CTC union®

2012
PRODUCT CATALOG

Looking for Fiber Network Solutions ?

4G 2R Fiber Repeater
Residential Access Device
E1 Inverse Mux
H.264 Digital Video Server

10G Ethernet Converter
L2 OAM Fiber Switch
Industrial Fiber
CWDM/DWDM Transponder

RoHS Compliance

MEF METRO ETHERNET FORUM MEMBER

ISO 9001
ISO 14000

www.ctcu.com

About CTC Union

CTC Union Technologies, founded in 1993, proactively designs and manufactures telecommunications, data communications, networking, and IP surveillance products for a global market. With technologies based on PDH, SDH, DSL, Ethernet and Optical transmission, CTC Union can effectively meet the requirements of voice and data carriers in deploying last mile applications.

With the increasing demands for security products world wide, CTC Union invested R&D resources to setup a new development group specifically for network based digital surveillance products, starting in 2005. By leveraging their existing core technologies and network management expertise, CTC Union has developed a complete IP surveillance monitoring solution with product lines of H.264 network cameras and digital video servers, megapixel cameras and network video servers.

MEF Member

As services such as voice and multimedia are moving to IP based technologies, carriers have found that their core networks can be operated more effectively and economically if the public switching networks are migrated to a next generation IP based networks. Fully in line with this world wide trends, CTC Union in 2009, became a member of the MEF (Metro Ethernet Forum) whose main goal is to provide interoperability standards for carriers and manufacturers to smoothly deploy Ethernet solutions from core networks to Last-Mile. This proactive thinking will allow CTC Union to continue developing solutions for today and tomorrow's markets.

Environment

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 and WEEE directives.

CTC Unions continuing mission is to provide their customers with "on time" solutions, quick and effective customer support, and valuable products with extended service life.

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Fiber Network
Transmission Solutions

- **4G** Transponder
- **10G** Ethernet Converter
- OAM Fiber Switch
- Multiservice Platform
- Residential Access Device
- Industrial Fiber
- CWDM / DWDM
  (Transponder / MUX/DeMUX / OADM)

FRM220-CH20
(In-Band Managed Multi-Service Platform)
FRM220A-CH20
(Ethernet Aggregation Platform)

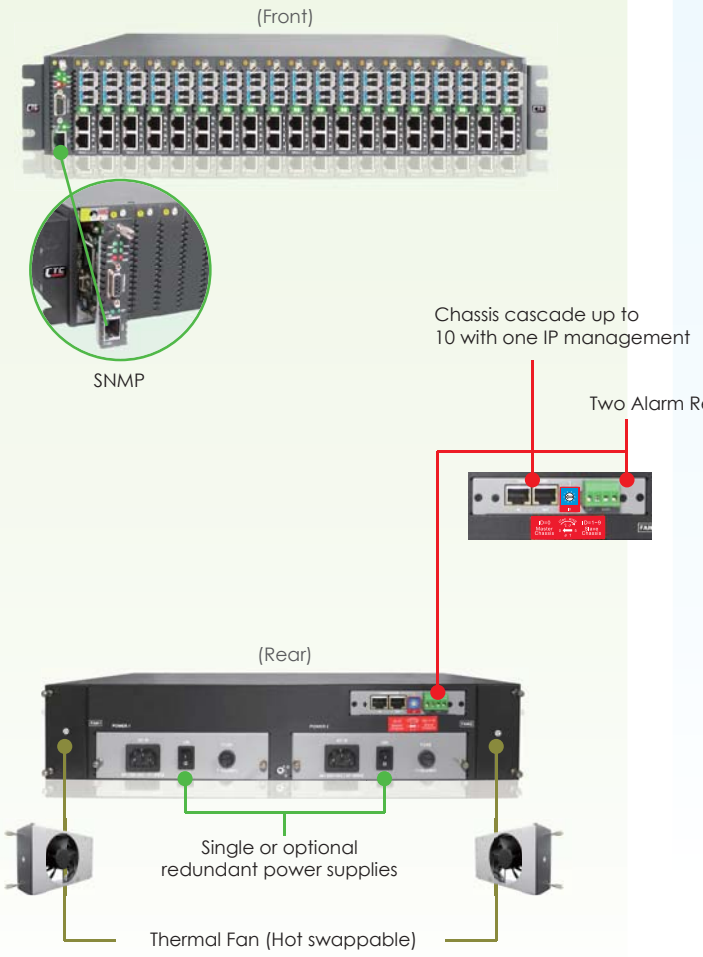
The FRM220-CH20 and FRM220A-CH20 are 2U high 19" Rack, 20 Slot modular media converter chassis with redundant power and all hot swappable design. They provide an economic solution in high density fiber converter installations in enterprises or central offices. Particularly, FRM220A chassis supports an uplink Gigabyte Ethernet switch, for efficient scalability and easy deployment in access networks. All critical components, Power, fans, management module and interface cards are hot swappable, allowing online field replacement. The chassis also has a pair of alarm relays and are able to stack up to 10 chassis using only one management IP address. A number of cards are available that support different protocols including Ethernet, Voice, Data, transponders, FOM and IMUX.

Features

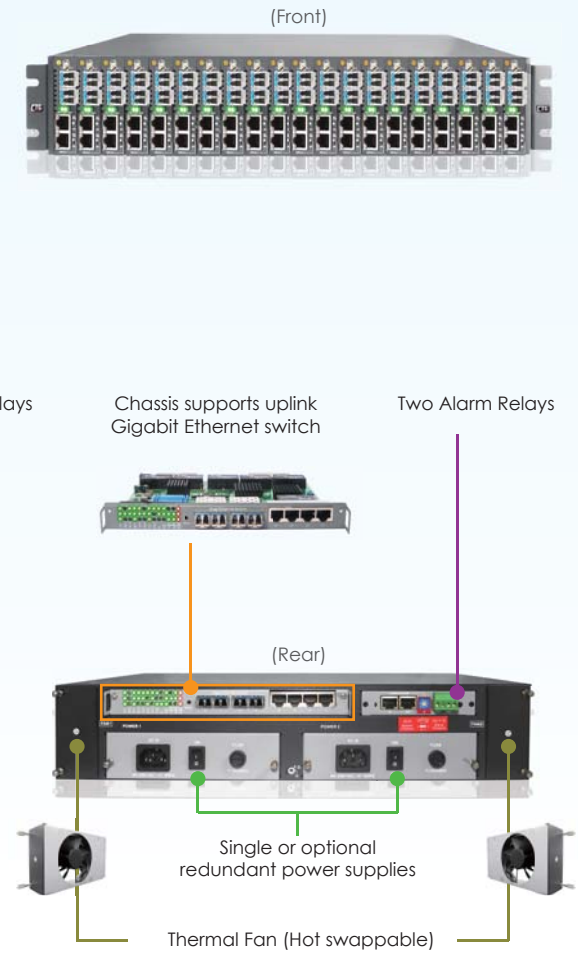
- 2U 19" 20-slot Chassis with AC/DC power redundancy
- Chassis cascade up to 10 with one IP management (FRM220-CH20 only)
- Chassis backplane consists of passive components
- All modules and cards support hot-swapping
- Two alarm relays
- E1 Inverse Multiplexers are supported by Gigabit Switch
- Chassis supports uplink Gigabit Ethernet switch 4-port 10/100/1000T plus 4-port 1000SX/LX SFP trunk card (FRM220A-CH20 only)

Chassis Overview

FRM220-CH20



FRM220A-CH20



Specifications

Connectors :

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

Physical Specifications :

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

Power Characteristics :

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

Environmental Specifications :

- Operating 0°C ~ 60°C
- Storage -10°C ~ 70°C
- Relative humidity 5% ~ 90% non-condensing
- Predicted MTBF : 65,000 hrs

Certification :

- FCC class A, VCCI class A, CE, RoHS

Power Redundancy

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

Cooling Fan

To further increase system reliability, the FRM220-CH20 and FRM220A-CH20 chassis are fitted with two hot swappable fan modules. Both fan modules can be easily removed from the rear of the chassis, without interruption to the operation of the line cards. A fully loaded chassis can run continuously with only one fan module fitted into the chassis.

Chassis Cascade *(FRM220-CH20 only) Figure 1*

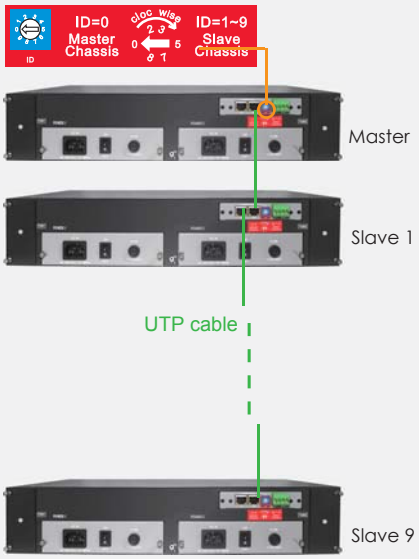
The FRM220-CH20 Chassis features cascadeable management which allows managing a stack (up to 10 chassis) from a single IP address. Chassis are interconnected with standard UTP cables that carry control signals. Each chassis has its own ID, starting with the master chassis ID0 and cascading up to ID9.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

Protocol Support

The FRM220-CH20 or FRM220A-CH20 has been designed as a Multi-service platforms. This allows network administrators to deploy the chassis in a wide range of networks. Technologies supported by the chassis included Fast/Gigabit Ethernet, E1/T1, V35/X21/RS530, Serial RS485/422, Voice FXO/FXS, Repeater, Fiber Multiplexer, E1 Inverse Multiplexer (FRM220A-CH20 : Supports a Gigabit Ethernet trunk card)

(Figure 1)

FRM220-CH20 Chassis cascade



10 chassis cascade with one IP management

Network Management *(FRM220-CH20 only)*

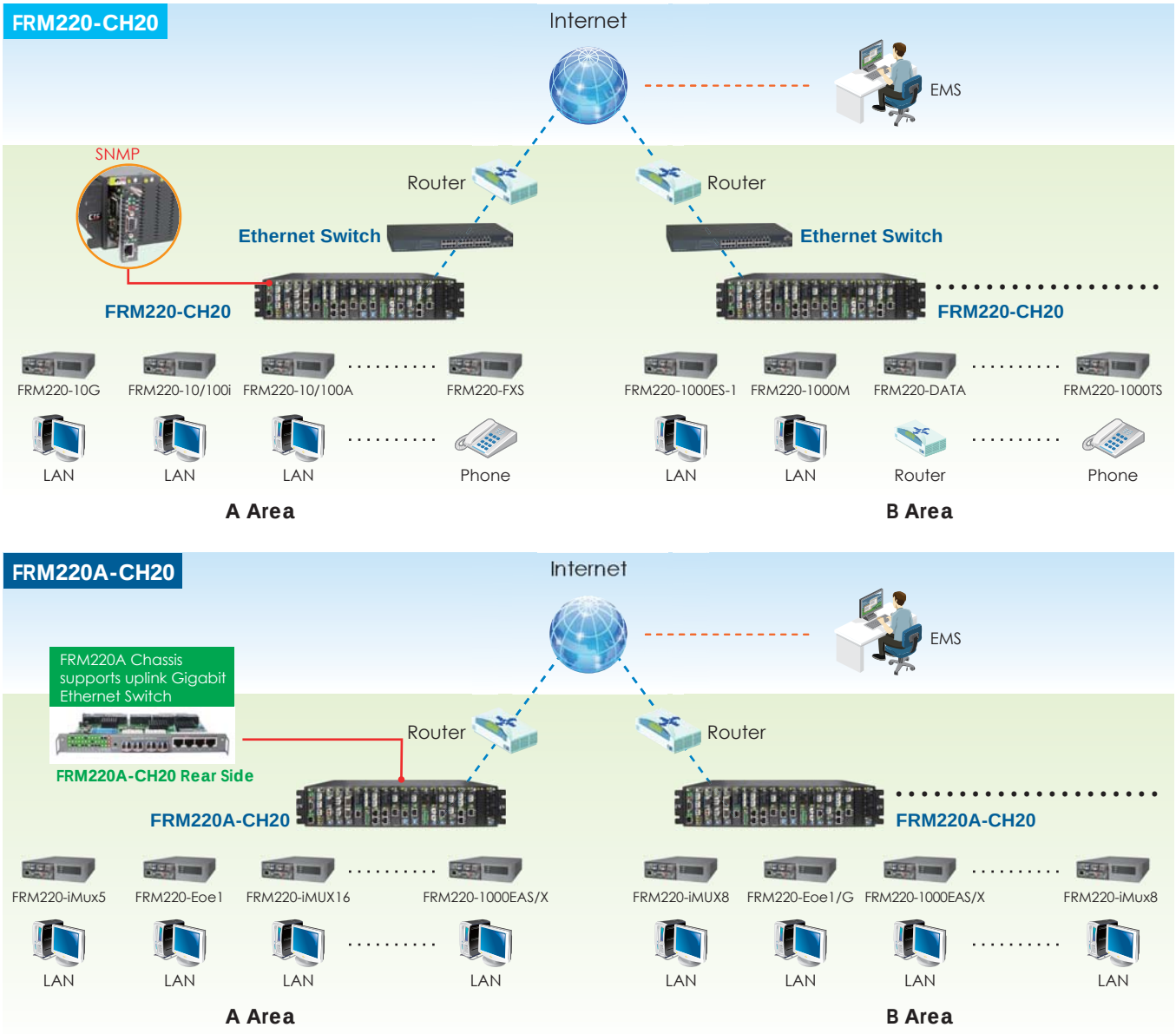
The FRM220-CH20 chassis requires an NMC (Network Management Controller) card which must be installed into the first slot of chassis. The NMC card allows a network administrator the ability to configure and monitor the status of the blades. Management can be achieved locally over RS232, or over the network by Telnet, Web or SNMP If the blades support Ethernet in the First Mile (IEEE 802.3ah), then the management module can also configure and monitor the status of a remote CPE.

Gigabit Ethernet switch with Network Management *(FRM220A-CH20 only)*

The FRM220A-CH20 incorporates a 24+4 Gigabit Ethernet Switch. Twenty ports supply each slot of the 2U 20-slot chassis with an electrical gigabit Ethernet uplink with the remaining four electrical gigabit ports accessible via the rear of the chassis. The additional four ports are provided by SFP sockets.

All eight gigabit ports (4+4) are usable without restrictions for uplink aggregation to an Ethernet Metropolitan Area Network (E-MAN). The FRM220A-GSW/SNMP card transmits Ethernet between the subscriber equipment (bridge/modem or network interface card) and the E-MAN. The card provides a user-networking interface with Ethernet packets. This card is capable of providing high bandwidth for assembling Ethernet traffic. The FRM220A-GSW/SNMP card is not only the system aggragate/trunk module, but also the system's control module, providing OAM / IP Management function.

Application



Comparison Table

Chassis Type	Slot	Power Type	NMC	Ethernet Aggregation Card	Chassis Cascade
FRM220-CH20	20	AC, DC, AD, AA, DD	✓		✓
FRM220A-CH20	20	AC, DC, AD, AA, DD		✓	
FRM220-CH08	8	AC, DC, AD, AA, DD	✓		

Note: AC: AC Power DC: DC Power AD: AC+DC Power AA: AC+AC Power DD: DC+DC Power

Ordering Information

Model Name	Type	Description
FRM220-CH20	Chassis	2U 20-Slot rack mount chassis with 20 line card blank plate
FRM220A-CH20	Chassis	2U 20-Slot rack mount chassis with 20 line card blank plate
FRM220-AC	Power	Chassis power module 100 ~ 240 VAC, IEC connector 200W
FRM220-DC24	Power	Chassis power module 18 ~ 36 VDC, 3 pin terminal block 200W
FRM220-DC48	Power	Chassis power module 36 ~ 72 VDC, 3 pin terminal block 200W

Chassis

FRM220 – □□□□

Example: FRM220 – CH20

Power Type

FRM220 – □□

Example: FRM220 – AC

In-Band Managed Multi-Service Platform

FRM220-CH08

The FRM220-CH08 is a 1U high 19" Rack, 8 slot modular media converter rack. It provides an economic solution for fiber converter installations in enterprises or central offices. All critical components, power, management module and interface cards are hot swappable, allowing online field replacement. The hot-swappable power modules can be chosen from AC100-240V, DC18-36. or DC 36-75V. The chassis also has alarm relays. Management is supported by installing an NMC card info slot#1 . A number of cards are available that support different protocols including Ethernet, Voice, Data, transponders, FOM and IMUX.

Features

- 1U 19" 8-slot Chassis with AC/DC power redundancy
- Chassis backplane consists of passive components
- All modules and cards support hot-swapping
- Two alarm relays

Specifications

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

Physical Specifications :
- Dimensions(W x D x H): 440mm x 310mm x 44mm
- Weight: 3.5kg w/o P/S

Environmental Specifications :
- Operating 0°C ~ 60°C
- Storage -10°C ~ 70°C
- Relative humidity 5% ~ 90% non-condensing
- Predicted MTBF : 65,000 hrs

Power Characteristics :
- AC : 100 ~ 240VAC ,150W
- DC24 : 18 ~ 36VDC, DC48: 36 ~ 75VDC, 150W

Certification :
- FCC class A, VCCI class A, CE, RoHS

Power Redundancy

The two FRM220-CH08 chassis power supplies are hot swappable and modular. Installing two into a chassis provides redundancy should a single power supply fail. A fully loaded chassis can run continuously with only one power module fitted into the chassis.

Cooling Fan

To further increase system reliability, the FRM220-CH08 chassis is fitted with two fixed fans on each power unit. The fans rotate speed status can be shown through NMC management.

Network Management

The FRM220-CH08 chassis requires an NMC (Network Management Controller) card which must be installed into the first slot of chassis. The NMC card allows a network administrator the ability to configure and monitor the status of the blades.
Management can be achieved locally over RS232, or over the network by Telnet, Web or SNMP If the blades support Ethernet in the First Mile (IEEE 802.3ah), then the management module can also configure and monitor the status of a remote CPE.

Protocol Support

The FRM220-CH08 chassis has been designed as a Multi-service platform. This allows network administrators to deploy the chassis in a wide range of networks. Technologies supported by the chassis included Fast/Gigabit Ethernet, E1/T1, V35/X21/RS530, Serial RS485/422, Voice FXO/FXS, Repeater, Fiber Multiplexer, E1 Inverse Multiplexer and 10G, 2.7G Transponders.

Chassis Overview

Ordering Information

Chassis	Type	Power(option)
FRM220-CH08	Chassis	1U 8 slots rack mount chassis with 8 line card blank plate
FRM220-CH08-AC	Power	Chassis power module 100 ~ 240 VAC, IEC connector
FRM220-CH08-DC24	Power	Chassis power module 18 ~ 36 VDC, 3 pin terminal block
FRM220-CH08-DC48	Power	Chassis power module 36 ~ 72 VDC module, 3 pin terminal block

Chassis
FRM220 – □□□□
Example: FRM220 – CH08

Power Type
FRM220 – CH08 – □□
Example: FRM220 – CH08 – DC24

FRM220 Slide-in Card Chassis

The FRM220 Chassis Product line includes various metal chassis sizes, which can hold from one to twenty FRM220 slide-in modules. The FRM220-CH01 is one slot chassis, which can be installed with one single width blade card for stand-alone applications. The available power options are external AC adapter, built-in AC, DC power or built-in AC+DC, AC+AC, DC+DC redundant power. The FRM220-CH01M is one slot chassis with DB9 console port for local management, which can be installed with one single width blade card for stand-alone applications. The available power options are built-in AC, DC or built-in AC+DC redundant power. The FRM220-CH02 is a two slot chassis, which can be installed with one double width blade card for stand-alone applications. The only available power supply option is an external AC adapter. The FRM220-CH02M is a two slot chassis with DB9 console port for local management, which can be installed with either one or two single width blade cards or one double width blade card. The available power supplies are built-in AC, DC or AC+DC redundant power. The FRM220-CH02/NMC is a two slot chassis and can be SNMP managed when installing one FRM220-NMC card for Web, Telnet, Console and SNMP management. The FRM220-CH02/NMC can be installed with either one or two single width blade cards or one double width blade card. The FRM220-CH02/NMC available power options are built-in AC, DC or AC+DC redundant power.

