



CTC UNION TECHNOLOGIES CO., LTD.

8F/9F, No.60, Zhouzi St. Neihu, Taipei 114, Taiwan,
Vienna Technology Center (NeiHu Technology Park)
TEL : +886 2 2659-1021 FAX : +886 2 2659-0237
sales@ctcu.com

www.ctcu.com

2020 TELECOM PRODUCT CATALOG

CTC UNION TECHNOLOGIES

**2020
TELECOM**
PRODUCT CATALOG
YOUR RELIABLE SUPPLIER



© Copyright 2020 CTC UNION TECHNOLOGIES CO., LTD.
CTC UNION and the CTC UNION logo are trademarks of CTC UNION TECHNOLOGIES CO., LTD. All rights reserved. All other trademarks are the property of their respective owners.
Specifications & design are subject to change without prior notice. Please visit CTC UNION website for more details.
Printed 2020 V1.0



ISO 9001
ISO 14001



Since 1993
www.ctcu.com

About *Since 1993* CTC Union



CTC Union Technologies Co. Ltd., founded in 1993, proactively designs and manufactures telecommunications, data communications and industrial networking products for a global market. With technologies based on Ethernet and Optical transmission, CTC Union can effectively meet the requirements of voice and data carriers, enterprises, as well as industrial grade Ethernet users.

Using the latest technologies, CTC Union has stormed into the "Industrial Ethernet" marketplace with a wide range of rugged Ethernet products for public utilities, transportation and power substation deployment. With a heavy focus on reliability, certifications and new standards, this proactive thinking will allow CTC Union to continue developing solutions for today and tomorrow's industrial markets.

CTC Union's global alliance is a network of worldwide branch offices, partners and distributors on every continent. By forming partnerships with major telecom operators, Internet Service providers, and value-added resellers, CTC Union reduces costs and improves services for customers. This alliance covers Europe, Asia, the Middle East, Africa, plus North and South America. This global partnership receives direct engineering and technical support from our company headquarters, located in Taipei, Taiwan.

Environmental Policy



As a socially responsible manufacturer, CTC Union is concerned with the environment and has taken active measures to reduce carbon emissions and eliminate hazardous materials in their products. None of CTC Union products use chlorofluorocarbons (CFC) in their production process and since 2007 all electronics use non-lead soldering according to RoHS 2.0 and WEEE directives.

Our Mission & Vision

- Provides innovative last-mile optical access solutions for telecommunication markets.
- Provides customers with "on time" solutions, quick and effective customer support, and valuable products with extended service life.
- We still ensure honesty and fairness in all our actions, we will always do the right thing.
- To be a trusted in providing creative connectivity products and solutions
- To be a leading communication transmission solution provider meets our customer's needs

2020 Table of Contents (Telecom)

Chapter 1 Management Software

SmartView™ -Element Management System.....	1-2
--	-----

Chapter 2 Cellular Router

4G LTE, WiFi IEEE802.11 b/g/n/ac, 3x GbE RJ45, Cellular Router.....	ICR-W403	2-1
4G LTE, WiFi IEEE802.11b/g/n, 2x 10/100Base RJ45, Compact Size Cellular Router.....	ICR-W401	2-5
4G LTE, 4x 10/100Base RJ45, Cellular Router.....	ICR-4103	2-8

Chapter 3 iAccess™ Ethernet Aggregation Platform - FRM220A

iAccess Ethernet Aggregation Platform.....	FRM220A	3-2
NEW 4x 100/1000Base-X SFP In-Band OAM/IP Managed GbE Switch.....	FRM220A-GSW40S	4-27
2x 10/100/1000Base-T + 2x 100/1000Base-X SFP In-Band OAM/IP Managed GbE Switch.....	FRM220A-1000EAS/X	4-29
10G uplink Ethernet Aggregation Switch Card with In-Band Management.....	FRM220A-GSW/SNMP-10G	3-4
1G uplink Ethernet Aggregation Switch Card with In-Band Management.....	FRM220A-GSW/SNMP (n)	3-4

Chapter 4 iAccess™ Multi-Service Platform - FRM220

iAccess Multi-Service Platform.....	FRM220-CH20	4-1
NEW Network Management Controller (R4).....	FRM220-NMC-R4	4-5
Network Management Controller (R3).....	FRM220-NMC-R3	4-6

CWDM & DWDM

WDM Optical Multiplexer

DWDM Mux/DeMUX.....	FRM220-DWMD	4-7
CWDM Mux/DeMUX.....	FRM220-CWMD	4-9
Optical Add-Drop Multiplexer.....	FRM220-OADM	4-12

Transponder

NEW 100G QSFP28 to QSFP28, 3R Transponder with In-Band Management.....	FRM220-100G-3R	4-13
40G QSFP+ to QSFP+, 3R Transponder.....	FRM220-40G-2Q	4-14
40G QSFP+ to 4x 10G SFP+ Transponder.....	FRM220-40G-1Q4S	4-15
NEW 25G 3R Multi-rate Transponder with In-Band Management.....	FRM220-25G-3R	4-16
16G 3R Multi-rate Transponder with Optical Line Protection.....	FRM220-16G-3R	4-17
10G 3R Multi-rate Transponder with Optical Line Protection.....	FRM220-10G-3R	4-18
4G 3R Multi-rate Transponder with Optical Line Protection.....	FRM220-4G-3R	4-19
4G 2R Multi-rate Transponder with Optical Line Protection.....	FRM220-4G-3S	4-20
1G 2R Multi-rate Transponder.....	FRM220-1000DS	4-21

Muxponder

NEW 7x GE to 10G Muxponder with In-Band Management.....	FRM220-TM-10GMux	4-22
--	------------------	------

Optical Protection Switch

1:1 Multi-mode Optical Protection Switch.....	FRM220-OPS51M	4-23
1:1 Single-mode Fiber Optical Protection Switch.....	FRM220-OPS51	4-24
1+1 Single-mode Fiber Optical Protection Switch.....	FRM220-OPS52	4-24

EDFA

NEW Optical Amplifier Booster 21dB (MAX).....	FRM220-OAB21A	4-25
NEW Optical Amplifier PreAmp 17dB (MAX).....	FRM220-OAP17	4-26

Ethernet Switch

NEW 4x 100/1000Base-X SFP In-Band OAM/IP Managed GbE Switch.....	FRM220A-GSW40S	4-27
2x 10/100/1000Base-T + 2x 100/1000Base-X SFP GbE Switch.....	FRM220A-1002ES	4-28
2x 10/100/1000Base-T + 2x 100/1000Base-X SFP In-Band OAM/IP Managed GbE Switch.....	FRM220A-1000EAS/X	4-29
2x 10/100Base-TX + 2x 100Base-FX In-Band OAM / IP Managed FE Switch.....	FRM220-10/100AS-2	4-31
2x 10/100/1000 Base-T + 2x 100/1000 Base-X SFP Managed GbE Switch.....	FRM220-MSW202	
4X 10/100/1000 Base-T + 4X 100/1000 Base-X SFP Managed GbE Switch.....	FRM220-MSW404	

2020 Table of Contents (Telecom)

Ethernet Media Converter

In-Band OAM/IP Managed GbE Converter, 100/1000Base-X to 100/1000Base-SFP	FRM220-1000EAS/X-1	4-32
In-Band OAM/IP Managed FE Converter, 10/100Base-TX to 100Base-FX SFP	FRM220-100AS-1	4-33
Web Smart In-Band OAM Managed GbE Converter, 100/1000Base-T to 1000Base-X	FRM220-1000M	4-34
Web Smart In-Band OAM Managed GbE Converter. 100/1000Base-T to 100/1000Base-X SFP	FRM220-1000MS	4-34
In-Band Managed FE Converter, 100Base-TX to 100Base-FX	FRM220-10/100i	4-35
In-Band Managed FE Converter, Dual Channel 100Base-TX to 100Base-FX	FRM220-10/100iS-2	4-36
10G Managed Media Converter 10G Base-T to 10G Base-R SFP+	FRM220-10GC-TS	4-37
Managed GbE Media Converter , 1000Base-TX to 1000Base-FX	FRM220-1000TS	4-38
Non-managed FE Media Converter , 100Base-TX to 100Base-FX	FRM220-10/100	4-39

Voice over Fiber

4x FXO over Fiber In-Band Managed Converter	FRM220-FXO-4	4-40
4x FXS over Fiber In-Band Managed Converter	FRM220-FXS-4	4-40
FXO/FXS over Fiber In-Band Managed Converter	FRM220-FXO/FXS	4-41

Inverse Multiplexer

Ethernet over Bonded 16 E1 NTU, In-Band Managed	FRM220A-iMux16	4-42
Ethernet over Bonded 8 E1 NTU, In-Band Managed	FRM220A-iMux8	4-42
Ethernet over Bonded 4 E1 NTU, In-Band Managed	FRM220A-iMux4	4-42

Fiber Multiplexer

8/4x E1/T1+ GbE Fiber Multiplexer with In-Band Management	FRM220-GFOM08 / GFOM04	4-44
4/1x E1/T1+ FE Fiber Multiplexer with In-Band Management	FRM220-FOM04 / FOM01	4-45

E1/T1 Cross Rate Converter

E1/T1 Cross Rate Converter.....	FRM220-FTEC	4-46
---------------------------------	-------------	------

Ethernet over E1 Converter

Ethernet Bridge over E1 (GFP), In-Band Managed	FRM220A-Eoe1/G(S)	4-47
--	-------------------	------

Media Converter (E1/T1, DS3/E3, Ethernet, Data, Serial)

E1/T1 over Fiber, In-Band Managed	FRM220-E1/T1	4-48
DS3/E3 over Fiber, In-Band Managed	FRM220-DS3/E3	4-50
E1 to DATA.....	FRM220-E1/DATA	4-51
RS232/530/V35 over Fiber, In-Band Managed	FRM220-DATA	4-52
RS232/485 over Fiber, In-Band Managed	FRM220-Serial	4-54

CCF (Contact Closure Fiber Converter)

4ch Contact Closure Fiber Converter, In-Band Managed	FRM220-CCF40	4-55
2ch Contact Closure Fiber Converter, In-Band Managed	FRM220-CCF20	4-55

Chapter 5 SFP Patching Hub & Compact Media Converter

SFP Patching Hub

20 Ports Fixed Managed Media Converter Concentrator	PHB-200M, PHB-200	5-1
---	-------------------	-----

Compact Media Converter

17-slot Compact Media Converter Chassis.....	FMC-CH17	5-2
--	----------	-----

Unmanaged Compact Converter

10/100/1000Base-T to 100/1000Base-X SFP Media Converter.....	FMC-1001S	5-3
10/100Base-TX to 100Base-FX Media Converter.....	FMC-10/100	5-4

Managed Compact Converter

Web Smart In-Band OAM Managed Converter, 10/100/1000Base-T to 100/1000Base-X SFP.....	FMC-1000MS	5-5
Web Smart In-Band OAM Managed Converter, 10/100/1000Base-T to 1000Base-X.....	FMC-1000M	5-5
In-Band Managed Converter, 10/100Base-TX to 100Base-FX.....	FMC-10/100i	5-6

2020 Table of Contents (Telecom)

Chapter 6 L2+ Ethernet Switch

Access Switch

NEW 24x CSFP (48x GbE) with 4x GbE Combo + 4x 10G/SFP+ Managed Switch.....	GSW-4448CM	6-2
24x GbE/SFP + 4x GbE/RJ45 + 4x 10G/SFP+ Managed Switch.....	GSW-3424FM	6-4
24x GbE/RJ45 + 4x GbE Combo Managed Switch.....	GSW-3424M1	6-6
8x GbE/RJ45 + 2x 1G/SFP Managed Switch.....	GSW-3208M2	6-8

CPE Switch

4x GbE/RJ45 + 1x GbE/RJ45 with PoE+ PSE Managed Switch.....	GSW-2020P	6-10
8x GbE/RJ45 + 2x 1G/SFP Managed Switch.....	GSW-2008MS	6-12
5x GbE/RJ45 + 1x 1G/SFP Managed Switch.....	GSW-1005MS	6-14

Carrier Ethernet Switch

24x GbE/SFP + 4x GbE/RJ-45 + 4x 10G/SFP+ Managed Switch.....	MSW-4428X	6-16
24x GbE/SFP + 4x 10G/SFP+ Managed Switch.....	MSW-4424A	6-18
20x GbE/SFP + 4x GbE Combo + 4x 10G/SFP+ Managed Switch with SyncE.....	MSW-4424CS	6-20
20x GbE/SFP + 4x GbE Combo + 4x 10G/SFP+ Managed Switch.....	MSW-4424C	6-22

EDD/NID

NEW 2x GbE/RJ45 + 2x 1G/2.5G RJ45 + 2x 10G/SFP+ Managed Switch with SyncE.....	MSW-4204S	6-24
NEW 2x GbE/RJ45 + 2x 1G/2.5G RJ45 + 2x 10G/SFP+ Managed Switch.....	MSW-4204	6-26
4x GbE/RJ45 + 4x 1G/SFP Managed Switch.....	MSW-404	6-28
NEW 2x GbE/RJ45 + 2x 1G/SFP Managed Switch (CE2.0)	MSW-202A	6-30
2x GbE/RJ45 + 2x 1G/SFP Managed Switch (CE1.0).....	MSW-202	6-31

Chapter 7 L2+ PoE Switch / Converter / Injector

PoE Switch

NEW 8x GbE/RJ45 + 2x 1G/SFP with 8x PoE+ (200W) Managed Switch.....	GSW3208MP-1	7-1
24x GbE/RJ45 + 2x GbE Combo with 24x PoE+ (450W) Managed Switch.....	GSW-3224MP	7-3

PoE Converter

1x GbE/RJ45 to 1x 100/1000Base-X SFP with PoE (30W) Media Converter.....	FMC-1000S-PH	7-5
1x GbE/RJ45 to 1x 1000Base-X SFP with PoE (15.4W, AC Power built-in) Media Converter.....	IFC-1000PSE	7-6

PoE Injector

GbE IEEE802.3 af/at PoE Injector(15/30/36W).....	INJ-G30	7-7
--	---------	-----

Chapter 8 Standalone CWDM Multiplexer

NEW 8/4 Ch. Dual Fiber CWDM Mux/Demux (Standalone).....	CWMD-80 / CWMD-40	8-1
18 Ch. Dual Fiber CWDM Mux/DeMux (Rackmount).....	CWMD-180	8-3

Chapter 9 Digital Cross Connect Multiplexer

STM1/E1 Access Multiplexer

STM1/E1, Data, Ethernet, Voice Managed Multiplexer (4.5U).....	iSAP5100	9-1
E1, Data, Ethernet, Voice Managed Multiplexer (2U).....	iSAP2000	9-3

E1 Multiplexer / Inverse Mux Access Unit

4U E1 Multiplexer.....	ERM-MUX-Plus	9-7
1U E1 Multiplexer.....	ETU02-MUX	9-9
Ethernet to 4E1/8E1 Multiplexer.....	iMux4A-100 / iMux8A-100	9-10
Single Modular Port E1 CSU/DSU with LCD and SNMP.....	ETU01A	9-11
Single Modular Port E1 CSU/DSU.....	ETU011	9-12
Single V.35 Port E1 CSU/DSU.....	ETU01-Plus	9-14

2020 Table of Contents (Telecom)

Chapter 10 TDM over IP

E1/4x E1 over Ethernet with Web Management.....	IPM-E1 / 4E1	10-1
8/16x E1 over Ethernet with Web Management.....	IPM-8E1 / 16E1	10-2

Chapter 11 DSL Series

VDSL2 LAN Extender

NEW 4-Port Gigabit VDSL2 LAN Extender.....	VDTU2-B140	11-1
NEW 1-Port Gigabit VDSL2 LAN Extender.....	VDTU2-B120	11-2
1-Port Fast Ethernet VDSL2 LAN Extender.....	VDTU2-B110	11-2

G.SHDSL.bis ATM / EFM Router

4-Port 10/100Base-TX ATM Bridge / Router w/Firewall (2-wire 5.7Mbps).....	SHDTU04bF-ET10RS	11-3
4-Port 10/100Base-TX ATM Bridge / Router w/Firewall (4-wire 11.4Mbps).....	SHDTU04bAF-ET10RS	11-3
4-Port 10/100Base-TX ATM Bridge / Router w/Firewall (8-wire 22.78Mbps).....	SHDTU04bCF-ET10RS	11-3

G.SHDSL.bis TDM NTU

1-port TDM E1 NTU (2-wire-5.7Mbps).....	SHDTU03bE1	11-5
1-port TDM E1 NTU (4-wire 11.4Mbps).....	SHDTU03bA-E1	11-5

G.SHDSL.bis EFM / VPN Router

2/4/8W G.SHDSL.bis.VPN Router with 4x10/100TX.....	VPN10 / 20 / 40	11-6
--	-----------------	------

Chapter 12 Fiber Multiplexer

NEW 4x E1/T1 + 4x GbE Fiber Multiplexer.....	FMUX04A	12-1
Modularized 16x E1/T1 + 4x GbE Managed Fiber Multiplexer.....	FMUX1001	12-2
Modularized 16x E1/T1 + 4x FE Managed Fiber Multiplexer.....	FMUX101	12-2
16/8x E1/T1 + 4x GbE RJ45 Managed Fiber Multiplexer.....	FMUX1600 / FMUX800	12-4

Chapter 13 Ethernet Serial Server

NEW 4/8-Port RS232 Ethernet Serial Server.....	STE400A-RS232 / STE800A-RS232	13-1
RS232 Ethernet Serial Server.....	STE100A-232	13-2

Chapter 14 Surge Protector

Fast Ethernet PoE Surge Protector.....	SP-POE-01 / SP-POE-01A	14-1
Gigabit Ethernet PoE Surge Protector.....	SP-GPOE-01 / SP-GPOE-24	14-1
Gigabit Ethernet Surge Protector.....	SP-GE-01 / SP-GE-24	14-2
Fast Ethernet Surge Protector.....	SP-ETH-01 / SP-ETH-24	14-2

Chapter 15 Fiber Transceiver

Fiber Transceiver(40G~155Mbps).....		15-1
-------------------------------------	--	------

APPENDIX

FRM220 Standalone Chassis vs Power Type Compatible Table.....	P.161
FRM220/FRM220A Slide-in Card vs Standalone Chassis Compatible Table.....	P.162

SmartView™ EMS

Fault Management

- Trap Collection • Active Alarm • Trap Forwarding and Syslog Messages
- Alarms sent by E-mail & SMS • Alarm Selection

Configuration Management

- Network Element Configuration • Network Topology • Network Element Firmware Upgrade
- Network Element Discovery • Network Element Time Synchronization

Accounting Management

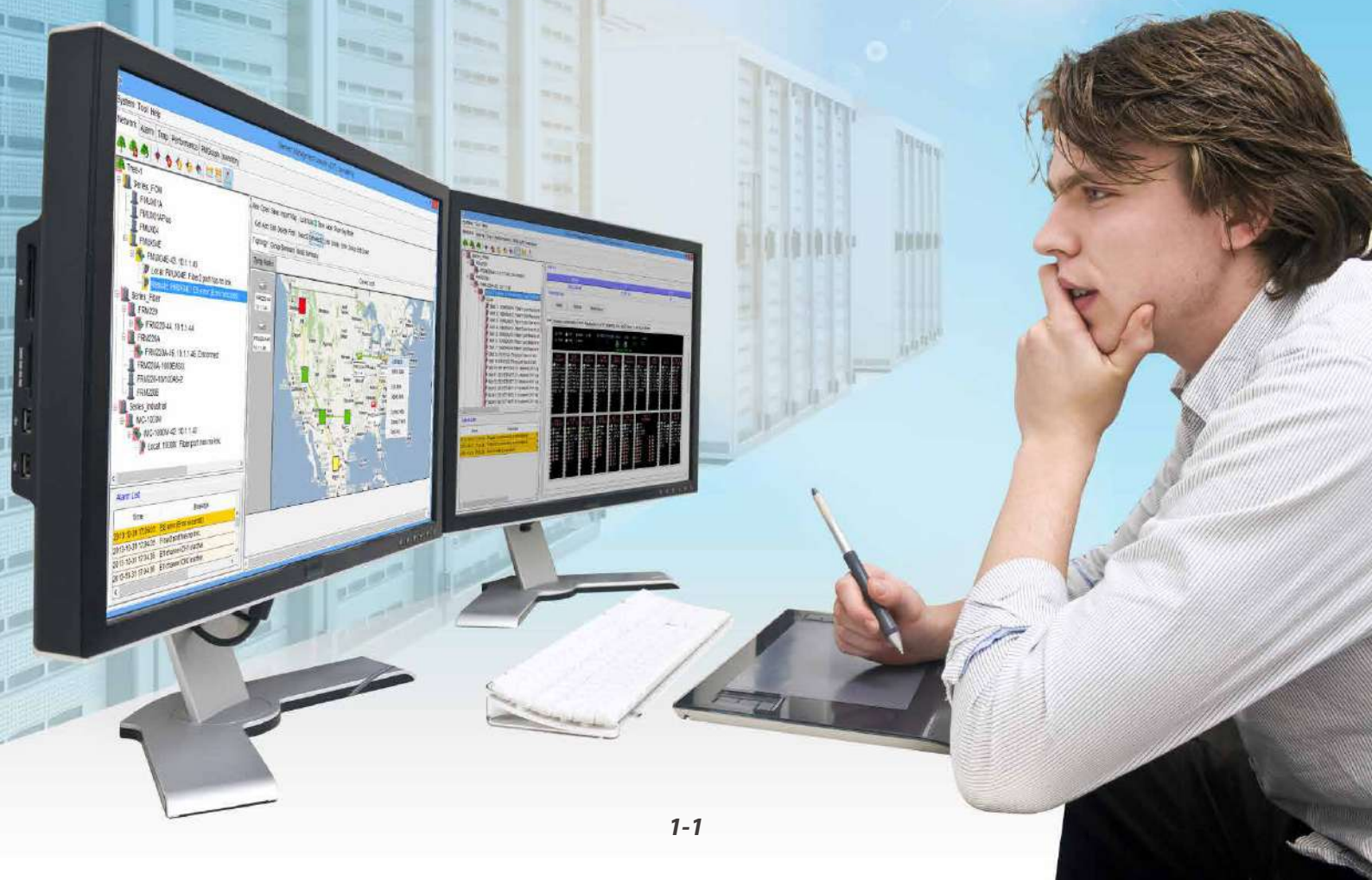
- Location, status and serial numbers of all assets can be managed and exported

Performance Management

- SmartView™ is able to monitor device performance parameters through polling of specific OIDs.

Security Management

- User Privilege • User Role • User Activity





SmartView™ EMS

— Manage 2,000 Devices

- Remote Access and Centralized Device Management
 - Real-time visual representations & processing of alarms
 - Long term event storage (up to 1 year)
 - Easy, User-Friendly GUI Operation Interface

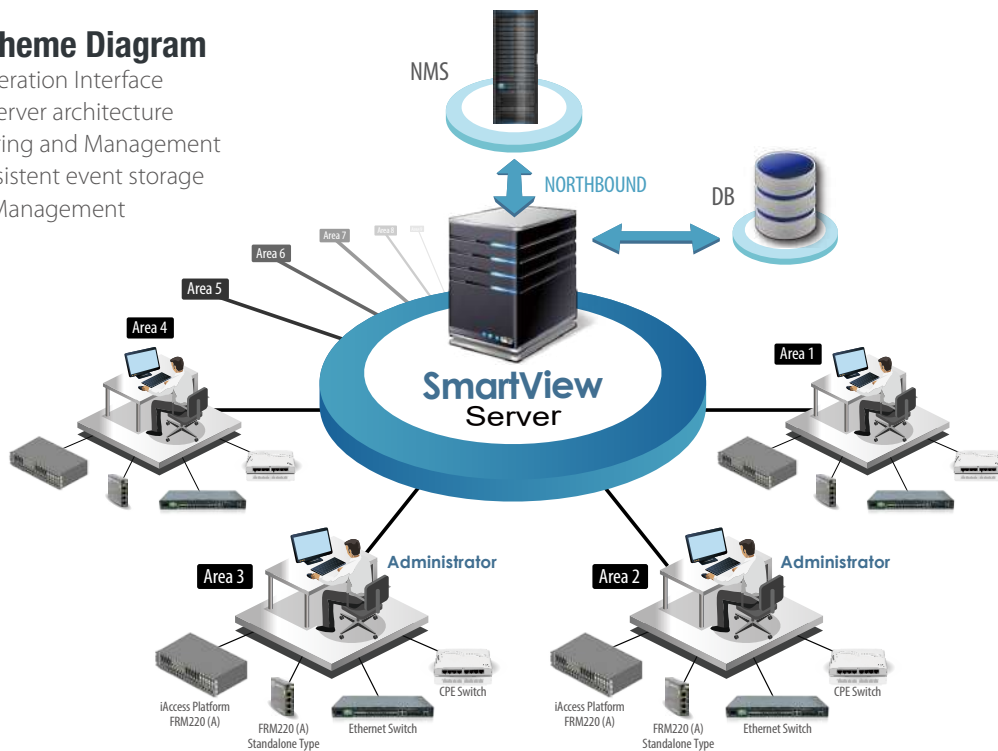
CTC Union's **SmartView™ Element Management System (EMS)** is a comprehensive management solution that monitors device performance, enables remote configuration and provisioning, and provides fault notification status.

■ Functions

- Main Functions (FCAPS):
 - Fault Management, Configuration Management, Accounting Management, Performance Management, Security Management
- Remote access control for efficient configuration
- Traffic / Performance monitoring and management
- Alarm Trap and event log management
- Auto Discovery and Device Viewer
- Allow up to 25 administrators to login

■ Network Scheme Diagram

- User-Friendly Operation Interface
- Robust Client / Server architecture
- Network Monitoring and Management
- Database for persistent event storage
- Security Access Management



SmartView™ Server

The server handles connection with the network devices using SNMP protocol, and is responsible for communication of requests from management clients. SmartView™ Server collects the information data from specific SNMP agents, stores the information into a persistent database and updates that information to the management clients. SmartView™ server requires 64bit Microsoft® Windows™ O.S.

Microsoft® MS-SQL Server for Persistent Storage

SQL Server is the place where SmartView™ stores collected data, such as alarms, traps and user actions, for long term retrieval. SmartView™ requires Microsoft® SQL Server and is compatible with SQL 2008 Server, SQL 2008 Express, SQL 2014 Server and SQL 2014 Express. (The EMS installer will install the free version Microsoft® SQL 2008 Express or SQL 2014 Express under Windows 10 by default).

Multi-Administrators

Management clients are provided with the JAVA applet GUI to monitor and control the agents at far end. They also receive the Alarm and Traps from the corresponding SNMP Agents. Multiple workstations are allowed, with a maximum of 25 concurrent logged in users.

■ Features at a Glance

Fault Management

▪ Trap Collection

All traps will be stored in SQL database. When an SNMP agent experiences an abnormal condition it will send an SNMP trap message to SmartView™ which then receives the message, and records it in the database. Depending on preset conditions, SmartView™ may sound an audible alarm, send an email or SMS alert message or just simply flash the trap message on the administrative console screen.

▪ Active Alarm

SmartView™ continuously polls all network devices under its management and will visually display all alarm conditions found. Alarms will be categorized as Major, Minor or Warning, depending on severity. Although alarms may be acknowledged, they remain actively displayed on the alarm page until there is no longer an alarm condition.

▪ Alarm Selection

Alarm events of network element are configurable. All alarm events are warned by default, but they can be manually disabled to ignore warning messages.

▪ Alarms sent by E-mail & SMS

The SmartView™ is capable of sending emails and or SMS text messages to selected administrators when critical alarms occur. Prompt notification of system problems aid in getting problems in the network devices fixed in the shortest time possible.

▪ Trap Forwarding and Syslog messages

The SmartView is capable of forwarding received traps to upper network management and sending event messages to a syslog server.

Configuration Management

▪ Network Topology

User can load maps to SQL server, load maps from SQL server or delete attached maps. Map area may be used to layout any objects from Root and Node panel. Using drag-and-drop, put any object to map area. Any label or network element location name may be added to object. Objects in red color indicate some alarm condition is present in the device.

▪ Network Element Configuration

SmartView™ is able to provide a single point of configuration for the device elements. Most settings only require mouse clicks and by using a tab format, most scrolling is eliminated. Current settings and status are displayed along with hardware and firmware versions for each element.

▪ Network Element Firmware Upgrade

SmartView™ is able to download firmware to device elements and perform configuration backup/restore.

▪ Network Element Time Synchronization

SmartView™ is able to trigger a command to network elements to perform time synchronization with Smartview or a NTP server.

▪ Network Element Discovery

SmartView™ has a tool for automatically discovering SNMP agents on the network. Simply enter an IP address range and the discovery program will ping every IP address looking for SNMP agents. Once discovered, the agents can be selected and brought into the broker for polling.

Accounting Management

The accounting management supports reading a factory programmed serial number specific for each line card. The location, status and serial numbers of all assets can be managed and exported.

Performance Management

SmartView™ is able to monitor device performance parameters through polling of specific OIDs. Graphs of performance information (for example PDH PM data such as ES, UAS, etc. as well as hardware parameters such as fan speed, temperature, optical Tx/Rx power or RMON counters) can be generated on an X Y axis showing different trend data.

Security Management

• User Privilege

- ▶ The administrator can add necessary user logins with specific privileges, from Administrator to Operator and lastly to normal user.
- ▶ Radius Authentication. Supports authentication login provided by credentials stored on RADIUS server.

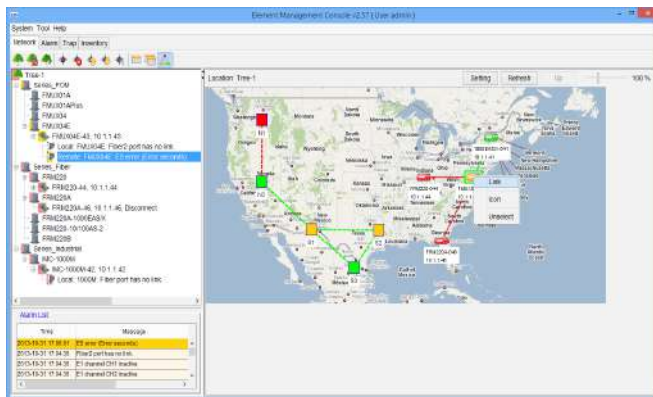
• User Role

A user role is a group and defines privileges for users to perform management tasks. The access to network elements is also restricted by user role.

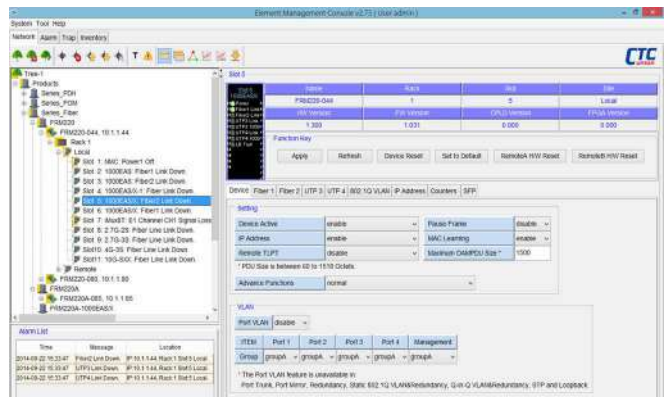
• User Activity

Provides viewing and clearing of the user login and configuration action logs.
User client login & logouts are recorded, including the client's source IP address.

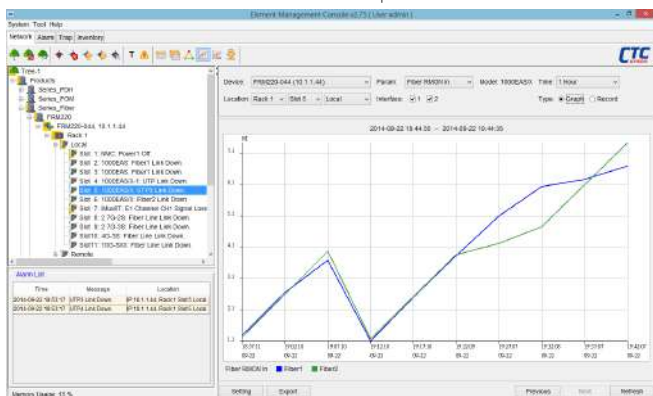
Network Topology



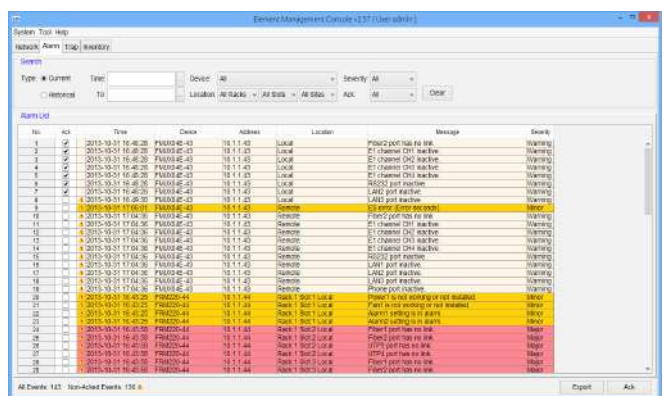
Network Element Configuration



Performance Graphics



Active Alarm



System Requirements

SmartView™	Hardware (minimum)	Software	Operating System
SmartView™ Server	Intel Core2 or higher processor, 2GB RAM, 40GB HD	JAVA JRE. SmartView™ Kit. MS-SQL Server	Windows Server 2012/2014/2016, Win10 Pro (64 bit)
SmartView™ Clients	Intel Core2 or higher processor, 2GB RAM, 20GB HD	JAVA JRE. SmartView™ Kit.	Windows 10 Pro (64 bit)
All-In-One	Intel Core2 or higher processor, 4GB RAM, 80GB HD	JAVA JRE. MS-SQL Server. SmartView™ Kit. SmartView™ Server/Client	Windows Server 2012/2014/2016, Win10 Pro (64 bit)

Ordering Information

SmartView™ EMS Server for Max 2,000 IP address nodes

Model Name	Description
SV1-AGT-50	SmartView™ management software with 50 nodes
SV1-AGT-100	SmartView™ management software with 100 nodes
SV1-AGT-200	SmartView™ management software with 200 nodes
SV1-AGT-500	SmartView™ management software with 500 nodes
SV1-AGT-1000	SmartView™ management software with 1000 nodes
SV1-AGT-1500	SmartView™ management software with 1500 nodes
SV1-AGT-2000	SmartView™ management software with 2000 nodes



ICR-W403

4G LTE, GPS, IEEE 802.11ac/b/g/n 2T2R, 2x SIM,
3x GbE + DI/DO, RS232



The ICR-W403 is a high-performance industrial grade wireless router. It combines IEEE 802.11b/g/n/ac WLAN and 4G LTE cellular technologies to provide flexible wireless network connectivity for industrial applications. ICR-W403 provides 3 Ethernet ports and dual SIM cards for failover redundancy, to ensure uninterrupted connectivity. ICR-W403 has support for secure VPN communications, GPS, static and dynamic IP routing of RIP1/2 and OSPF, NAT, port forwarding, Firewall, built-in DI/DO and Serial port services. In addition, ICR-W403 uses the highest level of industrial grade design for connection in the most demanding environments, and is an ideal solution for Industrial Internet of Things (IIoT) and M2M (Machine-to-Machine) applications, such as remote control and monitoring, fleet management, bus ticketing collection systems, CCTV, SCADA, digital signage, KIOSK and intelligent traffic systems.

Features

- IEEE 802.11 ac/b/g/n, multiple SSID, captive portal for WiFi hotspot
- Web, CLI, SNMP, TR069, SMS for management and configuration
- Events triggered by pre-defined, and notification sent by SMS, SNMP trap, or e-mail
- Supports USB for log storage
- EN-60950-1, CE, FCC, Rail Traffic EN50121-4 certified
- Heavy industrial grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- Rugged metal, IP30 protection & Fanless design
- 4G LTE/ WiFi/ UTP to configure WAN port for failover redundant
- Various VPN protocols for security, Firewall & IPS, ACL & Authentication by MAC/User to enhance access security

Specifications

Standard	Cellular MobilComm standard: (Please see order information for optional band) 4G LTE: FDD-LTE, TDD-LTE 3G: WCDMA 2G: GSM/EDGE GNSS: GPS	Connector	2x 2.3dBi LTE Antenna and connector 2x 5dBi WiFi Antenna and connector 1x SMA Female connector for GPS antenna (Antenna optional) 2 SIM card sockets 1x USB 2.0 socket 3 RJ45 for GbE LAN/WAN 1x Removable Terminal block (Input power, 1x IGN, 2x DI, 1x DO, RS232)
IEEE 802.3	10Base-T 10Mbit/s Ethernet	4G LTE data rate	Cat 4, Maxium 150Mbps download, upload 50Mbps
IEEE 802.3u	100Base-TX Fast Ethernet	Power Supply	12/24VDC (9~36VDC)
IEEE 802.3ab	1000Base-T Gbit Ethernet over twisted pair	Power consumption	<14W
IEEE 802.1Q	Virtual LANs (VLAN)	LED	Power (Green), GPS (Green) 2.4G (Green), 5G (Green) SIM 1 (Green), SIM 2 (Green) LTE signal High (Green), LTE signal Low (Green) WAN/LAN LNK/ACT (Green)
IEEE 802.3x	Flow control for Full Duplex	Alarm message Handling	Events triggered by pre-defined, and notification sent by SMS, SNMP trap, or e-mail
IEEE 802.1p	LAN Layer 2 QoS for Traffic Prioritization	Operation Temperature	-40~ 75°C
IEEE 802.1X	Port based and MAC based Network Access Control, Authentication	Operating Humidity	5% to 95% (Non-condensing)
WiFi Standard Interface	IEEE802.11ac, IEEE802.11b, IEEE802.11g, IEEE802.11n	Storage Temperature	-40 ~ 85°C
WAN	1x 3G/4G LTE (Please see order information for detail optional mobil band) Built-in dual SIM card slots for network redundancy / failover/ roaming over/ back up IEEE 802.11ac (5G Hz) 1x GbE UTP (WAN or LAN configurable)	Housing	Rugged Metal, IP30 Protection, Fanless
LAN	Concurrent WiFi 2.4G/5G with IEEE 802.11ac 2T2R (5GHz), and IEEE 802.11b/g/n 2T2R (2.4GHz) 3x 10/100/1000Base-T UTP port, port 1 could be WAN or LAN configurable	Dimensions (D x W x H)	120 x 200 x 39.5 mm (Dx Wx H)
COM port	1x RS232	Weight	975g
DI/DO	2x DI, 1x DO, 1x IGN (Ignition Sense for Vehicle)	Installation	Wall mounting
GNSS	1x GPS receiver	MTBF	394,330 Hours (MIL-HDBK-217)
Log Storage	1x USB 2.0	Warranty	5 years

Certification	
EMC	CE (EN55024, EN55032)
EMI	FCC Part 15 Subpart B Class A, CE EN55022 Class A
Railway Traffic	EN50121-4
Immunity for Heavy Industrial Environment	EN61000-6-2
Emission for Heavy Industrial Environment	EN61000-6-4

EMS (Electromagnetic Susceptibility) Protection Level	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (Burst) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
	EN61000-4-6 (CS) Level 3, Criteria A
Safety	EN61000-4-8 (PFMF, Magnetic Field) Field Strength: 300A/m, Criteria A
	EN60950-1
	IEC 60068-2-27
	IEC 60068-2-32
	IEC 60068-2-6

Software Specifications

Routing	Static routing , Dynamic routing, RIP1/RIP2, OSPF, BGP
Security	Firewall: SPI Firewall with Stealth Mode, IPS VPN Tunneling: IPSec, OpenVPN, PPTP, L2TP, GRE; Tunneling with Full Tunnel, Tunnel Failover VPN Scenario: Site to Site, Site to Host, Host to Site, Host to Host, Hub and Spoke, Dynamic VPN Port Forwarding: Virtual Server/ Computer, DMZ Host, Special AP & APG, VPN Pass-through Access control: Packet Filter, URL Blocking, MAC Filter, Content Filter, Application Filter Authentication: Captive Portal, MAC Authentication
VLAN	Port-based VLAN, Tag-based VLAN
QoS	Policy-based Bandwidth Control and Packet Flow Prioritization
Management	Web, CLI, Telnet, SNMP V3, TR069
IPV6	Dual Stack
Upgrade F/W	Support
Backup & Restore Configuration file	Support

Others	
System Time Information	NTP client
DHCP	Server and Client
Cellular toolkit	SIM PIN, USSD, Network Scan, SMS, Data Usage
Alarm message Handling	DI, DO, SMS, Syslog, SNMP Trap, Email Alert, Reboot
Location Tracking	GPS
Diagnostic	Packet Analyzer, Diagnostic tools
Power Control	Ignition Sense for delay OFF
MobilComm Connectivity	Two SIM for muti ISP failover/ back up Seamless
Multi WAN connections	4G LTE , 1xWiFi IEEE 802.11ac and 1x Ethernet WAN for failover/ back up Seamless
WiFi mode	AP Router, WDS, WDS Hybrid
WiFi Security	WEP, WPA, WPA2, WPA-PSK, WPA2-PSK, IEEE 802.1X
Virtual COM	TCP Client, TCP Server, UDP, RFC2217
Others DDNS, UPnP, QoS	
Remote management via Telnet, SSH v2, HTTPS	
Local management via Telnet, SSH v2, HTTP/HTTPS	
Syslog monitor	

Application

Figure 1 : Application of Wireless Transmission in Logistics Center

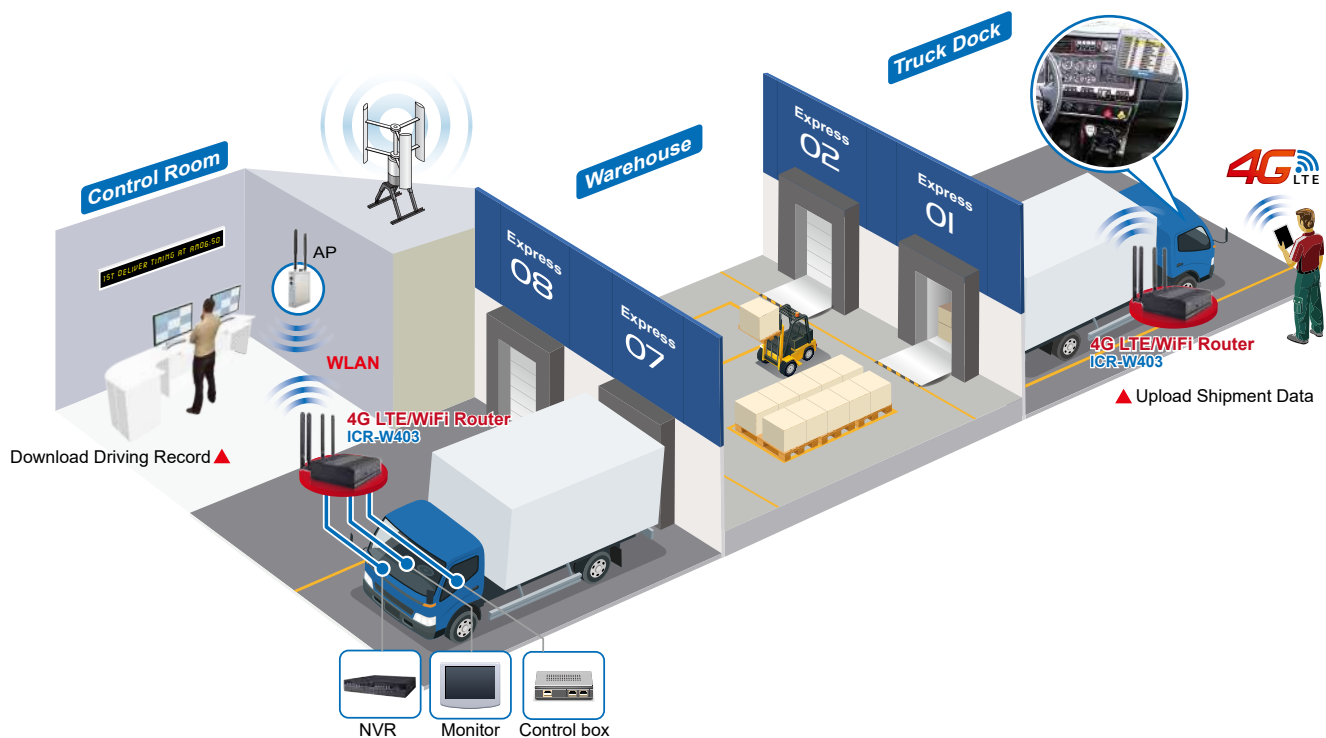
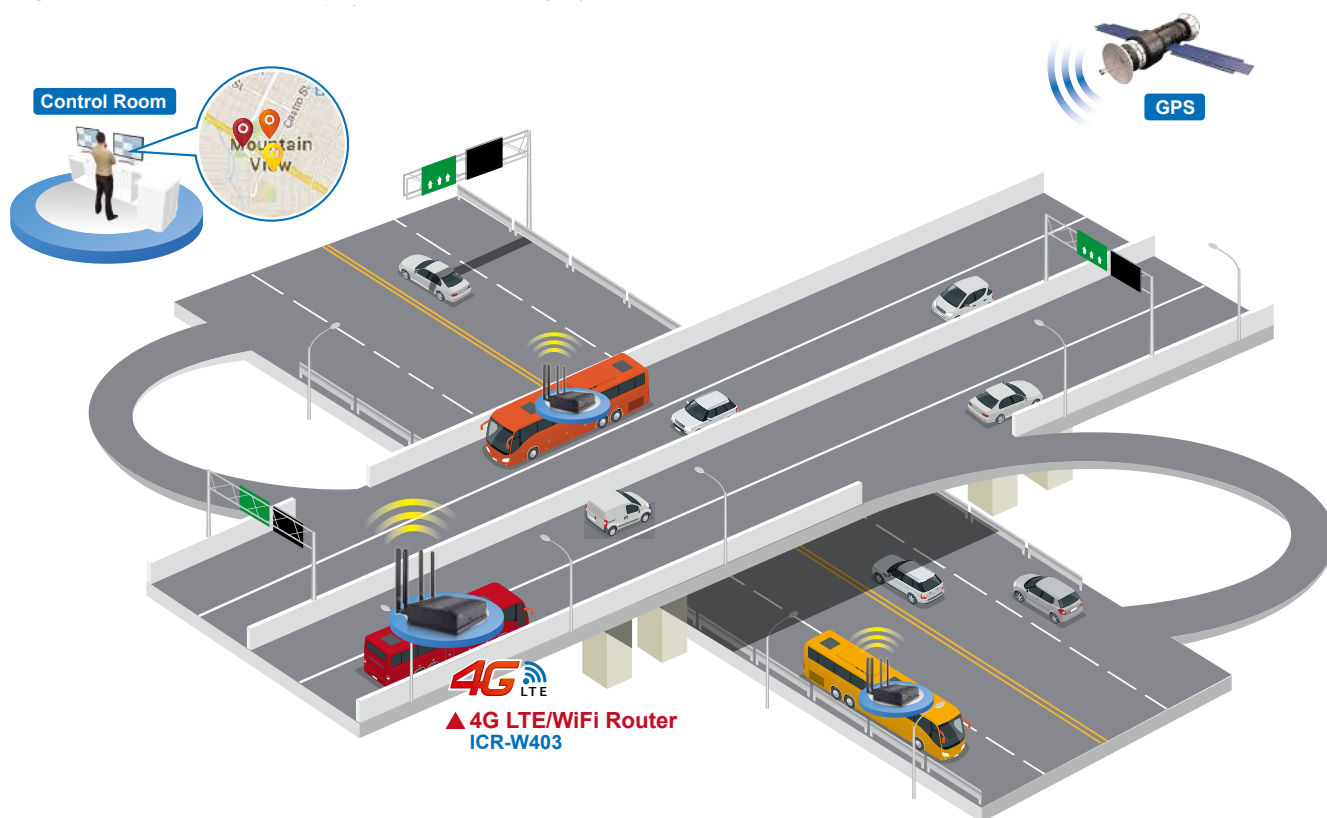
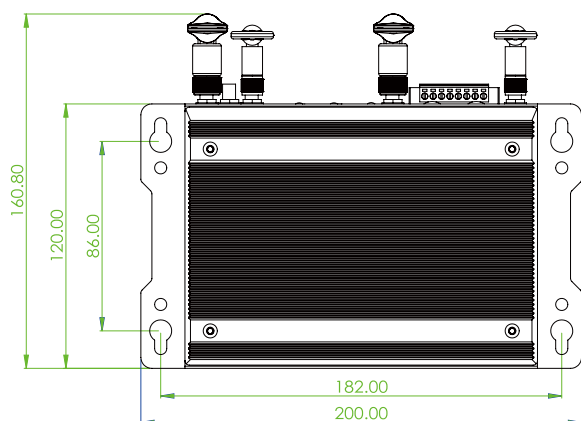


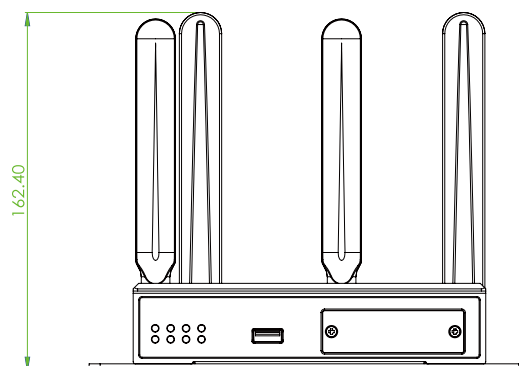
Figure 2 : Application of Vehicle Location Tracking System



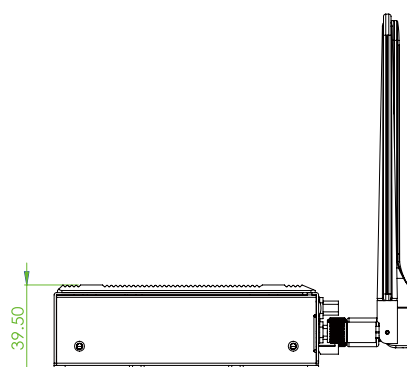
Dimensions



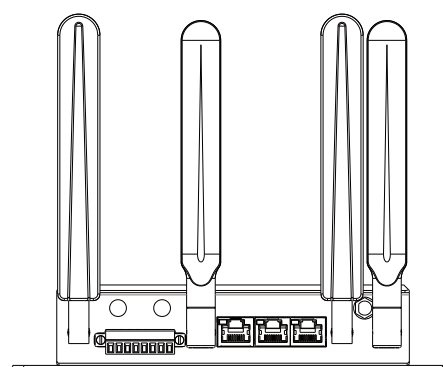
Top View



Front View



Side View

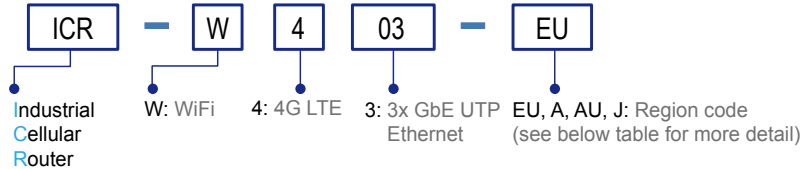


Rear View

Ordering Information

Model Name	WAN		WAN/LAN		LAN		Certification			
	Cellular Mobil Band (2 Sim for Redundant)	GPS (Ant. Optional)	WiFi	UTP 10/100/1000Base-T	DI, DO	RS232	Safety EN60950-1	RailWay EN50121-4	EN61000-6-2 EN61000-6-4	CE, FCC
ICR-W403-EU	see Region code table EU	1x GNSS	IEEE 802.11ac/b/g/n (LAN) or IEEE 802.11ac (WAN)	2x(LAN) +1x (LAN or WAN)	2xDI, 1xDO	1	V	V	V	V
ICR-W403-A	see Region code table A	1x GNSS	IEEE 802.11ac/b/g/n (LAN) or IEEE 802.11ac (WAN)	2x(LAN) +1x (LAN or WAN)	2xDI, 1xDO	1	V	V	V	V
ICR-W403-AU	see Region code table AU	1x GNSS	IEEE 802.11ac/b/g/n (LAN) or IEEE 802.11ac (WAN)	2x(LAN) +1x (LAN or WAN)	2xDI, 1xDO	1	V	V	V	V
ICR-W403-J	see Region code table J	1x GNSS	IEEE 802.11ac/b/g/n (LAN) or IEEE 802.11ac (WAN)	2x(LAN) +1x (LAN or WAN)	2xDI, 1xDO	1	V	V	V	V

Model Naming Rule



MobilComm Region Code Options

Region Code	4G LTE		3G	2G	GNSS	Region
	FDD LTE	TDD LTE	WCDMA	GSM / EDGE		
EU	B1(2100), B3(1800), B7(2600), B8(900), B20(800)		B1(2100), B8(900)	B3(1800), B8(900)	Yes	Europe, Africa, Middle East, Korea, Thailand, India
A	B2(1900), B4(1700), B12(700)		B2(1900), B4(1700), B5(850)		Yes	USA (AT&T, T-Mobile)
AU	B1(2100), B2(1900), B3(1800), B4(1700), B5(850), B7(2600), B8(900), B28(700)	B40(2300)	B1(2100), B2(1900), B5(850), B8(900)	B2(1900), B3(1800), B5(850), B8(900)	Yes	ANZ, South America, Taiwan
J	B1(2100), B3(1800), B8(900), B18(850), B19(850), B26(850)	B41(2500)	B1(2100), B6(850), B8(900), B19(850)		Yes	China

Optional Accessories

Antenna accessories

ANT-GPS-01	Antennas for GNSS
ANT-BASE-01	Antennas Base with Magnetic, SMA (Male) connector, 1.5meter for 4G LTE extension



ANT-GPS-01



ANT-BASE-01

**Compact**

ICR-W401

4G LTE, GPS, WiFi IEEE 802.11 b/g/n 2T2R,
RS232 COM port and DI/DO Router



The ICR-W401 is a compact, lightweight and cost-effective Industrial grade 4G LTE Router that has 1 LAN plus 1 WAN Fast Ethernet connection and supports uplink to 2G/3G/4G mobile data networks. Built for harsh environments, the router is equipped with a single RS232 serial port and a DI/DO interface. The ICR-W401 is simple to configure through its embedded Web user interface and can be deployed where the collection of real-time data transmissions is required for Industrial IoT and M2M (machine-to-machine) applications. The ICR-W401's WiFi is compliant with IEEE 802.11b/g/n wireless connectivity. The Router features VPN Tunneling with Firewall and management capability via TR069 and SNMP. The ICR-W401 provides highly secure authentication, encryption and management, to protect your data between public and private networks and simplify your complicated solutions for smart city and industrial networking.

Features

- Highly reliable and secure for mission-critical cellular communications
- Compact and lightweight design with 1 LAN and 1 WAN Ethernet interfaces
- Supports multi-band connectivity with FDD LTE/ TDD LTE/ WCDMA/ GSM/ LTE Cat 4
- Provides IEEE 802.11b/g/n WiFi 2T2R
- Micro SIM connector, RS232 serial 3-wire port and DI/DO interfaces
- LED indicators for connection and data transmission status
- Industrial temperature rated from -30 ~ +70°C for use in harsh environments
- IPv6/IPv4 dual stack and all applications are IPv6 ready
- Support serial communication protocols for rich connectivity
- Enhance security and encryption for authentication and transmission

Specifications

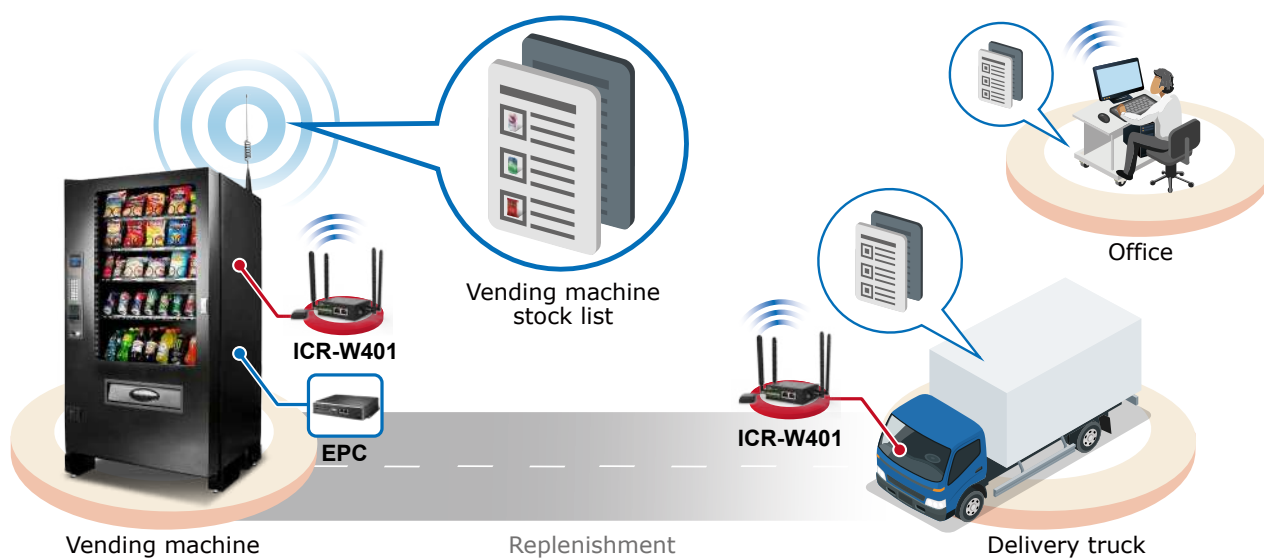
Standard	IEEE 802.3 10Base-T 10Mbit/s Ethernet IEEE 802.3u 100Base-TX Fast Ethernet IEEE 802.1Q Virtual LANs (VLAN) IEEE 802.3x Flow control for Full Duplex IEEE 802.1p LAN Layer 2 QoS for Traffic Prioritization IEEE 802.1X Port based and MAC based Network Access Control, Authentication	Weight	400g
LTE Interface	Cellular MobilComm standard: (Please see order information for optional area and band) 4G LTE: FDD-LTE, TDD-LTE 3G: WCDMA 2G: GSM/EDGE GNSS: GPS LTE Data rate: Cat 4, 150Mbps (Down load) 50Mbps (up load) 1 x micro SIM Connector (push-push type)	Installation	DIN Rail mounting, or wall mounting (optional)
WiFi Interface (ICR-W401)	IEEE 802.11b/g/n WiFi Standards Support AP or Station mode 2 x RP-SMA for WiFi Antenna 2T2R 300Mbps wireless operation rate 2.4GHz radio for wireless	LED Display	1 x Power LED 2 x Ethernet LED for each port (LAN/WAN) 1x LTE LED 1 x Function LED (User define by Web)
Hardware Interface	1 x Micro SIM Connector (push-push type) 1 x LAN 10/100 Mbps Ethernet port 1 x WAN 10/100 Mbps Ethernet port Reset Button for device reset 1x RS232 for serial COM port or console configuration (TXD/RXD/GND) 1 x DI (Non-Isolated), 1 x DO (Non-Isolated) 2 x SMA connectors for detachable LTE Antenna 2 x RP-SMA for WiFi Antenna 1 x GPS detachable Antenna	Power Supply	Power Consumption 7 Watt(Max) Power Input 12/24/48VDC (9.6~60VDC)
Housing	Rugged metal, Fanless, IP30 protection	Operating Temperature	-30 ~ 70°C
Dimensions (W x H x D)	30x 92 x 75 mm	Storage Temperature	-40 ~ 85°C
		Operating Humidity	10 ~ 95% (non-condensing)
		MTBF	271,952 Hours (MIL-HDBK-217)
		Warranty	5 Years
		Certification	EMC CE EMI EN301 489, FCC EMS EN301 489 Radio EN301511 EN301908-1 EN301908-2 EN301908-13 EN300328 EN303413 EN62311 Shock IEC 60068-2-27 Freefall IEC 60068-2-32 Vibration IEC 60068-2-6

Software Specifications

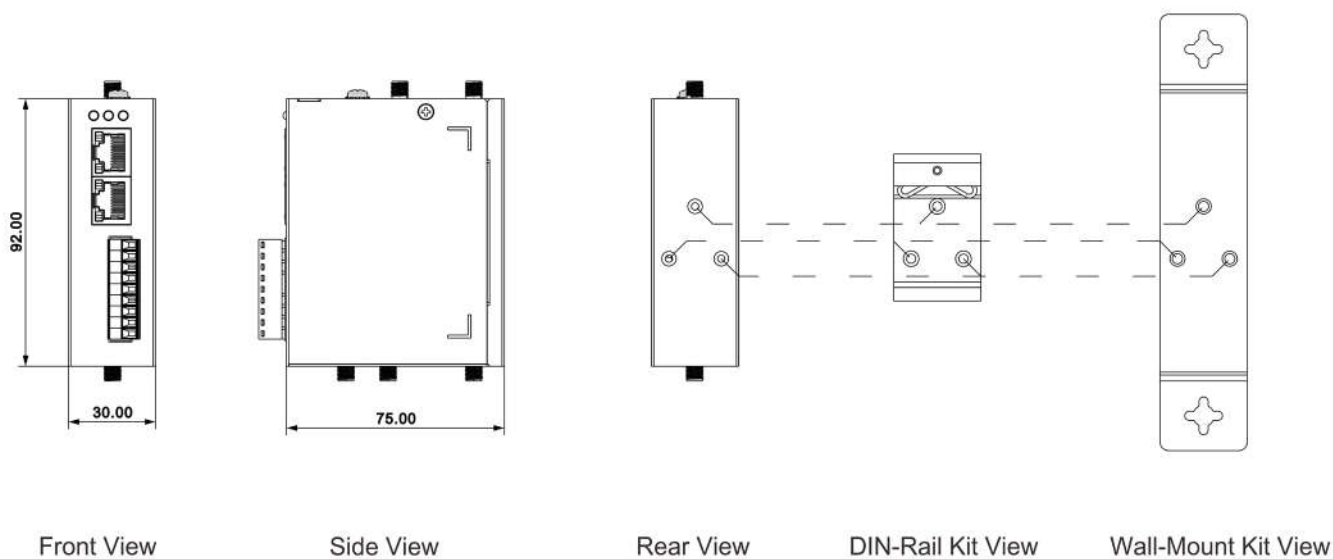
Network Protocols	IPv4, IPv6, IPv4/IPv6 dual stack, DHCP server and client, PPPoE, Static IP, SNTP, GPS sync time, DNS Proxy, VRRP, OSPF, Message Queue Telemetry Transport (MQTT Broker), BGP, Flow (Modbus master <--> MQTT client)	Others	DDNS, QoS, UPnP, SMS action, GPS track Drawing, GPS TCP Push
Routing/Firewall	NAT, Virtual Server, DMZ, MAC Filter, URL Filter, IP Filter, VLAN, Static Routing, RIP 1, RIP 2, IPS, Policy Route	Alarm	DI, DO, SMS, VPN/WAN Disconnect, SNMP Trap, Email, TR069
VPN	OpenVPN, IPSec (3DES, AES128, AES196, AES256, MD5, SHA-1, SHA256), GRE, PPTP, L2TP	Management	Web GUI for remote and local management, CLI
WiFi	Security with WPA2-PSK (AES) Multiple SSID Wireless Mac Filtering Wireless client isolation Wireless Connectivity: WAN WiFi Client		Syslog monitor SNMP, TR069 FOTA (Firmware over Air) Remote management via SSH v2, HTTPS Local management via Telnet, SSH v2, HTTP/HTTPS

Application

The vending machine logistics system application



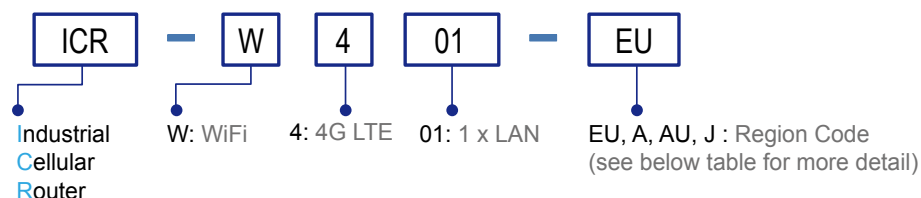
Dimensions



Ordering Information

Model Name	Managed	WAN		LAN				Certification		
		"Cellular Mobile Band"	"10/100 Base-TX"	"WiFi IEEE 802.11 b/g/n"	"10/100 Base-TX"	RS232	DI/DO	CE	FCC	Shock, Freefall, Vibration
ICR-W401-EU	V	see Region code table EU	1	1	1	1	1	V	V	V
ICR-W401-A	V	see Region code table A	1	1	1	1	1	V	V	V
ICR-W401-AU	V	see Region code table AU	1	1	1	1	1	V	V	V
ICR-W401-J	V	see Region code table J	1	1	1	1	1	V	V	V

Model Naming Rule



MobilComm Region Code Options

Region Code	4G LTE		3G	2G	Region
	FDD LTE	TDD LTE	WCDMA	GSM / EDGE	
EU	B1(2100), B3(1800), B5(850), B7(2600), B8(900), B20(800)	B38(2600), B40(2300), B41(2500)	B1(2100), B5(850), B8(900)	B3(1800), B8(900)	Europe, Africa, Middle East, Korea, Thailand, India
A	B2(1900), B4(1700), B12(700)		B2(1900), B4(1700), B5(850)		USA (AT&T, T-Mobile)
AU	B1(2100), B2(1900), B3(1800), B4(1700), B5(850), B7(2600), B8(900), B28(700)	B40(2300)	B1(2100), B2(1900), B5(850), B8(900)	B2(1900), B3(1800), B5(850), B8(900)	ANZ, South America, Taiwan
J	B1(2100), B3(1800), B8(900), B18(850), B19(850), B26(850)	B41(2500)	B1(2100), B6(850), B8(900), B19(850)		Japan

Optional Accessories

Antenna accessories

ANT-BASE-01	Antennas Base with Magnetic, SMA (Male) connector, 1.5meter for 4G LTE extension
-------------	--

Wall mount kit accessories

IND-WMK03	Wall Mount kit for Industrial product (Compact, 150x 30mm)
-----------	--



ANT-BASE-01



ICR-4103

4G LTE, 2x SIM, 4x FE + 2x DI/1x DO, 1x RS485, 2x RS232



The ICR-4103 is a high-performance, industrial grade, 4G-LTE cellular router which is designed to offer fast connectivity over cellular networks for industrial applications. ICR-4103's Ethernet ports can allow up to 3 Ethernet devices to link to the cellular network. It provides dual SIM card slots and one Ethernet WAN port which can automatically re-connect and auto-switch to offer cellular network redundancy and ensure uninterrupted connectivity. The ICR-4103 cellular router is integrated with WAN, LAN, SIM, VPN, Firewall, built-in DI/DO and Serial port services. In addition, ICR-4103 uses the highest level of industrial grade design for connection in the most demanding environments and is an ideal solution for Industrial Internet of Things (IIoT) and M2M (Machine-to-Machine) applications, such as remote control and monitoring, bus ticketing collection system, CCTV, SCADA, digital signage, kiosk and intelligent traffic systems.

