/1000Base-T
		MDI/MDIX auto crossover
		IEEE802.3x flow control
Standards	IEEE 802.3, 802.3u, 802.3z, 802.3ab	
LEDs	PWR, Link (Port1, Port2, Port3) Port4: Link/Speed	

Power	12VDC
Power Consumption	< 10W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	5 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application

Double the bandwidth from 8Ch to 16Ch via CWDM MUX/DeMUX



In-band management MX210

- IP address configuration
- Port Configuration–speed, flow control, max frame, traffic statistics
- VLANs configuration
- Mux Mode configuration
- DDM information
- Device Reset
- Set to Default
- Save Startup Configuration

Ordering Information

Model Name	Description
FRM220-MX210	2-port Gigabit Ethernet Multiplexer for transporting two Gigabit Ethernet over one 2.5G Fiber

Note: This card may use CH01M to provide console for initial TCP/IP settings, or use CH01 with default IP.

FRM220-1000M

10/100/1000Base-T to 1000Base-X
Web Smart GbE OAM Managed Converter

The FRM220-1000M is an IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-T and 1000Base-X with SC, FC or ST connectors. 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. Converter settings include band-width control, duplex, and speed configuration, VLAN tagging and Q-in-Q support.

Features

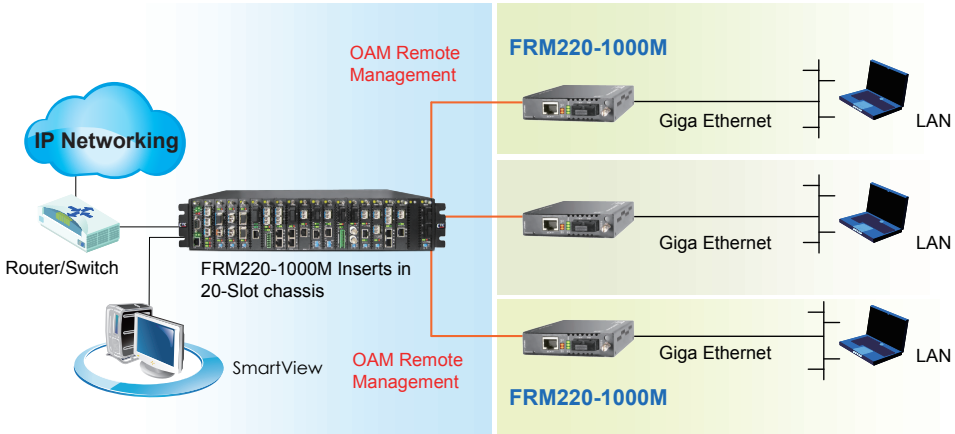
- 10/100/1000Base-T to 1000Base-X Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Supports flow control Enable or Disable
- Supports Jumbo Frame 9K Bite
- Ingress / Egress bandwidth control
- Supports IEEE 802.3ah OAM in-band management
- Firmware upgrade via Web
- Management Password Security
- Dying gasp (remote power failure detection)
- Supports Link Fault Pass-Through (LFPT) Function
- Supports Auto Laser Shutdown (ALS) Function
- Allow IP settings Web or Console management on stand-alone.
- Provide Product information for management
- Online local/remote f/w upgrade
- Supports 16 Tag VLAN Group
- RMON counters (for standalone unit only)

Specifications

Optical Interface	Connector	1x9 (SC)
	Data rate	125/1250Mbps
	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, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP,
		100Base-TX Cat.5, 5e or higher

Standards	IEEE 802.3, IEEE 802.3u IEEE 802.3ab, 802.3z, 802.3ah, 802.1Q
Indications	LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input	12VDC
Power Consumption	< 4W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-1000M	10/100/1000Base-T to 1000Base-X, Web Smart OAM managed media converter

Note: This card may use CH01M to provide console for initial TCP/IP settings, or use CH01 with default IP.

FRM220-1000MS

10/100/1000Base-T to 100/1000Base-X SFP Web Smart GbE OAM Managed Converter

The FRM220-1000MS is an IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-T and 100/1000Base-X with SFP modules. 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. Converter settings include bandwidth control, duplex, and speed configuration, VLAN tagging, Q-in-Q support and SFP DDMI.

Features

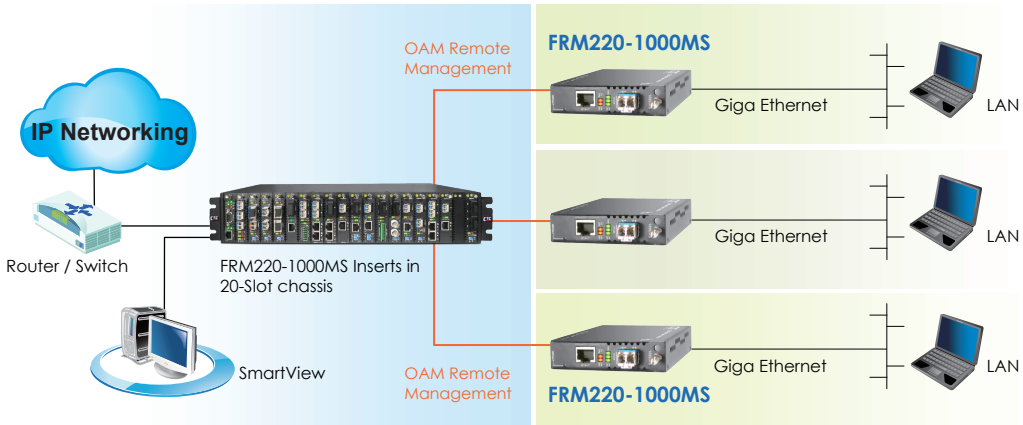
- 1-Port 10/100/1000Base-T to 100/1000Base-X Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Supports flow control Enable or Disable
- Supports Jumbo Frame 9K Packet
- Ingress / Egress bandwidth control
- Supports 802.3ah-OAM in-band management
- (for standalone unit only)
- Firmware upgrade via Web (for standalone unit only)
- Management Password Setting (for standalone unit only)
- Dying gasp (remote power failure detection on stand-alone)
- Supports Link Fault Pass-Through (LFPT) Function
- Supports Auto Laser Shutdown (ALS) Function
- Allow IP settings web or console management
- (for standalone unit only)
- Supports D/D function for SFP fiber transceiver
- Supports 16 Tag VLAN Group
- RMON counters (for standalone unit only)

Specifications

Optical Interface	Connector	SFP LC
	Data rate	125/1250Mbps
	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, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP 100Base-TX Cat.5, 5e or higher

Standards	IEEE 802.3, 802.3u, 802.3ab, 802.3z, 802.3ah, 802.1Q
Indications	LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input	12VDC
Power Consumption	< 4W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-1000MS	10/100/1000Base-T to 100/1000Base-X SFP Web smart OAM managed mediaconverter. (Optional SFP)

Note: This card may use CH01M to provide console for initial TCP/IP settings, or use CH01 with default IP.

FRM220-1000EAS/X-1

10/100/1000Base-T to 100/1000Base-X OAM/IP-Based Managed GbE Media Converter

The FRM220-1000EAS/X-1 is an IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-T and 100/1000Base-X with SFP. With stand-alone SNMP and Web-based management, the network administrator can monitor, configure and control the activity of each IEEE802.3ah series card and remotely connected OAM compliant converter. By offering IEEE802.3ah OAM in-band management, this converter can also be completely controlled and monitored from a centrally located managed rack. Based on a powerful L2 switch architecture, this converter supports bandwidth control, duplex and speed configuration, VLAN tagging, Q-in-Q, QoS, Spanning tree as well as auto laser shutdown, link fault pass through, OAM loop back and dying gasp.

Features

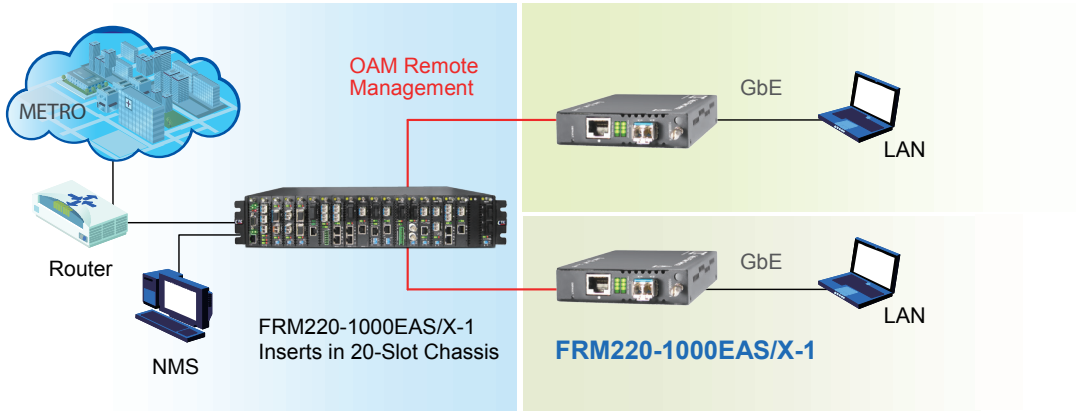
- 10/100/1000Base-T to 100/1000Base-X SFP
- Supports local / remote IEEE802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Supports IEEE 802.1Q Tagging
- Supports Q in Q double tagging
- Forward 10K bytes Jumbo packets (max.)
- 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 Indication (FEFI)
- Supports Link Fault Pass-Through (LFPT)
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Online local / remote f/w upgrade
- Default port and IEEE802.1Q Tagging priority QoS

Specifications

Optical Interface	Connector	SFP LC
	Data rate	100/1000Mbps
	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)
Power Consumption	< 8W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	120g	

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
Standards	IEEE 802.3, IEEE 802.3u, IEEE 802.1Q, IEEE 802.3ab, IEEE 802.3z	
Indications	LED : Power, FX-Link, FEF, TEST, Speed(10,100,1000), FULL	
Power Input	Card : 12VDC Standalone : AC, DC options	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220-1000EAS/X-1	10/100/1000Base-T to 100/1000Base-X with OAM/IP-Based managed GE Media Converter, (optional SFP)

Note: This card may use CH01M to provide console for initial TCP/IP settings, or use CH01 with default IP.

FRM220-10/100 i

10/100Base-TX to 100Base-FX In-Band Managed Converter

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 bandwidth 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

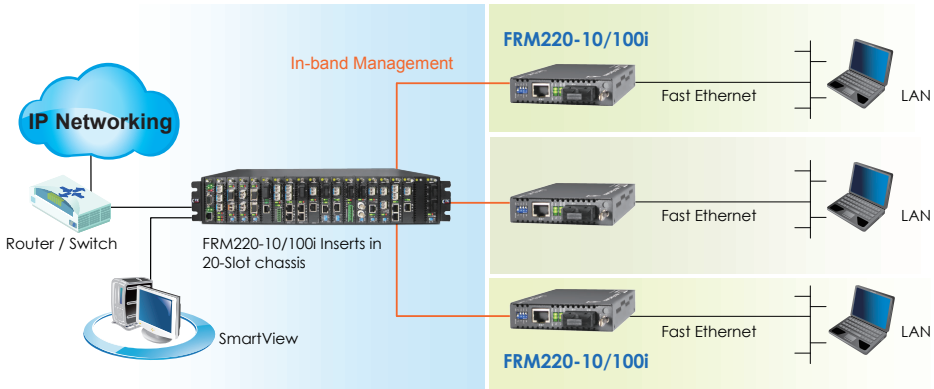
- 1-Port 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault Indication (FEFI)
- Supports Link Fault Pass-Through (LFPT)
- Supports Loop Back Test
- Supports RMON counter
- Auto Laser Shutdown (ALS)
- Auto 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 (Nx32Kbps or Nx512Kbps)
- Supports flow control (Pause)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	125Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm
		SM 9/125μm
	Distance	MM 2km, SM 15/30/50km
		WDM 20/40km
	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

Standards	IEEE 802.3, IEEE 802.3u,TS-1000
Indications	LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input	12VDC
Power Consumption	< 4W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-10/100i	10/100Base-TX to 100Base-FX In-band managed converter

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Connector Type / Connectivity Distance

FRM220 – 10/100i – □□□□□

Example: FRM220 – 10/100i – SC002

Note: This card must use CH01M, with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220-10/100iS

10/100Base-TX to 100Base-FX SFP In-Band Managed Converter

The FRM220-10/100iS 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 bandwidth 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

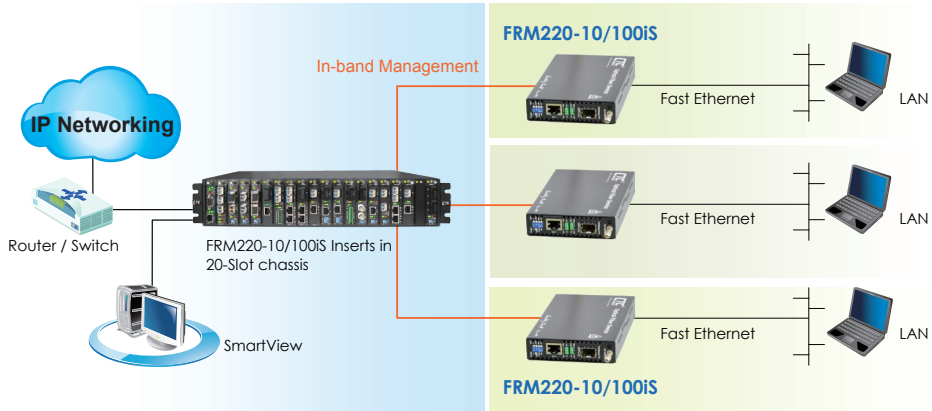
- 1-Port 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault Indication (FEFI)
- Supports Link Fault Pass-Through (LFPT)
- Supports Loop Back Test
- Supports RMON counter
- Auto Laser Shutdown (ALS)
- Auto 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 Nx512K bps)
- Supports flow control (Pause)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

Specifications

Optical Interface	Connector	SFP LC
	Data rate	125Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm
		SM 9/125μm
	Distance	MM 2km, SM 15/30/50km
		WDM 20/40km
	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

Standards	IEEE 802.3, IEEE 802.3u,TS-1000
Indications	LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input	12VDC
Power Consumption	< 4W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-10/100iS	10/100Base-TX to 100Base-FX SFP In-band managed converter

Note: This card must use CH01M, with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220-10/100iS-2

Dual Channels 10/100Base-TX to 100Base-FX In-Band Managed Converter

The FRM220-10/100iS-2 is a dual (2 in 1) 10/100Base Ethernet to 100Base-FX fiber slide-in card converter based on the popular FRM220-10/100i. 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. By offering two completely isolated converters on one card, this card can effectively double the conversion capacity of a rack.