FRM220 One Slot Chassis

FRM220-CH01

FRM220-CH01 (w/External adapter)

FRM220-CH01 (Power built-in)

Features :

- One slot chassis for FRM220 Single width blade line cards.
- Available in six types: external power adapter or power built-in AC, DC, AC+DC, AC+AC or DC+DC
- Fanless

Power Input :

- AC power 100 ~ 240VAC
- DC power 18 ~ 72VDC
- External Adapter
  Input voltage 100 ~ 240VAC 50/60Hz
  Output voltage 12VDC 1A

Dimensions (D x W x H) :

External adapter : 160 x 88 x 24mm
Internal power : 180 x 135 x 35mm

FRM220 One Slot Chassis with Console Port

FRM220-CH01M

Features :

- One slot chassis for FRM220 Single width blade line cards.
- Supports DB9 console port for local management
- Available in three types: power built-in AC,DC,AC+DC
- Fanless

Dimensions (D x W x H) : 201 x 135 x 35mn

Power Input (option) :

- AC power 100 ~ 240VAC
- DC power 18 ~ 72VDC

Comparison Table

Chassis Type	Slot	Power Type	Console Port	Console Fan	NMC
FRM220-CH01	1	DC12, AC, DC, AD, AA, DD			
FRM220A-CH01M	1	AC, DC, AD	✓		
FRM220-CH02	2	DC12			
FRM-CH02/NMC	2	AC, DC, AD		✓	✓
FRM220A-CH02M	2	AC, DC, AD	✓	✓	

Note: DC12: AC Adapter AC:AC Power DC: DC Power AD: AC+DC Power AA: AC+AC Power DD: DC+DC Power

FRM220 Two Slot Chassis

FRM220-CH02

Features :

- Two slot chassis for FRM220 line cards.
- Supports either one or two single width blades or one double width blade.
- Power Type: external power adapter
- Fanless

Dimensions (D x W x H) : 139 x 88 x 44mn

Power Input (option) : External Adapter: Input voltage 100 ~ 240VAC 50/60Hz, Output voltage 12VDC 1A

FRM220 Two Slot Chassis with Console port

FRM220-CH02M

Features :

- Two slot chassis for FRM220 line cards.
- Supports backplane connection between two slots
- Supports DB9 console port for local management
- Support either one or two single width blades or one double width blade.
- Available in three types: power built-in AC, DC, AC+DC
- Cooling Fan

Dimensions (D x W x H) : 220 x 168 x 45mn

Power Input (option) : • AC power 100 ~ 240VAC • DC power 18 ~ 72VDC

FRM220 SNMP manageable Two Slot Chassis

FRM220-CH02/NMC

Features :

- Two slot chassis for FRM220 line cards.
- Supports backplane connection between two slots
- Telnet, Web, Console, SNMP manageable via NMC card (not included)
- Support either one or two single width blades or one double width blade.
- Available in three types: power built-in AC, DC, AC+DC
- Cooling Fan

Dimensions (D x W x H) : 220 x 168 x 45mn

Power Input (option) : • AC power 100 ~ 240VAC • DC power 18 ~ 72VDC

Ordering Information

Model Name	Description
FRM220-CH01	1 Slot Chassis with 100 ~240VAC to 12VDC adapter
FRM220-CH01-AC	1 Slot Chassis with 100 ~240VAC
FRM220-CH01-DC	1 Slot Chassis with 18 ~75VDC
FRM220-CH01-AD	1 Slot Chassis with 100~240VAC + 18 ~75VDC
FRM220A-CH01M-AC	1 Slot Chassis with console port and 100 ~240VAC
FRM220A-CH01M-DC	1 Slot Chassis with console port and 18 ~75VDC
FRM220A-CH01M-AD	1 Slot Chassis with console port and AC 100~240V + DC 18 ~75V
FRN220-CH02	2 slots Chassis with 100 ~240VAC to 12VDC adapter
FRM220-CH02M-AC	2 slots Chassis with console port and 30W 100 ~240VAC
FRM220-CH02M-DC	2 slots Chassis with console port and 30W 18 ~75VDC
FRM220-CH02M-AD	2 slots Chassis with console port and 30W AC 100~240V + DC 18 ~75V
FRM220-CH02M-2-AC	2 slots Chassis with console port and 12W 100 ~240VAC
FRM220-CH02M-2-DC	2 slots Chassis with console port and 12W 18 ~75VDC
FRM220-CH02M-2-AD	2 slots Chassis with console port and 12W AC 100~240V + DC 18 ~75V
FRM220-CH02/NMC-AC	2 slots Chassis with 100 ~240VAC , optional NMC card
FRM220-CH02/NMC-DC	2 slots Chassis with 18 ~75VDC , optional NMC card
FRM220-CH02/NMC-AD	2 slots Chassis with AC 100~240V + DC 18 ~75V , optional NMC card

FRM220 – □□□□
Example: FRM220 – CH01

Chassis Type Power Type
FRM220A – □□□□ – □□
Example: FRM220A – CH01M – DC

Slide-in Card vs Standalone Chassis Compatible Table

Card Name	Product Name	Page	FRM220-CH20	FRM220A-CH20	CH08
FRM220-NMC	Network Management Controller	1-9	✓		✓
FRM220A-GSW/SNMP	Gigabit Ethernet Aggregate Switch Card	1-10		✓	
FRM220-10G-SS	10G 3R transponder SFP+ to SFP+	1-11	✓		✓
FRM220-10G-SXX	10G 3R transponder SFP+ to XFP fiber protection	1-12	✓		✓
FRM220-4G-2S	4G multi-rate 2R transponder SFP to SFP	1-13	✓		✓
FRM220-4G-3S	4G multi-rate 2R transponder SFP to SFP fiber protection	1-14	✓		✓
FRM220-2.7G-2S	2.7G multi-rate 3R transponder SFP to SFP	1-15	✓		✓
FRM220-2.7G-3S	2.7G multi-rate 3R transponder SFP to SFP Fiber Protection	1-16	✓		✓
FRM220-Protection	1+1 Fiber optical protection switch	1-17	✓		✓
FRM220-MD40	4 Ch CWDM Mux/Demux (1550, 1570, 1590, 1610)nm	1-18	✓		✓
FRM220-MD80	8 Ch CWDM Mux/Demux (1470 ~ 1610)nm	1-18	✓		✓
FRM220-MD40 WA/WB	4 Ch single fiber CWDM MUX/DEMUX	1-19	✓		✓
FRM220A-1000EAS/X	2-Port 10/100/1000Base-T + 2-port 1000Base-X OAM/IP managed switch	1-20	✓	✓	✓
FRM220-10/100AS-2	2-Port 10/100Base-TX to 2-port 100Base-FX, OAM/IP media converter	1-22	✓		✓
FRM220-10/100A	10/100Base-TX to 100Base-FX, OAM/IP media converter	1-23	✓		✓
FRM220A-ESW-G2G02XM	Hardened Gigabit Ethernet Managed Switch	1-24	✓	✓	✓
FRM220A-FSW103	3x 10/100TX + 100FX Managed Converter	1-25	✓	✓	✓
FRM220-10GE-TS	10G Ethernet Converter 10G Base-T to SFP+	1-26	✓		✓
FRM220-10GE-TX	10G Ethernet Converter 10G Base-T to XFP	1-27	✓		✓
FRM220-1000MS	10/100/1000Base-T to 1000Base-X SFP Web smart OAM/IP managed converter	1-28	✓		✓
FRM220-100M	10/100Base-TX to 100Base-FX Web smart OAM/IP managed converter	1-29	✓		✓
FRM220-10/100i	10/100Base-TX to 100Base-FX In-band managed converter	1-30	✓		✓
FRM220-10/100i-2E	2-Port 10/100Base-TX to 100Base-FX media converter	1-31	✓		✓
FRM220-10/100iS-2	Dual Channels 10/100Base-TX to 100Base-FX SFP media converter	1-32	✓		✓
FRM220-ET100	Ethernet over E1 fiber modem	1-33	✓		✓
FRM220-Data	V.35/X.21/RS530/449/232 Fiber modem	1-34	✓		✓
FRM220-E1/T1	E1/T1 Fiber modem	1-35	✓		✓
FRM220-Serial	RS485/232 media converter	1-36	✓		✓
FRM220-FXO/FXS	POTS over Fiber	1-38	✓		✓
FRM220A-Eoe1	Ethernet Bridge over E1	1-39	✓	✓	✓
FRM220A-Eoe1/G	Ethernet Bridge over E1 (GFP)	1-40	✓	✓	✓
FRM220A-iMux5	Ethernet to 5 E1 Mux NIC	1-41	✓	✓	✓
FRM220A-iMux8	Ethernet to 8 E1 Mux NIC	1-42	✓	✓	✓
FRM220A-iMux16	Ethernet to 16 E1 Mux NIC	1-43	✓	✓	✓
FRM220-E1/Data	E1 DSU/CSU	1-44	✓		✓
FRM220-FTEC	E1/T1 Cross Rate Converter	1-45	✓		✓
FRM220-FOM01	E1/T1+100M Ethernet Fiber Multiplexer	1-46	✓		✓
FRM220-FOM04	4-Port E1/T1+100M Ethernet Fiber Multiplexer	1-47	✓		✓

Note: ✓ This card supports Ethernet uplink to the aggregate switch (GSW/SNMP)

Power Type vs Standalone Chassis Compatible Table

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

Product specifications are subject to change without notice.

Slide-in Card vs Standalone Chassis Compatible Table

Card Name	Product Name	Page	CH02M	CH02/ NMC	CH02	CH01	CH01M
FRM220-NMC	Network Management Controller	1-9					
FRM220A-GSW/SNMP	Gigabit Ethernet Aggregate Switch Card	1-10					
FRM220-10G-SS	10G 3R transponder SFP+ to SFP+	1-11	✓	✓			
FRM220-10G-SXX	10G 3R transponder SFP+ to XFP fiber protection	1-12	✓	✓			
FRM220-4G-2S	4G multi-rate 2R transponder SFP to SFP	1-13	✓	✓		✓	✓
FRM220-4G-3S	4G multi-rate 2R transponder SFP to SFP fiber protection	1-14	✓	✓		✓	✓
FRM220-2.7G-2S	2.7G multi-rate 3R transponder SFP to SFP	1-15	✓	✓			
FRM220-2.7G-3S	2.7G multi-rate 3R transponder SFP to SFP Fiber Protection	1-16	✓	✓			
FRM220-Protection	1+1 Fiber optical protection switch	1-17	✓	✓		✓	✓
FRM220-MD40	4 Ch CWDM Mux/Demux (1550, 1570, 1590, 1610)nm	1-18				✓	
FRM220-MD80	8 Ch CWDM Mux/Demux (1470 ~ 1610)nm	1-18			✓		
FRM220-MD40 WA/WB	4 Ch single fiber CWDM MUX/DEMUX	1-19				✓	
FRM220A-1000EAS/X	2-Port 10/100/1000Base-T + 2-port 1000Base-X OAM/IP managed switch	1-20	✓			✓	✓
FRM220-10/100AS-2	2-Port 10/100Base-TX to 2-port 100Base-FX, OAM/IP media converter	1-22	✓			✓	✓
FRM220-10/100A	10/100Base-TX to 100Base-FX, OAM/IP media converter	1-23	✓			✓	✓
FRM220A-ESW-G2G02XM	Hardened Gigabit Ethernet Managed Switch	1-24	✓	✓		✓	✓
FRM220A-FSW103	3x 10/100TX + 100FX Managed Converter	1-25	✓	✓			
FRM220-10GE-TS	10G Ethernet Converter 10G Base-T to SFP+	1-26	✓	✓			
FRM220-10GE-TX	10G Ethernet Converter 10G Base-T to XFP	1-27	✓	✓			
FRM220-1000MS	10/100/1000Base-T to 1000Base-X SFP Web smart OAM/IP managed converter	1-28	✓	✓		✓	✓
FRM220-100M	10/100Base-TX to 100Base-FX Web smart OAM/IP managed converter	1-29	✓	✓		✓	✓
FRM220-10/100i	10/100Base-TX to 100Base-FX In-band managed converter	1-30	✓	✓		✓	✓
FRM220-10/100i-2E	2-Port 10/100Base-TX to 100Base-FX media converter	1-31	✓	✓		✓	✓
FRM220-10/100iS-2	Dual Channels 10/100Base-TX to 100Base-FX SFP media converter	1-32	✓	✓		✓	✓
FRM220-ET100	Ethernet over E1 fiber modem	1-33	✓	✓		✓	✓
FRM220-Data	V.35/X.21/RS530/449/232 Fiber modem	1-34	✓	✓		✓	✓
FRM220-E1/T1	E1/T1 Fiber modem	1-35	✓	✓		✓	✓
FRM220-Serial	RS485/232 media converter	1-36	✓	✓		✓	✓
FRM220-FXO/FXS	POTS over Fiber	1-38	✓	✓		✓	✓
FRM220A-Eoe1	Ethernet Bridge over E1	1-39	✓	✓		✓	✓
FRM220A-Eoe1/G	Ethernet Bridge over E1 (GFP)	1-40	✓	✓		✓	✓
FRM220A-iMux5	Ethernet to 5 E1 Mux NIC	1-41	✓	✓		✓	✓
FRM220A-iMux8	Ethernet to 8 E1 Mux NIC	1-42	✓	✓		✓	✓
FRM220A-iMux16	Ethernet to 16 E1 Mux NIC	1-43	✓		✓		
FRM220-E1/Data	E1 DSU/CSU	1-44	✓	✓		✓	✓
FRM220-FTEC	E1/T1 Cross Rate Converter	1-45	✓	✓		✓	✓
FRM220-FOM01	E1/T1+100M Ethernet Fiber Multiplexer	1-46	✓	✓		✓	✓
FRM220-FOM04	4-Port E1/T1+100M Ethernet Fiber Multiplexer	1-47	✓		✓		

Power Type vs Standalone Chassis Compatible Table

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

Network Management Controller

FRM220-NMC

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

Features

- Supports local / remote monitor and configuration
- Supports local / remote online TFTP f/w upgrade
- Fiber transceiver status & info display
- Supports multiple accesses for SNMP management
- Supports Web GUI management, Telnet, Serial console
- Supports console RS-232 port and 10/100Base-T Ethernet port
- Supports SNMP standard MIB II and enterprise MIB
- Supports NTP time synchronization
- Supports syslog
- Supports 255 entries system log

Specifications

Electrical Interface	• Console RS232 port • LAN 10/100Base-TX
Management Interface	• In-band management: provide all system OAM/IP functions: software updates, and management system interaction through Ethernet port. • Out-band management: supports Web, Telnet and SNMP , EMS management
OAM/IP	• Configuration Management • Performance Management • Fault Management • Status Monitoring
Indications	• PWR, Fan, Alarm Act, STK, LAN LNK/SPD
Dimensions	• 155 x 88 x 23mm (D x W x H)
Weight	• 0.12kg
Temperature	• 0 ~ 60°C (Operating) , -10 ~ 70°C (Storage)
Humidity	• 10 ~9 0% non-condensing
Certification	• CE, FCC, LVD, RoHS
MTBF	• 65,000 hrs

Ordering Information

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

Note: The card is suitable for using in CH01 standalone chassis.

Gigabit Ethernet Aggregate Switch Card

FRM220A-GSW/SNMP

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

Features

- Provides chassis aggregation via 4 electrical (RJ-45) 10/100/1000T ports plus 4 optical (SFP) 1000X/2500Base-X Gigabit Ethernet ports
- Optical Ethernet ports Support stacking in Ring or Chain topology
- Each chassis slot has one gigabit Ethernet uplink
- Provides Web, Telnet, SNMP for out-band management
- Supports IEEE802.1d Ethernet bridge function between trunk Ethernet ports
- Supports Rapid Spanning Tree Protocol (RSTP) for the trunk interfaces per IEEE 802.1w
- Support automatic source MAC learning and block duplicate ones
- Supports IEEE 802.1q Port-base VLAN and Tag-base VLAN
- Supports static VLAN management
- Supports Link Aggregation in IEEE 802.3ad that allows GbE links to be aggregated together as logical link.
- Support Simple Network Time Protocol (SNTP)
- Supports VLAN level QoS function and 4 priority queues for QoS
- Supports f/w upgrade via http

Specifications

Trunk Interface	• 4x 10/100/1000Base-T plus 4x 1000Base-X/ 2500Base-X GbE Switch trunk card. • Auto-adaptive between full-duplex and half-duplex • Operation modes for 10, 100 , 1000 Mbps operation speed on RJ45 trunk port basis. • The system only supports full-duplex mode for 1000 Mbps. • Supports both RJ45 and optical SFP (Mini-GBIC) connectors
Capacity	• Supports up to 20 service cards
Management Interface	• In-band management: provide all system OAM functions: software updates, and management system interaction through Ethernet trunk port. • Out-band management: supports Web, Telnet and SNMP, EMS management
Indications	PWR, FAN, Alarm, STK
Dimensions	142x200x26mm (DxWxH)
Weight	0.5kg
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity	5 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Ordering Information

Model Name	Description
FRM220-GSW/SNMP	Gigabit Ethernet Aggregate switch card supports web, telnet, SNMP functions

10G 3R Transponder

FRM220-10G-SS

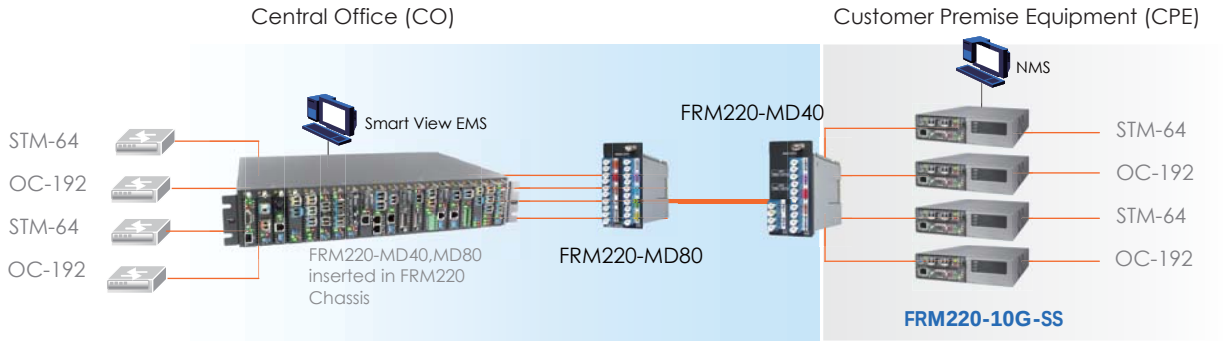
The FRM220-10G-SS is a 10G fiber to fiber 3R repeater and transponder. Based on a number of 10 Gigabit Fiber standards, these transponders support SFP+ to SFP+ (SS) fiber connections. The transponders are protocol transparent, providing 3R (Re-amplification, Re-shaping and Re-clocking) regeneration between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

Features

- Multiple protocol supported 10G Ethernet, STM-64, OC-192, G.709 OTU2, Fiber Channel (1xFC, 2xFC, 4xFC, 8xFC, 10xFC)
- Network management via Web, Telnet, SNMP in central FRM220 chassis(10 cards in chassis max.)
- Protocol transparent 3R fiber media transponder / repeater (Re-amplification, Re-shaping and Re-clocking)
- Promotes flexibility and eases management with pluggable SFP+ transceiver
- Features two 10G ports offering multiservice 10G transponder and regenerator function
- Provides superior optics capabilities resulting in extended transport distances for regional application.
- Extend 10G Ethernet transmission over fiber
- Useful as a 'Transponder' in CWDM or DWDM systems for 10G Ethernet/Fiber Channel/STM-64
- Supports Client / Line loop back tests
- Serial console for stand-alone management when inserted in CH02M Single Slot Chassis
- SFP+ Power supplies: +3.3V

Specifications

Optical Interface	Connector	LC, 1x Line SFP+ to 1x Client SFP+
	Traffic Format	OC-192/STM-64 (9.95328Gbps) 10 Gigabit Ethernet LAN(10.3125Gbps) G.709 OTU2 (10.709225Gbps) **Fiber Channel** 1xFC(1.062 Gbps); 2xFC(2.125 Gbps); 4xFC(4.25 Gbps); 8xFC(8.5 Gbps); 10xFC(10.51875 Gbps)
	Regeneration	Re-amplification Re-shaping, Re-timing
	Loopback	Line / Client
	Fiber	SM 9/125μm MM 50/125μm or 62.5/125μm
	Wavelength	CWDM 1470 ~ 1610nm DWDM 1529.55 ~ 1565.50nm
Indications		LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input		Card : 12VDC , Standalone : AC,DC option
Power Consumption		<10W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		0.15kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

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

Note: The card is suitable for using in CH02M standalone chassis.