Features

- Supports multi-band connectivity with FDD 4G LTE/ TDD 4G LTE/ 3G WCDMA/2G GSM/ LTE Cat4
- 2 SIM card slots 4G LTE antenna, 1x WAN (10/100Base-TX) + 3x LAN (10/100Base-TX UTP), 2x DI + 1x DO, 3x Serial COM port (2x RS232, 1x RS485)
- Highly reliable and secure for mission-critical cellular communications
- Provide flexible options to configure LAN/ WAN ports
- Built-in dual SIM for network redundancy / failover/ roaming over/ back up
- Integrated dual detachable antenna against radio interference
- 4G LTE and WAN port for seamless connection and redundancy
- Supports 3x Serial port (1x RS484, 2x RS232) for IoT and automation application, ModBus RTU and ModBus/TCP gateway, MQTT
- Supports Routing/Firewall, NAT, Virtual Server, DMZ, Port filtering, MAC Filter, URL Filter, IP Filter, VLAN, Static Routing and RIP 1 & 2, VRRP, OSPF V2 & V3, BGP
- Supports VPN, OpenVPN, IPSec (3DES, AES128, AES196, AES256, MD5, SHA-1, SHA256)
- IPv6/IPv4 dual stack and all applications are IPv6 ready
- Supports DHCP server and client, PPPoE, Static IP, SNTP, DNS Proxy, DDNS, QoS, Virtual Com, UPnP
- Supports Alarm message : DO, SNMP Trap, E-mail
- Supports SNMP, TR069, Web, Telnet, CLI for management
- Supports dual Image firmware upgrade by Web
- CE, FCC, Rail Traffic EN50121-4 certified
- Safety EN60950-1 certified
- Radio RED ETSI EN301 489-1/-19/-52, EN301 908-1, EN303 413, NCC certified
- Heavy industrial grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- Rugged metal, IP30 protection & Fanless design
- Wide operating temperature -20 ~ 75°C

Specifications

Standard	Cellular MobilComm standard: (Please see order information for optional band) 4G LTE: FDD-LTE, TDD-LTE 3G: WCDMA 2G: GSM/EDGE IEEE 802.3 10Base-T 10Mbit/s Ethernet IEEE 802.3u 100Base-TX Fast Ethernet IEEE 802.1Q Virtual LANs (VLAN) IEEE 802.3x Flow control for Full Duplex	LED	System status (Green) VPN (Green), SIM 1 (Green), SIM 2 (Green) Cell signal Strong / Weak: H/L (Green)
Connector	Cellular MobilComm and WAN: Built-in dual SIM card slots for network redundancy / failover/ roaming over/ back up 2 SMA (female) connector for Antenna (Please see ordering information for optional accessories) 1x 10/100Base-TX RJ45 for WAN port LAN: 3x 10/100Base-TX RJ45 Serial: 1x RS485 and 2x RS232 (one of RS232 could be configured for console) Programmable DI/DO: 2xDI and 1x DO	DIP SW for RS485 port	DIP 1 Pull Low : OFF: Disable, ON: Enable DIP 2 Pull High : OFF: Disable, ON: Enable DIP 3 120 ohm terminal resistor : OFF: Disable, ON: Enable
LTE data rate	Cat 4, Max download 150Mbps, Max upload 50 Mbps	Alarm message	DO for alarm message, with current capacity of 500mA/50VDC maximum SNMP trap, E-mail, SMS, Alarm trigger by DI, VPN or WAN disconnection
Removable terminal block	Provides for Power input, DO, DI1, DI2, COM2 (RS232), COM3 (RS485)	Operation Temperature	-20~75°C
Power Supply	Input 10-32VDC removable terminal block	Operating Humidity	5% to 95% (Non-condensing)
Power consumption	<7W	Storage Temperature	-40 ~ 85°C
		Housing	Rugged Metal, Fanless , IP30 grade housing protection
		Dimensions (D x W x H)	106 x 62.5 x 135mm
		Weight	0.74kg
		Installation	Mounting : DIN Rail mounting or Wall mounting (Optional)

MTBF	296,306 Hours (MIL-HDBK-217)
Warranty	5 years
Certification	
EMC	CE (EN55024, EN55032)
EMI	FCC Part 15 Subpart B Class A, CE
Railway Traffic	EN50121-4
Immunity for Heavy Industrial Environment	EN61000-6-2
Emission for Heavy Industrial Environment	EN61000-6-4
EMS (Electromagnetic Susceptibility Protection Level)	EN61000-4-2 (ESD) Level 3, Criteria B EN61000-4-3 (RS) Level 3, Criteria A EN61000-4-4 (Burst) Level 3, Criteria A

EMS (Electromagnetic Susceptibility Protection Level)	EN61000-4-5 (Surge) Level 3, Criteria B EN61000-4-6 (CS) Level 3, Criteria A EN61000-4-8 (PFMF, Magnetic Field) Field Strength: 300A/m, Criteria A
Safety	EN60950-1
Radio	RED ETSI EN301 908-1 RED ETSI EN303 413 RED ETSI EN301 489-1 RED ETSI EN301 489-19 RED ETSI EN301 489-52 NCC
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6

Software Specifications

Network Protocols	IPv4, IPv6, IPv4/IPv6 dual stack, DHCP server and client, DNS Proxy, PPPoE, Static IP, SNTP, VRRP, OSPF V2, OSPF V3, BGP, MQTT
Modbus TCP, Modbus RTU	Gatway between Ethernet and COM3 (RS485) port
Routing/Firewall	NAT, Virtual Server, DMZ, Port filtering, MAC Filter, URL Filter, IP Filter, VLAN, Static Routing and RIP 1, RIP 2
VPN	OpenVPN, IPSec (3DES, AES128, AES196, AES256, MD5, SHA-1, SHA256)
MobilComm Connectivity	Two SIM for failover/ roaming over/ back up Seamless multi WAN connections switch (2x SIM and 1x Ethernet WAN)

Others	DDNS, UPnP, QoS Virtual COM for serial COM port
Alarm message Management	Sent by DO, SMS, SNMP Trap, E-mail Web GUI for remote and local management CLI Dual Image firmware upgrade by Web GUI Syslog monitor SNMP TR069: TR098 model Remote management via Telnet, SSH v2, HTTPS Local management via Telnet, SSH v2, HTTP/HTTPS

Application

Figure 1 : Application for Outdoor Digital Signage

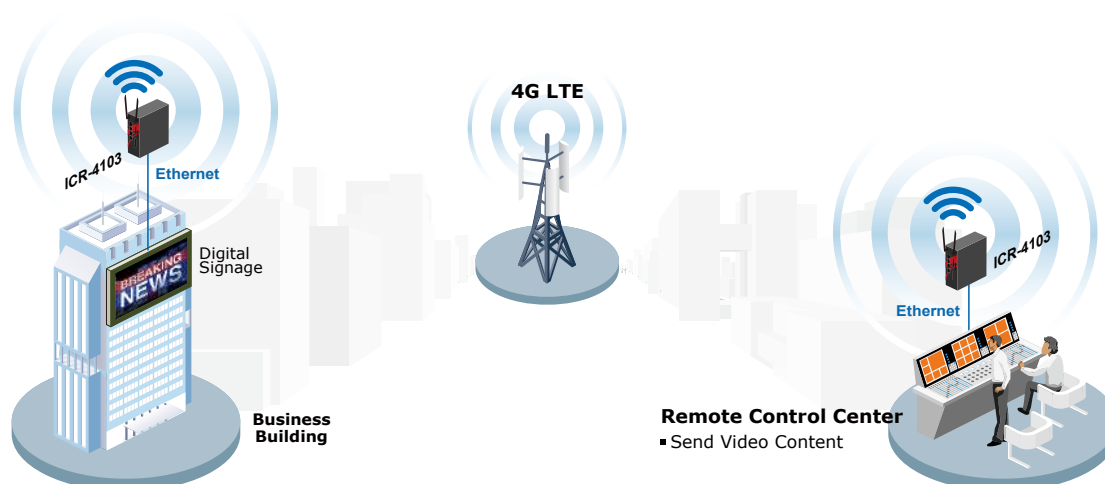
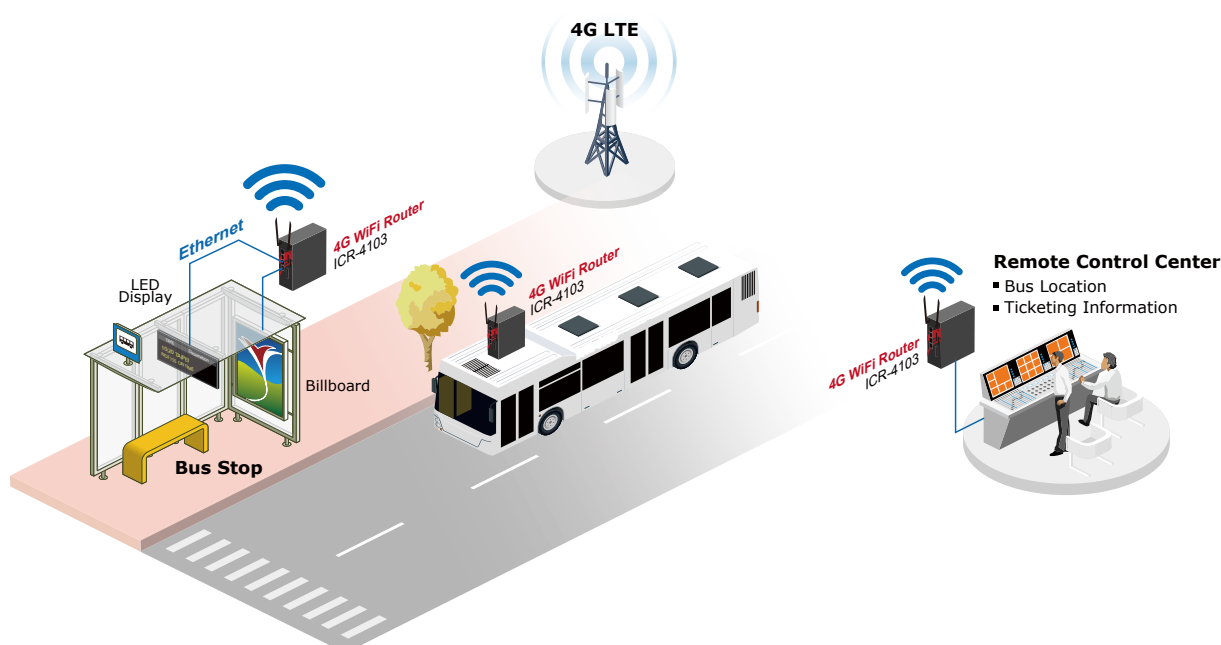
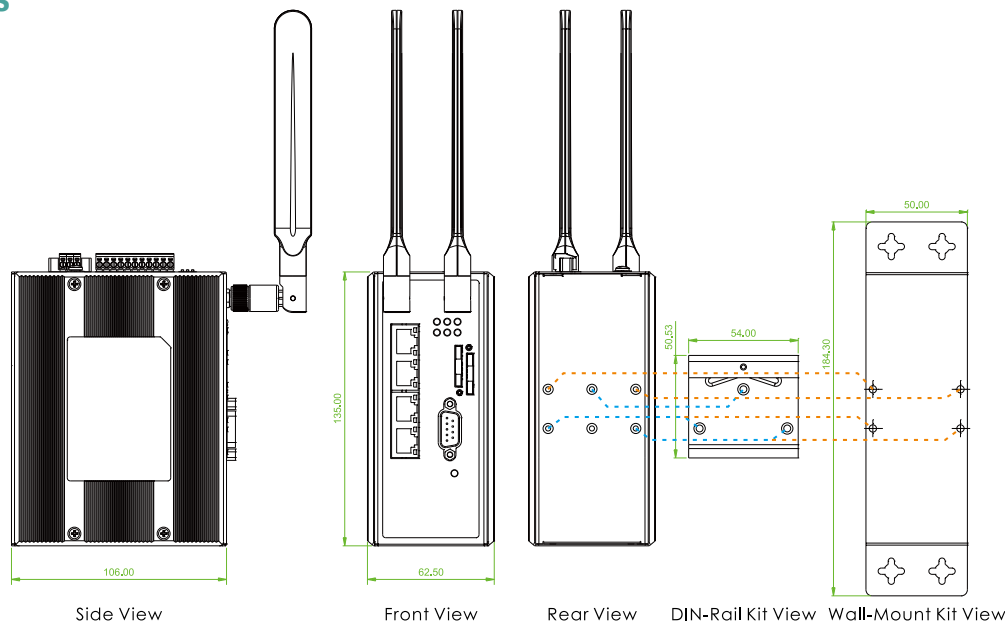


Figure 2 : Application for Transportation/Bus Communication



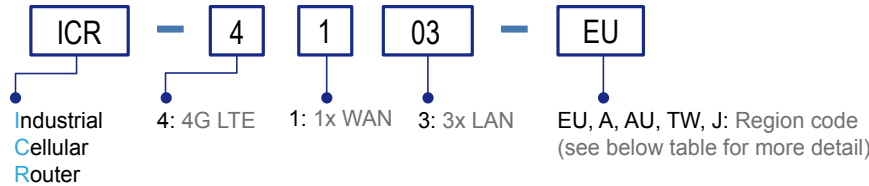
Dimensions



Ordering Information

ModelName	Managed	WAN		LAN			Certification			
		Cellular MobilComm band (2 SIM for Redundancy)	10/100Base-TX	10/100Base-TX	RS232	RS485 (ModBus)	Radio	Railway EN50121-4	EN61000-6-2 EN61000-6-4	CE, FCC
ICR-4103-EU	V	see Region code table EU	1	3	2	1	RED	V	V	V
ICR-4103-A	V	see Region code table A	1	3	2	1	RED	V	V	V
ICR-4103-AU	V	see Region code table AU	1	3	2	1	RED	V	V	V
ICR-4103-TW	V	see Region code table TW	1	3	2	1	NCC	V	V	V
ICR-4103-J	V	see Region code table J	1	3	2	1	RED	V	V	V

Model Naming Rule



MobilComm Region Code Options

Region Code	4G LTE		3G	2G	Region
	FDD LTE	TDD LTE	WCDMA	GSM / EDGE	
EU	B1(2100), B3(1800), B5(850), B7(2600), B8(900), B20(800)	B38(2600), B40(2300), B41(2500)	B1(2100), B5(850), B8(900)	B3(1800), B8(900)	Europe, Africa, Middle East, Korea, Thailand, India
A	B2(1900), B4(1700), B12(700)		B2(1900), B4(1700), B5(850)		USA (AT&T, T-Mobile)
AU	B1(2100), B2(1900), B3(1800), B4(1700), B5(850), B7(2600), B8(900), B28(700)	B40(2300)	B1(2100), B2(1900), B5(850), B8(900)	B2(1900), B3(1800), B5(850), B8(900)	ANZ, South America
TW	B1(2100), B2(1900), B3(1800), B4(1700), B5(850), B7(2600), B8(900), B28(700)	B40(2300)	B1(2100), B2(1900), B5(850), B8(900)	B2(1900), B3(1800), B5(850), B8(900)	Taiwan
J	B1(2100), B3(1800), B8(900), B18(850), B19(850), B26(850)	B41(2500)	B1(2100), B6(850), B8(900), B19(850)		Japan (KDDI, Docomo, Softbank)

Optional Accessories

Antenna accessories

ANT-BASE-01	Antennas Base with Magnetic, SMA (Male) connector, 1.5meter for 4G LTE extension
-------------	--



ANT-BASE-01

Wall mount kit accessories

IND-WMK02	Wall Mount kit for Industrial product (Wide) (184 x 50mm)
-----------	---

Access Transmission Platform

iAccess™ Multi-Service Platform

iAccess™ **10G** Ethernet Aggregation Platform



Optical Transport Solutions

- 100G Transponder / Muxponder / Protection / EDFA / WDM

Ethernet Services

- Ethernet Switch

Data Communication Solutions

- CCF / Datacom / RS485

TDM/PDH/Voice Solutions



iAccess™ Ethernet Aggregation Platform - FRM220A

The FRM220A series is an Ethernet based aggregation platform, which incorporates a 24+4 port L2 Gigabit Ethernet switch (FRM220A-GSW/SNMP-(n)) 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 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.

Specifications

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

(Front Side)



2U 19" 20-slot Rackmount Chassis

(Rear Side)



Cooling Fan Redundant Power Cooling Fan
10G/1G Ethernet Aggregation Switch Card

1G/10G Uplink Ethernet Aggregation Switch Card

The FRM220A chassis incorporate an Ethernet trunk card (FRM220A-GSW/SNMP-10G), for grooming traffic from all twenty (20) card slots and for Device Management. This card has four (4) uplink ports of either 1G/10G SFP+, depending on model, and is built with GbE interfaces to connect the backplane with each slot of FRM220A chassis. The FRM220A-GSW/SNMP-10G Ethernet switch trunk card transmits Ethernet between the subscriber equipment (bridge/modem or network interface card) and provides a user-networking interface with Ethernet packets.

FRM220A-GSW/SNMP-10G

10G uplink Ethernet Aggregation Switch Card with In-Band Management



FRM220A-GSW/SNMP(n)

Gigabit uplink Ethernet Aggregation Switch Card with In-Band Management



- Provides chassis aggregation via 4x1G/10Gigabit Base-X SFP/SFP+ plus 4x10/100/1000Base-T uplink ports
- Supports IEEE 802.1p HW based 8 priority queues and L2~L4 QoS functions
- Supports IPv6 management
- Provides Web (https), Telnet, SSHv2, SNMP(V1, V2c, V3) management interfaces
- Supports secure authentication by IEEE802.1x, RADIUS or TACACS+
- Supports IEEE802.1D/802.1w/802.1s for ring protection on all interfaces
- Supports IEEE 802.1Q tagged VLAN and IEEE 802.1ad Q-in-Q application

FRM220 Module Cards

The products listed below are designed for FRM220A-CH20 Ethernet Aggregation Applications

FRM220A-1000EAS/X



- 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
- Supports IEEE 802.1Q Tagged and Port based VLAN
- Supports remote CPE power fail detect (dying gasp)
- Supports Link Fault Pass-Through (LFPT)
- Loop Protection

FRM220A-GSW40S



NEW

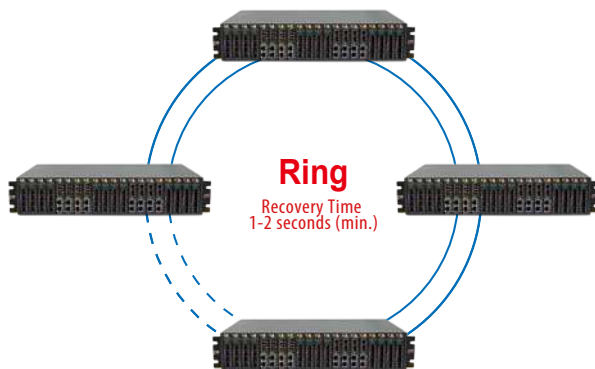
- 4-port 100/1000Base-X SFP
- Supports local / remote IEEE 802.3ah OAM / IP In-band management
- Standalone IP Based, Web GUI, Telnet, SNMP management
- Supports IEEE 802.1Q Tagged and Port based VLAN
- Supports dying gasp
- Spanning Tree Protocol
- Online local / remote f/w upgrade
- Auto Laser Shutdown (ALS)

Benefit of FRM220A Chassis Platform

Enabling IP Transportation Protection Mechanism

- STP/RSTP Featured Ring Protection

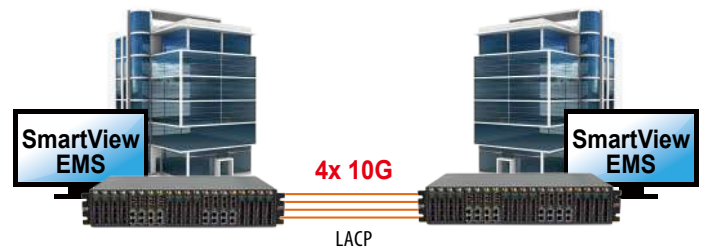
- Standard based but advanced fault protection systems
- Rapidly recovery path from failed connection (1-2 seconds min. recovery time)



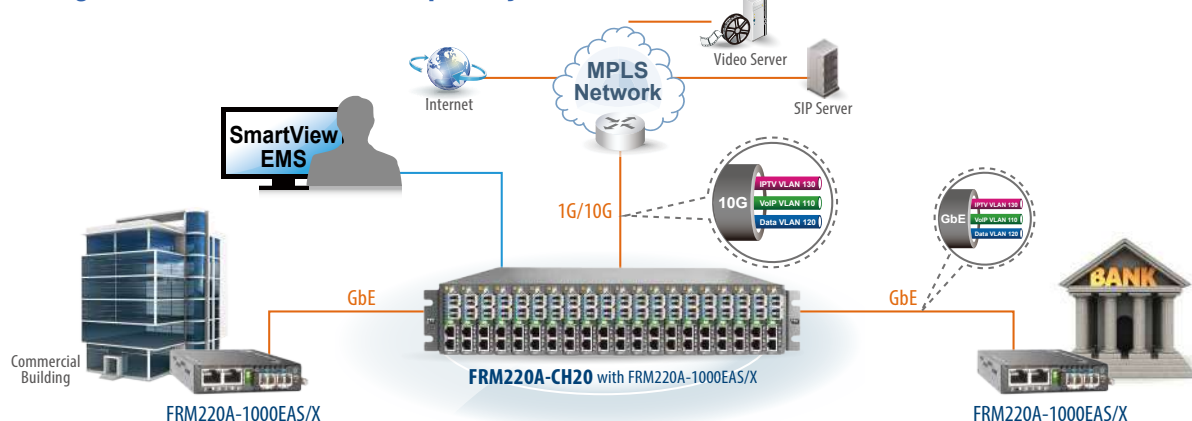
LACP Enabled Traffic Aggregation

- Fiber Redundant / Trunking Application

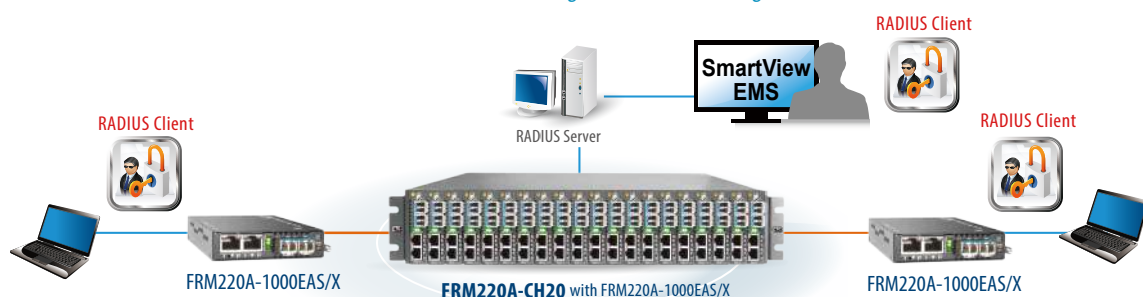
- Dynamic port aggregation or trunking to increase bandwidth between LACP peer devices
- Redundant paths to reduce network fault risk



Enabling VLAN & QoS Prioritized Multiple Play Services



Secured Access Control Enhancement - Centralized Management of Accessing the Network for user or device





FRM220A-GSW/SNMP-10G

10G uplink Ethernet Aggregation Switch Card

FRM220A-GSW/SNMP(n)

1G uplink Ethernet Aggregation Switch Card

FRM220A-GSW/SNMP-10G/FRM220A-GSW/SNMP (n) are next generation switch/management trunk cards for the FRM220A chassis. Twenty (20) GbE switch ports supply each slot of the 2U 20-slot chassis with an electrical gigabit Ethernet uplink with a remaining four (4) electrical gigabit ports accessible via the rear of the chassis. The additional four uplink SFP ports provide 1G/10G Ethernet connections, also on the rear of the chassis. All rear facing eight (8) ports (4x GE+ 4x 1G/10G or 4x GE + 4x 1G) are usable without restrictions for uplink aggregation to the Ethernet Metropolitan Area Network (E-MAN). The FRM220A-GSW/SNMP trunk card transmits Ethernet between the subscriber equipment (bridge/modem or network interface card) and the E-MAN. The trunk card also provides a management interface with Ethernet packets via Telnet, SSHv2, http/https and SNMP (v1,v2c,v3).

Features

- Provides chassis aggregation via 4x 1G/10Gigabit Base-X SFP/ SFP+ uplink slots (FRM220A-GSW/SNMP-10)
- Provides chassis aggregation via 4x 1G Gigabit Base-X SFP uplink slots (FRM220A-GSW/SNMP(n))
- Supports IEEE 802.1p HW based 8 priority queues and L2~L4 QoS functions
- Supports IPv6 management
- Fiber optical ports supports Ring topology
- Built-in gigabit Ethernet interface to link with each slot of FRM220A chassis
- Provides Web (https), Telnet, SSHv2, SNMP(V1, V2c, V3) management interface
- Supports IEEE 802.1D/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	4x 1G Base-X SFP + 4x 10/100/1000Base-T RJ45 switch trunk card	Management Specifications	In-band management	Provides all system OAM functions: software updates, and management system interaction through Ethernet trunk port
	Supports full-duplex mode for 1G/10G Mbps (FRM220A-GSW/SNMP-10G)		Out-band management	Supports Web, Telnet and SNMP, SSHv2 EMS management
	Supports full-duplex mode for 1G Mbps (FRM220A-GSW/SNMP(n))			
Capacity	Supports up to 20 service cards	Indications	PWR, FAN, Alarm, STK	
Temperature	0~60°C (Operating), -10~70°C (Storage)	Dimensions	142 x 200 x 26 mm (D x W x H)	
Humidity	5~90% non-condensing	Weight	0.5kg	
Certification	CE, FCC, RoHS compliant	MTBF	65,000 hrs	

Ordering Information

Model Name	Type	Description
FRM220A-CH20	Chassis	2U 20-Slot rack mount chassis with 20 line console blank plate
FRM220A-GSW/SNMP-10G	Card	10G Ethernet Aggregate switch card supports web, telnet, SNMP management interface
FRM220A-GSW/SNMP(n)	Card	1G 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-10G



iAccess™ Multi-Service Platform - FRM220

The FRM220 series is a multi-service platform chassis, 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-CH20 and FRM220-CH08 chassis such as power modules, fans, management module and interface cards are hot swappable, allowing online field replacement. FRM220 series is offered in three chassis densities, a 2U 20-slot (FRM220-CH20), a 1U 8-slot (FRM220-CH08), and a 1U 4-slot (FRM220-CH04A). FRM220-CH04A utilizes fixed type AC, DC power built-in. The available power options are built-in AC, DC power or built-in AC+DC, AC+AC, DC+DC redundant power.

All FRM220/FRM220A series cards are hot-swappable and can be installed in a 20 slots (2U), or 8 slots (1U) rack-mountable chassis with any combination of redundant hot swappable AC, 24VDC or 48VDC power supplies, providing a scalable solution that is space-efficient and cost-effective. The cards can also be mounted in 4 slots, 2 slots, or 1 slot standalone housings with fixed AC/DC powered chassis. The cards of FRM220/FRM220A series provide telecommunication solutions for most applications. CTC union offers a universal and cost-efficient transmission series for a variety of fiber optic technologies (Multimode, Single mode, WDM, CWDM) starting from converters and switches, to modems and extending to intelligent voice/data multiplexer systems. The products are designed as cards in combination with various chassis types. The concept is to ensure an extremely variable mixture of products at low storage costs for spares.

Features

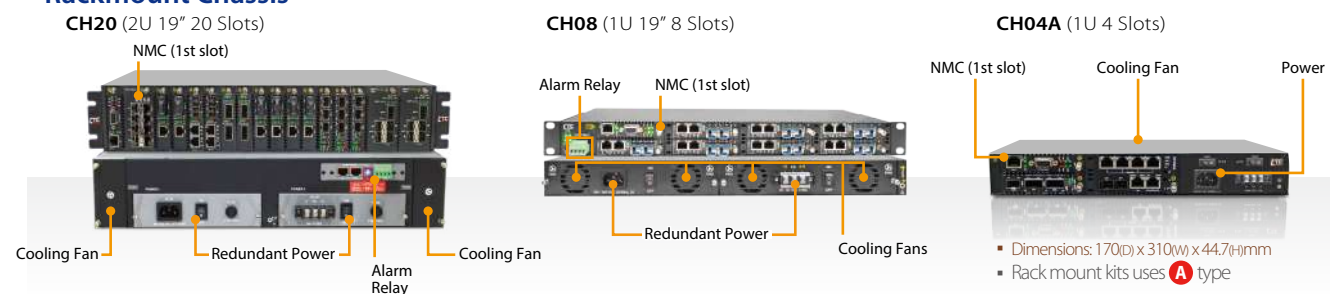
- Interface cards are hot swappable
- Supports AC/DC power modules hot swappable and power redundancy (CH20 & CH08)
- Supports fixed type AC/DC power built-in and power redundancy (CH04A)
- Two alarm relay contacts for critical events warnings (CH20/CH08)
- Chassis backplane consists of passive components (CH20/CH08)
- Fanless (CH02, CH02M-2, CH01, CH01M)
- Cooling Fan (CH20, CH08, CH04A, CH02M, CH02/SMT, CH02/NMC)
- Supports DB9 console port for local management (CH02M, CH02M-2, CH01M)
- Telnet, Web, Console, SNMP management via NMC Card (CH20, CH08, CH04A, CH02/SMT, CH02/NMC)

Specifications

Power Input	AC	100-240VAC (CH20/CH08/CH04A/CH02/CH01)	Dimensions (D x W x H)	CH20	303 × 438 × 88 mm
	DC24	18-36VDC (CH20/CH08)		CH08	310 × 440 × 44 mm
	DC48	36-75VDC (CH20/CH08)		CH04A	170 × 310 × 44.7 mm
	DC	18-72VDC (CH04A/CH02/CH01)		CH02M, CH02M-2, CH02/NMC	222 × 45.5 × 167.4 mm
	Adapter Type (CH01)	Input Voltage 100-240VAC 50/60Hz Output Voltage 12VDC 1A		CH02/SMT	220 × 44.7 × 205 mm
Weight			Temperature	CH01 AC/DC Power build-in	180 × 30 × 135 mm
				CH01 Adapter Type	139 × 23.2 × 88 mm
				CH01M	185 × 30 × 135 mm
				Humidity	Operationg 0~60C, Storage -10~70C
				Certification	5%~90% non-condensing
			Safety	Certification	FCC Class A, VCCI Class A, CE
					UL60950-1 (FRM220-CH20)

Chassis Overview

■ Rackmount Chassis



iAccess Platform Solutions

iAccess™ Multi-Service Platform offers a full range of solutions for service providers and enterprises, including **Optical Transport Solutions** (transponders, muxponders, CWDM, DWDM), **TDM/PDH/Voice Solutions** (fiber converters and multiplexers), **Ethernet Services** (switches, converters and NID/EDD) and **Data Communication Solutions** (Sync/Async serial over fiber). The iAccess is a fully modular product series that integrates a wide range of modules for any interface or protocol hosted in a selection of Chassis sizes for simple and flexible operations.



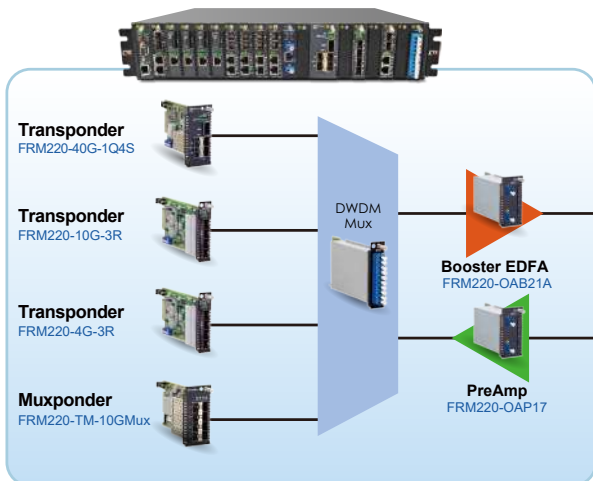
iAccess Platform Solution Category

Applications

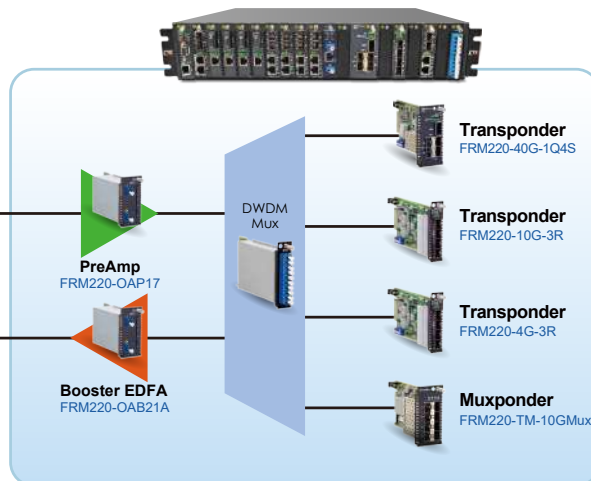
• Optical Transport Solution

Optical transport is important in providing data over long distances. CTC Union's Optical Transport Solutions include the optical transport building blocks of Mux/Demux, transponders, muxponders, EDFA and optical protection switching.

iAccess Multi-Service Platform



iAccess Multi-Service Platform



CWDM /DWDM P to P Application

4 iAccess Multi-Service Platform FRM220

iAccess Multi-Service Platform FRM22C



iAccess Multi-Service Platform FRM22C

iAccess Multi-Service Platform FRM22C

iAccess Multi-Service Platform FRM22C



iAccess Multi-Service Platform FRM22C

iAccess Multi-Service Platform FRM22C

iAccess Multi-Service Platform FRM22C



iAccess Multi-Service Platform FRM22C

NEW



FRM220-NMC-R4

Optical Transport Series Network Management Controller

The FRM220-NMC-R4 is a Network Management Controller card that can be placed in a compatible FRM220 series chassis to provide the management function for Optical Transport solution products. The FRM220-NMC-R4 features 2x 10/100/1000Base-T RJ45 plus 2x 100/1000Base-X SFP ports, supports remote TCP/IP management by **SSHv2**, HTTPS and **SNMPv1, v2c, v3** protocols and is designed to be hot swapped so that it may be field replaced without affecting any online service of any other rack cards. The FRM220-NMC-R4 also supports online firmware upgrade from TFTP server, using any user interface, without affecting any other inserted line card's transmissions. Support for any standard NMS is provided by the included enterprise MIB file. CTC Union also provides and maintains our own EMS (Element Management System) which is a Java based client/server manager for monitoring and maintaining a large number of network elements over a long period of time

Features

- User interfaces for SSH & Web
- Configure, monitor and provide fault management for all installed line cards
- Monitor power and fan status in chassis
- Provides upgrade feature for most line card types
- SNMP agent for complete management by enterprise MIB
- Running System log with time stamping by NTP (time server)
- Parameter management for quick configuration, configuration copy/backup/restore
- Card alias and inventory by type and serial number
- eCos Kernel based for high stability and reliability
- Supports IPv6, SNMP v1/v2/v3

FRM220 Optical Transport Solution Module cards

Item	Model Name
Muxponder	FRM220-TM-10GMux
Transponder	FRM220-100G-3R, FRM220-40G-2Q, FRM220-40G-1Q4S, FRM220-25G-3R, FRM220-16G-3R, FRM220-10G-3R
EDFA	FRM220-OAB21A, FRM220-OAP17
Protection	FRM220-OPS51M, FRM220-OPS51, FRM220-OPS52
Mux/Demux	FRM220-CWMD80, FRM220-CWMD80

Specifications

Optical Interface	Connector	SFP LC x 2
	Data rate	100M/1000M
	Duplex mode	Full duplex
Electrical Interface	Connector	UTP port x 2
	Data rate	UTP 10M/100M/1000M (auto or forced)
	Duplex mode	Full or Half Duplex (RJ-45)
	Cable	10Base-T Cat. 3,4,5,5e UTP 100Base-TX Cat. 5, 5e or higher 1000Base-T Cat 5, 5e, 6 or higher
Standards	IEEE802.3, 802.3u, 802.3z, 802.3ad, 802.3x, 802.1W, 802.1p, 802.1Q	
Management	HTTPs, Systog, IPv6, NTP, SNTP Web/Telnet/SNMP/SSHv2	
Jumbo Frame Size	9.6K bytes	
MAC Table Size	10K	
Indicators	Power, Fan, ALM, UTP Link/ACT, UTP Speed, Fiber Speed	
Power	Input	12VDC, 1.5A
	Consumption	<18W
Dimensions	155mm (D) x 88mm (W) x 39mm (H)	
Weight	120g	
Certification	CE, FCC, RoHS Compliant	

Ordering Information

Model Name	Type	Description
FRM220-NMC-R4	Card	Network management controller card for Optical Transport solution



FRM220-NMC-R3

Network Management Controller

The FRM220-NMC-R3 is a Network Management Controller card that can be placed in a compatible FRM220 series chassis to provide device management functions. The management interface supports a local RS-232 serial console or remote TCP/IP management by Telnet, HTTP and SNMPv1, v2c protocols and is designed to be hot swapped so that it may be field replaced without affecting any online service of any other rack cards. The card also supports online firmware upgrade from TFTP server, using any user interface, without affecting any other inserted line card's transmissions. Support for any standard NMS is provided by the included enterprise MIB file. CTC Union also provides and maintains our own EMS (Element Management System) which is a Java based client/server manager for monitoring and maintaining a large number of network elements over a long period of time.

Features

NMC provides central management for FRM220-CH20, FRM220-CH08, FRM220-CH04A, CH02/SMT and CH02-NMC

- User interfaces for serial console, Telnet & Web
- Configure, monitor and provide fault management for all installed line cards
- Monitor power and fan status in chassis (CH20, CH08 & CH02/SMT only)
- Provides upgrade feature for most line card types
- SNMP agent for complete management by enterprise MIB
- Running System log with time stamping for SNTP (time server)
- Parameter management for quick configuration, configuration copy/backup/restore
- Card alias and inventory by type and serial number
- Linux Kernel based for high stability and reliability

Specifications

Protocol	IP, UDP, SNMP V1/V2c, TCP, ARP, ICMP, TFTP, HTTP
Ports	DB9-F (x1), RJ45(x1)
Indicators	PWR1, PWR2, FAN1, FAN2, ALM1, ALM2, STK, ACT, LAN LNK/SPD
MIB Supported	MIB II, Enterprise MIB
Management	Web GUI, Telnet, Console, SNMP
Power	12VDC, 150mA
Dimensions	155x 88x 23mm (DxWxH)
Weight	120g
Temperature	0~60 (Operating), -10 ~70 (storage)
Humidity	5 ~ 90% (non-condensing)
MTBF	65000 hrs

Ordering Information

Model Name	Type	Description
FRM220-NMC-R3	Card	Network Management Controller card, support web, telnet, console, SNMP functions



FRM220-DWMD

DWDM Mux/DeMux

CTC Union DWDM MUX DEMUX Modules, with 100GHz channel spacing, can be used to combine or separate wavelength channels at standard ITU grid. We supply the common configuration including 4, 8, 16 channels. These DWDM modules passively multiplex the optical signal outputs from 4 or more electronic devices, and send them over a single optical fiber and then de-multiplex the signals into separate, distinct signals for input into electronic devices at the other end of the fiber optic link. All the DWDM MUX DEMUX modules provide excellent optical performance and high reliability to ease of fiber handling and power saving solution.

Features

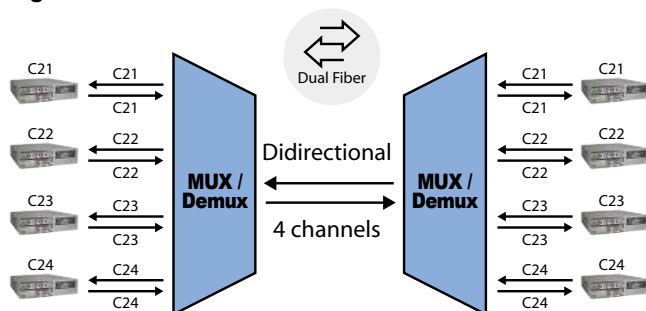
- Low Optical Insertion Loss
- High channel isolation
- Low PDL
- Good channel-to-channel uniformity
- Exceptional reliability and stability
- Reliable passive WDM optical technology
- Scales easily for ring networks
- Compliance with RoHS

Specifications

Item	100GHz DWDM	
Type	Mux	DeMux
Channel No.	4 / 8 / 16	
Center Wavelength, nm	Ch 21~60 or ITU Standard (specify)	
Channel Spacing, nm	0.8	
Channel Spacing, GHz	100	
Passband @0.5dB, nm	ITU \pm 0.1	
Insertion Loss, dB for 4 channel	≤ 2.0	
Insertion Loss, dB for 8 channel	≤ 3.5	
Insertion Loss, dB for 16 channel	≤ 4.5	
Adjacent Channel Isolation, dB	N/A	≥ 25
Non-adjacent Channel Isolation, dB	N/A	≥ 35
Uniformity, dB	≤ 1.5 (Mux-DeMux Pair only)	
Directivity, dB	≥ 45	
Optical Input Return Loss, dB	≥ 45	
Polarization Dependent Loss, dB	≤ 0.15	
Polarization Mode Dispersion (PMD), ps	≤ 0.1	
Thermal Stability Drift, pm/ $^{\circ}$ C	≤ 1	
Max. Optical Power, mW	300	
Max. Tensile Load, N	5	
Storage Temperature, $^{\circ}$ C	-40~85	
Operating Temperature, $^{\circ}$ C	0~70	

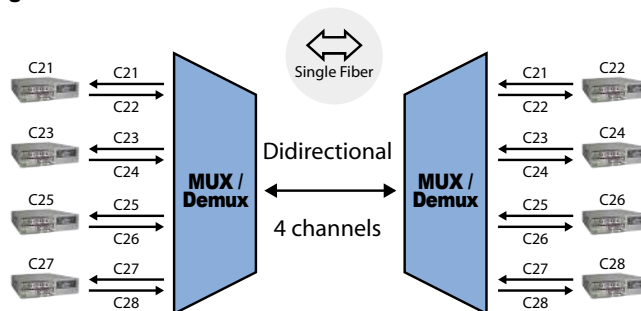
Application

Figure 1 :



The DWDM transceivers connected to DWDM Mux/DeMux should have the same wavelength as the client.

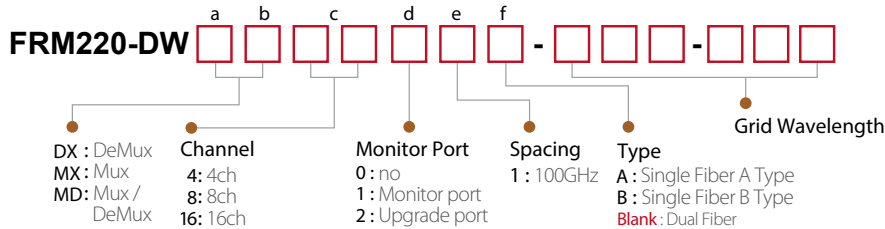
Figure 2 :



The DWDM transceivers should have the same wavelength as the transmit wavelength of the client port.

Ordering Information

Model Name	Description
	ab → DX: DeMux, MX: Mux, MD: Mux/DeMux
	c → 4: 4ch, 8: 8ch, 16: 16ch
FRM220-DWab-cdef-xxxx-xxxx	d → 0: no, 1: Monitor port, 2: 1x Upgrade Port
	e → 1: 100GHz
	f → A: Single Fiber A Type B: Single Fiber B Type Blank: Dual Fiber



Order Code -100GHz Grid Wavelength (Please ✓select all the apply from below list)

Label	Frequency (THz)	Center Wavelength (nm)
<input type="checkbox"/> C21	192.1	1560.61
<input type="checkbox"/> C22	192.2	1559.79
<input type="checkbox"/> C23	192.3	1558.98
<input type="checkbox"/> C24	192.4	1558.17
<input type="checkbox"/> C25	192.5	1557.36
<input type="checkbox"/> C26	192.6	1556.55
<input type="checkbox"/> C27	192.7	1555.75
<input type="checkbox"/> C28	192.8	1554.94
<input type="checkbox"/> C29	192.9	1554.13
<input type="checkbox"/> C30	193.0	1553.33
<input type="checkbox"/> C31	193.1	1552.52
<input type="checkbox"/> C32	193.2	1551.72
<input type="checkbox"/> C33	193.3	1550.92
<input type="checkbox"/> C34	193.4	1550.12
<input type="checkbox"/> C35	193.5	1549.32
<input type="checkbox"/> C36	193.6	1548.51
<input type="checkbox"/> C37	193.7	1547.72
<input type="checkbox"/> C38	193.8	1546.92
<input type="checkbox"/> C39	193.9	1546.12
<input type="checkbox"/> C40	194.0	1545.32

Label	Frequency (THz)	Center Wavelength (nm)
<input type="checkbox"/> C41	194.1	1544.53
<input type="checkbox"/> C42	194.2	1543.73
<input type="checkbox"/> C43	194.3	1542.94
<input type="checkbox"/> C44	194.4	1542.14
<input type="checkbox"/> C45	194.5	1541.35
<input type="checkbox"/> C46	194.6	1540.56
<input type="checkbox"/> C47	194.7	1539.77
<input type="checkbox"/> C48	194.8	1538.98
<input type="checkbox"/> C49	194.9	1538.19
<input type="checkbox"/> C50	195.0	1537.40
<input type="checkbox"/> C51	195.1	1536.61
<input type="checkbox"/> C52	195.2	1535.82
<input type="checkbox"/> C53	195.3	1535.04
<input type="checkbox"/> C54	195.4	1534.25
<input type="checkbox"/> C55	195.5	1533.47
<input type="checkbox"/> C56	195.6	1532.68
<input type="checkbox"/> C57	195.7	1531.90
<input type="checkbox"/> C58	195.8	1531.12
<input type="checkbox"/> C59	195.9	1530.33
<input type="checkbox"/> C60	196.0	1529.55

Example:

FRM220 - DW M X - 4 0 1 A - C 2 1 - C 2 4

→ (DWDM, Mux, 4ch, 100GHz, Single Fiber A Type, 1560.61, 1558.17 Grid Wavelength)

FRM220 - DW - - - -

Optional Accessories

■ SFP Transceiver

2.67Gbps dual fiber DWDM 100GHz SFP

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm) Power	Budget(dB)	Distance	DDMI	Temp.
SFS-9120-DW-Cxx	C17~C61	SMF	0~+4	-30	30	120km	✓	0~70

10Gbps Ethernet, SONET OC192, SDH STM-64

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm) Power	Budget(dB)	Distance	DDMI	Temp.
SFS-1040-DW-CXX	C17~C61	SMF	+4~-1	<-16	15	40km	✓	0~70
SFS-1080-DW-CXX	C17~C61	SMF	+4~0	<-23	23	80km	✓	0~70



FRM220-CWMD

CWDM Mux/DeMux

The FRM220-CWMD Mux/DeMux are modular design cards that support ITU-T G.694.2 wavelengths between 1271nm to 1611nm in 20nm increments. The FRM220-CWMD 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-CWMD Mux/DeMux modules are available in 4, 8 and 16-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-CWMD modules are passive devices that require no external power. They can also be installed in an FRM220 powered chassis with a NMC management module¹ and can be managed using SmartView EMS device 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

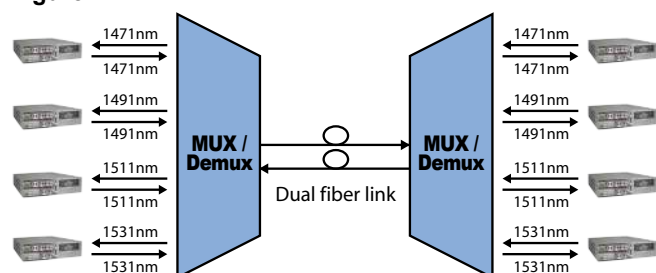
Specifications

Channel	4, 8 or 16 channels
Standards	ITU-T G.694.2
Wavelength	1271 ~ 1611nm
Insertion Loss	4ch < 1.8dB, 8ch < 3.0dB, 16ch < 3.6dB
Return Loss	>45dB
Option	Upgrade port Wide 1310 ± 50 nm
Line Link	Single fiber or two fiber
Connector	LC / UPC

Dimension	4ch : 155x 23 x88 mm (D x W x H) 8/16ch : 155x 42 x88 mm (D x W x H)
Weight	4ch : 200g 8/16ch : 380g
Temperature	0 ~ 50°C (Operating) -40 ~ 70°C (Storage)
Humidity	0 ~95% (non-condensing)
Certification	CE, FCC

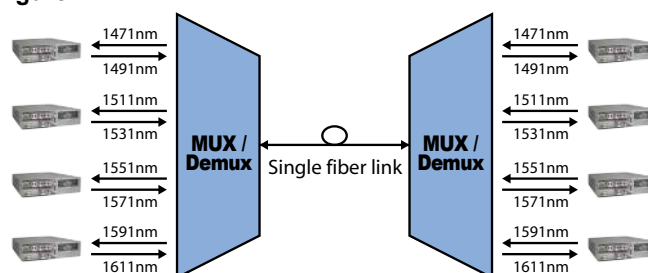
Application

Figure 1 :



4 channels Duplex Transmission CWDM Mux & Demux

Figure 2 :



4 channels Bi-Directional Transmission CWDM Mux & Demux

Related Products



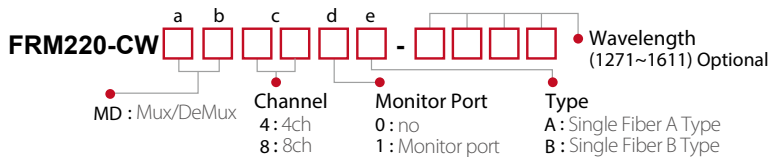
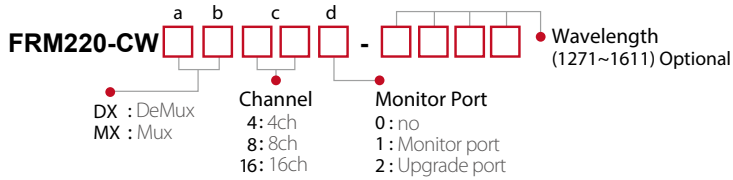
CWMD-180 (18 ch Dual Fiber CWDM Fiber Mux / DeMux. (Rackmount))



CWMD-80 & CWMD-40 (8/4 ch Single Fiber CWDM Fiber Mux / DeMux. (Standalone))

Ordering Information

Model Name	Description
	ab → DX : DeMux, MX : Mux, MD : Mux/DeMux
	c → 4: 4ch, 8: 8ch, 16: 16ch
FRM220-CWab-cde-xxxx	d → 0: no, 1: Monitor port, 2: 1x Upgrade Port
	e (only for MD Model) → A: Single Fiber A Type, B: Single Fiber B Type, Blank: Dual Fiber
	xxxx → Wavelength optional (1271~1611)



Order Code -Wavelength (Please ✓select all the apply from below list)

2	7	1271	2	9	1291	3	1	1311	3	3	1331	3	5	1351	3	7	1371	4	3	1431	4	5	1451
4	7	1471	4	9	1491	5	1	1511	5	3	1531	5	5	1551	5	7	1571	5	9	1591	6	1	1611
3	9	1391	4	1	1411	(Water peak wavelength)																	

Example:

- **4ch** : FRM220 - CW D X 4 0 - 2 7 3 3

→ (CWDM, DeMux, 4ch, 1271, 1291, 1311, 1331 Wavelength)

FRM220 - CW -

- **16ch** : FRM220 - CW M X 1 6 1 - 2 7 6 1

→ (CWDM, Mux, 16ch, Monitor port, 1271 - 1611 Wavelength)

FRM220 - CW -

- **4ch** : FRM220 - CW M D 4 1 - 2 7 3 3

→ (CWDM, Mux/DeMux, 4ch, Monitor port, Dual Fiber, 1271, 1291, 1311, 1331 Wavelength)

FRM220 - CW -

- **8ch** : FRM220 - CW M D 8 0 - 2 7 5 3

→ (CWDM, DeMux, 8ch, Single Fiber A Type, 1271, 1291, 1311, 1331, 1471, 1491, 1511, 1531 Wavelength)

FRM220 - CW -

Optional Accessories

■ SFP Transceiver

155Mbps CWDM Dual Fiber SFP / (LC Type) OC3/STM1/Fast Ethernet (RoHS)

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm) Power	Budget(dB)	Distance	DDMI	Temp.
SFS-5080-Cxx-DD	1470 ~ 1610	SMF	+3 ~ -4	-34	30	80km	✓	0~70
SFS-5080-Cxx-DD	1270 ~ 1450	SMF	+3 ~ -4	-34	30	80km	✓	0~70
SFS-5100-Cxx-DD	1470 ~ 1610	SMF	+5 ~ 0	-35	35	100km	✓	0~70
SFS-5100-Cxx-DD	1270 ~ 1450	SMF	+5 ~ 0	-35	35	100km	✓	0~70

1.25Gbps CWDM Dual Fiber SFP / (LC Type) Gigabit Ethernet / 1X Fiber channel(RoHS)

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm) Power	Budget(dB)	Distance	DDMI	Temp.
SFS-7040-Cxx-DD	1470~1610nm	SMF	+1~-4	-24	20dB	40km	✓	0~70
SFS-7040-Cxx-DD	1270~1450nm	SMF	+1~-4	-24	20dB	40km	✓	0~70
SFS-7080-Cxx-DD	1470~1610nm	SMF	+5~0	-27	24dB	80km	✓	0~70
SFS-7080-Cxx-DD	1270~1450nm	SMF	+5~0	-27	24dB	80km	✓	0~70
SFS-7120-Cxx-DD	1470~1610nm	SMF	+5~0	-32	32dB	120km	✓	0~70

2.67Gbps dual fiber CWDM SFP

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm) Power	Budget(dB)	Distance	DDMI	Temp.
SFS-9040-Cxx	1470~1610	SMF	-1~+4	-21	20	40km	✓	0~70
SFS-9080-Cxx	1470~1610	SMF	-2~+3	-28	26	80km	✓	0~70
SFS-9100-Cxx	1470~1610	SMF	0~+5	-30	30	100km	✓	0~70

10Gbps CWDM dual fiber SFP+ 10G Ethernet, SONET OC192, SDH STM-64

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm) Power	Budget(dB)	Distance	DDMI	Temp.
SFS-1040-CXX-DD	1470~1610nm	SMF	+4~-1	<-16	15	40km	✓	0~70
SFS-1080-CXX-DD	1470~1610nm	SMF	+4~0	<-23	23	80km	✓	0~70
SFS-1030-CXX-DD	1270~1450nm	SMF	+4~-1	<-15	14	30km	✓	0~70
SFS-1060-CXX-DD	1270~1450nm	SMF	+4~0	<-22	22	60km	✓	0~70



4

Optical Add-Drop Multiplexer FRM220-OADM

- # Optical Add-Drop Multiplexer FRM220-OADM

Optical Add-Drop Multiplexer FRM220-OADM

Optical Add-Drop Multiplexer FRM220-OADM

Optical Add-Drop Multiplexer FRM220-OADM



Optical Add-Drop Multiplexer FRM220-OADM

Optical Add-Drop Multiplexer FRM220-OADM

Optical Add-Drop Multiplexer FRM220-OADM

NEW



FRM220-100G-3R

100G QSFP28 to QSFP28 Transponder

The FRM220-100G-3R is a 100G QSFP28 to QSFP28 3R transponder that provides media conversion and distance extension for 100G Ethernet links. The FRM220-100G-3R is developed for high capacity and long-distance optical transport solutions. It is a highly integrated platform for providing a unified 100G optical transport layer, supporting various 100G client services including 100GBASE-LR4/100GBASE-ER4 and 100GBASE-SR10. The FRM220-100G-3R is hot-swappable with two QSFP28 sockets for 100G QSFP28 transceivers. The installation and setup are simple plug and play. The FRM220-100G-3R can be inserted into any powered FRM220- CH20, CH08, CH04 chassis or CH02M, CH02/SMT standalone chassis with QSFP28 transceivers required for the application.

Features

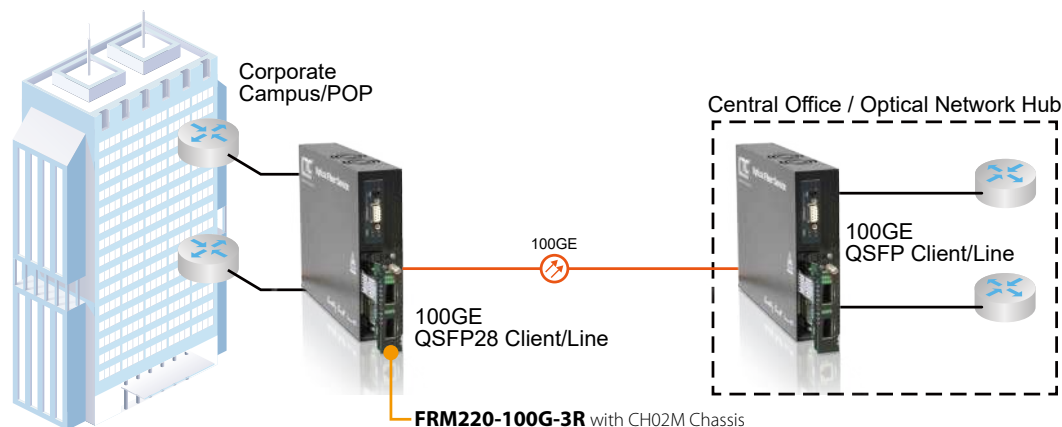
- Device management via FRM220 chassis with NMC
- Supports 100G repeater mode or Quad 25G optical multiplexer mode
- 100G link interface -- IEEE:100G QSFP28-SR4/LR4/ER4
- QSFP28 ports for flexibility and scalability
- Hot-swap support (module and interfaces)
- Supports 2x 100G QSFP28
- Supports DMI function for QSFP28 module
- Supports Loopback test function
- 3R function.

Specifications

Equipment function	3R Transponder (Regenerator, Reshaper, Retimer)
Protocol	100GbE
Forward Error Correction Modes	RS-FEC
Line Interface	QSFP28
Client Interface	QSFP28
Transmission Distance	Up to QSFP28 module

Power requirement	Power input 12VDC Power consumption: <12W
Work Environment	Operating Temperature 0 ~ 50°C Storage Temperature -10 ~ 70°C Humidity 5 ~ 90% (non-condensing)
Weight	300g
Dimension	Card : 155 × 46 × 88mm (D × W × H)

Application



Ordering Information

Model Name	Description
FRM220-100G-3R	100G 3R QSFP28 to QSFP28 transponder card

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



FRM220-40G-2Q

40G 3R Transponder

The FRM220-40G-2Q is a 40G QSFP+ to 40G QSFP+ 3R transponder that provides media conversion and distance extension for 40G Ethernet links. The FRM220-40G-2Q meets the growing need for more bandwidth for data centers and enterprises. The emergence of high-end servers and Ethernet switches with 40G Ethernet interfaces increases the need for media conversion (multi-mode to single-mode) and link range (single-mode to single mode) extension. The FRM220-40G-2Q is hot-swappable with two QSFP+ sockets for 40G QSFP+ transceivers. The installation and setup is simple plug and play. The FRM220-40G-2QP can be inserted into any powered FRM220-CH20, CH08, CH04 chassis or CH02M, CH02/SMT standalone chassis with QSFP+ transceivers required for the application.

Features

- Device management via FRM220 chassis with NMC
- Supports 40G repeater mode or Quad 10G optical multiplexer mode
- 40G link interface --Ethernet/IEEE: 802.3ba 40GE-SR4/LR4/ER4
- 40G multi-link (fiber) interfaces --Ethernet/IEEE: 802.3ba XLAUI and OIF: CEI-11G
- QSFP+ ports for flexibility and scalability
- Supports hot-swapping (module and interfaces)
- Supports jumbo frame
- Supports DMI function for QSFP+ fiber module
- RoHS compliant and Lead-Free
- Supports loopback test function
- 3R function (Regenerator, Reshaper, Retimer)

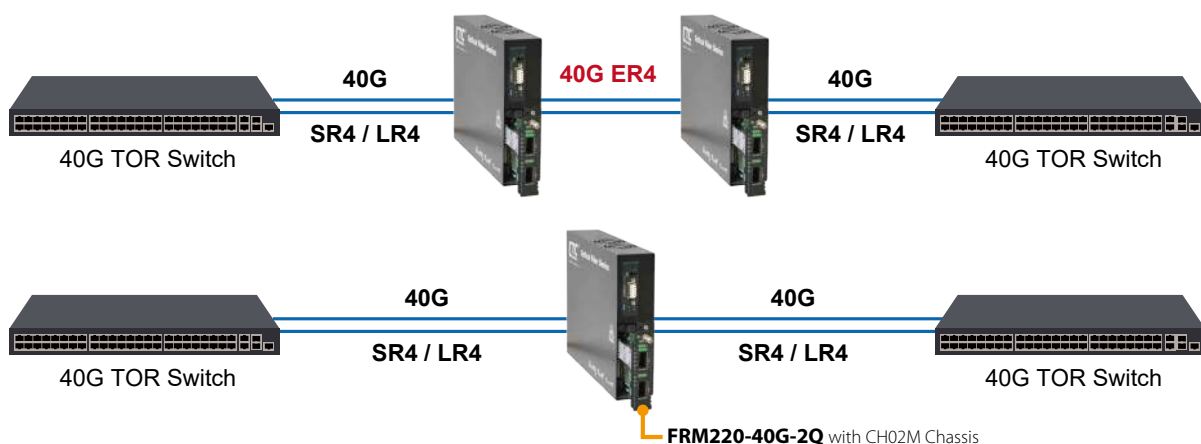
Specifications

Equipment function	3R Transponder (Regenerator / Reshaper / Retimer)
Protocol	Multiple functions in one module: 40G converter/repeater—Quad 10G optical multiplexer 40G link interface Ethernet/IEEE 802.3ba 40GE-SR4/LR4/ER4 10G interface: 9.95 ~ 11.3125Gbps
Access Type	40G Ethernet
Interface Type	QSFP+
Transmission Distance	Up to QSFP+ module

Power requirement	Power input 12VDC Power consumption: ≤12W
Work Environment	Operating Temperature 0 ~ 50°C Storage Temperature -10 ~ 70°C Humidity 5 ~ 90% (non-condensing)
Weight	130g
Dimension	Card: 155 × 20.8 × 88mm (D × W × H)

Application

40G SR4/LR4/ER4 P to P application



Ordering Information

Model Name	Description
FRM220-40G-2Q	40G QSFP+ to 40G QSFP+ 3R transponder card (optional 40G QSFP+ module)

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



FRM220-40G-1Q4S

40G QSFP+ to 4x 10G SFP+ Transponder

The FRM220-40G-1Q4S is a 40G QSFP+ to 4x 10G SFP+ transponder that provides media conversion and distance extension for 40G over 10G links. The FRM220-40G-1Q4S meets the growing need for more bandwidth for data centers and enterprises. The emergence of high-end servers and Ethernet switches with 40G Ethernet interfaces increases the need for media conversion (multi-mode to single-mode) and link range extension. The FRM220-40G-1Q4S is a two slot wide hot-swappable card with one QSFP+ slot for QSFP+ 40G transceiver and four SFP+ slots for SFP+ 10G transceivers. The installation and setup is simple plug and play. The FRM220-40G-1Q4S can be inserted into any powered FRM220-CH20 chassis with QSFP+ and SFP+ transceivers required for the application.

Features

- Device Management via FRM220 Chassis with NMC
- Multiple functions in one module: 40G converter/repeater and Quad 10G optical multiplexer
- 40G link interface --Ethernet/IEEE: 802.3ba 40GE-LR4
- 40G multi-link (fiber) interfaces --Ethernet/IEEE: 802.3ba XLAUI and OIF: CEI-11G
- QSFP+ ports for flexibility and scalability
- Hot-swap support (module and interfaces)
- Supports 1x 40G QSFP+ and 4x 10G SFP+
- Supports DMI function for QSFP+ & SFP+ module
- Supports Loopback test function
- 3R function.

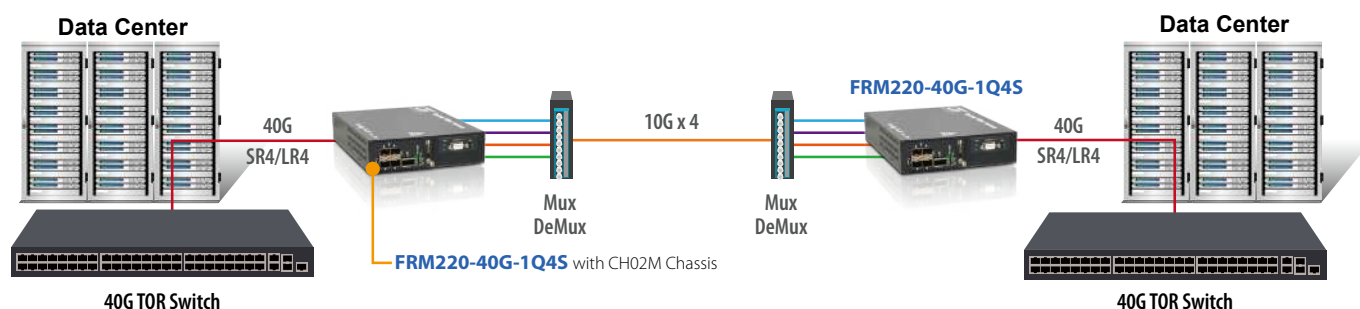
Specifications

Equipment function	3R Transponder, Regenerator, Reshaper, Retimer
Data Rate	Aggregate Data Rate 32 - 56.8 Gbps
	Data Rate per Lane 8 - 14.2 Gbps
Protocol	CPRI x 16
	STM - 64
	OC - 192
	FC8, FC10
	10G Ethernet
Interface Type	40Gbps : QSFP+ (1 port), 10Gbps : SFP+ (4 ports)

Transmission Distance	depends on QSFP+ & SFP+ module
Power requirement	Power input 12VDC
	Power consumption: ≤12W
Work Environment	Operating Temperature 0 ~ 50°C
	Storage Temperature -10 ~ 70°C
	Humidity 10 ~ 90% (non-condensing)
Weight	170g
Dimension	Card: 155 x 46 x 88mm (D x W x H)

Application

40G SR4/LR4 P to P application



Ordering Information

Model Name	Description
FRM220-40G-1Q4S	40G converter/repeater, Quad 10G Optical Multiplexer module with QSFP Interfaces (optional SFP+, QSFP+)

Note: This card MUST be placed in CH02M chassis with fan. For SNMP management, place this card in CH04A chassis.

NEW



FRM220-25G-3R

25G Ethernet 3R Transponder

The FRM220-25G-3R has 4x SFP28 slots that can be configured as a dual channel 25G 3R multi-rate transponder. The device provides a flexible transmission of various protocols, such as 1G/10G/25G Ethernet. Using SFP28 ports with dedicated CWDM or DWDM wavelengths, the 25G transponder supports multi-rate functionality with optical data rates from 1Gbps up to 25Gbps. With its functionality the FRM220-25G-3R transponder is also suitable as a repeater for transmission over extended distances. In addition, the use of state-of-the-art components greatly reduces the power requirements and heat dissipation factors over our previous transponders.

Features

- Multi-rate supports GbE, 10GbE, 25GbE
- Protocol Transparent 3R fiber Media Transponder / Repeater
- Supports dual channels
- Supports Loopback Test
- Support FEC (RS-FEC) , Non-FEC
- Support BERT test
- Supports 1550nm ITU-T C-band tunable DWDM SFP+ Transceiver
- SFP DDM Information
- Firmware Upgrade
- Setting from Console, NMC

Specifications

Optical Interface	Connector	LC (SFP+, SFP)
	Wavelength	CWDM 1271 ~ 1611nm (10G)
Operation mode	Dual channel mode : Ch 1 SFP1 line / SFP2 client. Ch2 SFP3 line/ SFP4 client.	
Protocol	Ethernet 1GE, 10GE, 25GE	
Regeneration	Re-Amplification, Re-Shaping, Re-Timing	
Indication	LED	Power, System, Mode, Test, FX1 Link, FX2 Link, FX3 Link, FX4 Link
Power	Input	12V / 1A
	Power Consumption	< 8W

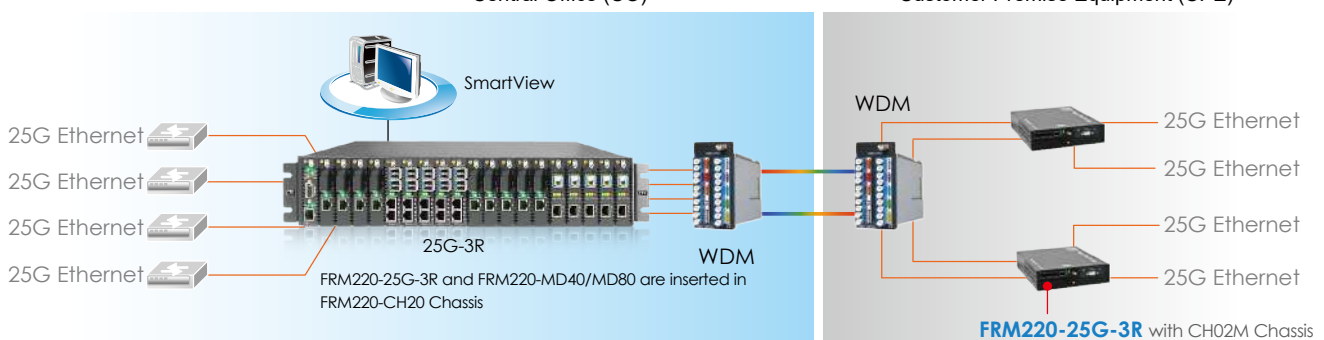
Size	Dimensions	Card: 155 × 20.8 × 88mm (D × W × H)
	Weight	150g
Environment	Operating Temperature	0 ~ 50°C
	Storage Temperature	-10 ~ 70°C
	Humidity	10 ~ 90%
	Certification	CE, FCC
	MTBF	65000 hrs

Application

25G-3R CWDM P to P application

Central Office (CO)

Customer Premise Equipment (CPE)



Ordering Information

Model Name	Description
FRM220-25G-3R	2ch 25G Ethernet 3R multi-rate transponder card (optional SFP28)

Note: This card may be placed in CH02M, CH01M or CH04A chassis with fan. For SNMP management, place this card in CH02/NMC or CH04A Chassis.



FRM220-16G-3R

16G 3R Multi-rate Transponder

The FRM220-16G-3R has 4 SFP+ slots that can be configured as a dual channel 16G 3R multi-rate transponder or in a 1-to-2 port protection mode. The device provides a flexible transmission of various protocols, such as 1G/10G Ethernet, SDH STM16/STM64, OTU1/OTU1e/OTU2/OTU2e, Fiber Channel 1/2/4/8/10/16, ODU, OBSAI, CPRI, etc. Using SFP+ ports with dedicated CWDM or DWDM wavelengths, the 16G transponder supports multi-rate functionality with optical data rates from 1Gbps up to 14Gbps. With its functionality the FRM220-16G-3R transponder is also suitable as a repeater for transmission over extended distances. In addition, the use of state of the art components greatly reduces the power requirements and heat dissipation factors over our previous transponders.

Features

- Multi-rate supports 1Gbps ~ 14Gbps
- Protocol Transparent 3R fiber Media Transponder / Repeater
- Supports 1+1 Optical Line Protection, switching time <50ms
- Supports 2 channels with different bit rate
- Supports Loopback Test
- Supports 1550nm ITU-T C-band tunable DWDM SFP+ Transceiver
- SFP DDM Information
- Firmware Upgrade
- Setting from DIP Switch, Console, NMC

Specifications

Optical Interface	Connector	LC (SFP+, SFP)
	Wavelength	CWDM 1271 ~ 1611nm DWDM 1529.5~1565.50nm
Operation mode	Dual channel mode : Ch 1 SFP1 line / SFP2 client. Ch2 SFP3 line/ SFP4 client. Protection mode : SFP1 line / SFP2, SFP3 client	
Protocol	SONET	OC-12, OC-24, OC-48, OC-192
	SDH	STM-4, STM-16, STM-64
	Ethernet	1G, 2.5G, 10G
	OTU	10GE OTU2e, 10GE OTU1e, STM-64 OTU2, STM-16 OTU1, 10GFC OTU2
	ODU	10GE ODU2e, 10GE ODU1e, STM-64 ODU2, STM-16 ODU1
	OBSAI	OBSAI x1, x2, x4, x8
	CPRI	CPRI x1, x2, x4, x5, x8, x10, x16, x20
	Fiber Channel	1/ 2/4/8/10/16G FC
	SDI/Other	HD-SDI, 3G-SDI, 6G-SDI, 12G-SDI

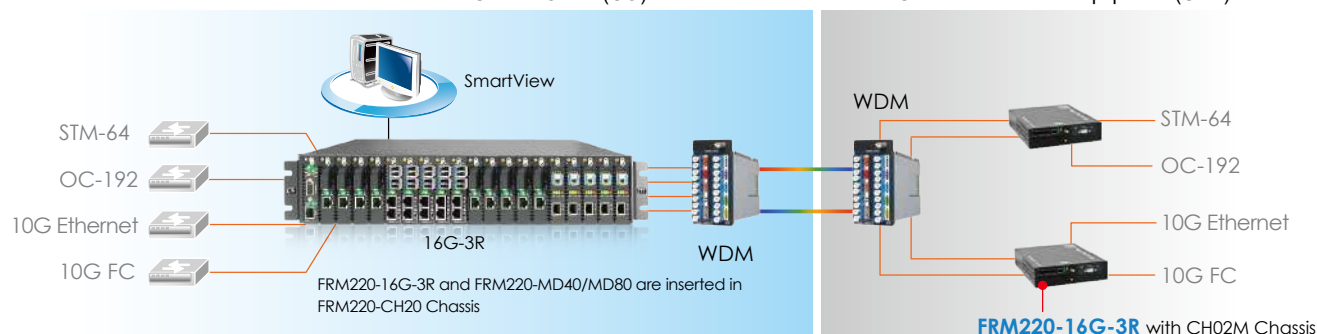
Regeneration	Re-Amplification, Re-Shaping, Re-Timing	
Indication	LED	Power, System, Mode, Test, FX1 Link, FX2 Link, FX3 Link, FX4 Link
Power	Input	12V / 1A
	Power Consumption	< 8W
Size	Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)
	Weight	150g
Environment	Operating Temperature	0 ~ 50°C
	Storage Temperature	-10 ~ 70°C
	Humidity	10 ~ 90%
	Certification	CE, FCC
	MTBF	65000 hrs

Application

16G-3R CWDM P to P application

Central Office (CO)

Customer Premise Equipment (CPE)



Ordering Information

Model Name	Description
FRM220-16G-3R	2 Channels 16Gbps 3R Multi-rate transponder card (optional SFP+)

Note: This card may be placed in CH02M, CH01M or CH04A chassis with fan. For SNMP management, place this card in CH02/NMC or CH04A Chassis.



FRM220-10G-3R

10G 3R Multi-rate Transponder with Optical Line Protection

The FRM220-10G-3R has 4 SFP+ slots that can be configured as a dual channel 10G 3R multi-rate transponder or in a 1-to-2 port protection mode. The device provides a flexible transmission of various protocols, such as 1G/10G Ethernet, SDH STM16/STM64, OTU1/OTU1e/OTU2/OTU2e, Fiber Channel 1/2/4/8/10, OBSAI, CPRI, etc. Using SFP+ ports with dedicated CWDM or DWDM wavelengths, the 10G transponder supports multi-rate functionality with optical data rates from 1Gbps up to 10Gbps. With its functionality the FRM220-10G-3R transponder is also suitable as a repeater for transmission over extended distances. In addition, the use of state of the art components greatly reduces the power requirements and heat dissipation factors over our previous transponders.

Features

- Multi-rate supports 1Gbps ~ 10Gbps
- Protocol Transparent 3R fiber Media Transponder / Repeater
- Supports 1+1 Optical Line Protection, switching time <50ms
- Supports 2 channels with different bit rate
- Supports Loopback Test.
- Supports 1550nm ITU-T C-band tunable DWDM SFP+ Transceiver
- SFP DDM Information
- Firmware Upgrade
- Setting from DIP Switch, Console, NMC

Specifications

Optical Interface	Connector	LC (SFP+, SFP)
	Wavelength	CWDM 1271 ~ 1611nm DWDM 1529.5~1565.50nm
Operation mode	Dual channel mode : Ch 1 SFP1 line / SFP2 client. Ch2 SFP3 line/ SFP4 client. Protection mode : SFP1 line / SFP2, SFP3 client	
Protocol	SONET	OC-12, OC-24, OC-48, OC-192
	SDH	STM-4, STM-16, STM-64
	Ethernet	1G, 2.5G, 10G
	OTU	10GE OTU2e, 10GE OTU1e, STM-64 OTU2, STM-16 OTU1, 10GFC OTU2
	ODU	10GE ODU2e, 10GE ODU1e, STM-64 ODU2, STM-16 ODU1
	OBSAI	OBSAI x1, x2, x4, x8
	CPRI	CPRI x1, x2, x4, x5, x8, x10, x16, x20
	Fiber Channel	1/ 2/4/8/10G FC
	SDI/Other	HD-SDI, 3G-SDI, 6G-SDI, 12G-SDI

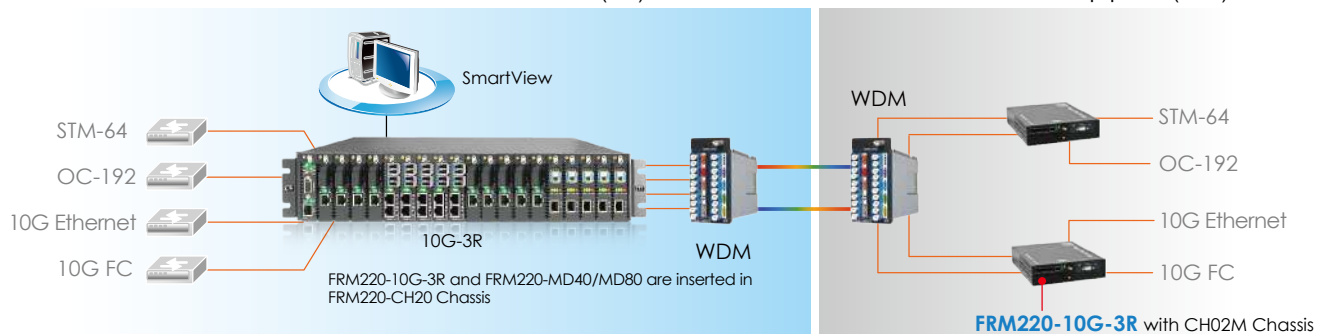
Regeneration	Re-Amplification, Re-Shaping, Re-Timing	
Indication	LED	Power, System, Mode, Test, FX1 Link, FX2 Link, FX3 Link, FX4 Link
Power	Input	12V / 1A
	Power Consumption	< 8W
Size	Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)
	Weight	150g
Environment	Operating Temperature	0 ~ 50°C
	Storage Temperature	-10 ~ 70°C
	Humidity	10 ~ 90%
	Certification	CE, FCC
	MTBF	65000 hrs

Application

10G-3R CWDM P to P application

Central Office (CO)

Customer Premise Equipment (CPE)



Ordering Information

Model Name	Description
FRM220-10G-3R	2 Channels 10Gbps 3R Multi-rate transponder card (optional SFP+)

Note: This card may be placed in CH02M, CH01M or CH04A chassis with fan. For SNMP management, place this card in CH02/NMC or CH04A Chassis.



FRM220-4G-3R

4G 3R Multi-rate Transponder

The FRM220-4G-3R has 4 SFP slots that can be configured as a dual channel 4G 3R multi-rate transponder or in a 1-to-2 port protection mode. The device provides a flexible transmission of various protocols, such as 1G Ethernet, SDH STM-16, OC-24, OC-48, Fiber Channel 1/2/4, OBSAI, CPRI, etc. Using SFP ports with dedicated CWDM or DWDM wavelengths, the FRM220-4G-3R transponder supports multi-rate functionality with optical data rates from 1Gbps up to 4.25Gbps. With its functionality the FRM220-4G-3R transponder is also suitable as a repeater for transmission over extended distances. In addition, the use of state of the art components greatly reduces the power requirements and heat dissipation factors over our previous transponders.