Features

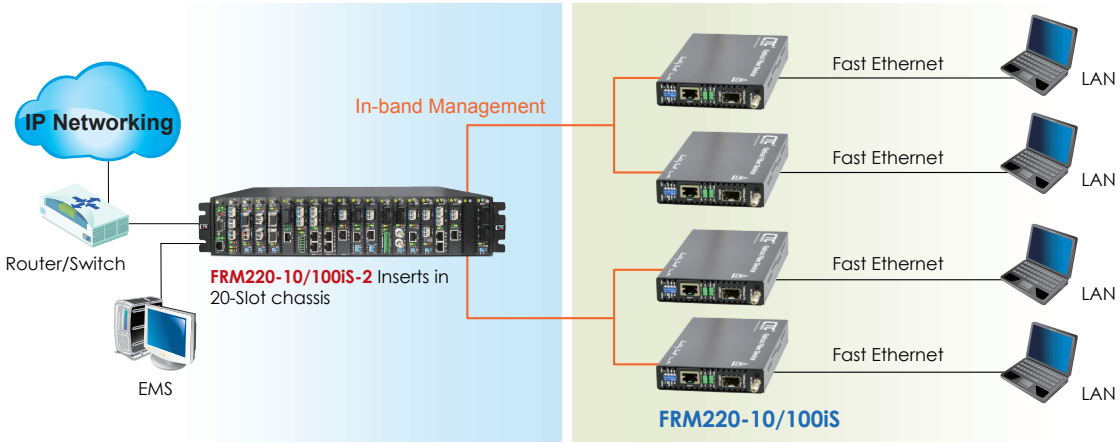
- Dual independent converters 10/100Base-TX to 100Base-FX
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets in switch mode
- Supports IEEE 802.1Q Tag VLAN pass thru
- Supports Q in Q double tagged frame transparent
- Forward 9K jumbo packets in converter mode
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager.
- Bandwidth control (Nx32Kbps or Nx512Kbps) & flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault Indication (FEFI) and Link Fault Pass-Through (LFPT)
- Supports Loop Back Test and RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS) and Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

Specifications

Optical Interface	Connector	SFP LC
	Data rate	125 Mbps
	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	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP 100Base-TX Cat.5, 5e or higher

Standards	IEEE 802.3, IEEE 802.3u, IEEE 802.3s, TS-1000
Indications	LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input	12VDC
Power Consumption	< 4W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-10/100iS-2	Dual converter 10/100Base-TX to 100Base-FX SFP with In-band management, (optional SFP)

Note: This card must use CH01M, with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220A-1000EAS/X

2x 10/100/1000Base-T, RJ45 and 2x 100/1000Base-X, SFP OAM/IP Managed Switch

The FRM220A-1000EAS/X is an IEEE 802.3ah OAM compliant dual copper and dual fiber Gigabit Ethernet switch solution designed to make conversion between 10/100/1000Base-T(X) and 100/1000Base-X with SFP. With embedded SNMP and Web-based management, the network administrator can monitor, configure and control the activity of each IEEE 802.3ah series card and remotely connected OAM compliant converter. Based on a powerful L2 switch architecture, this converter supports bandwidth control, duplex and speed configuration, VLAN tagging, Q-in-Q, QoS, Spanning tree, jumbo frames as well as auto laser shutdown, link fault pass through, OAM loop back and dying gasp.

Features

- 2-port 10/100/1000Base-T and 2-port 100/1000Base-X SFP
- Supports local / remote IEEE 802.3ah OAM / IP In-band management
- Standalone IP Based, Web GUI, Telnet, SNMP management
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Supports IEEE 802.1Q Tagged and Port based VLAN
- Supports IEEE 802.1ad Q in Q double tagging
- Forward 10K bytes Jumbo packets (max.)
- Supports Flow control (Pause)
- Supports OAM remote loopback to assist in diagnosing network problems
- RADIUS Client
- Supports bandwidth control
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault Indication (FEFI)
- Supports Link Fault Pass-Through (LFPT)
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Online local / remote f/w upgrade
- Fiber Redundant mode
- Spanning Tree Protocol
- Port Trunking
- Default port and 802.1p tag priority QoS
- Fixed or weighted priority QoS

Specifications

Optical Interface	Connector	SFP LC
	Data rate	125/1250Mbps
	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)
Power Consumption	< 8W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	130g	

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
Standards	IEEE 802.3, IEEE 802.3u, IEEE802.1Q, IEEE 802.3ah	
Indications	LED (Power, FX-Link, Test, TX-Link, TX-SPD)	
Power Input	12VDC	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

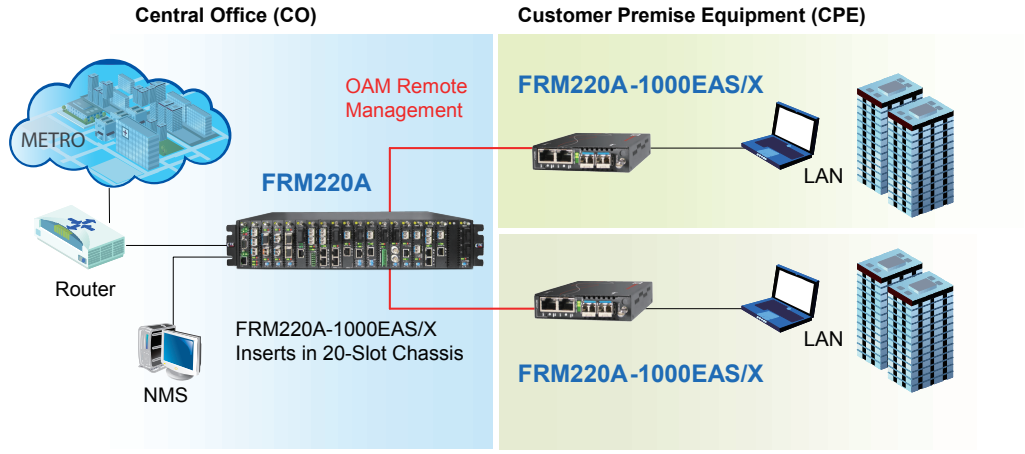
Ordering Information

Model Name	Description
FRM220-1000EAS/X	2-Port 10/100/1000Base-T and 2-Port 100/1000Base-X with OAM/IP management, (optional SFP)

Note: This card may use CH01M to provide console for initial TCP/IP settings, or use CH01 with default IP.

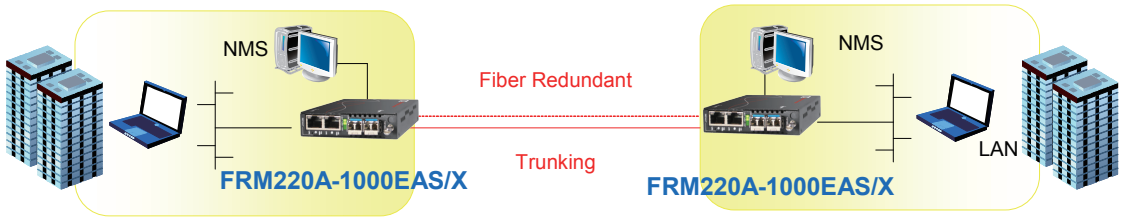
FRM220A-1000EAS/X Application

In the Centrally managed application, the main chassis, all of its cards and all fiber connected remote CPE units can be provisioned and monitored from a single management point



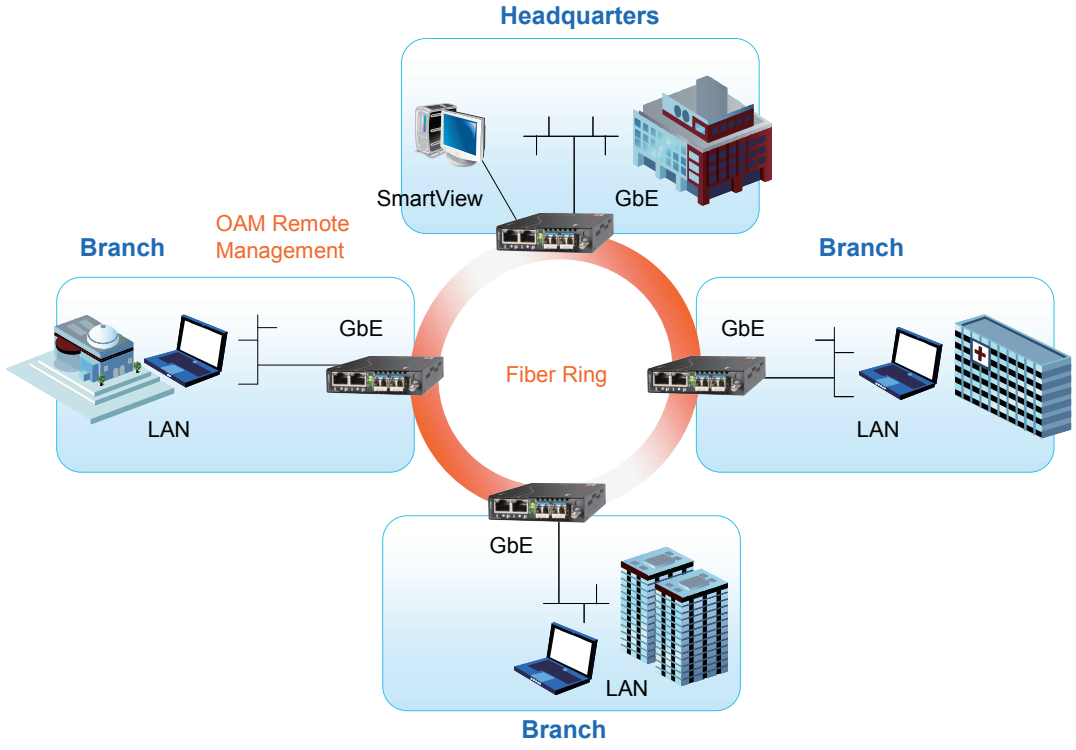
Fiber Redundant / Trunking Application

Utilizing a special trunking function, the 1000EAS/X can be deployed in stand-alone, point-to-point applications and provide 1+1 redundant fiber protection



Fiber Ring Application

In the ring or mesh topology, Spanning Tree Protocol enables a highly resilient network based on multiple 1000EAS/X units



FRM220A-1002ES

2x 10/100/1000Base-T and 2x 100/1000Base-X SFP GbE Managed Switch

The FRM220A-1002ES is a dual copper and dual fiber Gigabit Ethernet switch designed to make conversion between 10/100/1000Base-T and 100/1000Base-SX/LX with SFP connector. With SNMP and Web-based management in the FRM220 or FRM220A chassis the network administrator can monitor, configure and control the activity of each FRM220A-1002ES switch card locally via the chassis management. Based on a powerful L2 switch architecture, this converter supports bandwidth control, duplex and speed configuration, VLAN tagging, Q-in-Q, QoS, jumbo frames as well as auto laser shutdown, and link fault pass through.