10G 3R Transponder with Optical Line Protection

FRM220-10G-SXX

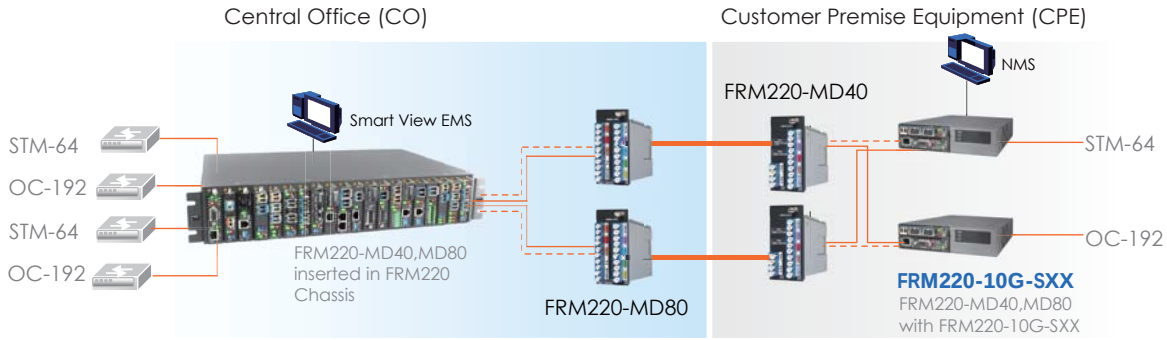
The FRM220-10G-SXX is a 10G fiber to fiber 3R repeater and transponder. Based on 10 Gigabit Fiber standards, the transponder support SFP+ to XFP (SX) or XFP to XFP (XX) fiber connections. 1+1 Automatic optical line Protection Switching is supported for the aggregate XFP fiber ports. The transponder is protocol transparent, providing 3R (Re-amplification, Re-shaping and Re-clocking) regeneration between these different optical module types. One of the major applications for this converter is in connecting proprietary transceiver equipment to CWDM or DWDM when these 'colored' optical modules are not available for the proprietary equipment. With transparent bi-directional forwarding capability between the 2 fiber media, the FRM220-10G-SXX brings you the best and simplest solution for your 10G conversion between fiber and fiber.

Features

- Multiple protocol supported 10G Ethernet, STM-64, OC-192, G.709 OTU2, Fiber Channel (1xFC, 2xFC, 4xFC, 8xFC, 10xFC)
- Network management via Web, Telnet, SNMP in central FRM220-CH20 chassis(10 cards in chassis max.)
- Protocol transparent 3R fiber media transponder / repeater (Re-amplification, Re-shaping and Re-clocking)
- Promotes flexibility and eases management with pluggable SFP+ or XFP transceiver
- Features two 10G ports offering multiservice 10G transponder and regenerator function
- Provides superior optics capabilities resulting in extended transport distances for regional application.
- Extend 10G Ethernet transmission over fiber Useful as a 'Transponder' in CWDM or DWDM
- systems for 10G Ethernet/Fiber Channel/STM-64 Supports Client / Line loop back tests
- Serial console for stand-alone management When inserted in CH02M dual Slot Chassis
- XFP/SFP+ Power supplies: +5.0V, -5.2V, +3.3V and +1.8V
- Support reference clock output
- Support 1+1 optical Line Protection

Specifications

Optical Interface	Connector	LC
		1x Line SFP+ to 2x Client XFP
		1x Line SFP+ to 1x Client XFP
		1x Line XFP to 1x Client XFP
	Traffic Format	OC-192/STM-64 (9.95328Gbps)
		1 Gigabit Ethernet (1.25Gbps)
		10 Gigabit Ethernet LAN(10.3125Gbps)
		G.709 OTU2 (10.709225Gbps)
		Fiber Channel
		1xFC(1.062 Gbps); 2xFC(2.125 Gbps);
		4xFC(4.25 Gbps); 8xFC(8.5 Gbps);
		10xFC(10 Gbps)
	Regeneration	Re-amplification
		Re-shaping, Re-timing
	Loopback	Line / Client
	Fiber	SM 9/125µm
		MM 50/125µm or 62.5/125µm
	Wavelength	Depends on SFP+ or XFP
Indications		LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input		Card : 12VDC , Standalone : AC,DC option
Power Consumption		<10W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		0.15kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

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

Note: The card is suitable for using in CH02M standalone chassis.

4G 2R Transponder

FRM220-4G-2S

The FRM220-4G-2S is a 4G 2R 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. When the FRM220-4G-2S card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port and perform diagnostic loop backs.

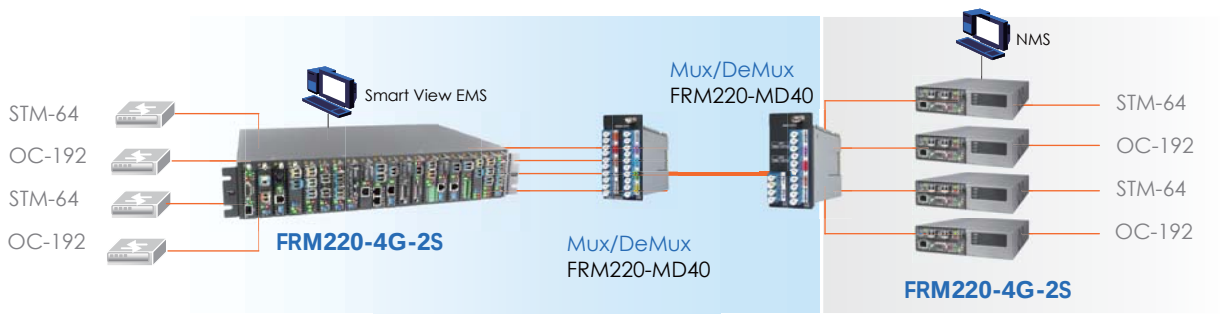
Features

- Multiple protocol supported at bit rates 28Mbps to 4.25Gbps (Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2, FC-4)
- Network management via Web, Telnet, SNMP in central FRM220 chassis
- Link Fault Pass through (LFP)
- Auto Laser Shutdown (ALS)
- 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
- Detect transceiver transmitter error Alarm

Specifications

Optical Interface	Connector	SFP LC
	Data rate	28Mbps ~ 4.25Gbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B) CWDM 1470 ~ 1610nm
Indications		LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 7W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Managed 4G 2R Transponder



Ordering Information

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

Note: The card is suitable for using in CH01M standalone chassis.

4G 2R Transponder with Optical Line Protection

FRM220-4G-3S

The FRM220-4G-3S is a 2R 4G optical regeneration device, which consists of Re-amplification and Re-shaping. The transponder card converts a data signal to the correct wavelength for transmission on a specific channel by supporting SFP optics on both line side and client side interfaces. 1+1 Automatic optical line Protection Switching is supported for the aggregate fiber ports. When the FRM220-4G-3S card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port and perform diagnostic loop backs.

Features

- Multiple protocol supported at bit rates 28Mbps to 4.25Gbps (Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2, FC-4)
- Network management via Web, Telnet, SNMP in central FRM220 chassis
- Local configuration via DB9 console port (when placed in CH01M or CH02M)
- Digital Diagnostic monitoring of SFP module
- Perform optical repeater function (Re-amplification, Re-shaping)
- Facility loopback on both Client / Line sides
- 1+1 Optic fiber protection
- Link Fault Pass through (LFP)
- Auto Laser Shutdown (ALS)
- Detect transceiver transmitter error Alarm

Specifications

Optical Interface	Connector	SFP LC
	Data rate	28Mbps to 4.25Gbps
	Regeneration	Re-amplification Re-shaping
	Loop back	Line/Client
	Fiber	MM 62.2/125µm, 50/125µm. SM 9/125µm
	Wavelength	MM 850, 1310nm SM 1310, 1550nm WDM 1310T/1550R, 1550T/1310R CWDM 1470 ~ 1610nm
Indications		LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input		Card : 12VDC , Standalone : AC,DC option
Power Consumption		< 8W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity		10~90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Managed 4G 2R Transponder with Fiber Protection

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

Ordering Information

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

Note: The card is suitable for using in CH01M standalone chassis.

2.7G 3R Transponder

FRM220-2.7G-2S

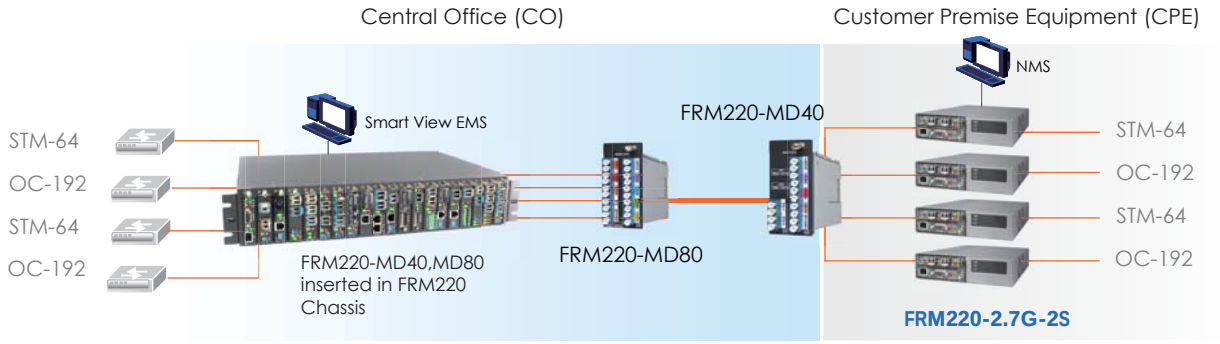
The FRM220-2.7G-2S is a 2.7G 3R optical regeneration device, which consists of Re-amplification, Re-shaping and Re-timing. The transponder card converts a data signal to the correct wavelength for transmission on a specific channel by supporting SFP optics on both line side and client side interfaces.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

Features

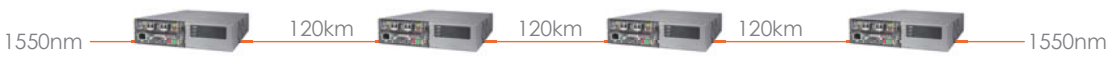
- Multiple protocol supported at bit rates 34.3Mbps to 2.7Gbps (Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2)
- Network management via Web, Telnet, SNMP in central FRM220 chassis
- Link Fault Pass through (LFP)
- Auto Laser Shutdown (ALS)
- Local configuration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

Specifications

Optical Interface	Connector	SFP LC
	Data rate	E3 to OC-48
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B) CWDM 1470 ~ 1610nm
Indications		LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 10W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



2.7G 3R Repeater



FRM220-2.7G-2S

Ordering Information

Model Name	Description
FRM220-2.7G-2S	2.7G 3R Transponder, (optional SFP module)

Note: The card is suitable for using in CH02M standalone chassis.

2.7G 3R Transponder with Optical Line Protection

FRM220-2.7G-3S

The FRM220-2.7G-3S is a 3R 2.7G optical regeneration device, which consists of Re-amplification, Re-shaping and Re-timing. The transponder card converts a data signal to the correct wavelength for transmission on a specific channel by supporting SFP optics on both line side and client side interfaces. 1+1 Automatic optical line Protection Switching are supported for the aggregate fiber ports. When the FRM220-2.7G-3S card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port and set the desired data rate.

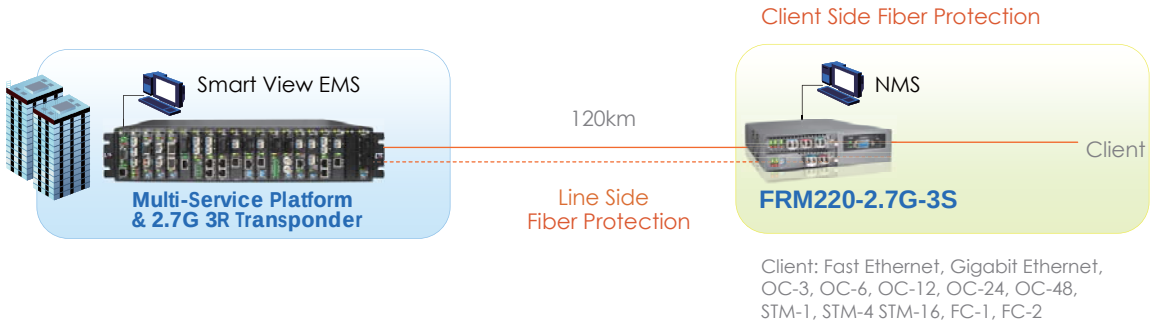
Features

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

Specifications

Optical Interface	Connector	SFP LC
	Data rate	E3 to OC-48
	Regeneration	Re-amplification
		Re-shaping
		Re-clocking
	Loop back	Line/Client
	Fiber	MM 62.2/125µm, 50/125µm.
		SM 9/125µm
	Wavelength	MM 850, 1310nm
		SM 1310, 1550nm
		WDM 1310T/1550R, 1550T/1310R
		CWDM 1470 ~ 1610nm
Indications	LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)	
Power Input	Card : 12VDC , Standalone : AC,DC option	
Power Consumption	< 10W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	0.12kg	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, LVD, RoHS	
MTBF	65,000 hrs (25°C)	

Managed 2.7G 3R Transponder with Fiber Protection



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

Ordering Information

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

Note: The card is suitable for using in CH02M standalone chassis.

1+1 Fiber Optical Protection Switch

FRM220-Protection

The Fiber optical protection unit is able to provide fiber path redundancy on a channel by channel basis. These units are particularly well suited for protection in fiber data transmission. The solution includes monitoring capabilities for both working and protection paths. The monitoring is available through the SNMP Management unit. In case of a fiber cut in the protecting path, traffic will be switched over to the protecting path in less than 50 ms.

Features

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

Specifications

Connecter	LC
LEDs	Power System, Working Path, Protection Path, Work mode
Power	DC 12V In
Restoration Time	50ms
Range	Input PWR :+3 ~ -15dBm(TX), -2~-29dBm(RX). Detection: -5 ~ -29dBm
Loss	Insertion Loss < 5.5dB, Return Loss > 45dB
Power Consumption	< 5W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	0.9kg
Temperature	0 ~ 60°C (Operating), 20 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	65,000 hours

Ordering Information

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

Note: The card is suitable for using in CH01M standalone chassis.

4Ch/8Ch CWDM Single Fiber MUX/DeMUX

FRM220-MD40
FRM220-MD80

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

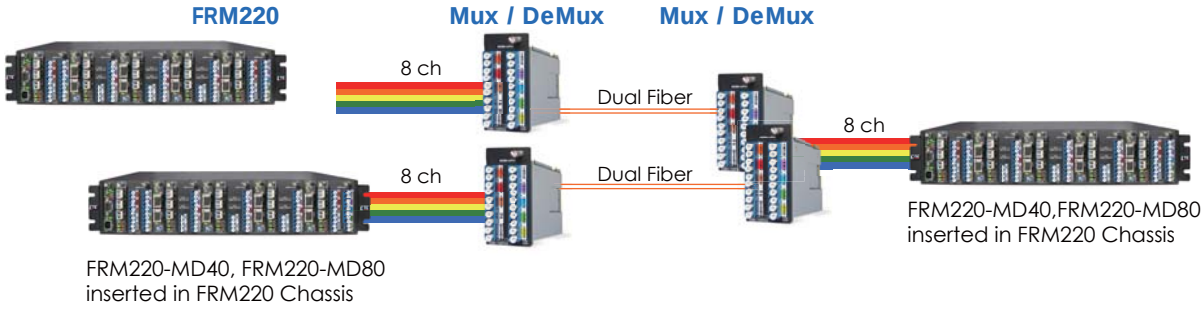
Features

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

Specifications

Connector	LC
Standard	ITU-T G.694.2
Wavelength	1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610nm
Upgrade Port	1503nm ~ 1577nm, 1260nm ~ 1457nm
Insertion Loss	MD40 : < 1.8dB
	MD40-2UP : < 2.2dB
	MD80-1UP : < 2.8dB
Return Loss	>45dB
Dimensions	MD40
	155 x 88 x 23 mm (D x W x H)
	MD40-2UP, MD80-1UP
	155 x 88 x 42 mm (D x W x H)
Weight	MD40 : 0.2kg
	MD40-2UP : 0.36kg
	MD80-1UP : 0.38kg
Temperature	0 ~ 60 °C (Operating)
	-10 ~ 70 °C (Storage)
Humidity	0 ~ 95% non-condensing
Certification	RoHS
MTBF	75,000 hours

CWDM Mux/DeMux



Ordering Information

Model Name	Description
FRM220-MD40-5157	4 Ch CWDM Mux/Demux (1510, 1530, 1550, 1570nm)
FRM220-MD40-5561	4 Ch CWDM Mux/Demux (1550, 1570, 1590, 1610nm)
FRM220-MD80	8 Ch CWDM Mux/Demux (1470 ~ 1610nm)

Note: FRM220-MD40 is suitable for using in CH01 standalone chassis
FRM220-MD80 is suitable for using in CH02 standalone chassis

FRM220 – □□□□
Example: FRM220 – MD80

4Ch Single Fiber CWDM MUX/DeMUX

FRM220-MD40 WA/WB

The Single Fiber Optical Multiplexer are available in 4 channels versions and are used to combine signals from the traffic cards on to a single fiber. The FRM220-MD40-WA is 4 channels Single fiber MUX/DEMUX modular design card for CWDM wavelengths including 1470nm, 1510nm, 1550nm, 1590nm. The FRM220-MD40-WB is 4 channels Single fiber MUX/DEMUX, modular design card for CWDM wavelengths including 1490nm, 1530nm, 1570nm, 1610nm. The Single fiber MUX/DEMUX cards provide the primary wave division and combination functions for CWDM. Line side wavelengths require translation to client side equipment via a transponder card.

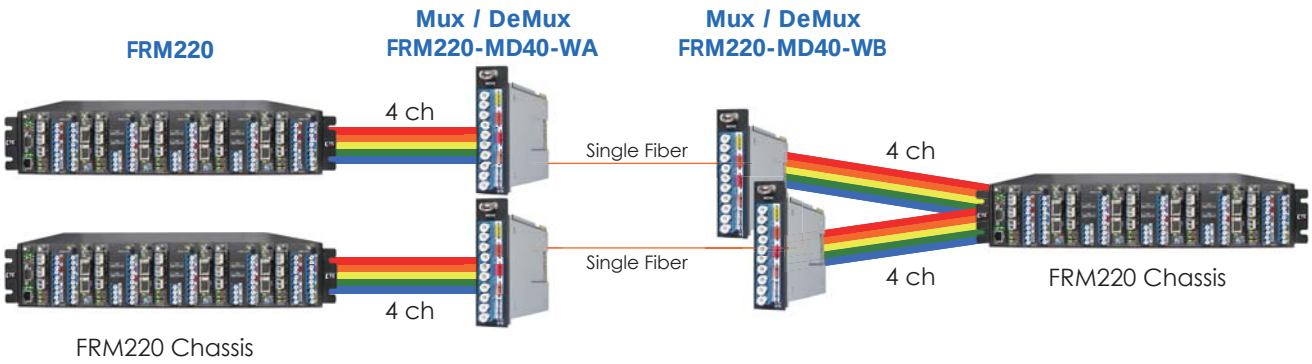
Features

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

Specifications

Connector	LC
Standard	ITU-T G.694.2
Wavelength	FRM220-MD40-WA:1470, 1510, 1550, 1590nm
	FRM220-MD40-WB :1490, 1530, 1570, 1610nm
Insertion Loss	< 1.8dB
Return Loss	> 45dB
Dimensions	155 x 88 x 23 mm (D x W x H)
Weight	0.2kg
Temperature	0 ~ 60 °C (Operating)
	-10 ~ 70 °C (Storage)
Humidity	0 ~95% non-condensing
Certification	RoHS

CWDM Mux/DeMux



Ordering Information

Model Name	Description
FRM220-MD40-WA	4ch CWDM Mux/Demux (1470, 1510, 1550, 1590nm), Bidi on WAN port
FRM220-MD40-WB	4ch CWDM Mux/Demux (1490, 1530, 1570, 1610nm), Bidi on WAN port

Note: The card is suitable for using in CH01 standalone chassis.