Features

- Multi-rate supports 1Gbps ~ 4.25Gbps
- Protocol Transparent 3R fiber Media Transponder / Repeater
- Supports 1+1 Optical Line Protection, switching time <50ms
- Supports 2 channels with different bit rate
- Supports Loopback Test
- SFP DDM Information
- Firmware Upgrade
- Setting from DIP Switch, Console, NMC

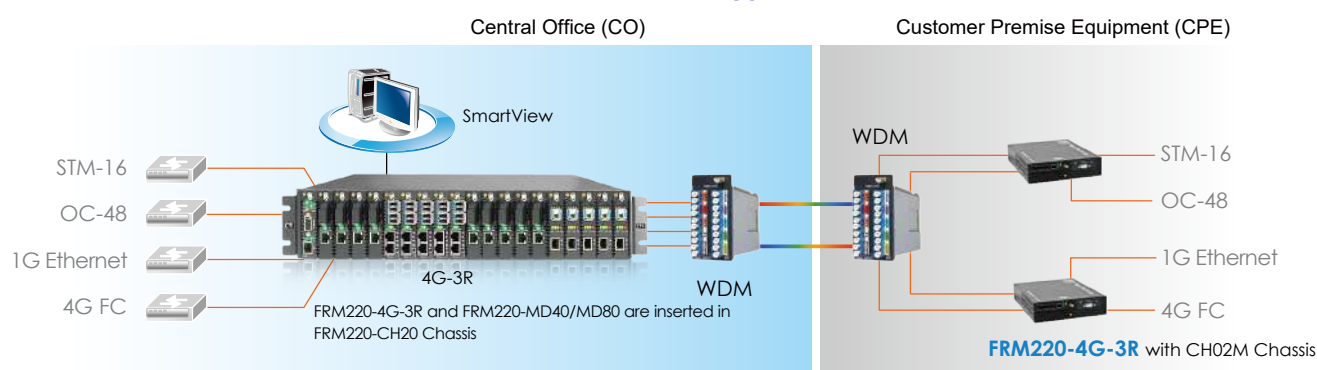
Specifications

Optical Interface	Connector	LC (SFP)
	Wavelength	CWDM 1271 ~ 1611nm DWDM 1529.5~1565.50nm
Operation mode	Dual channel mode : Ch 1 SFP1 line / SFP2 client. Ch2 SFP3 line/ SFP4 client.	
	Protection mode : SFP1 line / SFP2, SFP3 client	
Protocol	SONET	OC-12, OC-24, OC-48
	SDH	STM-4, STM-16
	Ethernet	1G
	OBSAI	OBSAI x1, x2, x4
	CPRI	CPRI x1, x2, x4, x5
	Fiber Channel	1/ 2/4G FC
	SDI/Other	HD-SDI, 3G-SDI
Regeneration	Re-Amplification, Re-Shaping, Re-Timing	

Indication	LED	Power, System, Mode, Test, FX1 Link, FX2 Link, FX3 Link, FX4 Link
	Power	Input 12V / 1A
Power	Power Consumption	< 8W
	Size	Dimensions Card: 155 x 20.8 x 88mm (D x W x H)
Size	Weight	150g
	Environment	Operating Temperature 0 ~ 50°C
Environment	Storage Temperature	-10 ~ 70°C
	Humidity	10 ~ 90%
	Certification	CE, FCC
	MTBF	65000 hrs

Application

4G-3R CWDM P to P application



Ordering Information

Model Name	Description
FRM220-4G-3R	2 Channels 4Gbps 3R Multi-rate transponder card (optional SFP)

Note: This card may be placed in CH02M, CH01M or CH04A chassis with fan. For SNMP management, place this card in CH02M/SMT or CH04A Chassis.



FRM220-4G-3S

4G 2R Multi-rate Transponder
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

- Multi-rate supports 28Mbps to 4.25Gbps
- 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, switching time < 50ms
- Link Fault Pass-Through (LFPT)
- Auto Laser Shutdown (ALS)
- Detect transceiver transmitter alarm

Specifications

Optical Interface	Connector	SFP LC
	Protocol	OC -3, OC -6, OC -12, STM-1, STM-4, STM-16, FC -1, FC -2, FC -4
	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 1471 ~ 1611nm

Indications	LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input	12VDC
Power Consumption	< 12W
Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	65,000 hrs

Application

Managed 4G 2R transponder with fiber protection application



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 card with fiber protection (optional SFP module)

Note: This card may be set by DIP switch and placed in CH02M chassis with fan, or set by serial console if placed in CH01M chassis.



FRM220-1000DS

1G 2R Multi-rate 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 and 1000Mbps Gigabit Ethernet, STM-1, Fiber Channel 1 and OC3. 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, fiber link status and SFP DOM.

Features

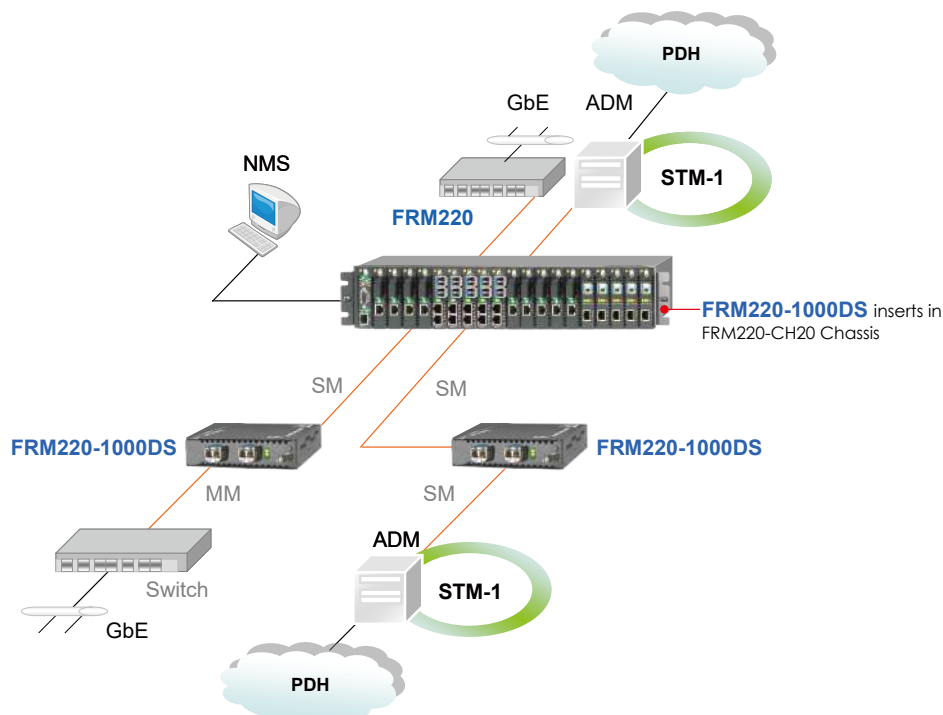
- Transparent FE or GbE fiber media converter / repeater
- Data rate up to 1G
- Device management via terminal or SNMP in FRM220 chassis
- Extend transmission from 2km to 120km over fiber
- Perform optical repeater function (Re-amplification & Reshaping)
- Digital diagnostic monitoring of SFP modules
- Supports Link Fault Pass-Through LFTP function
- Supports Auto Laser Shutdown (ALS) function

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	< 6W
Dimensions	Card: 155 x 20.8 x 88 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
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-1000DS	1000Base-X SFP to 1000Base-X SFP media converter card (Optional SFP)

Note: This Card is suitable for use in CH01 standalone chassis

NEW



AKA: FRM220-MP7G1X

FRM220-TM-10GMux

7x 1 GE to 10G Muxponder

The FRM220-TM-10GMux is a 7x 1GE to 10G Muxponder. Based on TDM technology, the Muxponder transports seven separate Gigabit Ethernet data streams into a 10 Gbps SFP+ Based trunk port. This solution provides significant cost reduction and excellent fiber utilization when compared to CWDM optical multiplexing. The FRM220-TM-10GMux incorporates 7x 1GE SFP based access interfaces that can accommodate various types of SFP. Such as Multi-mode, Single mode and 1Gbps copper SFPs. The trunk port is a SFP+ 10Gbps permitting flexible connectivity options between the Muxponders either in a WDM system or directly between two devices. Two types of housings are available for installation in a 19" FRM220 chassis. 20 slots are provided by using the FRM220-CH20 chassis 2U while the FRM220-CH08 1U supports up to 8 modules. Both housings can be monitored and configured through SNMP, Web GUI or Telnet using a NMC management module.

Features

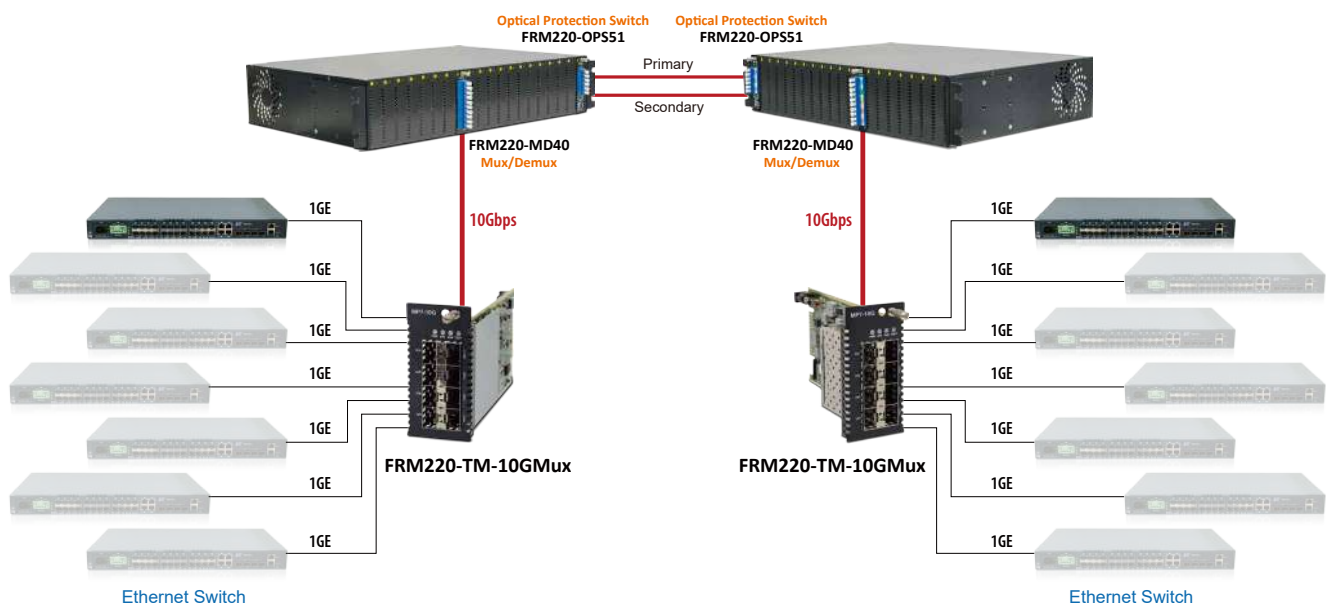
- 7x 1 GE to 10G
- 10 Gbps trunk port rate
- Network management via NMC
- Remotely activated local or remote loopback
- 7 independent 1 GE services over 10G trunk port
- Supports ITU-T C-band tunable DWDM SFP+ transceiver
- SFP+ digital diagnostics monitoring
- Hot swappable
- In-Band management

Specifications

Access Data Rate	1G Ethernet
Trunk Data Rate	10Gbps
Optical parameters	1.25G SFP/ 10G SFP+
Operating Temperature	0 ~ 55°C
Storage Temperature	-10 ~ 80°C

Relative Humidity	10 ~ 90% (non-condensing)
Dimension	Card: 155 x 46 x 88mm (D x W x H)
Weight	300g
Connectors	7x SFP-LC & 1x SFP+ LC
Power Consumption	12W

Application



Ordering Information

Model Name	Description
FRM220-TM-10GMux	7x 1GE (SFP) to 10G (SFP+) muxponder card (optional 10G SFP+ / GE SFP module)

Note: This card MUST be placed in CH02M chassis with fan. For SNMP management, place this card in CH04A chassis.



FRM220-OPS51M

1:1 Multi-mode Optical Protection Switch

The FRM220-OPS51M is a Multi-mode Fiber Optical Protection Switch that is able to provide Multi-mode fiber path redundancy on a channel by channel basis. This unit is particularly well suited for protection in 50/125um Multi-mode 850nm type of fiber data transmission. This solution includes monitoring capabilities for the working fiber only. In case of a fiber cut in the active path, traffic will be switched over to the protected path in less than 50ms. Monitoring is available through SNMP Management when both 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

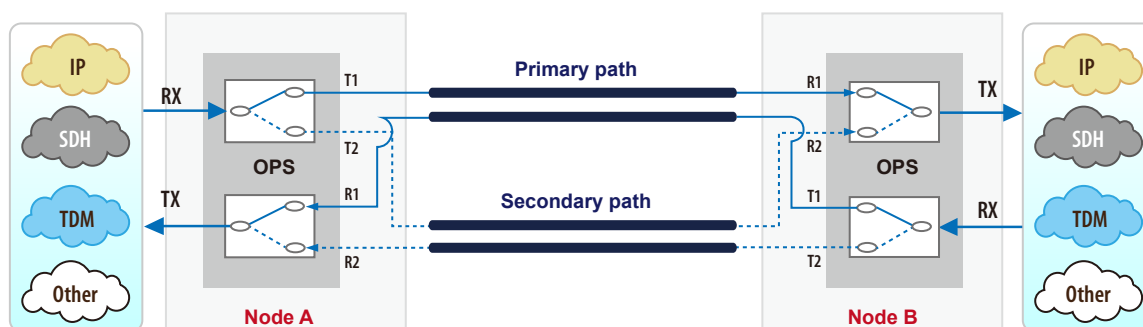
- Latch feature, if power is lost the switch remains in its current state
- Work with Multi-mode 850 wavelength
- Traffic is switched in one of two modes : non-revertive, manual
- Programmable RX threshold setting for switch-over
- Optical interface type : LC connector
- Working and protected lines are physically separated fiber
- High channel isolation
- Highly stable and reliable

Specifications

Connector LC / PC	LC / PC
LEDs	Power System, Working Path, Protection Path, Work mode
Power	DC 12V In
Operating Wavelength	850nm
Fiber Type	Multimode 50/125um
Switch Type	2x1 / Latching
Input Power (Optical)	-30~5dBm
Insertion Loss	≤ 3dB (Pair)
Return Loss	≥ 30dB (SM)

Cross-talk	≥ 30dB (SM)
Restoration Time	≤ 20ms
Power Consumption	< 3W
Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	5%RH to 95%RH non-condensing
Certification	CE, FCC
MTBF	65,000 hours

Application



Ordering Information

Model Name	Description
FRM220-OPS51M	1:1 multi-mode fiber optical line protection switch card, dual fiber on WAN port, LC/PC connector

Note: This card must use CH01M, with serial console, to configure standalone settings.
For SNMP management, place this card in CH02/NMC or CH04A Chassis.



FRM220-OPS51 FRM220-OPS52

Fiber Optical Protection Switch

The FRM220-OPS Series are 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, including CWDM & DWDM links. The OPS52 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 50ms (FRM220-OPS51) or 20ms (FRM220-OPS52). Monitoring is available through SNMP Management when both 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

- Latch feature, if power is lost the switch remains in its current state
- Protection transition < 50 ms (FRM220-OPS51)
- Protection transition < 20 ms (FRM220-OPS52)
- Works with any combination of 1 ~16 wavelengths
- Traffic is switched in one of three modes : revertive, non-revertive, manual (OPS52) or non-revertive, manual (OPS51)
- Programmable Rx threshold setting for switch-over
- Optical Interface Type : LC connectors
- Working and protected lines are physically separated fiber

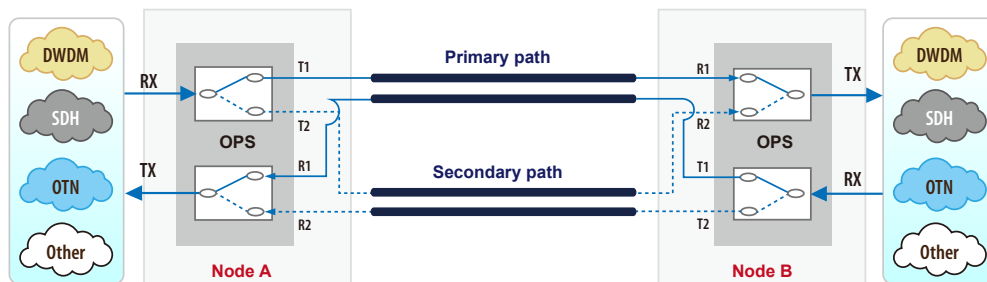
Specifications

Connector	LC/PC
LEDs	Power System, Working Path, Protection Path, Work mode
Power	DC 12V In
Operating Wavelength	1261 ~ 1621
Switch Type	2x1 / Latching
Input Power (Optical)	-35~5dBm
Accuracy	≤ 2dBm
Insertion Loss	≤ 3dB (Pair) (FRM220-OPS51), ≤ 5.5dB (Pair) (FRM220-OPS52)
Return Loss	≥ 45dB
Cross-talk	≥ 60dB

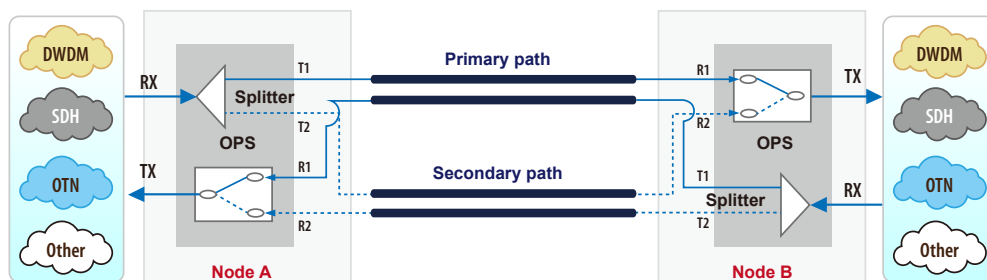
Polarization Dependent Loss (PDL)	≤ 0.1dB
Input Power Sensitivity	-35dBm
Restoration Time	≤20ms
Power Consumption	< 3W
Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	5%RH to 95%RH non-condensing
Certification	CE, FCC
MTBF	65,000 hours

Application

FRM220-OPS51 Working Theory



FRM220-OPS52 Working Theory



Ordering Information

Model Name	Description
FRM220-OPS51	1:1 optical line protection switch card, dual fiber on WAN port, LC/PC connector
FRM220-OPS52	1+1 optical line protection switch card, dual fiber on WAN port, LC/PC connector

Note: This card must use CH01M, with serial console, to configure standalone settings. For SNMP management, place this card in CH02/NMC or CH04A Chassis.

Naming Rule

FRM220-OPS5

- Optical Switch Mode
- 1: 1:1 OPS
- 2: 1+1 OPS

NEW



FRM220-OAB21A

Single Channel EDFA Booster

The FRM220-OAB21A is a single channel optical amplifier/booster module that provides multi-function, low noise, Erbium-Doped Fiber Amplifier (EDFA) solutions for metro Dense Wavelength Division Multiplexing (DWDM) applications. The FRM220-OAB21A operates at the transmission side of the link. It features high input power, high output power, and medium optical gain and is designed to amplify aggregated optical input power for reach extension. The FRM220-OAB21A provides Automatic Gain Control (AGC) via rack management or RS-232 console interface. Its fast-transient suppression feature allows the output power to be kept at a constant level when there are fast changes in input power.

Features

- Automatic Gain Control (AGC)
- Advanced performance monitoring
- Input and output power levels
- Up to 21 dBm output power
- Gain flattening filters (GFF) assure flat gain (<0.75 dB variance) over the entire amplified C-band.
- LC/UPC connector
- Hot-swap support
- Single channel EDFA with FRM220 chassis rack management

Applications

- Metropolitan WAN network system
- C-Band DWDM network system
- CATV transmission system

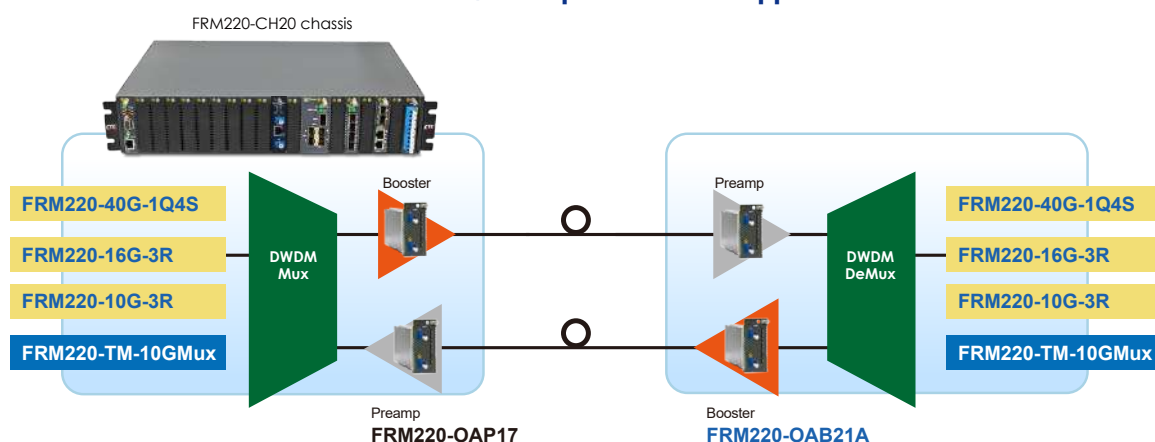
Specifications

Operating wavelength	1528 ~ 1563nm
Input power	-20 ~ +5dBm
Signal gain	15 ~ 25dB
Total output power	-5 ~ +21dBm
Total saturated output power	+21dBm
Gain flatness (Max.)	≤ ±0.75dB
Noise figure	5.5dB (Typ.)
Polarization dependent gain (Max.)	0.5dB
Polarization mode dispersion (Max.)	0.5ps

Output power stability (Max.)	±0.1dB
Return loss (Min.)	45dB
Connector	LC/UPC
Control mode	AGC
Operation case temperature	0 ~ 65°C
Relative humidity (non-condensing)	5 ~ 85%
Laser Class	Class 1M
Power consumption	14W

Application

EDFA booster/Preamp DWDM P to P application



Ordering Information

Model Name	Description
FRM220-OAB21A	DWDM C-band EDFA booster card 21dBm with automatic gain control (AGC)

Note: This card must use CH02M, with serial console, to configure standalone settings. For SNMP management, place this card in CH02/NMC or CH04A Chassis.

Single Channel EDFA Preamplifier

4

- Automatic Gain Control (AGC)
- Advanced performance monitoring
- Input and output power levels
- Up to 17 dBm output power

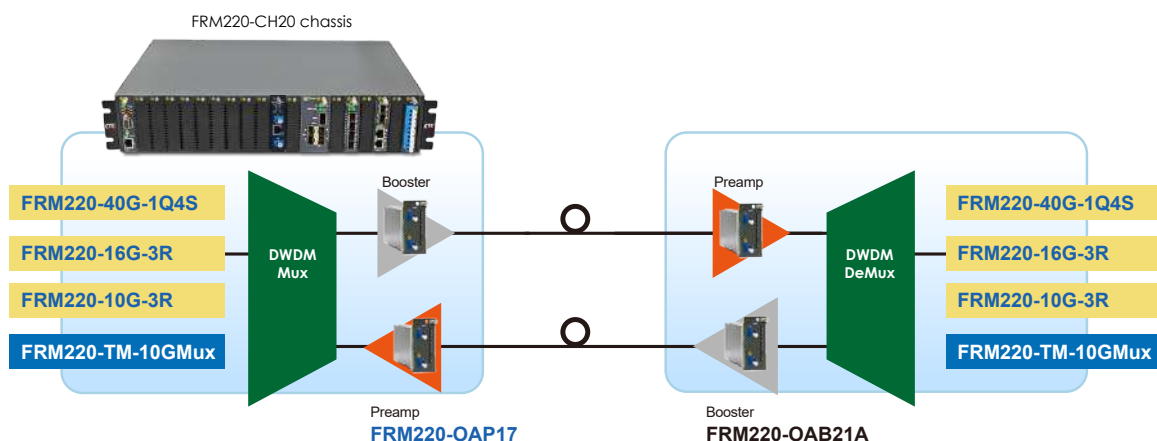
- Gain flattening filters (GFF) assure flat gain (<1dB variance) over the entire amplified C-band.
- LC/UPC connector
- Hot-swap support
- Single channel EDFA with FRM220 chassis rack management

- Metropolitan WAN network system
- C-Band DWDM network system
- CATV transmission system

Operating wavelength	1528 ~ 1563nm
Input power	-35 ~ -10dBm
Signal gain	25 ~ 35dB
Total saturated output power	+17dBm
Gain flatness (Max.)	≤ ±1.0dB
Noise figure	5.5dB (Typ)
Polarization dependent gain (Max.)	0.5dB
Polarization mode dispersion (Max.)	0.5ps

Output power stability (Max.)	±0.1dB
Return loss (Min.)	45dB
Connector	LC/UPC
Control mode	AGC
Operation case temperature	0 ~ 65°C
Relative humidity (non-condensing)	5 ~ 85%
Laser Class	Class 1M
Power consumption	10W

EDFA booster/Preamp DWDM P to P application



Model Name	Description
FRM220-OAP17	DWDM C-band EDFA preamp card 17dBm with automatic gain control (AGC)

Optical Amplifiers Preamp FRM220-OAP17

NEW



FRM220A-GSW40S

4-port 100/1000Base-X SFP Managed Switch

The FRM220A-GSW40S is a managed Gigabit Ethernet slide-in card switch designed with 4-port 100/1000Base-X SFP. With embedded SNMP and Web-based management, the administrator can monitor, configure and control the activity of each switch card both locally and remotely. Based on a powerful L2+ switch architecture, this switch 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. This card may also be controlled and monitored via an GSW/SNMP in a managed FRM220A chassis.

Features

- 4-port 100/1000Base-X SFP
- Standalone IP Based, Web GUI, Telnet, SNMP management
- Supports RMON counter
- Supports dying gasp
- D/D function for supported SFP fiber transceiver
- Online local / remote f/w upgrade
- Supports local / remote IEEE 802.3ah OAM / IP management
- Supports Far End Fault Indication (FEFI)
- Supports Link Fault Pass-Through (LFPT)
- Auto Laser Shutdown (ALS)

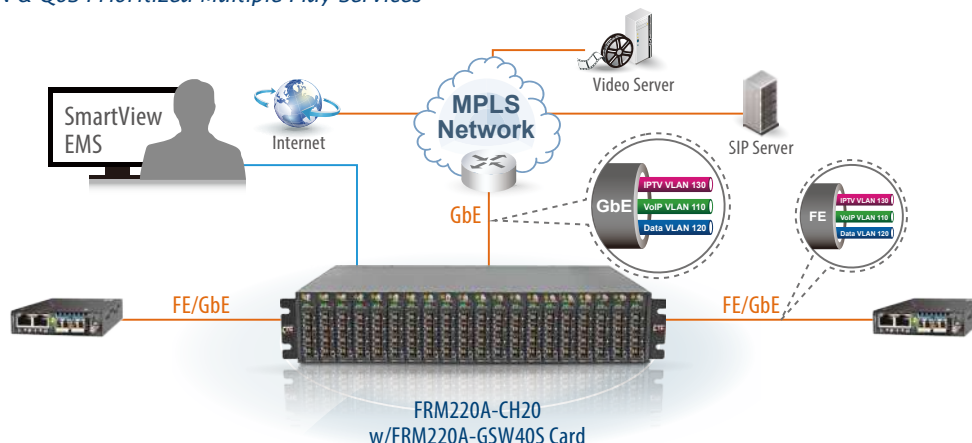
Specifications

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)
Indications	LED (Power, FX-Link, Test, FX-SPD)	
Transmission Method	Store and Forward Switching	
Packet buffer	1.75M bits	
MAC table size	4K	
Jumbo frame size	10240 Bytes	
VLAN feature	IEEE 802.1Q tagged VLAN (4K VLAN groups) IEEE 802.1ad QinQ VLAN Voice VLAN; MAC based VLAN; Protocol based VLAN IP subnet based VLAN Private VLAN for port isolation; VLAN Translation GVRP (GARP VLAN registration protocol)	

Link aggregation	Static trunk (SA, DA, IP, TCP/UDP port) IEEE 802.3ad LACP, 2 LACP trunk groups Max 4 port Max. per LACP trunk
L2 switching protection	IEEE 802.1D STP/IEEE 802.1w RSTP/IEEE 802.1s MSTP Loop Protection
QoS feature	Hard wired IEEE 802.1p 8 priority queues per port Traffic scheduling based on strict/WRR priority CoS based traffic classification on switch port, VLAN ID, DSCP, TCP/UDP port IEEE 802.1p priority tag remarking; DSCP remarking Per Port/Queue based ingress/egress rate limit in steps of 100kbps IEEE 802.3x flow control Multicast/Broadcast/Unicast storm control with flooding control
Power Consumption	8W
Power Input	12VDC
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
Dimensions	Card: 155 x 20.8 x 88mm (DxWxH)
Weight	130g

Application

■ Enabling VLAN & QoS Prioritized Multiple Play Services



Ordering Information

Model Name	Description
FRM220A-GSW40S	4-port 100/1000Base-X SFP-LC managed switch card (optional SFP module)



FRM220A-1002ES

2x 10/100/1000Base-T + 2x 100/1000Base-X
SFP GbE 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. When placed stand-alone, this card may only be managed via local serial console when placed in a CH01M single slot type chassis.

Features

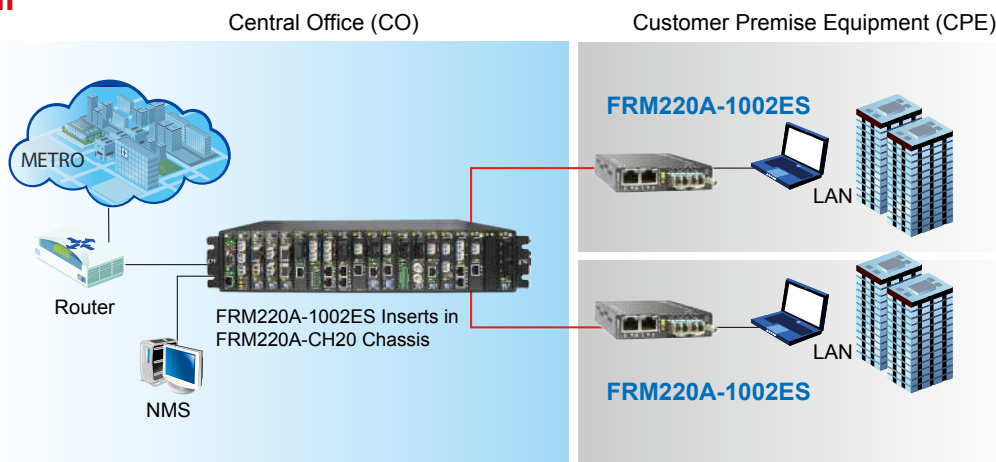
- 2-Port 10/100/1000Base-T and 2-Port 100/1000Base-X Switch
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or manual mode in TP port
- Supports flow control Enable or Disable
- Supports Jumbo Frame 10K Bytes
- Supports 16 Tag VLAN Group
- Supports Double VLAN tag (Q-in-Q)
- Supports Bandwidth 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.

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
Standards	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
	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	
Power Consumption	< 12W	
Dimensions	Card: 155 x 20.8 x 88mm (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 switch card (Optional SFP)



FRM220A-1000EAS/X

2x 10/100/1000Base-T and 2x 100/1000Base-X SFP
OAM/IP GbE 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. This card may also be controlled and monitored via an NMC in a managed chassis.

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
- Broadcast/Multicast/unknown unicast traffic storm control
- Loop Protection

Specifications

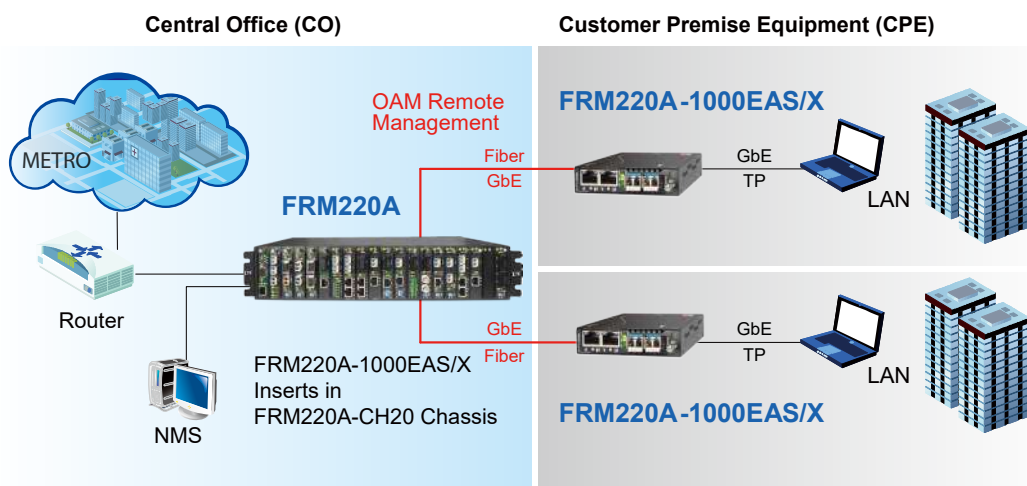
Optical Interface	Connector	SFP LC
	Data rate	125/1250Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125µm, 62.5/125µm. SM 9/125µm
	Distance	MM 550m, 2km, SM 15/30/50/80/120km WDM 20/40/60km
Wavelength	MM	1310nm, SM 1310,1550nm
	WDM	1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Power Consumption	< 12W	
Dimensions	Card: 155 x 20.8 x 88mm (DxWxH)	
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, IEEE 802.1Q, 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	
MTBF	65,000 hrs	

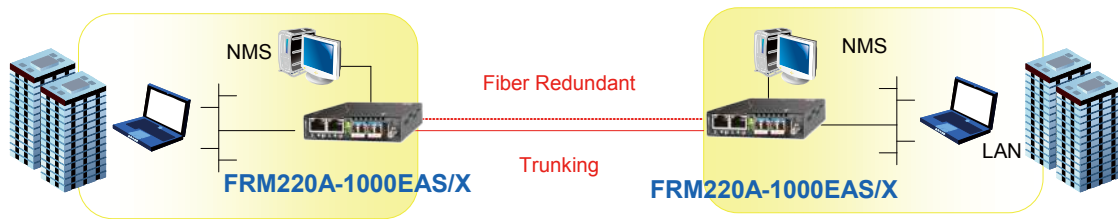
Application

• 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

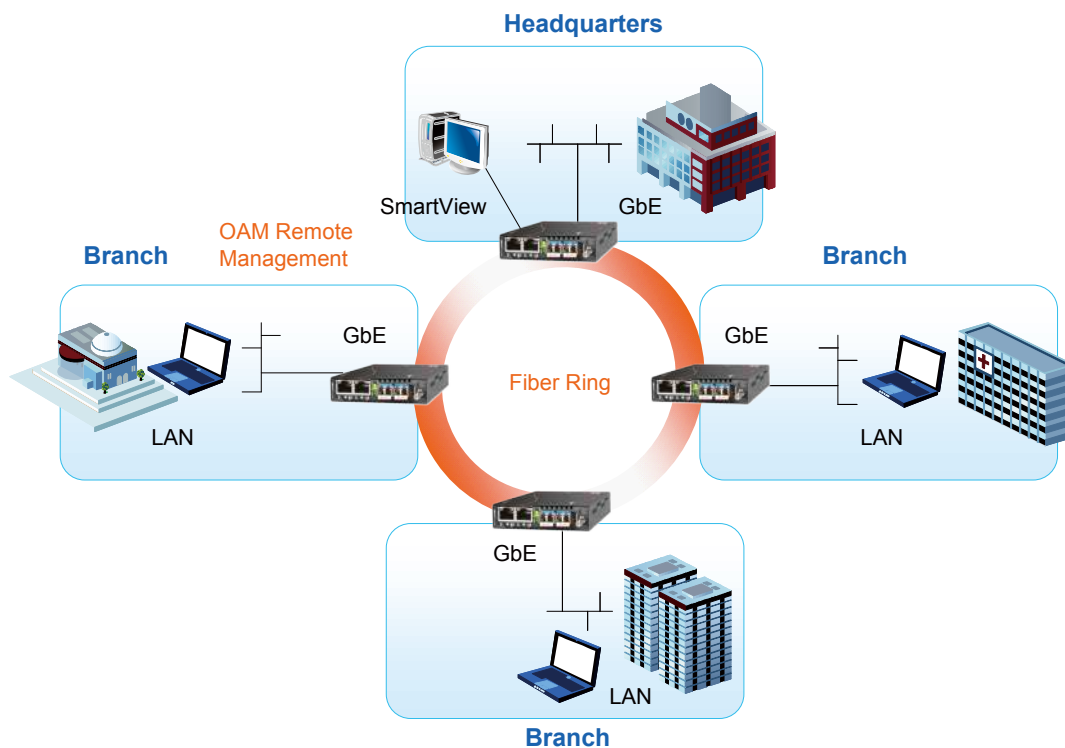


Utilizing a special trunking function, the 1000EAS/X can be deployed in stand-alone, point-to-point applications and provide 1+1 redundant fiber protection



- **Fiber Ring Application**

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



Ordering Information

Model Name	Description
FRM220A-1000EAS/X	2-Port 10/100/1000Base-T and 2-port 100/1000Base-X switch card 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.



FRM220-10/100AS-2

2x 10/100Base-TX + 2x 100Base-FX
OAM / IP Managed FE Switch

FRM220-10/100AS-2 is an IEEE 802.3ah OAM compliant two copper to two fiber Fast Ethernet solution designed to make conversion between 10/100Base-TX and 100Base-FX with SFP. With stand-alone 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. By offering IEEE 802.3ah 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

- 2x 10/100Base-TX + 2x 100Base-FX SFP
- Supports local / remote IEEE 802.3ah 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
- Max. MTU size 1536 bytes
- 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 remote loopback
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Online local / remote f/w upgrade
- Default port and IEEE 802.1Q Tagging priority QoS
- SNMP trap and LED alarm for loss of light and loss of signal

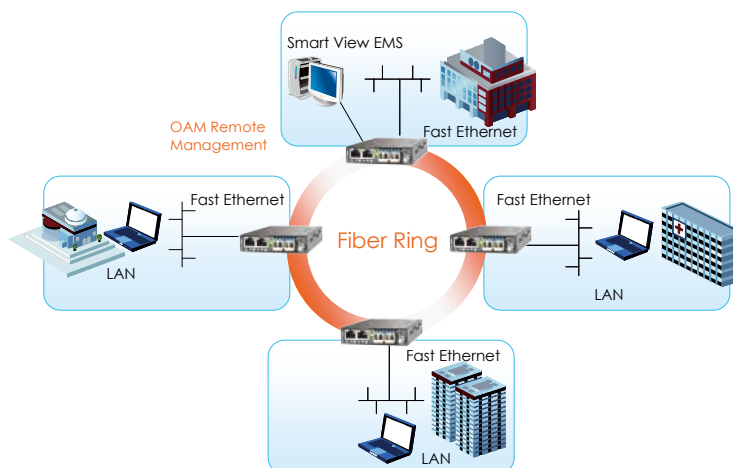
Specifications

Optical Interface	Connector	SFP LC
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125µm, 62.5/125µm. SM 9/125µm
	Distance	MM 550M, 2km, SM15/30/50/80/120km WDM 20/40/60km
	Wavelength	MM 1310nm, SM 1310, 1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Power Consumption	< 12W	
Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)	
Weight	120g	
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex

Electrical Interface	Cable: 10Base-T	Cat.3, 4, 5, UTP
	100Base-TX	Cat.5, 5e or higher
Standards	IEEE 802.3, IEEE 802.3u, IEEE 802.1Q, ITU-T G.644	
Indications	LED: Power, FX-Link, FEF, TEST, Speed(10, 100), Full	
Power Input	Card	: 12VDC
	Standalone	: AC, DC options
Temperature	Storage conditions	
	Temperature range : -5~+45°C	
	Relative Humidity : 5~95% Rh	
	Absolute Humidity : 1~25g H2O/m3	
	Operation conditions	
	Temperature range : -5~+45°C	
Certification	Relative Humidity : 5~95% Rh	
	Exist conditions for condensation and icing	
	Absolute Humidity : 1~29g H2O/m3	
	CE, FCC, EN60950 LVD compliant	
MTBF	65,000 hrs	

Application

Fiber Ring Application



Ordering Information

Model Name	Description
FRM220-10/100AS-2	2x 10/100Base-TX + 2x 100Base-FX with OAM/IP Based Managed FE Switch card (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

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

The FRM220-1000EAS/X-1 is an IEEE 802.3ah 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 administrator can monitor, configure and control the activity of each IEEE 802.3ah series card and remotely connected OAM compliant converter. By offering IEEE 802.3ah 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

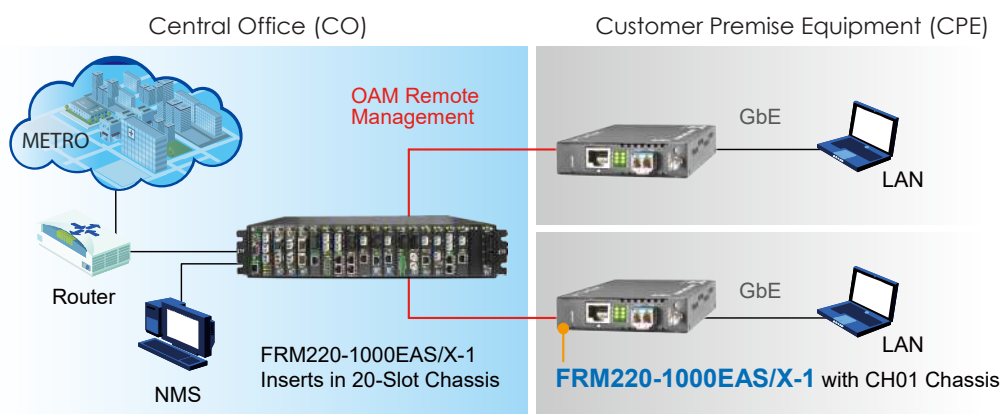
- 10/100/1000Base-T to 100/1000Base-X SFP
- Supports local / remote IEEE 802.3ah OAM/ IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Supports IEEE 802.1Q Tagging
- Supports Q in Q double tagging
- Forward 10K bytes Jumbo packets (max.)
- Supports Flow control (Pause)
- Supports OAM remote loopback to assist in diagnosing network problems
- Supports remote IP ping function for diagnostic purpose
- 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 IEEE 802.1Q 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	Card: 155 x 20.8 x 88mm (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	
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 GbE media converter card (optional SFP)

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



FRM220-100AS-1

OAM/IP Managed 10/100Base-TX to 100Base-FX FE Media Converter

The FRM220-100AS-1 is an IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution designed to make conversion between 10/100Base-TX and 100Base-FX 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

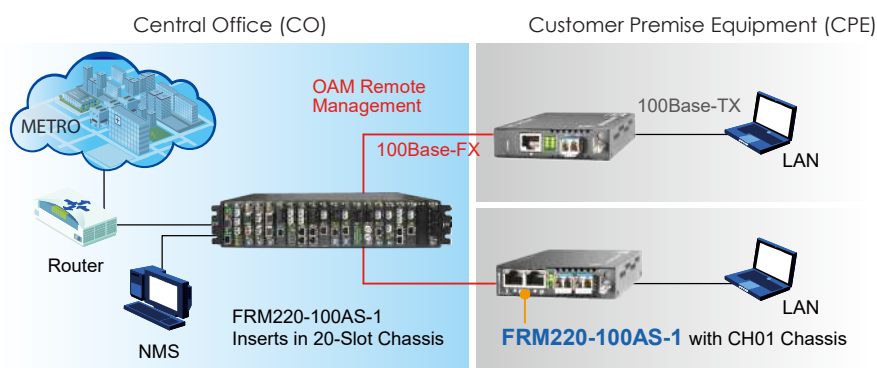
- 10/100Base-TX to 100Base-FX SFP
- Supports local / remote IEEE802.3ah OAM/IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Supports IEEE 802.1Q Tagging
- Supports Q in Q double tagging
- Max. MTU size 10K bytes
- Supports 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 remote loopback
- 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
- SNMP trap and LED alarm for loss of light and loss of signal

Specifications

Optical Interface	Connector	SFP LC
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 550m, 2km, SM15/30/50/80/120km WDM 20/40/60km
	Wavelength	MM 1310nm, SM 1310, 1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Power Consumption	< 12W	
Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)	
Weight	120g	
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex

Electrical Interface	Cable: 10Base-T Cat.3, 4, 5, UTP 100Base-TX Cat.5, 5e or higher
	Standards IEEE 802.3, IEEE 802.3u, IEEE 802.1Q, ITU-T G.664
Indications	LED : Power, FX-Link, FEF, TEST, Speed(10,100), FULL
Power Input	Card : 12VDC
	Standalone : AC, DC options
Temperature	Storage conditions
	Temperature range : -5~+45°C
	Relative Humidity : 5~95% Rh
	Absolute Humidity : 1~25g H ₂ O/m ³
	Operation conditions
	Temperature range : -5~+45°C
Certification	Relative Humidity : 5~95% Rh
	Exist conditions for condensation and icing
	Absolute Humidity : 1~29g H ₂ O/m ³
	MTBF 65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-100AS-1	10/100Base-TX to 100Base-FX with OAM/IP-Based managed FE media converter card (optional SFP)

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



4

- 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
- Supports D/D function for SFP fiber transceiver
- Supports 16 Tag VLAN Group
- RMON counters (for standalone unit only)

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	< 6W
Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	65,000 hrs

Diagram illustrating three identical network configurations. Each configuration shows a FRM220-1000M(S) with CH01 chassis connected via a Giga Ethernet line to a laptop. The laptop is labeled LAN.

SC	002: 2km 20A: WDM 20km A type	015: 15km 20B: WDM 20km B type	030: 30km 40A: WDM 40km A type	050: 50km 40B: WDM 40km B type
----	----------------------------------	-----------------------------------	-----------------------------------	-----------------------------------



FRM220-10/100i

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 FTTH 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. When used stand-alone, this converter has no access to management functions except to force Ethernet connection and apply Link Fault Pass-thru via setting of a 4-pole DIP switch.

Features

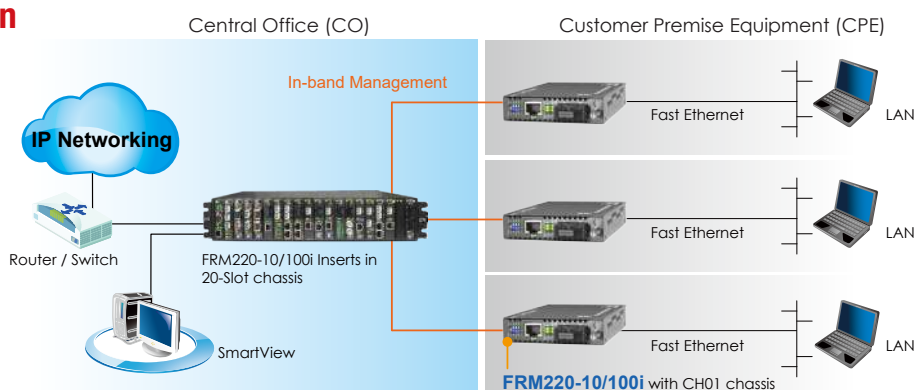
- 1-Port 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault Indication (FEFI)
- Supports Link Fault Pass-Through (LFPT)
- Supports Loop Back Test
- Supports RMON counter
- Auto Laser Shutdown (ALS)
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports transparent Q in Q double tagged frame
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager. (NMC)
- Bandwidth control (Nx32Kbps or Nx512Kbps)
- Supports IEEE 802.3x flow control (Pause)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade

Specifications

Optical Interface	Connector	1 x 9 (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
Electrical Interface	Wavelength	MM 1310nm, SM 1310, 1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
	Connector	RJ45
	Data rate	10Mbps, 100Mbps
Electrical Interface	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 802.3x, TS-1000
Indications	LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input	12VDC
Power Consumption	< 6W
Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-10/100i	10/100Base-TX to 100Base-FX In-band managed converter card
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-2

Dual Channel 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 dual media converter is targeted for central equipment in metro LAN, campus, enterprise and FTTx applications. By offering in-band management, this converter can be completely controlled and monitored in a centrally located managed rack. By offering two completely isolated converters on one card, this card can effectively double the conversion capacity of a rack.

Features

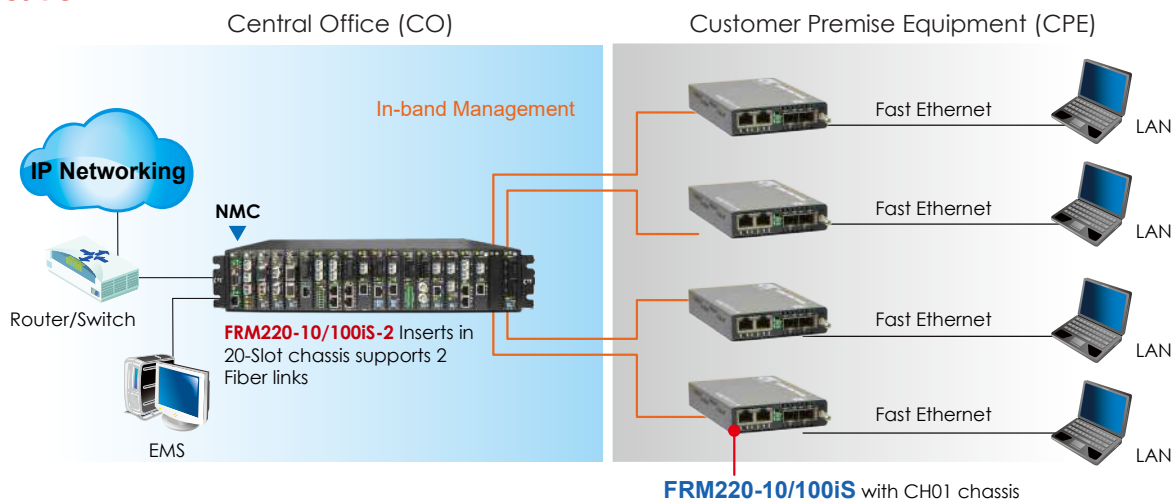
- Dual independent converters 10/100Base-TX to 100Base-FX
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets in switch mode
- Supports IEEE 802.1Q Tag VLAN pass thru
- Supports Q in Q double tagged frame transparent
- Forward 9K jumbo packets in converter mode
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager (NMC)
- 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 x 2
	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 x 2
	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 802.3x, 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 converter card with In-band management, (optional SFP)

Note: The Card is suitable for use in CH01 standalone chassis.



FRM220-10GC-TS

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

The FRM220-10GC-TS is a copper to fiber 10G Ethernet media converter based on IEEE 802.3an and IEEE 802.3ae. With SNMP and Web-based management in the FRM220, the 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 10G Base-T to 10G Base-R and vice versa. With full duplex wire speed forwarding capability between these two media, the FRM220-10GC-TS brings you the best and simplest solution for the 10G Ethernet conversion between copper wire and fiber.

Features

- Device Management via FRM220 Chassis with NMC
- Complies with IEEE 802.3an 10GBase-T and IEEE 802.3ae 10GBase-R
- Real-Time conversion between 10GBase-T and 10GBase-R
- Common used SFP+ fiber interface and RJ45 connector
- Full duplex wire speed forwarding
- Forwarding 18k bytes jumbo packet
- Loopback Test
- Link Fault Pass Through
- Fiber Fault Alert
- IEEE 802.1q VLAN pass through
- Supports manual Dip Switch for quick set up

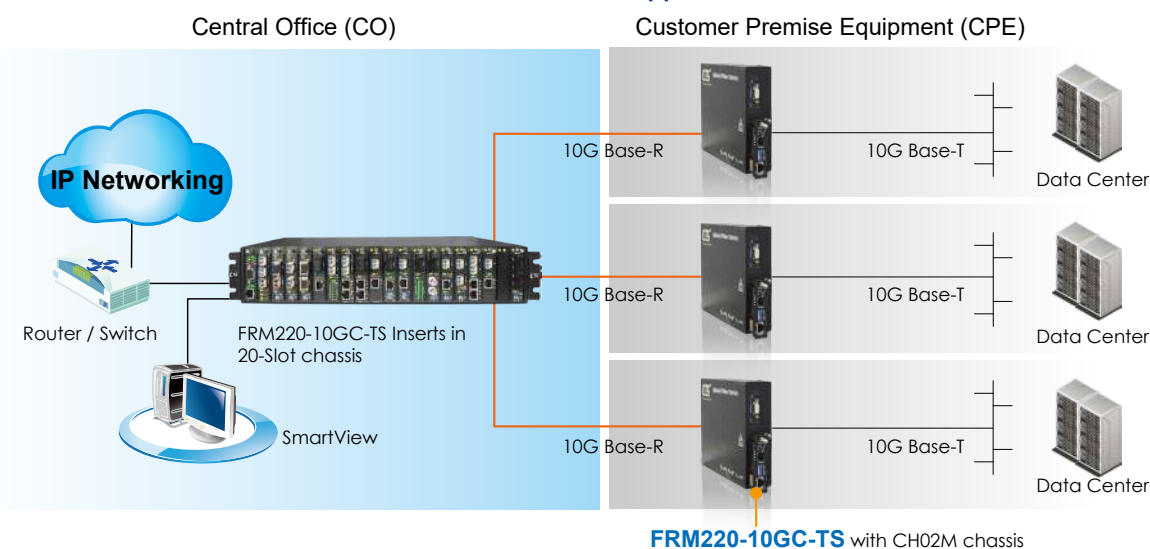
Specifications

Optical Interface	Connector	SFP+ LC
	Data rate	10.3125Gbps
	Distance	300m, 10km, 40km, 80km
	Wavelength	1550nm, 1310nm, 850nm, WDM
Electrical Interface	Connector	RJ45
	Data rate	10Gbps
	Cable type	Cat.6a, 7
	Distance	95 meters (Cat.7)
Management	Console port	RS-232 via CH01M, DIP Switch with CH01
Standards	IEEE 802.3an, IEEE 802.3ae	

LEDs	SFP+, LR, Link/Act, Lbk A/B, SYS
Power	12VDC
Power Consumption	< 12W
Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)
Weight	130g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	0 ~ 85% non-condensing
Certification	CE, FCC
MTBF	57,000 hrs

Application

10G Media Conversion application



Ordering Information

Model Name	Description
FRM220-10GC-TS	10G Base-T RJ45 to 10G Base-R SFP+ media converter card, with DIP switch (optional SFP+)

Note: This Card MUST be placed in CH02M chassis. For standalone SNMP management, place this card in CH02/NMC or CH04A chassis.



FRM220-1000TS

1000Base-T to 1000Base-X SFP Media Converter

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

Features

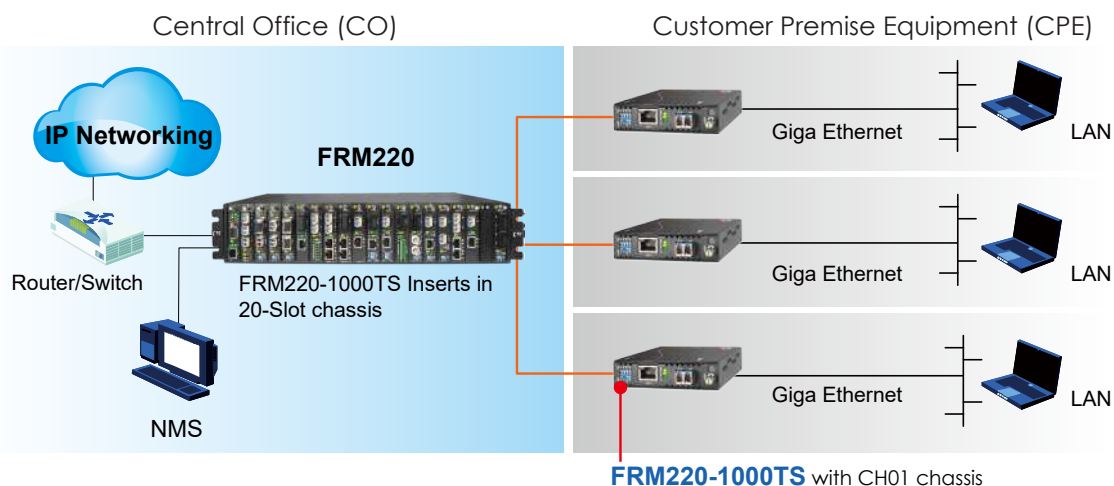
- 1000Base-T to 1000Base-SX/LX
- Device management via FRM220 Chassis with NMC
- Auto-negotiation or force mode
- Auto MDI/MDIX
- Forward > 9K bytes packets
- Supports Link Fault Pass Through (LFP) function
- Auto Laser Shutdown (ALS)
- Protocol Transparent (OAM, L2CP, etc)

Specifications

Optical Interface	Connector	SFP LC
	Data rate	1000Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm SM 9/125μm
	Distance	MM 550m, 2km, SM15/30/50/80/120km WDM 20/40/60km
	Wavelength	MM 1310nm, SM 1310,1550nm
		WDM 1310Tx/1550Rx (type A)
		1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	1000Mbps
	Duplex mode	Full duplex
	Cable	1000Base-T Cat.6 or above UTP

Standard	IEEE 802.3ab
Indications	LED (Power, FX-Link, FX Duplex, TX-SPD, TX-Duplex, TX-Link)
Power Input	Card : 12VDC Standalone : AC, DC options
Power Consumption	< 12W
Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD
MTBF	65,000 hrs (25°C)

Application



Ordering Information

Model Name	Description
FRM220-1000TS	1000Base-T to 1000Base-X SFP media converter card (Optional SFP)

Note: This Card is suitable for use in CH01 standalone chassis



FRM220-10/100

10/1000Base-TX to 100Base-FX Unmanaged Media Converter

The FRM220-10/100 is a Fast Ethernet 10/100Base-TX to 100Base-FX non-managed stand-alone media converter, which gives the options to choose from the most popular fiber cabling connectors, ST, SC or FC. Both multi-mode and single mode converter models are available as well as BiDi which allows bi-directional transmissions using only a single fiber core. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, according to IEEE 802.3u standards. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status. These non-managed stand-alone converters may also be concentrated into either the FRM220-CH20 or FRM220-CH08 managed chassis.

Features

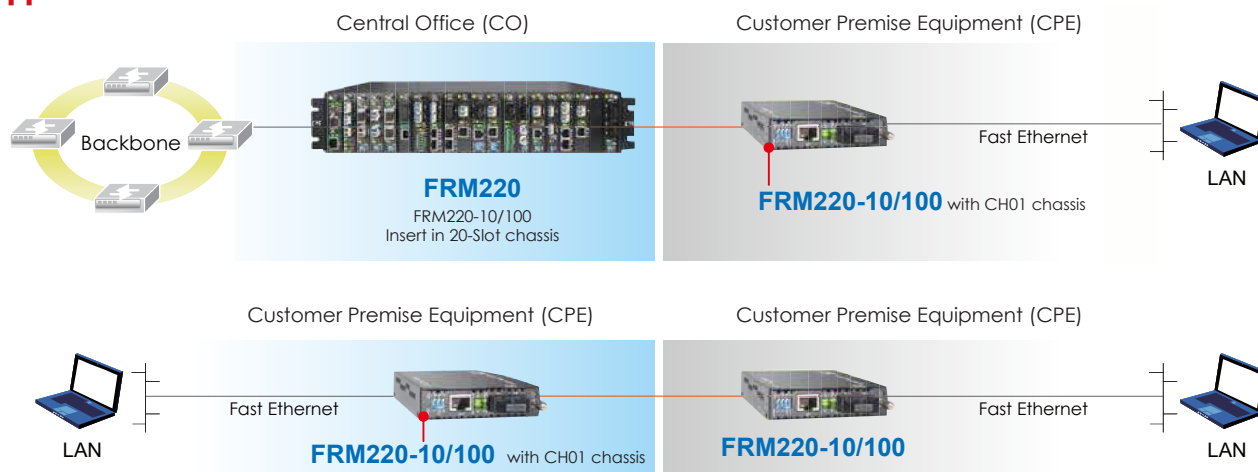
- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1600 bytes (Max.) packets
- Supports transparent Q in Q double tagged frame
- Supports IEEE 802.1q Tag VLAN pass thru
- Support flow control (Pause)
- Supports Link Fault Pass through (LFP)
- Forward 9K jumbo packets in converter mode

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Standards	IEEE 802.3, IEEE 802.3u	
Indications	LED (Power, FX Link, TX SPD, TX Link, TX Duplex, FEF)	
Certification	CE, FCC, RoHS	

Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Power	12VDC	
Power Consumption	< 4W	
Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)	
Weight	120g	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220-10/100	10/100Base-TX to 100Base-FX unmanaged media converter card
Connector Type	Connectivity Distance

SC, ST, FC	002: 2km	015: 15km	030: 30km	050: 50km	080: 80km	120: 120km
	20A: WDM 20km A type	20B: WDM 20km B type	40A: WDM 40km A type	40B: WDM 40km B type	60A: WDM 60km A type	60B: WDM 60km B type
	80A: WDM 80km A type	80B: WDM 80km B type				

Connector Type Connectivity Distance
FRM220 – 10/100 –
 Example: FRM220 – 10/100 – SC002

Note: This Card is suitable for use in CH01 standalone chassis



FRM220-FXO-4 FRM220-FXS-4

4x FXO over fiber & 4x FXS over fiber

FRM220-FXO-4/FXS-4 are 4 channel POTS (Plain Old Telephone System) over fiber converter/extender. The four POTS connection uses standard RJ-11C modular connectors for each copper pair connection. A pair of FRM220-FXO-4/FXS-4 is required to implement an end to end system. FXO type unit connects to a telephone line (PSTN) or PBX station line and has ability to detect ringing voltages and to act as a telephone. FXS type unit is the reciprocal unit and has ability to act as PSTN and connects to a telephone device. Two FXS cards may be connected back-to-back to provide a private "hot line".

When the FRM220-FXO-4/FXS-4 cards are 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 (NMC)
- Supports telephone voice transmission
- Supports FXS to FXS hot line
- Supports caller ID Pass-Through
- Supports FAX and Modem transmissions

Specifications

Optical Interface	Connector	SFP-LC
	Fiber	MM 62.2/125μm, 50/125μm, SM 9/125μm
	Rate:	155Mbps
	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	< 6W (FRM220-FXO-4) < 12W (FRM220-FXS-4)	
Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)	
Weight	120g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC	
MTBF	65,000 hrs	

Electrical Interface	Connector	RJ-11
	FXO model	Impedance : 600 ohms
		Coding : 16 bits liner
		Loop Current : 10~100mA
		Ring Frequency : Acceptable 20 ~50Hz
		Insertion Loss: 0.0 ± 1.0dB at 1000Hz
		Level Gain : TX 0dB, RX -3dB
	FXS model	Coding : 16 bits liner
		Dial: DTMF and Dial Pulse
		Provides 48VDC ± 4V to FXO
		Ringing Waveform : Sine wave
		Impedance : 600 ohms
		Ringing Frequency : 20/25/30/35/40/45/50/55 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)		
Level Gain : TX 0dB, RX -3dB		

Application

Figure 1 : Automatic Ring down hotline

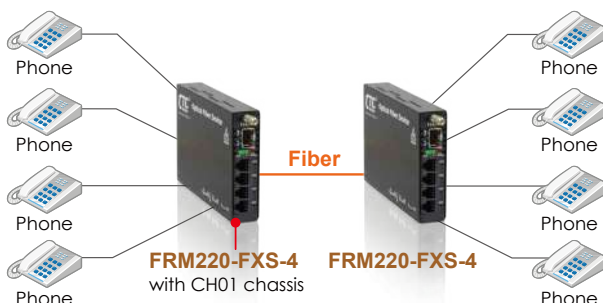
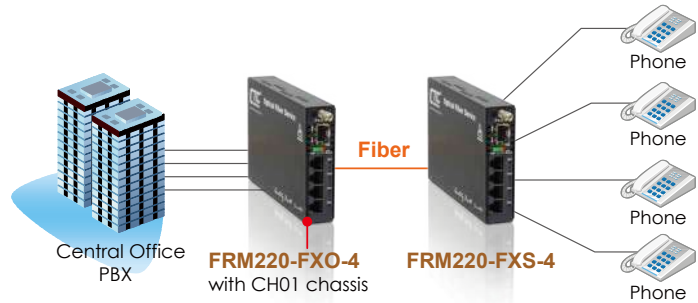


Figure 2 : Voice transmission from 2km to 120km over fiber



Ordering Information

Model Name	Description
FRM220-FXO-4	4-port FXO fiber converter card (SFP-LC)
FRM220-FXS-4	4-port FXS fiber converter card (SFP-LC)

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.



FRM220-FXO/FXS FRM220-FXO/FXS-SFP

Single port FXO/FXS Fiber Converter

The FRM220-FXO/FXS is a POTS (Plain Old Telephone System) over fiber converter/extender. The POTS connection uses a standard RJ-11C modular connector for one copper pair connection. A pair of FRM220-FXO/FXS 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-FXO/FXS card is placed in the FRM220 rack with NMC 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. Both card and remote can be configured to enable or disable the port, reset the port and set the FXO or FXS mode. When configured in an FXS to FXS fashion, a private "hot line" or direct line is created. 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 (NMC)
- Supports caller ID Pass-Through
- Selectable FXO or FXS mode
- Supports FXS to FXS hot line
- Supports D/D function for SFP fiber transceiver
- Will not support FAX or Modems

Specifications

Optical Interface	Connector	SFP-LC / 1x9 (SC, ST, FC)
	Fiber	MM 62.2/125μm, 50/125μm, SM 9/125μm Rate: 51.84Mbps
	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	< 6W	
Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)	
Weight	120g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC	
MTBF	65,000 hrs	

Electrical Interface	Connector	RJ-11
	FXO mode	Impedance : 600 ohms
		Coding : 16 bits liner
		Loop Current : 10~100mA
		Ring Frequency : Acceptable 20 ~50Hz
		Insertion Loss: 0.0 ± 1.0dB at 1000Hz
		Level Gain : TX 0dB, RX -3dB
	FXS mode	Coding : 16 bits liner
		Dial: DTMF and Dial Pulse
		Battery Source: 48VDC ± 4V
		Ringing Waveform : Sine wave
		Impedance : 600 ohms
		Ringing Frequency : 20/25/30/35/40/45/50/55 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)		
Level Gain : TX 0dB, RX -3dB		

Application

Figure 1 : Automatic Ring down hotline

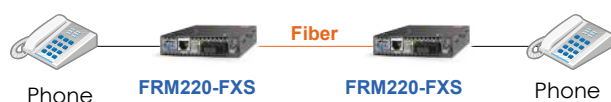


Figure 2 : Voice Transmission from 2km to 120km over fiber

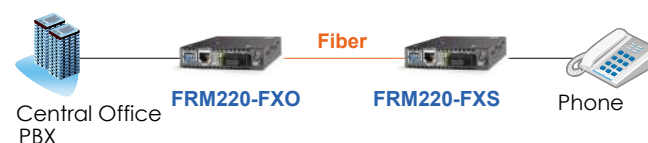
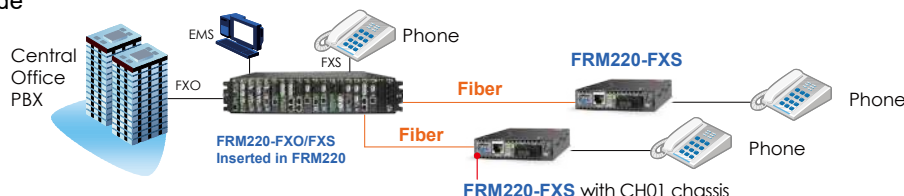


Figure 3 : Selectable FXO or FXS mode



Ordering Information

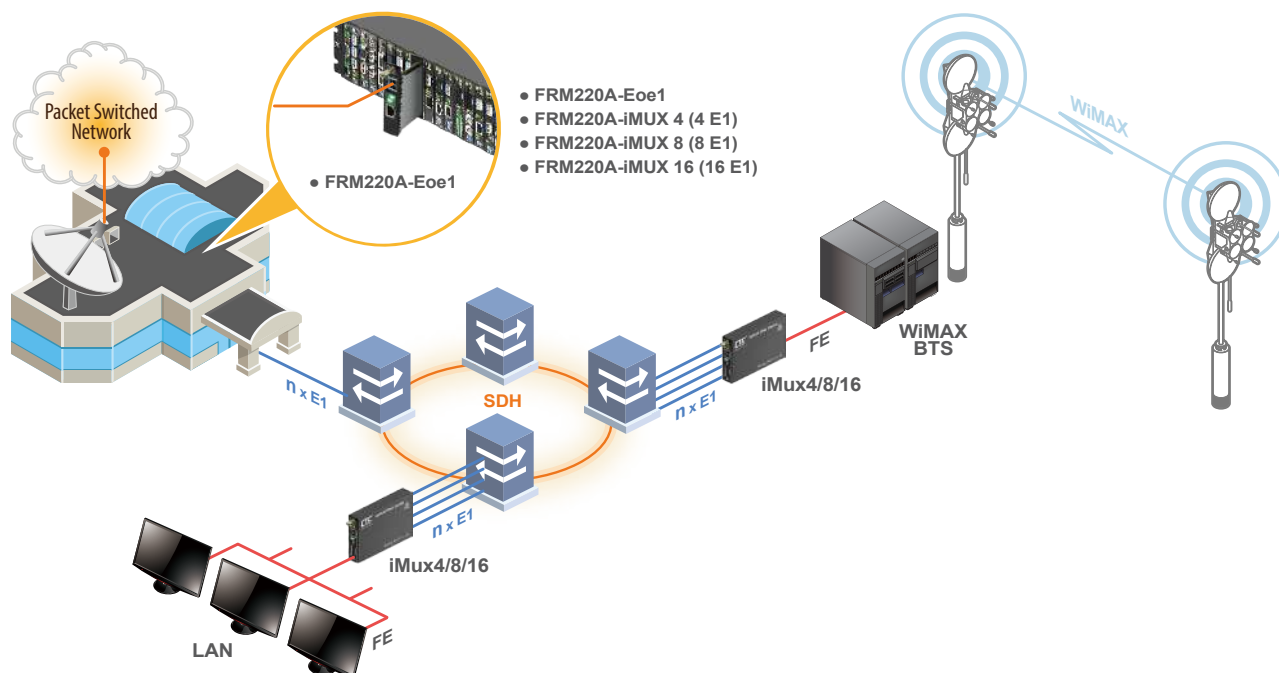
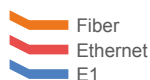
Model Name	Description
FRM220-FXO/FXS	FXO / FXS fiber converter card
FRM220-FXO/FXS-SFP	FXO / FXS fiber converter card (SFP-LC)
Connector Type	Connectivity Distance

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 standalone chassis. When connected as a remote to a managed central chassis, this card supports in-band management.

Connector Type Connectivity Distance
FRM220 – FXO/FXS – ☐☐☐☐☐
Example: FRM220 – FXO/FXS– SC002

Application



Related Product



iMux4A-100 & iMux8A-100 (Standalone Ethernet to 4E1/8E1 Multiplexer)

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-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-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

Note: This card may be locally configured by its own console when placed in CH02M with fan.

When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH02 chassis.

Cable Type



RJ45 Cable



BNC Cable

FRM220A – iMux –

Example: FRM220A – iMux16T – R



FRM220-GFOM04 FRM220-GFOM08

4/8 E1/T1 + GbE Fiber Multiplexer

The FRM220-GFOM04/GFOM08 is a 4/8 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/GFOM08 card is placed in the FRM220 rack with NMC, the administrator can view the converter card's status, type, version, fiber link status and alarms. Remote, fiber connected standalone card, can also be managed through in-band management via the chassis NMC. 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 1.25Gbps 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

- 8 channels unframed E1/T1 (transparent)(FRM220-GFOM08)
- 4 channels unframed E1/T1 (transparent)(FRM220-GFOM04)
- 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, switching time < 50ms
- Supports Digital Diagnostics Monitoring Interface (DDMI) SFP
- ALS 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

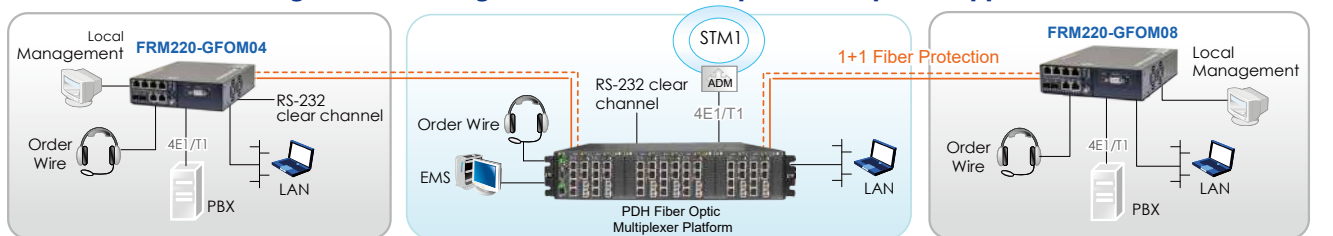
Specifications

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
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	
Power Consumption	< 12W	
Dimensions	Card: 155 x 42.1 x 88mm (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	
MTBF	65,000hrs	

Application

Managed 4E1/T1 + Gigabit Ethernet Fiber Optical Multiplexer Application

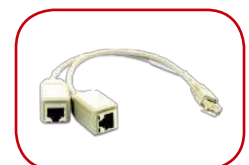


Ordering Information

Model Name	Description
FRM220-GFOM04-SR	4 x E1/T1 RJ-45 and 10/100/1000Base-T Ethernet fiber optic multiplexer card (optional SFP module)
FRM220-GFOM04-SB	4x E1 BNC and 10/100/1000Base-T Ethernet fiber optic multiplexer card (optional SFP module)
FRM220-GFOM08-SR	8x E1/T1 RJ45 and 1000Mbps Ethernet fiber mux card with 4x2E1 RJ45 cable (optional SFP module, Model : SFS-70xx-xx)
FRM220-GFOM08-SB	8x E1 BNC and 1000Mbps Ethernet fiber mux card with 4x2E1 BNC cable (optional SFP module, Model : SFS-70xx-xx)

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

FRM220 – GFOM04 – ☐ ☐
Example: FRM220 – GFOM04 – SR



2E1 RJ45 cable



FRM220-FOM01

E1/T1 + FE Fiber Multiplexer

FRM220-FOM04

4x E1/T1 + FE Fiber Multiplexer

The FRM220-FOM01 is a single slot, single channel E1/T1 plus 100M Fast Ethernet fiber multiplexer card. The FRM220-FOM04 is a dual slot, 4-channel E1/T1 plus 100M Fast Ethernet to 1+1 redundant fiber multiplexer card with an additional clear channel RS-232 and order wire. When the FRM220-FOM cards are placed in the FRM220 rack with NMC, the administrator can view the converter card's status, type, version, fiber link status and alarms. Remote, fiber connected standalone card, can also be managed through in-band management via the chassis NMC. 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

- 4 channels unframed E1/T1 (transparent) (FRM220-FOM04)
- 1 channels unframed E1/T1 (transparent) (FRM220-FOM01)
- 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
- Supports Digital Diagnostics Monitoring Interface (DDMI) SFP
- Supports local or remote In-band management by SNMP manager and console port
- Supports On-Line F/W upgrade & Dying Gasp
- One clear channel RS232 up to 250Kbps(Async) (FRM220-FOM04)
- 1+1 fiber protection, switching time < 50ms (FRM220-FOM04)
- AIS on signal loss on E1/T1 and fiber port (FRM220-FOM04)
- Loopback test on E1/T1, RS232, fiber ports (FRM220-FOM04)
- Supports Order wire Ear / Microphone port (FRM220-FOM04)

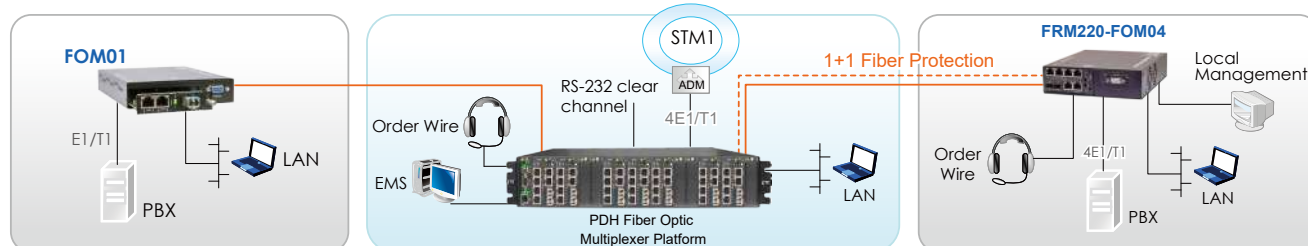
Specifications

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
	Interface Connectors	RJ-45
	Test Loops	LLB (Local Loop Back) RLB (Remote Loop Back) NELB(Near End Loop Back) (FRM220-FOM04) RRLB(Request Remote Loop) (FRM220-FOM04)

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	FRM220-FOM04: Power FX1 Link, FX2 link, E1/T1 Mode/Link/Loop back test, Order wire phone indicator, LAN Link/Speed. FRM220-FOM01: Power FX Link, E1/T1 Mode/Link/Loop back test, LAN Link/Speed.	
Power Input	12VDC	
Power Consumption	< 7W (FRM220-FOM04) < 4W (FRM220-FOM01)	
Dimensions	Card: 155 x 42.1 x 88mm (D x W x H) (FRM220-FOM04) Card: 155 x 20.8 x 88mm (D x W x H) (FRM220-FOM01)	
Weight	200g (FRM220-FOM04), 130g (FRM220-FOM01)	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC	
MTBF	57,000hrs	

Application

Managed 1/4 E1/T1 + Fast Ethernet Fiber Optical Multiplexer Application



Ordering Information

Model Name	Description
FRM220-FOM04-SR	4 x E1/T1 RJ-45 and 100Mbps Ethernet fiber optic multiplexer card (optional SFP module)
FRM220-FOM04-SB	4x E1 BNC and 100Mbps Ethernet fiber optic multiplexer card (optional SFP module)
FRM220-FOM01-SR	E1/T1 RJ-45 and 100Mbps Ethernet fiber optic multiplexer card (optional SFP module)
FRM220-FOM01-SB	E1 BNC and 100Mbps Ethernet fiber optic multiplexer card (optional SFP module)

Note: This card may be locally configured by its own console when placed in CH02M with fan.