Features

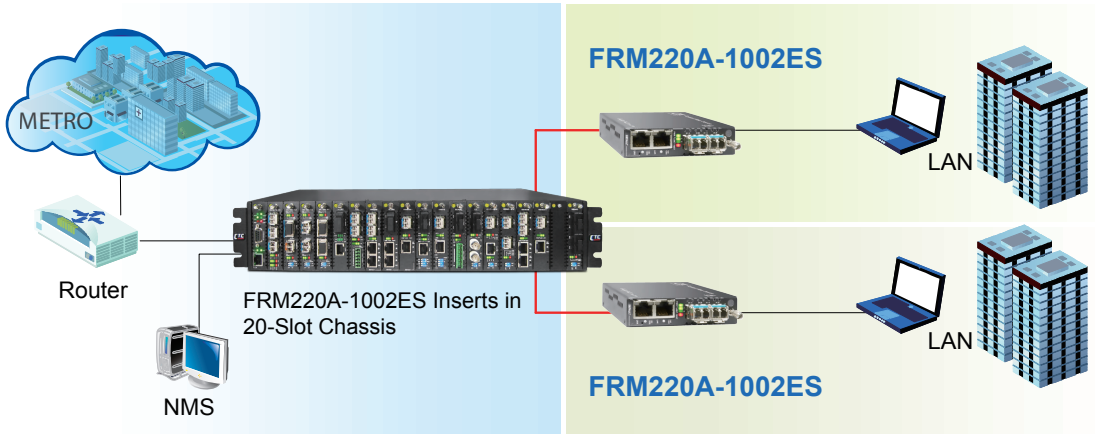
- 2-Port 10/100/1000Base-T and 2-Port 100/1000Base-X Switch
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Supports flow control Enable or Disable
- Supports Jumbo Frame 10K Bytes
- Supports 16 Tag VLAN Group
- Supports Double VLAN tag (Q-in-Q)
- Supports Bandwidth control
- Supports Loop Back Test
- Supports Link Fault Pass-Through (LFPT) Function
- Supports Auto Laser Shutdown (ALS) Function
- Supports local management on FRM220A rack management.
- Console management on stand-alone.
- Supports D/D function for SFP fiber transceiver
- Provide Product information for management
- Supports the local management (Monitor or Configure status) by the SNMP manager.
- Supports FRM220A for Ethernet Aggregation

Specifications

Optical Interface	Connector	SFP LC
	Data rate	125Mbps, 1250Mbps
	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)
Standards	IEEE 802.3, IEEE 802.3u, 802.3z, 802.3ab, 802.1Q, 802.3X, 802.1ad	
Indications	PWR, LNK1, LNK2, TEST, LAN Link, LAN SPEED	
Certification	FCC Part 15 Class A, CE Mark	

Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Cable	10Base-T Cat.3, 4, 5, UTP
		100Base-TX Cat.5, 5e or higher
		1000Base-X Cat.5e or higher
Power	12VDC	
Dimensions	155 x 88 x 23mm (DxWxH)	
Weight	130g	
Temperature	0~50°C (Operating), -10~70°C (Storage)	
Humidity	0 ~ 95% non-condensing	

Application



Ordering Information

Model Name	Description
FRM220A-1002ES	2-Port 10/100/1000Base-T and 2-Port 100/1000Base-SX/LX SFP GE Manage Switch

Note: This card must use CH01M, with serial console, to configure standalone settings.

FRM220A-FSW103

3x 10/100Base-TX to 100Base-FX SFP Switch

The FRM220A-FSW103 is a 3-Port 10/100Base-TX and 100Base-FX SFP fiber slide-in card Ethernet switch designed for central applications. With SNMP and Web-based management in the FRM220 or FRM220A chassis, the network administrator can monitor, configure and control the activity of each FRM220A-FSW103 switch card locally via the chassis management. This switch is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc

Features

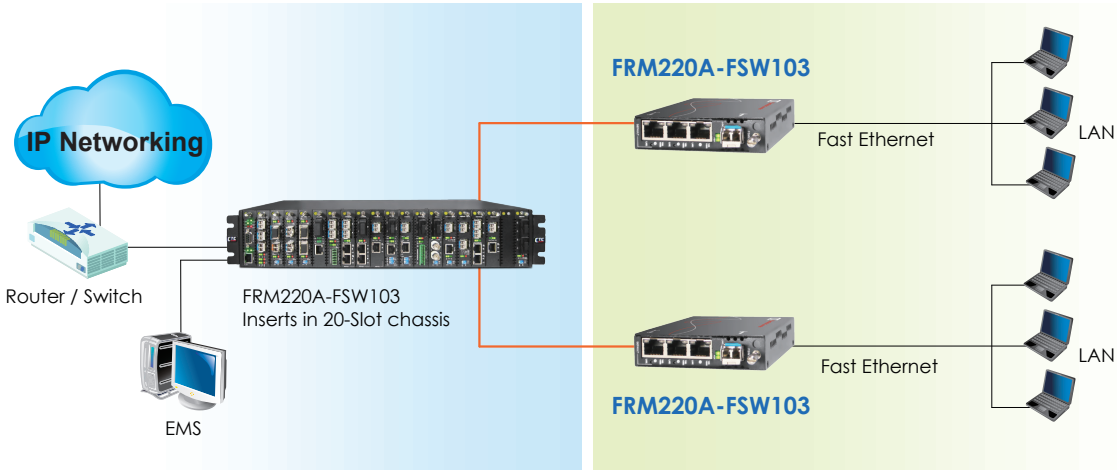
- 3-Port 10/100Base-TX + 1-Port 100Base-FX Ethernet Switch
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Supports flow control
- Forward 1552 bytes (max.) packets in switch mode
- Supports Store and forward switch mode
- Supports FRM220 chassis management system
- Supports FRM220A chassis management system and Ethernet Aggregation
- Supports local management (Monitor or Configure status) by the SNMP manager.
- Supports D/D function for SFP fiber transceiver
- Provides Auto Laser Shutdown (ALS) function

Specifications

Optical Interface	Connector	SFP LC
	Data rate	125Mbps
	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

Standards	IEEE 802.3, IEEE 802.3u
Indications	LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input	12VDC
Power Consumption	< 4W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 80°C (Operating), -10 ~ 80°C (Storage)
Humidity	5 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220A-FSW103	3-Port 10/100Base-TX and 100Base-FX SFP Switch, (optional SFP)

Note: This card must use CH01M, with serial console, to configure standalone settings.

FRM220-DS3/E3

DS3/E3 over Fiber

NEW

The FRM220-DS3/E3 is fiber modem that works in pairs to transparently extend DS3, E3 or STS-1 transmissions over optical fiber. By utilizing pluggable SFP transceivers, these converters may be easily deployed on multimode or single mode fiber, at a distance up to 120km, or over a single core fiber using BiDi (WDM) SFP modules. The DS3/E3 connections utilize industry standard BNC connections for transmit and receive via coaxial cables. When the FRM220-DS3/E3 card is used standalone in a single slot chassis, DIP switches may be used for configuration and loopback control. When placed in a single slot chassis with console port, an easy to maneuver user menu is available via terminal to configure, monitor, and run diagnostic loop back functions. The EOC (embedded operations channel) allows in-band management to control the remotely connected modem over a working fiber link. When the FRM220-DS3/E3 card is placed in the FRM220 rack with SNMP management, the management can configure and view the local and remote converter cards' status, type, version, fiber link status and alarms.

Features

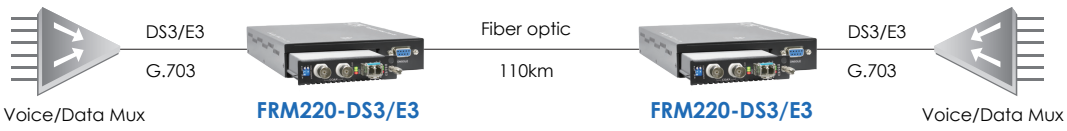
- In-band network Managed via Terminal, web or SNMP in FRM220 chassis
- DS3/E3 Coax (BNC) to Fiber SFP fiber modem
- Supports AIS (Alarm Indication Signal)
- User selectable E3 or DS3 setting
- Electrical and optical Loop back tests
- Standalone RS232 console management via CH01M

Specifications

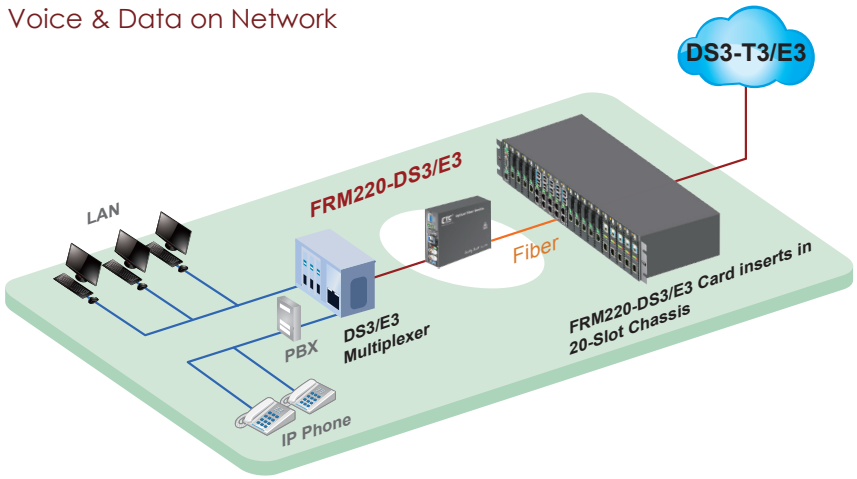
Optical Interface	Connector	SFP : LC (Uses standard 100Base-X/OC-3 SFP)
	Data Rate	DS3/T3 = 44.7 Mbps; E3 = 34.4 Mbps
Line Coding	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	1310nm, 1550nm, CWDM 1471nm ~ 1611nm
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	120g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Certification	CE, FCC, RoHS compliant	

Electrical Interface	Connector	75 ohm Coax, TX output min: +2.5dBm max : +9.1dBm
		RX input min: -9.7dBm, max +10.5dBm
	Standards	ANSI, ITU-TS, ETSI, AT&T, G.703, G.921 & G.955
	Indications	Power, Coax link, coax loop-back, AIS on coax link; FX link, fiber loop-back ,AIS on FX link
Power Input	12VDC	
Power Consumption	<5W	

Application



Integrate Voice & Data on Network



Ordering Information

Model Name	Description
FRM220-DS3/E3	DS3/E3 Coax (BNC) to Fiber SFP fiber media converter

Note: This card must use CH01M, with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220-ET100

Fiber Modem Ethernet over E1 Fiber

FRM220-ET100 is a single port Fiber WAN (TDM) card with built-in HDLC Ethernet Bridge for the FRM220 Series. The converter supports Nx64 data rates from 64Kbps up to 2.048Mbps when linked by fiber to FRM220-Data or FRM220-E1/ T1 cards. The clock source may be selected internally or recovered from received fiber signal. The Ethernet port utilizes a single RJ- 45 connector. When the FRM220-ET100 card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, Ethernet link status and alarms. The card can be configured to enable or disable the port, reset the card, set clocking, data rate and provide digital diagnostic loopbacks. A unique feature of the FRM220-ET100 is the use of a common card design which may either be inserted in the FRM220-CH01 single slot chassis as a stand-alone modem or as a card when placed in the FRM220-CH20 In-band managed rack.