FRM220 – □□□□ – □□

Example: FRM220 – MD40 – WA

2-Port 10/100/1000Base-T + 2-Port 1000Base-X OAM/IP Managed Switch

FRM220A-1000EAS/X

The FRM220A-1000EAS/X is an IEEE802.3ah OAM compliant dual copper to dual fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-TX and 100/1000Base-X with SFP. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each 802.3ah series card and remotely connected OAM compliant converter. By offering 802.3ah OAM Compliant in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

Features

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

Specifications

Optical Interface	Connector	SFP LC
	Data rate	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)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP 100Base-TX Cat.5, 5e or higher 1000Base-T Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u, IEEE802.1q
Indications		LED (Power, FX-Link, Test, TX-Link, TX-SPD)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 8W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

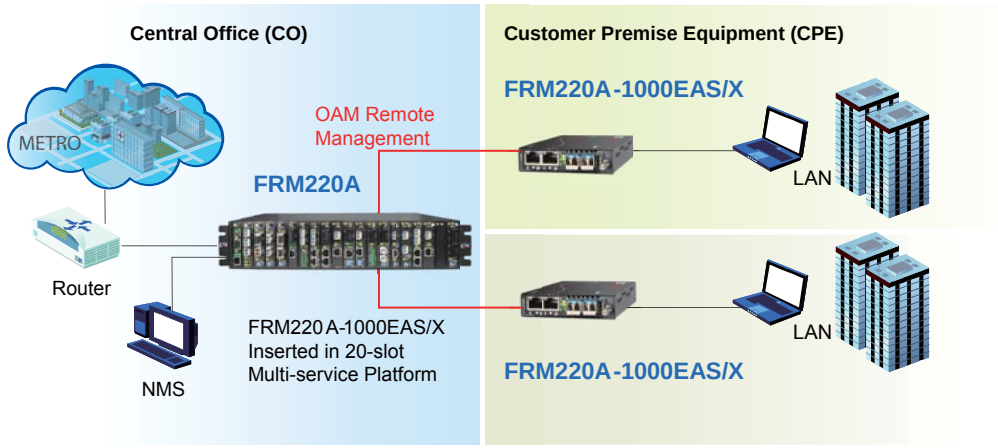
Ordering Information

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

Note: The card is suitable for using in CH01 standalone chassis.

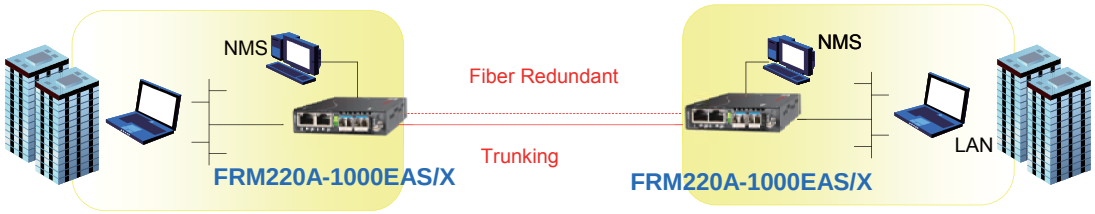
FRM220A-1000EAS/X Application

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



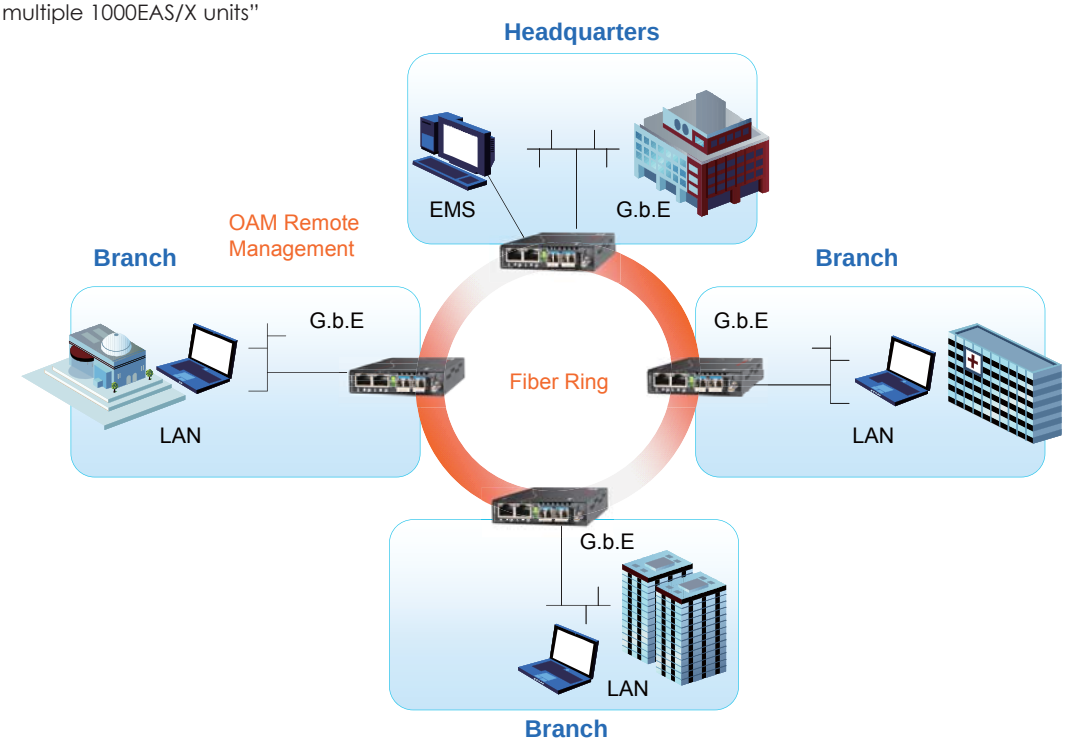
Fiber Redundant / Trunking Application

"Utilizing a special trunking function, the 1000EAS/X can be deployedin 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"



2-Port 10/100Base-TX + 2-port 100Base-FX, OAM/IP Managed Switch

FRM220-10/100AS-2

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

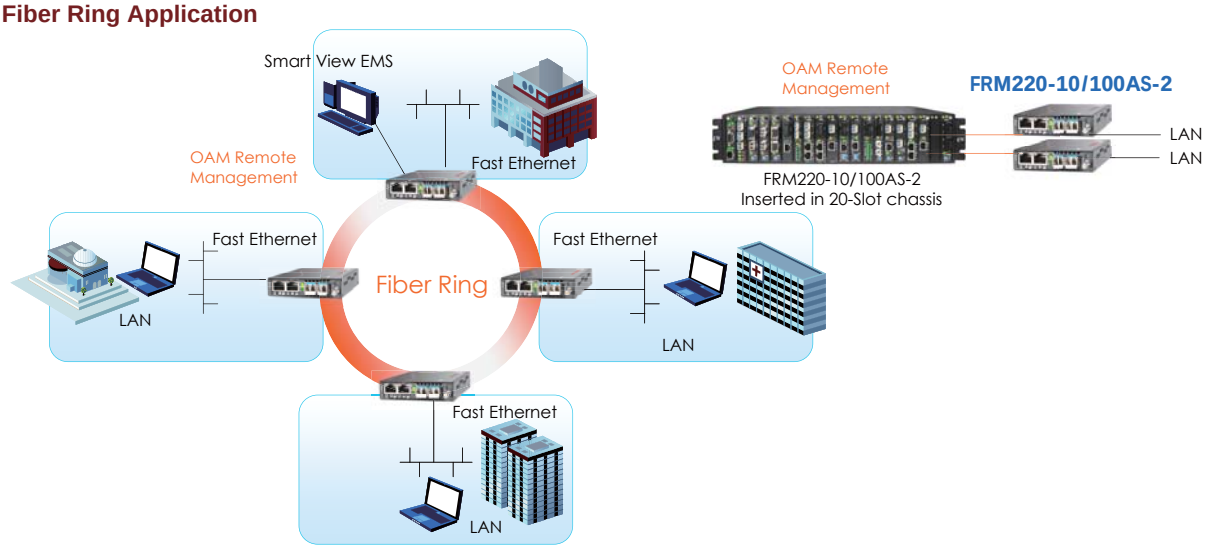
Features

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

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 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u, IEEE 802.1Q
Indications		LED (Power, Test, FX-Link, TX-Speed, TX-Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Fiber Ring Application



Ordering Information

Model Name	Description
FRM220-10/100AS-2	2x 10/100Base-TX + 2x 100Base-FX with OAM/IP management(optional SFP)

Note: The card is suitable for using in CH01 standalone chassis.

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

FRM220-10/100A

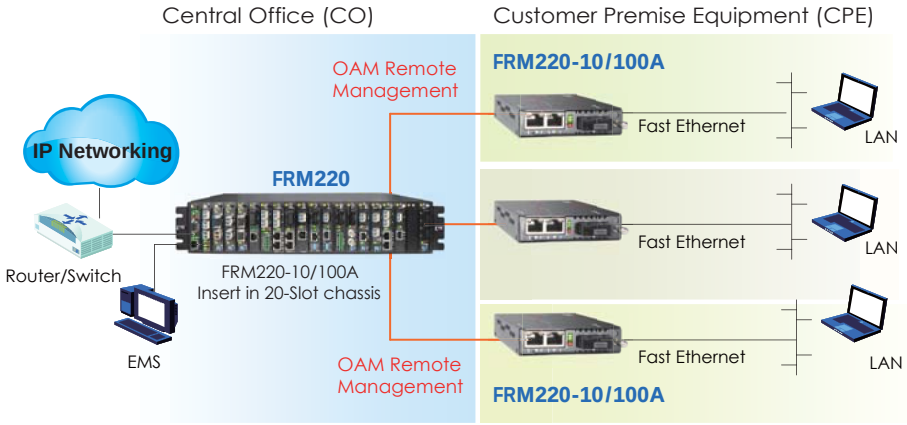
The FRM220-10/100A is an IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution designed to make conversion between 2x 10/100Base-TX and 100Base-FX with SC, FC or ST connector. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the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

Features

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

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)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u, IEEE 802.1Q
Indications		LED (Power, Test, FX-Link, TX-Speed, TX-Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220-10/100A	2x 10/100Base-TX to 100Base-FX with OAM/IP management(optional SFP)

Note: The card is suitable for using in CH01 standalone chassis.

Connector Type / Connectivity Distance

FRM220 – 10/100A – □□□□□

Example: FRM220 – 10/100A – SC002

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

Hardened Gigabit Ethernet Managed Switch

FRM220A-ESW-G2G02XM

The FRM220A-G2G02XM is an industrial grade dual copper to dual fiber Gigabit Ethernet managed 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-G2G02XM switch card locally via the SNMP manager, the functions including bandwidth control, QoS, VLAN, duplex and speed configuration. This managed switch is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, IPX, IP, etc. The FRM220A-G2G02XM managed switch is available in models that support operating temperatures from 0 to 80 degree C.

Features

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

Specifications

Optical Interface

Connector: SFP-LC
Data rate: 100Mbps, 1000Mbps
Duplex mode: Full duplex
Fiber
MM 50/125μm, 62.5/125μm.
SM 9/125μm
Distance
MM 2km, SM 15/30/50/80/120km,
WDM 20/40/60/80km
Wavelength
MM 1310nm, SM 1310,1550nm
WDM 1310Tx/1550Rx (type A)
1550Tx/1310Rx (type B)

Electrical Interface

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

Standard

IEEE 802.3, IEEE 802.3u, 802.3z, 802.3ab

LED Indications

PWR, LNK1, LNK2, TEST, LAN Link, LAN SPEED

Power

Power Input
DC 12V in
Power Consumption: < 5V

Mechanical

Dimension
155 x 88 x 23mm (DxWxH)
Weight
120g
Physical Characteristics
Housing: Metal

Environmental

Temperature
Operating: 0 ~ 80°C
Storage: -40 ~ 85°C
Humidity
0 ~ 95% non-condensing

Certification

FCC Part 15 Class A,CE Mark

Ordering Information

Model Name	Description
FRM220A-ESW-G2G02XM	2-Port 10/100/1000Base-T to 2-Port 100/1000Base-SX/LX SFP GE Manage Switch

3-Port 10/100Base-TX + 100Base FX Managed Switch

FRM220A-FSW103

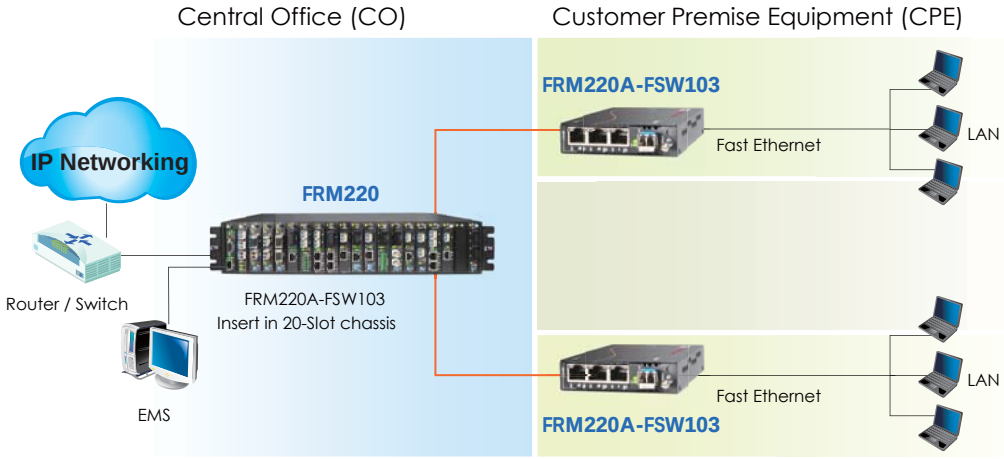
The FRM220A-FSW103 is a 3-port 10/100Base-TX to 100Base-FX SFP fiber slide-in card Ethernet switch designed for central and remote applications. With SNMP and Web-based management in the FRM220 or FRM220A chassis, the network administrator can monitor, configure and control the activity of each FRM220A-FSW103 switch card locally via the SNMP manager. this switch can be completely controlled and monitored from a centrally located managed rack controlling all switch settings including duplex and speed configuration. This switch is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc

Features

- 3 Port 10/100BASE-TX + 1 Port 100BASE-FX Ethernet Switch
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Support flow control
- Forward 1552 bytes (max.) packets in switch mode
- Support Store and forward switch mode
- Support FRM220 chassis management system
- Support FRM220A chassis management System and Ethernet Aggregation
- Support the local management (Monitor or Configure status) by the SNMP manager.
- Support D/D function for SFP fiber transceiver
- Provide Auto Laser Shutdown (ALS) function
- Provide Product information for management
- Support On-Line F/W upgrade (local) by the SNMP manager

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 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u
Indications		LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 80°C (Operating), 0 ~ 80°C (Storage)
Humidity		5 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

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

Note: The card is suitable for using in CH01 standalone chassis.

10G Ethernet Media Converter

FRM220-10GE-TS

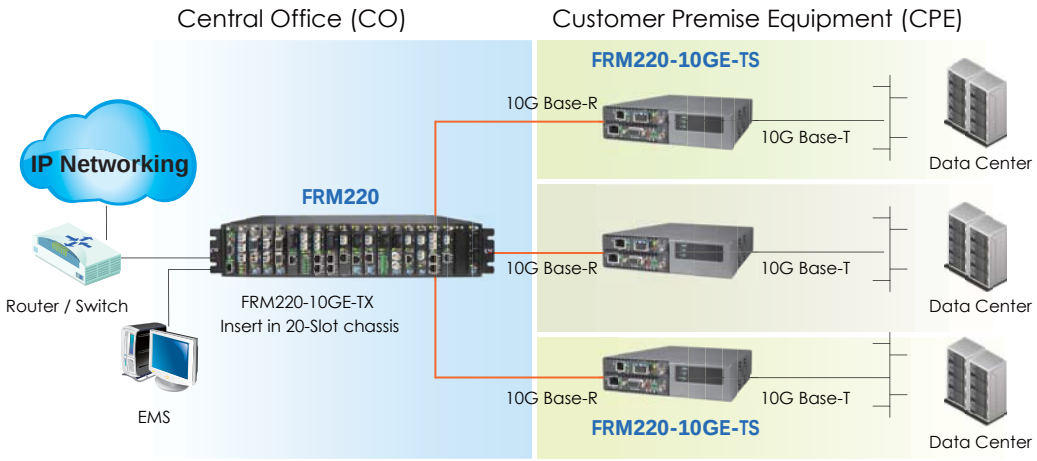
The FRM220-10GE-TS is a copper to fiber 10Gbps Ethernet media converter based on IEEE802.3an and IEEE802.3ae. With SNMP and Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each card in the chassis. This converter uses Cat.6a/Cat 7 twisted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

Features

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

Specifications

Optical Interface	Connector	SFP+ LC
	Data rate	10GMbps
	Distance	300m, 10km, 40km, 80km
	Wavelength	1550nm
Electrical Interface	Connector	RJ45
	Data rate	10GMbps
	RS-232	RJ45
	Console port	
	Cable type	Cat.6a, 7
	Distance	95 meters (Cat.7)
Standard		IEEE 802.3an, IEEE 802.3ae
LEDs		SFP+, LR, Link/Act, LBK A/B, SYS
Power		DC 12V In
Power Consumption		< 15W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		0.55kg
Temperature		0 ~ 40°C (Operating), 0 ~ 50°C (Storage)
Humidity		0 ~ 85% non-condensing
Certification		CE, FCC, RoHS
MTBF		57,000 hrs



Ordering Information

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

Note: The card is suitable for using in CH02M standalone chassis.

10G Ethernet Media Converter

FRM220-10GE-TX

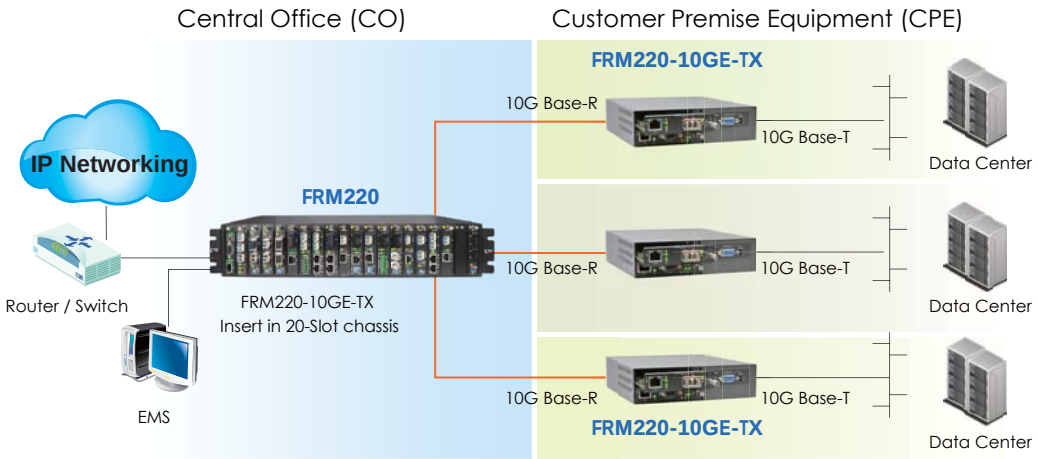
he FRM220-10GE-TX is a copper to fiber 10Gbps Ethernet media converter based on IEEE802.3an and IEEE802.3ae. With SNMP and Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each card in the chassis. This converter uses Cat.6a/Cat 7 twisted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

Features

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

Specifications

Optical Interface	Connector	XFP LC
	Data rate	10GMbps
	Distance	300m, 10km, 40km, 80km
	Wavelength	1550nm
Electrical Interface	Connector	RJ-45
	Data rate	10GMbps
	RS-232	RJ-45
	Console port	
	Cable type	Cat.6a, 7
	Distance	95 meters (Cat.7)
Standard		IEEE 802.3an, IEEE 802.3ae
LEDs		SFP+, LR, Link/Act, LBK A/B, SYS
Power		DC 12V In
Power Consumption		< 15W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		0.55kg
Temperature		0 ~ 40°C (Operating), 0 ~ 50°C (Storage)
Humidity		0 ~ 85% non-condensing
Certification		CE, FCC, RoHS
MTBF		57,000 hrs



Ordering Information

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

Note: The card is suitable for using in CH02M standalone chassis.