When connected as a remote to a managed central chassis, this card supports in-band management and only needs a CH02M chassis.

Connector Type
FRM220 - FOM04 - ☐☐
Example: FRM220 - FOM04 - SR
Connector Type
FRM220 - FOM01 - ☐☐
Example: FRM220 - FOM01 - SR



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 64kbps 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	LEDs	PWR, Sys, Test, T1/E1
	Bit rate	2.048Mbps	Standard	ITU-T G.703, G.704, G.706, G.823, G.824, ANSI T1.403
	Line Code	HDB3	Power	12VDC
	Line	75 ohm (BNC) / 120 ohm (RJ-45)	Power Consumption	< 6W
	Impedance	Voice channel sample rule A-Law	Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)
	CRC check	CRC-4 enable/disable	Weight	130g
	Pulse amplitude	Nominal 2.37V \pm 10% for 75ohm Nominal 3.00V \pm 10% for 120ohm	Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
	Zero amplitude	\pm 0.1V	Humidity	10 ~ 90% non-condensing
	Connector	RJ-45	Certification	CE, FCC
			MTBF	57,000 hrs
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 \pm 10%,		
	Receive signal level	0 ~ -10dB		
	Connector	RJ-45		

Application



Ordering Information

Model Name	Description
FRM220-FTEC	E1/T1 cross rate converter card

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



FRM220A-Eoe1/G(S)

Ethernet Bridge over E1 (GFP)

- HDLC & GFP
- MTU 2046bytes
- Unframed E1

The FRM220A-Eoe1/G(S) 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(S) is able to transmit up to a 2M bits Ethernet over an E1 link. The FRM220A-Eoe1/G(S) 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(S) 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 a single slot chassis and used standalone without management, the card may be configured by serial terminal.

Features

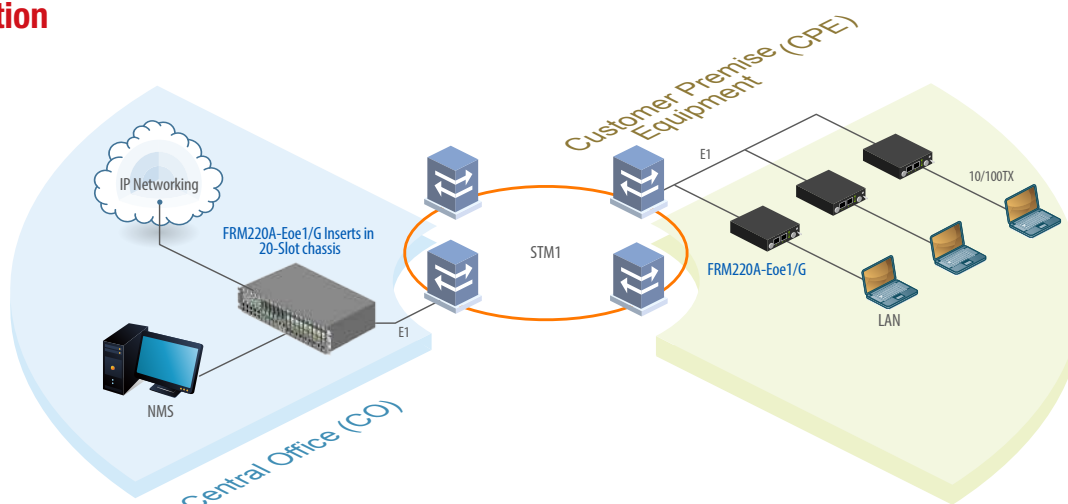
- Connects one Fast Ethernet over E1 links (2.048Mbps)
- Built-in GFP bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

E1 Interface	Framing	Unframed
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ-45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
Ethernet Interface	Delay Variance	220ms
	Connector	RJ-45, BNC
	Diagnostics	Digital remote loopback
	Standards	IEEE 802.3, 802.3u

Ethernet Interface	Data rate	10/100Base-TX or 100Base-FX Half/Full duplex
	Encapsulation	GFP (G.7041)
Connector	MTU	2046bytes
	RJ45	10/100Base-T
Indications	SFP-LC	100Base-FX
		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	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	

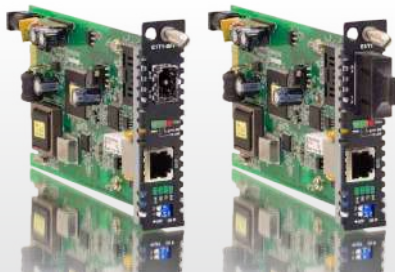
Application



Ordering Information

Model Name	Description
FRM220A-Eoe1/G	10/100Base-TX to E1 GFP bridge operates at WAN
FRM220A-Eoe1/GS	100Base-FX SFP to E1 GFP bridge operates at WAN (Optical 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. 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 FRM220-E1/T1-SFP

E1/T1 over Fiber

The FRM220-E1/T1 is a fiber media transport for G.703 E1/T1 transmissions designed for point-to-point use. 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

FRM220-E1R & FRM220-E1B

- RJ-45 (USOC RJ48C) or BNC (coaxial) to fiber converter
- Supports HDB3 or AMI Line coding
- Supports Nx64k connection to FRM220-DATA

Common Features

- In-band management via terminal, web, SNMP when in managed FRM220 chassis
- Electrical and optical loop back tests
- Standalone RS232 console (when placed in CH01M)

FRM220-T1

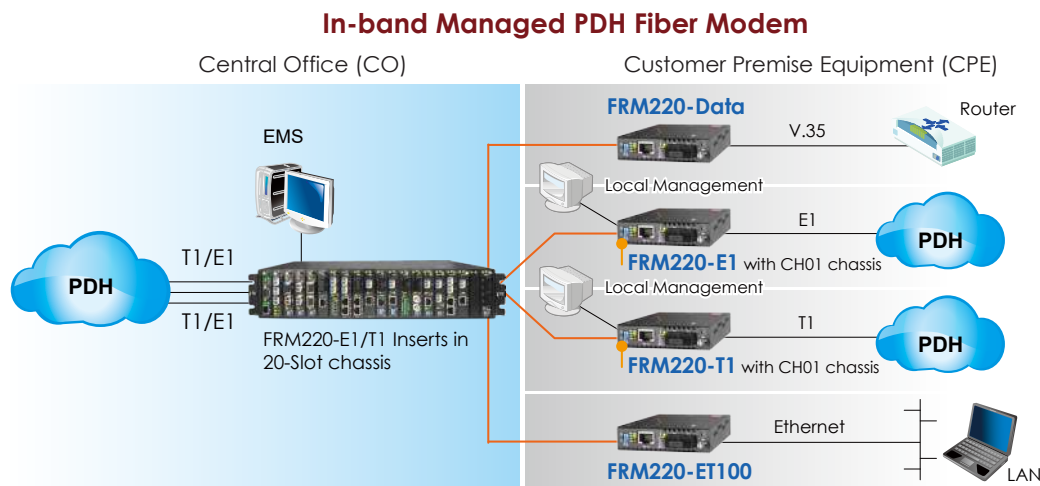
- RJ-45 (USOC RJ48C) to fiber converter
- Supports B8ZS or AMI Line coding
- Supports unframed to FRM220-DATA

Specifications

Optical Interface	Connector	FRM220-E1/T1: 1x9 (SC, ST, FC) FRM220-E1/T1-SFP: SFP-LC		
	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	E1	Connector: E1R: RJ-45(1) 120 Ω E1B: BNC(2) 75 Ω Data Rate: 2.048Mbps Line Code: HDB3/AMI		
		T1	Connector: RJ-45(1) 100 Ω Data Rate: 1.544Mbps Line Code: 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	< 6W
Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)
Weight	120g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FRM220-E1R	E1 RJ-45 to fiber card
FRM220-E1B	E1 BNC to fiber card
FRM220-E1R-SFP	E1 RJ-45 to fiber card (SFP module not included)
FRM220-E1B-SFP	E1 BNC to fiber card (SFP module not included)
FRM220-T1R	T1 RJ-45 to fiber card
FRM220-T1R-SFP	T1 RJ-45 to fiber card (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 - □□□ - □□□□□
Example: FRM220 - E1R - SC002

Connector Type Connectivity Distance
FRM220 - □□□ - □□□□□
Example: FRM220 - T1R - SC015

Note: This card may 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-DS3/E3

DS3/E3 over Fiber

The FRM220-DS3/E3 is a fiber modem that works in pairs to transparently extend DS3, E3 or STS-1 transmissions over optical fiber. By utilizing pluggable SFP transceivers (155Mbps), 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 NMC management, the administrator can configure and view the local and remote converter cards' status, type, version, fiber link status and alarms.

Features

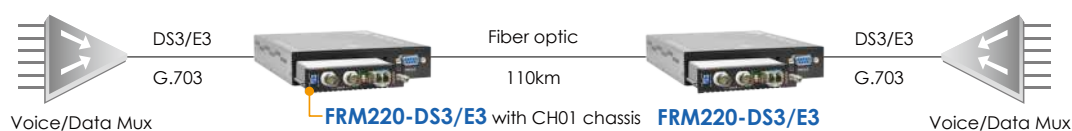
- In-band network Managed via Terminal, web or SNMP in FRM220 chassis
- DS3/E3 Coax (BNC) to Fiber SFP fiber modem
- Supports AIS (Alarm Indication Signal)
- User selectable E3 or DS3 setting
- Electrical and optical Loop back tests
- Standalone RS232 console management via CH01M

Specifications

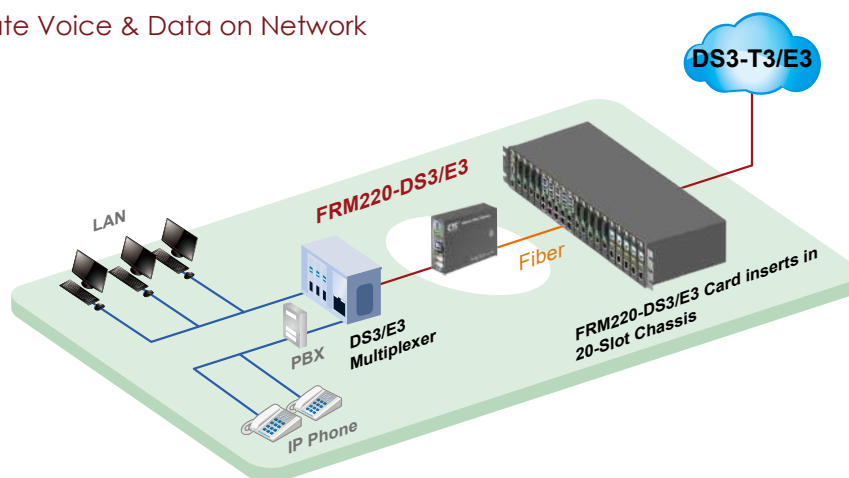
Optical Interface	Connector	SFP : LC (Uses standard 100Base-X/OC-3 SFP)
	Data Rate	DS3/T3 = 44.7 Mbps; E3 = 34.4 Mbps
Line Coding	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	1310nm, 1550nm, CWDM 1471nm ~ 1611nm
Dimensions	Card:	155 x 20.8 x 88mm (D x W x H)
Weight		120g
Temperature		0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Certification		CE, FCC

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		< 6W

Application



- Integrate Voice & Data on Network



- In-Band Management

Ordering Information

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

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 CH01M chassis.



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 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 NMC management, the administrator 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 managed rack.

Features

- Supports Fractional E1 and Unframed E1 services with V.35/X.21/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 (NMC)
- LED Alarm indication
- Standalone RS232 console management via CH01M

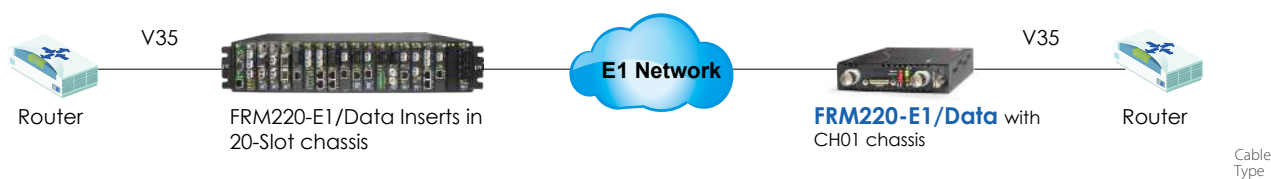
Specifications

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	Complies with ITU-T G.823
	Performance	
	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
LEDs	Connector	HDB26F w/ adapter cable for Data
	Power, TD, RD, RTS, DCD, TX Clock loss, Signal loss, Sync loss, Alarm, test error	
Power		12VDC
Power Consumption		< 6W
Dimensions		Card: 155 x 20.8 x 88mm (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
MTBF		65,000 hrs

Application

Managed E1 Access Unit



Ordering Information

Model Name	Description
FRM220-E1/V35-R	V35 to framed E1 RJ-45 card with HP26M to MB34F cable
FRM220-E1/V35-B	V35 to framed E1 BNC card with HP26M to MB34F cable
FRM220-E1/X21-R	X21 to framed E1 RJ-45 card with HP26M to DB15M cable
FRM220-E1/X21-B	X21 to framed E1 BNC card with HP26M to DB15M cable
FRM220-E1/RS530-R	RS530 to framed E1 RJ-45 card with HP26M to DB25M cable

FRM220-E1/RS530-B	RS530 to framed E1 BNC card with HP26M to DB25M cable
FRM220-E1/RS449-R	RS449 to framed E1 RJ-45 card with HP26M to DB37M cable
FRM220-E1/RS449-B	RS449 to framed E1 BNC card with HP26M to DB37M cable
FRM220-E1/RS232-R	RS232 to framed E1 RJ-45 card with HP26M to DB25M cable
FRM220-E1/RS232-B	RS232 to framed E1 BNC card with HP26M to DB25M cable

Interface Cable Adapters



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/NMC chassis.



FRM220-DATA FRM220-DATA-SFP

RS232/530/V35 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

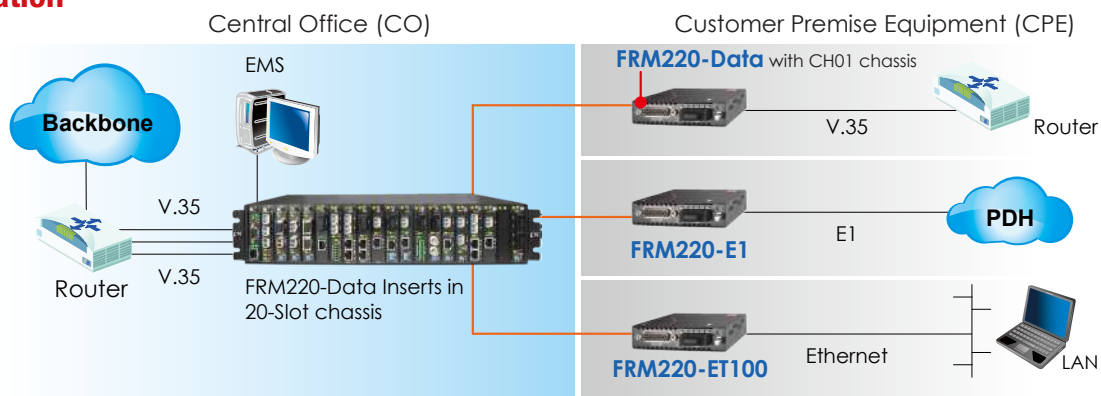
- Synchronous or Asynchronous data over fiber
- In-band network management via terminal, web or SNMP in FRM220 chassis
- Selectable I/F, V.35, X.21, RS-530, RS-449, RS-232
- Selectable DCE or DTE mode
- Data rate n x 64kbps, up to 9Mbps
- Multiple clock setting
- Electrical and optical loop back tests
- Compatible with FRM220-E1 on same fiber link for N x 64k
- Standalone RS232 console management via CH01M

Specifications

Optical Interface	Connector	FRM220-DATA: SFP LC FRM220-DATA-SFP: 1x9 (SC, FC, ST)
	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	Card: 155 x 20.8 x 88mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC	
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 ~ 9152Kbps)
	Clock source	Internal, Recovery, External
Standard	ITU-T	
Indications	LED (Power, FX Link, RTS, Test, TD, RD, CTS, DCD)	
Power Input	12VDC	
Power Consumption	< 6W	

Application



Ordering Information

Model Name	Description
FRM220-V35	V.35 to fiber card with HD26M to MB34F cable (1m)
FRM220-X21	X.21 to fiber card with HD26M to DB15M cable (1m)
FRM220-RS530	RS530 to fiber card with HD26M to DB25M cable (1m)
FRM220-RS449	RS449 to fiber card with HD26M to DB37M cable (1m)
FRM220-RS232	RS232 to fiber card with HD26M to DB25M cable (1m)
FRM220-V35-SFP	V.35 to fiber card with HD26M to MB34F cable (1m) (SFP module not included)
FRM220-X21-SFP	X.21 to fiber card with HD26M to DB15M cable (1m) (SFP module not included)
FRM220-RS530-SFP	RS530 to fiber card with HD26M to DB25M cable (1m) (SFP module not included)
FRM220-RS449-SFP	RS449 to fiber card with HD26M to DB37M cable (1m) (SFP module not included)
FRM220-RS232-SFP	RS232 to fiber card with HD26M to DB25M cable (1m) (SFP module not included)

Interface Type Connector Type Connectivity Distance
FRM220 - □□□ - □□□□□
 Example: FRM220 - V35 - SC002

Interface Cable Adapters



V35



X21



RS530



RS449



RS232

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

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 FRM220-Serial-SFP

RS232/485 over Fiber

The FRM220-Serial provides a fiber modem solution to extend asynchronous RS-232, RS-422 or RS-485 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 RS485/422 (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 RS485/422. When the FRM220-Serial/485 card is placed in the FRM220 rack with NMC 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

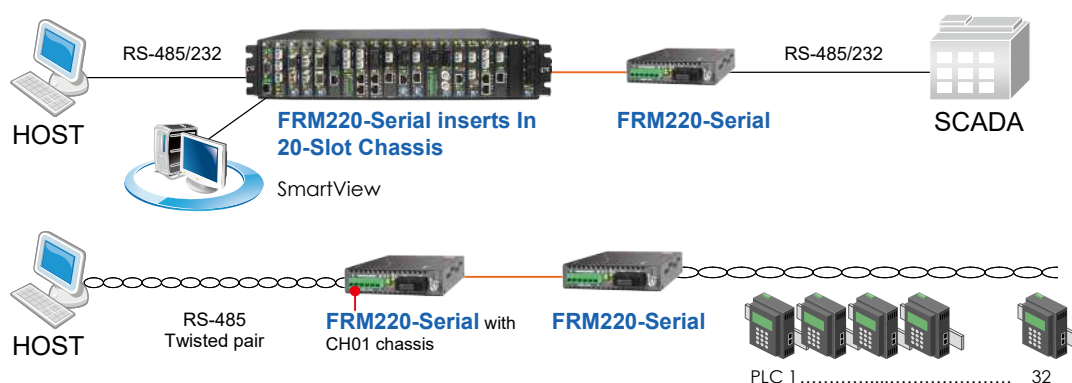
- Extend asynchronous serial transmission up to 120km over fiber
- In-band network management via terminal, Web or SNMP in FRM220-CH20 chassis with NMC
- Selectable data interface for RS-232/ 485
- RS232/Async. 3W or 5W up to 256Kbps
- RS485/Async. 2W (half duplex) or 4W (full duplex) up to 1Mbps
- Standalone RS232 console management via CH01M
- Software selectable two wires (half duplex) or four wires (full duplex) RS-485

Specifications

Optical Interface	Connector	FRM220-Serial: Fixed SC, ST, FC FRM220-Serial-SFP: 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	< 6W
Dimensions	Card: 155 x 20.8 x 88mm (D x W x H)	
Weight	130g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FRM220-Serial	RS-232/485 fiber converter card
FRM220-Serial-SFP	RS-232/485 fiber converter card (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 - Serial - SC002

Note: This card may be set by DIP switch and placed in CH01M 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-CCF40 4 ch. Contact Closure Fiber Converter

FRM220-CCF20 2 ch. Contact Closure Fiber Converter

The FRM220-CCF contact closure fiber converter comes in two models, one with 2 channels (CCF20) and one with 4 channels (CCF40) and provides the transmission of contact closure over a single fiber optic link. With SFP cage on fiber ports, the FRM220-CCF gives you the fiber cabling connector SFP-LC, both multi-mode and single-mode, as well as BiDi which allows bi-directional transmission using only a single fiber core. The FRM220-CCF has contact inputs and 0.5 amp contact output relays. The relay output follows the "relay input" from the remote end. When the remote "relay input" is shorted, the local relay output is closed and vice-versa. Any one of the relay outputs can be configured to close when "carrier loss" is detected from the remote end. (Either through a CH01M console or via NMC in managed chassis.) Carrier Loss indicates that the optical fiber is disconnected or that the remote end has lost power and is not operating. This "carrier loss" relay can then be connected to an appropriate alarm circuit.

Features

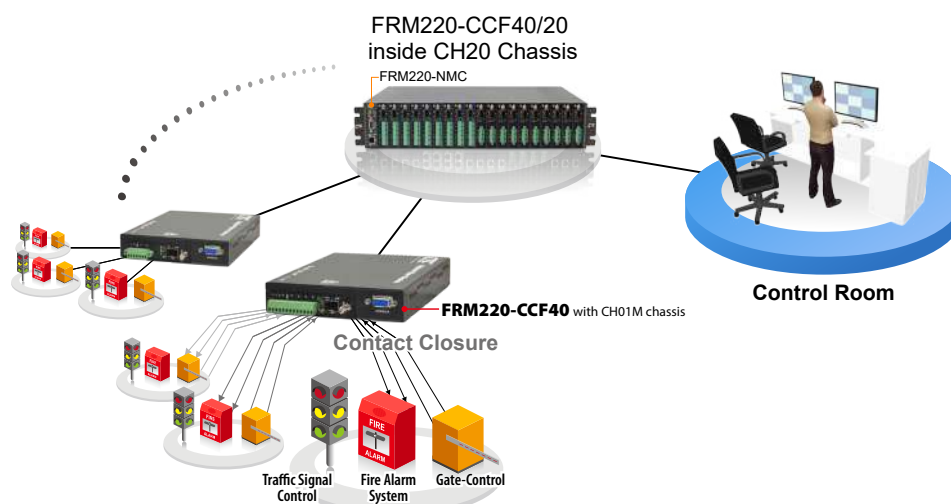
- Transmits a single contact closure in one or two directions
- Distances up to 120km
- 30 VDC, 0.5 amp relay N.O. (Normally Open)
- Point-to-Point transmission architecture
- Plug-and-play design ensures ease of installation requiring no electrical or optical adjustments
- Relay contact for Carrier Detect, N.C. (Normally Close)
- Indicating LEDs are provided for confirming equipment operating status
- Managed when places in FRM220 chassis with NMC

Specifications

Contacts	Contact Interface Response Time : 4 msec Input Dry Contact Closure Output SPST Relay, 30 VDC @ 0.5 A, Resistive loads only. 0.5 A Contact Rating - normally open
Optical	1xSFP/LC (155m)
Connectors	Optical SFP-LC, Contact, Terminal Block
LED Indicators	Contact Relay, Carrier Detect
Power	Operating Voltage Range 8 to 15 VDC Power Consumption 4W Max

Electrical & Mechanical	Current Protection Automatic Resettable Solid-State Current Limiters Circuit Board Meets IPC Standard
Dimension	155 x 208 x 88mm (D x W x H)
Weight	200g
MTBF	>100,000 hours
Operating Temperature	0°C to +50°C
Storage Temperature	-10°C to +85°C
Relative Humidity	0% to 95% (non-condensing) ¹

Application



Related Product



IFC-CCF40

(Industrial 4 Channel Binary Transducer, 4 binary input, 4 high power MSR Relay output)

Ordering Information

Model Name	Description
FRM220-CCF40	4ch Contact closure fiber converter
FRM220-CCF20	2ch Contact closure fiber converter



PHB-200M PHB-200

20x 100/1000Base-T to 20x 100/1000Base-X
FE/GbE Media Converter Concentrator

PHB-200M is a 20-channel Managed Media Converter that converts Ethernet copper 100/1000Base-TX to SFPs working at 100Mbps and 1000Mbps. PHB-200M can connect to any RJ-45 Ethernet switch and supports any third-party standard SFP module from any SFP vendor. PHB-200M can also be used as an Ethernet copper-to-fiber media converter. With different kinds of fiber optic media, both multi-mode and single mode fiber are available as well as BiDi which allows bi-directional transmissions using only a single fiber to extend the distance of Fast Ethernet and Gigabit Ethernet networks. With SNMP and Web-based management, the administrator can monitor, configure and control the activity of PHB-200M remotely.

Features

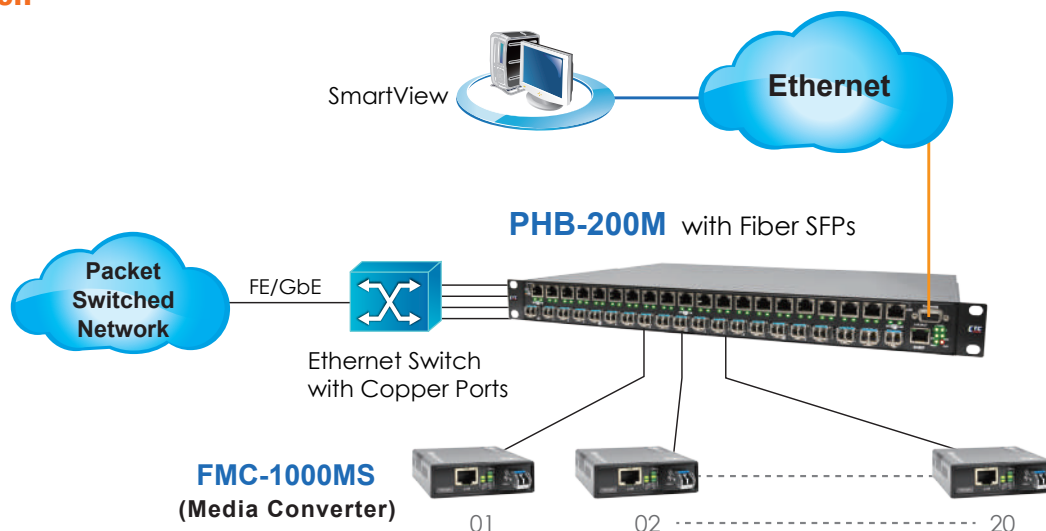
- 1U, 19", 20 channels Managed Media Converter Concentrator
- 20-port 100/1000Base-T to 20-port 100/1000Base-X SFP
- Auto MDI/MDIX in TP port
- Auto-Negotiation in TX port
- Supports hot-swappable SFPs working at 100 Mbps and 1000 Mbps
- Supports Web, Telnet, SNMP Management (PHB-200M)
- Local configuration via DB9 port
- Supports Link Pass-Through & Link loss Alarm
- Supports any third-party standard SFP module
- Supports SFP DDM I
- Layer 2 wire-speed conversion with fully transparent function
- Available in 3 types : power built-in AC, DC, AC+DC

Specifications

Optical Interface	Connector	SFP LC
	Number of port	20
	Data rate	100/1000Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125um, 6.25/125um, SM 9/125um
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	1310nm, 1550nm, CWDM 1471nm ~ 1611nm
Management	Console, Web, Telnet, SNMP	
Control Port	RS-232 DCE, DB-9, female	
Standards	IEEE 802.3, 802.3u, 802.3ab, 802.3z, 802.3x	
Indications	Power FX-Link, Duplex, TX-Link/Act, TX-Speed	

Electrical Interface	Connector	RJ-45
	Number of port	20
	Data rate	10/100/1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat. 3, 4, 5 UTP 100/1000Base-T Cat.5, 5e or higher
Power	100 ~ 240VAC, 36~60 VDC	
Power Consumption	45W	
Dimensions	180 x 440 x 44mm (D x W x H)	
Weight	3.4kg	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Certification	CE, FCC	

Application



Ordering Information

Model Name	Description
PHB-200M-AC, DC, AD	20-ch Managed FE/GbE Media Converter Concentrator, built-in AC, DC or AD (AC+DC) Power
PHB-200-AC, DC, AD	20-ch FE/GbE Media Converter Concentrator, built-in AC, DC or AD (AC+DC) Power

Power Type
PHB-200 ☐ - ☐ ☐
 Example: PHB-200M - DC



FMC-CH17

17 slots Rackmount Converter Chassis

The FMC-CH17 is a 2U high 19" 17 slots chassis. The chassis provides an economic solution in low density fiber converter installations where no management features are required. Each FMC or VDU2-B110 converter is an independent Ethernet to fiber or Ethernet to copper media converter that may be used as a stand-alone converter or placed in the FMC-CH17 chassis. With two power supplies, the FMC-CH17 chassis supports redundant power from any of two power options. The AC supplies operate from (100-240VAC) and DC supplies operate from 36-60VDC. The built in cooling fan ensures that the temperatures in the rack remain within the tolerated working range.

Features

- FMC-CH17, 2U, 19", 17-Slot chassis with single or dual built-in power for AC or DC
- Cross flow cooling fan built-in.
- Designed for 19" Rack mounting
- FMC units are hot swappable

Specifications

Power Input	AC : 100 ~240V or DC : 36 ~ 60V
Power Consumption	<60W
Dimensions	199 x 476 x 88 mm (D x W x H)
Weight	7.9Kg

Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	65,000 hrs

Application



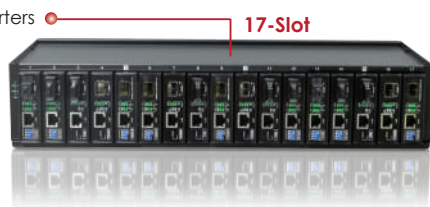
Easy to install or remove without any tools

FMC-CH17 Front view

FMC-CH17 Rear view

FMC Optional Converters

- Fast Ethernet
- Gigabit Ethernet
- VDSL2 LAN Extender



17-Slot

DC Power Terminal
Power Switch
FAN



AC Power Socket
Power Switch

Note: Each FMC Card can be placed in the FMC-CH17 chassis, also can use the wall mount kit for wall mount installation.



FMC-WMK01 (Single Unit Wall Mounting Kit)

Ordering Information

Model Name	Description
FMC-CH17-AC, DC, AD, AA, DD	2U, 19", 17-Slot FMC converter chassis with AC, DC, AD, AA or DD power

Optional Accessories

Wall Mount Kits	Type
FMC-WMK01	Single Unit Wall Mounting Kit



FMC-1001S

10/100/1000Base-T to 100/1000Base-X SFP
Media Converter

The FMC-1001S family are Gigabit Ethernet 10/100/1000Base-T to 100/1000Base-X non-managed stand-alone media converters, which give you the fiber cabling connectors, LC with SFP module. Pluggable SFP are available in both multi-mode and single mode types as well as BiDi which allows bi-directional transmissions using only a single fiber cable. Auto-negotiation will automatically tailor to convert full-duplex signals, according to IEEE 802.3u standards. LED indicators signal the power status of the converter, UTP port speed and Link status FX port speed and Link status.

Features

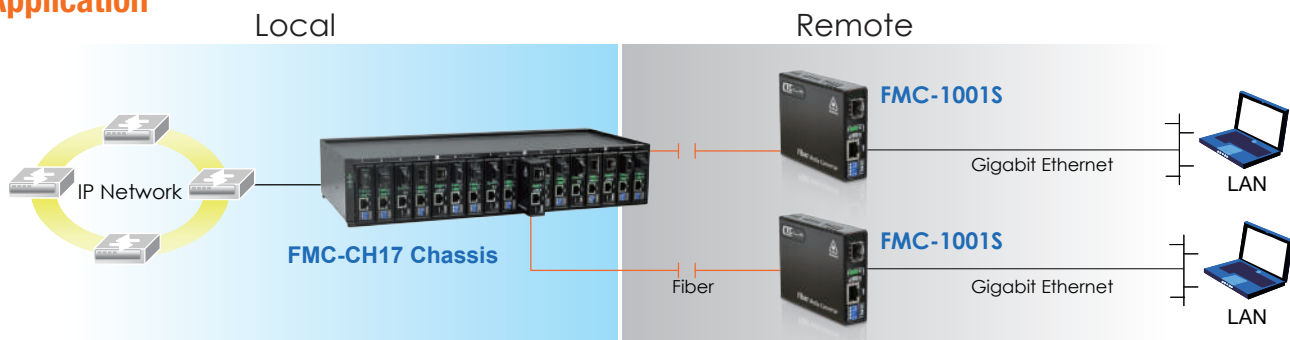
- 10/100/1000Base-T to 100/1000Base-X Converter
- Auto-Negotiation
- Auto MDI/MDIX
- Forward 2048 bytes (Max.) packets in switch mode (copper & fiber port in different speed)
- Forward 9k bytes in connector mode (fiber & copper port at the same speed)
- Provides DIP switch to set function
 - Select fiber speed (100/1000M)
 - Select LPF enable / disable
 - Flow control enable / disable
- Supports transparent Q in Q double tagged frame
- Supports IEEE 802.1Q Tag VLAN pass thru
- May be concentrated into FMC-CH17 chassis

Specifications

Optical Interface	Connector	SFP LC
	Data rate	1.25G / 125M
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm SM 9/125μm
	Distance	MM 2km, SM 15/30km WDM 20/40km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (Type A) 1550Tx/1310Rx (Type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Full duplex
	Cable	100Base-TX Cat.5, 5e or higher 1000Base-T Cat.5, 5e or higher

DIP Switch	Fiber Speed	100M/1000M
	LFP Fiber	Enable/Disable
	LFP Copper	Enable/Disable
	Flow Control	On/Off
Standards	IEEE 802.3, 802.3u, 802.3x, 802.3Z, 802.3ab	
Indications	LED (Power, FX Link, FX SPD, TX SPD, TX Link)	
Power Input	Adapter Type: DC 12V	
	Power Built-in Type: AC 100~240V	
	Power Built-in Type: DC 18~60V	
Power Consumption	< 3W	
Dimensions (D x W x H)	Adapter Type: 108 x 23 x 73.4mm	
	Power Built-in Type: 135 x 23 x 73.4mm	
Weight	120g	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FMC-1001S	10/100/1000Base-T to 100/1000Base-X SFP media converter (Adapter Type)



FMC-10/100

10/100Base-TX to 100Base-FX Media Converter

The FMC-10/100 family are Fast Ethernet 10/100Base-TX to 100Base-FX non-managed stand-alone media converters, which give you the options to choose from the most popular fiber cabling connectors, ST, SC or FC. Both multi-mode and single mode converter models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. Auto-negotiation will automatically tailor to convert both half-duplex and full-duplex signals, according to IEEE 802.3u standards. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status.

Features

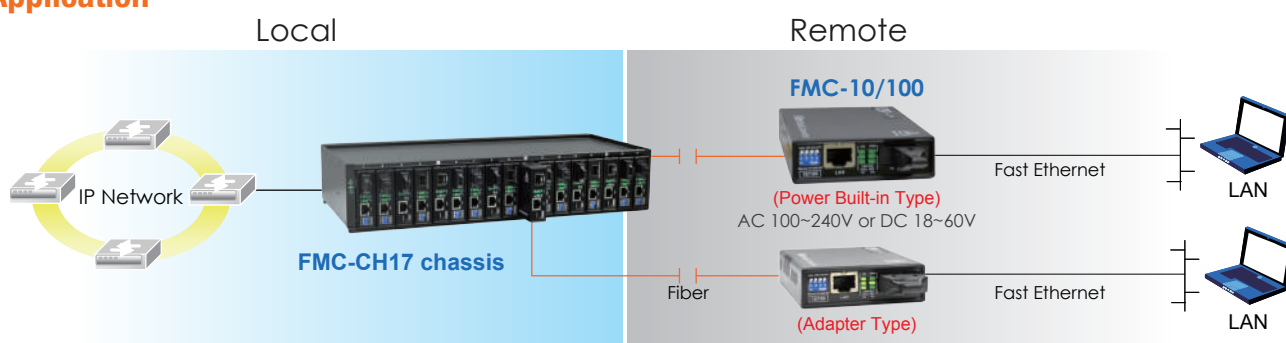
- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1600 bytes (Max.) packets
- Supports flow control (Pause)
- Supports Link Fault Pass-Through (LFPT)
- Supports Far End Fault Indication (FEFI)
- Forward 9K jumbo packets in converter mode (100M/Full)
- May be concentrated into FMC-CH17 chassis (FMC-10/100 Adapter type only)

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 15/30km WDM 20/40km
	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, cat.6
		100Base-TX Cat.5, 5e or cat.6

Standards	IEEE 802.3, IEEE 802.3u
Indications	LED (Power, FX Link, TX SPD, TX Link, TX Duplex, FEF)
Power Input	Adapter Type: DC 12V Power Built-in Type: AC 100 ~ 240V Power Built-in Type: DC 18 ~ 60V
Power Consumption	< 2W
Dimensions (D x W x H)	Adapter Type: 108 x 23 x 73.4mm Power Built-in Type: 135 x 23 x 73.4mm
Weight	Adapter Type: 120g Power Built-in Type: 140g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FMC-10/100	10/100Base-TX to 100Base-FX Non-managed media converter Adapter Type
FMC-10/100-AC	10/100Base-TX to 100Base-FX Non-managed media converter with AC Power
FMC-10/100-DC	10/100Base-TX to 100Base-FX Non-managed media converter with DC Power
Connector Type	Connectivity Distance
SC, ST, FC	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 80A: WDM 80km A type 80B: WDM 80km B type 120A: WDM 120km A type 120B: WDM 120km B type

Power Type
FMC - 10/100 - □□
 Example: FMC - 10/100 - AC



FMC-1000M FMC-1000MS

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

The FMC-1000M(S) family are Web Smart OAM/IP managed Gigabit Ethernet 10/100/1000Base-T to 100/1000Base-X fiber media converters, which provide simple control and setting function on each Ethernet port through out of band network via a Web browser. The FMC-1000M(S) media converters give you the fiber cabling connector, SFP-LC(1000MS) and fixed type 1x9 SC connector(1000M). Both multi-mode and single mode converter models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. Auto-negotiation will automatically tailor to convert both half-duplex and full-duplex signals, according to IEEE 802.3u standards. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status.

Features

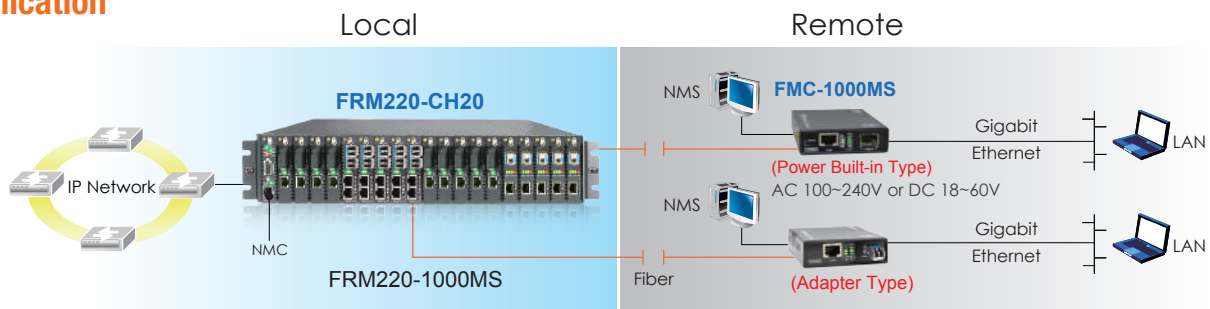
- 10/100/1000Base-T to 100/1000Base-X Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Supports flow control Enable or Disable
- Supports Jumbo Frame 9K Packet
- Ingress/Egress Bandwidth control
- Supports IEEE 802.3ah OAM management
- Firmware upgrade via Web
- Digital Diagnostic (DOM) SFP Support
- Management Password Setting
- Dying gasp (remote power failure detection)
- Supports Link Fault Pass-Through (LFPT) Function
- Supports Auto Laser Shutdown (ALS) Function
- Web management on stand-alone.
- Supports D/D function for SFP fiber transceiver
- Supports On-Line F/W upgrade (local) by the Web manager
- Supports 16 Tag VLAN Group
- RMON counters
- May be concentrated into FMC-CH17 chassis (Adapter Type only)
- May be used as a remote to FRM-1000M(S)

Specifications

Optical Interface	Connector	SFP LC (FMC-1000MS), 1x9 SC (FMC-1000M)
	Data rate	125/1250Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm SM 9/125μm
	Distance	MM 2km, SM 15/30km WDM 20/40km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (Type A) 1550Tx/1310Rx (Type B)
Electrical Interface	Connector	RJ-45
	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, 802.1Q
Indications	LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input	Adapter Type: DC 12V
	Power Built-in Type: AC 100 ~ 240V
	Power Built-in Type: DC 18 ~ 60V
Power Consumption	< 3W
Dimensions (D x W x H)	Adapter Type: 108 x 23 x 73.4mm
	Power Built-in Type: 135 x 23 x 73.4mm
Weight	Adapter Type: 120g
	Power Built-in Type: 140g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	65,000 hrs

Application



Ordering Information

Model Name	Description
FMC-1000MS	10/100/1000Base-T to 100/1000Base-X SFP web smart managed media converter (optional SFP module) Adapter Type
FMC-1000MS-AC,DC	10/100/1000Base-T to 100/1000Base-X SFP web smart managed media converter (optional SFP module) with AC or DC Power
FMC-1000M	10/100/1000Base-T to 1000Base-X web smart OAM/IP managed media converter Adapter Type
FMC-1000M-AC,DC	10/100/1000Base-T to 1000Base-X web smart OAM/IP managed media converter with AC or DC Power
FMC-1000M-AD	10/100/1000Base-T to 1000Base-X web smart OAM/IP managed media converter with AC + DC Power
Connector Type	Connectivity Distance
SC	001: 550m 002: 2km S/M 010: 10km 020: 20km 040: 40km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type

Power Type
FMC - 1000MS - □□
Example: FMC - 1000MS - DC

Power Type
FMC - 1000M - □□
Example: FMC - 1000M - DC



FMC-10/100i

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

The FMC-10/100i family are Fast Ethernet 10/100Base-TX to 100Base-FX In-band managed media converters, which give you the options to choose from the most popular fiber cabling connectors, ST, SC or FC. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTx applications. By offering in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

Features

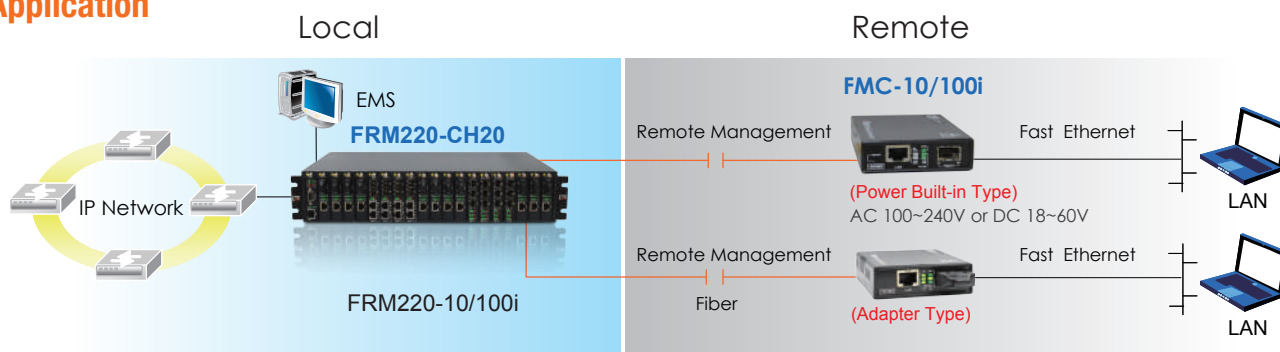
- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (Max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager with FRM220-NMC
- Bandwidth control (Nx32K or Nx512Kbps)
- Supports flow control (Pause)
- 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)
- 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 62.2/125µm, 50/125µm. SM 9/125µm
	Distance	MM 2km, SM 15/30km WDM 20/40km
Wavelength	MM	1310nm, SM 1310,1550nm
	WDM	1310Tx/1550Rx (Type A) 1550Tx/1310Rx (Type B)
Standards	IEEE 802.3, IEEE 802.3u	
Power Input	Adapter Type : DC 12V	
	Power Built-in Type : AC 100 ~ 240V	
	Power Built-in Type : DC 18 ~ 60V	
LEDs	Power, FX Link, TX SPD, TX Link, TX Duplex, FEF	

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
	Distance	100 meters
Power Consumption	< 3W	
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Dimensions (D x W x H)	Adapter Type : 108 x 23 x 73.4mm	
	Power Built-in Type : 135 x 23 x 73.4mm	
Weight	Adapter Type : 120g	
	Power Built-in Type : 140g	
Certification	CE, FCC	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Description
FMC-10/100i	10/100Base-TX to 100Base-FX In-band managed media converter Adapter Type
FMC-10/100i-AC,DC	10/100Base-TX to 100Base-FX In-band managed media converter with AC or DC Power
Connector Type	Connectivity Distance
SC, ST, FC	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

Power Type
FMC - 10/100i - ☐ ☐
 Example: FMC - 10/100i - DC

Metro Ethernet & P2P FTTB/FTTH



CTC Union's standalone fiber switch series of Gigabit Ethernet, managed switches are suitable for market segments included SOHO, SMB and Enterprise as well as Telecom carrier customers. For any deployment scale, CTC Union's standalone fiber switches fulfill the simple installation requirements of Ethernet Technology based networks in a cost effective manner.

NEW



GSW-4448CM

24x CSFP (48x GbE) with 4x GbE Combo +
4x 10G SFP+ Managed Switch

GSW-4448CM is an SNMP manageable Gigabit Ethernet switch for FTTx deployment or Gigabit Ethernet fiber aggregation that is equipped with 48 1000Base-X CSFP ports included 4 Gigabit combo ports (RJ45 or CSFP slot) and 4 1G/10Gbps dual rate SFP+ slots. The GSW-4448CM supports a special BX optics (Compact SFP) which can double the fiber port density to 48 links, make it be attractive for the FTTx deployment and scenarios where increased user links are required in limited construction space. With advanced layer 2 and QoS features, this switch is targeted at multi-service operators (MSO) with a desire to deploy provisioned triple play services via active Ethernet FTTx network infrastructures. Fiber based network infrastructures offer the data rates required by triple play services such as high speed internet access, VoIP and HD IPTV. The GSW-4448CM Ethernet access switch provides VLAN, QoS and IGMP L2 feature sets as well as robust security management to facilitate service provider's build out of a manageable and secure FTTx access network.

Feature and Benefits

- IPv6 management
- 8 priority queues are supported on each port for QoS application
- Port-based VLAN, 802.1Q VLAN, Voice VLAN and Q-in-Q(double tagging) function
- Protected Port and Loop Detection function
- IEEE 802.1x security function, and VLAN assignment, Guest VLAN functions
- Static MAC address access limit and Dynamic MAC address number on port
- IEEE 802.1D & 802.1w & 802.1s
- DHCP Client / DHCP Option 82 Relay / DHCP Snooping function
- ACL function for L2 ~ L4 packet control, Ingress/Egress rate control on port
- IP Multicast with IGMP snooping / query / fast leave / filtering / group limited /MVR
- Broadcast/Multicast/Unknown Unicast storm control
- ARP inspection / IP source guard
- RMON 1,2,3,9
- SFP Transceiver DDMI function
- Remote port configuration setting and statistics monitoring
- Text based CLI configuration download and upload
- IEEE 802.3az power management / Green Ethernet

Specifications

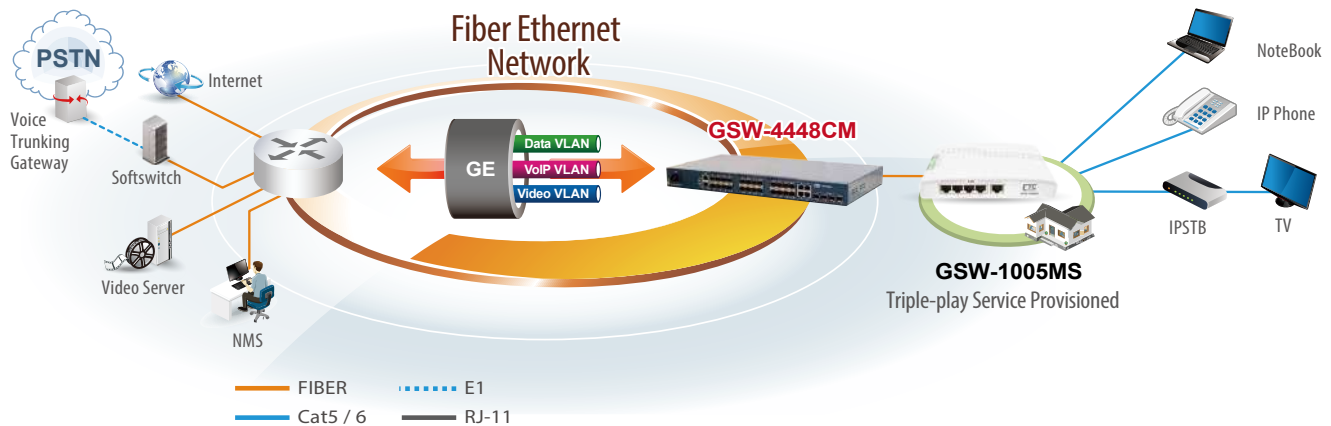
System	
1G CSFP or 100M/1G SFP Slot	24
1G Combo 10/100/1000Base-T Port	4
1G/10G Uplink Port	4
Memory	Flash : 16MB / RAM: 128MB
Packet buffer	32M bits
MAC Table size	32K
Max Packet Size	10K
Filter & Forward rate	14880pps at 10Mbps 148800pps at 100Mbps 148800pps at 1Gbps 1488000pps at 10Gbps
Switching Fabric Capacity	178Gbps
Packet Forwarding Capacity	132Mpps
FAN	3 x independent fans with speed sensors
Console port	RJ-45
SFP DDMI	Yes
Dimension (mm)	250(D) x 440(W) x 43.5(H)
Operatin Temperature	0 ~ 50°C
Storage Temperature	-25 ~ 70°C
Humidity	10% ~ 90% (non-condensing)
Power Consumption	<100W Max.
Power Input	Dual power redundancy (100V~240V); -36~-60VDC

Software	
Port Control	Port speed, duplex mode, and flow control Port Auto MDI/MDI-X Port maximum frame size (10240 bytes) Port state (administrative status) Port status (link monitoring) Port statistics (MIB counters) Port VeriPHY (cable diagnostics)
L2 Switching	Auto MAC address learning/aging. Per port limited MAC address learning IEEE 802.1Q static VLAN(4K VLAN groups), Voice VLAN, Port isolation, Private VLAN, MAC based VLAN protocol based VLAN, IP subnet based VLAN IEEE 802.1D STP/802.1w RSTP/802.1s MSTP IEEE 802.3ad Link Aggregation, static and LACP BPDU guard and restricted role, Error Disable Recovery DHCP client, DHCP snooping, DHCP option 82 relay ARP inspection(256 entries Max.) Port mirroring, RSPAN
Layer 2 Multicast	IGMP snooping v1,v2, v3 snooping, (1024 groups) IGMP snooping Fast and Immediate leave IGMP throttling, filtering, and leave proxy MVR and MVR profile IPv6 MLD v1/v2 snooping
QoS	8 Priority Queues per Port Port Based priority Scheduler priority QoS Control List(256 entries Max.) Storm control for UC, MC, and BC Per port/per queue based ingress policing and egress shaping DiffServ (RFC 2474) remarking Tag remarking

Security	Port-based 802.1X, Single 802.1X, Multiple 802.1X MAC-based authentication, VLAN assignment, QoS assignment, Guest VLAN RADIUS accounting MAC address limit TACACS+ Web and CLI authentication and authorization ACLs for filtering, policing, and port copy IP source guard
Synchronization	NTPv4 Client
SFP DDMI	Yes

Management	HTTP server CLI console port Telnet CLI Management access filtering SSHv2 and HTTPS IPv6 Management Syslog Software upload through Web and TFTP SNMPv1/v2c/v3 Agent RMON Group 1, 2, 3, and 9 IEEE 802.1AB-2005 Link Layer Discovery, LLDP Text Configuration download or upload Daylight Saving
-------------------	--

Application



Ordering Information

Model Name	Description
GSW-4448CM-AC	48x GbE (24x CSFP), 4x GbE combo (RJ45 or CSFP) + 4x 1G/10G, SFP+ slots uplink with single AC power supply
GSW-4448CM-DC	48x GbE (24x CSFP), 4x GbE combo (RJ45 or CSFP) + 4x 1G/10G, SFP+ slots uplink with single DC power supply (-48V)
GSW-4448CM-AA	48x GbE (24x CSFP), 4x GbE combo (RJ45 or CSFP) + 4x 1G/10G, SFP+ slots uplink with 2x AC power supplies
GSW-4448CM-DD	48x GbE (24x CSFP), 4x GbE combo (RJ45 or CSFP) + 4x 1G/10G, SFP+ slots uplink with 2x DC power supplies (-48V)
GSW-4448CM-AD	48x GbE (24x CSFP), 4x GbE combo (RJ45 or CSFP) + 4x 1G/10G, SFP+ slots uplink with AC + DC power supplies

Accessories (option)

10G SFP+ Transceiver Module

SFM-1000-SR85	10G SFP+ SR/SW MMF 300m, 850nm VCSEL, 10G Ethernet/FC/SDH/SONET
SFS-1010-LR31	10G SFP+ LR/LW SMF 10km, 1310nm DFB DML, 10G Ethernet/FC/SDH/SONET
SFS-1040-ER55	10G SFP+ ER/EW SMF 40km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET
SFS-1080-ZR55	10G SFP+ ZR/EW SMF 80km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET

Power Type
GSW - 4448CM - ☐
 Example: GSW - 4448CM - AC



GSW-3424FM

24x GbE/SFP + 4x GbE/RJ45 + 4x 10G/SFP+
L2+ Managed Ethernet Switch

GSW-3424FM is an SNMP manageable Gigabit Ethernet switch for FTTx deployment or Gigabit Ethernet fiber aggregation that is equipped with 24 dual rate 100/1000Base-X SFP ports, 4 10/100/1000Base-T RJ45 ports and 4 1G/10Gbps dual rate SFP+ slots. With advanced layer 2 and QoS features, this switch is targeted at multi-service operators (MSO) with a desire to deploy provisioned triple play services via active Ethernet FTTx network infrastructures. Fiber based network infrastructures offer the data rates required by triple play services such as high speed internet access, VoIP and HD IPTV. The GSW-3424FM Ethernet access switch provides VLAN, QoS and IGMP L2 feature sets as well as robust security management to facilitate service provider's build out of a manageable and secure FTTx access network.

Features

- IPv6 management
- 8 priority queues are supported on each port for QoS application
- Port-based VLAN, 802.1Q VLAN, Voice VLAN and Q-in-Q(double tagging) function
- Protected Port and Loop Detection function
- IEEE 802.1x security function, and VLAN assignment, Guest VLAN functions
- Static Mac address access limit and Dynamic Mac address number on port
- IEEE802.1d & 802.1w & 802.1s
- DHCP Client / DHCP Option 82 Relay / DHCP Snooping function
- ACL function for L2 ~ L4 packet control, Ingress/Egress rate control on port
- IP Multicast with IGMP snooping / query / fast leave / filtering / group limited /MVR
- Broadcast/Multicast/Unknown Unicast storm control
- ARP inspection / IP source guard
- RMON 1,2,3,9
- SFP Transceiver DDMI function
- Remote port configuration setting and statistics monitoring
- Text based CLI configuration download and upload
- IEEE 802.3az power management / Green Ethernet

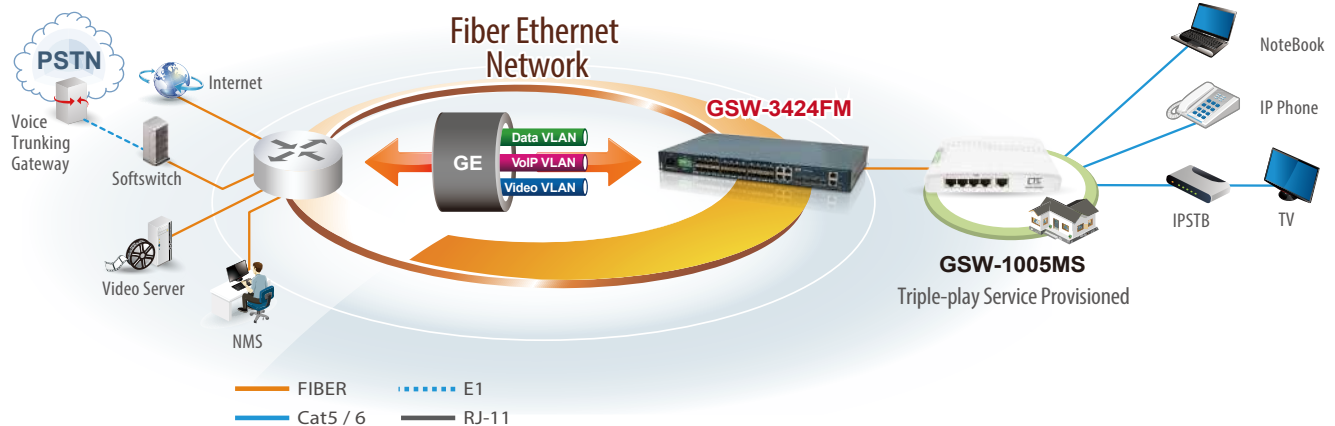
Specifications

System	
100M/1G SFP Port	24
10/100/1000 Base-T RJ45	4
1G/10G Uplink Port	4
Memory	Flash : 16MB / RAM: 128MB
Packet buffer	32M bits
MAC Table size	32K
Max Packet Size	10K
Transmission Method	Store and Forward Switching
Filter & Forward rate	14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps, 14880000pps at 10Gbps
Switching Fabric capacity	136Gbps
Packet Forwarding capacity	102Mpps
FAN Design	Yes
Console port	RJ-45
19" Rack-Mount	Yes, with kits
SFP DDMI	Yes
Dimension	250x 440x 43.5mm (DxWxH)
Operating Temperature	0 ~ 50°C
Storage Temperature	-25 ~ 70°C
Humidity	10% ~ 90% (non-condensing)
LED Display	Per Port : Link/Act (Green: Gigabit, Yellow:10/100M) Per Device : Power and System
Power Consumption	<60W Max.
Power Input	AC Power input (100V~240V); -36~-60VDC
LED	
Power	Lights(Green) System is receiving power
System	Lights(Green) System is ready

Link / Act	Lights	Link is ready 1000Mbps : Amber 100Mbps : Green
	Flashing	Data packets being received or sent
Software		
Port Control	Port speed, duplex mode, and IEEE 802.3x flow control Port Auto MDI/MDI-X Port frame size (jumbo frames), Maximum ingress frame size (10056 bytes) Port state (administrative status) Port status (link monitoring) Port statistics (MIB counters) Port VeriPHY (cable diagnostics)	
L2 Switching	Auto MAC address learning/aging Per port limited MAC address learning IEEE 802.1Q static VLAN(4K VLAN groups), Voice VLAN, Port isolation, Private VLAN, MAC based VLAN protocol based VLAN IP subnet based VLAN IEEE 802.1D STP/802.1w RSTP/802.1s MSTP IEEE 802.3ad Link Aggregation, static and LACP BPDU guard and restricted role, Error Disable Recovery DHCP client, DHCP snooping, DHCP option 82 relay ARP inspection(256 entries Max.) Port mirroring, RSPAN	
Layer 2 Multicast	IGMP snooping v1,v2, v3 snooping, (1024 groups) IGMP snooping Fast and Immediate leave IGMP throttling, filtering, and leave proxy MVR and MVR profile IPv6 MLD v1/v2 snooping	
QoS	IEEE 802.1p 8 Priority Queues per Port Port Based priority Scheduler priority QoS Control List(256 entries Max.) Storm control for UC, MC, and BC Per port/per queue based ingress policing and egress shaping DiffServ (RFC 2474) remarking Tag remarking	

Security	Port-based 802.1X, Single 802.1X, Multiple 802.1X MAC-based authentication, VLAN assignment, QoS assignment, Guest VLAN RADIUS accounting MAC address limited learning TACACS+ Web and CLI authentication and authorization ACL rules based on L2~L4 information IP source guard	Management	HTTP server CLI console port Telnet CLI Management access filtering SSHv2 and HTTPS IPv6 Management Syslog Software upload through Web and TFTP SNMPv1/v2c/v3 Agent RMON Group 1, 2, 3, and 9 IEEE 802.1AB-2005 Link Layer Discovery, LLDP Text Configuration download or upload Daylight Saving
Synchronization	NTPv4 Client		
SFP DDMI	Yes		

Application



Ordering Information

Model Name	Description
GSW-3424FM-AC	24x GbE SFP slots + 4x GbE RJ45 + 4x 1G/10Gbps SFP+ slots uplink with single AC power supply
GSW-3424FM-DC	24x GbE SFP slots + 4x GbE RJ45 + 4x 1G/10Gbps SFP+ slots uplink with single DC power supply (-48V)
GSW-3424FM-AA	24x GbE SFP slots + 4x GbE RJ45 + 4x 1G/10Gbps SFP+ slots uplink Dual AC power supply
GSW-3424FM-DD	24x GbE SFP slots + 4x GbE RJ45 + 4x 1G/10Gbps SFP+ slots uplink Dual DC power supply (-48V)
GSW-3424FM-AD	24x GbE SFP slots + 4x GbE RJ45 + 4x 1G/10Gbps SFP+ slots uplink AC & DC (-48V) power supply

Accessories

10G SFP+ Transceiver Module

SFM-1000-SR85	10G SFP+ SR/SW MMF 300m, 850nm VCSEL, 10G Ethernet/FC/SDH/SONET
SFS-1010-LR31	10G SFP+ LR/LW SMF 10km, 1310nm DFB DML, 10G Ethernet/FC/SDH/SONET
SFS-1040-ER55	10G SFP+ ER/EW SMF 40km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET
SFS-1080-ZR55	10G SFP+ ZR/EW SMF 80km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET

Power Type
GSW - 3424FM - ☐
 Example: GSW - 3424FM - AD



GSW-3424M1

20x GbE/RJ45 + 4x GbE Combo (SFP or RJ45)
L2+ Managed Ethernet Switch

GSW-3424M1 is a cost-effect, high performance, managed L2 Ethernet with 20x 10/100/1000Base-T ports and 4x Gigabit Ethernet combo (10/100/1000Base-T or 1000Base-X) ports. This switch supports remote management by SNMP, HTTP(HTTPS) and Telnet(SSH) interfaces along with local management by console interface. GSW-3424M1 supports many L2 switch management functions, including 802.1Q VLAN, 802.1x Port Security, Rate Control, Port Configuration, Port Mirroring, Port Statistics, QoS functions, Spanning tree and more.

Features

- 20x RJ45 ports, with 10/100/1000Mbps, Full/Half duplex auto-negotiation and Auto-MDIX functions
- 4x Dual Speed SFP sockets, shared with TX ports of Port 21~24 ;
- auto-detect TX/SFP connection
- CISCO-like command line interface, IPv6 management
- 8 priority queues are supported on each port for QoS application
- Port-based VLAN, 802.1Q VLAN, Voice VLAN and Q-in-Q (double tagging) function
- Protected Port and Loop Detection function
- IEEE 802.1x security function, and VLAN assignment, Guest VLAN functions
- Static Mac address access limit and Dynamic Mac address number on port
- IEEE802.1D & 802.1w & 802.1s (spanning tree)
- IP Multicast with IGMP snooping / query / fast leave / filtering / group limited /MVR
- DHCP Client / DHCP Option 82 Relay / DHCP Snooping function
- ACL function for L2 ~ L4 packet control, Ingress/Egress rate control on port
- Broadcast/Multicast/Unknown Unicast storm control
- ARP inspection / IP source guard, RMON 1, 2, 3, 9
- SFP Transceiver DDMI function / Dual Speed SFP Ports (100/1000Mbps)
- Remote port configuration setting and statistics monitoring
- Text based CLI configuration download and upload
- IEEE 802.3az power management / FANless / Green Ethernet

Specifications

System	
10/100/1000 Base-T	20
100M/1G SFP Slot	4 UTP/SFP Combo (Port 21~24)
Packet buffer	512KB
MAC Table size	8K
Max Packet size	9600 Bytes
Filter & Forward rate	14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps
Switching Fabric capacity	48Gbps
Packet Forwarding capacity	35.7Mpps
FAN Design	FAN less
Console port	D-Sub 9
19" Rack-Mount	Yes, with kits
SFP DDMI	Yes
Dimensions	330 x 204 x 44 mm (W x D x H)
Operating Temperature	0 ~ 50°C
Storage Temperature	-25 ~ 70°C
Humidity	10% ~ 90% (non-condensing)
LED Display	Per Port : Link/Act (Green: Gigabit, Yellow:10/100M) Per Device : Power and System
Power Consumption	18 Watt Max.
Power Input	AC Power input (100V~240V)
Software	
Port Control	Port speed, duplex mode, and flow control Port frame size (jumbo frames), Maximum ingress frame size (9600 bytes) Port state (administrative status) Port status (link monitoring) Port statistics (MIB counters) Port VeriPHY (cable diagnostics), Power Control

L2 Switching	Auto MAC address learning/aging and MAC addresses (static) IEEE 802.1Q static VLAN(Max. 4K VLAN groups), Voice VLAN, Port isolation, Port Based VLAN, IEEE 802.1ad Provider Bridge IEEE 802.1D STP/802.1w RSTP/802.1s MSTP IEEE 802.3ad Link Aggregation, static and LACP BPDU guard and restricted role, BPDU transparency DHCP client, DHCP snooping, DHCP option 82 relay ARP inspection, Port mirroring, IP MAC binding
Layer 2 Multicast	IGMP snooping v1,v2, v3 snooping, (1024 groups) IGMP snooping Fast and Immediate leave IGMP throttling, filtering, and leave proxy IGMP proxy mode and snooping mode selection MVR, IPv6 MLD snooping
QoS	8 Priority Queues per Port Port Based priority, Scheduler priority, QoS Control List Storm control for UC, MC, and BC Policing and shaping per port and per queue Ingress Policing : (100-1000000 when the "Unit" is "kbps" or "fps" and 1-3300 when the "Unit" is "Mbps" or "kfps") Egress Shaping : (100-1000000 when the "Unit" is "kbps", and 1-3300 when the "Unit" is "Mbps") DiffServ (RF 2474) remarking, Tag remarking
Security	Port-based 802.1X, Single 802.1X, Multiple 802.1X MAC-based authentication, VLAN assignment, QoS assignment, Guest VLAN, RADIUS accounting, MAC address limit TACACS+, Web and CLI authentication and authorization Authorization (3 levels) ACLs for filtering(256 entries), policing, and port copy IP source guard
Synchronization	NTPv4 Client
Power Saving	ActiPHY, PerfectReach, Ethernet Energy Efficient power management(EEE)
SFP DDMI	Yes

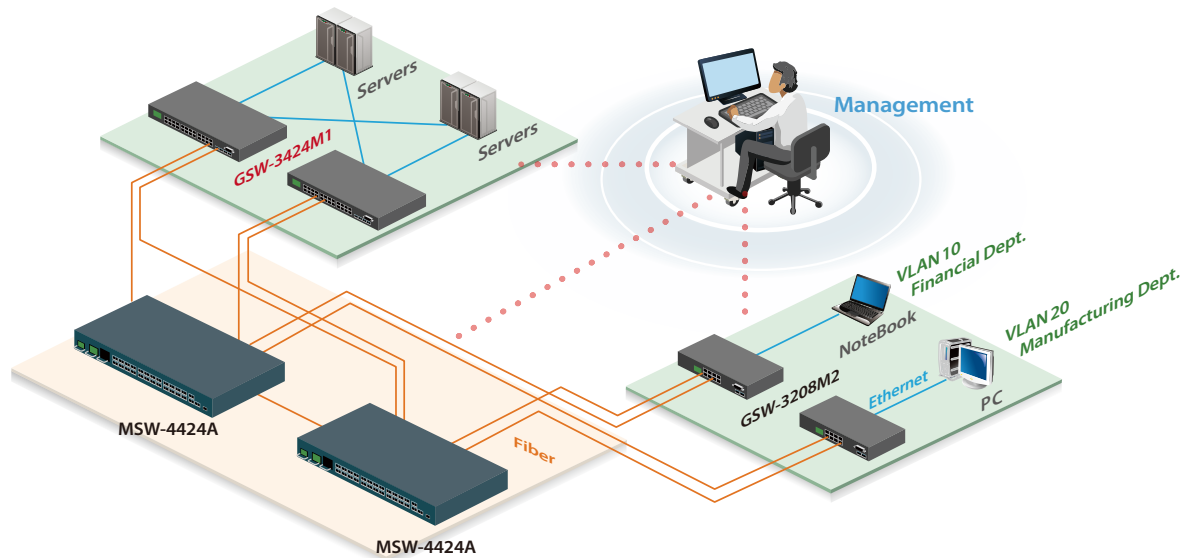
Management

HTTP server, CLI console port, Telnet CLI,
Management access filtering, SSHv2 and HTTPS
IPv6 Management, System Syslog
Software download through Web

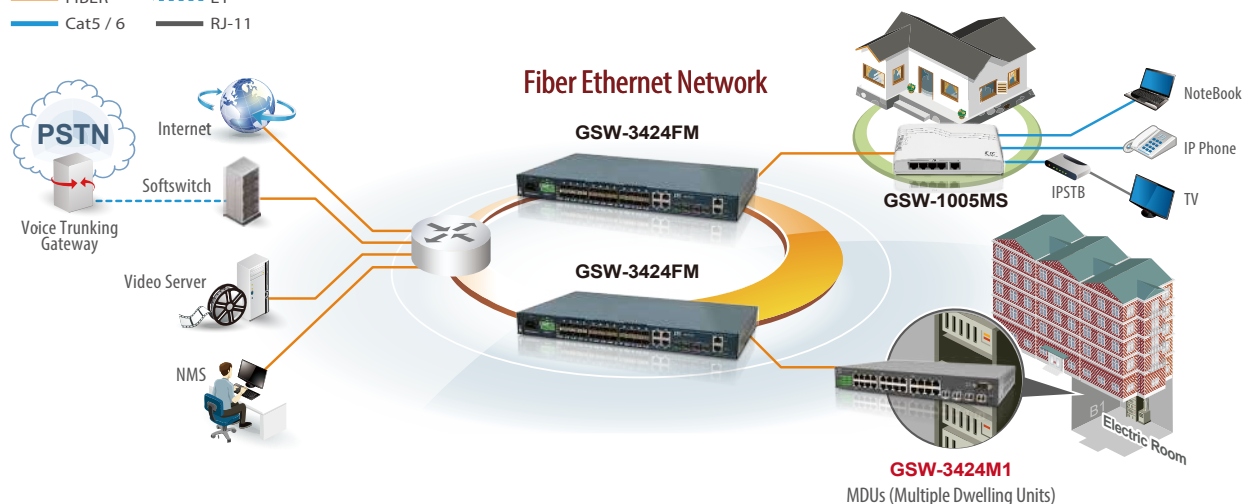
Management

SNMPv1/v2c/v3 Agent
RMON Group 1, 2, 3, and 9
IEEE 802.1AB-2005 Link Layer Discovery, LLDP
Text Configuration download or upload, sFlow,
Daylight Saving

Application



— FIBER — E1
— Cat5 / 6 — RJ-11



Ordering Information

Model Name	Description
GSW-3424M1-AC	20x 10/100/1000Base-T + 4x GbE Combo with AC power supply
GSW-3424M1-DC48	20x 10/100/1000Base-T + 4x GbE Combo with DC 48V power supply

Power Type
GSW – 3424M1 – ☐ ☐ ☐ ☐
Example: GSW – 3424M1 – DC48



GSW-3208M2

8x GbE/RJ45 + 2x GbE/SFP

L2+ Managed Ethernet Switch

GSW-3208M2 is positioned as a layer 2 managed switch solution for high speed connectivity with popular traffic priority and management capabilities for small and medium businesses. It features 8-port 10/100/1000Base-T RJ45 and 2-100/1000Base-X SFP based fiber optics. The GSW-3208M2 is designed with a high-performance switching architecture and offers wire-speed transportation capability for bandwidth-intensive applications of enterprises. More and more corporations are adapting new IT technologies over the network such as voice over IP, video conference to improve productivity and save operation expenditure. The GSW-3208M2 also supports features such as VLAN, QoS, IGMP for multicast applications and network management to fulfill SMB requirements. The GSW-3208M2 delivers a cost effective Gigabit Ethernet solution to meet the converged applications for enterprise customer's networks.