Features

- 1-Port Ethernet to HDLC (fiber) converter
- P2P Fiber link compatible with FRM220-E1/T1 and FRM220-Data
- Clock source (internal or external)
- Nx64k data rate (64kbps~2048kbps)
- Ethernet encapsulated with ISO 13239 standard HDLC
- Loop Back with integral BERT & LED indicators
- Firmware upgradeable, when placed in managed FRM220 chassis
- Interface connectors, RJ-45 for 10/100 Base-Tx
- Fixed optical for SC or ST, 2km(MM) to 120km(SM)

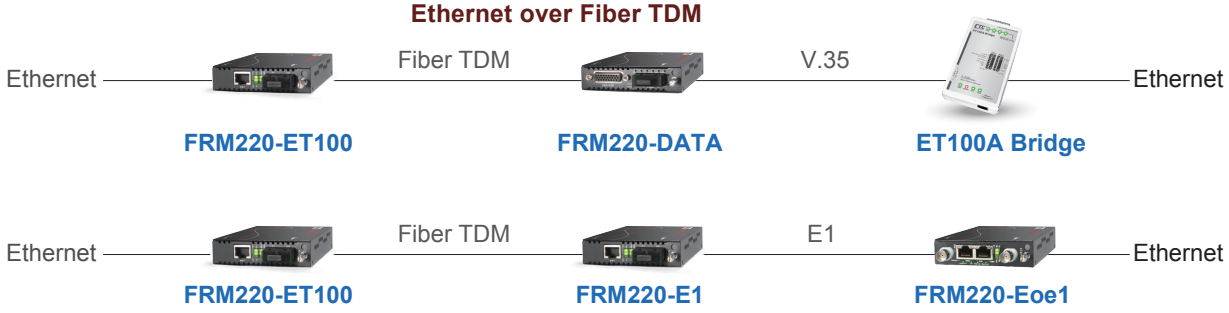
Specifications

TDM (fiber) Interface	Connector	1x9 (SC, ST, FC)
	Data rate	64~2048kb/s(nx64)
	Distance	MM 2km, SM 15/30/50km
		WDM 20/40km
	Wavelength	MM 1310nm, SM 1310, 1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Ethernet Interface	Standards	IEEE 802.3u, IEEE 802.3
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Connector	RJ-45
Tests	E1 Loops	Remote Loop back

Indications	PWR, TD/RD Act, Test, Sys, Alarm, Error
Power Input	12VDC
Power Consumption	< 5W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% RH (non-condensing)
Certifications	CE, FCC, RoHS compliant
MTBF	75,000 hrs

Application

Ethernet over Fiber TDM



Ordering Information

Model Name	Description
FRM220-ET100	10/100Base-TX to E1 fiber modem

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Connector Type / Connectivity Distance

FRM220 – ET100 – □□□□□

Example: FRM220 – ET100 – SC002

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220-DATA

Fiber Modem V.35/X.21/RS-530/ RS-449/RS-232 over Fiber

The FRM220-DATA is a fiber modem for high-speed (up to 8.192Mbps) synchronous or low speed synchronous and asynchronous data transmissions (V.35, RS-232, RS-530, X.21 or RS-449) over fiber optical media. When the FRM220-DATA card is placed in the FRM220 rack with SNMP management, in-band management allows viewing the card and remote 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 fiber modem may also be paired with the FRM220-E1/T1 for Nx64K transmissions. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switches.

Features

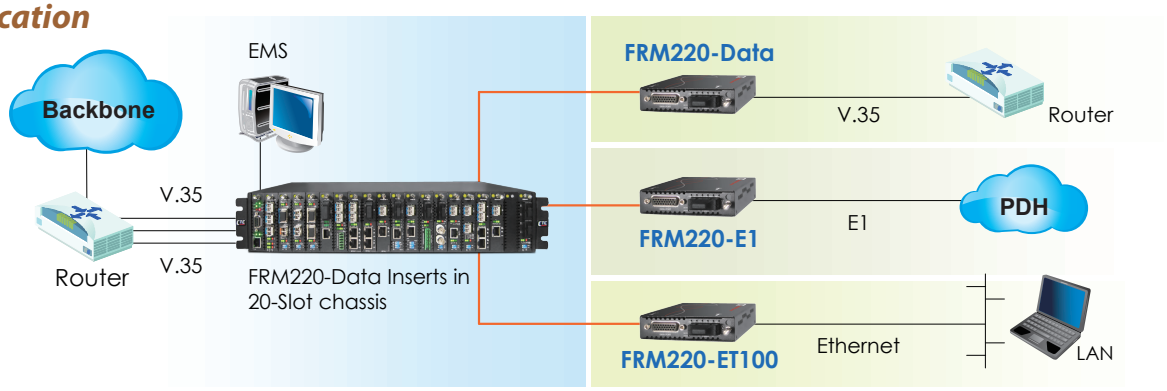
- Synchronous or Asynchronous data over fiber
- In-band network management via terminal, web or SNMP in FRM220 chassis
- Software selectable interface, V.35, X.21, RS-530, RS-449, RS-232 (sync mode)
- Software selectable DCE or DTE mode
- User selectable data rate n x 64kbps, up to 9Mbps
- Independent 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
- Standalone RS232 console management via CH01M

Specifications

Optical Interface	Connector	SFP LC
	Data rate	36.864Mbps
	Line coding	Scrambled NRZ
	Bit Error Rate	Less than 10-10
	Distance	MM 2km, SM 15/30km
		WDM 20/40km
	Wavelength	1310nm, 1550nm
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

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 ~ 9152KKbps)
	Clock source	Internal, Recovery, External
Standard	ITU-T	
Indications	LED (Power, FX Link, RTS, Test , TD, RD, CTS, DCD)	
Power Input	12VDC	
Power Consumption	<5W	

Application



Ordering Information

Model Name	Description
FRM220-V35	V.35 to fiber with V35 cable
FRM220-X21	X.21 to fiber with X.21 cable
FRM220-RS530	RS530 to fiber with RS530 cable
FRM220-RS449	RS449 to fiber with RS449 cable
FRM220-RS232	RS232 to fiber with RS232 cable
FRM220-V35-SFP	V.35 to fiber with V35 cable (SFP module not included)
FRM220-X21-SFP	X.21 to fiber with X.21 cable (SFP module not included)
FRM220-RS530-SFP	RS530 to fiber with RS530 cable (SFP module not included)
FRM220-RS449-SFP	RS449 to fiber with RS449 cable (SFP module not included)
FRM220-RS232-SFP	RS232 to fiber with RS232 cable (SFP module not included)

Connector Type	Connectivity Distance
SC, ST, FC (Not Applicable for SFP Type)	002: 2km 015: 15km 030: 30km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Interface Type / Connector Type / Connectivity Distance

FRM220 – □□□ – □□□□□

Example: FRM220 – V35 – SC002

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220-E1/T1

E1/T1 Fiber Modem

The FRM220-E1/T1 is a fiber media transport for G.703 E1/T1 transmissions. The BNC model provides unbalanced 75 Ohm coaxial E1 connections while the RJ-45 model provides switchable balanced 120 Ohm E1 or 100 Ohm T1 connections over twisted pair wiring. When the FRM220-E1/T1 card is placed in the FRM220 rack with in-band management, the card status, type, version, fiber link status, E1 or T1 link status and alarms for both local card and remote unit can all be displayed. When set for E1 mode, the FRM220-E1/T1 also supports fractional (structured) E1 when connected to a remote FRM220-Data, synchronous data communications converter. In an E1 transmission network where end connection requires synchronous data communication such as V.35 or RS-530 (X.21, RS-449), these units eliminate the need for an extra CSU/DSU. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switches.

Features

- n-band network Managed via Terminal, web or SNMP in FRM220 chassis
- T1/E1 RJ-45 (USOC RJ-48C) or E1 Coax (BNC) to Fiber converter
- Supports AMI or B8ZS/HDB3 line codes
- T1 supports unframed to FRM220-Data
- E1 supports unframed or fractional (N x 64k) to FRM220-Data
- User selectable E1 or T1 setting
- Electrical and optical Loop back tests
- Standalone RS232 console management via CH01M

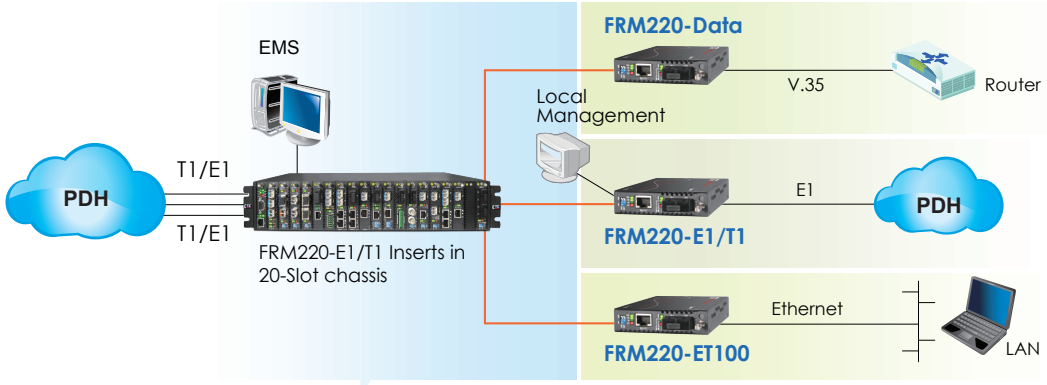
Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	36.864Mbps
	Line coding	Scrambled NRZ
	Bit Error Rate	Less than 10-10
	Distance	MM 2km, SM 15/30/50km
		WDM 20/40km
	Wavelength	1310nm, 1550nm
Electrical Interface	Connector	RJ45 E1-120Ω, T1-100 Ω, BNC E1-75 Ω
	Data rate	E1: 2.048Mpbs, T1:1.544Mbps
	Line Code	E1 HDB3/AMI, T1: B8ZS/AMI
	Cable type	Cat.3 or higher Twisted-Pair cable
Standards	E1 ITU-T G.703, G.704, G.706, G.732, G.823	
	T1 ITU-T G.703, G.704, AT&T, TR-62411, ANSI T1.403	

Indications	Power, FX-Link, E1/T1 SIG, Test, SYN, RD, TD, AIS
	(E1/T1R) Power, FX-Link, E1 SIG, Test(E1B)
Power Input	12VDC
Power Consumption	< 5W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	65,000 hrs

Application

In-band Managed PDH Fiber Modem



Ordering Information

Model Name	Description
FRM220-E1/T1R	E1/T1 RJ-45 fiber modem
FRM220-E1B	E1 BNC fiber modem
FRM220-E1/T1R-SFP	E1/T1 RJ-45 fiber modem (SFP module not included)
FRM220-E1B-SFP	E1 BNC fiber modem (SFP module not included)

Connector Type / Connectivity Distance

FRM220 – □□ / □□□ – □□□□□

Example: FRM220 – E1/T1R – SC002

Connector Type	Connectivity Distance
SC, ST, FC (Not Applicable for SFP Type)	002: 2km 015: 15km 030: 30km 050: 50km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220-Serial

RS485/232 over Fiber

The FRM220-Serial provides a fiber modem 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 RS485 (2 or 4 wire, full or half duplex). The FRM220-Serial secures data transmission over EMI resistant fiber at speeds up to 256kbps for RS-232 or up to 1024kbps for RS485. When the FRM220-Serial/485 card is placed in the FRM220 rack with SNMP management, in-band management allows configuring and viewing the card and remote converter's status, type, version, fiber link status, data link status and alarms. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switches.

Features

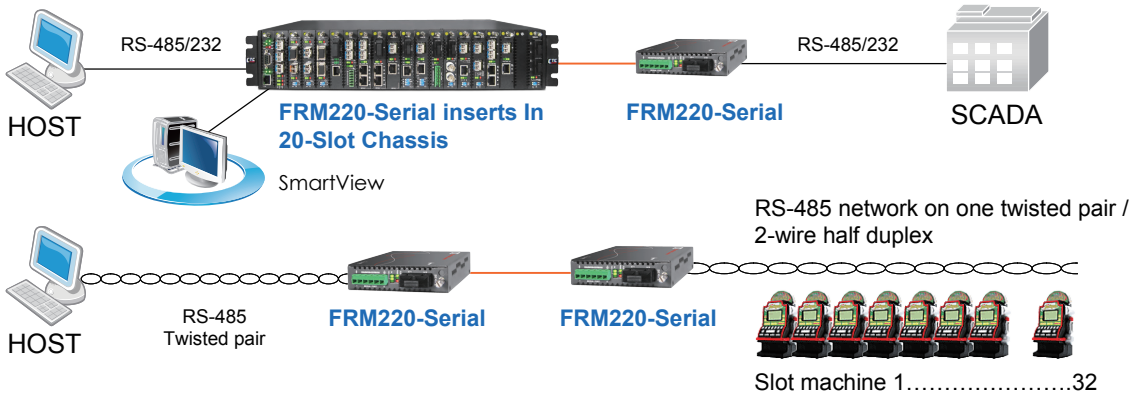
- Extend asynchronous serial transmission up to 120km over fiber
- In-band network management via terminal, Web or SNMP in FRM220-CH20 chassis
- Software selectable data interface for RS-232/ 485
- Software selectable three or five wires RS-232
- Speeds up to 256kbps for RS-232 (Async. mode)
- Speeds up to 1Mbps for RS-485
- Standalone RS232 console management via CH01M
- Software selectable two wires (half duplex) or four wires (full duplex) RS-485

Specifications

Optical Interface	Connector	SFP LC
	Data rate	36.864Mbps
	Line coding	Scrambled NRZ
	Bit Error Rate	Less than 10-10
	Fiber	MM 62.2/125µm, 50/125µm
		SM 9/125µm
	Distance	MM 2km, SM 15/30/50km
		WDM 20/40km
	Wavelength	MM 1310nm, SM 1310, 1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Standards	EIA/TIA RS-485, RS-232	
LEDs	Power, FX Link, DI, DO, Test	
Power Input	12VDC	

Electrical Interface	Connector	6 pins Terminal block
	Data Signal Formats	RS-485 2-wire
		RS-232 RTS/CTS 5-wire
		RS-232 3-wire
	Baud Rate	RS-422, RS-485 up to 1024kbps
		RS-232 up to 256kbps
	Bit Error Rate	Less than 10-10
Power Consumption	< 5W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220-Serial	RS-485/232 fiber converter
FRM220-Serial-SFP	RS-485/232 fiber converter (SFP module not included)

Connector Type	Connectivity Distance
SC, ST, FC (Not Applicable for SFP Type)	002: 2km 015: 15km 030: 30km 050: 50km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Connector Type / Connectivity Distance

FRM220 – Serial – □□□□□

Example: FRM220 – E1/T1R – SC002

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

NEW

FRM220-FXO/FXS
FRM220-FXO-4
FRM220-FXS-4

1ch / 4ch POTS over Fiber Media Converter

The FRM220-FXO/FXS is one channel POTS (Plain Old Telephone System) over fiber converter/extender and FRM220-FXO-4/FRM220-FXS-4 is a 4 channels POTS over fiber converter/extender. The POTS connection uses a standard RJ-11C modular connectors for each copper pair connection. A pair of the FRM220 POTS fiber converter is required to implement an end to end system. FXO mode connects to a telephone line (PSTN) or PBX station line 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 POTS fiber converter card is placed in the FRM220 rack with SNMP management, in-band management allows configuring and viewing the card and remote converter's status, type, version, fiber link status, on hook status and alarms. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switch.