Gigabit Ethernet OAM/IP In-band Managed Converter

FRM220-1000MS

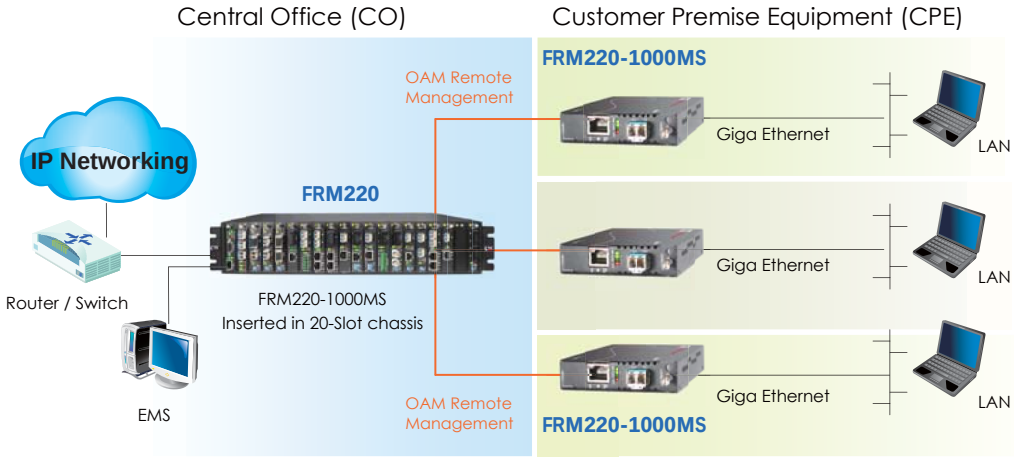
The FRM220-1000MS is an IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-TX and dual rate 100/1000Base-X with SFP LC connector. When deployed as a stand-alone solution, this media converter incorporates an easy to use Web user interface for operation, administration and maintenance of both local and remotely connected FRM220-1000MS converters. By offering 802.3ah OAM compliance, this converter can be linked to any 802.3ah compliant fiber switch and support loop back and dying gasp functions. When placed in our centrally controlled and managed rack, all functions of this converter and the remotely connected converter can be configured and monitored via in-band management, including band-width control, duplex, speed, VLAN configuration and more.

Features

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

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 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u IEEE 802.3ab, 802.3z
Indications		LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

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

Note: The card is suitable for using in CH01 standalone chassis.

Fast Ethernet OAM/IP In-band Managed Converter

FRM220-100M

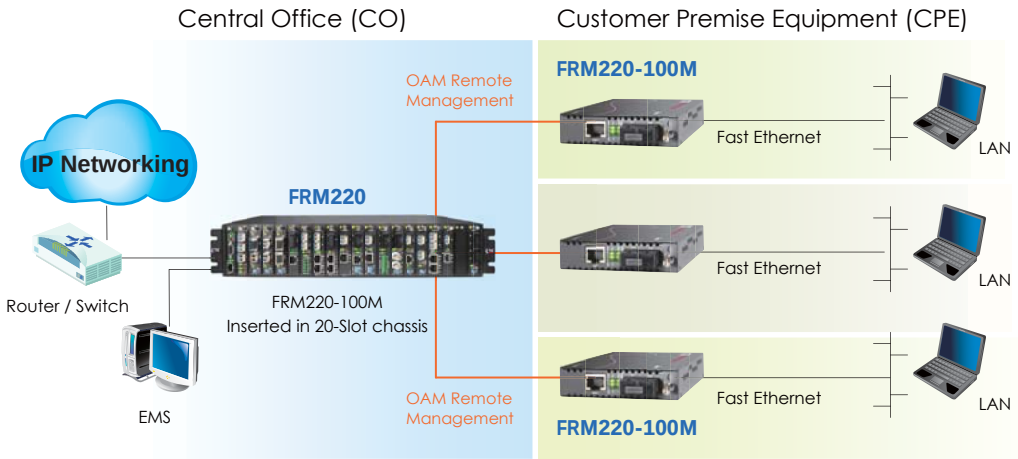
The FRM220-100M is an IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution designed to make conversion between 10/100Base-TX and 100Base-FX with SC, FC, ST connector. When deployed as a stand-alone solution, this media converter incorporates an easy to use Web user interface for operation, administration and maintenance of both local and remotely connected FRM220-100M converters. By offering 802.3ah OAM compliance, this converter can be linked to any 802.3ah compliant fiber switch and support loop back and dying gasp functions. When placed in our centrally controlled and managed rack, all functions of this converter and the remotely connected converter can be configured and monitored via in-band management, including band-width control, duplex, speed, VLAN configuration and more.

Features

- 1 Port 10/100BASE-TX to 100BASE-FX Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Dying gasp (remote power failure detection) on standalone unit
- Supports Link Fault Pass Through (LFP) Function
- Supports Auto Laser Shutdown (ALS) Function
- Supports flow control Enable or Disable
- Supports Jumbo Frame 9K Packet
- Ingress/Egress Bandwidth control
- Support 802.3ah-OAM/IP in-band management (for standalone unit only)
- Firmware upgrade via Web (for standalone unit only)
- Password Setting (for standalone unit only)
- Allow IP settings Web or Console management (for standalone unit only)
- Supports 16 Tag VLAN Group (for standalone unit only)
- RMON counters (for standalone unit only)
- Supports Double VLAN tag (Q-in-Q) on standalone unit

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)(Option)
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u
Indications		LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension / Weight		155 x 88 x 23mm (D x W x H) ; 0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220-100M	10/100Base-TX to 100Base-FX Web smart OAM/IP managed converter

Note: The card is suitable for using in CH01 standalone chassis.

Connector Type / Connectivity Distance

FRM220 – 100M – □□□□□

Example: FRM220 – 100M – SC002

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

Fast Ethernet In-band Managed Converter

FRM220-10/100i

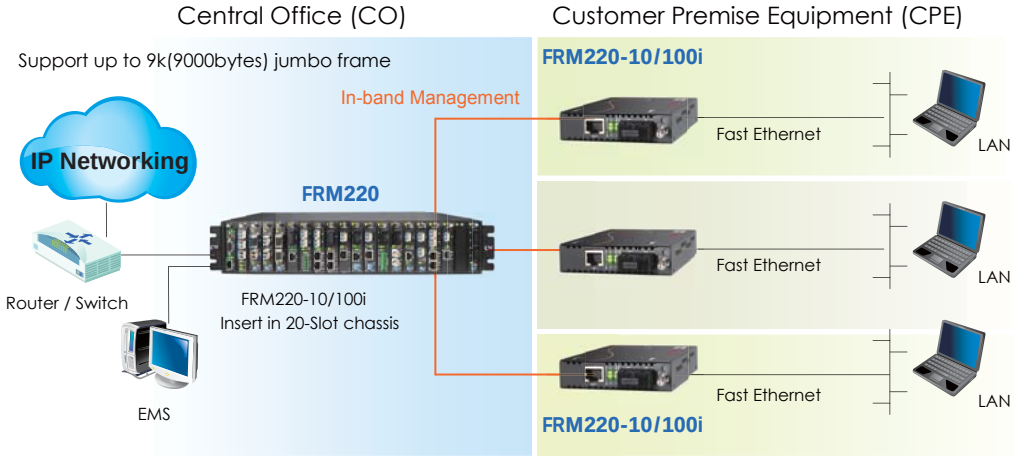
The FRM220-10/100i is a 10/100Base Ethernet to 100Base-FX fiber slide-in card converter designed for central and remote applications. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications.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

Features

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

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)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u,TS-1000
Indications		LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension / Weight		155 x 88 x 23mm (D x W x H) ; 0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

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

Note: The card is suitable for using in CH01 standalone chassis.

Connector Type / Connectivity Distance

FRM220 – 10/100i – □□□□□

Example: FRM220 – 10/100i – SC002

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

Fast Ethernet In-band Managed Converter

FRM220-10/100i-2E

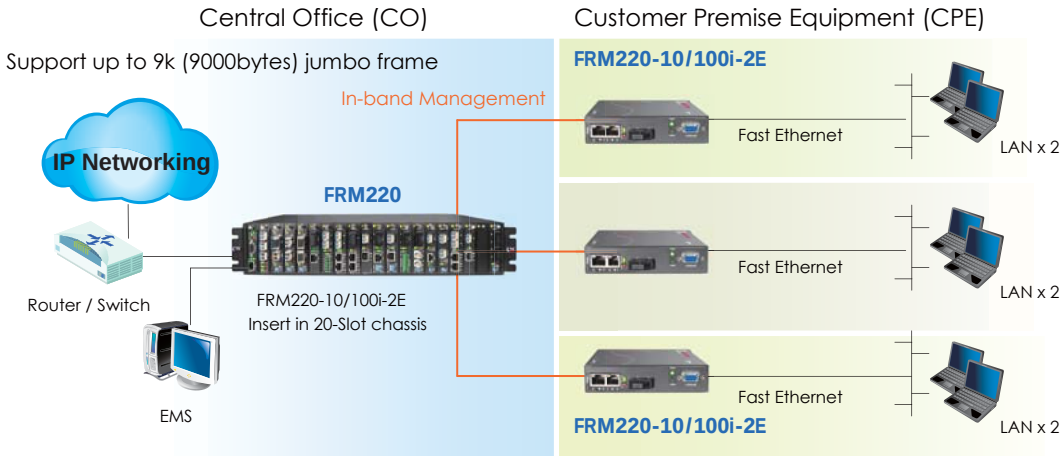
The FRM220-10/100i-2E is a 2-port 10/100Base Ethernet to 100Base-FX fiber slide-in card converter designed for central and remote applications. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications.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

Features

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

Specifications

Optical Interface	Connector	1x9 (SC,FC,ST)
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u
Indications		LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input		Card: 12VDC Standalone : AC, DC options
Power Consumption		< 5W
Dimension / Weight		155 x 88 x 23mm (D x W x H) ; 0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

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

Note: The card is suitable for using in CH01 standalone chassis.

Connector Type / Connectivity Distance

FRM220 – 10/100i-2E – □□□□□

Example: FRM220 – 10/100i-2E – SC002

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

Dual Channel Fast Ethernet In-band Managed Converter

FRM220-10/100iS-2

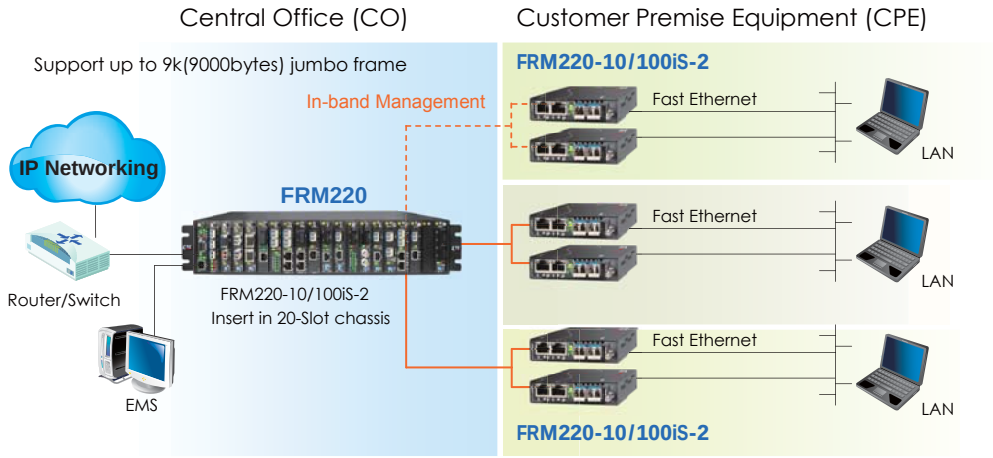
The FRM220-10/100iS-2 is a dual channel (two in one) 10/100Base Ethernet to 100Base-FX fiber slide-in card converter designed for central and remote applications. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise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

Features

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

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 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u,TS-1000
Indications		LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension / Weight		155 x 88 x 23mm (D x W x H) ; 0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

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

Note: The card is suitable for using in CH01 standalone chassis.

NEW

Fiber Modem Ethernet over E1 Fiber

FRM220-ET100

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

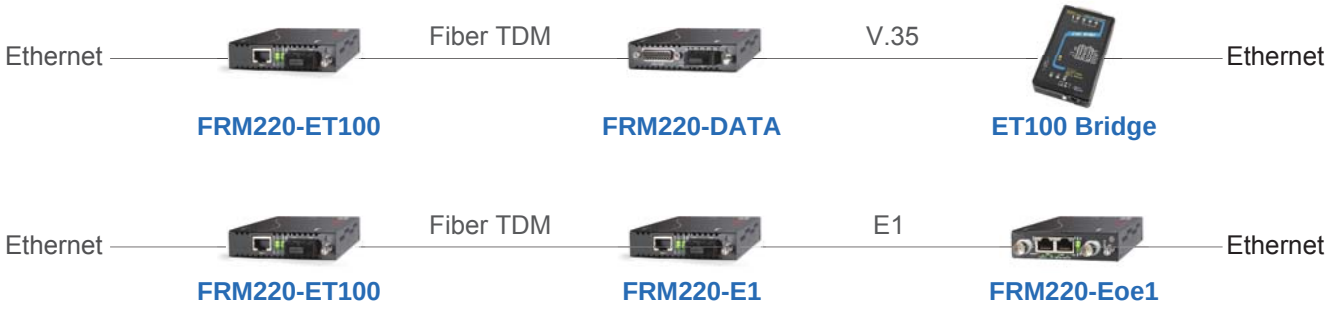
Features

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

Specifications

TDM (fiber) Interface	Connector	1x9 (SC, ST, FC)
	Data rate	64~2048kb/s(nx64)
	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)
Tests	E1 Loops	Remote Loop back
	BERT	Integral 511 pattern generator
Ethernet Interface	Standard	IEEE 802.3u, IEEE 802.3
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Connector	RJ-45
Indications	PWR, TD/RD Act., Test, Sys, Alarm, Error	
Power Input	Card : 12 VDC	
	Standalone : AC, DC option	
Power Consumption	< 5W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	0.28kg	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS	
MTBF	75,000 hrs	

Ethernet over Fiber TDM



Ordering Information

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

Note: The card is suitable for using in CH01M standalone chassis.

Connector Type / Connectivity Distance

FRM220 – ET100 – □□□□□

Example: FRM220 – ET100 – SC002

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

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

FRM220-Data

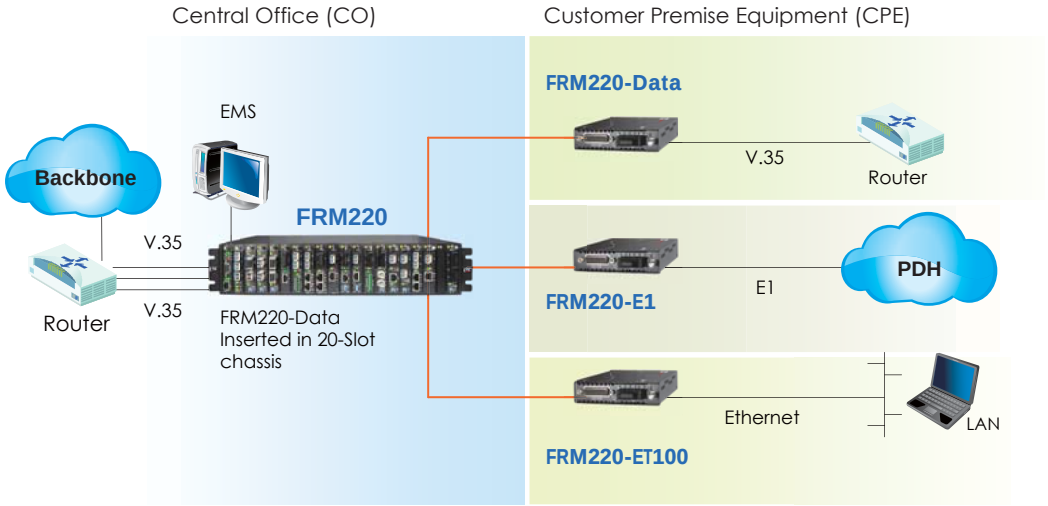
The FRM220-DATA is a media converter for high-speed (up to 8.192Mbps) synchronous or low speed synchronous and asynchronous data transmissions (V.35, RS-232, RS-530, X.21 or RS-449) over fiber optical media. When the FRM220-DATA card is placed in the FRM220 rack with SNMP management, in-band management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

Features

- Synchronous or Asynchronous data over fiber
- In-band network management via terminal, web or SNMP in FRM220 chassis
- Software selectable interface, V.35, X.21, RS-530, RS-449, RS-232 (sync mode)
- Software selectable DCE or DTE mode
- User selectable data rate n x 64kbps, up to 9Mbps
- Independent clock mode setting, (internal, external, or recovery) for transmit and receive
- Electrical and optical loop back tests
- Compatible with FRM220-E1 on same fiber link for N x 64k
- Standalone RS232 console management via CH01M

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	36.864Mbps
	Line coding	Scrambled NRZ
	Bit Error Rate	Less than 10^{-10}
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	1310nm, 1550nm
Electrical Interface	Connector	HDB26F w/ adapter cable for V35, X21, RS530, RS449,RS232
	Line Code	NRZ
	Baud Rate	RS-232 up to 384K async V.35/RS-530 up to 9152k sync where n=1 to 143 (64K ~ 9152KKbps)
	Clock source	Internal, Recovery, External
Standard		ITU-T
Indications		LED (Power, FX Link, RTS, Test , TD, RD, CTS, DCD)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 5W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220-Data	V.35/X.21/RS-530/RS-449/RS-232 fiber modem

Note: The card is suitable for using in CH01M standalone chassis.

Connector Type / Connectivity Distance

FRM220 – Data – □□□□□

Example: FRM220 – Data – SC002

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

Fiber Modem E1/T1 over Fiber

FRM220-E1/T1

The FRM220-E1/T1 is a fiber media transport for G.703 E1/T1 transmissions. The BNC model provides unbalanced 75 Ohm coaxial E1 connections while the RJ-45 model provides switchable balanced 120 Ohm E1 or 100 Ohm T1 connections over twisted pair wiring. When the FRM220-E1/T1 card is placed in the FRM220 rack with in-band management, the card status, type, version, fiber link status, E1 or T1 link status and alarms for both local card and remote unit can all be displayed. Configuration is also available to enable or disable the port, reset the port, do far end fault setting, and initiate local or far end loop-back tests. When 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.

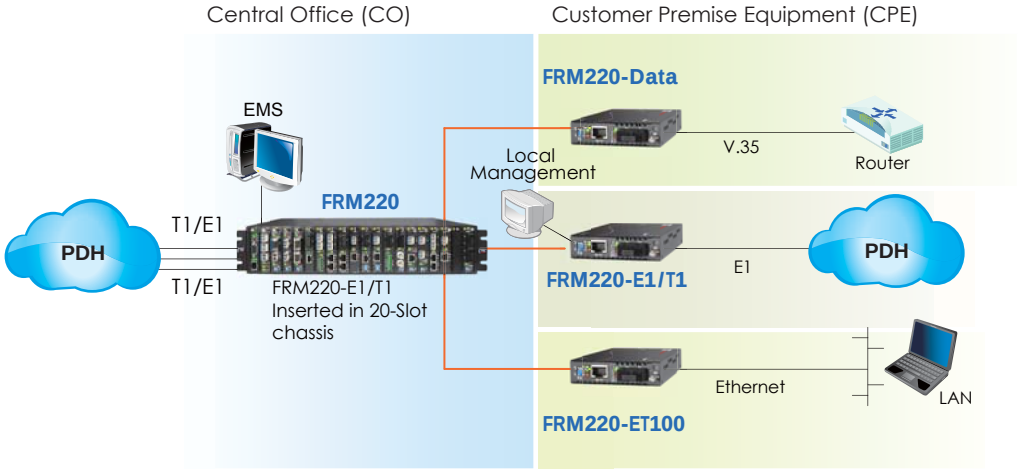
Features

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

Specifications

Optical Interface	Connector : 1x9 (SC, ST, FC)
	Data rate : 36.864Mbps
	Line coding : Scrambled NRZ
	Bit Error Rate : Less than 10^{-10}
	Distance : MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength : 1310nm, 1550nm
Electrical Interface	Connector : RJ45 E1-120Ω, T1-100 Ω, BNC E1-75 Ω
	Data rate: E1: 2.048Mpbs, T1:1.544Mbps
	Line Code: E1 HDB3/AMI, T1: B8ZS/AMI
	Cable type
	Cat.3 or higher Twisted-Pair cable
Standard	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	Card : 12VDC
	Standalone : AC, DC options
Power Consumption	< 5W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	0.12kg
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

In-band Managed PDH Fiber Modem



Ordering Information

Model Name	Description
FRM220-E1/T1R	RJ-45 fiber modem
FRM220-E1B	BNC fiber modem

Note: The card is suitable for using in CH01M standalone chassis.