Features

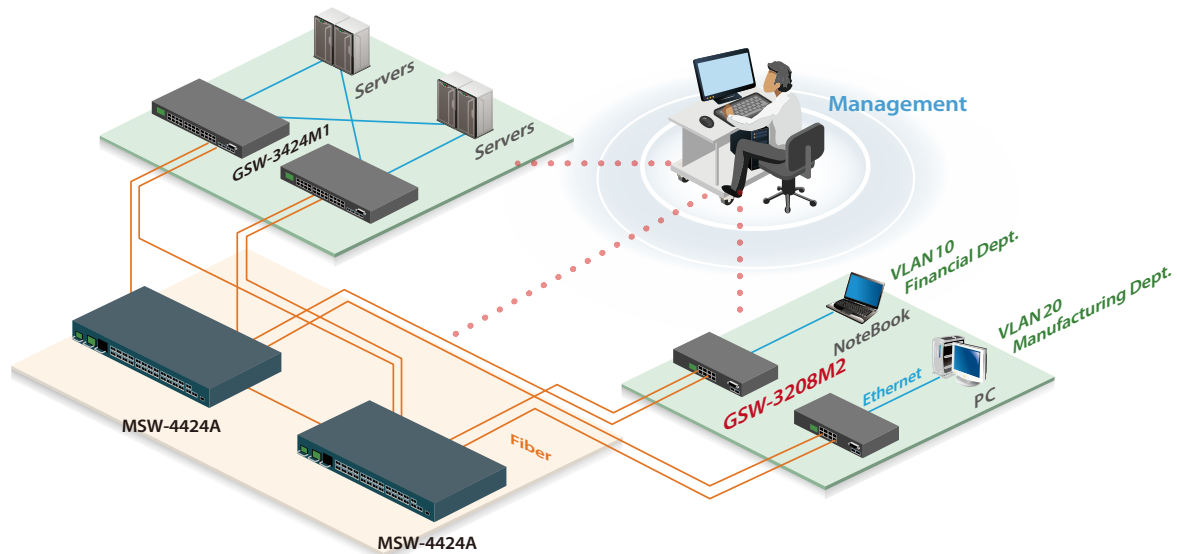
- 8-port 10/100/1000Base-T RJ45 + 2 uplink 100/1000Base-X SFP slot
- Supports 9.6K Bytes jumbo frame
- Supports IEEE 802.1Q tagged VLAN & Q-in-Q VLAN stacking
- Supports IEEE 802.1p priority queue
- Supports IGMP snooping v1/v2/v3
- Supports dying gasp
- Supports power redundancy (optional)
- Supports Cisco® like CLI

Specifications

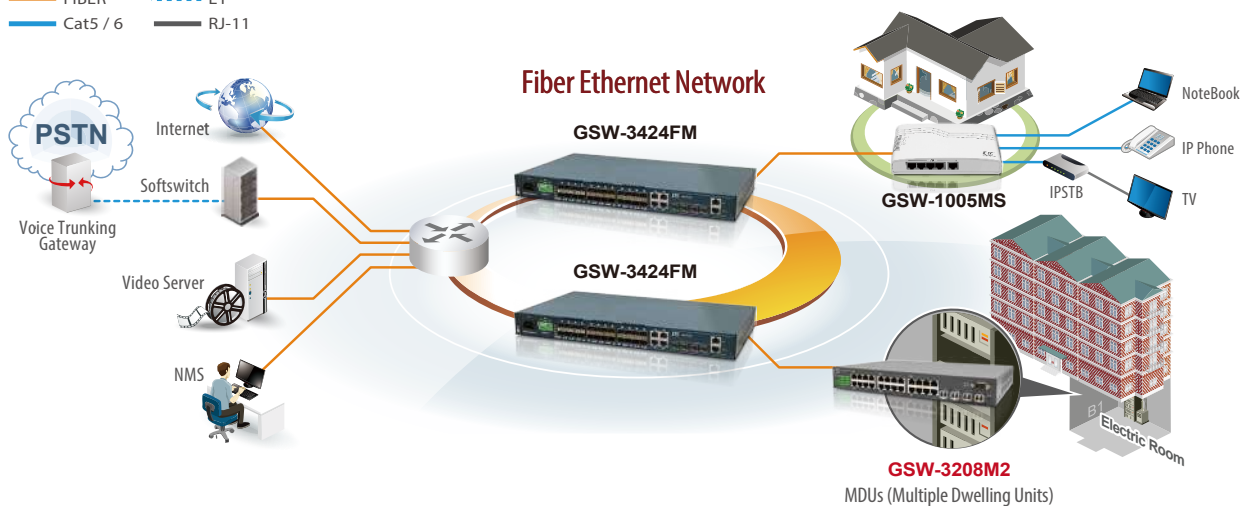
Interface	8x 10/100/1000Base-T(X) RJ-45 with 2x 100/1000Base-X SFP
Console port	D-Sub 9
FAN design	Fanless
19" rack mountable	Yes, with kits (optional)
Switching fabric capacity	20Gbps
Filter & Forward rate	14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps
Transmission method	Store and Forward Switching
Standard	IEEE 802.3u, IEEE 802.3z, IEEE 802.3ae, IEEE 802.3x, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1x, IEEE 802.1D, IEEE 802.1w, IEEE 802.1s, IEEE 802.3ad, IEEE 802.1ab
Packet buffer	4M bits
MAC table size	8K
Max. Packet Jumbo frame size	9600 Bytes
VLAN feature	IEEE 802.1Q tagged VLAN (Max. 4K VLAN groups) MAC based VLAN Protocol based VLAN Private VLAN for port isolation IP subnet based VLAN, Voice VLAN VLAN translation, IEEE 802.1ad Q-in-Q
L2 switching protection	STP, RSTP, MSTP
Trunking	IEEE 802.3ad LACP
QoS feature	IEEE 802.1p 8 priority queues per port, Port Default Priority, User Priority, Input priority mapping, QoS Control List (QCL Mode), Storm Control for UC, BC and Unknown Port policers, Global/VCAP (ACL) policers, Port egress shaper, Queue egress shapers, DiffServ (RFC2474) remarking, Tag remarking, Scheduler mode

Security	Port based/single/multiple IEEE 802.1x access control MAC based access control authentication RADIUS authentication, limited MAC address learning IP/MAC binding, ACL rule based filtering TACACS+, IP source guard DHCP snooping/relay option 82 ARP inspection
IP multicasting	IGMP throttling, IGMP filtering, IGMP fast leave, IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2
Storm Control	Unknown Unicast/Broadcast/Multicast storm suppression
Management	Web/Telnet CLI interface, Web/CLI authentication, SSH v2, HTTPs, port mirroring, system syslog, IPv6 management, NTP, text based CLI configuration upload or download, IEEE 802.1ab LLDP, DHCP auto provisioning IEEE 802.3az, Energy, Efficient, Ethernet (EEE) power management
SNMP agent	SNMP v1/v2c/v3, RMON Group 1,2,3 and 9, Multiple trap destinations
Software upgrade	TFTP/HTTP
Power input	100 ~ 240VAC -18 ~ -60VDC (-48VDC)
Operating Temperature	0 ~ 50°C
Storage Temperature	-25 ~ 70°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	117 x 250 x 43.8 mm (D x W x H)
Certification	FCC, CE

Application



— FIBER — E1
— Cat5 / 6 — RJ-11



Ordering Information

Model Name	Description
GSW-3208M2-AC	8x 10/100/1000Base-T + 2x GbE SFP slot L2 Managed Switch with AC power supply
GSW-3208M2-DC48	8x 10/100/1000Base-T + 2x GbE SFP slot L2 Managed Switch with DC 48V power supply

Accessories

GSW/MSW-RMK	19" rack mount kit
-------------	--------------------

Remark: SFP Transceiver not included

Power Type
GSW – 3208M2 – ☐ ☐ ☐ ☐
 Example: GSW – 3208M2 – DC48



GSW-2020P

4x GbE/RJ45 + 1x GbE/RJ45 with PoE+/PSE
L2+ Managed Ethernet Switch
with Cable Tray (option)

The GSW-2020P is a new generation CPE switch developed by CTC Union Technologies. This new CPE switch is designed with 4 ports 10/100/1000Base-T RJ45, plus 1 port 10/100/1000Base-T RJ45 with PoE+/PSE for airborne broadband service application. Its design concept is well considered from the basis of stylish and elegant appearance for the residential user as well as the advantage of easy installation for the service provider. Hence, the GSW-2020P makes an Internet connected device no longer like the legacy ones hidden in the corner of household. Oppositely, it can become as an eye-catching furniture to blend into the overall decoration aesthetics at home.

The GSW-2020P fully supports Layer 2 feature sets with complete network management interfaces such as Web GUI, CLI and SNMP. The GSW-2020P also supports DHCP auto provisioning and TR-069 client function which are suitable for the very large scale deployment from operator or service provider. Both device management features can avoid truck rolls and save OPEX for service providers.

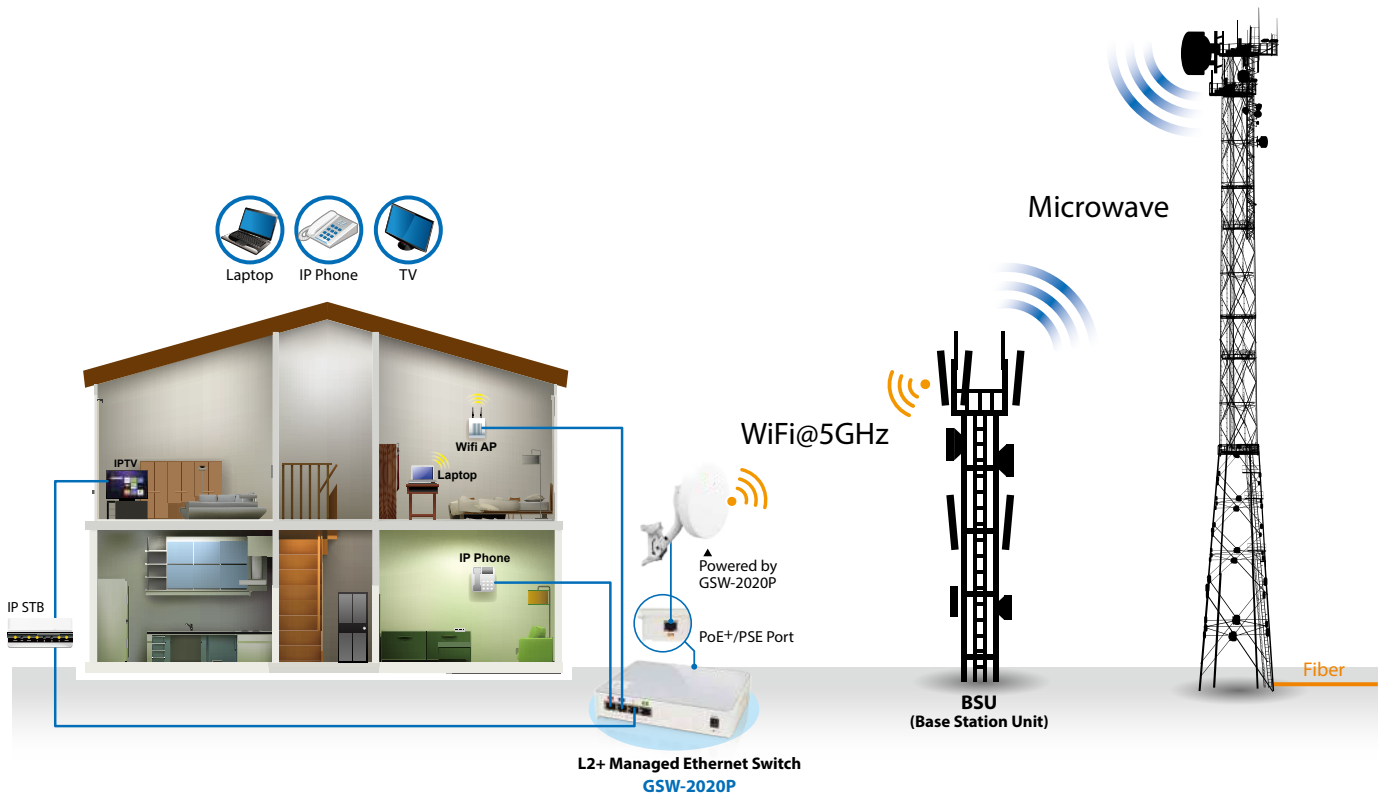
Feature

- Built-in one PoE+/PSE port for feeding PoE equipment
- Regulated PoE output voltage (52VDC) to stabilize PoE device, and guarantee delivery PoE power distance to 100 meter
- Cable diagnostics, measuring cable OK or broken point distance

Specifications

Interface	Copper port: 10/100/1000Mbps RJ45 x 4; PoE+/PSE port: 10/100/1000Mbps RJ45 x 1 (Port 5)	
PoE Standard	IEEE 802.3af & IEEE 802.3at	
Pin Assignment	Alternative A Positive (V+) : RJ-45 pin 1,2 Negative (V-) : RJ-45 pin 3,6	
PoE Power Budget	30W	
Packet forwarding rate	14880pps @10Mbps 148800pps @100Mbps 1488000pps @1000Mbps	
Transmission Method	Store and Forward Switching	
Packet buffer	1.75M bits	
MAC table size	4K	
Jumbo frame size	10240 Bytes	
VLAN feature	IEEE 802.1Q tagged VLAN (4K VLAN groups) IEEE 802.1ad QinQ VLAN Voice VLAN; MAC based VLAN; Protocol based VLAN IP subnet based VLAN Private VLAN for port isolation, VLAN Translation GVRP (GARP VLAN registration protocol)	
Link aggregation	Static trunk (SA, DA, IP, TCP/UDP port) IEEE 802.3ad LACP, 2 LACP trunk groups Max 5 port Max. per LACP trunk	
L2 switching protection	IEEE 802.1D STP/IEEE 802.1w RSTP/IEEE 802.1s MSTP Loop Protection	
QoS feature	Hard wired IEEE 802.1p 8 priority queues per port Traffic scheduling based on strict/WRR priority CoS based traffic classification on switch port, VLAN ID, DSCP, TCP/UDP port IEEE 802.1p priority tag remarking; DSCP remarking Per Port/Queue based ingress/egress rate limit in steps of 100kbps IEEE 802.3x flow control Multicast/Broadcast/Unicast storm control with flooding control	
Security	Static port security (MAC based) Per port limited MAC learning Port based/MAC base/single/multiple IEEE 802.1x access control 256 ACL rules based on L2~L4 information RADIUS/TACACS+ authentication	
Security	HTTPs & SSH v2 IP/MAC binding IP source guard & ARP inspection	
IP Multicasting	IGMP snooping v1/v2/v3, IGMP proxy reporting MLD snooping v1/v2 IGMP fast leave IGMP query IGMP filtering/throttling MVR (Multicast VLAN Registration)	
Management	WebGUI/Telnet CLI interface SNMP v1/v2c/v3 TR-069 client for remote device management and configuration RMON I (1,2,3,9 groups) & RFC1213 MIB II Dying gasp in trap message DHCP client/relay/snooping/relay option 82 TFTP/HTTP based firmware and configuration upgrade Port mirroring Event syslog server DNS client/proxy DHCP auto provisioning NTP client, UPnP IPv4/IPv6 management SFF-8472 DDIM IEEE 802.1ab LLDP	
Power Input	Connector	DC power Jack
	Input voltage	52 VDC
Power Input	Accessory	power adaptor 100~240VAC input 52VDC output
Operating Temperature	0~45°C	
Storage Temperature	-25~70°C	
Humidity	5%~90% (non-condensing)	
Dimension	122 x 162 x 32.2mm (D x W x H)	
Certification	CE, FCC, RoHS	

P2MP Airborne Broadband Service Application

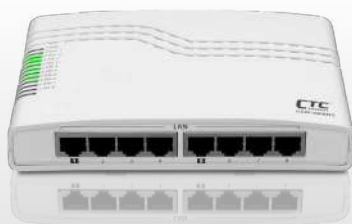


Ordering Information

Model Name	Description
GSW-2020P	4x GbE, RJ45 + 1x GbE, RJ45 with PoE+/PSE Managed Ethernet Switch

Optional Accessory

Model Name	Description
GSW-20FT	Cable Tray set for GSW-20 series CPE



GSW-2008MS

8x GbE/RJ45 + 2x 1G/SFP
L2+ Managed Ethernet Switch

GSW-2008MS is a managed Gigabit Ethernet CPE switch positioned as a layer 2 managed switch solution for high speed connectivity with popular traffic priority and management capabilities for small and medium businesses. It features 8-port 10/100/1000Base-T RJ45 and 2-100/1000Base-X SFP based fiber optics. The GSW-2008MS is designed with a high-performance switching architecture and offers wire-speed transportation capability for bandwidth-intensive applications of enterprises. More and more corporations are adapting new IT technologies over the network such as voice over IP, video conference to improve productivity and save operation expenditure. The GSW-2008MS also supports features such as VLAN, QoS, IGMP for multicast applications and network management to fulfill SMB requirements. The GSW2008 delivers a cost effective Gigabit Ethernet solution to meet the converged applications for enterprise customer's networks.

Features

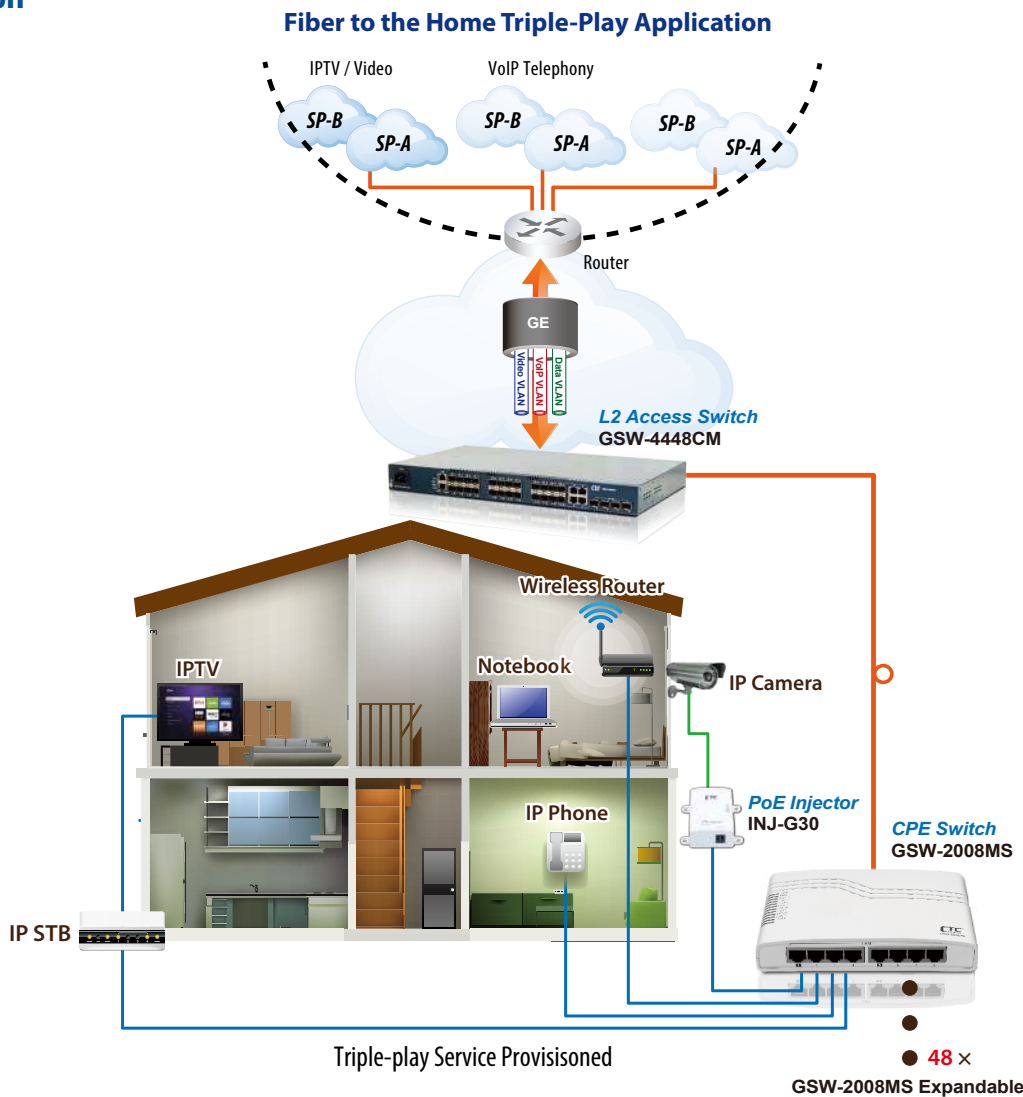
- 8-port 10/100/1000Base-T RJ45 + 2 uplink 100/1000Base-X SFP slot
- Supports 9.6K Bytes jumbo frame
- Supports IEEE 802.1Q tagged VLAN & Q-in-Q VLAN stacking
- Supports IEEE 802.1p priority queue
- Supports IGMP snooping v1/v2/v3
- Supports dying gasp
- Fiber Cable Tray (optional)

Specifications

Interface	8x 10/100/1000Base-T RJ-45 with 2x 100/1000Base-X SFP
Filter & Forward rate	14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps
Switching Fabric capacity	20Gbps
Transmission method	Store and Forward Switching
Standard	IEEE 802.3u, IEEE 802.3z, IEEE 802.3ae, IEEE 802.3x, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1x, IEEE 802.1D, IEEE 802.1w, IEEE 802.1s, IEEE 802.3ad, IEEE 802.1ab, IEEE 802.3az
Packet buffer	4M bits
MAC table size	8K
Jumbo frame size	9600 Bytes
VLAN feature	IEEE 802.1Q tagged VLAN (Max. 4K VLAN groups) MAC based VLAN Protocol based VLAN Private VLAN for port isolation IP subnet based VLAN, Voice VLAN VLAN translation, IEEE 802.1ad Q-in-Q
L2 switching protection	STP, RSTP, MSTP
Trunking	IEEE 802.3ad LACP
QoS feature	IEEE 802.1p 8 priority queues per port, Port Default Priority, User Priority, Input priority mapping, QoS Control List (QCL Mode), Port policers, Global/VCAP (ACL) policers, Port egress shaper, Queue egress shapers, DiffServ (RFC2474) remarking, Tag remarking, Scheduler mode
Security	Port based/single/multiple IEEE 802.1x access control MAC based access control authentication RADIUS authentication, limited MAC address learning IP/MAC binding, ACL rule based filtering
Security	TACACS+, IP source guard DHCP snooping/relay option 82 ARP inspection

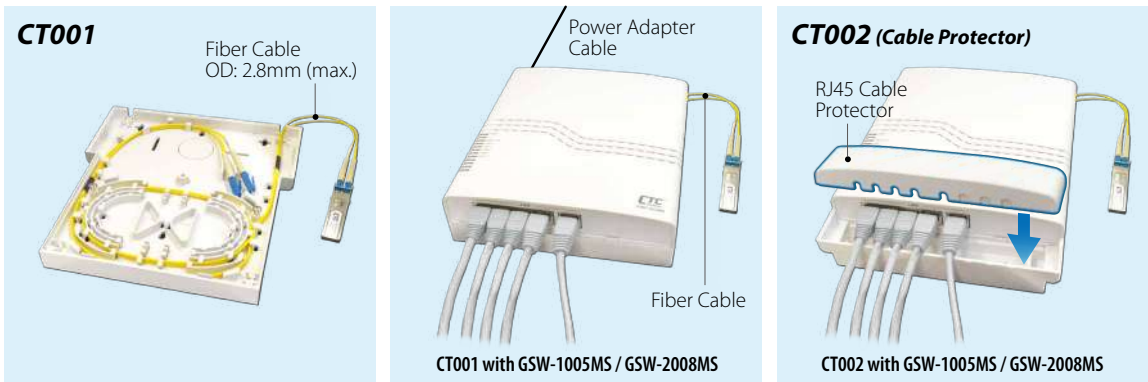
IP multicasting	IGMP throttling, IGMP filtering, IGMP fast leave, IGMP snooping v1/v2/v3, MVR, MLD snooping v1
Storm Control	Unknown Unicast/Broadcast/Multicast storm suppression
Management	Web/Telnet CLI interface, Web/CLI authentication, SSH v2, HTTPs, port mirroring, system syslog, IPv6 management, NTP, text based CLI configuration upload or download, IEEE 802.1ab LLDP, DHCP auto provisioning IEEE 802.3 az, Energy, Efficient, Ethernet (EEE) power management
SNMP agent	SNMP v1/v2c/v3, RMON Group 1,2,3 and 9
Software upgrade	TFTP/HTTP
Operating Temperature	0 ~ 50°C
Storage Temperature	-25 ~ 70°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	170 x 120 x 35mm (D x W x H)
Certification	FCC, CE

Application



Cable Tray Assembly

CT001/CT002 is an optional fiber tray and mounting hardware for deploying GSW-1005/2008 for residential fiber to the home applications. CT001/CT002 tray options is wall mounted, allowing secure termination of fiber leads.



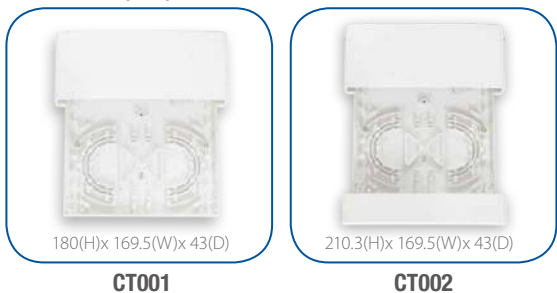
Ordering Information

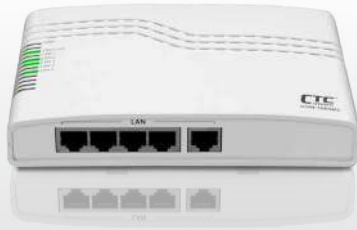
Model Name	Description
GSW-2008MS	8-port 10/100/1000 Base-T to 2-port 100/1000 Base-X Managed GbE Switch (cable tray optional)

Accessories

CT001	Cable Tray for GSW-1005MS/GSW-2008MS
CT002	Cable Tray & LAN cable protection cover for GSW-1005MS/2008MS

Dimensions (mm)





GSW-1005MS

5x GbE/RJ45 + 1x 1G/SFP
L2+ Managed Ethernet Switch

GSW-1005MS is a managed Gigabit Ethernet CPE switch designed 5-Ports 10/100/1000Base-T RJ45 and 1 port 100/1000Base-X SFP based fiber optics. The traditional transmission distance of Gigabit Ethernet over RJ45 copper can be extended up to 100km over a fiber optics interface. GSW-1005MS has a optional cable tray that allows the installer to enclose the excess fiber within the unit, thus providing protection for the sensitive fiber at subscriber side. LEDs provide visual monitoring of Ethernet connected devices such as Ethernet home gateways, wireless access points or PC/laptop via 10/100/1000Base-T twisted pair RJ45 ports on GSW-1005MS. When GSW-1005MS is deployed as a stand-alone solution, it incorporates an easy to use Web user interface for operation, administration and maintenance both locally and remotely. All of the enabled Layer 2 features and functions of GSW-1005MS can be configured and monitored via web, CLI or SNMP management. GSW- 1005MS is particularly suitable for deploying and provisioning active Ethernet FTTX service of multi-service operators (MSO).

Features

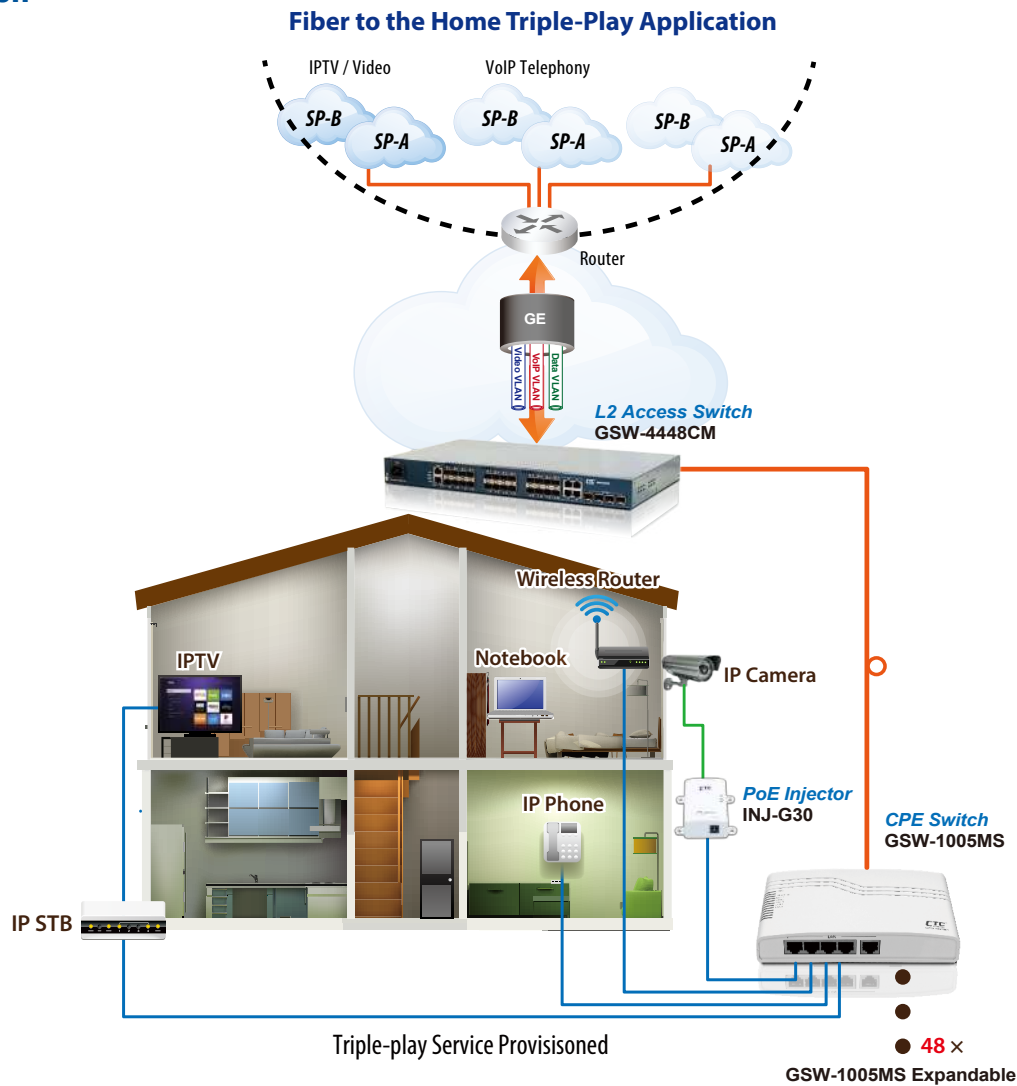
- 5-Port 10/100/1000Base-T + 100/1000Base-X SFP uplink
- Supports 9.6K Bytes jumbo frame
- Supports IEEE 802.1Q tagged VLAN & Q-in-Q VLAN stacking
- Supports IEEE 802.1p priority queue
- Supports IGMP snooping v1/v2/v3
- Supports DHCP auto provisioning
- Supports dying gasp
- Fiber cable tray(optional)

Specifications

Interface	5x 10/100/1000Base-T RJ-45 with 1x 100/1000Base-X SFP
Switching fabric capacity	12Gbps
Packet forwarding capacity	8.928Mpps
Filter & Forward rate	14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps
Transmission method	Store and Forward Switching
Standard	IEEE 802.3u, IEEE 802.3z, IEEE 802.3ae, IEEE 802.3x, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1x, IEEE 802.1ab, IEEE 802.3az
Packet buffer	4M bits
MAC table size	8K
Jumbo frame size	9600 Bytes
VLAN feature	IEEE 802.1Q tagged VLAN (Max. 4K VLAN groups) MAC based VLAN Protocol based VLAN Private VLAN for port isolation IP subnet based VLAN, Voice VLAN VLAN translation, IEEE 802.1ad Q-in-Q
QoS feature	IEEE 802.1p 8 priority queues per port, CoS based on switch port; VLAN ID; DSCP; TCP/UDP port IEEE 802.1p priority tag remarking, DSCP remarking, Port based ingress/egress rate limit
Security	Port based/single/multiple IEEE 802.1x access control MAC based access control authentication RADIUS authentication, limited MAC address learning IP/MAC binding, ACL rule based filtering TACACS+, DHCP snooping/relay option 82 ARP inspection, IP source guard
IP multicasting	IGMP throttling, IGMP filtering, IGMP fast leave, IGMP snooping v1/v2/v3, MVR, MLD snooping v1
Storm Control	Unknown Unicast/Broadcast/Multicast storm suppression
Management	Web/Telnet CLI interface Web/CLI authentication SSH v2 HTTPs port mirroring

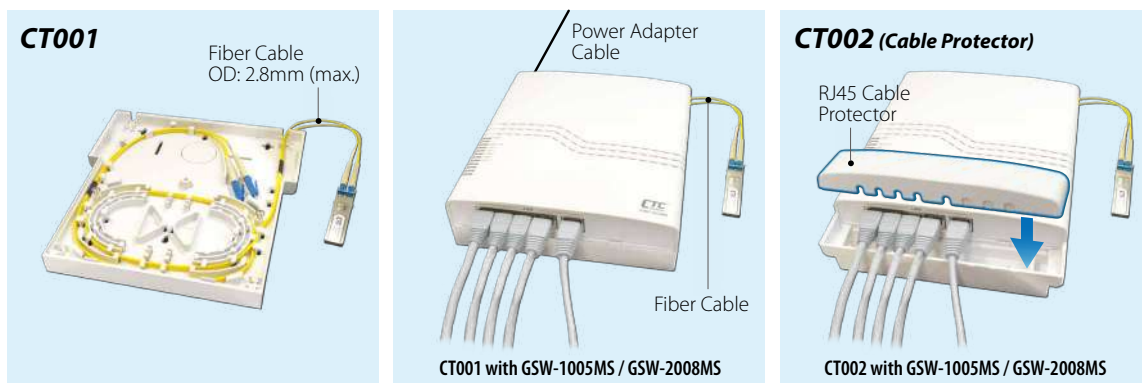
Management	system syslog IPv6 management NTP text based configuration upload or download, IEEE 802.1ab LLDP DHCP auto provisioning IEEE 802.3 az, Energy, Efficient, Ethernet (EEE) power management
SNMP agent	SNMP v1/v2c/v3, RMON Group 1,2,3 and 9
Software upgrade	TFTP/HTTP
Power Input	100v~240VAC power adapter
Operating Temperature	0 ~ 50°C
Storage Temperature	-25 ~ 70°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	170 x 120 x 35mm (D x W x H)
Certification	FCC, CE

Application



Cable Tray Assembly

CT001/CT002 is an optional fiber tray and mounting hardware for deploying GSW-1005/2008 for residential fiber to the home applications. CT001/CT002 tray options is wall mounted, allowing secure termination of fiber leads.



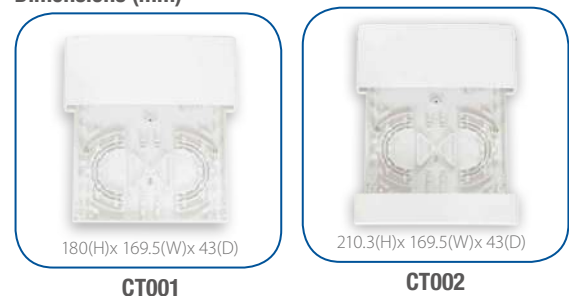
Ordering Information

Model Name	Description
GSW-1005MS	5-port 10/100/1000 Base-T to 100/1000 Base-X Managed GbE Ethernet Switch (cable tray optional)

Accessories

CT001	Cable Tray for GSW-1005MS/GSW-2008MS
CT002	Cable Tray & LAN cable protection cover for GSW-1005MS/2008MS

Dimensions (mm)



CE^{2.0}

MSW-4428X

24x GbE/SFP + 4x GbE/RJ-45 with 4x 10G/SFP+
L2+ Carrier Ethernet Switch

The MSW-4428X is positioned as a layer 2+ Gigabit access switch solution. It is equipped with 24 100Base-FX/1000Base-X dual speed SFP slots, 4 ports GbE (10/100/1000Base-T) ports and 4 1000Base-X/10GBase-X dual speed SFP+ uplink slots. The MSW-4428X offers the best flexibility and scalability for operators or service providers to deploy their Metro Ethernet network. With the deployment of MSW-4428X, operators or service providers can flexibly provision the bandwidth of either 100Mbps or 1000Mbps as well as uplink connection of Gigabit or 10G speed upon their service applications. The MSW-4428X has built-in dual power supplies to enable power redundancy and enhance high network availability.

Aimed at Metro Ethernet applications, the specifications of MSW-4428X fully meet the attributes of Carrier Ethernet proposed by MEF (Metro Ethernet Forum). It complies with CE2.0 standard to support E-Line/E-LAN/E-Tree/E-Access service and enables the bandwidth profile configuration delivering SLA (Service Level Agreement) for end-to-end performance characteristics as well as Ethernet OAM functionality to support carrier grade service OAM management rapidly detecting and recovering from the network incidents in real time.

Features

Fully dual rate architecture of fiber link port

Completely dual speed ports of fiber link to offer the scalable physical connection of Metro Ethernet network for operators

Fully Ethernet OAM enabled

Enables Ethernet OAM features (IEEE 802.3ah/802.1ag/ITU-T Y.1731) to rapidly detect and recover network fault and save the OPEX for operators as well as increase customer satisfaction

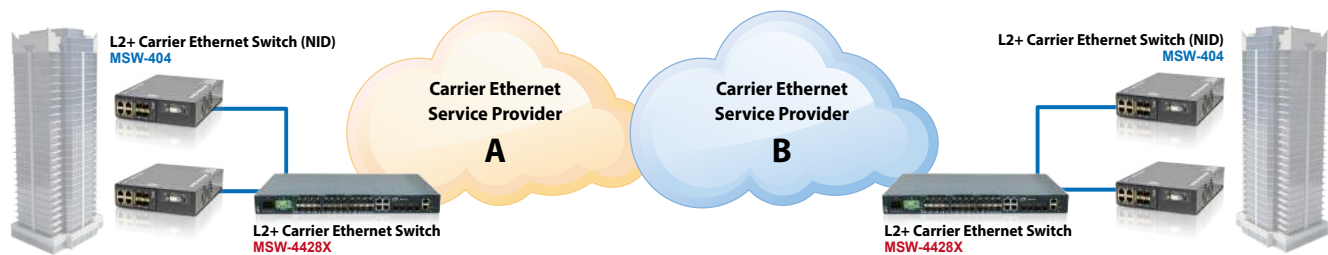
MEF standards compliant solution

CE2.0 compliant product to guarantee the compatibility with other MEF certified equipment and reduce the risk and cost for Metro Ethernet network deployment of operators

Specifications

Interface	100/1000Mbps SFP slots x 24 + 10/100/1000Base-T RJ45 x 4 + 1G/10Gbps SFP+ slot x 4	Security	IEEE 802.1x port based access control MAC based access control authentication RADIUS authentication, limited MAC address learning IP/MAC binding, ACL rule based filtering, TACACS+ IP source guard, DHCP snooping/relay option 82 ARP inspection
Console Port	RJ-45 console port x 1	IP Multicasting	IGMP throttling, IGMP filtering, IGMP fast leave IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2
Management Port	10/100/1000Base-T RJ45 x 1	Storm Control	Unknown/Broadcast/Multicast storm suppression
Switching fabric capacity	136Gbps	Management	Web/Telnet CLI/SNMP/console interface Web/CLI authentication, SSH v2, HTTPs, port mirroring, RSPAN syslog, IPv6 management, NTP, IEEE 802.3az, Energy Efficient Ethernet (EEE) power management
Packet Forwarding capacity	102Mpps	SNMP agent	SNMP v1/v2c/v3, RMON Group 1,2,3 and 9
Filter & Forward Rate	14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps, 14880000pps at 10Gbps	Software upgrade	TFTP/HTTP
Transmission Method	Store and Forward Switching	Ethernet OAM	IEEE 802.3ah/IEEE 802.1ag/ITU-T Y.1731, RFC2544, ITU-T Y.1564
Standards	IEEE 802.3u, IEEE 802.3z, IEEE 802.3ae IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1d IEEE 802.1w, IEEE 802.1s, IEEE 802.1x, IEEE 802.3ad IEEE 802.3az, IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731	Timing Synchronization	IEEE 1588v2 (Future Upgradable)
Packet Buffer	32M bits	LED display	Power, System, Console, Link/Act, Speed
Mac Table Size	32K	Power input	100V ~ 240V AC, -36 ~ -60V DC
Max. Packet Size	10,240 bytes - jumbo frames	Build in power module combination	AC, DC, AD (AC+DC), AA (AC+AC) or DD (DC+DC)
VLAN Feature	IEEE 802.1Q tagged VLAN (Max. 4K VLAN groups), port based VLAN, MAC based VLAN, protocol based VLAN private VLAN, IEEE 802.1ad Q-in-Q, VLAN translation, GVRP	Power Consumption	< 60W
QoS Feature	IEEE 802.1p 8 priority queues per port, CoS based on switch port; VLAN ID; DSCP; TCP/UDP port IEEE 802.1p priority tag remarking, DSCP remarking, Port based ingress/egress rate limit 3 colors marker-CIR/EIR/Burst bandwidth control IEEE 802.3x flow control	Operating Temperature	-10 ~ 60°C
L2 switching Protection	STP, RSTP, MSTP, ITU-T G.8031/G.8032	Storage Temperature	-25 ~ 70°C
Trunking	IEEE 802.3ad LACP (Max. 16 trunking group, Max. 8 ports per trunking group)	Humidity	5% ~ 90% (non-condensing)
		Dimensions	250 x 440 x 43.5mm (D x W x H)
		Certification	FCC, CE

Application



Ordering Information

Model Name	Description
MSW-4428X-AC	L2+ 10G Fiber Access Switch and build-in single AC power module
MSW-4428X-DC	L2+ 10G Fiber Access Switch and build-in single DC power module
MSW-4428X-AA	L2+ 10G Fiber Access Switch and build-in dual AC power module
MSW-4428X-DD	L2+ 10G Fiber Access Switch and build-in dual DC power module
MSW-4428X-AD	L2+ 10G Fiber Access Switch and build-in AC + DC power module

Power Type
MSW – 4428X – ☐ ☐
Example: MSW – 4428X – AC

Accessories

10G SFP+ Transceiver Module

SFM-1000-SR85	10G SFP+ SR/SW MMF 300m, 850nm VCSEL, 10G Ethernet/FC/SDH/SONET
SFS-1010-LR31	10G SFP+ LR/LW SMF 10km, 1310nm DFB DML, 10G Ethernet/FC/SDH/SONET
SFS-1040-ER55	10G SFP+ ER/EW SMF 40km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET
SFS-1080-ZR55	10G SFP+ ZR/EW SMF 80km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET

CE 2.4



MSW-4424A

24x GbE/SFP + 4x 10G/SFP+
L2+ Carrier Ethernet Switch

MSW-4424A layer 2+ managed Gigabit Ethernet switches are positioned as a Carrier Ethernet access switch solution. They are equipped with 24 SFP based 100Base-FX/1000Base-X dual speed optical ports and 4 10G Base-X SFP+ or 1000Base-X SFP uplink ports. The MSW-4424A offers the best flexibility and scalability for operators and service providers to deploy their Metro Ethernet networks. Aimed specifically at Metro Ethernet deployment, the specifications of MSW-4424A fully meet the attributes of Carrier Ethernet proposed by the Metro Ethernet Forum. The switches comply with MEF 9 standard to support E-Line/E-Access services and MEF 14 standard to enable the bandwidth profile configuration for delivering SLA (Service Level Agreement) with predictable end-to-end performance characteristics. MSW-4424A also supports advanced service OAM management to rapidly detect and recover from the network incidents in real time.

Features

Front access and hot swappable design

All of the system modules are front accessible, the hot swappable power and FAN module are designed to keep high network availability without service interruption when components fail

Fully dual rate architecture of fiber link port

Dual speed fiber ports offer scalable physical connections for Metro Ethernet network operators

Fully Ethernet OAM enabled

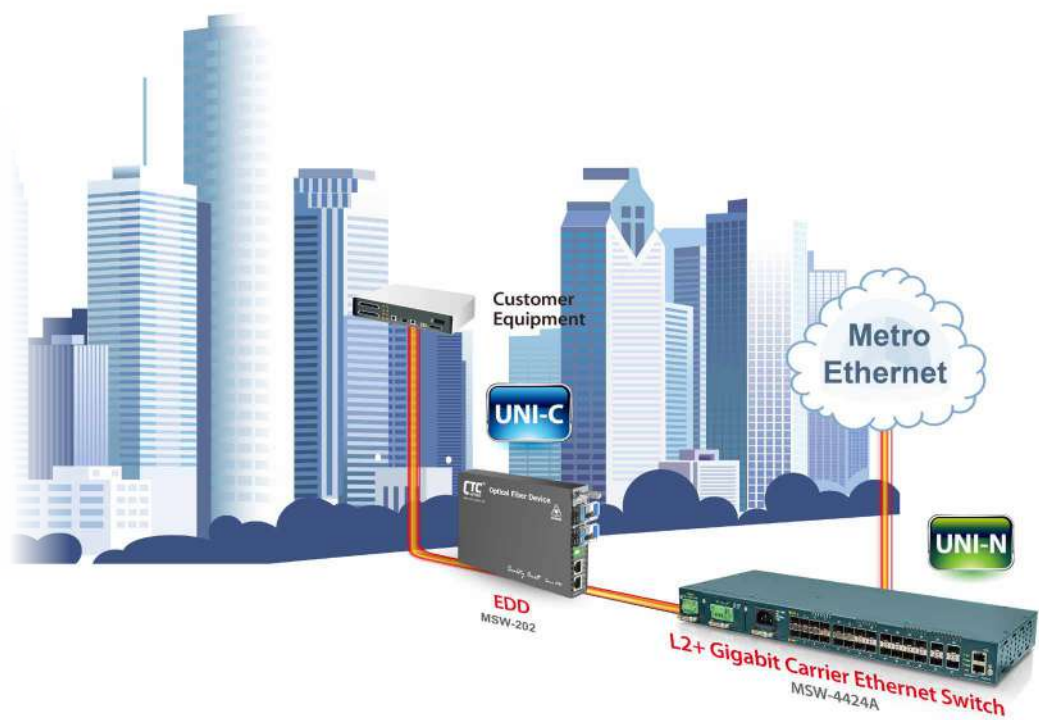
Ethernet OAM features (IEEE 802.3ah/802.1ag/ITU-T Y.1731) help to rapidly detect and recover network faults and save OPEX for operators as well as increase customer satisfaction

Specifications

Interface	100/1000Mbps SFP slots x 24 + 1G/10Gbps SFP+ slot x 4
Console Port	RJ-45 console port x 1
Filter & Forward Rate	14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps, 14880000pps at 10Gbps
Switching Fabric Capacity	128Gbps
Packet Forwarding Capacity	95Mpps
Transmission Method	Store and Forward Switching
Standards	IEEE 802.3u, IEEE 802.3z, IEEE 802.3ae, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1D, IEEE 802.1w, IEEE 802.1s, IEEE 802.1x, IEEE 802.3ad, IEEE 802.3ah, IEEE 802.3az, IEEE 802.1ag, ITU-T Y.1731
Packet Buffer	32M bits
Mac Table Size	32K
Max. Packet Size	10K Bytes
VLAN Feature	IEEE 802.1Q tagged VLAN (Max. 4K VLAN groups), port based VLAN, MAC based VLAN, protocol based VLAN, private VLAN, IEEE 802.1ad Q-in-Q, VLAN translation, GVRP
QoS Feature	IEEE 802.1p 8 priority queues per port, CoS based on switch port; VLAN ID; DSCP; TCP/UDP port, IEEE 802.1p priority tag remarking, DSCP remarking, Port based ingress/egress rate limit, 3 colors marker-CIR/EIR/Burst bandwidth control
L2 switching Protection	STP, RSTP, MSTP, ITU-T G.8031/G.8032
Trunking	IEEE 802.3ad LACP (Max. 14 trunking group, Max. 8 ports per trunking group)

Security	IEEE 802.1x port based access control, MAC based access control authentication, RADIUS authentication, limited MAC address learning, IP/MAC binding, ACL rule based filtering, TACACS+, IP source guard, DHCP snooping/relay option 82, ARP inspection
IP Multicasting	IGMP throttling, IGMP filtering, IGMP fast leave, IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2
Storm Control	Unknown Unicast/Broadcast/Multicast storm suppression
Management	Web/Telnet CLI/SNMP/console interface, Web/CLI authentication, SSH v2, HTTPs, port mirroring, syslog, IPv6 management, NTP, IEEE 802.3az, Energy Efficient Ethernet (EEE) power management
SNMP agent	SNMP v1/v2c/v3, RMON Group 1,2,3 and 9
Software upgrade	TFTP / HTTP
Ethernet OAM	IEEE 802.3ah / IEEE 802.1ag / ITU-T Y.1731
LED display	Power, System, Console, Link/Act, Speed
Power input	100V ~ 240VAC, -36~-75VDC (-48VDC Power), -18 ~-75VDC (-24VDC Power)
Power Consumption	< 60W
Operating Temperature	-10 ~ 60°C
Storage Temperature	-25 ~ 70°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	270.3 x 437.5 x 43.5 mm (D x W x H)
Certification	FCC, CE

Application



Ordering Information

Model Name	Description
MSW-4424A	24x100/1000Base-X (SFP) + 4 x 10GBase-X SFP+ L2+ Gigabit Carrier Ethernet Switch

Remark: SFP Transceiver not included

MSW – □□□□□
Example: MSW – 4424A

Accessories

10G SFP+ Transceiver Module

SFM-1000-SR85	10G SFP+ SR/SW MMF 300m, 850nm VCSEL, 10G Ethernet/FC/SDH/SONET
SFS-1010-LR31	10G SFP+ LR/LW SMF 10km, 1310nm DFB DML, 10G Ethernet/FC/SDH/SONET
SFS-1040-ER55	10G SFP+ ER/EW SMF 40km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET
SFS-1080-ZR55	10G SFP+ ZR/EW SMF 80km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET

Optional Power

4424-AC	100V ~ 240V AC power module (60W)
4424-DC24	18V ~ 75V DC power module (60W)
4424-DC48	36V ~ 75V DC power module (60W)

Optional FAN

4424-FAN	FAN module (3in1 FAN module, 10000RPM, software real-time status detection)
----------	---



MSW-4424CS

20x GbE/SFP + 4x GbE Combo + 4x 10G/SFP+
L2+ Managed Carrier Ethernet Switch w/ SyncE

The MSW-4424CS is positioned as a layer 2+ Gigabit access switch solution. It is equipped with 20 100Base-FX/1000Base-X dual speed SFP slots, 4 ports GbE combo (10/100/1000Base-T or 100/1000Base-X SFP) ports and 4 1000Base-X/10G Base-X dual speed SFP+ uplink slots. The MSW-4424CS offers the best flexibility and scalability for the operators or service providers to deploy their Metro Ethernet network. With the deployment of MSW-4424CS, the operators or service providers can flexibly provision the bandwidth for either 100Mbps or 1000Mbps as well as uplink connection of Gigabit or 10G speed upon their service applications. The MSW-4424CS has built-in dual power supplies to enable power redundancy function and enhance the high network availability.

Aimed at Metro Ethernet applications, the specifications of MSW-4424CS fully meet the attributes of Carrier Ethernet proposed by MEF (Metro Ethernet Forum). It complies with MEF 9 standard to support E-Line/E-Access service and MEF 14 standard to enable the bandwidth profile configuration delivering SLA (Service Level Agreement) for end-to-end performance characteristics as well as Ethernet OAM functionality to support carrier grade service OAM management rapidly detecting and recovering from the network incidents in real time. MSW-4424CS supports timing synchronization features (SyncE & IEEE 1588v2) to enhance and migrate a carrier grade network for mobile backhaul applications.

Features

Fully dual rate architecture of fiber link port

Completely dual speed ports of fiber link to offer the scalable physical connection of Metro Ethernet network for operators.

Fully Ethernet OAM enabled

Enabling Ethernet OAM features (IEEE 802.3ah/802.1ag/ITU-T Y.1731) to rapidly detect and recover network fault and save the OPEX for operators as well as increase customer satisfaction.

Timing synchronization

Advanced synchronization features such as SyncE or IEEE 1588v2 to allow operators delivering service with optimal stability and continuity in the end-to-end connectivity.

MEF standards compliant solution

CE2.0 compliant product to guarantee the compatibility with other MEF certified equipment and reduce the risk and cost for Metro Ethernet network deployment of operators.

Specifications

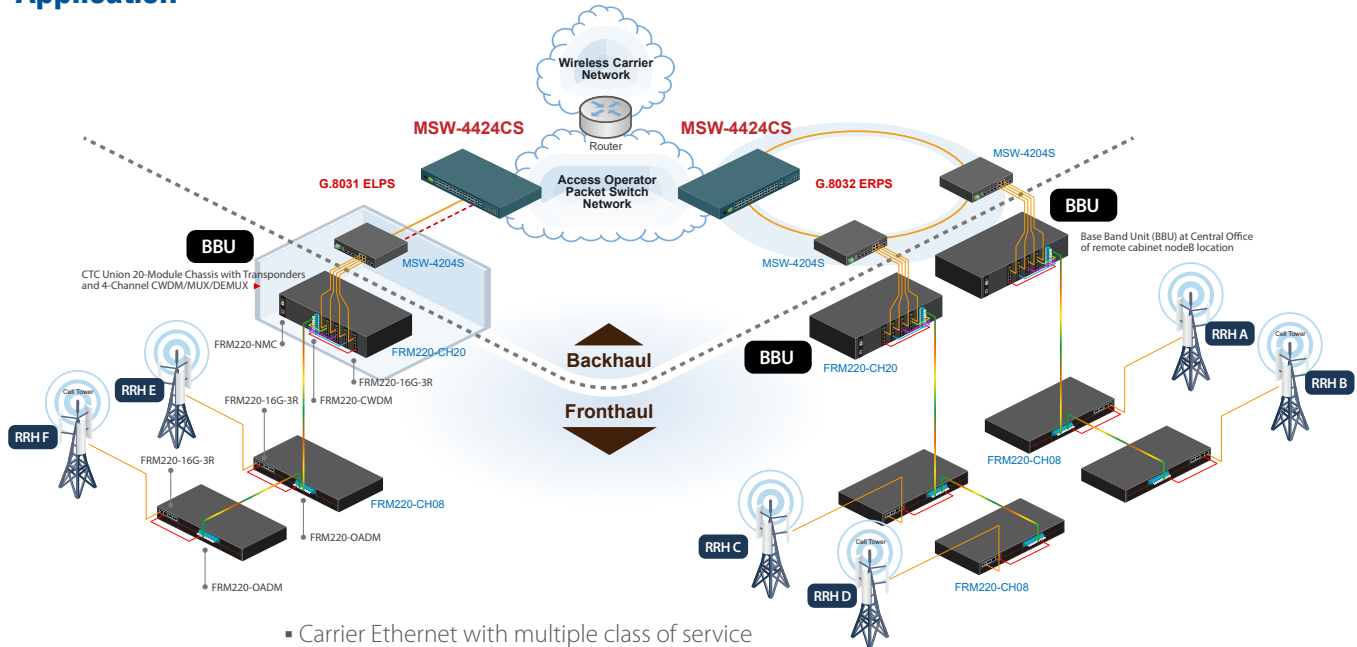
Interface	100/1000Mbps SFP slots x 20 + GbE combo port (10/100/1000Base-T or 100/1000Mbps SFP slot) x 4 + 1G/10Gbps SFP+ slot x 4
Console Port	RJ-45 console port x 1
1PPS/ToD port	RJ45 x 2
Management Port	10/100/1000Base-T RJ45 x 1
Filter & Forward Rate	14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps, 14880000pps at 10Gbps
Switching Fabric Capacity	128Gbps
Packet Forwarding Capacity	95Mpps
Transmission Method	Store and Forward Switching
Standards	IEEE 802.3u, IEEE 802.3z, IEEE 802.3ae, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1d, IEEE 802.1w, IEEE 802.1s, IEEE 802.1x, IEEE 802.3ad, IEEE 802.3ah, IEEE 802.1ag, IEEE 802.3az, ITU-T Y.1731, ITU-T G.8262, IEEE 1588 v2
Packet Buffer	32M bits
Mac Table Size	32K
Max. Packet Size	10K Bytes
VLAN Feature	IEEE 802.1Q tagged VLAN (Max. 4K VLAN groups), port based VLAN, MAC based VLAN, protocol based VLAN

VLAN Feature	private VLAN, IEEE 802.1ad Q-in-Q, VLAN translation, GVRP
QoS Feature	IEEE 802.1p 8 priority queues per port, CoS based on switch port; VLAN ID; DSCP; TCP/UDP port IEEE 802.1p priority tag remarking, DSCP remarking, Port based ingress/egress rate limit 3 colors marker-CIR/EIR/Burst bandwidth control
L2 switching Protection	STP, RSTP, MSTP, ITU-T G.8031/G.8032
Trunking	IEEE 802.3ad LACP (Max. 14 trunking group, Max. 8 ports per trunking group)
Security	IEEE 802.1x port based access control MAC based access control authentication RADIUS authentication, limited MAC address learning IP/MAC binding, ACL rule based filtering, TACACS+ IP source guard, DHCP snooping/relay option 82 ARP inspection
IP Multicasting	IGMP throttling, IGMP filtering, IGMP fast leave IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2
Storm Control	Unknown Unicast/Broadcast/Multicast storm suppression
Management	Web/Telnet CLI/SNMP/console interface, Web/CLI authentication, SSH v2, HTTPs, port mirroring syslog, IPv6 management, NTP, IEEE 802.3az, Energy, Efficient, Ethernet (EEE) power management
SNMP agent	SNMP v1/v2c/v3, RMON Group 1,2,3 and 9
Software upgrade	TFTP/HTTP
Ethernet OAM	IEEE 802.3ah/IEEE 802.1ag/ITU-T Y.1731

Timing synchronization	ITU-T G.8261/G.8262 SyncE, IEEE 1588 v2
LED display	Power, System, Console, Link/Act, Speed
Power input	100V ~ 240V AC, -36 ~ -60V DC
Build in power module combination	AC, DC, AD (AC+DC), AA (AC+AC) or DD (DC+DC)
Power Consumption	< 60W

Operating Temperature	-10 ~ 60°C
Storage Temperature	-25 ~ 70°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	250x 440x 43.5mm (DxWxH)
Certification	FCC, CE

Application



- Carrier Ethernet with multiple class of service
- Traffic Synchronization
- Precise delivery of time-sensitive services

Ordering Information

Model Name	Description
MSW-4424CS-AC	L2+ 10G Fiber Access Switch with SyncE and build-in single AC power module
MSW-4424CS-DC	L2+ 10G Fiber Access Switch with SyncE and build-in single DC power module
MSW-4424CS-AA	L2+ 10G Fiber Access Switch with SyncE and build-in dual AC power module
MSW-4424CS-DD	L2+ 10G Fiber Access Switch with SyncE and build-in dual DC power module
MSW-4424CS-AD	L2+ 10G Fiber Access Switch with SyncE and build-in AC + DC power module

Power Type
MSW – 4424CS – ☐ ☐
 Example: MSW – 4424CS – AC

Accessories

10G SFP+ Transceiver Module

SFM-1000-SR85	10G SFP+ SR/SW MMF 300m, 850nm VCSEL, 10G Ethernet/FC/SDH/SONET
SFS-1010-LR31	10G SFP+ LR/LW SMF 10km, 1310nm DFB DML, 10G Ethernet/FC/SDH/SONET
SFS-1040-ER55	10G SFP+ ER/EW SMF 40km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET
SFS-1080-ZR55	10G SFP+ ZR/EW SMF 80km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET

CE 2.0



MSW-4424C

20x GbE/SFP + 4x GbE Combo + 4x 10G/SFP+
L2+ Managed Carrier Ethernet Switch

The MSW-4424C is positioned as a layer 2+ Gigabit access switch solution. It is equipped with 20 100Base-FX/1000Base-X dual speed SFP slots, 4 ports GbE combo (10/100/1000Base-T or 100/1000Base-X SFP) ports and 4 1000Base-X/10G Base-X dual speed SFP+ uplink slots. The MSW-4424C offers the best flexibility and scalability for operators or service providers to deploy their Metro Ethernet network. With the deployment of MSW-4424C, operators or service providers can flexibly provision the bandwidth for either 100Mbps or 1000Mbps as well as uplink connection of Gigabit or 10G speed in their service applications. The MSW-4424C has built-in dual power supplies to enable power redundancy and enhance the high network availability.

Aimed at Metro Ethernet applications, the specifications of MSW-4424C fully meet the attributes of Carrier Ethernet proposed by MEF (Metro Ethernet Forum). It complies with MEF 9 standard to support E-Line/E-Access service and MEF 14 standard to enable the bandwidth profile configuration delivering SLA (Service Level Agreement) for end-to-end performance characteristics as well as Ethernet OAM functionality to support carrier grade service OAM management rapidly detecting and recovering from the network incidents in real time.

Features

Fully dual rate architecture of fiber link port

Completely dual speed ports of fiber link to offer the scalable physical connection of Metro Ethernet network for operators

Fully Ethernet OAM enabled

Enabling Ethernet OAM features (IEEE 802.3ah/802.1ag/ITU-T Y.1731) to rapidly detect and recover network fault and save the OPEX for operators as well as increase customer satisfaction

MEF standards compliant solution

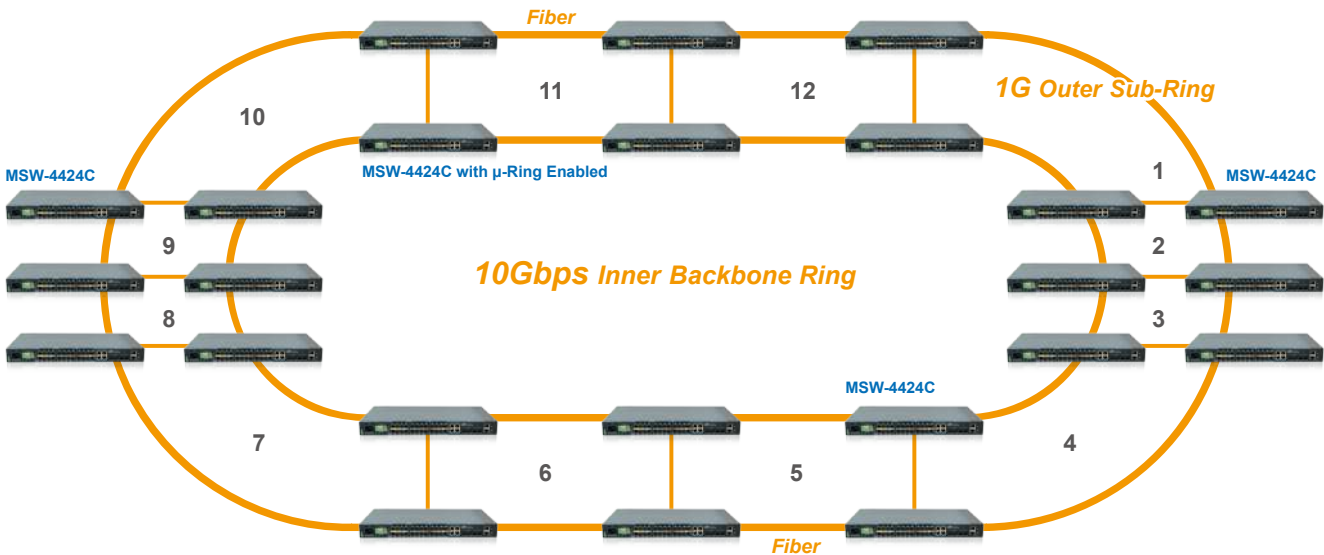
CE2.0 compliant product to guarantee the compatibility with other MEF certified equipment and reduce the risk and cost for Metro Ethernet network deployment of operators

Specifications

Interface	100/1000Mbps SFP slots x 20 + GbE combo port (10/100/1000Base-T or 100/1000Mbps SFP slot) x 4 + 1G/10Gbps SFP+ slot x 4
Console Port	RJ-45 console port x 1
Management Port	10/100/1000Base-T RJ45 x 1
Filter & Forward Rate	14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps, 14880000pps at 10Gbps
Switching Fabric Capacity	128Gbps
Packet Forwarding Capacity	95Mpps
Transmission Method	Store and Forward Switching
Standard	IEEE 802.3u, IEEE 802.3z, IEEE 802.3ae, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1d, IEEE 802.1w, IEEE 802.1s, IEEE 802.1x, IEEE 802.3ad, IEEE 802.3ah, IEEE 802.1ag, IEEE 802.3az, ITU-T Y.1731
Packet Buffer	32M bits
Mac Table Size	32K
Max. Packet Size	10K Bytes
VLAN Feature	IEEE 802.1Q tagged VLAN (Max. 4K VLAN groups), port based VLAN, MAC based VLAN, protocol based VLAN, private VLAN, IEEE 802.1ad Q-in-Q, VLAN translation, GVRP
QoS Feature	IEEE 802.1p 8 priority queues per port, CoS based on switch port; VLAN ID; DSCP; TCP/UDP port, IEEE 802.1p priority tag remarking, DSCP remarking, Port based ingress/egress rate limit, 3 colors marker-CIR/EIR/Bursts bandwidth control
L2 switching Protection	STP, RSTP, MSTP, ITU-T G.8031/G.8032

Trunking	IEEE 802.3ad LACP (Max. 14 trunking group, Max. 8 ports per trunking group).
Security	IEEE 802.1x port based access control, MAC based access control authentication, RADIUS authentication, limited MAC address learning, IP/MAC binding, ACL rule based filtering, TACACS+, IP source guard, DHCP snooping/relay option 82, ARP inspection
IP Multicasting	IGMP throttling, IGMP filtering, IGMP fast leave, IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2
Storm Control	Unknown Unicast/Broadcast/Multicast storm suppression
Management	Web/Telnet CLI/SNMP/console interface, Web/CLI authentication, SSH v2, HTTPs, port mirroring, syslog, IPv6 management, NTP, IEEE 802.3az, Energy Efficient Ethernet (EEE) power management
SNMP agent	SNMP v1/v2c/v3, RMON Group 1,2,3 and 9
Software upgrade	TFTP/HTTP
Ethernet OAM	IEEE 802.3ah/IEEE 802.1ag/ITU-T Y.1731
LED display	Power, System, Console, Link/Act, Speed
Power input	100V ~ 240V AC, -36 ~ -60V DC
Build in power module combination	AC, DC, AD (AC+DC), AA (AC+AC) or DD (DC+DC)
Power Consumption	< 60W
Operating Temperature	-10 ~ 60°C
Storage Temperature	-25 ~ 70°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	250 x 440 x 43.5mm (DxWxH)
Certification	FCC, CE

Application



Ordering Information

Model Name	Description
MSW-4424C-AC	L2+ 10G Fiber Access Switch with build-in single AC power module
MSW-4424C-DC	L2+ 10G Fiber Access Switch with build-in single DC power module
MSW-4424C-AA	L2+ 10G Fiber Access Switch with build-in dual AC power module
MSW-4424C-DD	L2+ 10G Fiber Access Switch with build-in dual DC power module
MSW-4424C-AD	L2+ 10G Fiber Access Switch with build-in AC + DC power module

Accessories

10G SFP+ Transceiver Module

SFM-1000-SR85	10G SFP+ SR/SW MMF 300m, 850nm VCSEL, 10G Ethernet/FC/SDH/SONET
SFS-1010-LR31	10G SFP+ LR/LW SMF 10km, 1310nm DFB DML, 10G Ethernet/FC/SDH/SONET
SFS-1040-ER55	10G SFP+ ER/EW SMF 40km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET
SFS-1080-ZR55	10G SFP+ ZR/EW SMF 80km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET

MSW – 4424C – ☐ ☐ Power Type
Example: MSW – 4424C – AC



NEW



MSW-4204S

2x GbE/RJ45 + 2x 1G/2.5G, RJ45 + 2x 10G/SFP+
L2+ Carrier Ethernet Switch with SyncE

The MSW-4204S is the next generation of carrier Ethernet demarcation device (EDD) for business connection in Ethernet virtual connection technology and mobile backhaul transportation beyond 4G service. The MSW-4204S is equipped 2 SFP+ slots as dual rate 1000Base-X/10Gbase-X and 2 ports 10M/100M/1Gbps RJ45 as well as 2 ports 10M/100M/1G/2.5Gbps RJ45 network interfaces. It can be configurable as either UNI or NNI device and enabled to provision E-Line, E-LAN, E-Tree, E-Access services which are CE(Carrier Ethernet) 2.0 compliant for Metro Ethernet network deployments.

The MSW-4204S is CTC first switch product enabled 2.5Gbps data rate to support multigigabit speed. The enterprise will be able to leverage the reliable and secure Ethernet based high speed leased line service and also connect the existing Cat5e/Cat6 cabling infrastructure with WiFi 6 device, small cell or powerful workstations to break through the limitation of 1Gbps rate for content richer applications such as Cloud storage, 4K video streaming or HD teleconferencing.

The MSW-4204S is positioned as an universal network interface device (NID) for most carrier Ethernet access applications. It has built-in hardware based Ethernet OAM engine and is compliant to the latest OAM standards to deliver the committed SLA performance KPIs measurement on a per service basis. The MSW-4204S will also support SyncE and IEEE 1588v2 to ensure the ultra-low delay and jitter for mission critical mobile backhaul transportation.

Features

- The next generation of Ethernet demarcation device, at customer premise, fulfilling the large-scale carrier Ethernet deployment for intelligent business connection and mobile backhaul services complied to CE 2.0 standard.
- CE2.0 standards compliant product guarantees the full interoperability with other MEF certified equipment and reduces the risks and cost of Carrier Ethernet network deployment for operators and service providers.
- Advanced clock synchronization features for carrier Ethernet network allows operators to deliver time sensitive services with optimal stability and continuity in the end-to-end connectivity.