Features

- Extend telephone voice transmission up to 120km over fiber
- Network management via terminal, web or SNMP in FRM220 chassis
- Supports telephone voice transmission
- Supports caller ID Pass-Through
- Supports FXS to FXS hot line

Specifications

Optical Interface	Connector	SFP-LC (FRM220-FXO/FXS-4) SC(1x9) (FRM220-FXO/FXS)
	Fiber	MM 62.2/125μm, 50/125μm SM 9/125μm
	Distance	MM 2km, SM 15/30/50km WDM 20/40km
	Wavelength	MM 1310nm, SM 1310, 1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Indications	LED (Power, FX Link, Phone Act, Test)	
Power Input	12VDC	
Power Consumption	< 5W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	120g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Electrical Interface	Connector	RJ-11
	FXO modle	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 modle	Impedance : 600 ohms
		Coding : 16 bits liner
		Dial: DTMF and Dial Pulse
		Battery Source: 48VDC ± 4V
		Ringing Waveform : Sine wave
		Ringing Frequency : 20/25/30/35/40/45/50 Hz selectable
		Ring Cadence: FXS to FXS : On / 1 sec, Off / 2 sec
		FXO to FXS; Reproduces the cadence detected by FXO
		Insertion Loss 0.0 ± 1.0dB at 1000Hz
		REN: 4.0B(Ring Equivalence Number)

Application

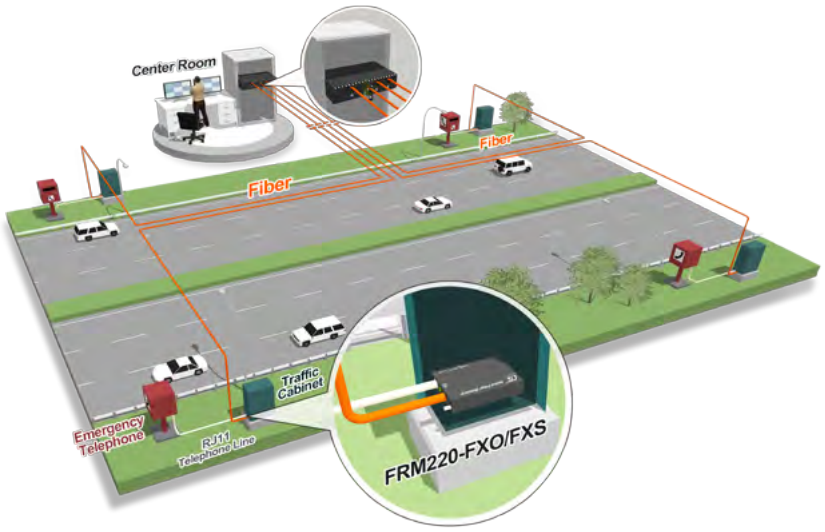


Figure 1: Voice Transmission in the highway application

Application

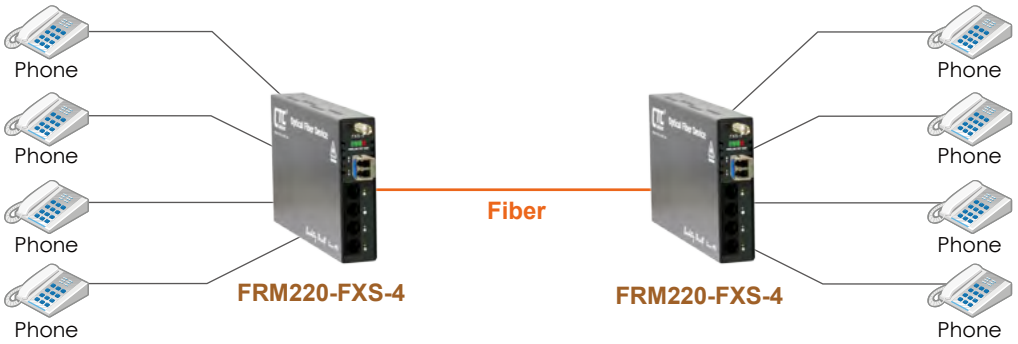


Figure 2: Automatic Ring down hotline

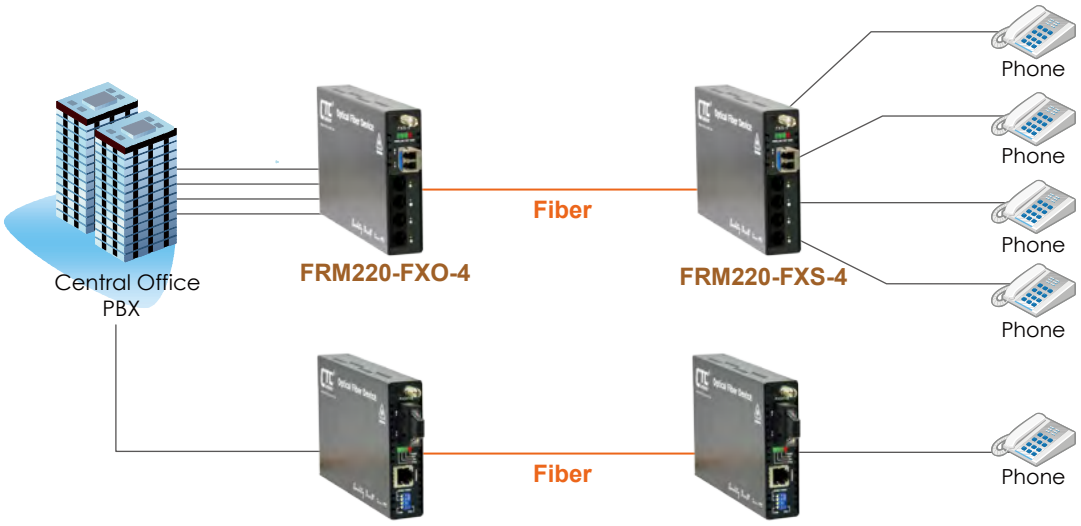


Figure 3: Voice transmission from 2km to 120km over fiber

Ordering Information

Model Name	Description
FRM220-FXO-4	4-port FXO fiber converter SFP-LC
FRM220-FXS-4	4-port FXS fiber converter SFP-LC
FRM220-FXO/FXS	1 Port FXO / FXS fiber converter, (1x9) SC, ST, FC

Connector Type / Connectivity Distance

FRM220 – FXO/FXS – □□□□□

Example: FRM220 – FXO/FXS – SC002

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Note: This card may be set by DIP switch and placed in CH01 standalone chassis.
When connected as a remote to a managed central chassis, this card supports in-band management.

FRM220A-Eoe1

Ethernet Bridge over E1

- HDLC
- MTU 1522bytes
- Framed / Unframed E1

The FRM220A-Eoe1 is an Ethernet over E1 Bridge for cost-effective connection of 10/100Base-TX or 100Base-FX LANs over a single E1 transport. By using standard HDLC encapsulation, the FRM220A-Eoe1 is able to transmit up to a 2M bits Ethernet over an E1 link. The FRM220A-Eoe1 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable, which provides an approximate operating range up to 2km (using 22AWG). The FRM220A-Eoe1 fully meets E1 specifications including ITU-T G.704 and G.823. The FRM220A-Eoe1 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-Eoe1 and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration. When placed in FRM220A system, the Ethernet may be aggregated to the chassis's built in Ethernet switch. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switch.

Features

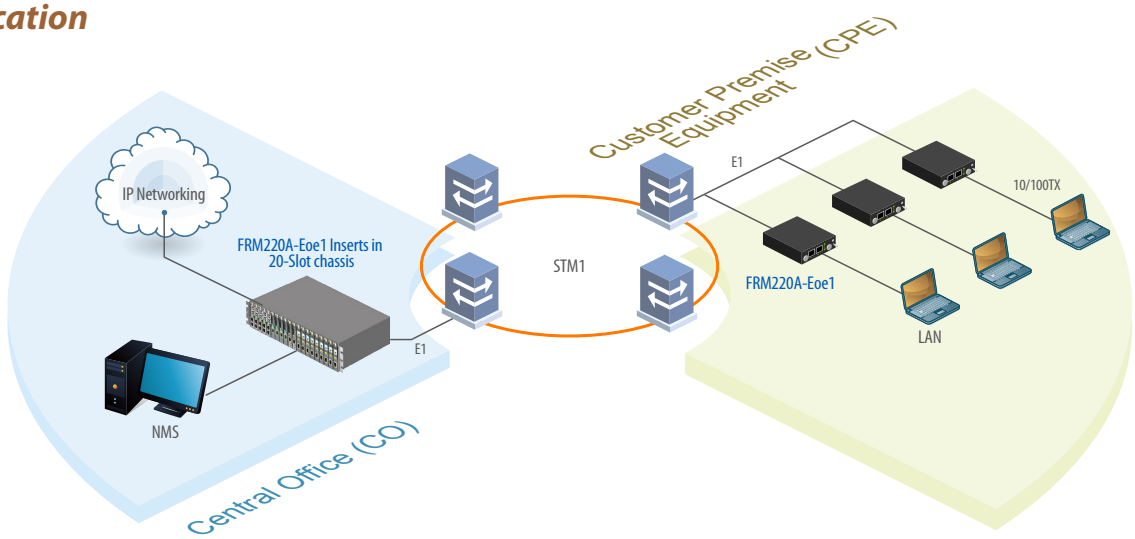
- Connects one Fast Ethernet over E1 links (64k~2048Kbps)
- Built-in HDLC bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A and FRM220 chassis
- SNMP management with FRM220A and FRM220 chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

E1 Interface	Framing	Framed / Unframed
	MTU	1522bytes (Max.)
	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 shape	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	RJ-45, BNC
	Diagnostics	Digital remote loopback

Ethernet Interface	Standards	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex
	Connector	RJ-45 10/100Base-TX
Indications	Power, ALM, E1 signal loss, E1 Alarm (AIS, LOF, RAI, LOMF), LAN link /ACT, 10/100M , SD (100Base-FX)	
Power Input	12VDC	
Power Consumption	< 12W	
Dimensions	155 x 88 x 24mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220A-Eoe1	10/100Base-TX to E1 HDLC bridge

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220A-Eoe1/G

Ethernet Bridge over E1 (GFP)

- HDLC & GFP
- MTU 2046bytes
- Unframed E1

NEW

The FRM220A-Eoe1/G is an Ethernet over E1 Bridge for cost-effective connection of 10/100Base-TX or 100Base-FX LANs over a single E1 transport. By using GFP (Generic Framing Procedure) or standard HDLC encapsulation, the FRM220A-Eoe1/G is able to transmit up to a 2M bits Ethernet over an E1 link. The FRM220A-Eoe1/G supports an E1 attenuation of up to 43 dB on twisted pair or coax cable, which provides an approximate operating range up to 2km (using 22AWG). The FRM220A-Eoe1/G fully meets E1 specifications including ITU-T G.704 and G.823. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration. When placed in FRM220A system, the Ethernet may be aggregated to the chassis's built in Ethernet switch. When placed in a single slot chassis and used standalone without management, the card may be configured by serial terminal.