Connector Type / Connectivity Distance

FRM220 – □□/□□□–□□□□□

Example: FRM220 – E1/T1R – SC002

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

RS-485 / 232 over Fiber

FRM220-Serial

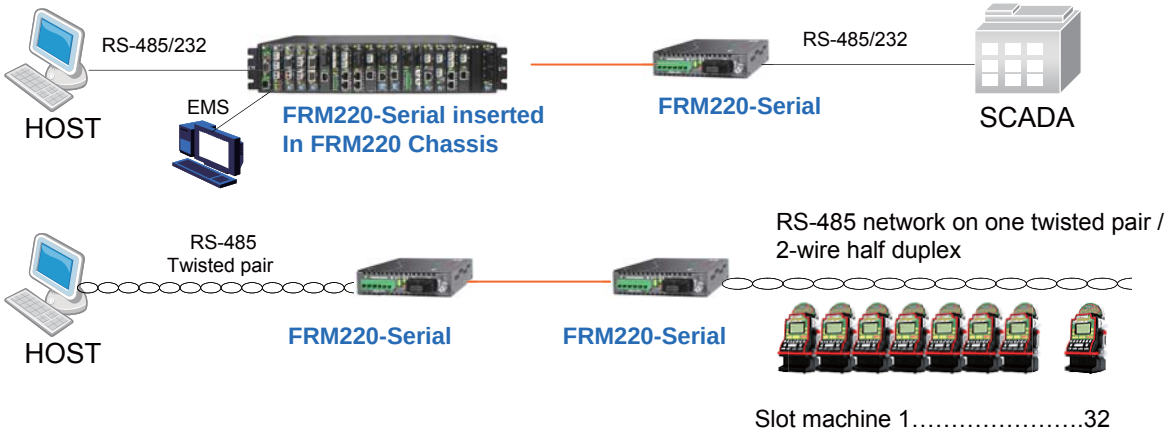
The FRM220-Serial provides a fiber converter solution to extend asynchronous RS-485 or RS-232 transmission distance up to 2km over multimode fiber or up to 120km over single mode fiber. The converter is equipped with multiple interface circuits for connection to RS-232 or RS485 (2 or 4 wire, full or half duplex). The FRM220-Serial secures data transmission over EMI resistant fiber at speeds up to 460kbps for RS-232 or up to 1024kbps for RS485. When the FRM220-Serial/485 card is placed in the FRM220 rack with SNMP management, in-band management allows viewing the card and remote converter's status, type, version, fiber link status, data link status and alarms. Both card and remote can be configured to enable or disable the port, reset the port and set the interface type.

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	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 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310, 1550nm, WDM 1310Tx/1550Rx(type A) 1550Tx/1310Rx(type B)
Electrical Interface	Connector	6 pins Terminal block
	Data Signal Formats	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}
Standard		EIA/TIA RS-485, RS-232
LEDs		Power, FX Link, DI, DO, Test
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 5W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Features

- Extend asynchronous serial transmission from 2km to 120km over fiber
- In-band network management via terminal, web or SNMP in FRM220-CH20 chassis
- Software selectable data interface for RS-232/ 485
- Software selectable two wires (half duplex) or four wires (full duplex) RS-485
- Software selectable three or five wires RS-232
- Speeds up to 256kbps for RS-232 (Async. mode)
- Speeds up to 1Mbps for RS-485
- Standalone RS232 console management via CH01M



Ordering Information

Model Name	Description
FRM220-Serial	RS-485/ 232 fiber converter

Note: The card is suitable for using in CH01M standalone chassis.

Connector Type / Connectivity Distance

FRM220 – Serial – □□□□□

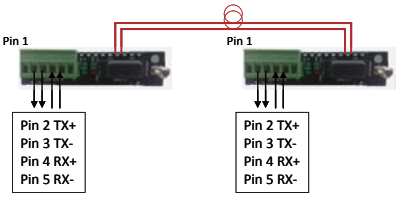
Example: FRM220 – Serial – SC002

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

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

RS-485 4 wires (Full duplex)

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



Pin	Signal Connection
1	NC
2	RS-485 Out +
3	RS-485 Out -
4	RS-485 In+
5	RS-485 In-
6	NC

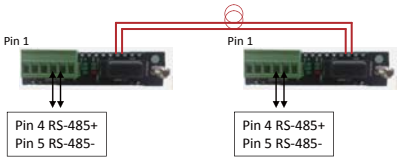
* For RS-485 4 wires Dip Switch Setting

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

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

RS-485 2 wires (Half duplex)

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



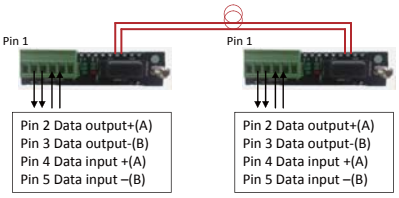
Pin	Signal Connection
1	NC
2	NC
3	NC
4	RS-485 (+)
5	RS-485 (-)
6	NC

* For RS-485 2 wires Dip Switch Setting

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

RS-422 4 wires

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



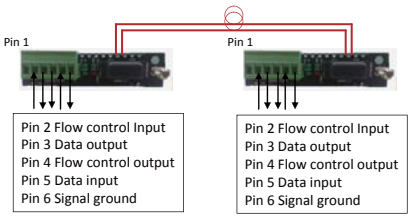
Pin	Signal Connection
1	NC
2	RS-422 Out+ (A)
3	RS-422 Out– (B)
4	RS-422 In+ (A)
5	RS-422 In- (B)
6	Signal Ground

* For RS-422 4 wires Dip Switch Setting

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

RS-232 5 wires

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



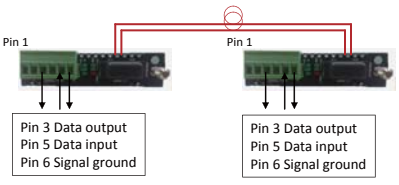
Pin	Signal Connection
1	NC
2	RS-232 RTS/CTS In
3	RS-232, Data out
4	RS-232 RTS/CTS Out
5	RS-232 Data in
6	Signal Ground

* For RS-232 5 wires Dip Switch Setting

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

RS-232 3 wires

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



Pin	Signal Connection
1	NC
2	NC
3	RS-232, Data out
4	NC
5	RS-232 Data in
6	Signal Ground

* For RS-232 3 wires Dip Switch Setting

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

FXO / FXS 2-wire Fiber Converter

FRM220-FXO/FXS

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

Features

- Extend telephone voice transmission from 2km to 120km over fiber
- Network management via terminal, web or SNMP in FRM220 chassis
- Supports telephone voice transmission
- Supports caller ID pass through
- Selectable FXO or FXS mode
- Supports FXS to FXS hot line

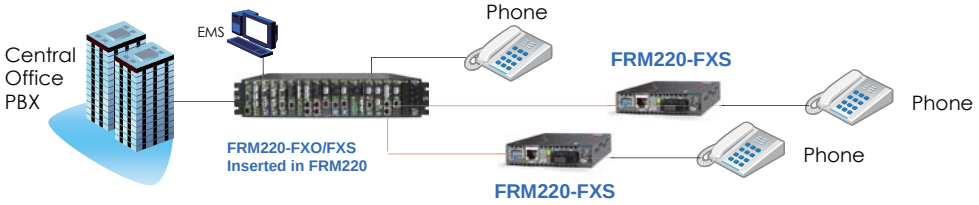
Specifications

Optical Interface	Connector	1x9 (SC)
	Fiber	MM 62.2/125μm, 50/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310, 1550nm, WDM 1310Tx/1550Rx(type A), 1550Tx/1310Rx(type B)
Electrical Interface	Connector	RJ-11
	FXO mode	Impedance : 600 ohms Coding : 16 bits liner Loop Current : 10~100mA Ring Frequency : Acceptable 20 ~50Hz Insertion Loss: 0.0 ± 1.0dB at 1000Hz
	FXS mode	Impedance : 600 ohms Coding : 16 bits liner Dial: DTMF and Dial Pulse Battery Source: 48VDC ± 4V Ringing Waveform : Sine wave Ringing Frequency : 20/25/30/35/40/45/50 Hz selectable Ring Cadence: FXS to FXS : On / 1 sec, Off / 2 sec FXO to FXS; Reproduces the cadence detected by FXO Insertion Loss 0.0 ± 1.0dB at 1000Hz REN: 4.0B(Ring Equivalence Number)
Indications	LED (Power, FX Link, Phone Act, Test)	
Power Input	Card : 12VDC Standalone : AC, DC options	
Power Consumption	< 5W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	0.12kg	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, LVD, RoHS	
MTBF	65,000 hrs	

Automatic Ring down hotline

Voice transmission from 2km to 120km over fiber

Selectable FXO or FXS mode



Ordering Information

Model Name	Description
FRM220-FXO/FXS	FXO/FXS fiber converter

Note: The card is suitable for using in CH01 standalone chassis.

Connector Type / Connectivity Distance

FRM220 – FXO/FXS – □□□□□

Example: FRM220 – FXO/FXS – SC002

Connector Type	*Connectivity Distance*
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 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

Ethernet Bridge over E1

FRM220A-Eoe1

The FRM220A-Eoe1 is a slide-in card E1 Ethernet Bridge capable of providing 1x E1 lines for cost-effective connection of 10/100BaseTX or 100Base-FX LANs over E1 transports. The FRM220A-Eoe1 transmits up to a 2.048Mbps Ethernet bridge channel (HDLC encapsulated) over E1 links. The FRM220A-Eoe1 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-Eoe1 fully meets E1 specifications including ITU-T G.704 and G.823. The FRM220A-Eoe1 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-Eoe1 and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

Features

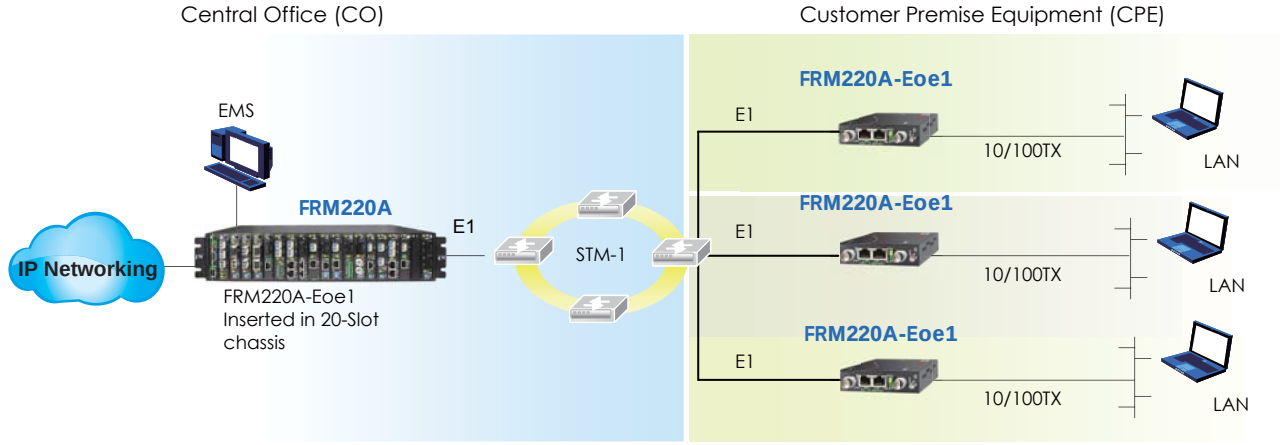
- Connects one Fast Ethernet over E1 links (64k~2048Kbps)
- Built-in HDLC bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A and FRM220 chassis
- SNMP management with FRM220A and FRM220 chassis
- LED Alarm indication
- Standalone RS232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

Specifications

Interface	Framing	framed / unframed
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	RJ45, BNC
	Diagnostics	Digital remote loopback
	Standard	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex
	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 adapter : 100~240VAC to 12VDC AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 12W
Dimensions	DC12	: 160 x 88 x 24mm (D x W x H)
	AC/DC48/AD	: 201 x 135 x 35mm (D x W x H)
Weight		DC 12 : 0.28kg, AC/DC48/AD : 0.58kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		65,000 hrs

Managed E1 Bridge

Delivering point-to-point Fast Ethernet service across E1 circuits



Ordering Information

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

Note: The card is suitable for using in CH01M standalone chassis.

NEW

Ethernet Bridge over E1 (GFP)

FRM220A-Eoe1/G

The FRM220A-Eoe1/G is a slide-in card E1 Ethernet Bridge capable of providing 1x E1 lines for cost-effective connection of 10/100BaseTX or 100Base-FX LANs over E1 transports. The FRM220A-Eoe1/G transmits up to a 1.984Mbps Ethernet bridge channel (Generic Framing Procedure Encapsulated) over E1 links. The FRM220A-Eoe1/G supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-Eoe1/G fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-Eoe1/G features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-Eoe1/G 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

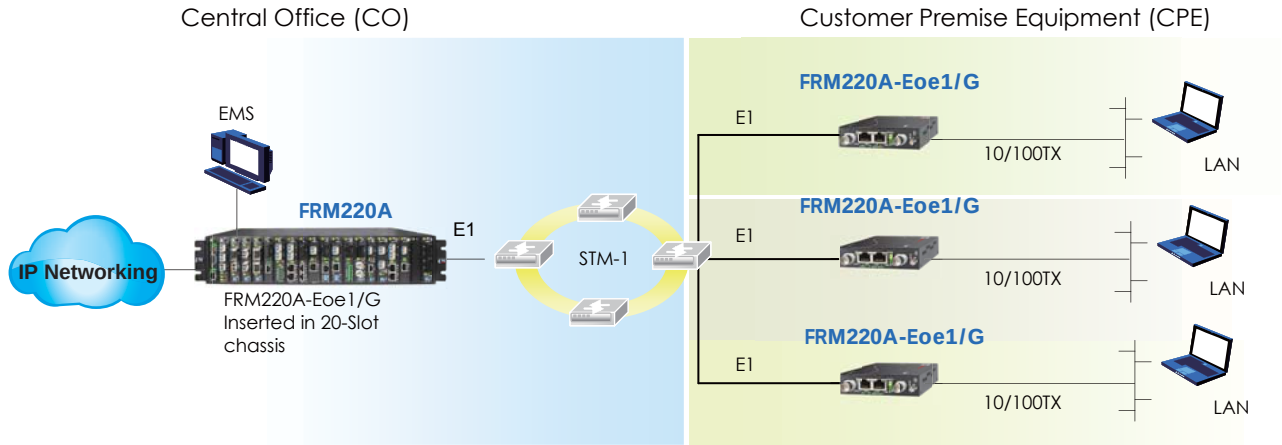
- Connects one Fast Ethernet over E1 links (1.984Mbps)
- Built-in GFP bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A and FRM220 chassis
- SNMP management with FRM220A and FRM220 chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

Interface	Framing	Framed / Unframed
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	RJ45, BNC
	Diagnostics	Digital remote loopback
	Standard	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex Encapsulation GFP (G.7041)
	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 adapter : 100~240VAC to 12VDC AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 6W
Dimensions	DC12	: 160 x 88 x 24mm (D x W x H)
	AC/DC48/AD	: 201 x 135 x 35mm (D x W x H)
Weight		DC 12 : 0.28kg, AC/DC48/AD : 0.58kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		65,000 hrs

Managed E1 Bridge

Delivering point-to-point Fast Ethernet service across E1 circuits



Ordering Information

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

Note: The card is suitable for using in CH01M standalone chassis.

5E1 Inverse Multiplexer

FRM220A-iMux5

The FRM220A-iMux5 is an E1 inverse multiplexer capable of bundling up to 5 E1 lines for cost-effective connection of 10/100BaseTX or 100Base-FX LANs over multiple E1 transports. The FRM220A-iMux5 inverse multiplexer transmits up to a 9.92Mbps Ethernet bridge channel (GFP-F encapsulated) over 5 E1 links. The FRM220A-iMux5 bridges the gap between E1 and E3, allowing bridges to operate at faster rates. It also provides high speed access to SDH/SONET backbones where the only access services available are E1 lines. The FRM220A-iMux5 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-iMux5 fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-iMux5 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-iMux5 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

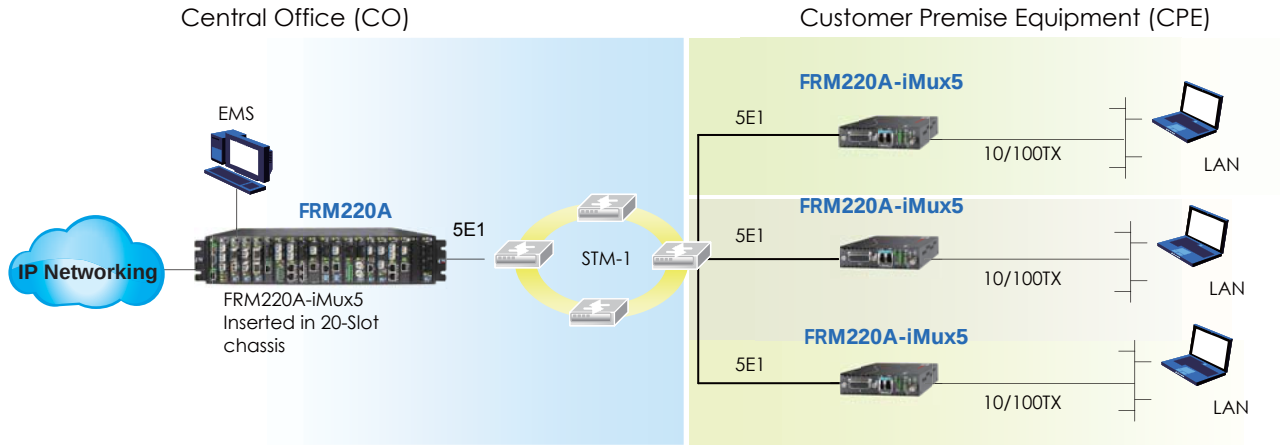
- Connects one Fast Ethernet over E1 links (1.984Mbps)
- Built-in GFP bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A chassis
- SNMP management with FRM220A chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

Interface	Framing	CCS+CRC
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm (up to 5E1)
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	RJ45, BNC
	Diagnostics	Digital remote loopback
	Standard	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex 100Base-FX
	Connector	RJ45 10/100Base-TX SFP-LC 100Base-FX
Indications		Power, ALM,E1 signal loss , E1 Alarm (AIS ، LOF ، RAI, LOMF), LAN link /ACT, 10/100M , SD(100Base-FX)
Power Input		AC adapter : 100~240VAC to 12VDC AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 6W
Dimensions	DC12	: 160 x 88 x 24 (D x W x H)mm
	AC/DC48/AD	: 201 x 135 x 35 (D x W x H)mm
Weight		DC 12 : 0.28kg , AC/DC48/AD : 0.58kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		75,000 hrs

Managed E1 Bridge

Delivering point-to-point Fast Ethernet service across E1 circuits



Ordering Information

Model Name	Description
FRM220A-iMux5T-R	10/100Base-TX to 5E1 mux card with 5E1 RJ45 cable
FRM220A-iMux5T-B	10/100Base-TX to 5E1 mux card with 5E1 BNC cable

Note: The card is suitable for using in CH01M standalone chassis.

FRM220A – iMux5T – ☐

Example: FRM220A – iMux5T – R

8E1 Inverse Multiplexer

FRM220A-iMux8

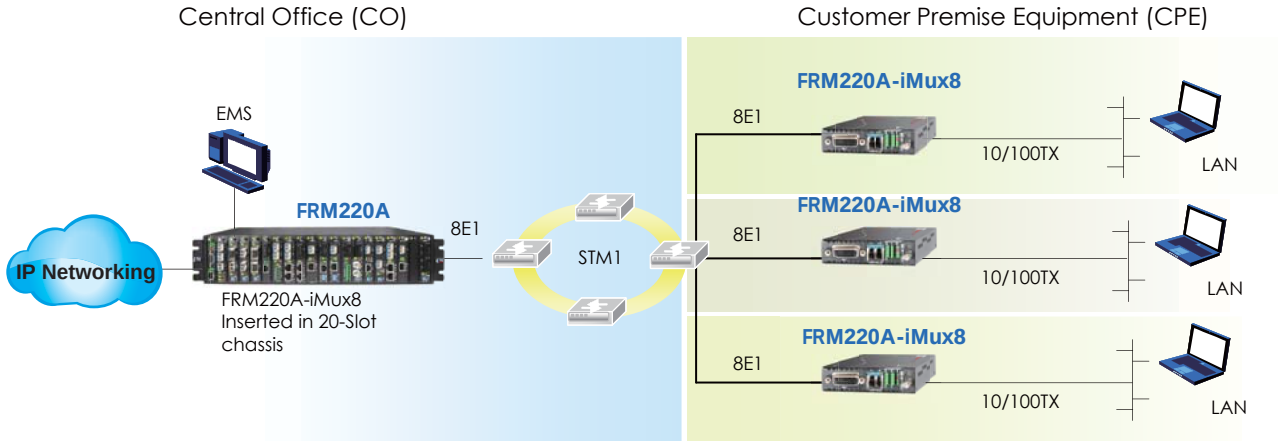
The FRM220A-iMux8 is an E1 inverse multiplexer capable of bundling up to 8 E1 lines for cost-effective connection of 10/100BaseTX or 100Base-FX LANs over multiple E1 transports. The FRM220A-iMux8 inverse multiplexer transmits up to a 15.87Mbps Ethernet bridge channel (GFP-F encapsulated) over 8 E1 links.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

Features

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

Specifications

Interface	Framing	CCS+CRC
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm (up to 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	BNC / RJ45
	Diagnostics	Digital remote loopback
	Standard	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex
	Connector	RJ45 10/100Base-TX
		SFP-LC 100Base-FX
Indications		Power, ALM,E1 signal loss ,
		E1 Alarm(AIS，LOF， RAI, LOMF),
		LAN link /ACT, 10/100M , SD(100Base-FX)
Power Input		AC adapter : 100~240VAC to 12VDC
		AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 12W
Dimensions	DC12	: 160 x 88 x 24mm (D x W x H)
	AC/DC48/AD	: 201 x 135 x 35mm (D x W x H)
Weight		DC 12 : 0.28kg, AC/DC48/AD : 0.58kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		65,000 hrs



Ordering Information

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

Note: The card is suitable for using in CH01M standalone chassis.