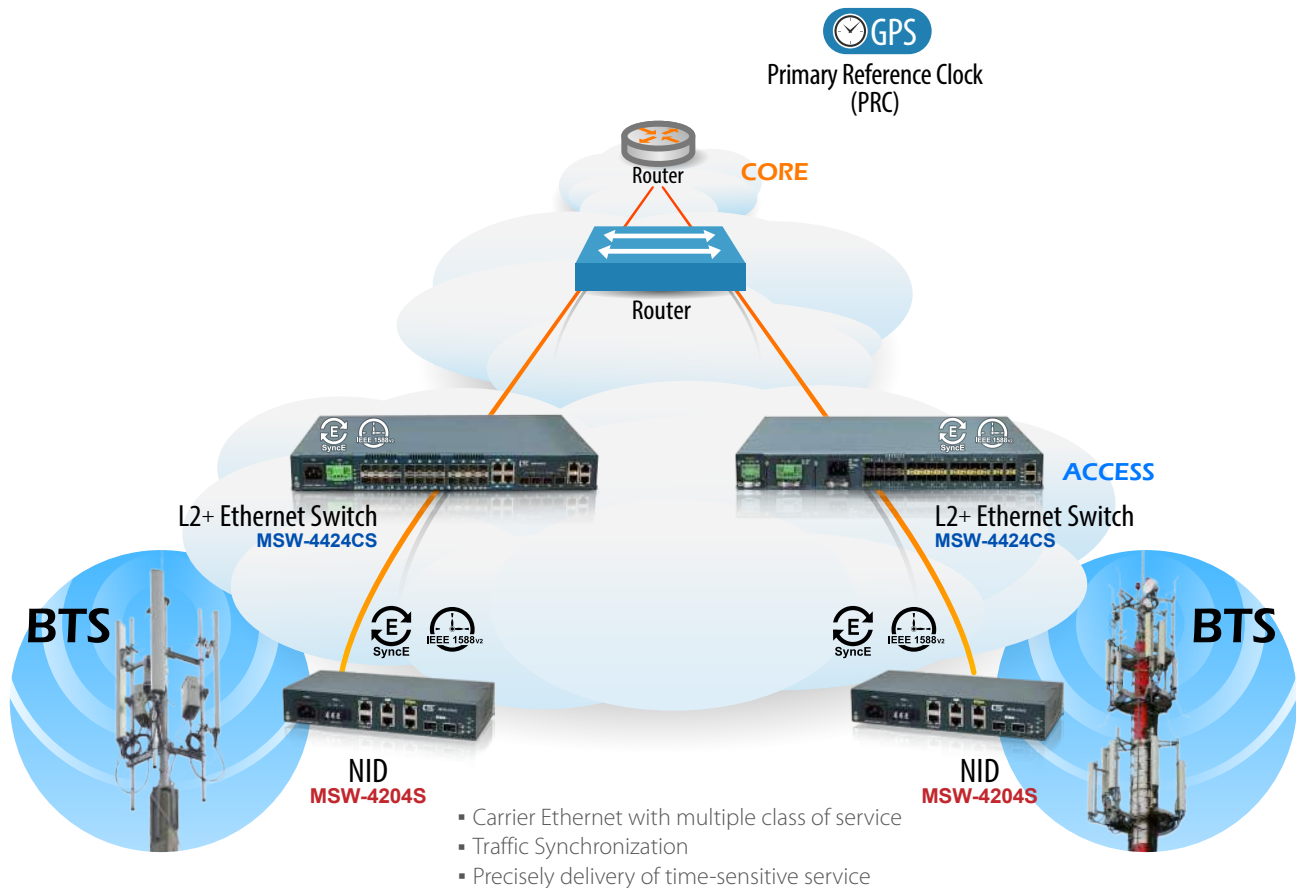
Specifications

Interface	10M/100M/1Gbps RJ45x2 + 10M/100M/1G/2.5Gbps RJ45x2 + 1G/10Gbps SFP+ x2
Console Port	RJ-45 console port x 1 (RS-232)
Management port	10/100/1000Base-T RJ45 x 1
Switching Fabric capacity	54Gbps
Filter & Forward rate	14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps, 14880000pps at 10Gbps
Transmission Method	Store and Forward Switching
Standard	IEEE 802.3 az, IEEE 802.1Qbb, IEEE 802.3u, IEEE 802.3z, IEEE 802.3ae, IEEE 802.3x, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1D, IEEE 802.1w, IEEE 802.1s, IEEE 802.1x, IEEE 802.3ad, IEEE 802.3bz
Packet Buffer	8M bits
MAC Table Size	16K
Max. Packet Size	10K Bytes
VLAN Feature	IEEE 802.1Q tagged VLAN(Max. 4K VLAN groups), port based VLAN, MAC based VLAN, protocol based VLAN, private VLAN, IEEE 802.1ad Q-in-Q, VLAN Translation, GVRP
QoS Feature	Supports Hierarchical Qos, IEEE 802.1Qbb Priority based flow control, IEEE 802.1p 8 priority queues per port, CoS based on switch port/VLAN ID/DSCP/TCP/UDP port, IEEE 802.1p priority tag remarking, DSCP remarking, Port based ingress/egress rate limit 3 colors marker-CIR/EIR/Burst bandwidth control
L2 switching protection	STP, RSTP, MSTP, ITU-T G.8031/G.8032 Ethernet ring protection
Trunking	IEEE 802.3ad LACP (Max. 3 trunking groups, Max. 6 ports per trunking group)

Security	IEEE 802.1x port based access control, MAC based access control authentication, RADIUS authentication, limited MAC address learning, IP/MAC binding, ACL rule based filtering, TACACS+, IP source guard, DHCP snooping/relay option 82, ARP inspection
IP Multicasting	IGMP throttling, IGMP filtering, IGMP fast leave, IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2
Storm Control	Unknown Unicast/Broadcast/Multicast storm suppression
Management	Web/Telnet CLI/SNMP/console interface, Web/CLI authentication, SSH v2, HTTPs, port mirroring, RSPAN, syslog, IPv6 management, NTP
SNMP Agent	SNMP v1/v2c/v3, RMON Group 1,2,3 and 9
Software Upgrade	TFTP/HTTP
Ethernet OAM	IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731, RFC2544 ITU-T Y.1564
Timing Synchronization	ITU-T G.8261/G.8262 SyncE, IEEE 1588v2
LED Display	Power, System, Console, Link, Speed/Act
Power Input	100V ~ 240VAC, -36 ~ -60VDC
Power Consumption	< 15W
Operating Temperature	0 ~ 50°C
Storage Temperature	-25 ~ 70°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	117 x 250 x 43.8 mm (D x W x H)
Regulatory	FCC, CE

Application

Mobile backhaul application



Ordering Information

Model Name	Description
MSW-4204S-AC	1G RJ45 x 2 + 1G/2.5G RJ45 x 2 + 1G/10G SFP+ slots x 2 L2+ Carrier Ethernet Switch with SyncE and single AC power supply built-in
MSW-4204S-DC	1G RJ45 x 2 + 1G/2.5G RJ45 x 2 + 1G/10G SFP+ slots x 2 L2+ Carrier Ethernet Switch with SyncE and single DC power supply built-in
MSW-4204S-AD	1G RJ45 x 2 + 1G/2.5G RJ45 x 2 + 1G/10G SFP+ slots x 2 L2+ Carrier Ethernet Switch with SyncE and AC & DC power supply built-in

Accessories (optional)

10G SFP+ Transceiver Module

Model Name	Description
SFM-1000-SR85	10G SFP+ SR/SW MMF 300m, 850nm VCSEL, 10G Ethernet/FC/SDH/SONET
SFS-1010-LR31	10G SFP+ LR/LW SMF 10km, 1310nm DFB DML, 10G Ethernet/FC/SDH/SONET
SFS-1040-ER55	10G SFP+ ER/EW SMF 40km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET
SFS-1080-ZR55	10G SFP+ ZR/EW SMF 80km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET

Rack Mount Kit

Model Name	Description
GSW/MSW-RMK	19" rack mount kit

Power Type ☐ ☐

MSW – 4204S-

Example: MSW – 4204S

CE^{2.0}

NEW



MSW-4204

2x GbE/RJ45 + 2x 1G/2.5G, RJ45 + 2x 10G/SFP+
L2+ Carrier Ethernet Switch

The MSW-4204 is the next generation of carrier Ethernet demarcation device (EDD) for business connection in Ethernet virtual connection technology and mobile backhaul transportation beyond 4G service. The MSW-4204 is equipped 2 SFP+ slots as dual rate 1000Base-X/10Gbase-X and 2 ports 10M/100M/1Gbps RJ45 as well as 2 ports 10M/100M/1G/2.5Gbps RJ45 network interfaces. It can be configurable as either UNI or NNI device and enabled to provision E-Line, E-LAN, E-Tree, E-Access services which are CE(Carrier Ethernet) 2.0 compliant for Metro Ethernet network deployments.

The MSW-4204 is CTC first switch product enabled 2.5Gbps data rate to support multigigabit speed. The enterprise will be able to leverage the reliable and secure Ethernet based high speed leased line service and also connect the existing Cat5e/Cat6 cabling infrastructure with WiFi 6 device, small cell or powerful workstations to break through the limitation of 1Gbps rate for content richer applications such as Cloud storage, 4K video streaming or HD teleconferencing.

The MSW-4204 is positioned as an universal network interface device (NID) for most carrier Ethernet access applications. It has built-in hardware based Ethernet OAM engine and is compliant to the latest OAM standards to deliver the committed SLA performance KPIs measurement on a per service basis.

Features

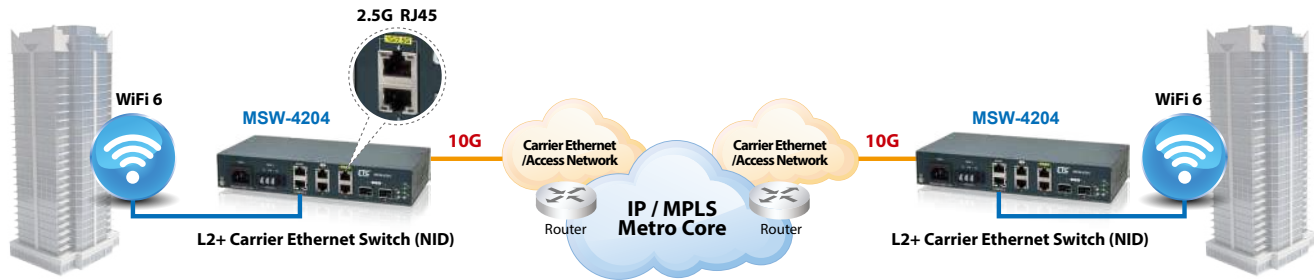
- The next generation of Ethernet demarcation device, at customer premise, fulfilling the large-scale carrier Ethernet deployment for intelligent business connection and mobile backhaul services complied to CE 2.0 standard.
- CE2.0 standards compliant product guarantees the full interoperability with other MEF certified equipment and reduces the risks and cost of Carrier Ethernet network deployment for operators and service providers.

Specifications

Interface	10M/100M/1Gbps RJ45x2 + 10M/100M/1G/2.5Gbps RJ45x2 + 1G/10Gbps SFP+ x2
Console Port	RJ-45 console port x 1 (RS-232)
Management port	10/100/1000Base-T RJ45 x 1
Switching Fabric capacity	54Gbps
Filter & Forward rate	14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps, 14880000pps at 10Gbps
Transmission Method	Store and Forward Switching
Standard	IEEE 802.3 az, IEEE 802.1Qbb, IEEE 802.3u, IEEE 802.3z, IEEE 802.3ae, IEEE 802.3x, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1D, IEEE 802.1w, IEEE 802.1s, IEEE 802.1x, IEEE 802.3ad
Packet Buffer	8M bits
MAC Table Size	16K
Max. Packet Size	10K Bytes
VLAN Feature	IEEE 802.1Q tagged VLAN(Max. 4K VLAN groups), port based VLAN, MAC based VLAN, protocol based VLAN, private VLAN, IEEE 802.1ad Q-in-Q, VLAN Translation, GVRP
QoS Feature	Supports Hierarchical Qos, IEEE 802.1Qbb Priority based flow control, IEEE 802.1p 8 priority queues per port, CoS based on switch port/VLAN ID/DSCP/TCP/UDP port, IEEE 802.1p priority tag remarking, DSCP remarking, Port based ingress/egress rate limit 3 colors marker-CIR/EIR/Burst bandwidth control
L2 switching protection	STP, RSTP, MSTP, ITU-T G.8031/G.8032 Ethernet ring protection
Trunking	IEEE 802.3ad LACP (Max. 3 trunking groups, Max. 6 ports per trunking group)

Security	IEEE 802.1x port based access control, MAC based access control authentication, RADIUS authentication, limited MAC address learning, IP/MAC binding, ACL rule based filtering, TACACS+, IP source guard, DHCP snooping/relay option 82, ARP inspection
IP Multicasting	IGMP throttling, IGMP filtering, IGMP fast leave, IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2
Storm Control	Unknown Unicast/Broadcast/Multicast storm suppression
Management	Web/Telnet CLI/SNMP/console interface, Web/CLI authentication, SSH v2, HTTPs, port mirroring, RSPAN, syslog, IPv6 management, NTP
SNMP Agent	SNMP v1/v2c/v3, RMON Group 1,2,3 and 9
Software Upgrade	TFTP/HTTP
Ethernet OAM	IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731, RFC2544 ITU-T Y.1564
LED Display	Power, System, Console, Link, Speed/Act
Power Input	100V ~ 240VAC, -36 ~ -60VDC
Power Consumption	< 15W
Operating Temperature	0 ~ 50°C
Storage Temperature	-25 ~ 70°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	117 x 250 x 43.8 mm (D x W x H)
Regulatory	FCC, CE

Application



Ordering Information

Model Name	Description
MSW-4204-AC	1G RJ45 x 2 + 1G/2.5G RJ45 x 2 + 1G/10G SFP+ slots x 2 L2+ Carrier Ethernet Switch with single AC power supply built-in
MSW-4204-DC	1G RJ45 x 2 + 1G/2.5G RJ45 x 2 + 1G/10G SFP+ slots x 2 L2+ Carrier Ethernet Switch with single DC power supply built-in
MSW-4204-AD	1G RJ45 x 2 + 1G/2.5G RJ45 x 2 + 1G/10G SFP+ slots x 2 L2+ Carrier Ethernet Switch with AC & DC power supply built-in

Accessories (optional)

10G SFP+ Transceiver Module

Model Name	Description
SFM-1000-SR85	10G SFP+ SR/SW MMF 300m, 850nm VCSEL, 10G Ethernet/FC/SDH/SONET
SFS-1010-LR31	10G SFP+ LR/LW SMF 10km, 1310nm DFB DML, 10G Ethernet/FC/SDH/SONET
SFS-1040-ER55	10G SFP+ ER/EW SMF 40km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET
SFS-1080-ZR55	10G SFP+ ZR/EW SMF 80km, 1550nm DFB EML, 10G Ethernet/FC/SDH/SONET
GSW/MSW-RMK	19" rack mount kit

Rack Mount Kit

Model Name	Description
GSW/MSW-RMK	19" rack mount kit

Power Type
MSW - 4204 - ☐ ☐
 Example: MSW - 4204

CE^{2.0}

MSW-404

4x GbE/RJ45 + 4x 1G/SFP
L2+ Carrier Ethernet Switch (NID)

MSW-404 is a new generation of carrier grade Ethernet demarcation device for business connection and mobile backhaul transportation service delivered by carriers. The MSW-404 is equipped 4 SFP slots as dual rate 100/1000Base-X and 4 ports 10/100/1000Base-T RJ45 network interfaces. It is designed to enable E-Line, E-LAN, E-Tree services which are CE (Carrier Ethernet) 2.0 compliant for Metro Ethernet network deployments.

The MSW-404 device enables carriers and service providers to delivered SLA-based network service with extensive fault detection and diagnostic capabilities which are compliant with the latest Ethernet OAM standards such as IEEE 802.3ah, IEEE 802.1ag and ITU-T Y.1731. With built-in RFC2544 and ITU-T Y.1564 feature sets, the MSW-404 also enables the service providers to perform the SLA verification anytime to ensure the quantitative latency, jitter and throughput delivery performance indexes. The CE2.0 compliant functions support EVCs and 3 colors marker QoS traffic management to enable service providers management of bandwidth and to enforce SLA guarantees.

Features

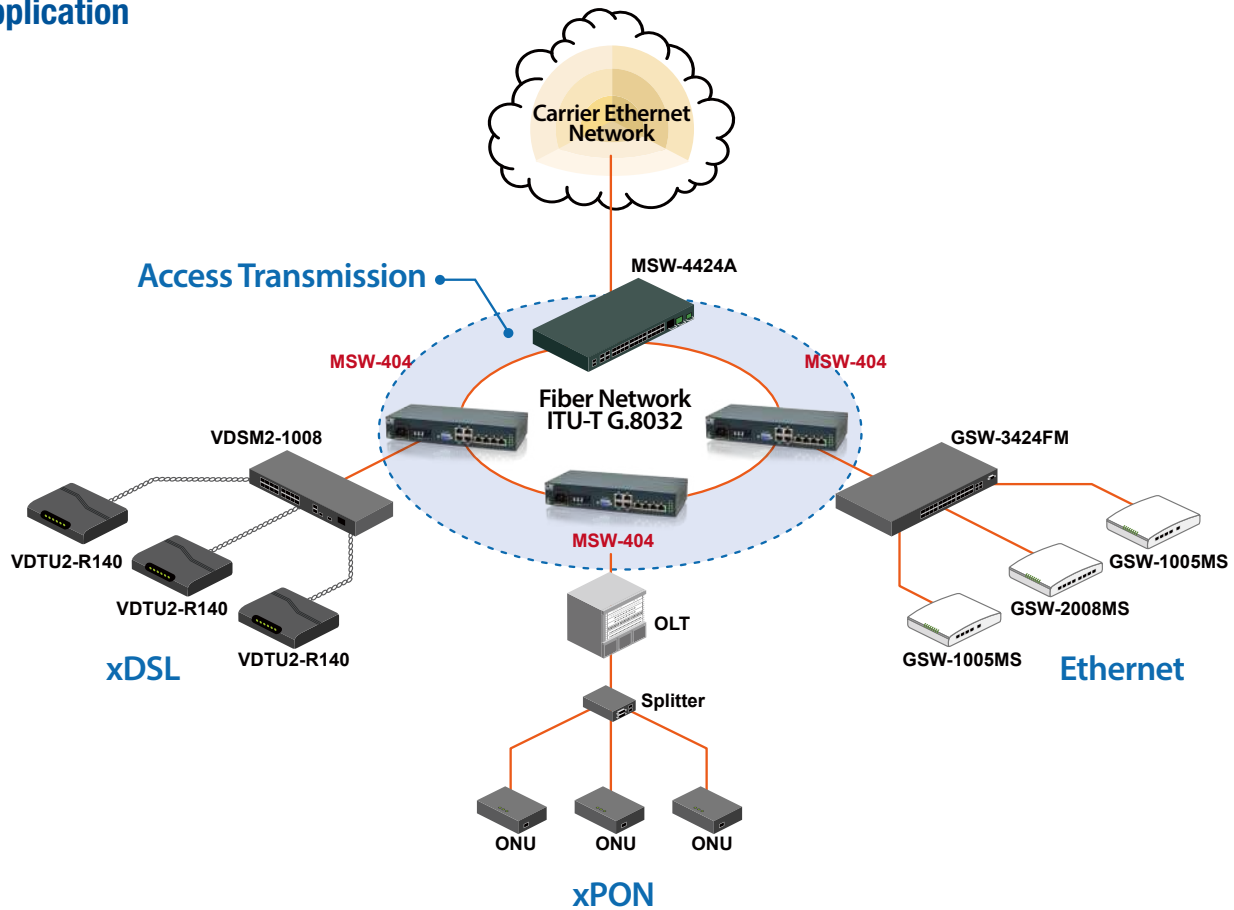
- The next generation of Ethernet demarcation device, at customer premise, fulfilling the large-scale carrier Ethernet deployment for intelligent business connection and mobile backhaul services complied to CE 2.0 standard.
- CE2.0 standards compliant product guarantees the fully interoperability with other MEF certified equipment and reduces the risks and cost of Carrier Ethernet network deployment for operators and service providers.

Specifications

Interface	100/1000Mbps SFP slots x 4 + 10/100/1000Base-T RJ45 x 4
Switching Fabric capacity	16Gbps
Filter & Forward rate	14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps
Switching Capacity	16Gbps
Transmission Method	Store and Forward Switching
Standard	IEEE 802.3u, IEEE 802.3z, IEEE 802.3ae, IEEE 802.3x, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1D, IEEE 802.1w, IEEE 802.1s, IEEE 802.1x, IEEE 802.3ad
Packet Buffer	8M bits
MAC Table Size	8K
Max. Packet Size	10K Bytes
VLAN Feature	IEEE 802.1Q tagged VLAN, port based VLAN, MAC based VLAN, protocol based VLAN, private VLAN, IEEE 802.1ad Q-in-Q, VLAN translation, GVRP
QoS Feature	IEEE 802.1p 8 priority queues per port, CoS based on switch port; VLAN ID; DSCP; TCP/UDP port, IEEE 802.1p priority tag remarking, DSCP remarking, Port based ingress/egress rate limit, 3 colors marker-CIR/EIR/Burst bandwidth control
L2 switching protection	STP, RSTP, MSTP, ITU-T G.8031/G.8032 Ethernet ring protection
Trunking	IEEE 802.3ad LACP(Max. 4 trunking groups, Max. 8 ports per trunking group)
Security	IEEE 802.1x port based access control, MAC based access control authentication, RADIUS authentication, limited MAC address learning, IP/MAC binding, ACL rule based filtering, TACACS+, IP source guard, DHCP snooping/relay option 82, ARP inspection
IP Multicasting	IGMP throttling, IGMP filtering, IGMP fast leave, IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2
Storm Control	Unknown Unicast/Broadcast/Multicast storm suppression
Management	Web/Telnet CLI/SNMP/console interface, Web/CLI authentication, SSH v2, HTTPs, port mirroring, syslog, IPv6 management, NTP
SNMP Agent	SNMP v1/v2c/v3, RMON Group 1,2,3 and 9

Software Upgrade	TFTP/HTTP
Ethernet OAM	IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731, RFC2544 ITU-T Y.1564
MPLS feature	MPLS-TP compliant to ITU-T G.8113.1
LED Display	Power, System, Console, Link, Speed/Act
Power Input	100V ~ 240VAC, -18 ~ -75VDC
Power Consumption	< 20W
Operating Temperature	0 ~ 50°C
Storage Temperature	-25 ~ 70°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	222.7 x 167.4 x 45.5 mm (D x W x H) (with CH02M Chassis)
Regulatory	FCC, CE

Application



Ordering Information

Model Name	Description
MSW-404-AC	4x SFP Slots in Dual Rate 100/1000Base-X and 4x 10/100/1000Base-T RJ45 OAM Managed Carrier Ethernet Switch with single AC power supply
MSW-404-DC	4x SFP Slots in Dual Rate 100/1000Base-X and 4x 10/100/1000Base-T RJ45 OAM Managed Carrier Ethernet Switch with single DC power supply
MSW-404-AD	4x SFP Slots in Dual Rate 100/1000Base-X and 4x 10/100/1000Base-T RJ45 OAM Managed Carrier Ethernet Switch with AC & DC power supply

Power Type
MSW – 404 - ☐
 Example: MSW – 404 - AC

CE^{2.0}

NEW



MSW-202A

2x GbE/RJ45 + 2x 1G/SFP
L2+ Carrier Ethernet Switch (EDD)

MSW-202A is a carrier class Ethernet Demarcation Device (EDD) with 2x 10/100/1000Base-T Ethernet ports and 2 x 100/1000/2500Base-X triple rate SFP fiber ports which enables E-Line & E-Access services with advanced carrier Ethernet features per CE2.0. By supporting link and service Ethernet OAM schemes, the MSW-202A also provides extensive fault detection and diagnostic capabilities to ensure that actual network use complies with pre-agreed service level agreements (SLAs).

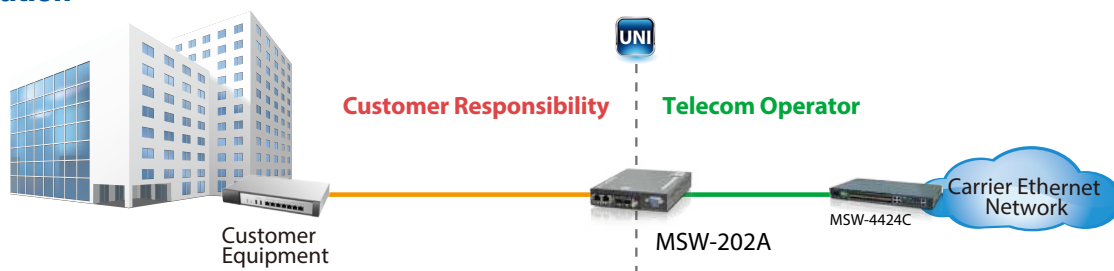
Features

- Complies with CE2.0 (E-Line / E-Access)
- IPv6 management
- IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731
- IEEE 1588v2

Specifications

Interface	100/1000Mbps SFP slots x 2 + 10/100/1000Base-T RJ45 x 2	IP Multicasting	IGMP throttling, IGMP filtering, IGMP fast leave, IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2
Filter & Forward rate	14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps	Storm Control	Unknown Unicast/Broadcast/Multicast storm suppression
Switching Fabric Capacity	8Gbps	Management	Web/Telnet CLI/SNMP/console interface, Web/CLI authentication, SSH v2, HTTPs, port mirroring, syslog, IPv6 management, NTP, IEEE 802.3az, Energy Efficient, Ethernet (EEE) power management
Transmission Method	Store and Forward Switching	SNMP Agent	SNMP v1/v2c/v3, RMON Group 1,2,3 and 9
Standard	IEEE 802.3u, IEEE 802.3z, IEEE 802.3ab, IEEE 802.3x, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1D, IEEE 802.1w, IEEE 802.1s, IEEE 802.1x, IEEE 802.3ad, IEEE802.3ah, IEEE802.1ag, IEEE 802.3az, ITU-T Y.1731, ITU-T G.8031, ITU-T G.8032	Software Upgrade	TFTP/HTTP
Packet Buffer	4M bits	Ethernet OAM	IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731
MAC Table Size	8K	Timing Synchronization	IEEE 1588v2
Max. Packet Size	9.6K Bytes	LED Display	Power, System, Console, Link, Speed/Act
VLAN Feature	IEEE 802.1Q tagged VLAN(Max. 4K VLAN groups), port based VLAN, MAC based VLAN, protocol based VLAN, private VLAN, IEEE 802.1ad Q-in-Q, VLAN translation, GVRP	Power Input	100V ~ 240VAC, -18 ~ -75VDC
QoS Feature	IEEE 802.1p 8 priority queues per port, CoS based on switch port; VLAN ID; DSCP; TCP/UDP port, IEEE 802.1p priority tag remarking, DSCP remarking, Port based ingress/egress rate limit, 3 colors marker-CIR/EIR/Burst bandwidth control	Power Consumption	< 12W
L2 switching protection	STP, RSTP, MSTP, ITU-T G.8031/G.8032 Ethernet ring protection	Operating Temperature	0 ~ 50°C
Trunking	IEEE 802.3ad LACP(Max. 2 trunking groups, Max. 4 ports per trunking group)	Storage Temperature	-25 ~ 70°C
Security	IEEE 802.1x port based access control, MAC based access control authentication, RADIUS authentication, limited MAC address learning, IP/MAC binding, ACL rule based filtering, TACACS+, IP source guard, DHCP snooping/relay option 82, ARP inspection	Humidity	5% ~ 90% (non-condensing)
		Dimensions	201 x 135 x 35 mm (D x W x H) (with CH01M Chassis)
		Regulatory	FCC, CE

Application



Ordering Information

Model Name	Description
MSW-202A-AC	2x SFP Slots in Dual Rate 100/1000Base-X and 2x 10/100/1000Base-T RJ45 OAM Managed Carrier Ethernet Switch with single AC power supply
MSW-202A-DC	2x SFP Slots in Dual Rate 100/1000Base-X and 2x 10/100/1000Base-T RJ45 OAM Managed Carrier Ethernet Switch with single DC power supply
MSW-202A-AD	2x SFP Slots in Dual Rate 100/1000Base-X and 2x 10/100/1000Base-T RJ45 OAM Managed Carrier Ethernet Switch with AC & DC power supply

Power Type

MSW - 202A - ☐ ☐

Example: MSW - 202A - AC



MSW-202

2x GbE/RJ45 + 2x Dual Rate SFP
L2+ Carrier Ethernet Switch (EDD)

MSW-202 is a carrier class Ethernet Demarcation Device (EDD) with 2x 10/100/1000Base-T Ethernet ports and 2 x 100/1000/2500Base-X triple rate SFP fiber ports which enables EPL (Ethernet Private Line) & EVPL (Ethernet Virtual Private Line) services with advanced carrier Ethernet features per the Metro Ethernet Forum (MEF 9 and 14). By supporting link and service Ethernet OAM schemes, the MSW-202 also provides extensive fault detection and diagnostic capabilities to ensure that actual network use complies with pre-agreed service level agreements (SLAs).

Features

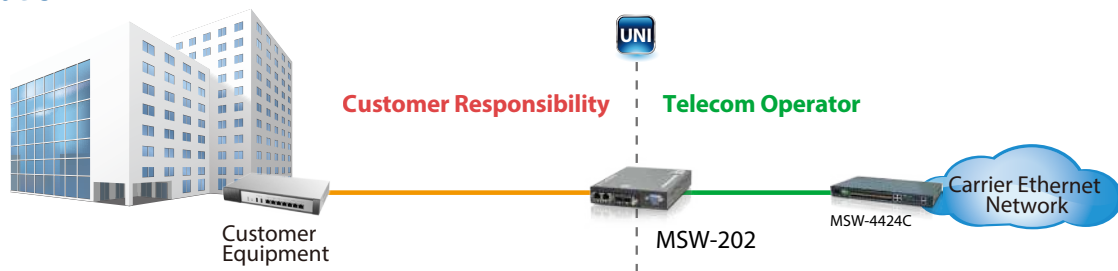
- Complies with CE1.0
- IPv6 management
- IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731
- IEEE 1588v2

Specifications

Interface	100/1000Mbps SFP slots x 2 + 10/100/1000Base-T RJ45 x 2
Filter & Forward rate	14880pps at 10Mbps, 148800pps at 100Mbps, 1488000pps at 1Gbps
Switching Fabric Capacity	8Gbps
Transmission Method	Store and Forward Switching
Standard	IEEE 802.3u, IEEE 802.3z, IEEE 802.3ab, IEEE 802.3x, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1ad, IEEE 802.1D, IEEE 802.1w, IEEE 802.1s, IEEE 802.1x, IEEE 802.3ad, IEEE802.3ah, IEEE802.1ag, IEEE 802.3az, ITU-T Y.1731, ITU-T G.8031, ITU-T G.8032
Packet Buffer	4M bits
MAC Table Size	8K
Max. Packet Size	9.6K Bytes
VLAN Feature	IEEE 802.1Q tagged VLAN(Max. 4K VLAN groups), port based VLAN, MAC based VLAN, protocol based VLAN, private VLAN, IEEE 802.1ad Q-in-Q, VLAN translation, GVRP
QoS Feature	IEEE 802.1p 8 priority queues per port, CoS based on switch port; VLAN ID; DSCP; TCP/UDP port, IEEE 802.1p priority tag remarking, DSCP remarking, Port based ingress/egress rate limit, 3 colors marker-CIR/EIR/Burst bandwidth control
L2 switching protection	STP, RSTP, MSTP, ITU-T G.8031/G.8032 Ethernet ring protection
Trunking	IEEE 802.3ad LACP(Max. 2 trunking groups, Max. 4 ports per trunking group)
Security	IEEE 802.1x port based access control, MAC based access control authentication, RADIUS authentication, limited MAC address learning, IP/MAC binding, ACL rule based filtering, TACACS+, IP source guard, DHCP snooping/relay option 82, ARP inspection

IP Multicasting	IGMP throttling, IGMP filtering, IGMP fast leave, IGMP snooping v1/v2/v3, MVR, MLD snooping v1/v2
Storm Control	Unknown Unicast/Broadcast/Multicast storm suppression
Management	Web/Telnet CLI/SNMP/console interface, Web/CLI authentication, SSH v2, HTTPs, port mirroring, syslog, IPv6 management, NTP, IEEE 802.3az, Energy Efficient, Ethernet (EEE) power management
SNMP Agent	SNMP v1/v2c/v3, RMON Group 1,2,3 and 9
Software Upgrade	TFTP/HTTP
Ethernet OAM	IEEE 802.3ah, IEEE 802.1ag, ITU-T Y.1731
Timing Synchronization	IEEE 1588v2
LED Display	Power, System, Console, Link, Speed/Act
Power Input	100V ~ 240VAC, -18 ~ -75VDC
Power Consumption	< 12W
Operating Temperature	0 ~ 50°C
Storage Temperature	-25 ~ 70°C
Humidity	5% ~ 90% (non-condensing)
Dimensions	201 x 135 x 35 mm (D x W x H) (with CH01M Chassis)
Regulatory	FCC, CE

Application



Ordering Information

Model Name	Description
MSW-202-AC	2x SFP Slots in Dual Rate 100/1000Base-X and 2x 10/100/1000Base-T RJ45 OAM Managed Carrier Ethernet Switch with single AC power supply
MSW-202-DC	2x SFP Slots in Dual Rate 100/1000Base-X and 2x 10/100/1000Base-T RJ45 OAM Managed Carrier Ethernet Switch with single DC power supply
MSW-202-AD	2x SFP Slots in Dual Rate 100/1000Base-X and 2x 10/100/1000Base-T RJ45 OAM Managed Carrier Ethernet Switch with AC & DC power supply

Power Type
MSW - 202 - ☐
 Example: MSW - 202 - AC

NEW



GSW3208MP-1

8x GbE/RJ45 + 2x 1G/SFP with 8x PoE+ (200W)
L2+ Managed Switch

The GSW3208MP-1 is the enhanced version of cost-effective high performance managed power over Ethernet switch, which is equipped 8 GbE/RJ45 with IEEE 802.3at standard 30W power injection per port and 2 dual rate FE/GbE SFP slots. It's designed for enterprise network deployment for office applications such as PoE powered IP telephony, WiFi access and IP surveillance. The GSW3208MP-1 support a wide variety of L2+ feature sets and included the advanced PoE management functions. Additionally, the GSW3208MP-1 can be managed by CTC in-house developed Smartview Element Management System, which offers a user-friendly and centralized device management platform that make the administrators be able to monitor and configure the deployed switches remotely.

Features

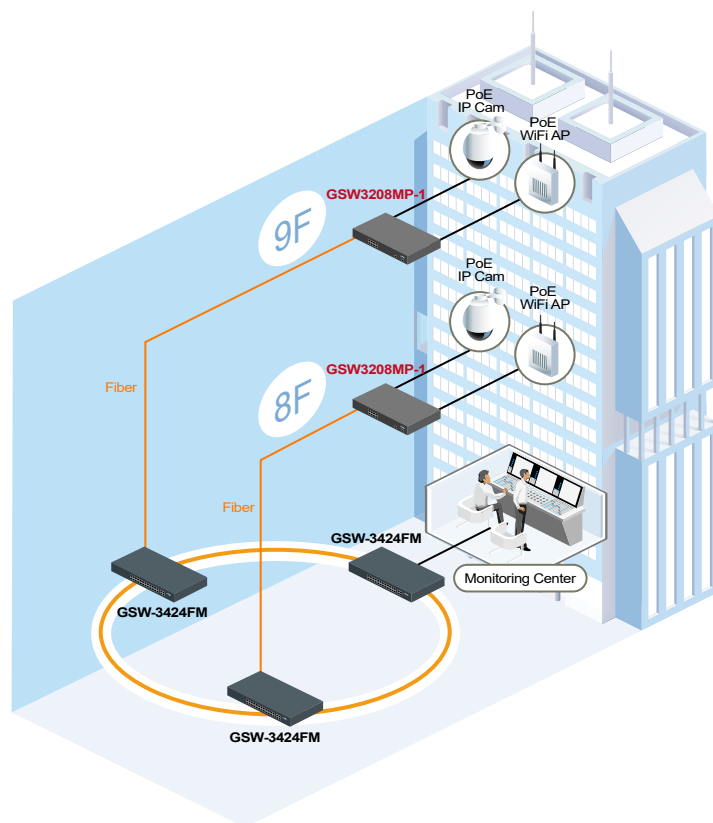
- 8 x RJ45/PoE+ ports with 200W power budget totally
- Cable diagnostics to test UTP cable or determine broken point distance
- Text based CLI configuration download and upload
- Advanced PoE management
 - PoE PD failure auto check and reset if PD failed
 - PoE port on/off scheduling
 - PoE configuration for power planning

Specifications

Interface	Fiber port: 100M/1Gbps SFP x2 Copper port: 10M/100M/1Gbps RJ45 x8	
PoE Power Budget	200W	
Switching Fabric Capacity	20Gbps	
Packet forwarding rate	14880pps	@10Mbps
	148800pps	@100Mbps
	1488000pps	@1000Mbps
Transmission method	Store and Forward Switching	
Packet buffer	4M bits	
MAC table size	8K	
Jumbo frame size	9600 Bytes	
VLAN feature	IEEE 802.1Q tagged VLAN (4K VLAN groups) IEEE 802.1ad QinQ VLAN Voice VLAN; MAC based VLAN; Protocol based VLAN; IP subnet based VLAN Private VLAN for port isolation; VLAN translation GVRP (GARP VLAN registration protocol)	
Link aggregation	Static trunk (SA, DA, IP, TCP/UDP port) IEEE 802.3ad LACP, 5 LACP trunk groups Max, 8-port Max. per LACP trunk group	
L2 switching protection	IEEE 802.1D STP/IEEE 802.1w RSTP/IEEE 802.1s MSTP Loop Protection	
QoS feature	Hard wired IEEE 802.1p 8 priority queues per port Traffic scheduling based on strict/WRR priority CoS based traffic classification on switch port, VLAN ID, DSCP, TCP/UDP port IEEE 802.1p priority tag remarking; DSCP remarking Per Port/Queue based ingress/egress rate limit in steps of 100kbps IEEE 802.3x flow control Multicast/Broadcast/Unicast storm control with flooding control	
Security	Static port security (MAC based) Per port limited MAC learning Port based/MAC base/single/multiple IEEE 802.1x access control 256 ACL rules based on L2~L4 information RADIUS/TACACS+ authentication HTTPs & SSH v2 IP/MAC binding IP source guard & ARP inspection	

IP Multicasting	IGMP snooping v1/v2/v3, IGMP proxy reporting MLD snooping v1/v2 IGMP fast leave IGMP query IGMP filtering/throttling MVR (Multicast VLAN Registration)
Management	WebGUI/Telnet CLI interface SNMP v1/v2c/v3 RMON I (1,2,3,9 groups), RFC1213 MIB II, Private MIB DHCP client/relay/snooping/relay option 82 TFTP/HTTP based firmware and configuration upgrade Port mirroring Event syslog server DNS client/proxy NTP client UPnP IPv4/IPv6 management SFF-8472 DDMI IEEE 802.1ab LLDP
Advanced PoE Management	PoE PD failure auto check and reset if PD failed PoE port on/off failure PoE port enable/disable Power limit by PD classification Totally PoE power budget limitation (200W maximum) Power feeding priority
Power input	AC power input (100~240V)
Operating temperature	0~50 degree C
Storage temperature	-25~70 degree C
Humidity	5%~95% (non-condensing)
Dimension	TBD
Certification	CE, FCC class A

Application



Ordering Information

Model Name	Description
GSW3208MP-1	8x GbE/RJ45, PoE+ + 2x FE/GbE, SFP L2+ Managed PoE Switch



GSW-3224MP

24x GbE/RJ45 + 2x 1GbE Combo with 24x PoE+ (450W)
L2+ Managed Switch

The GSW-3224MP is 24-port 10/100/1000M PoE + 2 Gigabit SFP/RJ45 Copper Combo Ports L2+ Full Managed Switch that is designed for small or medium network environment to strengthen its network connection. The 24 PoE ports support IEEE 802.3at/af PoE technology up to 30W per port and maximum 100m transmission distance. The switch equipped with AC to DC power module to support 450W power budget for PoE power. The added 2 SFP/RJ45 combo ports support 100M and Gigabit Fiber transceiver for long distance transmission. The switch also supports Layer 2+ full management software features. These features are powerful to provide PoE Control, Network Control, Management, Monitor and Security features' requests. It is the best choice to boost your network with better performance, efficiency and high PoE power consumption.

When the function called "PD alive check" is enabled, GSW-3224MP will detect a network PoE powered device (for example, an IP CAM) with a set of IP address periodically. If the switch doesn't get any replies from the network PoE powered device, GSW-3224MP will do a power cycle (PoE power OFF, and PoE power ON) to the port that connects the network PoE powered device, allowing that device to reboot. You can set the frequency of detecting, number of times of detecting, and the time period to perform power cycle when there's no reply via the switch's PoE configuration web page.

Features

- 24-port 10/100/1000M PoE + 2 Gigabit SFP/RJ45 Copper Combo Ports
- IEEE 802.3at/af PoE, up to 30W per port
- Layer 2+ Full Managed Software Features with MSTP, LACP, LLDP, sFlow, 802.1X, TACACS+, and ACL
- DHCP Server/Relay/Snooping
- PD Alive Check
- Automatically adjust Fan speed function

Specifications

Interface	
10/100/1000 Base-T	24
100/1000Base-X SFP & 1000M RJ45 Combo Port	2
Console Port for CLI Management	1
System Performance	
Packet buffer	4M bits
MAC Table size	8K
Switching Fabric Capacity	52Gbps
Forwarding Rate	38.688Mbps
PoE Features	
IEEE 802.3 af/at	IEEE 802.3af & IEEE 802.3at
Number of PoE Ports	24
Max. Power Budget	450Watts
Max. System Power Consumption	70Watts
Max. Total Power Consumption	520Watts
External/Internal Power	Internal Power
Power Feeding Detecting Capability on PD	
PD Alive Check	
PD Classification	
Power Management (Per Port)	Enable/Disable PoE Per Port Priority Setting Per Port Power Level Setting Per Port Overloading Protection
L2 Features	
Auto-Negotiation	
Auto MDI/MDIX	
Flow Control (Duplex)	802.3x (Full) Back-Pressure (Half)

Spanning Tree	IEEE 802.1D (STP) IEEE 802.1W (RSTP) IEEE 802.1S (MSTP)
VLAN	VLAN Group : 4K Tagged Based Port Based Voice VLAN : Voice VLAN with OUI
Link Aggregation	IEEE 802.3ad with LACP Static Trunk MAX. LACP Link Aggregation Group: 13 Max. Port Per Link Aggregation Group: 8
IGMP Snooping	IGMP Snooping v1/v2/v3 : Supports 1024 IGMP groups IGMP Static Multicast Addresses : Supports 1024 Static Multicast addresses IPv6 MLD Snooping : Supports 1024 NLD group MLD Static Multicast Addresses : Supports 1024 Static Multicast addresses Querier Immediate Leave
Storm Control (Broadcast/Multi-cast/UnKnow Unicast)	
Jumbo Frame Support	9.6KB
Qos Features	
Number of Priority Queue	8 queue/port
Rate Limiting	Ingress : Yes, 1KBps/1pps Egress : Yes, 1KBps/1pps
Diffserv (RFC2474 Remarking)	
Scheduling (WRR, Strict, Hybrid)	
CoS	IEEE 802.1p IP Tos Precedence, IP DSCP

Security

Management System User Name/Password Protection

User Privilege Set User Privilege up to 15 level

Port Security (MAC-based)

IEEE 802.1x Port-based Access Control

ACL (L2/L3/L4)

IP Source Guard

RADIUS (Authentication, Authorization, Accounting)

TACACS+

HTTP & SSL (Secure Web)

SSH v2.0 (Secured Telnet Session)

MAC/IP Filter

Management

Command Line Interface (CLI)

Web Based Management

Telnet

Access

Management Filtering SNMP/Web/SSH/Telnet

Firmware Upgrade via HTTP

Dual Firmware Images

Configuration Download/Upload

SNMP (v1/v2c/v3)

RMON (1,2,3 & 9 groups)

DHCP (Client/Relay/Option82/Snooping)

System Event/Error Log

NTP/LLDP

Cable Diagnostics

IPv6 Configuration

Port Mirroring One to One or Many to One

Mechanical

Power Input 100~240VAC

Dimension 44 x 440 x 331mm (H x W x D)

LED Power, PoE, Link/Act, SFP

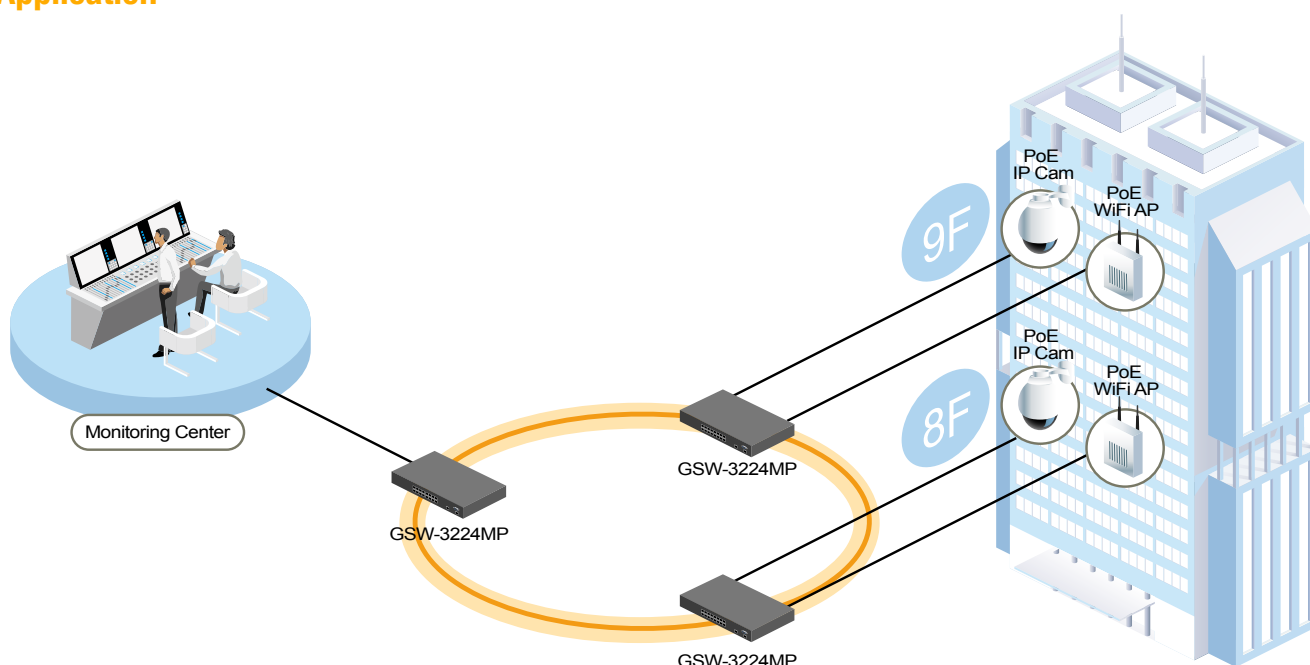
Operating Temperature 0~45°C

Storage Temperature -20~80°C

Operating Humidity 5~90% (non-condensing)

Weight 4.8kg

Certification VCCI, CE, FCC Class A

Application**Ordering Information**

Model Name	Description
GSW-3224MP	24 ports 10/100/1000Base-T + 2 ports GbE Combo (SFP or RJ45) L2+ Managed PoE Switch



FMC-1000S-PH

10/100/1000Base-T to 100/1000Base-X SFP with PoE+ (30W) Media Converter

FMC-1000S-PH is an unmanaged Gigabit Ethernet media converter that supports conversion between electrical 10/100/1000Base-T and optical 1000Base-X Ethernet and as PSE (Power Source Equipment) provide PoE+ power over Ethernet. FMC-1000S-PH provides an SFP cage for 100/1000Base-X compatible SFP modules.

Features

- Conversion between 10/100/1000Base-T and 100/1000Base-X
- Supports dual rate (100/1000) SFP for selectable Fast or Gigabit speed on fiber
- PoE output voltage upto 55VDC
- Supports IEEE 802.3at/af PoE, output 30Watts Power Budget
- Supports LFPT (Link Fault Pass Through)
- Supports DIP SW for setting LFPT, Switch or Converter mode, SFP speed
- Wall Mount and compact size for easy installation
- Supports Jumbo frame 9K bytes packet

Specifications

Standard	IEEE 802.3 10Base-T, IEEE 802.3u 100Base-T(X) IEEE 802.3u 100Base-FX, IEEE 802.3ab 1000Base-T(X) IEEE 802.3z 1000Base-SX/LX IEEE 802.3x Flow Control and Back pressure IEEE 802.3at Power over Ethernet + PoE+ IEEE 802.3af Power over Ethernet, PoE
RJ45 Ports	10/100/1000Base-T
Fiber Ports	100/1000Base-X SFP
Data process Architecture	Store and Forward mode or Pass through mode set by DIP SW
Jumbo Frame	9K bytes
Fiber parameters	Fiber Cable (Multi-mode): 50/125um, 62.5/125um Fiber Cable (Single-mode): 9/125um Wavelength: 1310nm (Multi-mode/Single-mode) Available distance: 500M (Multi-mode SX) 20/40KM (Single-mode) SFP, Distance depend on plug-in Fiber Transceiver
Link Fault Pass through (LFPT)	TX-- Fiber: If TX port link down, the media converter will force Fiber port to link down Fiber--TX: If Fiber port link down, the media converter will force TX port to link down
DIP Switch	Off: LFPT Disable On: LFPT Enable Data process Architecture Off: Store and Forward Switch mode On: Pass through mode Fiber Mode: Off: Auto On: Force SFP Fiber Speed Off: 1000BaseX On: 100Base X
Connector and Pin assignment	SFP Slot RJ-45 Socket: CAT-3/5 (10/100Mbps) Twisted Pair cable Auto MDI/MDI-X and Auto-Negotiation Function Support

Connector and Pin assignment	RJ-45 port support IEEE 802.3at/af End-Span, Alternative A mode. Positive (V+): RJ-45 pin 1, 2 Negative (V-): RJ-45 pin 3, 6 Data : 1, 2, 3, 6, 4, 5, 7, 8
LED	Per Unit: Power (Green) Fiber LNK/ACT (Green) RJ-45 port: 100LK/Act (Green), 1000LK/Act (Green) Dup/Col (Green) PoE Status (Green): Flash: PoE Fault (Over-load or short) On: PoE normal working Off: PoE No Power output
Power Input	48V~57VDC Input (Ship with 56VDC Power Adapter)
Power Adapter	Input 100/110/120/220/240 VAC (Wide Range) Output 36W, 56VDC
PoE output voltage	55VDC
PoE Power Budget	30W (Maximum)
Power Consumption	Maximum 35.4W (include PoE power budget 30W)
Operating Humidity	10 ~ 90% non-condensing
Operating Temperature	0°C ~ 50°C
Storage Temperature	-40°C ~ 85°C
Housing	Plastic
Dimension	108 x 23 x 74mm (D x W x H)
Weight	80g
Installation	Desk top or Wall Mounting (Optional)
EMC	FCC Class A, CE
MTBF	749556

Application



Ordering Information

Model Name	Description
FMC-1000S-PH	10/100/1000Base-T to 100/1000Base-X SFP With PoE+ (PSE) Fiber Converter (30W)
FMC-1000S-PH-WM	10/100/1000Base-T to 100/1000Base-X SFP With PoE+ (PSE) Fiber Converter (30W) with wall mount kit

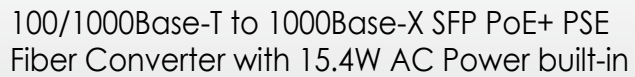


Wall-Mount Type



Non Wall-Mount Type

FMC – 1000S-PH- ☐ - ☐ ☐ ☐ ☐
 Example: FMC – 1000S-PH- WM – SC002



7-6



INJ-G30

Gigabit Ethernet IEEE 802.3af/at
PoE Injector (15/30/36W)

This device consists of 1 PoE Injector port. It can solve the limitation of the power outlet location and offer the system designer a flexible solution to locate the PD network device everywhere. The compact size and wall mounting was specifically designed for easy installation. It can be installed where space is limited; moreover, it provides smooth network migration and easy upgrade to network capacity.

Features

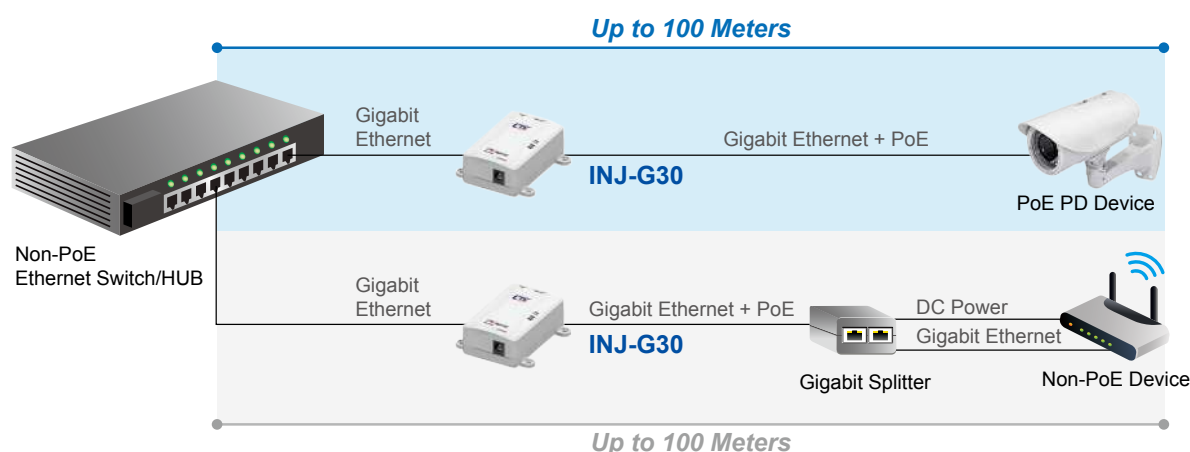
- 1 Port PoE Injector, 55VDC /30W output
- Compliant with IEEE 802.3af/at
- Providing 1 10/100/1000Mbps pass through data rate
- Wall Mountable
- Compliant with IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX and IEEE 802.3ab 1000Base-T
- Safety & EMI Certificates: CE & FCC Class B Smart plug & play
- Compact Size

Specifications

Ethernet Standard	IEEE 802.3	10Base-T 10Mbit/s Ethernet
	IEEE 802.3u	100Base-TX, 100Base-FX, Fast Ethernet
	IEEE 802.3ab	1000Base-T Gbit/s Ethernet over twisted pair
Network Cable	IEEE 802.3af	Power over Ethernet (PoE)
	IEEE 802.3at	Power over Ethernet (PoE+)
Indications	1x RJ-45	for 10/100/1000Base-T data
	1x RJ-45	for 10/100/1000Base-T data and PoE Power output
Power Input	10Base-T Cat. 3, 4, 5e	UTP/STP;
	100/1000Base-T Cat. 5	UTP/STP
Filtering/ Forwarding Rate	10/100/1000Mbps pass through data rate	
PoE Power output pin	RJ45 Pin 1,2(V+), Pin 3,6(V-)	
LED	System Power	

External Power Adapter	Input 100/110/120/220/240 VAC (Wide Range)
	Output 36W ,56VDC
PoE output voltage	55VDC
PoE Power Budget	30W (Maximum)
Operating Temperature	0 ~ 45°C
Storage Temperature	-20 ~ 85°C
Humidity	10 ~90% RH (Non-condensing)
Dimension	80 x 68 x 24mm (D x W x H)
Weight	138g
Installation mounting	Wall mount
Certificates	CE & FCC Class B

Application



Related Products



◀ INJ-IG60-24

Industrial 1 Port GbE PoE+ Injector, IEEE802.3at/af, 15.4/30/36/60/72W (12/24/48VDC)

■ INJ-IG01-PH

Industrial 1 Port GbE PoE+ Injector, IEEE802.3at/af, 15.4/30/36/60W (48VDC)

▶ INJ-IG02-PH

Industrial 1 Port Passive PoE Injector, IEEE802.3at, 15.4/30/60W (24/48VDC)

Ordering Information

Model Name	Description
INJ-G30	1 Port Gigabit Ethernet, IEEE 802.3af/at high power PoE+ Injector

NEW



CWMD-40

CWMD-80

4/8 ch CWDM Mux/DeMux

The CWMD-40/80 Mux/DeMux are standalone CWDM Mux/DeMux that support ITU-T G.694.2 wavelengths between 1271nm to 1611nm in 20nm increments. The CWMD-40/80 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 CWMD-40/80 Mux/DeMux are available in 4-channel and 8-channel (wavelength) models, supporting a variety of wavelength combinations and port configurations. The CWMD-40/80 are passive devices that require no external power and can be equipped with media converters and transponders to provide the capability 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
- Integration with media converter and transponders for CWDM application

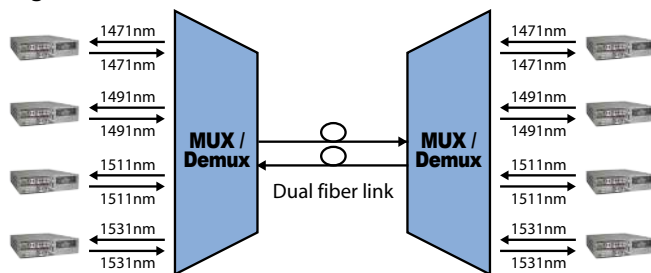
Specifications

Channel	4, 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	4ch : 155x 23 x88 mm (D x W x H) 8ch : 155x 42 x88 mm (D x W x H)
Weight	4ch : 200g 8ch : 380g
Temperature	0 ~ 50°C (Operating) -40 ~ 70°C (Storage)
Humidity	0 ~95% (non-condensing)
Certification	CE, FCC

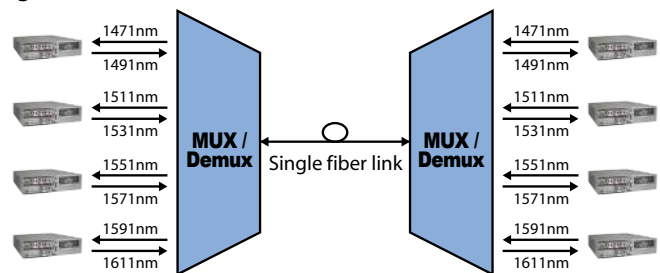
Application

Figure 1 :



4 channels Duplex Transmission CWDM Mux & Demux

Figure 2 :



4 channels Bi-Directional Transmission CWDM Mux & Demux

Ordering Information

Model Name	Description
CWMD-cde-xxxx	c → 4: 4ch, 8: 8ch
	d → 0: no, 1: Monitor port, 2: 1xUpgrade port
	e → A: Single fiber A type, B: Single fiber B type, Blank: Dual fiber
	xxxx → Wavelength optional (1271-1611)

CWMD - - ... Wavelength

Channel: 4: 4ch, 8: 8ch
Monitor Port: 0: no, 1: Monitor port
Type: A: Single Fiber A Type, B: Single Fiber B Type, Blank: Dual Fiber

Example:

• 8ch : CWMD - 8 0 - 4 7 6 1

→ CWDM, Mux/DeMux, 8ch, dual fiber, Wavelength (1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611)

CWMD - -

Optional Accessories

■ SFP Transceiver

155Mbps CWDM Dual Fiber SFP / (LC Type) OC3/STM1/Fast Ethernet (RoHS)

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm) Power	Budget(dB)	Distance	DDMI	Temp.
SFS-5080-Cxx-DD	1470 ~ 1610	SMF	+3 ~ -4	-34	30	80km	✓	0~70
SFS-5080-Cxx-DD	1270 ~ 1450	SMF	+3 ~ -4	-34	30	80km	✓	0~70
SFS-5100-Cxx-DD	1470 ~ 1610	SMF	+5 ~ 0	-35	35	100km	✓	0~70
SFS-5100-Cxx-DD	1270 ~ 1450	SMF	+5 ~ 0	-35	35	100km	✓	0~70

1.25Gbps CWDM Dual Fiber SFP / (LC Type) Gigabit Ethernet / 1X Fiber channel(RoHS)

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm) Power	Budget(dB)	Distance	DDMI	Temp.
SFS-7040-Cxx-DD	1470~1610nm	SMF	+1 ~ -4	-24	20dB	40km	✓	0~70
SFS-7040-Cxx-DD	1270~1450nm	SMF	+1 ~ -4	-24	20dB	40km	✓	0~70
SFS-7080-Cxx-DD	1470~1610nm	SMF	+5 ~ 0	-27	24dB	80km	✓	0~70
SFS-7080-Cxx-DD	1270~1450nm	SMF	+5 ~ 0	-27	24dB	80km	✓	0~70
SFS-7120-Cxx-DD	1470~1610nm	SMF	+5 ~ 0	-32	32dB	120km	✓	0~70

2.67Gbps dual fiber CWDM SFP

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm) Power	Budget(dB)	Distance	DDMI	Temp.
SFS-9040-Cxx	1470 ~ 1610	SMF	-1 ~ +4	-21	20	40km	✓	0~70
SFS-9080-Cxx	1470 ~ 1610	SMF	-2 ~ +3	-28	26	80km	✓	0~70
SFS-9100-Cxx	1470 ~ 1610	SMF	0 ~ +5	-30	30	100km	✓	0~70

10Gbps CWDM dual fiber SFP+ 10G Ethernet, SONET OC192, SDH STM-64

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm) Power	Budget(dB)	Distance	DDMI	Temp.
SFS-1040-CXX-DD	1470 ~ 1610nm	SMF	+4 ~ -1	<-16	15	40km	✓	0~70
SFS-1080-CXX-DD	1470 ~ 1610nm	SMF	+4 ~ 0	<-23	23	80km	✓	0~70
SFS-1030-CXX-DD	1270 ~ 1450nm	SMF	+4 ~ -1	<-15	14	30km	✓	0~70
SFS-1060-CXX-DD	1270 ~ 1450nm	SMF	+4 ~ 0	<-22	22	60km	✓	0~70



CWMD-180

1U 18 ch Rack Mount, LC/UPC

The CWMD-180 is 18 channel Dual Fiber CWDM MUX/DEMUX, 1U Rack Mount design for CWDM wavelengths from 1271nm to 1611nm. When fiber availability is limited, the CWMD-180 CWDM Mux/Demux can increase the bandwidth on the existing fiber infrastructure. By using 18ch CWDM Mux Demux, up to 180 Gbps could be supported on a fiber pair. The 18 channel MUX/DEMUX rack provides the primary wave division and combination functions for CWDM. Line side wave lengths require translation to client side equipment via a transponder card or direct connection to CWDM wavelength SFP modules.

Features

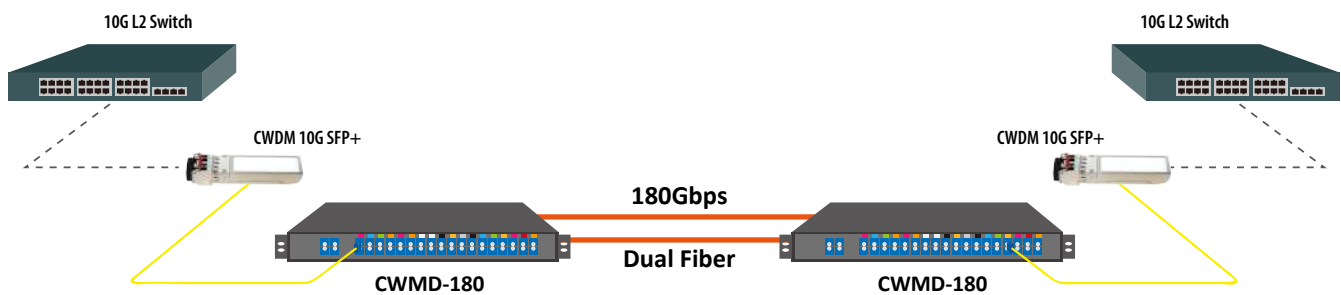
- Full native mode performance
- Optical connectors
- Passive model requires no power
- Protocol transparent, no limitation
- Utilizes industry standard ITU CWDM wavelength

Specifications

Number of Channels	18
Wavelength	1271-1611nm
Channel Spacing	20nm
Technology	Thin-Film Filter
Special Port	Monitor Port
Connectors	Duplex LC/UPC
Insertion Loss	< 4.9 dB

Return Loss	> 45 dB
Operating Temperature	-10°C ~ +70°C
Storage Temperature	-40°C ~ +80°C
Housing	1RU Rack Mount Chassis
Dimensions	485mm x 245mm x 44mm (L X D X H)

Application



Ordering Information

Model Name	Description
CWMD-180	18-Ch CWDM Mux/Demux (1271 ~ 1611nm), LC/UPC

Optional Accessories

■ SFP Transceiver

155Mbps CWDM Dual Fiber SFP / (LC Type) OC3/STM1/Fast Ethernet (RoHS)

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm) Power	Budget(dB)	Distance	DDMI	Temp.
SFS-5080-Cxx-DD	1470 ~ 1610	SMF	+3 ~ -4	-34	30	80km	✓	0~70
SFS-5080-Cxx-DD	1270 ~ 1450	SMF	+3 ~ -4	-34	30	80km	✓	0~70
SFS-5100-Cxx-DD	1470 ~ 1610	SMF	+5 ~ 0	-35	35	100km	✓	0~70
SFS-5100-Cxx-DD	1270 ~ 1450	SMF	+5 ~ 0	-35	35	100km	✓	0~70

1.25Gbps CWDM Dual Fiber SFP / (LC Type) Gigabit Ethernet / 1X Fiber channel(RoHS)

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm) Power	Budget(dB)	Distance	DDMI	Temp.
SFS-7040-Cxx-DD	1470~1610nm	SMF	+1~-4	-24	20dB	40km	✓	0~70
SFS-7040-Cxx-DD	1270~1450nm	SMF	+1~-4	-24	20dB	40km	✓	0~70
SFS-7080-Cxx-DD	1470~1610nm	SMF	+5~0	-27	24dB	80km	✓	0~70
SFS-7080-Cxx-DD	1270~1450nm	SMF	+5~0	-27	24dB	80km	✓	0~70
SFS-7120-Cxx-DD	1470~1610nm	SMF	+5~0	-32	32dB	120km	✓	0~70

2.67Gbps dual fiber CWDM SFP

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm) Power	Budget(dB)	Distance	DDMI	Temp.
SFS-9040-Cxx	1470~1610	SMF	-1~+4	-21	20	40km	✓	0~70
SFS-9080-Cxx	1470~1610	SMF	-2~+3	-28	26	80km	✓	0~70
SFS-9100-Cxx	1470~1610	SMF	0~+5	-30	30	100km	✓	0~70

10Gbps CWDM dual fiber SFP+ 10G Ethernet, SONET OC192, SDH STM-64

Model Name	Wavelength(nm)	Media	Optical Power(dBm)	Sensitivity(dBm) Power	Budget(dB)	Distance	DDMI	Temp.
SFS-1040-CXX-DD	1470~1610nm	SMF	+4~-1	<-16	15	40km	✓	0~70
SFS-1080-CXX-DD	1470~1610nm	SMF	+4~0	<-23	23	80km	✓	0~70
SFS-1030-CXX-DD	1270~1450nm	SMF	+4~-1	<-15	14	30km	✓	0~70
SFS-1060-CXX-DD	1270~1450nm	SMF	+4~0	<-22	22	60km	✓	0~70



iSAP5100

Multiservice Access Multiplexer (4.5U)

The iSAP5100 is a 4U 19" 20 slots rack type STM1 / E1 Time Division Multiplexer for fractional E1 network access, which is designed for non-stop operation. There are 18 slots available for hot-swappable iSAP5100 I/O cards. Two slots are provided for CPU Controller cards and two slots are provided for power supplies. Uplink supports STM1 fiber and E1 copper, two types of connection, maximum up to 144x E1 cross connect for Voice and Data. The iSAP5100 accommodates up to two separate power supplies, which may derive power from AC (110/220) or DC (-36~72V) power sources. When two power supplies are installed, the modules provide complete power redundancy and are hot swappable even during the E1 cards' transmission. The iSAP5100 provides STM1 fiber and E1 copper uplink with a the maximum E1 support of up to 96 E1 channels with cross connection for Voice and Data or interface including RS232, V.35, FXS, FXO, ET100 and E&M. CTC Union also provides and maintains our own SmartView EMS (Element Management System) which is a Java based client/server manager for monitoring , configuration, maintenance, or troubleshooting a large number of network elements over a long period of time.

Tributary Cards

- Control card: 5100-MS-DM-96, 5100-MS-DM-155
- E1 card: iSAP-8E1, iSAP-16E1
- Power modules: 5100-AC240, 5100-DC240
- I/O cards: iSAP-RS232, iSAP-V35, iSAP-ET100, iSAP-E&M, iSAP-FXS, iSAP-FXO

Features

- Supports MAX. 96xE1 with full cross-connect, Supports DS0 cross-connect
- Supports 16 channel Main E1 LTU card
- Supports E1 time slot broadcast function
- Modular design for Voice I/O card, the voice I/O card has two sub-module, each sub-module supports 4-port FXO/FXS
- All modules and cards support hot-swapping
- DCE card types included N x 64K, RS232(Sync/Async), ET100, E&M, FXO, FXS...etc.
- Supports Console, Telnet, SNMP and GUI management
- Available types of power built-in : AC+AC, AC+DC, DC+DC
- Modular design, 5U 19", 18-slot for I/O cards

Specifications

5100-MS-DM-96	
Interface	10/100Base-TX Ethernet RJ45 port
Console	RS232
E1 Cross Connect	144xE1 Transparent cross connect , Supports E1 time slot mapping / broadcast function
CAS Cross Connect	Supports 16 time slot CAS follow voice time cross connect
5100-MS-DM-155	
Interface	Supports 1-port STM-1 155M SFP Slot on CPU card, CPU redundancy (1+1)
NMC	10/100Base-TX
Console	RS232
E1 Cross Connect	155M fiber to 63E1 and 144xE1 cross connect, supports E1 /time slot mapping/broadcast function
CAS Cross Connect	Supports time slot 16 CAS follow voice time cross connect
STM-1/E1 Drop/Insert	Supports STM-1 63E1 x 32TS to E1/IO slot 128E1 x 32TS connection
iSAP-8E1/iSAP-16E1	
Interface	Supports 8E1/16E1 interface
Line Impedance	120 / 75 ohms
Frame format	CAS (PCM30)/CCS (PCM31)
Connector	RJ45
iSAP-RS232	
Data rate	≤38.4kbps Async or 64/128kbps Sync
Ports	6-port
Interface	RS232
iSAP-V35	
Interface types	V.35
Connector	HD68F (female) with cable adapter
Line code	NRZ
Data rate	Nx64kbps

iSAP-ET100	
Standards	IEEE 802.3, 802.3u
MDI/MDIX	Auto
Data rate	10/100Mbps
Encapsulation	HDLC
Ports	4-port
Connector	RJ45
iSAP-E&M	
Loop current	25 mA, maximum 70mA
Ports	8-port
Connector	RJ45
iSAP-FXS	
ITU-T Standard	G.712/G.713/G.714
Line resistance	600Ω
Off-hook current	25mA
Line distance	2km
Ports	8-port
On-hook current	10mA+/-3mA
Effective Ring	Frequency: 25Hz, Voltage: 75V, peak to peak110V MAX line resistance: 1500Ω
Connector	RJ45
iSAP-FXO	
ITU-T Standard	G.712, G.713, G.714
Line resistance	600Ω
Line distance	2km
Ports	8-ports
Caller ID	Supports DTMF, FSK Standard
Electrical & Mechanical	
Dimensions	350 × 440 × 187 mm (D x W x H)
Environmental	Operating: 0~60°C Storage: -25~70°C Humidity: 10~90%, non-condensing
Power	AC 220V : 165~265V, 50~60Hz, DC -48V: -36~-72VDC
Power Consumption	< 90W

Figure1 : Point to Multi-points 16E1 aggregation

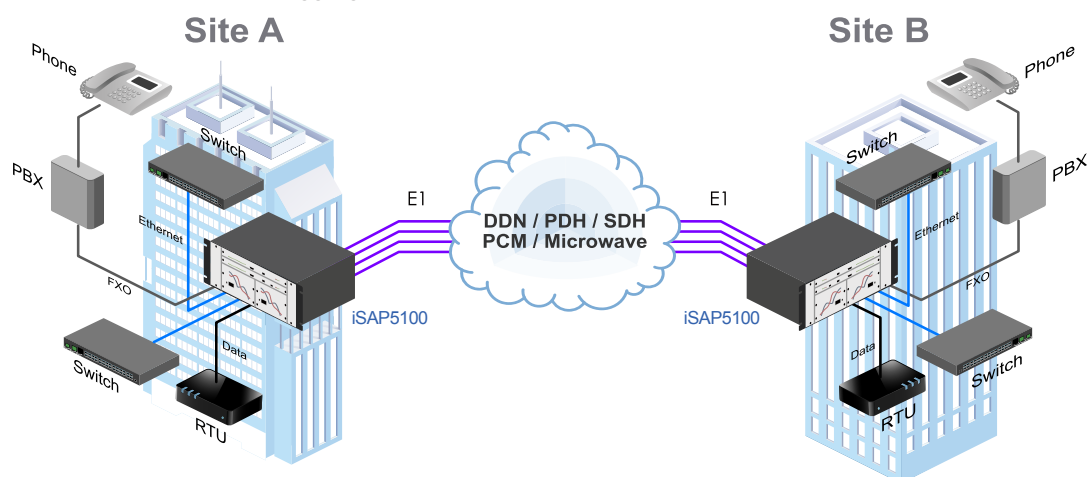
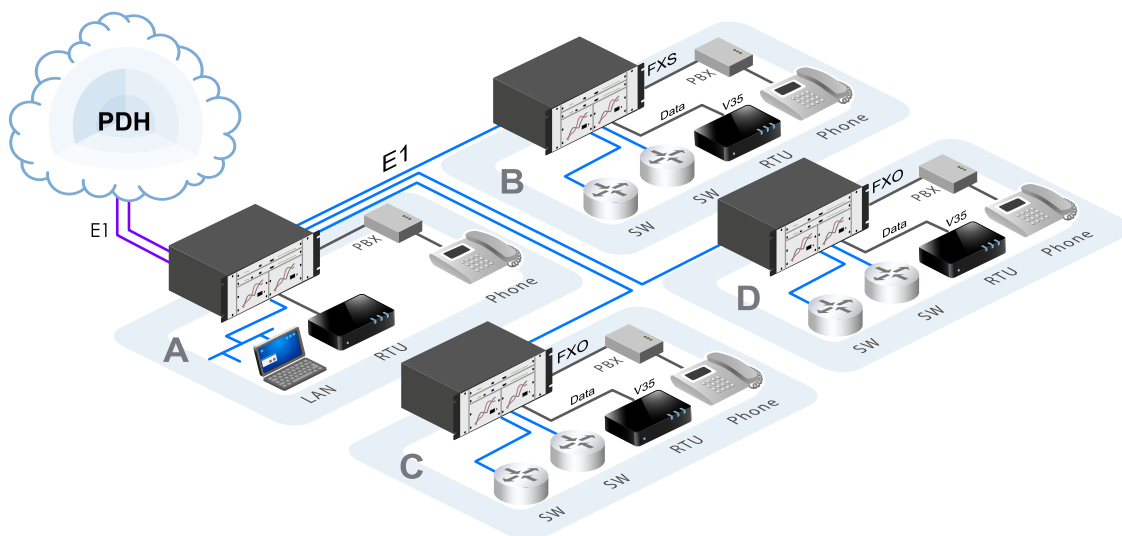


Figure2 : Point to Multi-points 63E1 aggregation over STM-1



Ordering Information

Model Name	Type	Description
iSAP5100-CH	Chassis	5U 19" 20 slot Chassis, power modules not included (18-slot for I/O cards, 2-slot for CPU card)
iSAP5100/AC	Power	AC Power plug-in module (165 to 265 VAC)
iSAP5100/DC	Power	DC Power plug-in module (± 36 to ± 76 VDC)
iSAP-EMS	Software	EverLink2000 EMS software for iSAP5100 and iSAP2000
iSAP-8E1R	Main E1 card	8 channels Main-E1 LTU card: Fractional E1 RJ45
iSAP-16E1R	Main E1 card	16 channels Main-E1 LTU card: Fractional E1 RJ45
iSAP-CAB-RJ45/4BNC	Cable	2ch E1 RJ45 to 4BNC cable (1.5 meter)
iSAP5100-MS-DM-96	CPU-card	CPU card with console, SNMP management port
iSAP5100-MS-DM-155	CPU-card	CPU card with console, SNMP management port and STM1 fiber port
iSAP-FXO	Voice card	8 channels FXO interface card
iSAP-FXS	Voice card	8 channels FXS interface card
iSAP-E&M	Voice card	8 channels 2/4 wires E&M voice interface card
iSAP-RS232	RS-232 card	6 channels RS-232 interface card (V4.0), Low speed: 128kbps 19.2kbps Async
CAB-DB62DB25F6-232-LS	Cable	RS-232 adapter cable for low speed: DB62 Male to 6x DB25 Female, 1M
iSAP-ET100	FE card	4 channels 10/100Base-TX Ethernet Bridge card
iSAP-DATA	Data card	4 channels V.35/X.21/RS530/RS449 cards
CAB-HP68MB34F4-V35	Cable	V35 adapter cable for High speed: HP68 Male to 4x MB34 Female, 1M
CAB-HP68DB25F4-530	Cable	RS530 adapter cable for High Speed: HP68 Male to 4x DB25 Female, 1M
CAB-HP68DB15F4-X.21	Cable	X21 adapter cable for High speed: HP68 Male to 4x DB15 Female, 1M
CAB-HP68DB37F4-449	Cable	RS449 adapter cable for High Speed: HP68 Male to 4x DB37 Female, 1M

Chassis
iSAP5100 - ☐☐
Example: iSAP5100 - CH

Card Type
iSAP5100 - ☐☐☐☐
Example: iSAP5100 - 8E1R



iSAP2000

Multiservice Access Multiplexer (2U)

The iSAP2000 is a 2U 19" 6 slots rack type E1 Time Division Multiplexer for fractional E1 network across, which is designed for nonstop operation. There are 6 slots available for hot-swappable I/O cards and two slots are provided for power supplies. Uplink supports E1 copper connection, maximum up to 96x E1 cross connect for Voice and Data. The iSAP2000 optionally accommodates up to two separate power supplies, which may derive power from AC (110/220) or DC (-36~72V) power sources. When two power supplies are installed, the modules provide complete power redundancy and are hot swappable even during the E1 cards' transmission. The iSAP2000 provides E1 copper uplink, the maximum E1 supports up to 96 E1 channels with cross connection for Voice and Data, the interface included RS232, V35, FXS, FXO, ET100 & E&M. CTC Union also provides and maintains our own SmartView EMS (Element Management System) which is a Java based client/server manager for monitoring, configuration, maintenance, or troubleshooting a large number of network elements over a long period of time.