Features

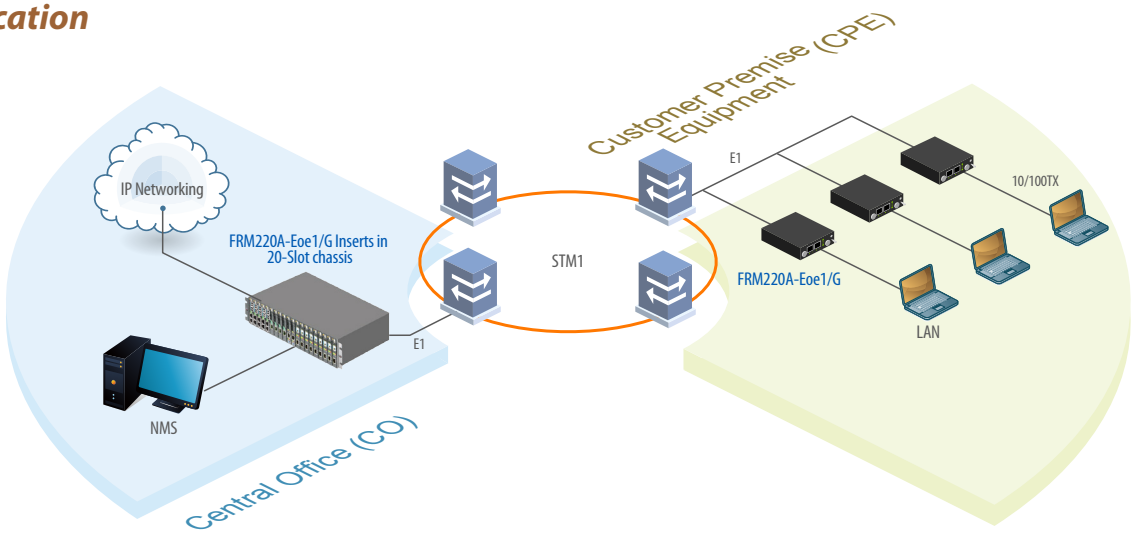
- Connects one Fast Ethernet over E1 links (2.048Mbps)
- Built-in GFP bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A and FRM220 chassis
- SNMP management with FRM220A and FRM220 chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

E1 Interface	Framing	Unframed
	MTU	2046bytes
	Connector	RJ45 10/100Base-TX
	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 (RJ-45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	RJ-45, BNC

Ethernet Interface	Diagnostics	Digital remote loopback
	Standards	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex
		Encapsulation GFP (G.7041)
Indications	Power, ALM,E1 signal loss ,E1 Alarm (AIS, LOF, RAI, LOMF), LAN link /ACT, 10/100M , SD (100Base-FX)	
Power Input	12VDC	
Power Consumption	< 4W	
Dimensions	155 x 88 x 24 mm (D x W x H)	
Weight	DC12 : 280g AC/DC 48/AD : 580g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220A-Eoe1/G	10/100Base-TX to E1 GFP bridge operates at WAN

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

NEW

STE100A-232 STE100A -Serial

STE100A-232

1-Port RS-232 IP Device Server

STE100A-Serial

1-Port RS-232/422/485 IP Device Server

The IP Device Server provides the serial device server for Windows hosts to control RS-232, 2 or 4 wire asynchronous RS-422/485 serial devices located virtually anywhere through a TCP/IP or UDP/IP connection. The Device Server has the DB9 port connection on one side, and a 10/100 Mbps Ethernet connection on the other side. It connects serial devices such as PLC, alarm sensors and PTZ camera control to IP networks. Applications include industrial/factory automation, public safety and surveillance systems. The IP Device Server Windows driver is designed to control the IP Serial Server devices. The driver installs a virtual COM on Windows which maps the virtual COM port to the IP address of the IP Serial Server device across the network, enabling the Windows applications to access remote serial devices over Ethernet. IP Device Server can function as a UDP or a server or client for TCP connection. The application scenarios are direct IP mode, virtual COM mode, and paired mode.

Features

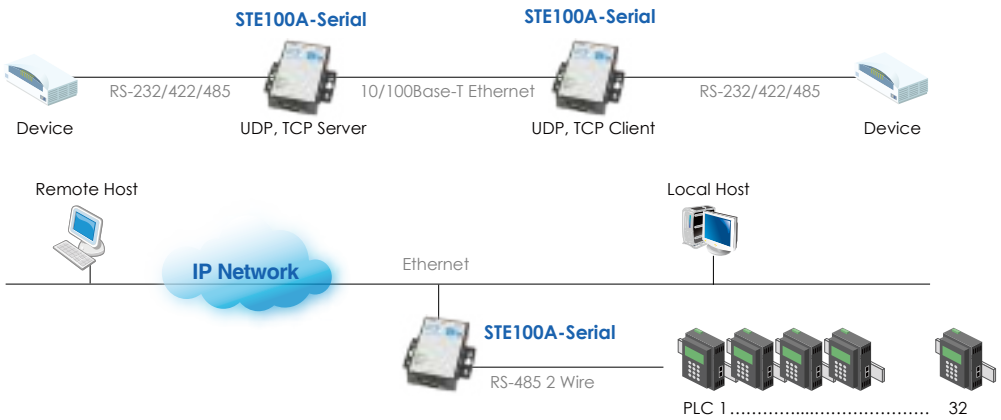
- 10/100Mbps Ethernet port
- 230.4kbps serial interface
- TCP Server, TCP client, Virtual com mode, UDP
- Supports for DHCP, HTTP, ICMP, ARP, IP, UDP, TCP
- Easy to use with Windows utility
- 2 Wire(half duplex) or 4 Wire(full duplex)RS-422/485 (STE100A-Serial)
- Configuration by web browser
- Flexible RS-232/422/485 Interface (STE100A-Serial)
- Low power consumption with single + 12V to +48V input

Specifications

General	LED	Ready, TP Link/Act, Data TX/RX
	OS supported	Windows XP / 2000 / 2003 / 2008 / VISTA / WIN7 / WIN8
Serial Interface	STE100A-Seria l : RS-232/422/485 STE100A-232 : RS-232	
Serial Connector	DB9 Male	
Baudrate	110 to 230.4Kbps	
Data bits	5, 6, 7, 8	
Stop bits	1, 1,5 for Data bits 5 mode; 1, 2 for data bits 6, 7, 8 mode	
Parity	None, Even, Odd	
Flow Control	None or RTS / CTS for RS-232 Full Duplex(4-Wire) or Half Duplex(2-Wire) for RS-422/485	
Data Packing Delimiter	1,2	
LAN Interface	RJ-45 connector, IEEE802.3 10/100Base-TX	

Communication Modes	TCP Server, TCP Client, Virtual COM mode, UDP
Protocols	TCP, UDP, IP, ARP, ICMP, HTTP, DHCP
Management	Web pages, Firmware upgrade
Security	Password Access
Power	12VDC
Operating Temperature	0 ~ 60°C
Storage Temperature	-10 ~ 70°C
Humidity	0 – 90% non-condensing
DIN rail mount	Yes
Panel mount	Yes
Dimensions	85 x 50 x 21mm (D x W x H)
Certifications	CE, FCC

Application

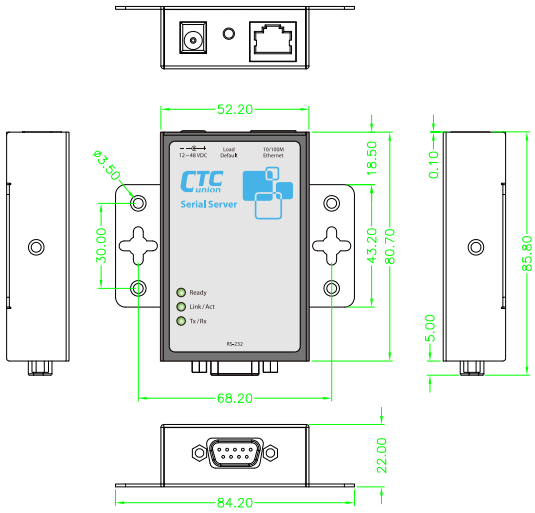


Appearance

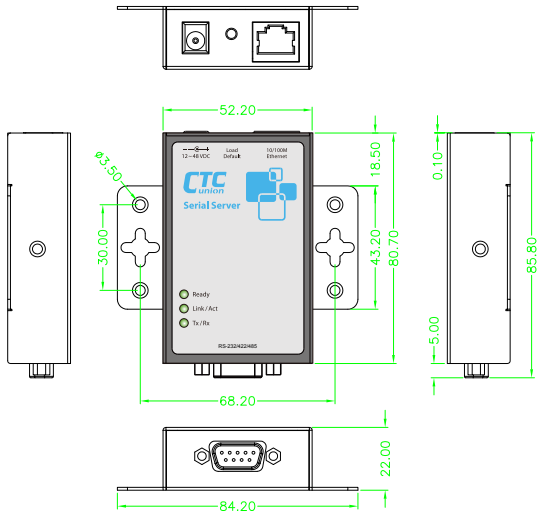
Dimensions

Unit: mm (inch)

STE100A-232



STE100A-Serial



Ordering Information

Model Name	Description
STE100A-232	1-port RS232 device server with AC power adapter
STE100A-Serial	1-port RS232/422/485 device server with AC power adapter
Optional accessories	
STE100A-Serial-WT	STE100A-Serial DB9 wiring terminal
STE100A/DRK01	STE100A/RS232,STE100A/Serial DIN-Rail Mounting Kit
Optional Power	
DC-APT/12V	-48VDC to 12VDC Adapter - 1 Amp, 10 Watts , Output 12 VDC, Input -48VDC

Din-Rail Mounting Kit
STE100A/DRK01

DB9 Wiring Terminal
STE100A-Serial-WT
(only for STE100A-Serial)

FRM220-E1/Data

E1 to DATA

The FRM220-E1/Data is a single port G.703/704 Fractional E1 DSU/CSU card for the FRM220/220A Series Platform Media Converter Rack. The converter supports Unframed, PCM31, PCM31+CRC4, PCM30, and PCM30+CRC4 framing modes. The clock source may be selected internally, recovered from received E1 signal, externally from the Data port or transparent. The data port interface utilizes a single hi-density 26pin connector. Cable solutions are provided for RS-530/449, X.21, V.35 and RS-232. The unit can recognize the cable type attached and automatically self-configure the interface circuits. Choosing from one of two model types, the E1 connection is either unbalanced 75 ohm with two BNC connectors or balanced 120 ohm with one RJ-45 connector. When the FRM220-E1/Data card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, E1 link status and alarms. The card can be configured to enable or disable the port, reset the card, set clocking, frame mode, interface type and provide analog or digital diagnostic loopbacks. A unique feature of the FRM220-E1/Data is the use of a common card design which may either be inserted in the FRM220-CH01 single slot chassis as a stand-alone modem or as a card when placed in the FRM220-CH20 in-band managed rack

Features

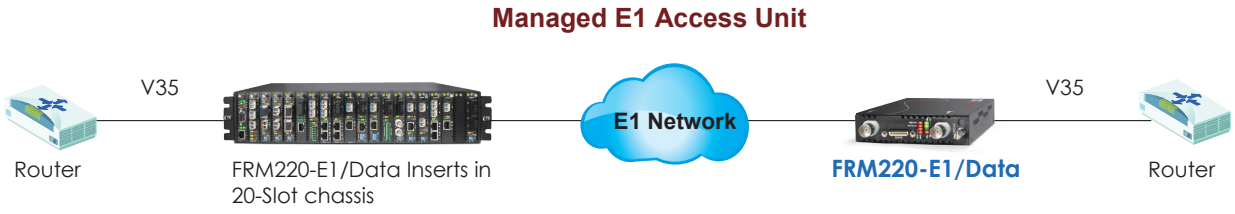
- Supports Fractional E1 and Unframed E1 services with V.35/X21/ RS530 adapter cable
- I/O connectors all located on front panel
- Multiple clock source selection and remote loopback
- (Internal or External: E1 recovery, DTE or DCE)
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220-CH20 and FRM220A chassis
- SNMP management with FRM220-CH20 chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

E1 Interface	Framing	Framed/Unframed
	Standards	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
	Connector	BNC / RJ-45
	Diagnostics	Digital remote loopback

Serial Interface	Standards	ITU-T, E1A
	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	12VDC	
Power Consumption	< 12W	
Dimensions	155 x 88 x 24mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70 °C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220- E1/V35-R	V35 to framed E1 RJ-45 with V35 cable
FRM220- E1/V35-B	V35 to framed E1 BNC with V35 cable
FRM220- E1/X21-R	X21 to framed E1 RJ-45 with X21 cable
FRM220- E1/X21-B	X21 to framed E1 BNC with X21 cable
FRM220- E1/RS530-R	RS530 to framed E1 RJ-45 with RS530 cable
FRM220- E1/RS530-B	RS530 to framed E1 BNC with RS530 cable
FRM220- E1/RS449-R	RS449 to framed E1 RJ-45 with RS449 cable
FRM220- E1/RS449-B	RS449 to framed E1 BNC with RS449 cable
FRM220- E1/RS232-R	RS232 to framed E1 RJ-45 with RS232 cable
FRM220- E1/RS232-B	RS232 to framed E1 BNC with RS232 cable

FRM220 – □□ / □□□ – □

Example: FRM220 – E1/V35 – R

Note: This card may be set by DIP switch and placed in CH01 chassis, or set by serial console if placed in CH01M chassis.
For standalone SNMP management, place this card in CH02/SNMP chassis.