FRM220A – iMux8T – ☐
Example: FRM220A – iMux8T – R

16E1 Inverse Multiplexer

FRM220A-iMux16

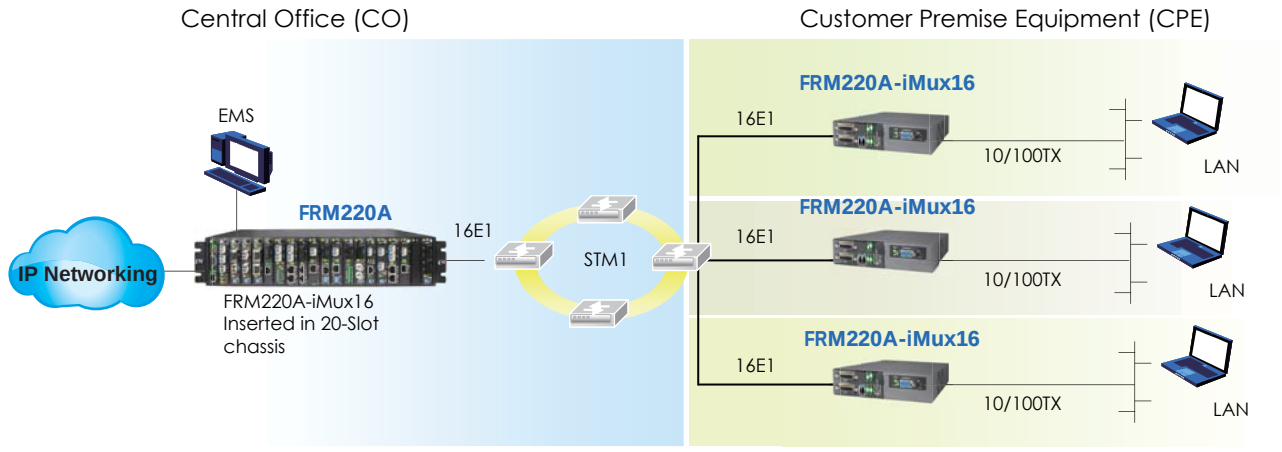
The FRM220A-iMux16 is an E1 inverse multiplexer capable of bundling up to 16 E1 lines for cost-effective connection of 10/100BaseTX or 100Base-FX LANs over multiple E1 transports. The FRM220A-iMux16 inverse multiplexer transmits up to a 31.74Mbps Ethernet bridge channel (GFP-F encapsulated) over 16 E1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

Features

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

Specifications

Interface	Framing	CCS+CRC
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm (up to 16E1)
	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
	Standard	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex 100Base-FX
	Connector	RJ45 10/100Base-TX SFP-LC 100Base-FX
Indications		Power, ALM,E1 signal loss , E1 Alarm（AIS，LOF， RAI, LOMF), LAN link /ACT, 10/100M , SD(100Base-FX)
Power Input		AC adapter : 100~240VAC to 12VDC AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 12W
Dimensions		DC12 : 160 x 88 x 24 (D x W x H)mm AC/DC48/AD : 201 x 135 x 35 (D x W x H)mm
Weight		DC 12 : 0.28kg , AC/DC48/AD : 0.58kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220A-iMux16T-R	10/100Base-TX to 16E1 mux card with 2x 8E1 RJ45 cables
FRM220A-iMux16T-B	10/100Base-TX to 16E1 mux card with 2x 8E1 BNC cables

Note: The card is suitable for using in CH02M standalone chassis.

FRM220A – iMux16T – ☐
Example: FRM220A – iMux16T – R

Data to Fractional E1

FRM220-E1/Data

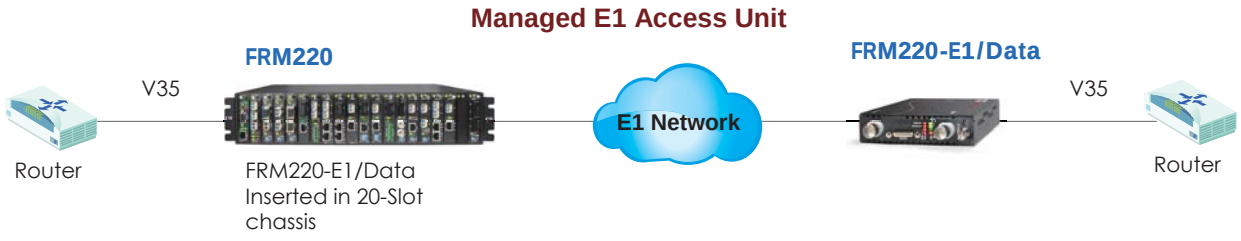
The FRM220-E1/DATA slide in card DSU/CSU is a digital access unit for Unframed or Fractional E1 services. The FRM220-E1/DATA data channel supports user-selectable transmission rates via selected E1 timeslots, which provides integral multiples of 64kbps or 56kbps, up to a maximum 2.048Mbps (unframed),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

Features

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

Specifications

E1 Interface	Framing	Framed/Unframed
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	8ms
	Connector	BNC / RJ45
	Diagnostics	Digital remote loopback
Ethernet Interface	Standard	ITU-T
	Data rate	Nx56 / Nx64
	Connector	HDB26F w/ adapter cable for Data
LEDs		Power, TD, RD, RTS, DCD, TX Clock loss, Signal loss, Sync loss, Alarm, test error
Power		AC adapter : 100~240VAC to 12VDC AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 12W
Dimensions	DC12	: 160 x 88 x 24mm (D x W x H)
	AC/DC48/AD	: 201 x 135 x 35mm (D x W x H)
Weight		DC 12 : 0.28kg, AC/DC48/AD : 0.58kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70 °C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220- E1/V35-R	10/100Base-TX to 16E1 mux card with 2x 8E1 RJ45 cables
FRM220- E1/V35-B	10/100Base-TX to 16E1 mux card with 2x 8E1 BNC cables
FRM220- E1/X21-R	X21 to framed E1 RJ-45 with X21 cable
FRM220- E1/X21-B	X21 to framed E1 BNC with X21 cable
FRM220- E1/RS530-R	RS530 to framed E1 RJ-45 with RS530 cable
FRM220- E1/RS530-B	RS530 to framed E1 BNC with RS530 cable
FRM220- E1/RS449-R	RS449 to framed E1 RJ-45 with RS449 cable
FRM220- E1/RS449-B	RS449 to framed E1 BNC with RS449 cable
FRM220- E1/RS232-R	RS232 to framed E1 RJ-45 with RS232 cable
FRM220- E1/RS232-B	RS232 to framed E1 BNC with RS232 cable

Note: The card is suitable for using in CH01M standalone chassis.

FRM220 – □□/□□□-□

Example: FRM220 – E1/V35-R

E1/T1 Cross Rate Converter

FRM220-FTEC

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

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

Features

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

Specifications

E1 interface	Framing	CAS/PCM30 or CCS/PCM31 selectable
	Bit rate	2.048Mbps
	Line Code	HDB3
	Line Impedance	75 ohm (BNC) / 120 ohm (RJ-45)
		Voice channel sample rule A-Law
	CRC check	CRC-4 enable/disable
	Pulse amplitude	Nominal 2.37V ±10% for 75ohm,
		Nominal 3.00V ±10% for 120ohm
	Zero amplitude	± 0.1V
	Connector	RJ-45 and BNC pair
T1 interface		
	Framing	D4, ESF selectable
	Bit rate	1.544Mbps
	Line Code	B8ZS / AMI
	Equalization	0 ~ 655 feet settable
		Voice channel sample rule μ-Law
	CRC check	CRC-6 when ESF
	Line Impedance	100 ohms
	Transmit Pulse level	3.0V ±10%,
	Receive signal level	0 ~ -10dB
	Connecto	RJ-45 and Bantam Jacks
LEDs	PWR, Sys, Test, T1/E1	
Standard	ITU-T G.703, G.704, G.706, G.823, G.824, ANSI T1.403	
Power	Card: 12VDC	
	Standalone: AC, DC Option	
Power Consumption	< 5W	
Dimensions	160 x 88 x 24mm(D x W x H)	
Weight	0.28kg	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	57,000 hrs	

Ordering Information

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

Note: The card is suitable for using in CH01 standalone chassis.

E1/ T1+100M Ethernet Fiber Multiplexer

FRM220-FOM01

FRM220-FOM01 is a modular design for E1/T1 + Fast Ethernet multi-service to fiber PDH multiplexer.
FRM220-FOM01 provides E1/T1 transmission transparently, pure 100Mbps Fast Ethernet simultaneously. The fiber optic line gives you the options to choose from most popular fiber cabling connectors such as, ST, SC, FC or SFP-LC.
Both multi-mode and single mode models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable, With SNMP and Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each card in the chassis.

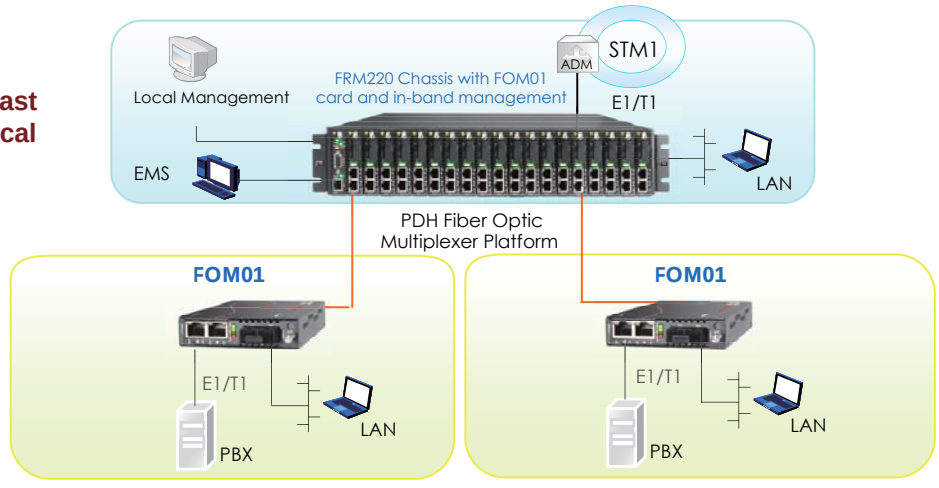
Features

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

Specifications

E1/T1 ports	
Framing	Unframed (transparent)
Bit Rate	E1:2.048 Mb/s , T1: 1.544Mb/s
Line Code	E1:AMI/HDB3, T1: AMI/B8ZS
Line Impedance	E1: Unbalanced 75 ohms (BNC cable) E1: Balanced 120 ohms (RJ-45) T1: Balanced 100 ohms (RJ-45)
Receiver sensitivity	Short haul
"Pulse" Amplitude	Nominal 2.37V+/-10% for 75 ohms Nominal 3.00V+/-10% for 120 ohms
"Zero" Amplitude	+/-0.3V
Transmit Frequency Tracking	w/external clock card option
Internal Timing	+/-30 ppm
Jitter Performance	According to ITU-T G.823
Performance monitoring	According to ITU-T G.821
Standard	ITU-T G.703, G.704, G.706 and G.732
Interface Connectors	RJ-45, BNC
Test Loops	LLB(Local Loop Back), RLB(Remote Loop Back)
Ethernet	
Interface Type	10/100Base-TX
Connector	RJ-45
Standard	IEEE 802.3, 802.3u
Duplex modes	full/half
Indications	Power FX Link, E1/T1 Mode/Link/Loopback test, LAN Link/Speed.
Power Input	AC adapter, 12VDC
Dimensions	155 x 88 x 23mm(D x W x H)
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% RH (non-condensing)
Certifications	CE, FCC, RoHS

Managed E1/T1 + Fast Ethernet Fiber Optical Multiplexer



Ordering Information

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

Note: The card is suitable for using in CH01M standalone chassis.

Connector Type / Connectivity Distance

FRM220 – FOM01 – □□ – □□□□□

Example: FRM220 – FOM01 – SR – SC002

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

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

FRM220-FOM04

FRM220-FOM04 is a modular design for 4xE1/T1 + Fast Ethernet multi-service to dual strand fiber PDH multiplexer. FRM220-FOM04 provides E1/T1 transmission transparently, pure 100Mbps Fast Ethernet simultaneously. The fiber optic line is based on the SFP technology that allows a flexible use of Multimode or Single mode lines and enable the support of different wavelengths and distances. The use of bi-directional SFPs maximizes the utilization of the fiber optic line and results in saving line costs. With SNMP and Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each card in the chassis.

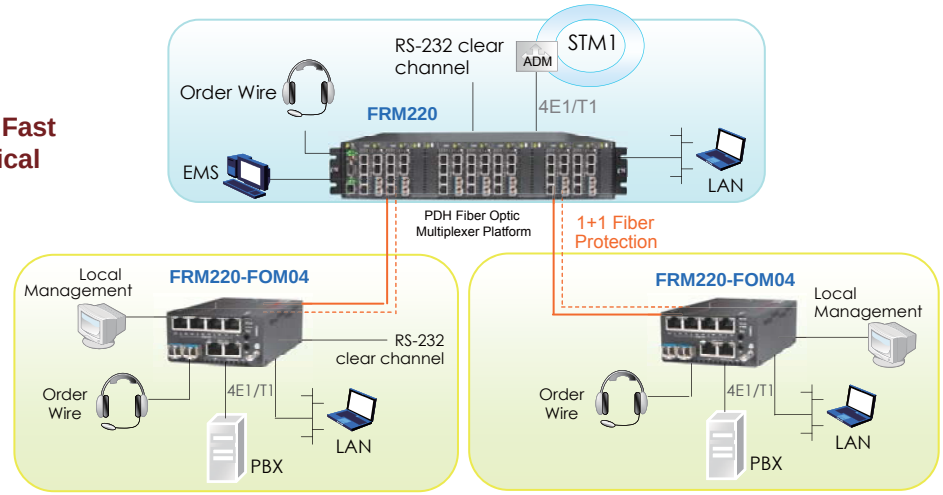
Features

- 4 channels unframed E1/T1
- 10/100Base-TX Ethernet (100M wirespeed)
- Auto MDI/MDIX
- Auto-Negotiation or Force mode
- Supports flow control 802.3x
- Supports 9K jumbo packets
- Supports Link fault pass through for Ethernet
- One clear channel RS232 up to 250Kbps(Async)
- 1+1 fiber protection, less than 50ms
- Supports Digital Diagnostics Monitoring Interface (DDMI) SFP
- AIS on signal loss on E1/T1 and fiber port
- Loopback test on E1/T1, RS232, fiber ports
- Supports Dying Gasp
- Supports local or remote In-band management (Monitor or Configure status) by SNMP manager and console port.
- Supports Order wire Ear / Microphone port.
- Supports On-Line F/W upgrade.

Specifications

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

Managed 4E1/T1 + Fast Ethernet Fiber Optical Multiplexer



Ordering Information

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

Note: The card is suitable for using in CH02M standalone chassis.

FRM220 – FOM04 – □□

Example: FRM220 – FOM04 – SR

2U, 17-Slot Non-Managed Chassis

FMC-CH17

The FMC-CH17 is a 2U high 19" chassis that supports up to 17 non-managed FMC or VDSL2 Bridge media converters. The FMC-CH17 provides an economic solution in low density fiber converter installations where no management features are required. Each FMC or VDTU2A-301 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, this chassis can support redundant power from any of three power options, universal AC (100-240VAC), DC 18-36VDC or DC 36-72VDC. The FMC-CH17 provides the working DC voltages for up to 17 FMC or VDTU2A-301 converters. The built in cooling fan ensures that temperatures in the rack remain within the tolerated working range.

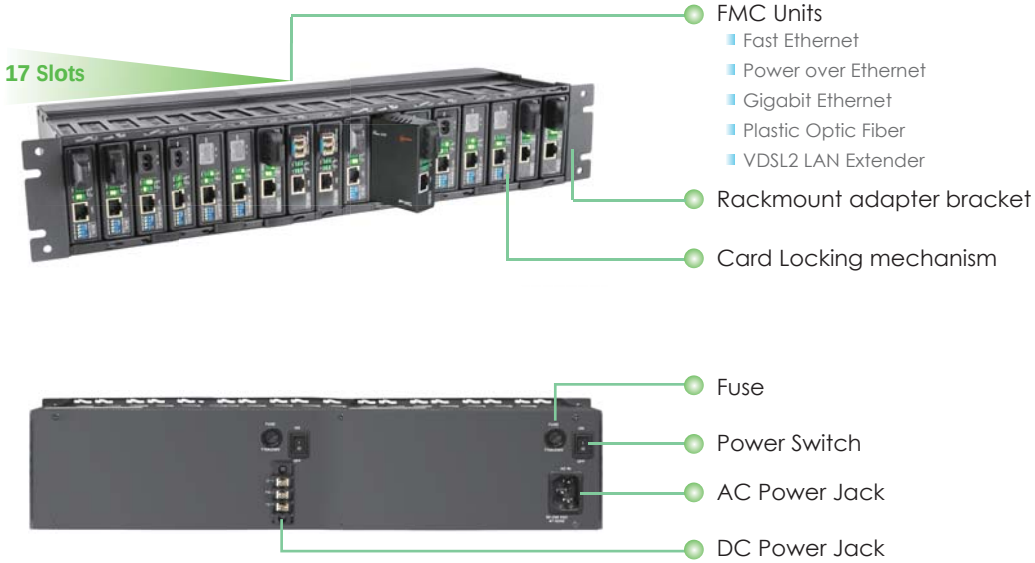
Features

- 2U, 19", 17-Slot rack supports up to 17 FMC converter
- Chassis with single or dual built-in power for AC or DC.
- Cross flow cooling fan built-in.
- Designed for rack mounting
- FMC units are hot swappable

Specifications

Power Input	AC : 100 ~240V or DC24 : 18 ~ 36V, DC48 : 36 ~ 72V
Power Consumption	< 100W
Dimensions	303 x 438 x 88mm (D x W x H)
Weight	7.9 kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	65,000 hrs

FMC-CH17 overview



Ordering Information

Model Name	Description
FMC-CH17-AC	2U, 19", 17-Slot FMC Rack with 100 ~240VAC
FMC-CH17-DC	2U, 19", 17-Slot FMC Rack with 36~75VDC
FMC-CH17-AD	2U, 19", 17-Slot FMC Rack with AC +DC redundant power
FMC-CH17-AA	2U, 19", 17-Slot FMC Rack with AC +AC redundant power
FMC-CH17-DD	2U, 19", 17-Slot FMC Rack with DC+DC redundant power

Power Type

FMC – CH17 – ☐☐

Example: FMC – CH17 – AC

2U, 8-Slot Non-managed Chassis

FMC-CH08

The FMC-CH08 is a 2U high 10" (or half 19") chassis that supports up to 8 non-managed FMC or VDSL2 Bridge media converters. The FMC-CH08 provides an economic solution in low density fiber converter installations where no management features are required. Each FMC or VDTU2A-301 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-CH08 chassis. When two chassis are connected in tandem, they fit exactly into a 2U 19" rack space. With one of three built-in power options of universal AC (100-240VAC), DC 18-36VDC or DC 36-72VDC, the FMC-CH08 provides the working DC voltages for up to 8 FMC or VDTU2A-301 converters. The built in cooling fan ensures that temperatures in the rack remain within the tolerated working range.