Interface Cards

- E1 card: iSAP-8E1, iSAP-16E1
- Power modules: 2000-AC240, 2000-DC48
- I/O cards: iSAP-RS232, iSAP-N*64K/V35, iSAP-ET100, iSAP-E&M, iSAP-FXS, iSAP-FXO

Features

- Supports MAX. 96xE1 with full cross-connect, Supports DS0 cross-connect
- Supports 16 channel Main E1 LTU card
- Supports E1 time slot broadcast function
- Modular design for Voice I/O card, the voice I/O card has two sub-module, each sub-module supports 4-port FXO/FXS
- All modules and cards support hot-swapping
- DCE card types included N*64K, RS232(Sync/Async) ET100, ET100R, E&M, FXO, FXS...etc.
- Supports Console, Telnet, SNMP and GUI management
- Available types of power built-in : AC+AC, AC+DC, DC+DC
- Modular design, 2U 19", 6-slot for I/O cards

Specifications

Management	
NMS	10/100Base-TX
Console	RS232
iSAP-8E1, iSAP-16E1	
Interface	Supports 8E1, 16E1 two types interface
E1 Cross connect	96 x E1 transparent cross connect, supports E1, time slot
CAS cross connect	Supports 16 time slot CAS follow voice time cross connect
Line Impedance	120 / 75 ohms
Frame format	CAS(PCM30)/CCS(PCM31)
Connector	RJ45
iSAP-RS232	
Data rate	≤38.4kbps Async or 64/128kbps Sync
Ports	6-port
Interface	RS232
iSAP-N*64K/V35	
Data rate	N x 64kbps(N=1~30 or 31)
Ports	4-port
Connector	V.35 Interface
iSAP-ET100	
Standards	IEEE 802.3, 802.3u
MDI/MDIX	Auto
Data rate	10/100Mbps
Ports	4-port
Connector	RJ45
iSAP-E&M	
Loop current	5~30 mA, maximum 70mA
Ports	8-port
Connector	RJ45

iSAP-FXS	
ITU-T Standard	G.712/G.713/G.714
Line resistance	600Ω
Off-hook current	25mA
Line distance	2km
Ports	8-port
On-hook current	10mA+/-3mA
Effective Ring	Frequency: 25Hz Voltage: 75V, peak to peak110V MAX line resistance: 1500Ω
Connector	RJ45
iSAP-FXO	
ITU-T Standard	G.712/G.713/G.714
Line resistance	600Ω
Line distance	2km
Ports	8-port
Caller ID	Supports DTMF, FSK Standard
Connector	RJ45
Electrical & Mechanical	
Dimensions	440 x 300 x 88mm (D x W x H)
Environmental	Operating: 0~60°C Storage:-25~70°C Humidity: 10~90%, non-condensing
Power	AC 220V: 165~265V, 50~60Hz DC -48V:-36~-76VDC
Power Consumption	< 40W

Figure1 : Point to Multi-points 16E1 aggregation

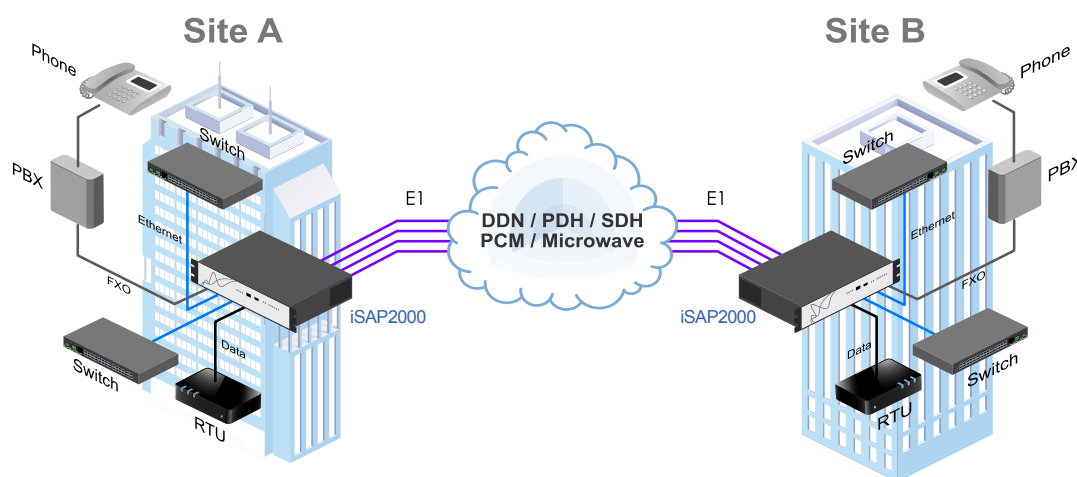
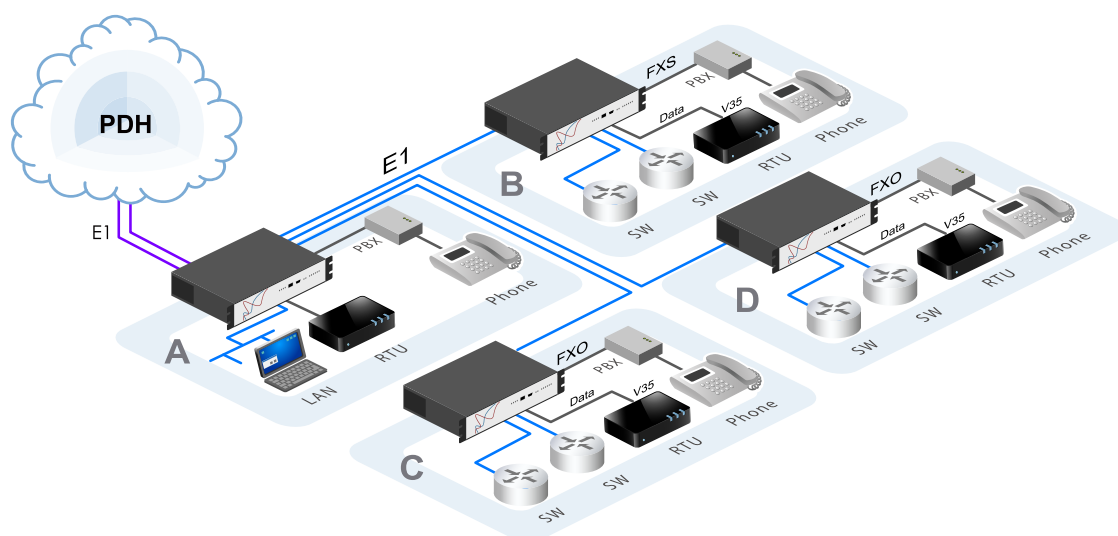


Figure2 : Point to Multi-points 63E1 aggregation over STM-1



Ordering Information

Model Name	Type	Description
iSAP2000-CH	Chassis	2U 19" 6 slots Chassis with built-in CPU card, power modules not included
iSAP2000/AC	Power	AC power plug-in module (165 to 265 VAC)
iSAP2000/DC	Power	DC Power plug-in module (±36 to ±76 VDC)
iSAP-EMS	Software	EverLink2000 EMS software for iSAP5100 and iSAP2000
iSAP-8E1R	Main E1 card	8 channels Main-E1 LTU card: Fractional E1 RJ45
iSAP-16E1R	Main E1 card	16 channels Main-E1 LTU card: Fractional E1 RJ45
iSAP-CAB-RJ45/4BNC	Cable	2ch E1 RJ45 to 4BNC cable (1.5 meter)
iSAP-FXO	Voice card	8 channels FXO interface card
iSAP-FXS	Voice card	8 channels FXS interface card
iSAP-E&M	Voice card	8 channels 2/4 wires E&M voice interface card
iSAP-RS232	RS-232 card	6 channels RS-232 interface card (V4.0), Low speed: 128kbps 19.2kbps Async
CAB-DB62DB25F6-232-LS	Cable	RS-232 adapter cable for low speed: DB62 Male to 6x DB25 Female, 1M
iSAP-ET100	FE card	4 channels 10/100Base-TX Ethernet Bridge card
iSAP-DATA	Data card	4 channels V.35/X.21/RS530/RS449 cards
CAB-HP68MB34F4-V35	Cable	V35 adapter cable for High speed: HP68 Male to 4x MB34 Female, 1M
CAB-HP68DB25F4-530	Cable	RS530 adapter cable for High Speed: HP68 Male to 4x DB25 Female, 1M
CAB-HP68DB15F4-X.21	Cable	X21 adapter cable for High speed: HP68 Male to 4x DB15 Female, 1M
CAB-HP68DB37F4-449	Cable	RS449 adapter cable for High Speed: HP68 Male to 4x DB37 Female, 1M

Chassis
iSAP2000 – □□
Example: iSAP2000 – CH

Card Type
iSAP2000 – □□□□
Example: iSAP2000 – 8E1R

Aggregate Card



iSAP5100-MS-DM-96
iSAP5100-MS-DM-155

CPU Control SNMP
Management Card

Features

- RS-232 port for dumb terminal at 9.6k, 8bit, no parity
- SNMP V1 and V2C support
- MIB file compliant to MIB-II ASN.1
- Firmware upgrade by TFTP
- Hot swappable

Specifications

Electrical Interface	Console RS-232 port NMS LAN 10/100Base-TX
Fiber Interface	STM-1 155Mbps (MS-DM-96) SFP-LC (MS-DM-155)
Network Management	Telnet, SNMP, EMS, local console port
Dimensions	340 × 145 × 32mm (W × D × H)
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs



iSAP-8E1R
iSAP-16E1R

Main E1 Cross Connect Aggregate Card

Features

- Available in 8,16 E1 channels
- Supports PCM31 or PCM30 framed/unframed
- Path / Card Redundancy / Hot Swappable
- E1 timeslots can support cross-connect function
- E1 channel can act as Sub-E1 for drop & insert

Specifications

Frame format	CAS(PCM30) / CCS(PCM31) ; CRC on/off , framed/ unframed
Bit rate	2.048Mbps
Line codes	HDB3/AMI
Rx sensitivity	0 ~ -43dB
Tx driver	1.5km over 0.5mm E1 cable
Line impedance	75 ohms (unbalanced) 120 ohms (balanced)
Pulse amplitude	nominal 2.37V (75ohm) nominal 3.00V (120ohm)
Pulse shape	According to ITU-T G.703
Dimensions	23 × 181 × 197mm (W × D × H)
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

Tributary Card



iSAP-RS232

RS232 Sync/Asyn Card

Features

- Six independent channels
- N x 64 setting from any E1 channel
- Transparent asynchronous rates up to 115.2kbps
- Synchronous 64 or 128Kbps, DCE mode
- Diagnostic loop backs
- Hot swappable

Specifications

Datacom interfaces	ITU-T V.24 compliant Multiplexing Nx64K data onto E1 time-slot
Data speed	N x 64K (N=1 to 2)
Data access	RS-232, supplied with corresponding interface cable
Access mode	DCE
Diagnostics	Local / Remote / Bi-directional Loop
Dimensions	23 x 181 x 197mm (W x D x H)
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs



iSAP-Data

N x 64 Synchronous Serial Card

Features

- Four independent Synchronous channels
- N x 64 setting from any E1 channel
- Each channel operates in native DCE mode
- Diagnostic loop backs
- LED indicators for Power, Alarm, RD/TD activity
- Hot swappable

Specifications

Datcom interfaces	ITU-T and ANSI compliant Multiplexing Nx64K data onto E1 time-slot
Data speed	N × 64K (N=1 to 30, or 31)
Data access	RS-530, RS-449, V.35, X.21, supplied with corresponding interface cable
Access mode	DCE
Diagnostics	Local / Remote / Bi-directional Loop
Dimensions	23 × 181 × 197mm (W × D × H)
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTBF	65,000 hrs

Tributary Card



iSAP-ET100
Fast Ethernet Bridge Card

Features

- Four independent Ethernet over E1 channels
- Utilizes HDLC WAN encapsulation
- MAC Address learning table with 5 minute aging
- Auto-MDIX and Auto-Negotiation
- Hot swappable

Specifications

Standards	IEEE 802.3, IEEE 802.3u
Ports	4-port RJ45
Throughput latency	1 frame
MDI/MDIX	Auto
Buffer	4K bits
Encapsulation	HDLC
Data rate	10/100Base-TX
Packet size	64 ~ 1522 bytes
Dimensions	23 × 181 × 197mm (W × D × H)
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs



iSAP-E&M
E&M Voice Card

Features

- Eight independent channels
- 2/4 wire independent setting
- 1x 64 setting from any E1 channel
- E&M Signaling PBX trunks
- Provides E line, M line, SB (battery) and SG (ground) lines
- Supports types I, II, III, IV or V
- G.711 Codec
- LED indicators for Power, Alarm, activity
- Hot swappable

Specifications

Loop current	5~30 mA, maximum 70 mA
Return loss	300-600Hz >12dB (2W), 600-3400Hz >15dB (2W), 300-3400Hz >20dB (4W)
Group delay	@-10dBm0 <750uSec(2W) <600uSec(4W)
Total Distortion	according to ITU-T G.223
Channel crosstalk	< -65dB, 1020Hz@0dBm
Noise	< -65dBm0p weighted
Dimensions	23 × 181 × 197mm (W × D × H)
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs



iSAP-FXS
FXS Voice Card

Features

- Eight independent channels
- 2 wire independent setting
- G.711 Codec
- 1x 64 setting from any E1 channel
- Provides ring function
- Supports caller-ID forwarding
- PSTN extension or direct "Hot-line"
- Links telephone to telephone or extends POTS
- LED indicators for Power, Alarm, RD/TD activity
- Hot swappable

Specifications

Effective ring voltage	AC 75VRMS +/-15V@25Hz +/-3Hz, <10% THD
Ring voltage at 300mA load	>50VACRMS
Loop resistance	<1.8K Ohms, including 300 Ohms for telephone
On-hook current	10mA +/-3mA
Off-hook loop current	18-50mA
Channel crosstalk	< -65dB, 1020Hz@0dBm
Noise	< -65dBm0p weighted
Surge protection	1000V, 10uSec transient response, decay to 50% in 700uSec 300VRMS for less than 200mSec; no component damage 220VRMS for 15 minutes; damage only local loop
Dimensions	23 × 181 × 197mm (W × D × H)
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs



iSAP-FXO
FXO Voice Card

Features

- Eight independent channels
- 2 wire independent setting
- G.711 Codec
- 1x 64 setting from any E1 channel
- PCM30 R2 Signaling PSTN trunks
- Links PBX to PBX or extends POTS
- LED indicators for Power, Alarm, activity
- Hot swappable

Specifications

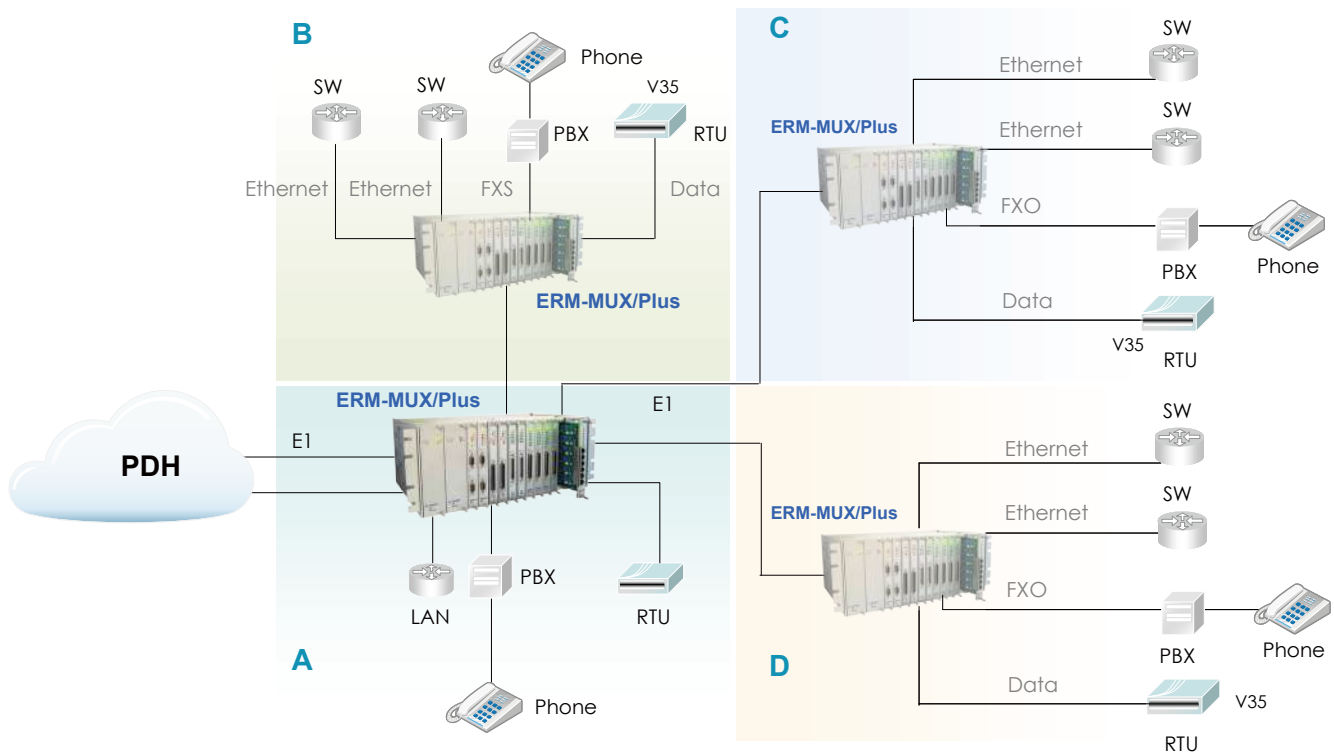
On-hook DC resistance	> 100K Ohms
Ring AC resistance	> 7.5K Ohms
Ring power sensitivity	< 50mW
Off-hook DC resistance	< 300 Ohms
Max. Input Voltage	70VDC
Max. Input Current	150mA
Channel crosstalk	< -65dB, 1020Hz@0dBm
Noise	< -65dBm0p weighted
Return loss	300-600Hz >12dB (2W) 600-3400Hz >15dB (2W) 300-3400Hz >20dB (4W)
Dimensions	23 × 181 × 197mm (W × D × H)
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs



9

4x E1 Multiplexer ERM-MUX-Plus

Figure 2 : The extension and expansion of DDN (Distributed Data)



Ordering Information

Model Name	Type	Description
ERM-MUX-PLUS/AA-CH	Chassis	4U 19" 14 slot Chassis for AC+AC power
ERM-MUX-PLUS/DD-CH	Chassis	4U 19" 14 slot Chassis for DC+DC power
ERM-MUX-PLUS/AD-CH	Chassis	4U 19" 14 slot Chassis for AC+DC power
ERM-MUX/AC	Power	AC Power plug-in module (90 to 250 VAC)
ERM-MUX/ACV	Power	AC Power plug-in module (90 to 250 VAC) with Voice support
ERM-MUX/DC	Power	DC Power plug-in module (±36 to ±76 VDC)
ERM-MUX/DCV	Power	DC Power plug-in module (±36 to ±72 VDC) with Voice support
ERM-MUX-PLUS/GUI	Management	GUI for ERM; support Windows 95, 98, 2000, XP
ERM-MUX-PLUS-2E1R	Card	2-Ch Main-E1 LTU card(V1.2); w/DB37M to 2xRJ45 cable
ERM-MUX-PLUS-2E1B	Card	2-Ch Main-E1 LTU card(V1.2); w/DB37M to 2xBNC cable
ERM-MUX-PLUS-8E1R	Card	8-Ch Main-E1 LTU card(V1.2); w/DB37M to 8xRJ45 cable
ERM-MUX-PLUS-8E1B	Card	8-Ch Main-E1 LTU card(V1.2); w/DB37M to 8xBNC cable
ERM-MUX-PLUS-CPU	Card	CPU card (V4.3) for NMP management
ERM-MUX-PLUS-SNMP	Card	SNMP card (V2.2) for NMP management
ERM-MUX-PLUS-FXO	Card	6-Ch FXO interface card(V2.1)
ERM-MUX-PLUS-FXS	Card	6-Ch FXS interface card(V4.1)
ERM-MUX-PLUS-E&M	Card	6-Ch 2/4 wires E&M voice interface card (V4.1) (Tx/Rx range -20dB ~ +8dB)
ERM-MUX-PLUS-E&M+	Card	6-Ch 2/4 wires E&M voice interface card (V4.1) (Tx range -12dB ~ +16dB, Rx range -20dB ~ +8dB)
ERM-MUX-PLUS-RS-232	Card	6-Ch RS-232 interface card, 64k/128kbps(Sync), 19.2k/38.4kbps(Async)
ERM-MUX-PLUS-ASYNC	Card	6-Ch RS-232 interface card, 9.6k/19.2kbps(Sync), 19.2k/38.4kbps(Async) with multi rate clock function.
ERM-MUX-PLUS-G64K	Card	4-Ch G.703 64k interface card (V4.0)
ERM-MUX-PLUS-HS-SERIAL	Card	4-Ch V.35/X.21/RS-449/RS-530 interface card
ERM-MUX-PLUS-RS485	Card	6-Ch RS-485 / RS-422 Interface card
ERM-MUX-PLUS-ET100	Card	2-Ch Ethernet(10/100Base-TX) interface card (V4.0)

Card Type
ERM – MUX– PLUS –
 Example: ERM – MUX–PLUS – 2E1R



ETU02-MUX

E1 Multiplexer

The ETU02-MUX is a 1U 19(23)" 4 slot rack mountable multiplexing solution for Fractional E1 network services. Up to four DTE devices may be linked to this model at data rates of 64Kbps to 2048Kbps. There is also provision for one optional E1 sub-link which will perform drop & insert with user-defined timeslot connections from a PABX or other E1 equipment to E1 network services. The Fractional E1 2 or 4 port multiplexer supports local control and diagnostics via an LCD display and LED status indicators located on the front panel or via a serial console port. These features enable users to easily configure the unit, execute the in-service diagnostics and monitor the network status. The ETU02-MUX provides for optional SNMP Network Management System, which allow the user to remotely control and manage the system via SNMP protocol. This model fully meets all of the E1 specifications including ITU-T G.703, G.704, G.706, G.732, and G.823.

Features

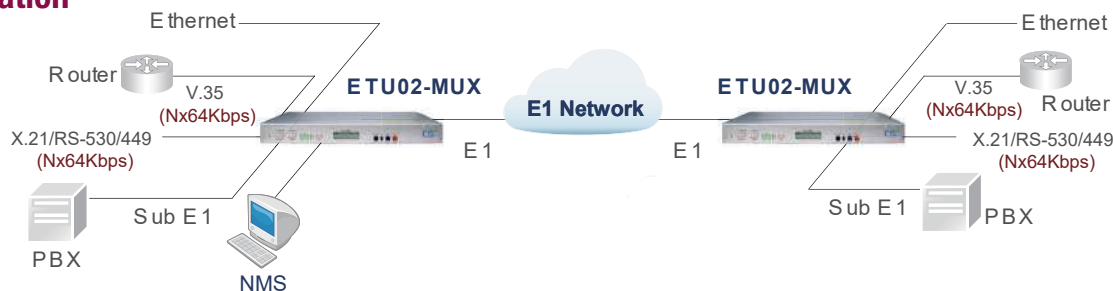
- Provides 4 slots, removable interfaces: V.35, X.21, RS530, RS449, RS232, G.703 Co-directional, NRZ, Ethernet Bridge and Router.
- Optional drop and insert E1 port (Sub E1)
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback
- Setup and Control via front Panel with LCD display or RS-232 terminal
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Optional SNMP management

Specifications

E1 and Sub-E1	Framing: Unframed / Framed CCS(PCM31) Framed: CAS(PCM30) Bit rate: 2.048Mbps±0 ppm Line code: AMI / HDB3 Line impedance: 75 ohm (BNC) / 120 ohm (DB-15, RJ-45)
Transmitter level	Relative receive level: 0 to -43dB Pulse: Nominal 2.37V ±10% for 75ohm Amplitude: Nominal 3.00V ±10% for 120ohm Zero amplitude: ±0.1V Transmit frequency: Internal timing±100 ppm Tracking: Recovery timing±100 ppm External timing: ±100 ppm Jitter performance: According to ITU-T G.823 Return loss: 12dB for 51 ~ 102KHz 18dB for 102 ~ 2048KHz, 14dB for 2048 ~ 3072KHz Interface connector: 15-pin D-type F, BNC
User Data Channel	Data rate: Nx56Kbps or Nx64Kbps Control signals: CTS constantly on DSR constantly on, except during test loops DCD constantly on or follows RTS, except during signal loss Loopback: Line, Payload, local, DTE loopback

User Data Channel	BERT Test Patterns: 511, 2047, 2e15-1, 2e20-1, QRSS, 2e23-1, All 1, All 0, Alt, 0011, 3 in 24, 1 in 16, 1 in 8, 1 in 4 test pattern.
Clock modes	Clock mode 0 (DCE1) Receive and transmit clock (recovered) to the sync DTE Clock mode 0 (DCE2) Receive and transmit clock (internal oscillator) to the sync DTE Clock mode 0 (DCE3) Receive and transmit clock from the sync DCE (from ETC and ERC pin) Clock mode 0 (DCE4) Receive and transmit clock from the sync DCE (all from ETC pin)
Key Pad	4 operation keys
LCD	16 x 2 character backlit LCD
Indications	Signal loss, Sync loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test
Standard	ITU-T G.703/G.704/G.706, G.732 & G.823
Power Input	AC: 90 ~250V, DC24: -18 ~-36VDC, DC48: -36 ~-72VDC
Power / Consumption	10W
Dimensions / Weight	235 x 438 x 45mm (D x W x H) / 2.9kg
Temperature	0~50°C (Operating), -10~70°C (Storage)
Humidity	10~90% non-condensing
Certification	CE, FCC
MTBF	57,000 hrs

Application



Ordering Information

Model Name	Type	Description
ETU02-Mux4-AC	Power	E1 Mux with 4 data ports, AC power
ETU02-Mux4-DC	Power	E1 Mux with 4 data ports, DC power
ETU02-Mux4-AD	Power	E1 Mux with 4 data ports, AC+DC power
ETU02-Mux2-AC	Power	E1 Mux with 2 data ports, AC power

ETU02-Mux2-DC	Power	E1 Mux with 2 data ports, DC power
ETU02-Mux2-AD	Power	E1 Mux with 2 data ports, AC+DC power

ETU02 - MUX ☐ - ☐ ☐
 Example: ETU02 - MUX4- AC



iMux4A-100

Ethernet to 4E1 Multiplexer

iMux8A-100

Ethernet to 8E1 Multiplexer

The iMux4A/iMux8A is an E1 inverse multiplexers capable of bundling up to 4E1/8E1 lines for cost-effective connection of 10/100Base-TX or 100Base-FX LANs over multiple E1 transports. The iMux4A/iMux8A inverse multiplexer transmits up to a 9.92Mbps/15.87Mbps Ethernet bridge channel (GFP-F encapsulated) over 4E1/8E1 links. The iMux4A/iMux8A 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 iMux4A/iMux8A 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 iMux4A/iMux8A fully meets E1 specifications including ITU-T G.703 and G.823. The iMux4A/iMux8A features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the iMux4A/iMux8A 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

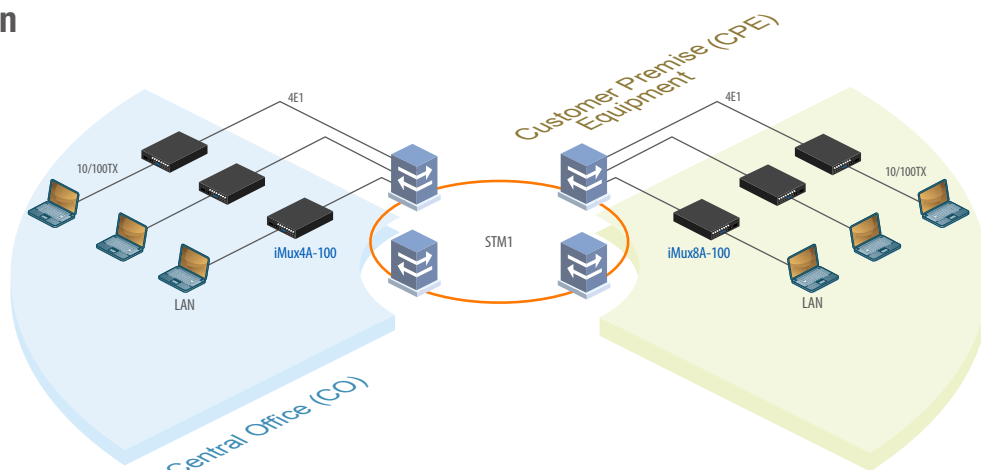
- Connects one Fast Ethernet over 1-4 E1 links (1.984 ~ 9.92Mbps) (iMux4A-100)
- Connects one Fast Ethernet over 1-8 E1 links (1.984 ~ 15.87Mbps) (iMux8A-100)
- Built-in GFP bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- LED Alarm indication
- Supports RS232 console management

Specifications

E1 Interface	Framing	CCS+CRC (requires Unframed)
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm (up to 4E1/8E1)
	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	AC 100~240VAC, DC 18~60VDC	
Power Consumption	< 6W	
Dimensions	210 x 128.8 x 43.8mm (D x W x H) (iMux04A)	
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
iMux4A-100AD	10/100Base-TX to 4 E1 RJ45 +BNC mux with built-in AC+DC Power
iMux4R-100AD	10/100Base-TX to 4 E1 RJ45 mux with built-in AC+DC Power
iMux4B-100AD	10/100Base-TX to 4 E1 BNC mux with built-in AC+DC Power
iMux8A-100AD	10/100Base-TX to 8 E1 RJ45 +BNC mux with built-in AC+DC Power
iMux8R-100AD	10/100Base-TX to 8 E1 RJ45 mux with built-in AC+DC Power
iMux8B-100AD	10/100Base-TX to 8 E1 BNC mux with built-in AC+DC Power



ETU01A

Single Modular Port E1CSU/DSU with LCD and SNMP

The ETU01A single port stand-alone CSU/DSU provides our best digital access solution for E1 and Fractional E1 network services termination. A DTE device may be linked to an ETU01A at data rates of 56Kbps to 2048Kbps. The ETU01A features user replaceable dataport modules for a number of interface standards; including Ethernet bridge, router, V.35, X.21, RS-530, RS-449, G.703 64Kbps Co-directional and RS-232. The ETU01A supports local control and diagnostics via LCD display, keypad and LED status indicators located on the front panel as well as via a menu driven RS-232 console port in conjunction with a standard terminal.

These features enable users to easily configure the unit, execute the in-service diagnostics and monitor the network status. The ETU01A provides optional SNMP (Simple Network Management Protocol), which allows the user to remotely control, diagnose and monitor the system using industry standard SNMP protocol, our proprietary MIB and any network management software.

Features

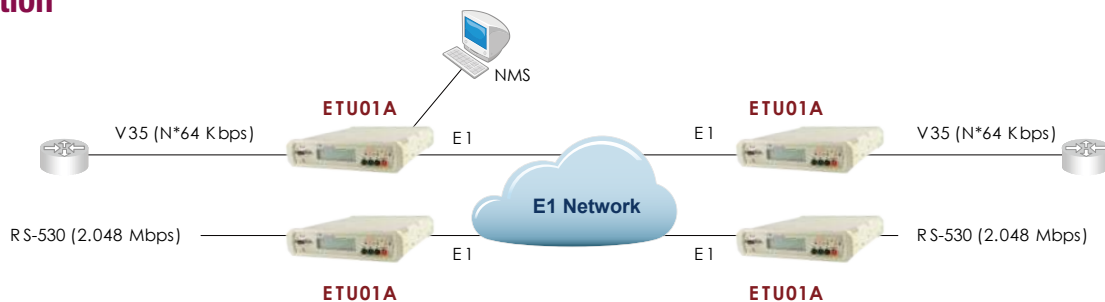
- Supports Fractional E1 and Unframed E1 service with EOC control
- Removable interfaces, support V.35, X.21, RS-530, RS-449, RS-232, G.703 Co-directional, NRZ, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Supports Console, Telnet and SNMP management
- Menu keys and LCD display
- SNMP V1, V2C, V3 supported
- Supported by Smart View EMS
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback

Specifications

G.703 E1	Framing	Framed CCS (PCM31) CAS (PCM30) / Unframed CRC4 on/off
	Line Code	AMI/ HDB3
	LCD display	16x2 character LCD with backlight
	Bit rate	Nx56K or Nx64Kbps, where N=1~31 in CCS or 1~30 in CAS
	Relative receive level	0 to -43dB
	Transmit level:	
	Pulse	Nominal 2.37V $\pm 10\%$ for 75ohm
	Amplitude	Nominal 3.00V $\pm 10\%$ for 120ohm Zero amplitude $\pm 0.1V$
	Jitter performance	According to ITU-T G.823
	Connectors	BNC(unbalanced), RJ-48(balanced)
	Clock modes:	
	Clock mode 0	Receive & transmit clock (DCE1) (recovered) to the sync DTE
	Clock mode 1	Receive & transmit clock (DCE2) (internal oscillator) to the sync DTE

G.703 E1	Clock mode 2	Receive clock to the sync and transmit (DTE1) clock from the sync device
	Clock mode 3	Receive and transmit clock from the (DTE2) sync DCE (from ETC and ERC pin)
	Clock mode 4	Receive and transmit clock from the (DTE3) sync DCE (all from ETC pin)
Diagnostics	local loopback, Digital remote loopback, Test pattern	
Indicators	LEDs (Power, TD, RD, Signal loss, Sync loss, Error and test)	
Standards	ITU-T G.703/G.704/G.706 & G.732	
Power Input	AC: 90-250VAC, DC: 18-72 VCD	
Power Consumption	10W	
Dimensions	250 x 195 x 45 mm (D x W x H)	
Weight	1.5kg	
Temperature	0 ~ 50°C (Operating), -1 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC	
MTBF	65,000 hrs	

Application



Ordering Information

Model Name	Type	Description
ETU01A/AC	Power	1U, 19/2", Data port to framed E1 with 100 ~240VAC
ETU01A/DC	Power	1U, 19/2", Data port to framed E1 with -48VDC
Interface Module		Description
ETU/TTU-V35		V.35 interface module
ETU/TTU-X21		X.21 interface module
ETU/TTU-530		RS-530 interface module
ETU/TTU-449		RS-449 interface module
ETU/TTU-232		RS-232 ASYN/SYNC interface module

ETU/TTU-G64	G.703 64Kbps co-directional interface module
ETU/TTU-NRZ	NRZ interface module (4xBNC)
ETU/TTU-ET100	10/100 Base-Tx Ethernet E1 Bridge interface module
ETU/TTU-ET100R	10/100 Base-Tx Ethernet Routing interface module

Power Type
ETU01A/□□
 Example: ETU01A/AC



ETU011

Single Modular Port E1 CSU/DSU

The ETU011 stand-alone DSU/CSU is a digital access unit for Unframed E1, Fractional E1, or Fractional cascaded E1 service. The ETU011 data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 64kbps, up to a maximum 2.048Mbps (unframed), for a line attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The ETU011 packs the data channels into the E1 link in user-selected time slots. The unused time slots can insert IDLE code (in frame mode). The ETU011 front panel sports status LEDs for monitoring both the CSU and DSU conditions and push button switches for initiating local and remote loopback with integral BERT.

Features

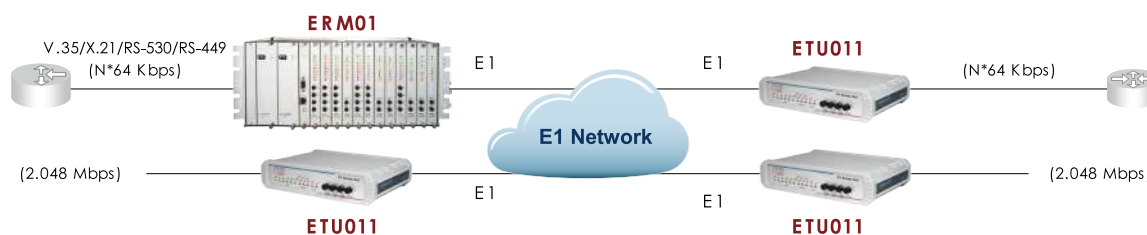
- Supports Fractional E1 and Unframed E1 service
- Removable interfaces, support V.35, X21, RS-530, RS-449, RS-232, G.703 Co-directional, NRZ, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection
- (Internal or External: E1 recovery, DTE or DCE)
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback

Specifications

G.703 E1	Framing	Framed CCS (PCM31) CAS (PCM30)/Unframed CRC4 on/off
	Line Code	AMI/ HDB3
	Bit rate	Nx56K or Nx64Kbps, where N=1~31 in CCS or N equal 1~30 in CAS
	Relative receive level	-43dB
	Transmit level:	
	Pulse	Nominal 2.37V ±10% for 75 ohm
	Amplitude	Nominal 3.00V ±10% for 120 ohm Zero amplitude ±0.1V
	Jitter performance	According to ITU-T G.823
	Connectors	BNC(unbalanced), RJ-48(balanced)
	Clock modes:	
	Clock mode 0	Receive & transmit clock (DCE1) (recovered) to the sync DTE
	Clock mode 1	Receive & transmit clock (DCE2) (internal oscillator) to the sync DTE

G.703 E1	Clock mode 2	Receive clock to the sync. and transmit (DTE1) clock from the sync device
	Clock mode 3	Receive and transmit clock from the (DTE2) sync DCE (from ETC and ERC pin)
	Clock mode 4	Receive and transmit clock from the (DTE3) sync DCE (all from ETC pin)
Indicators	LEDs (Power, TD, RD, RTS, DCD, Signal loss, Sync loss, Alarm)	
Standards	ITU-T G.703/G.704/G.706 & G.732	
Power Input	AC: 90-250VAC, DC: -18 ~ -75VDC	
Power Consumption	10W	
Dimensions	250 × 195 × 45 mm (D × W × H)	
Weight	0.51kg	
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC	
MTBF	57,000 hrs	

Application



Ordering Information

Model Name	Description
ETU/TTU-V35	V35 interface module
ETU/TTU-X21	X21 interface module
ETU/TTU-530	RS-530 interface module
ETU/TTU-449	RS-449 interface module
ETU/TTU-232	RS-232 ASYN/SYNC interface module
ETU/TTU-G64	G.703 64Kbps co-directional interface module
ETU/TTU-NRZ	NRZ interface module (4xBNC)
ETU/TTU-ET100	10/100 Base-TX Ethernet E1 Bridge interface module
ETU/TTU-ET100R	10/100 Base-TX Ethernet Routing interface module

Model Name	Description
Stand Alone Types	
ETU011-AC	Single port to fractional E1 unit with built-in AC 90 ~ 250V
ETU011-DC	Single port to fractional E1 unit with built-in DC -18 ~ -72V
Rack Mount Types	
ETU011-R-AC	Single port to fractional E1 Rack Mount unit with built-in AC 90 ~ 250V
ETU011-R-DC	Single port to fractional E1 Rack Mount unit with built-in DC -18 ~ -72V

Power Type
ETU011 – ☐ ☐
 Example: ETU011 – AC



ETU01-Plus

Single V.35 port E1 CSU/DSU

The ETU01-Plus stand-alone CSU/DSU is a digital access unit for Unframed E1 or Fractional E1 service. The ETU01-Plus data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 64kbps, up to a maximum 2.048Mbps (unframed), for a line attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The ETU01-Plus packs the data channels into the E1 link in user-selected time slots. The ETU01-Plus front panel sports status LEDs for monitoring the CSU and DSU conditions and pushbutton switches for initiating local and remote loopback with integral BERT. The ETU01-Plus features a fixed on-board V.35 interface.

Features

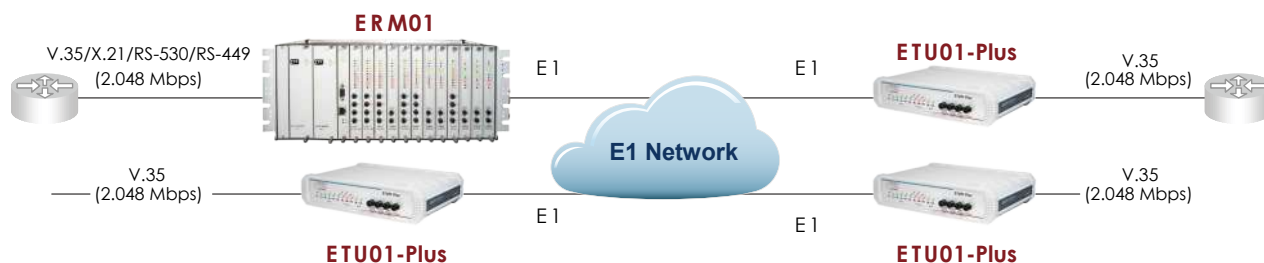
- Supports Fractional E1 and Unframed E1 service with EOC control
- Model with fixed V.35 interface for price critical applications
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback
- Fixed V.35 port with MB34F connector
- I/O connectors all located on rear panel

Specifications

G.703 E1	Framing	Framed CCS (PCM31) CAS (PCM30)/ Unframed CRC4 on/off
	Line Code	AMI/ HDB3
	Data rate	N x 56K or N x 64Kbps, where N=1~31 in CCS or N equal 1~30 in CAS
	Relative receive level	-43dB
	Transmit level:	
	Pulse	Nominal 2.37V ±10% for 75 ohm
	Amplitude	Nominal 3.00V ±10% for 120 ohm Zero amplitude ±0.1V
	Jitter performance	According to ITU-T G.823
	Connectors	BNC(unbalanced), RJ-48(balanced)
	Clock modes:	
	Clock mode 0	Receive & transmit clock (DCE1) (recovered) to the sync DTE
	Clock mode 1	Receive & transmit clock (DCE2) (internal oscillator) to the sync DTE

G.703 E1	Clock mode 2	Receive clock to the sync. and transmit (DTE1) clock from the sync device
	Clock mode 3	Receive and transmit clock from the (DTE2) sync DCE (from ETC and ERC pin)
	Clock mode 4	Receive and transmit clock from the (DTE3) sync DCE (all from ETC pin)
Indications	LEDs (Power, TD, RD, RTS, DCD, Signal loss, Sync loss, Alarm)	
Standards	ITU-T G.703/G.704/G.706 & G.732	
Power Input	AC: 90-250VAC, DC: -18 ~ -75 VDC	
Power Consumption	10W	
Dimensions	195 x 160 x 45 mm (D x W x H)	
Weight	0.51kg	
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC	
MTBF	55,000 hrs	

Application



Ordering Information

Model Name	Description
Stand Alone Types	
ETU01/Plus-AC	V.35/MB34F port, fractional E1 unit with built-in AC 90 ~ 250 VAC
ETU01/Plus-DC	V.35/MB34F port, fractional E1 unit with built-in AC 90 ~ 250 VAC
Rack Mount Types	
ETU01/Plus-R-AC	V.35/MB34F port, fractional E1 Rack Mount type unit w/ built-in AC 90 ~ 250 VAC
ETU01/Plus-R-DC	V.35/MB34F port, fractional E1 Rack Mount type unit w/ built-in DC -18 ~ -75 V

Power Type
ETU01/Plus – ☐ ☐
 Example: ETU01/Plus – AC



IPM-E1/IPM-4E1

E1/4x E1 over Ethernet with Web Management

IPM-E1/4E1 is designed as a multi-service access platform for PDH over IP applications. E1 frames can be mapped/de-mapped into/from IP packets. An adaptive clock recovery method for Ingress PDH (PSN->TDM) clock generation is implemented to support E1 (ITU-T G.823) Jitter performance.

IPM-E1/4E1 provides cost-effective applications of traditional circuit-switched system over IP. It is easy to interconnect existing phone systems over IP that are used to carry data, voice and video. With high precision clock recovery technology, IPM-E1/4E1 is capable of supporting 2G/3G/4G backhaul and provides smooth services. IPM-E1/4E1 can transparently transport proprietary signaling that are required to support PBX features, including call conference, call forwarding and SS7. Customer can easily apply and enjoy better integration of TDM and IP devices with lower network expense. With a pair of IPM-E1/4E1 and guaranteed internet bandwidth, it is sure to save cost dramatically, and to ensure the QoS of voice based on interconnections of TDM equipment.

Features

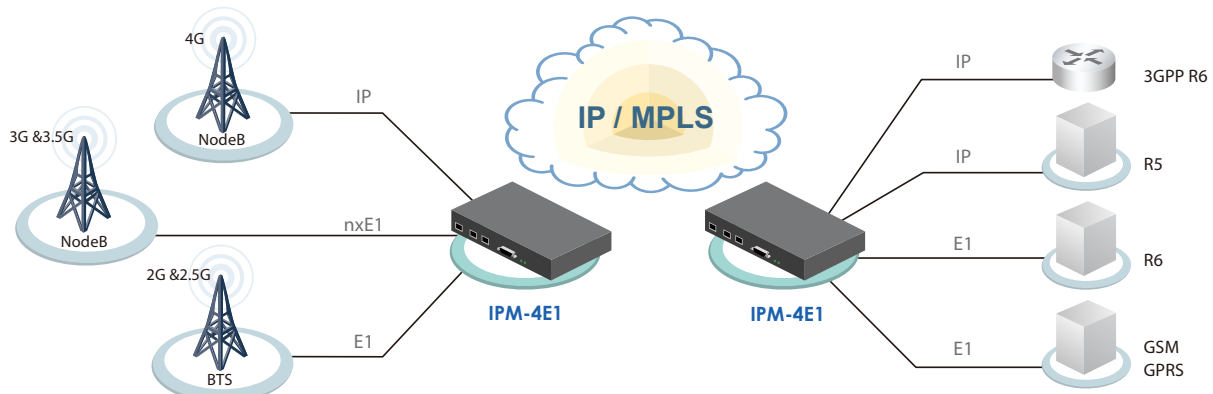
- Supports Web Management
- Supports IETF RFC4553 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8
- Use Raw Encapsulation method for PDH payload over Ethernet packet
- Supports Circuit Emulation Service over Ethernet networks
- Comply with IETF draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA
- Supports both Point-to-Point and Point-to-Multipoint operation
- Supports Adaptive Clock recovery block for Ingress PDH (PSN -> TDM) clock generation. Recovered clock jitter is compliant to ITU-T G.823 (E1 Jitter Control)
- Configurable jitter buffer depth to compensate PDV (Packet Delay Variation) with the flexible setting of 11ms, 23ms, 40ms, 75 ms
- Lost packets processing / compensation via PW (Pseudo Wire) control field Sequence Number
- Provide Subscriber side Data traffic bandwidth control to guarantee enough TDM payload bandwidth
- PDH LOS detection triggered PW L field or payload AIS generation at Egress direction (TDM->PSN)
- Configurable IEEE 802.3 DA/SA assignment
- LED alarm display for E1 Power failure status
- E1 NRZ Serial Interface with LOS/AIS detection

Specifications

E1 Interface	Standards	ITU-T G.703, G.704, G.706, G.732
	Ports	1 or 4-Port
	Data Rate	2.048Mbps ±50ppm
	Connector	RJ-48c for 120 ohm
	Line Coding	HDB3
Ethernet Interface	WAN Port	100 Base-TX Ethernet
	Interface	RJ-45
	LAN port	100 Bases-TX Ethernet
	Interface	RJ-45

Dimensions	125 x 320 x 44 mm (D x W x H)
Power	AC: 85 ~ 264V @ 47 ~ 63Hz DC: -72V ~ -36V
Environment	Ambient temperature: 0° ~ 50° Storage temperature: 0° ~ 85° Humidity: 5 ~ 95% non-condensing
Management	Console or Telnet / Web / SNMP management (via Ethernet)

Application



Ordering Information

Model Name	Description
IPM-E1-AD	E1 over Ethernet with built-in AC+DC Power
IPM-4E1-AD	4E1 over Ethernet with built-in AC+DC Power

Port Number Power Type
IPM - □□□ - □□
 Example: IPM - 4E1 - AD



IPM-8E1/IPM-16E1

8/16x E1 over Ethernet

IPM-8E1 & IPM-16E1 is designed as a multi-service access platform for PDH over IP applications. E1 frames can be mapped/de-mapped into/from IP packets. An adaptive clock recovery method for Ingress PDH (PSN->TDM) clock generation is implemented to support E1 (ITU-T G.823) Jitter performance.

IPM-8E1 & IPM-16E1 provides cost-effective applications of traditional circuit-switched system over IP. It is easy to interconnect existing phone systems over IP that are used to carry data, voice and video. With high precision clock recovery technology, IPM-8E1 & IPM-16E1 is capable of supporting 2G/3G/4G backhaul and provides smooth services. IPM-8E1 & IPM-16E1 can transparently transport proprietary signaling that are required to support PBX features, including call conference, call forwarding and SS7. Customer can easily apply and enjoy better integration of TDM and IP devices with lower network expense. With a pair of IPM-8E1 & IPM-16E1 and guaranteed internet bandwidth, it is sure to save cost dramatically, and to ensure the QoS of voice based on interconnections of TDM equipment.

Features

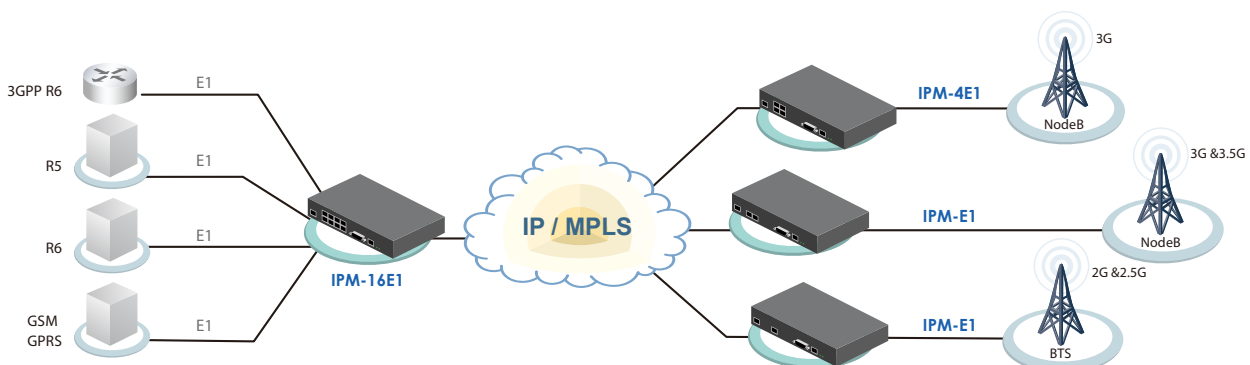
- Supports Web Management
- Supports IETF RFC4553 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8
- 8/16 x E1 NRZ Serial Interface with LOS/AIS detection
- Use Raw Encapsulation method for PDH payload over IP packet
- Supports Circuit Emulation Service over IPE
- Comply with IETF draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA
- Supports both Point-to-Point and Point-to-Multipoint operation
- Configurable IEEE 802.3 DA/SA assignment
- Supports 8/16 independent Adaptive Clock recovery block for Ingress PDH (PSN->TDM) clock generation. Recovered clock jitter is compliant with ITU-T G.823 (E1 Jitter Control)
- Independent configurable jitter buffer depth to compensate up to 250ms of Packet Delay Variation
- Lost packets processing / compensation via PW (Pseudo Wire) control field Sequence Number
- PDH LOS detection triggered PW L field or payload AIS generation at Egress direction (TDM->PSN)
- LED alarm display for E1 Power failure status

Specifications

E1 Interface	Standards	ITU-T G.703, G.704, G.706, G.732
	Ports	8 or 16-Port
	Data Rate	2.048Mbps ±50ppm
	Connector	RJ-45 for 120 ohm
	Line Coding	HDB3
Ethernet Interface	WAN Port	1 x 100Base-TX Ethernet
	Interface	RJ-45
Dimensions	268 x 290 x 44 mm (D x W x H)	

Power	AC: 85 ~ 264V @ 47 ~ 63Hz
	DC: -72V ~ -36V
Environment	Ambient temperature: 0° ~ 50°
	Storage temperature: 0° ~ 85°
	Humidity: 5 ~ 95% non-condensing
Management	Console port or Telnet/ Web / SNMP-based management via NMS port

Application



Ordering Information

Model Name	Description
IPM-8E1-AD	8E1 over Ethernet with built-in AC+DC Power
IPM-16E1-AD	16E1 over Ethernet with built-in AC+DC Power

Port Number Power Type
IPM - -
 Example: IPM - 16E1 - AD

NEW



VDTU2-B140

4-port Gigabit VDSL2 LAN Extender

The VDTU2-B140 is a Gigabit Ethernet Copper Extender that supports an aggregated bandwidth up to 300Mbps (Downstream: 150 Mbps/ Upstream: 150 Mbps) and delivers fiber-optic like speeds on existing copper infrastructure. The VDTU2-B140 is equipped with 4x 1000Base-T RJ-45 ports and 1x VDSL2 RJ-45 or 2-PIN Terminal Block. Built in a metal enclosure, it provides for easy installation in harsh environments. Eight different profile settings can be selected via dip switches to flexibly suit various applications and environments. Symmetric profiles can be applied as a standard Ethernet connection, while Asymmetric profiles can be used for other services such as Video streaming or IP surveillance services which require high traffic flow in one direction. The VDTU2-B140 supports transparent LAN bridging to extend Ethernet service over UTP, Cat 5+ cables or simple single pair telephone cable. It is the best high throughput Long Reach Ethernet Extender for service providers when deploying their IP-based networking services to meet various application scenarios in harsh environments.

Features

- High speed Ethernet extension over UTP, CAT 5e/6/7.
- Supports ITU-T G.993.5 G.vectoring and G.INP
- Selectable 8 different profile settings via Dip Switch (G.INP/ Interleaved, Target SNR 6/8/12/24 dB, Symmetric/Asymmetric Modes)
- Compatible with third-party VDSL2 IP DSLAM when operates in CPE(RT) mode
- Cost effective bridge function to connect two Ethernet LAN
- IEEE 802.1Q VLAN tag transparent
- Easy installation via simple plug-and-play in harsh environment

Specifications

VDSL Interface	RJ-45 or 2-PIN Terminal Block
	DMT Encoding
	Complying with ITU-T G993.1/G993.2/G993.5/G.997.1/G.998
	G.INP
	On-board surge protection
LAN Interface	4 x RJ-45
	10/100/1000 Base-T; Auto-Negotiation, Auto-MDI/MDI-X.
	Complying with IEEE 802.3/802.3u/802.3z
4-position DIP Switch	Selectable Master (OT) or Remote (RT) mode
	Selectable 8 different profile settings via Dip Switch (G.INP/ Interleaved, Target SNR 6/8/12/24 dB, Symmetric/Asymmetric Modes)
LED	Power: On/Off
	LAN: Fast Ethernet/Gigabit Ethernet
	VDSL2: Mode – CO (OT) / CPE (RT)
	Sync - Idle / Trained / Link
Power supply	VDTU2-B140: 12 VDC with Commercial Grade External Power Adaptor
	VDTU2-B140-DC : 12~24 VDC T2 terminal block
	Power Consumption: 4.5 Watts maximum
Dimension :	130 × 94.7 × 28 mm (W × H × D)
Operating Temperature:	-20°C ~65°C
Humidity:	0%~95%RH (non-condensing)

Standards and Certifications CE Class A
FCC Part 15B Class A

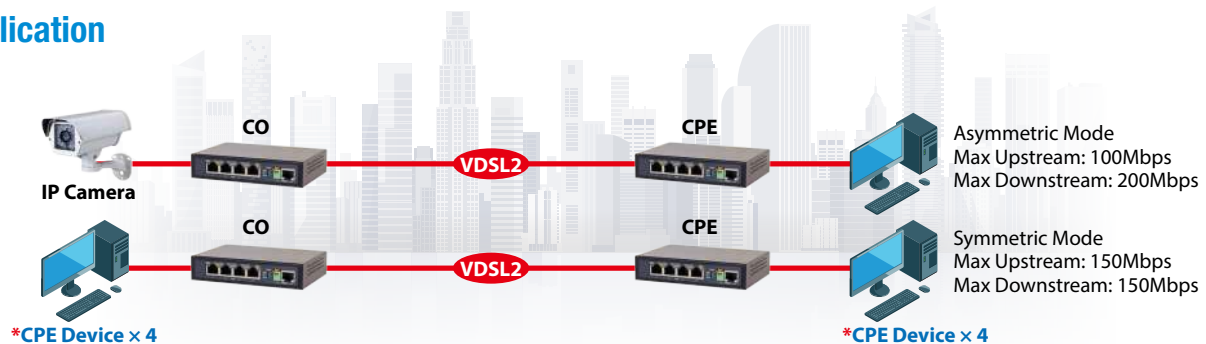
Performance

UTP, 26AWG		
Profile Setting 1: Symmetric, SNR 8dB, G.INP		
Distance (Feet)	Upstream Line Rate (Mbps)	Downstream Line Rate (Mbps)
500	155	158
1,000	122	126
1,500	75	80
2,000	48	56
2,500	28	38
3,000	23	28

UTP, 26AWG		
Profile Setting 1: Asymmetric, SNR 8dB, G.INP		
Distance (Feet)	Upstream Line Rate (Mbps)	Downstream Line Rate (Mbps)
500	100	200
1,000	77	170
1,500	38	105
2,000	22	64
2,500	10	43
3,000	9	42
4,000	6	34

* The above performance data is for reference only, the actual line rate may vary depending on the quality of the copper wire and environmental conditions.

Application



Ordering Information

Model Name	Description
VDTU2-140	4-port Gigabit VDSL2 LAN Extender with AC Power Adapter
VDTU2-140-DC	4-port Gigabit VDSL2 LAN Extender (12~24 VDC T2 Terminal Block)

NEW



VDTU2-B120

VDTU2-B110

VDTU2-B120

Gigabit Ethernet VDSL2 LAN Extender

VDTU2-B110

Fast Ethernet VDSL2 LAN Extender

The VDTU2-B120 is a Gigabit Ethernet Copper Extender that supports an aggregated bandwidth up to 300Mbps. (Downstream: 150 Mbps/ Upstream: 150 Mbps) and the VDTU2-B110 is a Fast Ethernet Copper Extender that supports an aggregated bandwidth up to 200Mbps (Downstream: 100 Mbps/Upstream: 100 Mbps). Both Lan Extenders deliver fiber-optic like speeds on existing copper infrastructure and are equipped with 1-port 1000Base-T RJ-45 (B120) or 100Base-T RJ45(B110) and 1-port VDSL2 RJ-45 in metal enclosures, for easy installation in harsh environment. Symmetric profile can be applied as a standard Ethernet connection while Asymmetric profile can be used for other services like Video streaming or IP surveillance services which require high traffic flow in one direction. The Lan Extender supports transparent LAN bridging to extend Ethernet service over UTP, Cat 5+ cables or simple single pair telephone cable. They are the best high throughput Long Reach Ethernet Extenders for service providers when deploying their IP-based networking services to meet various application scenarios in harsh environments.

Features

- High speed Ethernet extension over UTP, CAT 5e/6/7.
- Supports ITU-T G.993.5 G.vectoring and G.INP (VDTU2-B120)
- Selectable 8 different profile settings via Dip Switch (VDTU2-B120) (G.INP/Interleaved, Target SNR 6/8/12/24 dB, Symmetric/ Asymmetric Modes)
- Compatible with third-party VDSL2 IP DSLAM when operates in CPE(RT) mode
- Cost effective bridge function to connect two Ethernet LAN
- IEEE 802.1Q VLAN tag transparent
- Easy installation via simple plug-and-play in harsh environment

Specifications

VDSL Interface	RJ-45
	DMT Encoding Complying with ITU-T G.993.1/G.993.2/G.997.1/G.993.5/G.998 (VDTU2-B120) G.INP (VDTU2-B120) On-board surge protection
LAN Interface	1 x RJ-45 10/100/1000 Base-T; (VDTU2-B120) 10/100Base-TX (VDTU2-B110) Auto-Negotiation Auto-MDI/MDI-X Complying with IEEE 802.3/802.3u/802.3z(VDTU2-B120)
	4-position DIP Switch VDTU2-B120: Selectable Master (OT) or Remote (RT) mode Selectable 8 different profile settings via Dip Switch G.INP/Interleaved Target SNR 6/8/12/24 dB Symmetric/Asymmetric Modes VDTU2-B110: Selectable CO or CPE mode Selectable 30a or 17a (VDSL2 Profile) Selectable Band plan (Symmetric or Asymmetric) Selectable target SNR margin (6dB or 9dB)
LED	Power: On/Off
	VDSL2: Mode – CO (OT) / CPE (RT) Sync – Idle / Trained / Link
Power supply	VDTU2-B120 / B110: 12 VDC with Commercial Grade External Power Adaptor
	VDTU2-120-DC : 12~24 VDC T2 terminal block Power Consumption: 3.8 W (VDTU2-120) 4.2 W (VDTU2-110)
Dimension :	96.2 x 22.8 x 73.4 mm (WxHxD)

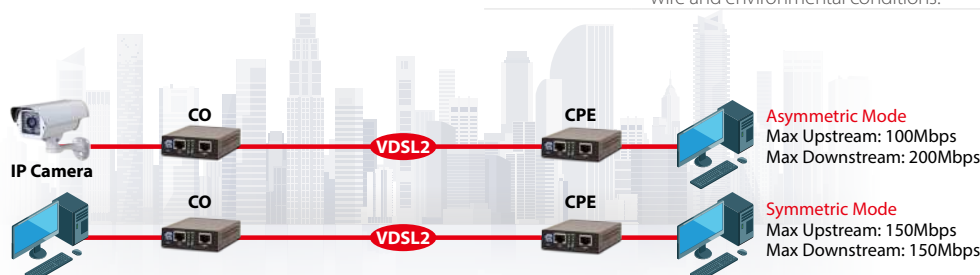
Operating Temperature:	-20°C ~65°C (VDTU2-120) -0°C ~50°C (VDTU2-110)
Humidity:	0%~95%RH (non-condensing)
Standards and Certifications	CE Class A FCC Part 15B Class A
Performance	VDTU2-B120

Distance (m)	UTP 26AWG			
	Profile Setting 1: Symmetric, SNR 8dB, G.INP		Profile Setting 1: Asymmetric, SNR 8dB, G.INP	
	Upstream Line Rate (Mbps)	Downstream Line Rate (Mbps)	Upstream Line Rate (Mbps)	Downstream Line Rate (Mbps)
150	155	158	100	200
300	122	126	54	129
450	75	80	49	112
600	48	56	39	84
750	28	38	23	60
900	23	28	11	45
1200	x	x	6	40

Loop (m)	UTP 26AWG			
	17a Profile		30a Profile	
	Downstream/Upstream	Loop	Downstream/Upstream	Loop
300M	100/72 Mbps	300M	100/100 Mbps	
600M	42/46 Mbps	600M	40/45 Mbps	
800M	32/28 Mbps	900M	22/19 Mbps	
1000M	18/13 Mbps	1200M	16/7 Mbps	
1200M	16/7 Mbps	1500M	12/3 Mbps	
1500M	12/3 Mbps	1800M	8/2 Mbps	
1800M	9/2 Mbps	2100M	5/2 Mbps	
2000M	5/2 Mbps	x	x	

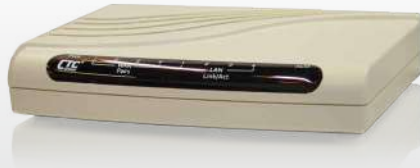
* The above performance data is for reference only, the actual line rate may vary depending on the quality of the copper wire and environmental conditions.

Application



Ordering Information

Model Name	Description
VDTU2-B120	1-port Gigabit VDSL2 LAN Extender with AC Power Adaptor
VDTU2-B120-DC	1-port Gigabit VDSL2 LAN Extender (12~24 VDC T2 Terminal Block)
VDTU2-B110	1-port Fast Ethernet VDSL2 LAN Extender with AC Power Adaptor



SHDTU04bF-ET10RS

G.SHDSL.bis ATM EFM Router (2/4/8wires)

The G.SHDSL.bis ATM EFM Router is 2/4/8wires Ethernet Bridge/Router that complies with G.991.2 standards and has an built-in four port 10Base-T /100Base-TX auto-negotiation and auto-MDIX switch. The G.SHDSL.bis ATM EFM Router provides multi-rate 2-wire / 5.7Mbps or 4-wire / 11.4Mbps and 8-wire / 22.78Mbps payload rates over existing single or two pair copper wire. The G.SHDSL.bis ATM EFM Router is designed not only to optimize the service bit rate from central office to customer premises but also integrates high-end Bridging/ Routing EFM bonding capabilities with advanced functions such as virtual server mapping and VPN pass through. The G.SHDSL.bis ATM EFM Router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs. In bridge mode, the four switching ports may be configured for IEEE802.1Q VLAN or port based VLAN applications. The modem can be configured in either central or client mode providing a point-to-point solution.

Features

- Supports Ethernet over ATM over SHDSL
- Full ATM protocol stack implementation over G.SHDSL.bis
- Adaptive rate installation maximizes data rate based on loop conditions
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.SHDSL
- Supports point-to-point configurations
- Local management interface via console port
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II
- Build-in advanced SPI firewall (Firewall routers)
- Efficient IP routing and transparent learning bridge to support broadband Internet services
- VPN pass-through for safeguarded connections
- DMZ host/Multi-DMZ/Multi-NAT; multiple PCs on a LAN with only one IP address
- PPPoA and PPPoE support user authentication with PAP/CHAP/MSCHAP
- Raw and time stamped statistics
- Supports firmware upgrade via web interface
- EFM (Ethernet in the First Mile) bonding per IEEE 802.3-2005;2/4-wire bonding for HDLC per G991.2

Specifications

Interface	WAN SHDSL.bis: ITU-T G.991.2 (2004) Annex A/B/F/G Support EFM Bonding and SHDSL M-Pair mode Line Code: TC-PAM 16/32/64/128 Data Rate: N x 64 Kbps (N=3~89) using TC-PAM 16/32 Max. 5.696Mbps (1-Pair) Max. 11.392Mbps (2-Pair) Max. 22.78Mbps (4-Pair) N x 64 Kbps (N=3~239) using TC-PAM 64/128 Max. 15.296 Mbps (1-Pair) Max. 30.592 Mbps (2-Pair) Max. 61.184Mbps (4-Pair) Impedance: 135 ohms LAN RJ-45 x 4-Ports 10/100 Base-T Ethernet ports
Serial Console	RS-232(Female) Connector
Factory Default Reset	Push Button
LED	Power: (Green) WAN: LINK/ACT (Green), one LED per pair LAN (Port 1 ~ Port 4): LINK/ACT (Green:100M, Orange:10M) ALARM: (Red)
G.SHDSL	Support G.991.2 / G994.1 standards TC-PAM line modulation Configurable as either server or client mode OAM IEEE 802.3 chapter 57 compliant IEEE 802.3 2BASE-TL (aka 802.3ah) compliant Rate negotiating / Manually rate adaptation configuration Connection Loops: 1 pair (2 wires) Support IPoE Support PPPoE
Routing/Bridge Support	IP (RFC 791) routing is supported TCP, UDP, ICMP, IGMP v1 and v2, ARP, RIP v1, RIP v2, OSPF, BGP-4 Transparent bridging (IEEE 802.1D) PPP BCP (RFC 3185) support IGMP snooping
ATM Support	Multiple protocols over AAL5 (RFC1483) (Not support IPoA/PPPoA) Only 1 PVC
EFM Support	EFM mode compliant to IEEE 802.3 PPP over Ethernet (RFC2516) Support of OAMPDU information and functionality (ITU-TY.1731)
EFM Support	OAMPDU Event Notification, Variable Request, Variable Response, Loopback Control VLAN base QOS (802.1P/Q), Priority Queue
Internet Access Sharing	NAT (includes multi-to-multi NAT) / SUA, 8192 NAT sessions Port restricted cone NAT SIP ALG pass-through NAT server (Port forwarding) Multi-NAT Dynamic DNS DHCP server/client/relay
Security	User Authentication (PAP, CHAP) with PPP (RFC 1334, RFC 1994) Microsoft CHAP Stateful packet inspection firewall Content filter Prevent Denial of service Access control of service Real-time attack alert and log
Network Management	Web-based Configuration, Command-line interface Password-protected Telnet support SNMP MIB I /MIB II support TFTP & FTP firmware upgrade and configuration backup Dying Gasp
VPN	IPSec VPN support, 10 VPN tunnels IKE/ Manual Key, DES/ 3DES/ AES Encryption MD5/ SHA1 Authentication, FQDN NETBIOS pass-through for IPSec, IPSec VPN keep-alive IPSec NAT Traversal

Diagnostics Capabilities

The router can perform self-diagnostic tests. These tests check the integrity of the following circuitry:

- FLASH memory
- SDSL circuitry
- RAM
- LAN port

Others

DNS Proxy
UNIX syslog
Each Ethernet port can be only tagged or only untagged
Application QoS
IPv6

Ordering Information

Model Name	Description
SHDTU04bF-ET10RS	4-Port 10/100Base-TX ATM Bridge / Router w/Firewall (2-wire 5.7Mbps)
SHDTU04bAF-ET10RS	4-Port 10/100Base-TX ATM Bridge / Router w/Firewall (4-wire 11.4Mbps)
SHDTU04bCF-ET10RS	4-Port 10/100Base-TX ATM Bridge / Router w/Firewall (8-wire 22.78Mbps)

NEW



SHDTU03b-E1 SHDTU03bA-E1

1-port TDM E1 NTU

The SHDTU03b(A)-E1 is a 2-Wire/4-Wire G.SHDSL.bis TDM NTU telecommunication product designed for carriers and SME user and offers an ITU-T G.703 DTE interface which works over an SHDSL link. The SHDTU03b(A)-E1 supports two different connectors for G.703 E1 applications (balanced 120 Ohm RJ45 or unbalanced 75 Ohm dual BNCs) at bit rates from 64kbps to 2.048Mbps. The SHDSL.bis NTU can be configured and managed via a menu-driven VT100 compatible Asynchronous Terminal Interface locally or via EOC (embedded operations channel) remotely. The SHDSL.bis NTU provides the capability to identify the maximum line rate supported by the copper loop. This powerful automatic configuration capability makes installation and service provisioning simple and painless. Furthermore it provides flexible manually setting of the maximum NTU speed at different levels for different customer-tailored service offerings.