FRM220-FTEC

E1/T1 Cross Rate Converter

The FRM220-FTEC is a 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 framing employ u-Law and A-Law compander encoding principles respectively and encode those analog (voice) signals into 64kbits digital data. The T1 interface supports D4(SF) or ESF frame formats with B8ZS or AMI line code. The E1 interface supports CCS (PCM31) or CAS (PCM30) framing without CRC-4 and framing with CRC-4. The line coding is HDB3.

Tests and diagnostics can easily be performed from the local console interface or via Web based management of the FRM220. Diagnostics include T1 local/remote and E1 local/remote loop back. When placed in a single slot chassis and used standalone without management, the card may be configured by DIP switches.

Features

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

Specifications

E1 Interface	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 ±10% for 75ohm
		Nominal 3.00V ±10% for 120ohm
	Zero amplitude	± 0.1V
	Connector	RJ-45
T1 Interface	Framing	D4, ESF selectable
	Bit rate	1.544Mbps
	Line Code	B8ZS / AMI
	Equalization	0 ~ 655 feet settable
		Voice channel sample rule μ-Law
	CRC check	CRC-6 when ESF
	Line Impedance	100 ohms
	Transmit Pulse level	3.0V ±10%,
	Receive signal level	0 ~ -10dB
	Connector	RJ-45

LEDs	PWR, Sys, Test, T1/E1
Standard	ITU-T G.703, G.704, G.706, G.823, G.824, ANSI T1.403
Power	12VDC
Power Consumption	< 5W
Dimensions	155 x 88 x 24mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	57,000 hrs

Application

Ordering Information

Model Name	Description
FRM220-FTEC	E1/T1 Cross rate converter

Note: This card must use CH01M, with serial console, to configure standalone settings.
For standalone SNMP management, place this card in CH02/NMC(SNMP) chassis.

NEW

FRM220A-iMux4

Ethernet to 4E1 Multiplexer

The FRM220A-iMux4 is an E1 inverse multiplexer capable of bundling up to 4 E1 lines for cost-effective connection of 10/100Base-TX or 100Base-FX LANs over multiple E1 transports. The FRM220A-iMux4 inverse multiplexer transmits up to a 9.92Mbps Ethernet bridge channel (GFP-F encapsulated) over 4 E1 links. The FRM220A-iMux4 bridges the gap between E1 and E3, allowing bridges to operate at faster rates. It also provides high speed access to SDH/SONET backbones where the only access services available are E1 lines. The FRM220A-iMux4 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-iMux4 fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-iMux4 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-iMux4 and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

Features

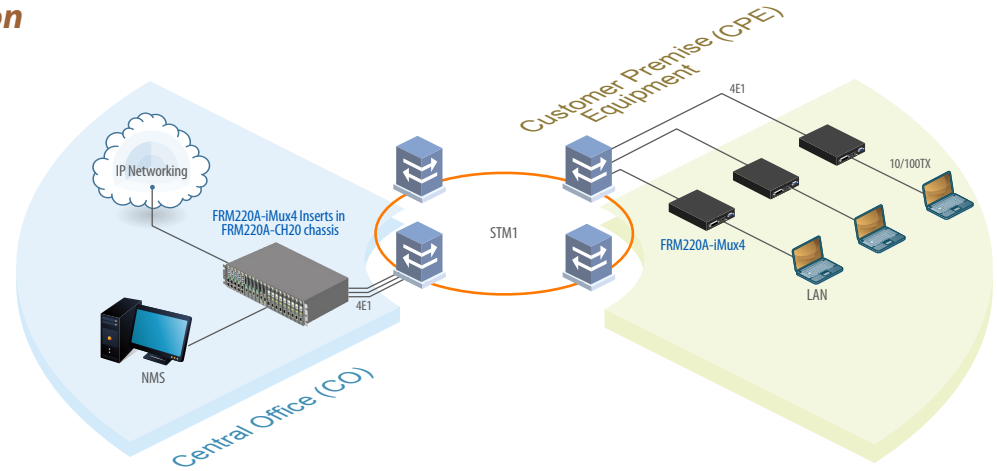
- Connects one Fast Ethernet over 1-4 E1 links (1.984 ~ 7.92Mbps)
- Built-in GFP bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A chassis
- SNMP management with FRM220A chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M
- Supports IEEE 802.1Q VLAN & VLAN trunking

Specifications

E1 Interface	Framing	CCS+CRC
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm (up to 4E1)
	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	220ms
	Connector	RJ45, BNC
	Diagnostics	Digital remote loopback

Ethernet Interface	Standards	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex
Ethernet Interface	Connector	RJ45 10/100Base-TX
Indications	Power, ALM, E1 signal loss, E1 Alarm (AIS, LOF, RAI, LOMF), LAN link /ACT, 10/100M, SD (100Base-FX)	
Power Input	12VDC	
Power Consumption	< 6W	
Dimensions	140 x 88 x 24mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS Compliant	
MTBF	75,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220A-iMux4T-R	10/100Base-TX to 4 E1 mux card with 4E1 RJ45 cable
FRM220A-iMux4T-B	10/100Base-TX to 4 E1 mux card with 4E1 BNC cable

FRM220A – iMux4T – ☐

Example: FRM220A – iMux4T – R

Cable Type

RJ45 Cable

BNC Cable

Note: This card must use CH01M, with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220A-iMux8

Ethernet to 8E1 Multiplexer

The FRM220A-iMux8 is an E1 inverse multiplexer capable of bundling up to 8 E1 lines for cost-effective connection of 10/100Base-TX or 100Base-FX LANs over multiple E1 transports. The FRM220A-iMux8 inverse multiplexer transmits up to a 15.87Mbps Ethernet bridge channel (GFP-F encapsulated) over 8 E1 links. The FRM220A-iMux8 bridges the gap between E1 and E3, allowing bridges to operate at faster rates. It also provides high speed access to SDH/SONET backbones where the only access services available are E1 lines. The FRM220A-iMux8 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-iMux8 fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-iMux8 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-iMux8 and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

Features

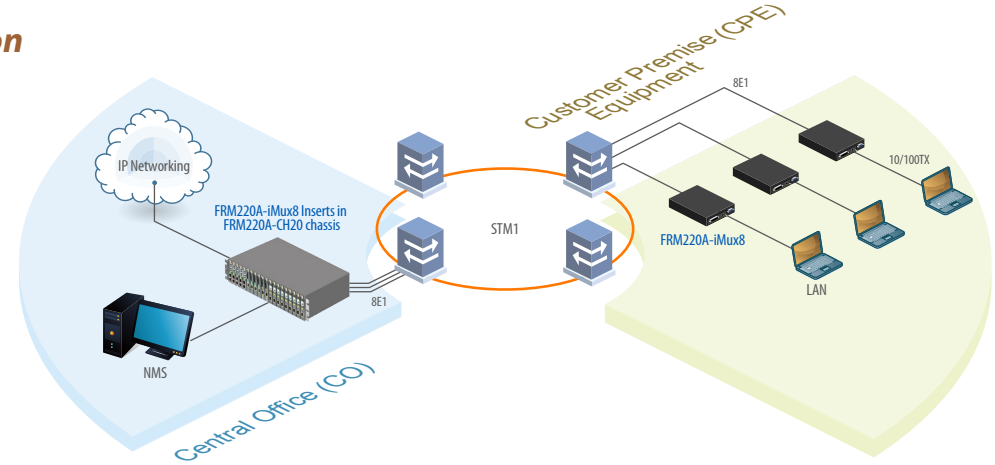
- Connects one Fast Ethernet over 1- 8 E1 links (1.984Mbps to 15.87Mbps)
- Built-in GFP bridge operates at WAN rate
- Maximum 220ms delay variance between E1 link
- Support IEEE 802.1Q VLAN & VLAN trunking
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A chassis
- SNMP management with FRM220A chassis
- LED Alarm indication & Auto-Negotiation
- Standalone RS232 console management via CH01M

Specifications

E1 Interface	Framing	CCS+CRC
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm (up to 5E1)
	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	220ms
	Connector	RJ-45 or BNC
	Diagnostics	Digital remote loopback
Ethernet Interface	Standards	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex

Ethernet Interface	Connector	RJ-45 10/100Base-TX
		Power, ALM, E1 signal loss
Indications	Power, ALM, E1 signal loss, E1 Alarm(AIS, LOF, RAI, LOMF), LAN link /ACT, 10/100M, SD(100Base-FX)	
Power Input	12VDC	
Power Consumption	< 12W	
Dimensions	140 x 88 x 24 mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220A-iMux8T-R	10/100Base-TX to 8 E1 mux card with 8 E1 RJ45 cable
FRM220A-iMux8T-B	10/100Base-TX to 8 E1 mux card with 8 E1 BNC cable

FRM220A – iMux8T – ☐

Example: FRM220A – iMux8T – R

Cable Type

RJ45 Cable

BNC Cable

Note: This card must use CH01M, with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.

FRM220A-iMux16

Ethernet to 16E1 Multiplexer

The FRM220A-iMux16 is an E1 inverse multiplexer capable of bundling up to 16 E1 lines for cost-effective connection of 10/100Base-TX or 100Base-FX LANs over multiple E1 transports. The FRM220A-iMux16 inverse multiplexer transmits up to a 31.74Mbps Ethernet bridge channel (GFP-F encapsulated) over 16 E1 links. The FRM220A-iMux16 bridges the gap between E1 and E3, allowing bridges to operate at faster rates. It also provides high speed access to SDH/SONET backbones where the only access services available are E1 lines. The FRM220A-iMux16 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-iMux16 fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-iMux16 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-iMux16 and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

Features

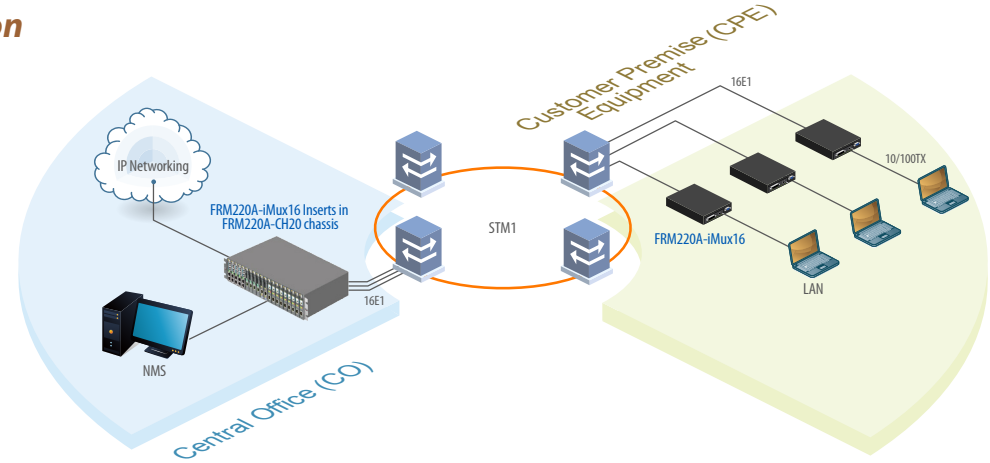
- Connects one Fast Ethernet over 1-16 E1 links (1.984Mbps to 31.74Mbps)
- Built-in GFP bridge operates at WAN rate
- Maximum 220ms delay variance between E1 links
- Support IEEE 802.1Q VLAN & VLAN trunking
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A chassis
- SNMP management with FRM220A chassis
- LED Alarm indication & Auto-Negotiation
- Standalone RS232 console management via CH02M

Specifications

E1 Interface	Framing	CCS+CRC
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm (up to 5E1)
	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	220ms
	Connector	RJ45, BNC
	Diagnostics	Digital remote loopback
Ethernet Interface	Standards	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex

Ethernet Interface	Connector	RJ45 10/100Base-TX
		Power, ALM, E1 signal loss
Indications	Power, ALM, E1 signal loss, E1 Alarm(AIS, LOF, RAI, LOMF), LAN link /ACT, 10/100M, SD (100Base-FX)	
Power Input	12VDC	
Power Consumption	< 12W	
Dimensions	140 x 88 x 42mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220A-iMux16T-R	10/100Base-TX to 16 E1 mux card with 16E1 RJ45 cable
FRM220A-iMux16T-B	10/100Base-TX to 16 E1 mux card with 16E1 BNC cable

FRM220A – iMux16T – ☐

Example: FRM220A – iMux16T – R

Cable Type

RJ45 Cable

BNC Cable

Note: This card may be locally configured by its own console when placed in CH02M.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH02 chassis.