Features

- Supports E1 and fractional E1 over SHDSL
- Standard ITU G.991.2 (2004) supports improvement on reach, speed and interoperability in contrast to conventional G.SHDSL.bis devices
- Auto rate installation maximizes data rate based on loop conditions
- Wetting current sink to protect SHDSL.bis line
- Local management interface with LCD display
- Remote line loopback
- E1 performance monitoring and alarm buffer
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Specifications

Ports WAN interface	Line Rate:	ITU G.9912 (2004)
	Coding :	Trellis coded amplitude modulation (TC-PAM16 and TC-PAM32)
G.703 Interface (as E1)	Support:	Annex A.B.F and G
	Payload rates:	64Kbps to 5.696Mbps (N=1 to 89) for 2-wire model. 128Kbps to 11.392Mbps (N=1 to 172) for 4-wire model
	Connection:	RJ-45 jack (2-wire or 4-wire)
	Impedance:	135 ohms
LED	Connection:	RJ-45 for balanced 120Ω E1 cable and BNC for unbalanced 75Ω E1 cable
	Line Rate :	2048KHz +/- 50ppm
	Framing:	PCM30/PCM30C/PCM31/PCM31C and Unframed
	Data Rate:	Humidity
DSL Timing	Operation :	Full E1 and Fractional E1
	Power, Alarm, Test, SYNC, Error, LBK	
Performance Monitoring	Internal	
	From E1 Recovery (as E1)	
Loopback Tests	From DTE (as V3.5 and Ethernet)	
	ES, SES, UAS, LOWS, Alarms and Errors	
Management	Local Digital Loopback	
	Local Loopback	
Power	Remote Line Loopback	
	Remote Payload Loopback	
Power Consumption	Far-end Line Loopback	
	Far-end Payload Loopback	
Dimensions	Build-in 2047(211-1) bit BER tester	
	Configuration with keypads and LCD display	
weight	Console port (RJ45, RS232)	
	Support firmware upgradeable	
Temperature	AC Input: 100-240V	
	DC Input: -36 - 72V	
	10W	
	168 x 195 x 48mm (D x W x H)	
	5.2Kg	
	0-50°C (Operating), 0-70°C (Storage)	

Humidity	10-90% non-condensing
Certification	CE, ROHS
MTBF	57,000 hours
Performance	2 wires mode:

line Speed	0.4mm/ 26AWG		0.5mm/ 24AWG		0.6mm/ 22AWG		0.9mm/ 18AWG		1.2mm/ 16AWG	
kbps	kft	km	kft	km	kft	km	kft	km	kft	km
192	23.5	7.2	28.0	8.5	35.0	10.7	42.0	12.8	51.5	15.7
256	22.5	6.9	27.0	8.2	33.5	10.2	40.5	12.3	49.5	15.1
512	19.5	5.9	23.5	7.2	29.0	8.8	35.0	10.7	42.5	13.0
768	17.0	5.2	20.4	6.2	25.5	7.8	30.5	9.3	37.0	11.3
1024	16.5	5.0	20.0	6.1	24.5	7.5	29.5	9.0	36.0	11.0
1280	15.5	4.7	18.5	5.6	23.0	7.0	27.5	8.4	34.0	10.4
1536	15.0	4.6	18.0	5.5	22.5	6.9	27.0	8.2	33.0	10.1
2048	13.0	4.0	15.5	4.7	19.5	5.9	23.5	7.2	28.5	8.7
2304	13.0	4.0	15.8	4.8	19.5	5.9	23.0	7.0	28.5	8.7
3840	9.0	2.7	10.5	3.2	13.5	4.1	16.0	4.9	19.5	5.9
4608	9.0	2.7	10.5	3.2	13.5	4.1	16.0	4.9	19.5	5.9
5696	8.0	2.4	9.5	2.9	12.0	3.7	14.0	4.3	17.5	5.3

4 wires mode:

line Speed	0.4mm/ 26AWG		0.5mm/ 24AWG		0.6mm/ 22AWG		0.9mm/ 18AWG		1.2mm/ 16AWG	
kbps	kft	km	kft	km	kft	km	kft	km	kft	km
384	23.5	7.2	28.0	8.5	35.0	10.7	42.0	12.8	51.5	15.7
512	22.5	6.9	27.0	8.2	33.5	10.2	40.5	12.3	49.5	15.1
1024	19.5	5.9	23.5	7.2	29.0	8.8	35.0	10.7	42.5	13.0
1536	17.0	5.2	20.4	6.2	25.5	7.8	30.5	9.3	37.0	11.3
2048	16.5	5.0	20.0	6.1	24.5	7.5	29.5	9.0	36.0	11.0
2560	15.5	4.7	18.5	5.6	23.0	7.0	27.5	8.4	34.0	10.4
3072	15.0	4.6	18.0	5.5	22.5	6.9	27.0	8.2	33.0	10.1
4096	13.0	4.0	15.5	4.7	19.5	5.9	23.5	7.2	28.5	8.7
4608	9.0	4.0	15.8	4.8	19.5	5.9	23.0	7.0	28.5	8.7
7680	9.0	2.7	10.5	3.2	13.5	4.1	16.0	4.9	19.5	5.9
9216	9.0	2.7	10.5	3.2	13.5	4.1	16.0	4.9	19.5	5.9
11392	8.0	2.4	9.5	2.9	12.0	3.7	14.0	4.3	17.5	5.3

Ordering Information

ModelName	Description
SHDTU03b-E1-AD	G.SHDSL.bis 2-wire E1 NTU with build-in AC+DC power
SHDTU03bA-E1-AD	G.SHDSL.bis 4-wire E1 NTU with build-in AC+DC power



VPN10 / 20 / 40

G.SHDSL.bis ATM EFM Router

CTC Union VPN10/20/40 G.SHDSL.bis EFM/ATM VPN Router provides secure and symmetrical high-speed connectivity over existing copper-line infrastructure that is ideal for SOHO and SME users. It features the latest G.Shdsl.bis technology supporting symmetrical upstream and downstream data rates up to 15.3Mbps/Pair (TC-PAM 128). Four pairs can be bonded together for aggregated bandwidth over 61Mbps. CTC Union VPN10/20/40 Series VPN Router operates the SHDSL link in either EFM mode or ATM mode. It is designed to deliver business class Ethernet Service under EFM mode while providing the flexibility to be compatible with the existing DSLAM infrastructure under ATM mode. CTC Union VPN10/20/40 series supports flexible VPN applications including VPN pass-through, client-to-VPN gateway and VPN LAN-to-LAN connection. It features IPsec VPN up to 12 encrypted tunnels for secure data communications between remote sites, home offices, and mobile users across public IP networks like the Internet. It also supports up-to-date 3DES and AES for data encryptions as well as MD5/SHA-1 and manual/IKE key for authentication. The Quality of Service (QoS) features allow users to allocate network resources effectively. By classifying the priority of services, the powerful bandwidth management functions increase efficiency on latency-sensitive applications such as VoIP, video streaming, video conferencing and interactive game. CTC Union VPN10/20/40 series enables service providers to offer symmetrical high-speed Ethernet service or point-to-point connectivity to their enterprise customers. It is the ideal copper-based Ethernet solution for quick deployment of standardized, reliable and secure services with carrier-class OAM and comprehensive management options.

Features

- Extend Ethernet Services to sites with existing copper infrastructure
- Business-class Ethernet services with flexibility of mapping user traffic into Ethernet flows
- EFM Bonding up to 61 Mbps (4 pairs, TC-PAM 128)
- Supports both EFM mode and ATM mode
- In ATM mode, supports up to 12 PVC
- IPsec VPN for safeguarded connections
- Flexible and Rapid Service Deployment
- Support EFM OAM complying with IEEE 802.3ah
- Low Delay, Jitter and Packet Loss for delay sensitive applications

Specifications

WAN Interface	SHDSL.bis: (ITU-T G.991.2 (2004) Annex A/ B / F / G supported Support EFM Bonding and SHDSL M-Pair mode Data Rate: N × 64 Kbps (N=3~89) using TC-PAM 16 / 32 Max. 5.696Mbps (1-Pair) Max. 11.392Mbps (2-Pair) Max. 22.784Mbps (4-Pair) N × 64 Kbps (N=3~239) using TC-PAM 64 / 128 Max. 15.296 Mbps (1-Pair) Max. 30.592 Mbps (2-Pair) Max. 61.184 Mbps (4-Pair) Impedance: 135 ohms.	Routing	Static routing and RIP v1/v2(RFC1058/ 2453) NAT/ PAT (RFC1631) NAT Application Level Gateways Skype/ MSN/ Yahoo Messenger (RFC2933) VoIP(SIP) pass through and VPN PPTP/L2TP pass through Virtual Serve
LAN Interface	4-Ports 10/100M Switch, Auto-negotiation for 10/100Base-TX and Half/ Full Duplex, Auto-MDIX	Network Protocol	IPv4 (ARP/ RARP, TCP/ UDP,ICMP) DHCP Client/ Server, Relay DNS Relay/ Proxy, Dynamic DNS(DDNS) IGMP v1/ v2/ v3, IGMP Proxy, IGMP Snooping SNTP and UPnP
USB (Optional)	Supports USB 2.0 Supports 3.5G	ATM	12 PVC OAM F4/ F5 Loopback AAL5 VC Multiplexing and SNAP/ LLC EoA (RFC 2684/RFC1483), PPPoA (RFC 2364) and IPoA(RFC1577) Multiple protocol over ATM AAL5(MPOA, REF1483/ 2684) QoS(UBR/ CBR/ VBR/ VBR-RT)
Serial Console	RJ-45 Connector	PPP	PPPoE PAP/ CHAP/ MS-CHAP/ MS-CHAPv2 Configurable timer to auto-reconnect and idle times for timeout.
Factory Default Reset	Push Button	QoS	802.1P Tag IPv4 TOS/ DiffServ Class-based Prioritization and Class-based Traffic Shaping Class-based DSCP Mark Up to 8 priority queues
LED	Power (Green) WAN: LINK/ ACT (Green), one LED per pair LAN (Port 1 ~ Port 4): LINK/ ACT (Green: 100M, Orange: 10M) ALARM (Red)	Firewall	SPI (Stateful Packet Inspection) and DoS (Denial of Service) DMZ Access Control List (ACL)
Bridging and VLAN	IEEE 802.1D Transparent Learning Bridge IEEE 802.1Q and Port Based VLAN Spanning Tree Protocol (STP) Up to 2K Mac Address	Operating Environment	Operating Temperature: 0 ~ 45°C Storage Temperature: -20°C ~ 70°C Operating Humidity: 20% ~ 95% (non-condensing)
VPN	IPsec (RFC2411) up to 12 Tunnels DES/ 3DES/ AES MD5/ SHA-1 and IKE/ Manual Key ISAKMP (RFC 2407/ 2408/ 4306) and IKE v1 (RFC 2409/ 4109) PSK L2TP/PPTP	Regulatory	ISO 9001 Quality Management CE Approval & EN60950 Certificate
Management	Management via Web, Telnet and CLI Support SSH (RFC4250/ 4251/ 4252/ 4253/ 4254/ 4255/ 4256) SNMP v1/ v2c/ v3 (RFC 1157/ 1901/ 1905) and MIB II (RFC1213/ 1493) Syslog with Remote Logging support Firmware Upgrade via TFTP EFM (IEEE 802.3ah) OAM (Optional)	Physical / Electrical	Dimensions: 18.7 × 3.3 × 14.5cm (W × H × D) Power: 100~240VAC (via power adapter) Power Consumption: 9 watts Max

Application

Figure 1 : Ring Topology

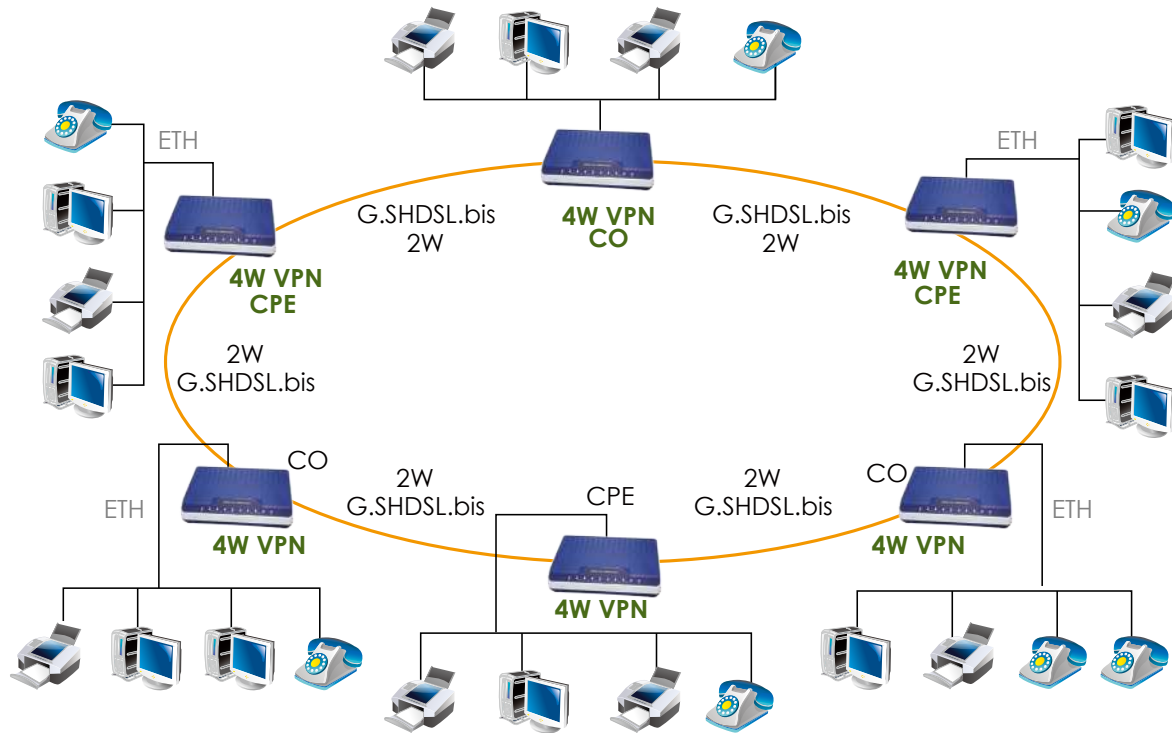
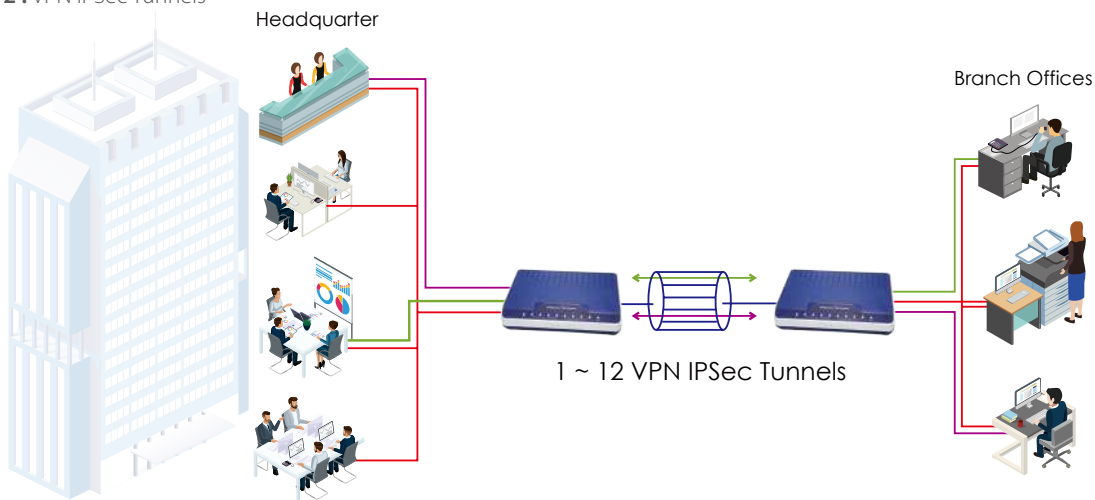


Figure 2 : VPN IPSec Tunnels



Ordering Information

ModelName	Description
VPN10	2W G.SHDSL.bis.VPN Router with 4x10/100TX
VPN20	4W G.SHDSL.bis.VPN Router with 4x10/100TX
VPN40	8W G.SHDSL.bis.VPN Router with 4x10/100TX
VPN10/U	2W G.SHDSL.bis.VPN Router with 4x10/100TX and USB Port
VPN20/U	4W G.SHDSL.bis.VPN Router with 4x10/100TX and USB Port
VPN40/U	8W G.SHDSL.bis.VPN Router with 4x10/100TX and USB Port

VPN-□□/□
Example: VPN- 10/U

NEW



FMUX04A

4E1/T1 + 4x GE Fiber Multiplexer

FMUX04A is a fixed design, PDH multiplexer, with 4x E1/T1 plus 4x 10/100/1000Base-T Ethernet switch that provides simultaneous multi-service through dual (1+1) fiber. The fiber optic line is based on 1.25Gbps SFP technology that allows the flexible use of Multimode or Single mode optics and enables support for different wavelengths and distances. The use of bi-directional SFPs maximizes the utilization of fiber optic line and results in saving fiber line costs. The multiplexer can be equipped with optional AC and DC power supplies for redundant operation. With SNMP and Web-based management in the FMUX04A, the administrator can monitor, configure and control both the local and remote device.

Features

- 4 channels unframed E1/T1
- 4x 10/100/1000Base-TX Ethernet ports
- Auto MDI/MDIX
- Auto-Negotiation or Force mode
- Supports flow control
- RS-232 port for system console
- One alarm output port, one Order Wire port
- Port based VLAN, tag based VLAN & bandwidth control
- 2 plug-in SFP slot for optical SFP module
- Forward 9K byte packets on Ethernet port
- 1+1 fiber protection, less than 50ms
- One clear channel RS232 up to 250Kbps(Async)
- Supports Digital Diagnostics Monitoring Interface (DDMI)
- AIS on signal loss on E1/T1 and fiber port
- Loopback test on E1/T1, RS-232, fiber ports
- Supports Dying Gasp
- Telnet and web based remote configuration
- SNMP management
- Supports local or remote In-band management
- Supports On-Line F/W upgrade (local or remote) by the SNMP manager

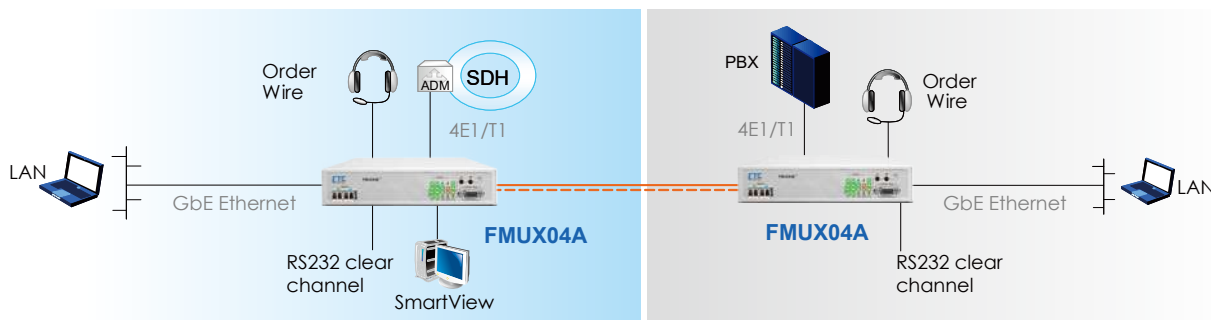
Specifications

E1/T1	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 120 ohms (RJ-45)
	Receiver sensitivity: Short haul
	Jitter Performance: According to ITU-T G.823
	Standard: ITU-T G.644, G.703, G.704, G.706 and G.732
Optical Interface	Interface Connectors: RJ-45, BNC
	Test Loops: LLB (Local Loop Back)
	RLB (Remote Loop Back)
	RRLB (Request Remote Loop Back)
	Bandwidth in optical Line: 1000 Mbps
	Optical Connector: LC (SFP module)
	Distance: 20/40/80 Km

Optical Interface	Optical Wavelength: 1310nm, 1550nm, WDM Tx1310/Rx1550nm (Type A), WDM Tx1550/Rx1310nm (Type B)
Ethernet	Interface Type: 100/1000Base-T Connector: 4x RJ-45 Standard: IEEE 802.3, 802.3u, 802.3ab Duplex modes: full/half
Indication	FX1 Link, FX2 link, E1/T1 Mode/Link/Loopback test, Order wire phone indicator, LAN Link/Speed
Power Input	AC : 100~240VAC, DC : 18-75 VDC
Dimensions	248 × 215 × 43mm (D × W × H)
Operating	0 ~ 50°C (Operating)
Temperature	-10 ~ 20°C (Storage)
Humidity	10 ~ 90% non-condensing
Certifications	CE, FCC, RoHS compliant
MTBF	75,000 hrs

Application

4E1/T1+GbE over fiber p to p connection Application



Ordering Information

Model Name	Description
FMUX04A-AC	Standalone FOM with built-in AC Power
FMUX04A-DC	Standalone FOM with built-in DC Power
FMUX04A-AD	Standalone FOM with built-in AD(AC+DC) Power

Note: SNMP option only required in one unit of paired link



FMUX1001

Modularized 16E1/T1 + 4x GbE Managed Fiber Multiplexer

FMUX101

Modularized 16E1/T1 + 4x FE Managed Fiber Multiplexer

The FMUX1001/FMUX101 is a 1U, 19" rack mountable, PDH fiber optic multiplexer that transmits up to 16 channels plus a 10/100/1000Base-T (FMUX1001) / 10/100Base-TX (FMUX101) Ethernet channel over a single fiber optic link. The FMUX1001/FMUX101 chassis supports redundant power and hot swappable design. The AC supplies operate from 100~240VAC while DC supplies operate from 18~60VDC. From the rear of the chassis, one to four hot swappable quad E1 or T1 line cards, serial data communications (V.35, X.21, RS-530) or FXO/FXS voice cards are supported. The standard FMUX1001 configuration may be viewed or set via the front panel LCD/menu keys, serial VT-100 terminal connection, Telnet, web HTTP or SNMP.

Features

- 1U, 19 (23)" 4-slot chassis
- 16 E1 (2.048Mb/s) Multiplexer with 100/1000Mbps Ethernet and RS-232 data (async) Interface (FMUX1001)
- 16 E1 (2.048Mb/s) Multiplexer with 10/100Mbps Ethernet and RS-232 data (async) Interface (FMUX101)
- RS-232 port for system console
- One alarm output port, one Order Wire port
- 4x 10/100/1000Base-T Ethernet ports (FMUX1001)
- SNMP management
- LCD plus menu keys for local configuration
- Port based VLAN, tag based VLAN & bandwidth control
- Telnet and web based remote configuration
- 2 plug-in SFP slot for optical SFP module
- Forward 1024K byte packets on Ethernet port

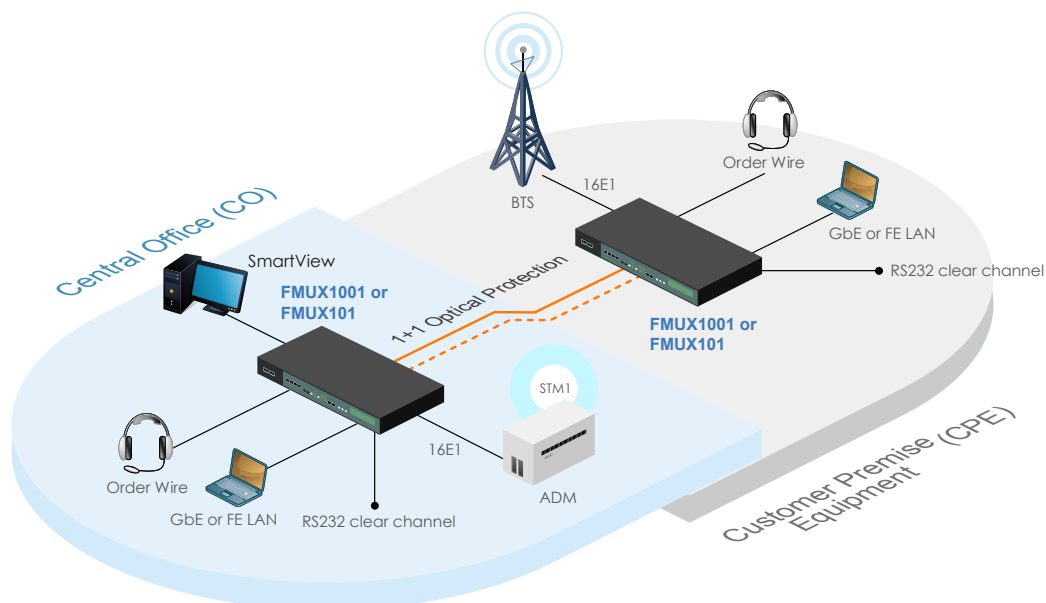
Specifications

Optical Interface	Connector	SFP - LC
	Data rate	1.25G (FMUX1001), 155M (FMUX101)
	Bit Error Rate	Less than 10^{-11}
	Fiber	MM 62.2/125 μ m, 50/125 μ m SM 9/125 μ m
	Distance	MM 2km. SM 15/30/50/80/120km WDM 20/40/60/80km
	Wavelength	1310, 1550nm
Electrical Interface	Console, SNMP	RJ45
	Ethernet	4x RJ45
	Alarm	RJ45

Standards	E1:ITU-T, T1:ITU-T, AT&T, ANSI, Ethernet: IEEE 802.3x
Indications	PWR, Alarm, Phone, ACO, Port, Channels
Power Input	AC module IN : AC 90 ~ 264V, Out : DC 12V
	DC module IN : DC 18 ~ 72V, Out : DC 12V
Power Consumption	< 25W
Dimensions	250 × 438 × 43mm (D × W × H)
Weight	3.58 kg
Temperature	0 ~ 50°C (Operating), 0 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	50,000 hrs

Application

Remote 3G BTS Connection Application



FMUX1001 & FMUX101 Interface Module



4x E1/T1 RJ45 I/F

Standards	ITU-T G.703, G.704, AT&T TR-62411, ANSI T1.403
Ports	4 ports
Framing	Unframed (clear channel)
E1	Data rate: 2.048 Mbps ± 50 ppm Line code: HDB3 / AMI Line impedance: 120 ohms $\pm 5\%$, 75ohms $\pm 5\%$
T1	Data rate: 1.544 Mbps ± 50 ppm Line code: B8ZS / AMI Line impedance: 100 ohms $\pm 5\%$
Receive Level	Short haul - 15dB
Connector	RJ-45



4x E1 BNC I/F

Standards	ITU-T G.703, G.704, G.706, G.732
Ports	4 ports
Framing	Unframed (clear channel)
Data rate	E1 2.048 Mbps ± 50 ppm
Line code	E1 HDB3/AMI
Receive Level	Short haul - 15dB
Line impedance	E1 75 ohms $\pm 5\%$
Connector	BNC 75 ohms

Related Cables (Please see order information for more details)



V35



RS530



RS449



X21



RS232

4x Data Com I/F

Standards	ITU-T, E1A
Card Type	V.35/ RS-530 (Include X.21 and RS-449)/ RS-232 I/F
Bit rate	n x 64K, n = 1 to 32 V.35 & RS-530 up to 2Mbps RS-232 up to 115.2Kbps (ASYNC)
Line code	NRZ
Clock Mode	Transparent, Recovery, External (From data port ETC) Internal (From oscillator)

Control Signal	CTS always On or follows RTS DSR constantly ON, except during test loops (RS-530 DSR always connect to DTR) DCD constantly ON, except during fiber signal loss
Test Loops	Local loop back, Remote loop back, V.54
Connector	Type Uses HD-68 pin D type Female with adapter cables



4x FXO I/F

Standards	G.711 A-law (separate modules for FXO)
Distance	2km
Bandwidth	64K voice channel
Connector	RJ45 x 4 (4 voice channel /per unit)



4x FXS I/F

Standards	G.711 A-law (separate modules for FXS)
Distance	2km
Bandwidth	64K voice channel
Connector	RJ45 x 4 (4 voice channel /per unit)

Ordering Information

Model Name	Description
FMUX1001-CH	1U 19" 4-Slot Rack Mount Chassis
FMUX101-CH	1U 19" 4-Slot Rack Mount Chassis
FMUX-AC	Chassis Power Module 90~264VAC
FMUX-DC	Chassis Power Module 18~72VDC
FMUX-4E1/T1-RJ45	4ch E1/T1 RJ45 interface card
FMUX-4E1/T1-Wire	4ch E1/T1 Wire Wrap interface card
FMUX-4E1/BNC	4ch G.703 E1 BNC interface card
FMUX-V35	V35 interface card with HD68M to 4 x MB34F cable (30cm)

FMUX-530	RS-530 interface card with HD68M to 4 x DB25F cable (30cm)
FMUX-449	RS-449 interface card with one HD68M to 4 x DB37F cable (30cm)
FMUX-X21	X.21 interface card with one HD68M to 4 x DB15F cable (30cm)
FMUX-232/Sync	RS-232 Sync card with one HD68M to 4 x DB9F cable (30cm)
FMUX-232/Async	RS-232 Async card with one HD68M to 4 x DB9F cable (30cm)
FMUX-4FXO	4 x FXO interface card
FMUX-4FXS	4 x FXS interface card
FMUX-Phone-2W	2 Wires order Wire (connect to analogue Telephone set)
FMUX-Phone-4W	4 Wires order Wire (connect to Ear-Mic set)
FMUX-EXT/CLK	External clock interface card

Example:

Chassis/Power/Line card Only

FMUX 1 0 0 1 - CH

1001 : GbE Fiber Multiplexer
101 : FE Fiber Multiplexer

FMUX A C

Power Module

FMUX V 3 5

I/F Line Card

Whole Set

FMUX 1 0 0 1 - A C - 2 W - A B C D

1001 : GbE

101 : FE

Power Type

AC

DC

AA : AC + AC

DD : DC + DC

AD : AC + DC

Order Wire

2W : 2 Wire Phone

4W : 4 Wire Phone

Card Type

A : 4x E1 BNC

B : 4x E1/T1 RJ45

C : 4x E1/T1 Wire

D : 4x V.35

E : 4x RS-232/Async

F : 4x RS-530

G : 4x X.21

H : 4x RS-449

I : 4x FXO

J : 4x FXS

L : EXT/CLK

M : 4x RS232/Sync



FMUX1600 FMUX800

16 or 8x E1/T1 + 4x GbE, Managed
Fiber Multiplexer

The FMUX1600/FMUX800 is 1U 19" rack mountable, PDH fiber optical Multiplexer that transmits up to 16/8 E1/T1 + 4x 10/100/1000 Base-T Gigabit Ethernet over a single fiber optic link. The FMUX1600/FMUX800 chassis is available in three different power configurations; single AC, single DC, or AC+DC. The AC supplies operate from 90 ~ 240VAC while DC supplies operate from 18~60VDC. On the rear of the chassis, the BNC model provides 32/16 unbalanced 75 Ohm coaxial connections with BNC connectors while the RJ-45 model provides 16/8 balanced 120 Ohm connections over twisted pair wiring with RJ45 connectors. With two SFP sockets on fiber ports, the FMUX1600/FMUX800 gives you the fiber cabling connector SFP-LC, both multi-mode and single-mode are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. 1+1 Automatic optical line protection is also supported for the aggregate fiber ports. The standard FMUX1600/FMUX800 configuration may be viewed or set via serial VT-100 terminal connection or SNMP card with web, telnet, and SNMP management

Features

- Provides 16/8 E1/T1 G.703 transparent transmission over fiber
- Provides 4x 10/100/1000 Mbit/s Ethernet Ports and 1x RS232 ch.
- Provides one RS232 channel
- Loopback test on E1/T1 fiber port
- Provides one hotline channel (order-wire)
- Supports full/half duplex, 10M/100M/1000M, auto-Negotiation
- Forward 10K byte jumbo packets on Ethernet port
- Supports 1+1 fiber line protection. Less than 50ms
- Complete alarm function and can monitor remote device status
- Power combination AC220V and DC-48V for redundant options
- Supports RS232 local management; Supports on-line f/w upgrade
- Supports Web, Telnet, SNMP management (optional)

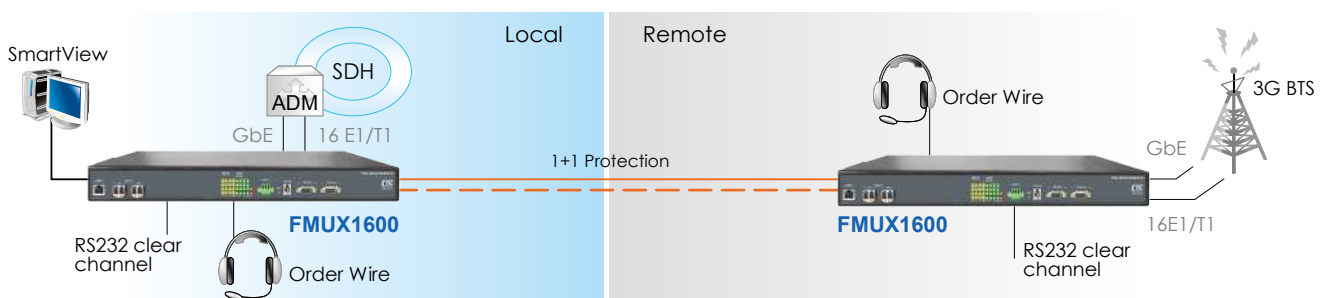
Specifications

Optical Interface	Connector	SFP-LC
	Data rate	1.25Gbps
	Bit Error Rate	Less than 10 ⁻¹¹
	Distance	MM 2km, SM 15/30/50/80/120km
	Wavelength	WDM 20/40/60/80km
Electrical Interface	Connector	Console : RS232 / SNMP : RJ45
		Ethernet : RJ45 (4-port)
		Alarm : RS232 / Order wire : RJ11
E1 Interface	Standards	ITU-T G.703, G.704, G.706, G.732
	Ports	8/16 ports
	Data Rate	2.048 Mbps ± 50 ppm
	Line Code	HDB3/AMI
	Connector	RJ-45 for 120 ohms BNC for 75 ohms
T1 Interface	Standards	ITU-T G.703, G.704, AT&T TR-62411, ANSI T1.403
	Ports	8/16 ports

T1 Interface	Data Rate	1.544 Mbps ± 50 ppm
	Line Code	B8ZS / AMI
	Connector	RJ-45 for 100 ohms
Certification	CE, FCC, RoHS compliant	
Standards	ITU-T G.703, G.823 and G.742, ANSI, AT&T, IEEE 803.2, IEEE 802.3u, IEEE 802.3ab	
Indications	Power, Alarm, LBK, RD, LCK, RNG, ACO, Port, channel	
Power Input	90 ~ 240VAC, 18~60VDC	
Power Consumption	<25W	
Dimensions	250 x 438 x 43mm (D x W x H)	
Weight	3.58kg	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
MTBF	50,000 hrs	

Application

Remote 3G BTS connection Application



Ordering Information

Model Name	Description
FMUX1600B-AD	16x E1 BNC + 4 x 10/100/1000Base-T Ethernet Fiber Multiplexer, build-in AC + DC Power
FMUX1600R-AD	16x E1/T1 RJ-45 + 4 x 10/100/1000Base-T Ethernet Fiber Multiplexer, build-in AC + DC Power
FMUX800B-AD	8x E1 BNC + 4 x 10/100/1000Base-T Ethernet Fiber Multiplexer, build-in AC + DC Power
FMUX800R-AD	8x E1/T1 RJ-45 + 4 x 10/100/1000Base-T Ethernet Fiber Multiplexer, build-in AC + DC Power
FMUX1600-SNMP	SNMP Card with 10/100Base-TX Ethernet Port
FMUX800-SNMP	SNMP Card with 10/100Base-TX Ethernet Port
FMUX-Phone-2	2 Wires Order Wire
FMUX-Phone-4	4 Wires Order Wire

Option Models

Model Name	Description
FMUX1600-SNMP	SNMP Card with 10/100Base-TX Ethernet Port
FMUX800-SNMP	SNMP Card with 10/100Base-TX Ethernet Port
FMUX-Phone-2	2 Wires Order Wire
FMUX-Phone-4	4 Wires Order Wire

Note: SNMP option only required in one unit of paired link

E1
Connector
Type

Power Type

FMUX1600-□-□□

Example: FMUX1600- B - DC

FMUX-Phone-□

Example: FMUX-Phone - 2

Preliminary



STE400A-232 / STE800A-232

4/8-Port RS232 Serial Server

The STE400A-232 / STE800A-232 are 4 or 8-port IP Device Servers that enable the ability to control asynchronous RS-232 (3 or 5 wire) devices located virtually anywhere over a TCP/IP connection. The STE400A-232 / STE800A-232 have 4 or 8 DB9M serial ports and a 10/100 Mbps Ethernet connection on the same 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 STE400A-232 / STE800A-232 Windows® driver is designed to control the IP Serial Server. The driver installs a virtual COM on Windows® which maps a COM port to the IP address of the IP Serial Server across the network, enabling the Windows® applications to access remote serial devices over Ethernet. IP Device Server can function as a server or client for TCP connection that provides a Serial over Ethernet solution. The application scenarios for the STE400A-232 / STE800A-232 are direct IP mode, virtual COM mode, or paired mode.

Features

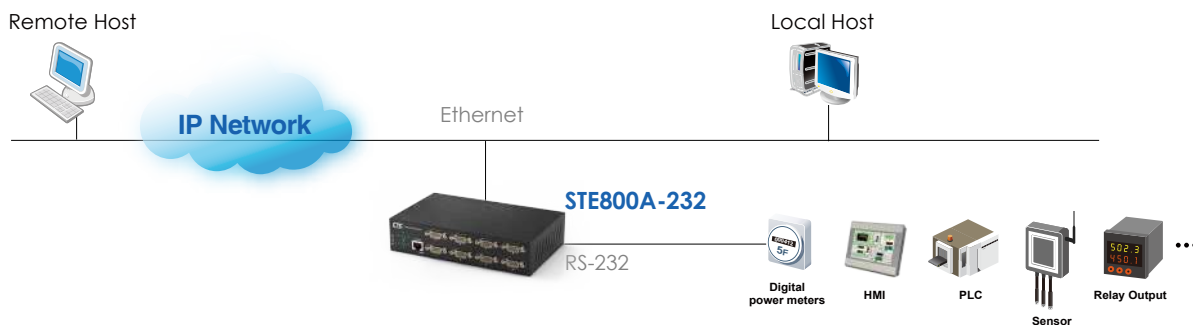
- 10/100Mbps Ethernet port
- 230.4kbps serial interface (software programmable)
- TCP Server, TCP client, Paired or Virtual com modes
- Supports Virtual COM application software
- Easy to use with Windows® utility
- Configurable IEEE 802.3 DA/SA assignment
- Supports RS232 Interface with physical DB9M port
- Configuration by web browser
- Low power consumption with 12VDC input
- Wall mount or Din Rail option

Specifications

General	LED	Ready, TP Link/Act, Data TX/RX
	OS supported	Windows XP / 2000 / 2003 / 2008 / VISTA / WIN7 / WIN8 / WIN10
Serial Interface	RS232	
Serial Connector	DB9M	
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	
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 external switching power adapter
Operating Temperature	0 ~ 60°C
Storage Temperature	-10 ~ 70°C
Humidity	0 – 90% non-condensing
DIN rail mount	DIN-Rail Mounting Kit (Optional)
Panel mount	Yes
Dimensions	85.8 x 84.2 x 22mm (D x W x H)
Certifications	CE, FCC
MTBF	2,385,346 Hours (MIL-HDBK-217)

Application



Ordering Information

Model Name	Description
STE400A-232	4-port RS232 Serial server with DB9M port and AC power adapter
STE800A-232	8-port RS232 Serial server with DB9M port and AC power adapter

Optional Accessories

STE400A/DRK01	STE400A-232, DIN-Rail Mounting Kit
STE800A/DRK01	STE800A-232, DIN-Rail Mounting Kit

Package List

- One device of the series
- 12V DC Switching power adapter



STE100A-232

Single port R232 Serial Server

The STE100A-232 is a single port IP Device Server that provides hosts the ability to control RS-232 asynchronous serial devices located virtually anywhere through a TCP/IP or UDP/IP connections. The STE100A-232 has a DB9 (Male) port connection on one side, and an RJ45 10/100Mbps Ethernet connection on the other side. STE100A 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 STE100A-232 Windows(R) driver is designed to control the IP Serial Server devices. The driver installs a virtual COM on Windows(R) which maps the virtual COM port to the IP address of the IP Serial Server device across the network, enabling the Windows(R) applications to access remote serial devices over Ethernet. IP Device Server can function as a server or client for TCP/UDP connections. The application scenarios include direct IP mode, virtual COM mode, and paired mode (RS232 serial over IP).

Features

- 10/100Mbps Ethernet port
- 110~230.4k Baud asynchronous RS-232 interface
- Installation and management via Web Browser
- TCP Server, TCP client, Virtual COM, UDP modes
- Supports Virtual COM
- Easy to use with Windows(R) utility
- Configurable IEEE 802.3 DA/SA assignment
- Low power consumption with 12VDC input
- Wall mount or Din Rail options
- Supports firmware update

Specifications

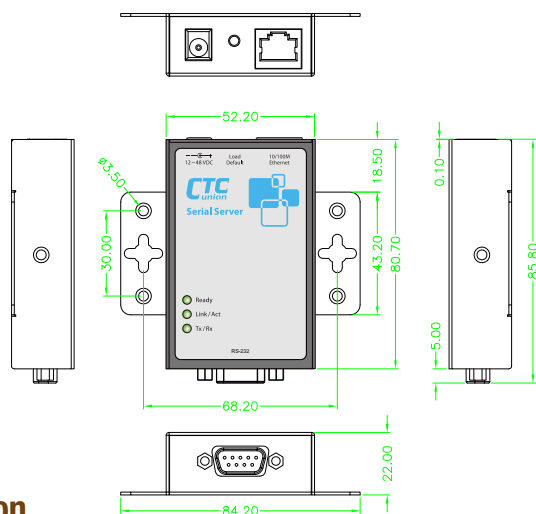
General	LED	Ready, TP Link/Act, Data TX/RX
	OS supported	Windows(R) 7/8/10 Server 2012
Serial Interface	RS232	
Serial Connector	DB9M	
Baudrate	110 to 230.4Kbps Asynchronous	
Data bits	5, 6, 7, 8	
Stop bits	1, 1.5 for Data bits 5 mode; 1, 2 for data bits 6, 7, 8 mode	
Parity	None, Even, Odd	
Flow Control	None or RTS / CTS for RS-232	
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 external switching power adapter
Operating Temperature	0 ~ 60°C
Storage Temperature	-10 ~ 70°C
Humidity	0 – 90% non-condensing
DIN rail mount	DIN-Rail Mounting Kit (Optional)
Panel mount	Yes
Dimensions	85.8 x 84.2 x 22mm (D x W x H)
Certifications	CE, FCC
MTBF	2,385,346 Hours (MIL-HDBK-217)

Application



Dimensions



Ordering Information

Model Name	Description
STE100A-232	Single port RS232 Serial server with DB9M port and AC power adapter
Optional Accessory	
STE100A/DRK01	STE100A-RS232 DIN-Rail Mounting Kit





SP-POE-01A/SP-POE-01

Power Over Ethernet 1-Port Surge Protector

The SP-POE-01A is a single port, Ethernet surge protector designed to protect all 8 lines used in a standard CAT5e cable. The product is compatible with 10/100Base-T(X) networks and 48V Power-over-Ethernet systems. The Standard 802.3af allows the methods of implementing PoE: The SP-POE-01A applies data to the pairs (pins 1/2 and pins 3/6) and power to the unused pairs (pins 1/2 and pins 3/6). The SP-POE-01A offered protection is provided on all 8 Ethernet pins (53V clamping on Data pins 1,2,3,6 and 53V clamping on PoE pins 1,2,3,6). Network connections are made via standard female RJ45 connectors. Grounding is accomplished via a ground wire.

Features

- 10/100Mbps data rate
- Compatible with 48V power over Ethernet systems
- 53V Data / PoE clamping voltage
- 5KA surge discharge current
- CAT5 and CAT5e compatible. All 8 pins protected.
- Shielded RJ45 jacks and metal enclosure for EMI noise suppression

Specifications

Voltage	Data 5V ; PoE 48V
Clamping Voltage	53V Data (Pins 1,2,3,6) 53V PoE (Pins 1,2,3,6)
Max Surge Discharge Current	5KA (8/20uS)
Peak Pulse Current	100A (10/1000uS)
Pins Protected	Data : 1, 2, 3, 6 PoE : 1, 2, 3, 6 (SP-POE-01A) Data : 1, 2, 3, 6 PoE : 4, 5, 7, 8 (SP-POE-01)
Insulation Lost	< 0.5dB (10Mbps)

Data Rate	10/100 Mbps
Response Time	line/line <1 ns; line/ground < 100ns
Operating Temperature	-20 ~ +75°C
Storage Temperature	-40 ~ +85°C
Operating Humidity	0% ~ 95% non condensing
Dimensions (D x W x H)	38 x 106 x 26 mm (1-port)
Weight	75 g (1-port)
Certification	IEC 61643-21:2000

Ordering Information

Model Name	Description
SP-POE-01A	1-port RJ45 10/100Base-TX PoE Ethernet Surge Protector (Data: 1,2,3,6. PoE: 1,2,3,6)
SP-POE-01	1-port RJ45 10/100Base-TX PoE Ethernet Surge Protector (Data: 1,2,3,6. PoE: 4,5,7,8)

SP - POE - □□□□
Example: SP - POE - 01A



SP-GPOE-01/SP-GPOE-24

Single Port, Gigabit Ethernet PoE Surge Protector

The SP-GPOE-01 is a single port, Gigabit Ethernet PoE surge protector designed to protect all 8 lines used in a standard CAT5e cable. The product is compatible with 1000Base-T networks and 48V Power-over-Ethernet systems. The Standard IEEE 802.3at/af allows the methods of implementing PoE: The SP-GPOE-01 applies data and PoE power to the pairs (pins 1/2, 3/6, 4/5, 7/8). The SP-GPOE-01 offers protection is provided on all 8 Ethernet pins (63V clamping on data and PoE pins 1, 2, 3, 4, 5, 6, 7, 8). Network connections are made via standard female RJ45 connectors. Grounding is accomplished via a ground wire.

Features

- 1000Mbps data rate
- Compatible with 48V power over Ethernet systems
- 63V PoE clamping voltage
- 1.5KA surge discharge current
- CAT5 and CAT5e compatible. All 8 pins protected.
- Integral mounting feet and separate ground wire
- Shielded RJ45 jacks and metal enclosure for EMI noise suppression

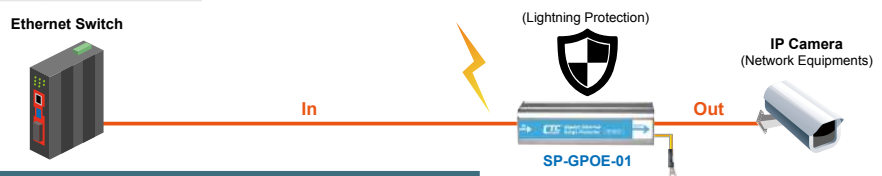
Specifications

Operating Voltage	UN	63V
Max. continuous operating voltage peak current line to line (8/20us)	Imax	1.5KA
Max. continuous operating voltage peak current line to ground (8/20us)	Imax	1.5KA
Voltage protection level (line to line)	UP	≤ 120V
Voltage protection level (line to ground)	UP	≤ 120V
Insertion Loss	< 0.5dB	
Data rate	10/100/1000Mbps	

NM Surge response time	≤ 1ns
Connector	RJ45
Data lines protected	1-8
Operating Temperature	-40 ~ 80°C
Dimensions	38 x 106 x 26mm (1-port) 73 x 183 x 44mm (24-port)
Weight	75g (1-port), 1.4kg (24-port)
Certification	IEC 61643-21:2000

Ordering Information

Model Name	Description
SP-GPOE-01	Single Port, 1000Base-T GE PoE Surge Protector (Data & PoE: 1, 2, 3, 4, 5, 6, 7, 8)
SP-GPOE-24	24-port RJ45 10/100/1000Base-TX PoE Ethernet Surge Protector (Data & PoE: 1, 2, 3, 4, 5, 6, 7, 8)





SP-GE-01/SP-GE-24

Gigabit Ethernet 1-Port Surge Protector

The SP-GE-01 Series is designed to work on Category 5e Gigabit Ethernet (GE) transmission lines as well as Category 6 applications. They are ideal to protect expensive equipment against surges and transients entering a building on exposed transmission lines. Available in both Single unit and Rack mountable surge protectors with female to female RJ-45 connectors.

Features

- Ethernet 10/100/1000Base-T Data line protection
- Exceeds CAT 5 & 6 Transmission Values
- Fast energy absorption when over-voltage occurs
- Low series resistance and minimal capacitance values to preserve the data information

Specifications

Operating Voltage	Un 5V
Max. continuous operating voltage	Uc 6V
Peak Current Normal Mode (line to ground, 8/20uS)	In 2.5KA
Peak Current Common Mode (line to line, 8/20uS)	In 300A
Voltage protection level (line to ground, 10/700uS)	Up <=500V
Voltage protection level (line to line, 10/700uS)	Up <=30V
NM Surge Response Time (ns)	tA <1ns

Transmission Speeds	Vs 10/100/1000Mbps
Bandwidth / Insertion Loss	fG 250Mhz ; Ae < 0.5dB
Connector / Data Lines Protected	RJ45 ; 8
Operating Temperature	-40 ~ 80°C degree
Dimensions	38 x 106 x 38 mm (1-port) 73 x 480 x 44 mm (24-port)
Weight	75g (1-port); 1.4kg (24-port)
Certification	IEC 61644-1

Ordering Information

Model Name	Description
SP-GE-01	1-port RJ45 10/100/1000Base-T Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-GE-24	24-Port RJ45 10/100/1000Base-T Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)

SP – GE – □□
Example: SP – GE – 01



SP-ETH-01/SP-ETH-24

Fast Ethernet 1-Port Surge Protector

A surge protector is an appliance designed to protect electrical devices from voltage spikes. A surge protector attempts to regulate the voltage supplied to an electric device by either blocking or by shorting to ground voltages above a safe threshold. The SP-ETH-01 will ensure the reliable operation of RJ-45 twisted pair based networking equipment running Ethernet. Single unit and rack mountable surge protectors are both available.

Features

- Ethernet 10/100Base-TX Data line protection
- Fast energy absorption when over-voltage occurs
- Low series resistance and minimal capacitance values to preserve the data information

Specifications

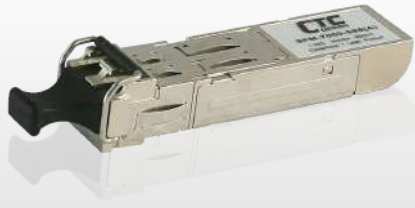
Un	5V
Uc	6.8V
Isn(discharge current)	2.5KA
Imax	5KA
Ures	< 30V
tA (Response time)	< 1ns
Protected Cores	SP-ETH-01-8: 8 pins SP-ETH-24: 8 pins
Attenuation in dB	< 0.5dB (100MHz)

Capacitance	< 40pF
Dimensions	38 x 106 x 38 mm (1-port) 73 x 480 x 44 mm (24-port)
Weight	75g (1-port) ; 1.40kg (24-port)
Certification	IEC 61644-1

Ordering Information

Model Name	Description
SP-ETH-01	1-port RJ45 10/100Base-TX Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-ETH-24	24-Port RJ45 10/100Base-TX Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)

Port Number
SP – ETH – □□
Example: SP – ETH – 01



Fiber Transceiver

Hot-Pluggable Fiber Transceiver Modules

- 40Gbps QSFP+
- 16Gbps SFP+
- 10Gbps SFP+
- 10Gbps Tunable SFP+
- 1.25Gbps SFP
- 1.25Gbps CSFP
- 155Mbps SFP

CTC Union's SFP/SFP+/QSFP Transceivers are high performance, multi-purpose modules for optical data communications applications specified for multi-mode or single mode at 155M, 1Gbps, 10Gbps, 16Gbps and 40Gbps. They operate with +3.3V power supplies and are intended for single mode or multi-mode fiber, operating at a nominal wavelength of 850nm, 1310nm and 1550nm or CWDM/DWDM wavelength. Each fiber transceiver module consists of a transmitter optical subassembly, a receiver optical subassembly and an electrical subassembly with duplex LC transceiver designed for short and long haul application. CTC Union's fiber transceivers ensure your networks operate with maximum reliability, performance, and flexibility.

Features

- Compliant to SFF-8436 QSFP+ MSA (40G QSFP)
- Single 3.3V power supply
- Duplex or Simplex LC receptacle connector
- Built-in digital diagnostic function
- Single 3.3V power supply
- RoHS compliant
- Lower power dissipation
- Hot Pluggable

40Gbps QSFP+ LC

Model Name	Cable Type	Typical Distance	Wavelength (nm)	TX(dBm) (Min ~ Max)	RX Sensitivity (dBm)	Power Budget (dB)	Saturation (dBm)	Power Consumption	DDMI	Operating Temperature
QSFP-000-SR4	MM	100m	850	-7.6 ~ -1	-10	2.4	+3.4	1.5	V	0 ~ 70°C
QSFP-002-IR4	SM	2km	1310	-8.2 ~ +0.5	-12.6	4.4	+3	1.5	V	0 ~ 70°C
QSFP-010-LR4	SM	10km	1310	-8 ~ +2.3	-12.6	4.6	+3	1.5	V	0 ~ 70°C
QSFP-040-ER4	SM	40km	1271	-3.7 ~ +4.5	-20.2	16.5	+3.8	1.5	V	0 ~ 70°C
			1291							
			1311							
			1331							

16Gbps SFP+ LC

Model Name	Cable Type	Typical Distance	Wavelength (nm)	TX(dBm) (Min ~ Max)	RX Sensitivity (dBm)	Power Budget (dB)	Saturation (dBm)	Power Consumption	DDMI	Operating Temperature
SFM-3000-85	MM	100m on OM3	850	-6.5 ~ -1.2	-10.5	4	-1	1W	V	0 ~ 70°C
SFS-3010-31	SM	10km	1310	-4 ~ +2	-10.9	6.9	2	1W	V	0 ~ 70°C
SFS-3040-Cxx	SM	40km	CWDM 147 ~ 155	-1 ~ +3	-14	13	1	1W	V	0 ~ 70°C

Cxx: C47:1471nm, C49:1491nm, C51:1511nm, C53:1531nm, C55:1551nm

10Gbps SFP+ LC

Model Name	Cable Type	Typical Distance	Wavelength (nm)	TX(dBm) (Min ~ Max)	RX Sensitivity (dBm)	Power Budget (dB)	Saturation (dBm)	Power Consumption	DDMI	Operating Temperature
SFM-1000-SR85	MM	300m	850	-6.5 ~ -1	-11.1	4.6	-1	1W	V	0 ~ 70°C
SFS-1010-LR31	SM	10km	1310	-6 ~ +0.5	-14.4	8.4	0.5	1W	V	0 ~ 70°C
SFS-1020-LR31	SM	20km	1310	-3 ~ +0.5	-15	12	0.5	1W	V	0 ~ 70°C
SFS-1040-ER55	SM	40km	1550	-4.7 ~ +4	-15.8	11.1	-1	1W	V	0 ~ 70°C
SFS-1010-WA	SM	10km	T1270/R1330	-4 ~ +1	-14	10	0.5	1W	V	0 ~ 70°C
SFS-1010-WB	SM	10km	T1330/R1270	-4 ~ +1	-14	10	0.5	1W	V	0 ~ 70°C
SFS-1020-WA	SM	20km	T1270/R1330	-2 ~ +2	-14	12	0.5	1W	V	0 ~ 70°C
SFS-1020-WB	SM	20km	T1330/R1270	-2 ~ +2	-14	12	0.5	1W	V	0 ~ 70°C
SFS-1030-Cxx-DD	SM	30km	1270 ~ 1450nm	-1 ~ +4	<-15	14	0.5	1W	V	0 ~ 70°C

Cxx: C27:1271nm, C29:1291nm, C31:1311nm, C33:1331nm, C35:1351nm, C37:1371nm, C39:1391nm, C41:1411nm, C43:1431nm, C45:1451nm

10Gbps Tunable SFP+ LC

Model Name	Cable Type	Typical Distance	Wavelength (nm)	TX(dBm) (Min ~ Max)	RX Sensitivity (dBm)	Power Budget (dB)	Saturation (dBm)	Power Consumption	DDMI	Operating Temperature
SFS-1080-TDW5	SM	80km	Ch20	-1 ~ +3	-24	23	-7	< 1.8W	V	0 ~ 70°C

1.25Gbps SFP LC

Model Name	Cable Type	Typical Distance	Wavelength (nm)	TX(dBm) (Min ~ Max)	RX Sensitivity (dBm)	Power Budget (dB)	Saturation (dBm)	Power Consumption	DDMI	Operating Temperature
SFM-7000-S85	MM	550m	850	-9.5 ~ -4	-17	7.5	-3	1W		0 ~ 70°C
SFM-7000-S85-DD	MM	550m	850	-9.5 ~ -4	-17	7.5	-3	1W	V	0 ~ 70°C
SFM-7000-L31	MM	2km	1310	-9 ~ -1	-19	10	-1	1W		0 ~ 70°C
SFM-7000-L31-DD	MM	2km	1310	-9 ~ -1	-19	10	-1	1W	V	0 ~ 70°C
SFS-7020-L31	SM	20km	1310	-8 ~ -2	-23	15	-1	1W		0 ~ 70°C
SFS-7020-L31-DD	SM	20km	1310	-8 ~ -2	-23	15	-1	1W	V	0 ~ 70°C
SFS-7040-L31	SM	40km	1310	-2 ~ +3	-23	21	-3	1W		0 ~ 70°C
SFS-7040-L31-DD	SM	40km	1310	-2 ~ +3	-23	21	-3	1W	V	0 ~ 70°C
SFS-7020-WA	SM	20km	T1310 / R1550	-8 ~ -2	-23	15	-2	1W		0 ~ 70°C
SFS-7020-WA-DD	SM	20km	T1310 / R1550	-8 ~ -2	-23	15	-2	1W	V	0 ~ 70°C
SFS-7020-WB	SM	20km	T1550 / R1310	-8 ~ -2	-23	15	-2	1W		0 ~ 70°C
SFS-7020-WB-DD	SM	20km	T1550 / R1310	-8 ~ -2	-23	15	-2	1W	V	0 ~ 70°C
SFS-7040-WA	SM	40km	T1310 / R1550	-3 ~ +2	-23	20	-3	1W		0 ~ 70°C
SFS-7040-WA-DD	SM	40km	T1310 / R1550	-3 ~ +2	-23	20	-3	1W	V	0 ~ 70°C
SFS-7040-WB	SM	40km	T1550 / R1310	-3 ~ +2	-23	20	-3	1W		0 ~ 70°C
SFS-7040-WB-DD	SM	40km	T1550 / R1310	-3 ~ +2	-23	20	-3	1W	V	0 ~ 70°C

155Mbps SFP LC

Model Name	Cable Type	Typical Distance	Wavelength (nm)	TX(dBm) (Min ~ Max)	RX Sensitivity (dBm)	Power Budget (dB)	Saturation (dBm)	Power Consumption	DDMI	Operating Temperature
SFM-5000-L31	MM	2km	1310	-20 ~ -8	-32	12	-3	1W		0 ~ 70°C
SFM-5000-L31-DD	MM	2km	1310	-20 ~ -8	-32	12	-3	1W	V	0 ~ 70°C
SFS-5030-L31	SM	30km	1310	-15 ~ -8	-34	19	-3	1W		0 ~ 70°C
SFS-5030-L31-DD	SM	30km	1310	-15 ~ -8	-34	19	-3	1W	V	0 ~ 70°C
SFS-5050-L31	SM	50km	1310	-5 ~ 0	-35	30	-5	1W		0 ~ 70°C
SFS-5050-L31-DD	SM	50km	1310	-5 ~ 0	-35	30	-5	1W	V	0 ~ 70°C
SFS-5020-WA	SM	20km	T1310 / R1550	-14 ~ -8	-32	18	-3	1W		0 ~ 70°C
SFS-5020-WA-DD	SM	20km	T1310 / R1550	-14 ~ -8	-32	18	-3	1W	V	0 ~ 70°C
SFS-5020-WB	SM	20km	T1550 / R1310	-14 ~ -8	-32	18	-3	1W		0 ~ 70°C
SFS-5020-WB-DD	SM	20km	T1550 / R1310	-14 ~ -8	-32	18	-3	1W	V	0 ~ 70°C

Appendix

- Power Type vs Standalone Chassis Compatible Table

Model Name	Slot	NMC Card Slot	Console Port	Adapter Type 100~240VAC to 12VDC	Power Built-In Type					Cooling Fan	Fan-less	Power Module
					100~240VAC	18~72VDC	18~60VDC	Dual Power 100~240VAC & 18~60VDC	Dual Power 100~240VAC & 18~72VDC			
CH01	1			✓							✓	12W
CH01-AC	1				✓						✓	12W
CH01-DC	1					✓					✓	12W
CH01-AD	1								✓		✓	12W/12W
CH01M-AC	1		✓		✓						✓	12W
CH01M-DC	1		✓			✓					✓	12W
CH01M-AD	1		✓						✓		✓	12W/12W
CH02M-AC	2		✓		✓					✓		30W
CH02M-DC	2		✓			✓				✓		30W
CH02M-AD	2		✓						✓	✓		30W/30W
CH02M-2-AC	2		✓		✓						✓	12W
CH02M-2-DC	2		✓			✓					✓	12W
CH02M-2-AD	2		✓						✓		✓	12W/12W
CH02/NMC-AC	2	✓			✓					✓		30W
CH02/NMC-DC	2	✓				✓				✓		30W
CH02/NMC-AD	2	✓							✓	✓		30W/30W
CH02/SMT-AC	2	✓			✓					✓		30W
CH02/SMT-DC	2	✓				✓				✓		30W
CH02/SMT-AD	2	✓							✓	✓		30W/30W
CH04A-AC	4	✓			✓					✓		65W
CH04A-DC	4	✓					✓			✓		50W
CH04A-AD	4	✓						✓		✓		65W/50W

Ordering Information

- DIP Switch Configuration Order : CH01
- Local Console Management Order : CH01M, CH02M and CH02M-2 "M" means the chassis with Console Management.
- Remote Web / SNMP Management Order : CH02 / NMC, CH02/SMT and CH04A
- Power Type : AD = AC + DC Power

Appendix

- Slide-in Card vs Standalone Chassis Compatible Table

Card Name	Description	FRM220-CH20	FRM220A-CH20	CH08	CH04A	CH02/SMT	CH02/NMC
Management							
FRM220A-GSW/SNMP-10G	10G uplink Ethernet Aggregate Switch Card		✓				
FRM220A-GSW/SNMP(n)	1G uplink Ethernet Aggregate Switch Card		✓				
FRM220-NMC-R3/R4	Network Management Controller	✓		✓	✓	✓	✓
WDM Optical Multiplexer							
FRM220-CWMD40	4ch Dual Fiber CWDM Mux/Demux	✓		✓	✓		
FRM220-CWMD80 (2-slot)	8ch Dual Fiber CWDM Mux/Demux	✓		✓	✓		
FRM220-CWMD40A/40B	4ch Single Fiber CWDM MUX/DEMUX A / B type	✓		✓	✓		
FRM220-CWMD80A/80B (2-slot)	8ch Single Fiber CWDM MUX/DEMUX A / B type	✓		✓	✓		
FRM220-OADM	Optical Add/Drop Multiplexer	✓		✓	✓		
Transponder							
FRM220-100G-3R	100G QSFP28 to QSFP28, 3R Transponder	✓		✓	✓	✓	✓
FRM220-40G-1Q4S (2-slot)	40G QSFP+ to 4x 10G SFP+, 3R Transponder	✓		✓	✓	✓	✓
FRM220-40G-2Q	40G QSFP+ to QSFP+, 3R Transponder	✓		✓	✓	✓	✓
FRM220-25G-3R	25G 3R Multi-rate Transponder	✓		✓	✓	✓	✓
FRM220-16G-3R	16G 3R Multi-rate Transponder with Optical Line Protection	✓		✓	✓	✓	✓
FRM220-10G-3R	10G 3R Multi-rate Transponder with Optical Line Protection	✓		✓	✓	✓	✓
FRM220-4G-3R	4G 3R Multi-rate Transponder with Optical Line Protection	✓		✓	✓	✓	✓
FRM220-4G-3S	4G 2R Multi-rate Transponder with Optical Line Protection	✓		✓	✓	✓	✓
FRM220-1000DS	1G 2R Multi-rate Transponder	✓		✓	✓	✓	✓
Muxponder							
FRM220-TM-10GMux (2-slot)	7x GE to 10G Muxponder	✓		✓	✓	✓	✓
Optical Protection Switch							
FRM220-OPS51M	1:1 Multi-mode Optical Protection Switch	✓		✓	✓	✓	✓
FRM220-OPS51	1:1 Single-mode Optical Protection Switch	✓		✓	✓	✓	✓
FRM220-OPS52	1+1 Single-mode Optical Protection Switch	✓		✓	✓	✓	✓
EDFA							
FRM220-OAB21A (2-slot)	Optical amplifier Booster 21dB(Max)	✓		✓	✓	✓	✓
FRM220-OAP17 (2-slot)	Optical amplifier PreAmp 10dB(Max)	✓		✓	✓	✓	✓
Ethernet Switch							
FRM220A-GSW40S	4x 100/1000Base-X SFP Managed GbE Switch	✓	✓	✓	✓	✓	✓
FRM220A-1002ES	2x 10/100/1000Base-T+2x 100/1000Base-X SFP GbE Switch	✓	✓	✓	✓	✓	✓
FRM220A-1000EAS/X	2x 10/100/1000Base-T+2x 100/1000Base-X OAM/IP Managed GbE Switch	✓	✓	✓	✓	✓	✓
FRM220-10/100AS-2	2x 10/100Base-TX+2x 100Base-X SFP OAM/IP Managed Switch	✓		✓	✓	✓	✓
Ethernet Media Converter							
FRM220-1000EAS/X-1	OAM/IP Managed GbE Converter, 100/1000Base-T to 100/1000Base-X SFP	✓		✓	✓	✓	✓
FRM220-100AS-1	OAM/IP Managed FE Converter, 10/100Base-TX to 100Base-X SFP	✓		✓	✓	✓	✓
FRM220-1000M	Web Smart OAM Managed GbE Converter, 10/100/1000Base-T to 1000Base-X	✓		✓	✓	✓	✓
FRM220-1000MS	Web Smart OAM Managed GbE Converter, 10/100/1000Base-T to 1000Base-X SFP	✓		✓	✓	✓	✓
FRM220-10/100i	In-Band Managed FE Converter, 10/100Base-TX to 100Base-FX	✓		✓	✓	✓	✓
FRM220-10/10iS-2	In-Band Managed FE Converter, Dual Ch, 10/100Base-TX to 100Base-FX SFP	✓		✓	✓	✓	✓
FRM220-10GC-TS	10G Managed Media Converter with Dip switch, 10G Base-T to 10G Base-R SFP+	✓		✓	✓	✓	✓
FRM220-1000TS	Managed GbE Media Converter, 1000Base-T to 1000Base-X SFP	✓		✓	✓	✓	✓
FRM220-10/100	Non-managed FE Media Converter, 10/100Base-TX to 100Base-FX	✓		✓	✓	✓	✓
Voice over Fiber							
FRM220-FXO-4 & FXS-4	4x FXO or 4x FXS over Fiber Converter	✓		✓	✓	✓	✓
FRM220-FXO/FXS	FXO/FXS over Fiber Converter	✓		✓	✓	✓	✓
Inverse Mux							
FRM220A-iMux16 (2-slot)	Ethernet over Bonded 16 E1 NTU	✓	✓	✓	✓	✓	✓
FRM220A-iMux8 / iMux4	Ethernet over Bonded 8/4 E1 NTU	✓	✓	✓	✓	✓	✓
Fiber Multiplexer							
FRM220-GFOM08/GFOM04 (2-slot)	8/4x E1/T1+ GbE Fiber Multiplexer	✓		✓	✓	✓	✓
FRM220-FOM04 (2-slot)	4x E1/T1+ FE Fiber Multiplexer	✓		✓	✓	✓	✓
FRM220-FOM01	E1/T1+ FE Fiber Multiplexer	✓		✓	✓	✓	✓
E1/T1 Cross Rate Converter							
FRM220-FTEC	E1/T1 Cross Rate Converter	✓		✓	✓	✓	✓
Ethernet over E1 Converter							
FRM220A-Eoe1(G/S)	Ethernet Bridge over E1 (GFP)	✓	✓	✓	✓	✓	✓
Media Converter (E1/T1, DS3/E3, Ethernet, Data, Serial)							
FRM220-E1/T1	E1/T1 over Fiber	✓		✓	✓	✓	✓
FRM220-DS3/E3	DS3/E3 Fiber over Fiber	✓		✓	✓	✓	✓
FRM220 E1/Data	E1 to Data	✓		✓	✓	✓	✓
FRM220-Data	RS232 / 530 / V35 over Fiber	✓		✓	✓	✓	✓
FRM220-Serial	RS485 / 232 over fiber	✓		✓	✓	✓	✓
CCF (Contact Closure Fiber Converter)							
FRM220-CCF40/CCF20	4ch/2ch Contact Closure fiber converter	✓		✓	✓	✓	✓

Appendix

- Slide-in Card vs Standalone Chassis Compatible Table

CH02M	CH02M-2	CH02	CH01M	CH01	Card Name	Description
					Management	
					FRM220A-GSW/SNMP-10G	10G uplink Ethernet Aggregate Switch Card
					FRM220A-GSW/SNMP(n)	1G uplink Ethernet Aggregate Switch Card
					FRM220-NMC-R3/R4	Network Management Controller
					WDM Optical Multiplexer	
					FRM220-CWMD40	4ch Dual Fiber CWDM Mux/Demux
					FRM220-CWMD80 (2-slot)	8ch Dual Fiber CWDM Mux/Demux
				✓	FRM220-CWMD40A/40B	4ch Single Fiber CWDM MUX/DEMUX A / B type
	✓				FRM220-CWMD80A/80B (2-slot)	8ch Single Fiber CWDM MUX/DEMUX A / B type
				✓	FRM220-OADM	Optical Add/Drop Multiplexer
					Transponder	
✓					FRM220-100G-3R	100G QSFP28 to QSFP28, 3R Transponder
✓					FRM220-40G-1Q4S (2-slot)	40G QSFP+ to 4x 10G SFP+, 3R Transponder
✓					FRM220-40G-2Q	40G QSFP+ to QSFP+, 3R Transponder
✓					FRM220-25G-3R	25G 3R Multi-rate Transponder
✓					FRM220-16G-3R	16G 3R Multi-rate Transponder with Optical Line Protection
✓					FRM220-10G-3R	10G 3R Multi-rate Transponder with Optical Line Protection
✓					FRM220-4G-3R	4G 3R Multi-rate Transponder with Optical Line Protection
✓			✓	✓	FRM220-4G-3S	4G 2R Multi-rate Transponder with Optical Line Protection
✓	✓		✓	✓	FRM220-1000DS	1G 2R Multi-rate Transponder
					Muxponder	
✓					FRM220-TM-10GMux (2-slot)	7x GE to 10G Muxponder
					Optical Protection Switch	
✓			✓	✓	FRM220-OP5S1M	1:1 Multi-mode Optical Protection Switch
✓			✓	✓	FRM220-OP5S1	1:1 Single-mode Optical Protection Switch
✓			✓	✓	FRM220-OP5S2	1+1 Single-mode Optical Protection Switch
					EDFA	
✓					FRM220-OAB21A (2-slot)	Optical amplifier Booster 21dB(Max)
✓					FRM220-OAP17 (2-slot)	Optical amplifier PreAmp 10dB(Max)
					Ethernet Switch	
✓	✓		✓	✓	FRM220A-GSW40S	4x 100/1000Base-X SFP Managed GbE Switch
✓	✓		✓	✓	FRM220A-1002ES	2x 10/100/1000Base-T+2x 100/1000Base-X SFP GbE Switch
✓	✓		✓	✓	FRM220A-1000EAS/X	2x 10/100/1000Base-T+2x 100/1000Base-X OAM/IP Managed GbE Switch
✓	✓		✓	✓	FRM220-10/100AS-2	2x 10/100Base-TX+2x 100Base-X SFP OAM/IP Managed Switch
					Ethernet Media Converter	
✓	✓		✓	✓	FRM220-1000EAS/X-1	OAM/IP Managed GbE Converter, 100/1000Base-T to 100/1000Base-X SFP
✓	✓		✓	✓	FRM220-100AS-1	OAM/IP Managed FE Converter, 10/100Base-TX to 100Base-X SFP
✓	✓		✓	✓	FRM220-1000M	Web Smart OAM Managed GbE Converter, 10/100/1000Base-T to 1000Base-X
✓	✓		✓	✓	FRM220-1000MS	Web Smart OAM Managed GbE Converter, 10/100/1000Base-T to 1000Base-X SFP
✓	✓		✓	✓	FRM220-10/100i	In-Band Managed FE Converter, 10/100Base-TX to 100Base-FX
✓	✓		✓	✓	FRM220-10/100iS-2	In-Band Managed FE Converter, Dual Ch, 10/100Base-TX to 100Base-FX SFP
✓	✓		✓	✓	FRM220-10GC-TS	10G Managed Media Converter with Dip switch, 10G Base-T to 10G Base-R SFP+
✓	✓		✓	✓	FRM220-1000TS	Managed GbE Media Converter, 1000Base-T to 1000Base-X SFP
✓	✓		✓	✓	FRM220-10/100	Non-managed FE Media Converter, 10/100Base-TX to 100Base-FX
					Voice over Fiber	
✓	✓		✓	✓	FRM220-FXO-4 & FXS-4	4x FXO or 4x FXS over Fiber Converter
✓	✓		✓	✓	FRM220-FXO/FXS	FXO/FXS over Fiber Converter
					Inverse Mux	
✓	✓	✓		✓	FRM220A-iMux16 (2-slot)	Ethernet over Bonded 16 E1 NTU
✓	✓		✓	✓	FRM220A-iMux8 / iMux4	Ethernet over Bonded 8/4 E1 NTU
					Fiber Multiplexer	
✓	✓	✓			FRM220-GFOM08/GFOM04 (2-slot)	8/4x E1/T1+ GbE Fiber Multiplexer
✓	✓	✓			FRM220-FOM04 (2-slot)	4x E1/T1+ FE Fiber Multiplexer
✓	✓		✓	✓	FRM220-FOM01	E1/T1+ FE Fiber Multiplexer
					E1/T1 Cross Rate Converter	
✓	✓		✓	✓	FRM220-FTEC	E1/T1 Cross Rate Converter
					Ethernet over E1 Converter	
✓	✓		✓	✓	FRM220A-Eoe1/G(S)	Ethernet Bridge over E1(GFP)
					Media Converter (E1/T1, DS3/E3, Ethernet, Data, Serial)	
✓	✓		✓	✓	FRM220-E1/T1	E1/T1 over Fiber
✓	✓		✓	✓	FRM220-DS3/E3	DS3/E3 Fiber over Fiber
✓	✓		✓	✓	FRM220-E1/Data	E1 to Data
✓	✓		✓	✓	FRM220-Data	RS232 / 530 / V35 over Fiber
✓	✓		✓	✓	FRM220-Serial	RS485 / 232 over fiber
					CCF (Contact Closure Fiber Converter)	
✓	✓		✓	✓	FRM220-CCF40/CCF20	4ch/2ch Contact Closure fiber converter