FRM220-GFOM04

4xE1/T1+ GbE Fiber Multiplexer

NEW

The FRM220-GFOM04 is a 4 channel E1/T1 fiber multiplexer with an additional Gigabit Ethernet trunk, plus order wire and clear channel RS-232, constructed as a two slot wide card for the FRM220 series. When the FRM220-GFOM04 card is placed in the FRM220 rack with NMC, 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 provide local or remote diagnostic loopback. The 1+1 redundant optical aggregate of this multiplexer employs industry standard pluggable optics (SFP) operating at 1.25Mbps data rates. The SFP modules can be chosen to support single-mode, multi-mode, single fiber bi-directional or Coarse and Dense Wave Division Multiplexing (CWDM and DWDM).

Features

- 4 channels unframed E1/T1 (transparent)
- 10/100/1000Base-T Ethernet
- Auto MDI/MDIX & Auto-Negotiation or Force Mode
- Supports flow control 802.3x & 9K jumbo packets
- Supports link fault Pass-Through for Ethernet
- One clear channel RS232 up to 250Kbps(Async)
- 1+1 fiber protection, less than 50ms
- Supports Digital Diagnostics Monitoring Interface (DDMI) SFP
- AIS on signal loss on E1/T1 and fiber port
- Loopback test on E1/T1, RS232, fiber ports
- 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 & Dying Gasp

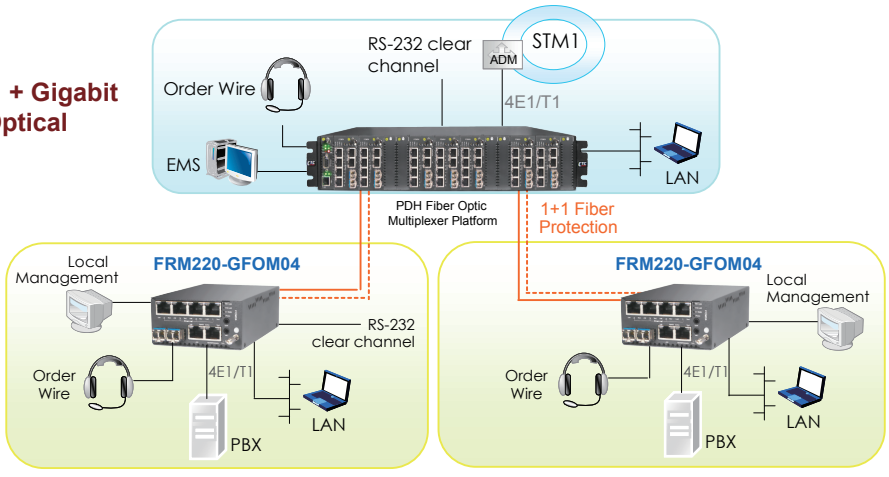
Specifications

E1/T1 ports	Framing	Unframed (transparent)
	Bit Rate	E1:2.048 Mb/s , T1: 1.544Mb/s
	Line Code	E1:AMI/HDB3, T1: AMI/B8ZS
	Line Impedance	E1: Unbalanced 75 ohms (BNC)
		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
	"Zero" Amplitude	+/-0.3V
	Internal Timing	+/-30 ppm
	Jitter Performance	According to ITU-T G.823
	Performance monitoring	According to ITU-T G.821
	Standards	ITU-T G.703, G.704, G.706 and G.732
	Interface Connectors	RJ-45

E1/T1 ports	Test Loops	LLB (Local Loop Back)
		NELB (Near End Loop Back)
		RLB (Remote Loop Back)
		RRLB (Request Remote Loop Back)
Fiber	Connector	SFP LC
	Data Rate	1.25 Gbps
Ethernet	Interface Type	10/100/1000Base-T
	Connector	RJ-45
	Standards	IEEE 802.3, 802.3u, 802.3ab
	Duplex modes	full/half
Indications	FX1 Link, FX2 link, E1/T1 Mode/Link/Loopback test, Order wire phone indicator, LAN Link/Speed.	
Power Input	12VDC	
Dimensions	140 x 88 x 42mm (D x W x H)	
Weight	200g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	

Application

Managed 4E1/T1 + Gigabit Ethernet Fiber Optical Multiplexer



Ordering Information

Model Name	Description
FRM220-GFOM04-SR	4 x E1/T1 RJ-45 and 10/100/1000Base-T Ethernet Fiber Optic Multiplexer (optional SFP module)
FRM220-GFOM04-SB	4x E1 BNC and 10/100/1000Base-T Ethernet Fiber Optic Multiplexer (optional SFP module)

Connector Type

FRM220 – GFOM04 – □□

Example: FRM220 – GFOM04 – SR

Note: This card may be locally configured by its own console when placed in CH02.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH02 chassis.

FRM220-FOM04

4xE1/T1+ FE Fiber Multiplexer

The FRM220-FOM04 is a 4 channel E1/T1 fiber multiplexer with an additional wire speed 100M Ethernet trunk, plus order wire and clear channel RS-232, constructed as a two slot wide card for the FRM220 series. When the FRM220-FOM04 card is placed in the FRM220 rack with NMC, 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 provide local or remote diagnostic loopback. The 1+1 redundant optical aggregate of this multiplexer employs industry standard pluggable optics (SFP) operating at OC3/STM-1 data rates (155M). The SFP modules can be chosen to support single-mode, multi-mode, single fiber bi-directional or Coarse and Dense Wave Division Multiplexing (CWDM and DWDM).

Features

- 4 channels unframed E1/T1 (transparent)
- 10/100Base-TX Ethernet (100M wirespeed)
- Auto MDI/MDIX & Auto-Negotiation or Force Mode
- Supports flow control 802.3x & 9K jumbo packets
- Supports link fault Pass-Through for Ethernet
- One clear channel RS232 up to 250Kbps(Async)
- 1+1 fiber protection, less than 50ms
- Supports Digital Diagnostics Monitoring Interface (DDMI) SFP
- AIS on signal loss on E1/T1 and fiber port
- Loopback test on E1/T1, RS232, fiber ports
- 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 & Dying Gasp

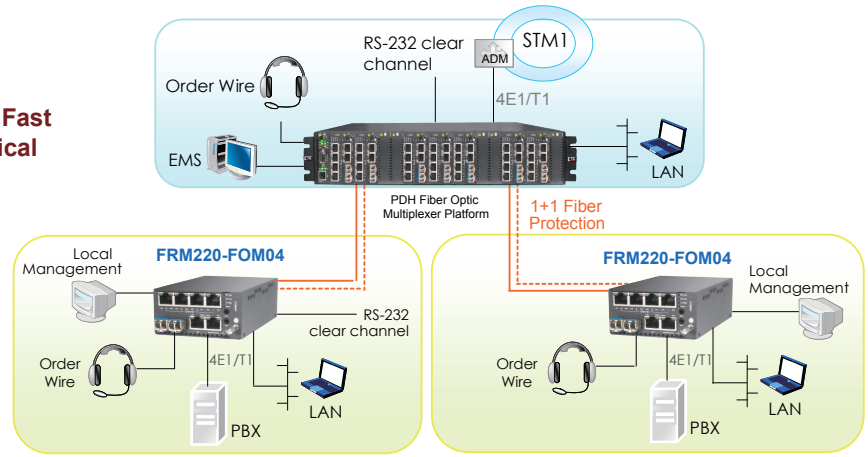
Specifications

E1/T1 ports	Framing	Unframed (transparent)
	Bit Rate	E1:2.048 Mb/s , T1: 1.544Mb/s
	Line Code	E1:AMI/HDB3, T1: AMI/B8ZS
	Line Impedance	E1: Unbalanced 75 ohms (BNC cable)
		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
	"Zero" Amplitude	+/-0.3V
	Internal Timing	+/-30 ppm
	Jitter Performance	According to ITU-T G.823
	Performance monitoring	According to ITU-T G.821
	Standards	ITU-T G.703, G.704, G.706 and G.732
	Interface Connectors	RJ-45

E1/T1 ports	Test Loops	LLB (Local Loop Back)
		NELB (Near End Loop Back)
		RLB (Remote Loop Back)
		RRLB (Request Remote Loop Back)
Fiber	Connector	SFP LC
	Data Rate	155 Mbps
Ethernet	Interface Type	10/100Base-TX
	Connector	RJ-45
	Standards	IEEE 802.3, 802.3u
	Duplex modes	full/half
Indications	FX1 Link, FX2 link, E1/T1 Mode/Link/Loopback test, Order wire phone indicator, LAN Link/Speed.	
Power Input	12VDC	
Dimensions	140 x 88 x 42mm (D x W x H)	
Weight	200g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	

Application

Managed 4E1/T1 + Fast Ethernet Fiber Optical Multiplexer



Ordering Information

Model Name	Description
FRM220-FOM04-SR	4 x E1/T1 RJ-45 and 100Mbps Ethernet Fiber Optic Multiplexer(optional SFP module)
FRM220-FOM04-SB	4x E1 BNC and 100Mbps Ethernet Fiber Optic Multiplexer(optional SFP module)

FRM220 – FOM04 – □□
Example: FRM220 – FOM04 – SR

Note: This card may be locally configured by its own console when placed in CH02.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH02 chassis.

FRM220-FOM01

E1/T1 + FE Fiber Multiplexer

The FRM220-FOM01 is a single channel E1/T1 fiber multiplexer with an additional wire speed 100M Ethernet trunk, plus clear channel RS-232, for placement the FRM220 series. When the FRM220-FOM01 card is placed in the FRM220 rack with NMC, 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 provide local or remote diagnostic loopback. The optical aggregate of this multiplexer employs either a fixed transceiver or industry standard pluggable optics (SFP) operating at OC3/STM-1 data rates (155M). The SFP modules can be chosen to support single-mode, multi-mode, single fiber bi-directional or Coarse and Dense Wave Division Multiplexing (CWDM and DWDM).

Features

- 1 channel unframed E1/T1 (transparent)
- 10/100Base-TX Ethernet (100M wirespeed)
- Auto MDI/MDIX & Auto-Negotiation or Force Mode
- Supports flow control & 9K jumbo packets
- Supports link fault Pass-Through for Ethernet
- Supports Digital Diagnostics Monitoring Interface (DDMI) SFP
- Loopback test on E1/T1, fiber ports
- Supports local or remote In-band management by SNMP manager
- Local management by console port via FRM220-CH01M chassis
- Supports On-Line F/W upgrade & Dying Gasp

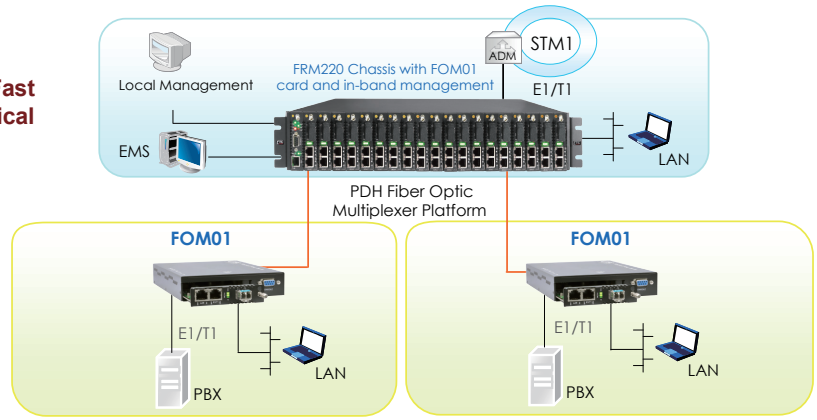
Specifications

E1/T1 ports	Framing	Unframed (transparent)
	Bit Rate	E1:2.048 Mb/s, T1: 1.544Mb/s
	Line Code	E1:AMI/HDB3, T1: AMI/B8ZS
	Line Impedance	E1: Unbalanced 75 ohms (BNC)
		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
		+/-0.3V
	"Zero" Amplitude	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
	Standards	ITU-T G.703, G.704, G.706 and G.732

E1/T1 ports	Interface Connectors	RJ-45
	Test Loops	LLB (Local Loop Back)
		RLB (Remote Loop Back)
Fiber	Connector	1x9 SC
	Data Rate	155 Mbps
Ethernet	Interface Type	10/100Base-TX
	Connector	RJ-45
	Standards	IEEE 802.3, 802.3u
	Duplex modes	full/half
Indications	Power FX Link, E1/T1 Mode/Link/Loopback test, LAN Link/Speed	
Power Input	12VDC	
Dimensions	140 x 88 x 23mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS compliant	

Application

Managed E1/T1 + Fast Ethernet Fiber Optical Multiplexer



Ordering Information

Model Name	Description
FRM220-FOM01-SR	E1/T1 RJ-45 and 100Mbps Ethernet Fiber Optic Multiplexer (optional SFP module)
FRM220-FOM01-SB	E1 BNC and 100Mbps Ethernet Fiber Optic Multiplexer (optional SFP module)

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Connector Type / Connectivity Distance

FMC220 – FOM01 – □□ – □□□□□

Example: FMC220 – FOM01 – SR – SC002

Note: This card must use CH01M, with serial console, to configure standalone settings.
When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH01 chassis.