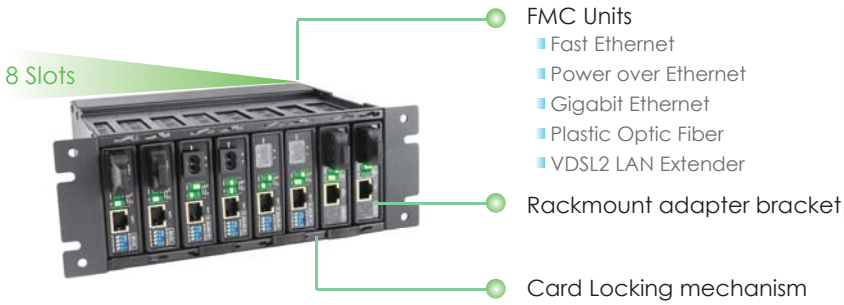
Features

- 2U, 10" (or half 19") rack supports up to 8 FMC converter
- Chassis with single built-in power available in AC or DC models.
- Cross flow cooling fan built-in.
- Designed for rack mounting in tandem
- FMC units are hot swappable

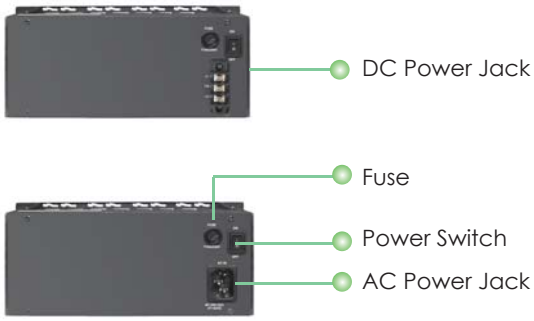
Specifications

Power Input	AC : 100 ~240V
	DC24 : 18 ~ 36V, DC48 : 36 ~ 72V
Power Consumption	< 45W
Dimensions	196 x 252 x 89mm (D x W x H)
Weight	1.47 kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	65,000 hrs

FMC-CH08 Front view



FMC-CH08 Back view



Ordering Information

Model Name	Description
FMC-CH08-AC	2U, 10" 8-Slot FMC Rack with 100 ~ 240VAC
FMC-CH08-DC-24	2U, 10" 8-Slot FMC Rack with 18 ~36VDC
FMC-CH08-DC-48	2U, 10" 8-Slot FMC Rack with 36 ~75VDC

Power Type

FMC – CH08 – □□

Example: FMC – CH08 – AC

Non-Managed Fast Ethernet Fiber Converter

FMC-10/100

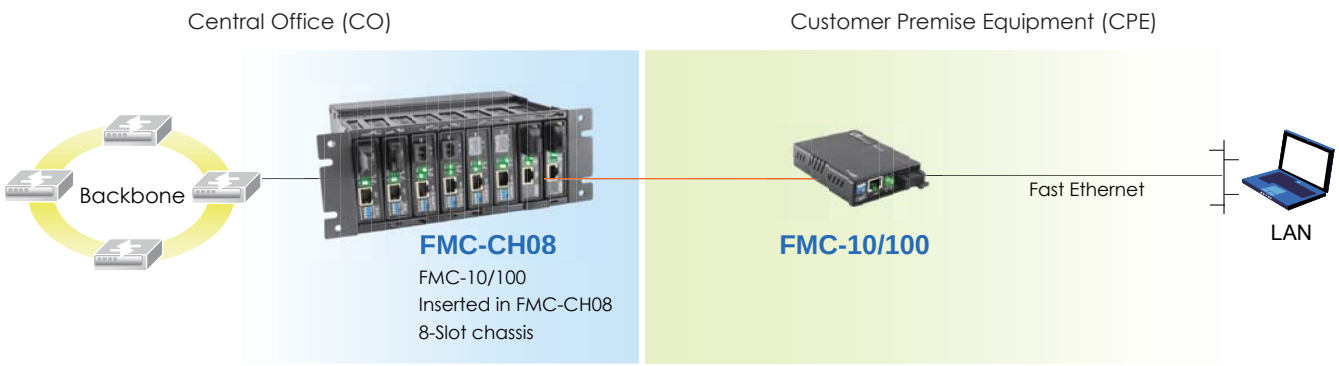
The FMC-10/100 family are Fast Ethernet 10/100Base-TX to 100Base-FX non-managed stand-alone media converters, which give you the options to choose from the most popular fiber cabling connectors, ST, SC, FC, or SFP-LC. Both multi-mode and single mode converter models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, according to IEEE802.3u standards. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status. These stand-alone converters may also be concentrated into either the FMC-CH08 or FMC-CH17 non-managed chassis.

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	WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mpbs
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u
Indications		LED (Power, FX Link, TX SPD, TX Link, TX Duplex, FEF)
Power Input		FMC: DC 12V In,
Power Consumption		< 4W
Dimension		FMC: 108 x 74 x 23mm (D x W x H)
Weight		FMC: 0.12kg, FMC-AC/DC: 0.55kg
Temperature		0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, RoHS
MTBF		65,000 hrs

Features

- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1600 bytes (Max.) packets
- Supports Q in Q double tagged frame transparent
- 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



Ordering Information

Model Name	Description
FMC-10/100	10/100Base-TX to 100Base-FX Non-managed media converter

Connector Type / Connectivity Distance

FMC – 10/100 – □□□□□

Example: FMC – 10/100 – SC002

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

Non-Managed Fast Ethernet Plastic Optical Fiber Converter

FMC-10/100POF

The FMC-10/100POF family is a Fast Ethernet 10/100Base-TX to 100Base-FX non-managed stand-alone media converter which uses plastic optical fiber (POF). POF, as it is widely known, offers affordable, high-end connectivity for small office and home networks. With speeds of 100 Mbps optical Ethernet, it is a superior alternative to copper used in traditional networks. This is especially true for applications such as triple play and IPTV. The advantages to professional installers and amateur do-it-yourselfers are numerous. The discrete 2mm x 4.5mm duplex cable is easily concealed under carpets or easily pulled inside walls without breaking, while it can be easily cut with a pair of scissors. POF is robust enough to survive even the most novice installer. Troubleshooting is a snap as it uses 650nm visible red light to transfer data from one device to another. A quick glance inside the cable will indicate connectivity to the network by a red glow; no red light means no connection. It's that simple.

POF is completely safe. Because it is a light-based solution, there is no EMI (electro-magnetic interference) so it won't interfere with or be interfered by other electrical equipment. POF is already used in millions of cars worldwide to drive entertainment and information networks and has been proven reliable even in the most rugged environments. These stand-alone converters may also be concentrated into either the FMC-CH08 or FMC-CH17 non-managed chassis.

Specifications

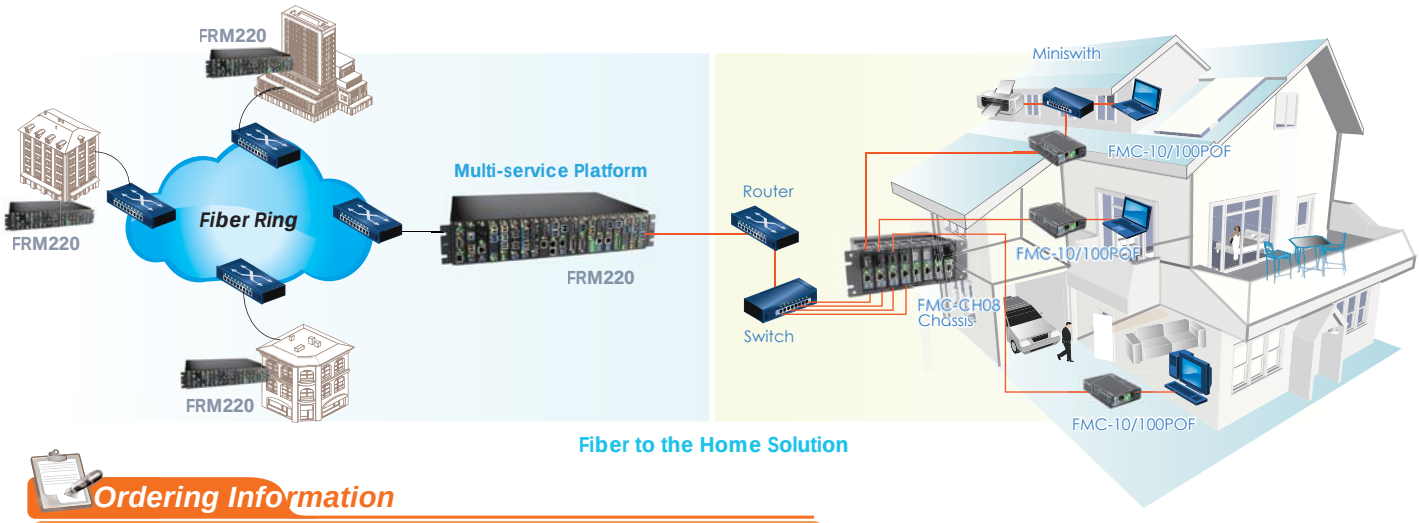
Optical Interface	Connector	Optolock
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	Duplex POF cable
	Distance	MM 50 meters
	Wavelength	MM 650nm
	Source	LED
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u, IEEE802.3ab
Indications		LED (Power, FX Link, TX SPD, TX Link, TX Duplex, FEF)
Power Input		12VDC
Power Consumption		< 4W
Dimension		97 x 74 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, RoHS
MTBF		65,000 hrs

Features

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

Easy to Install

Step 1: Simple cut POF with sharp scissors or razor blade
Step 2: Hold the "Optolock™ "and insert the cables all the way
Step 3: Press the "Optolock™ "to lock the cable
On remote side, the cable with visible red LED indication must plug in the RX port. The link is then complete.



Fiber to the Home Solution

Ordering Information

Model Name	Description
FMC-10/100 POF-O	10/100Base-TX to 100Base-FX POF, Optolock connector

Non-Managed Power Over Ethernet PD Converter

FMC-10/100P

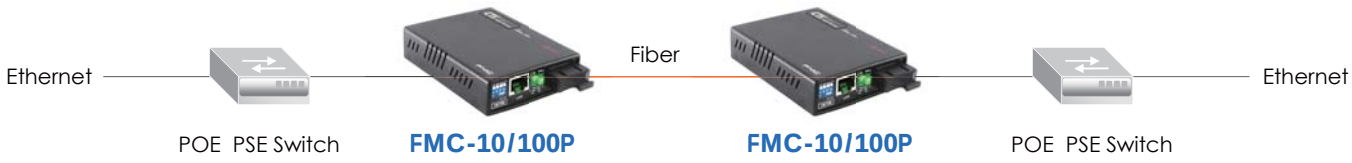
The FMC-10/100P is Power over Ethernet 10/100Base-TX to 100Base-FX non-managed PD(Power Device) Fiber converter, which give you the options to choose from the most popular fiber cabling connectors, ST, SC, FC. Both multi-mode and single mode converter models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. With Power over Ethernet (PoE) feature, FMC-10/100P takes power supply over Ethernet cable from PoE Ethernet Switch and may work without external power adapter. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, according to IEEE802.3u standards. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status. These stand-alone converters may also be concentrated into either the FMC-CH08 or FMC-CH17 non-managed chassis.

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	WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mpbs
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
	PD Input Power	48VDC
Standard		IEEE 802.3, IEEE 802.3u, IEEE 802.3af
Indications		LED (Power, FX Link, TX SPD, TX Link, TX Duplex, FEF)
Power Input		FMC: DC 12V In,
Power Consumption		< 4W
Dimension		FMC: 108 x 74 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, RoHS
MTBF		65,000 hrs

Features

- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1600 bytes (Max.) packets
- Supports Q in Q double tagged frame transparent
- 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
- Supports 802.3af Power over Ethernet



Ordering Information

Model Name	Description
FMC-10/100P	10/100Base-TX to 100Base-FX POE PD media converter

Connector Type / Connectivity Distance

FMC – 10/100P – □□□□□

Example: FMC – 10/100P – SC002

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

Fast Ethernet In-band Media Converter

FMC-10/100i

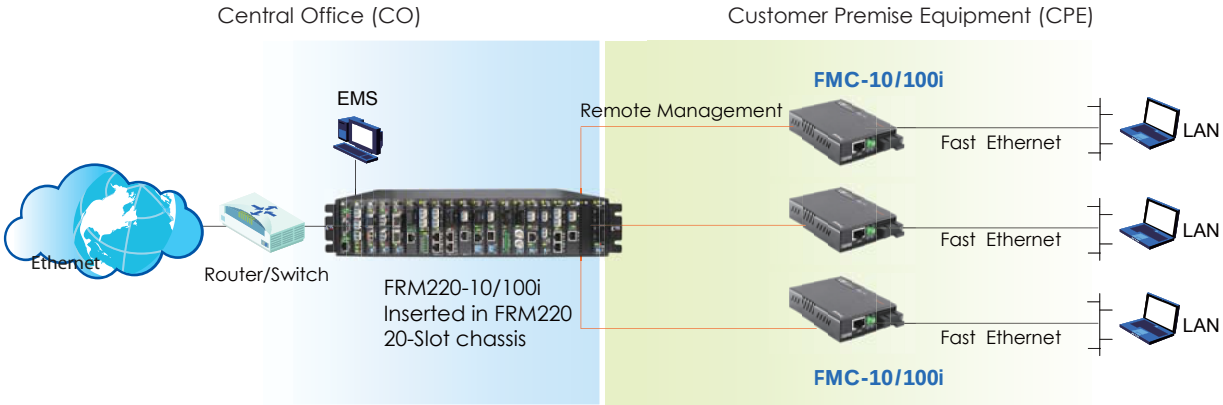
The FMC-10/100i family are 10/100Base Ethernet to 100Base-FX fiber stand-alone converters designed for fiber connection to FRM220-10/100i card in a managed FRM220-CH20 chassis. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

Features

- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (Max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager with FRM220-10/100i.
- Bandwidth control (Nx32K or Nx512Kbps)
- Support flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade
- Supports 802.3af Power over Ethernet (only FMC-10/100IP)

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC), SFP LC
	Data rate	100Mbps
	Duplex mode	Full duplex
	Cable type	MM 62.2/125μm, 50/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	1310, 1550nm
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mpbs
	Duplex mode	Half / Full duplex
	Cable type	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e,
	Distance	100 meters
Standard		IEEE 802.3, IEEE 802.3u, IEEE802.3ab
LEDs		Power, FX Link, TX SPD, TX Link, TX Duplex, FEF
Power		DC 12V In
Power Consumption		< 4W
Dimensions		108 x 74 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 50°C (Operating), -10~70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, RoHS
MTBF		65,000 hrs



Ordering Information

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

Connector Type / Connectivity Distance

FMC – 10/100i – □□□□□

Example: FMC – 10/100i – SC002

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

NEW

Web Smart OAM/IP Managed Fast Ethernet Media Converter

FMC-100M

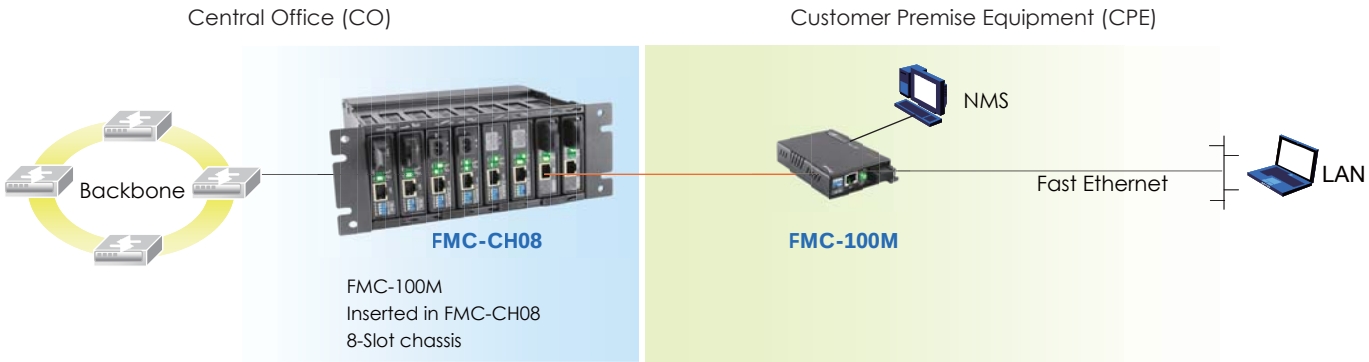
The FMC-100M family are Fast Ethernet 10/100Base-TX to 100Base-FX Web Smart IP based managed fiber media converters, which provide simple control and setting function on each Ethernet port through out of band network via a Web browser. The FMC-100M media converters give you the options to choose from the most popular fiber cabling connectors, ST, SC, FC, or SFP-LC. 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. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, according to IEEE802.3u standards. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status. These stand-alone converters may also be concentrated into either the FMC-CH08 or FMC-CH17 chassis.

Features

- 1 Port 10/100BASE-TX to 100BASE-FX Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Dying gasp (remote power failure detection)
- Supports Link Fault Pass Through (LFP) Function
- Supports Auto Laser Shutdown (ALS) Function
- Supports flow control Enable or Disable
- Supports Jumbo Frame 9K Packet
- Ingress/Egress Bandwidth control
- Support 802.3ah-OAM/IP in-band management
- Firmware upgrade via Web
- Password Setting
- Allow IP settings Web or Console management
- Supports 16 Tag VLAN Group
- RMON counters
- Supports Double VLAN tag (Q-in-Q) on standalone unit

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	WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mpbs
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u
Indications		LED (Power, FX Link, TX SPD, TX Link, TX Duplex, FEF)
Power Input		FMC: DC 12V In, FMC-AC/DC: AC 100 ~ 240V/ DC 24 ~ 72V
Power Consumption		< 4W
Dimension		FMC: 108 x 74 x 23mm (D x W x H) FMC-AC/DC: 192 x 86 x 30mm (D x W x H)
Weight		FMC: 0.12kg, FMC-AC/DC: 0.55kg
Temperature		0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FMC-100M	10/100Base-TX to 100Base-FX web smart OAM/IP managed media converter

Connector Type / Connectivity Distance

FMC – 100M – □□□□□

Example: FMC – 100M – SC002

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

Web Smart OAM/IP Managed Gigabit Ethernet Media Converter

FMC-1000MS

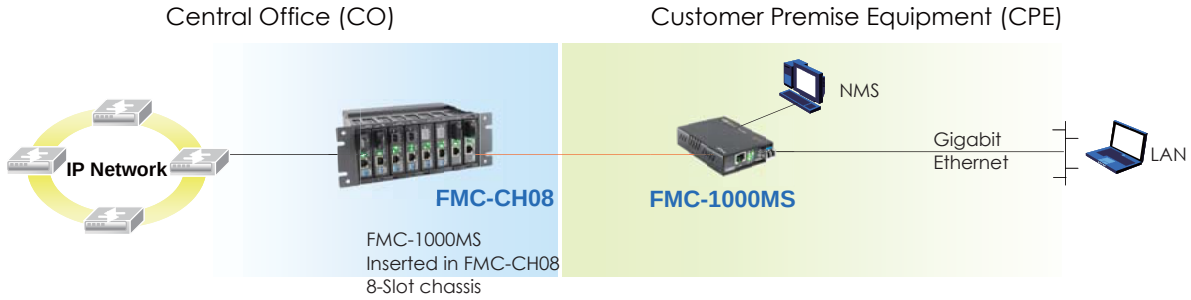
The FMC-1000MS family are Gigabit Ethernet 10/100/1000Base-T to 1000Base-X Web Smart IP based managed fiber media converters, which provide simple control and setting function on each Ethernet port through out of band network via a Web browser. The FMC-1000MS media converters give you the fiber cabling connector, SFP-LC 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. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, according to IEEE802.3u standards. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status. These stand-alone converters may also be concentrated into either the FMC-CH08 or FMC-CH17 chassis.

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
- Support flow control Enable or Disable
- Support Jumbo Frame 9K Packet
- Ingress/Egress Bandwidth control
- Support 802.3ah-OAM/IP in-band management
- Firmware upgrade via Web
- Digital Diagnostic (DOM) SFP Support
- Management Password Setting
- Dying gasp (remote power failure detection)
- Support Link Fault Pass Through (LFP) Function
- Support Auto Laser Shutdown (ALS) Function
- Web management on stand-alone.
- Support D/D function for SFP fiber transceiver
- Support On-Line F/W upgrade (local) by the Web manager
- Support 16 Tag VLAN Group/ Q-in-Q
- RMON counters

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 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u IEEE 802.3ab, 802.3z
Indications		LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FMC-1000MS	10/100/1000Base-T to 1000Base-X SFP web smart OAM/IP managed media converter (optional SFP module)

NEW

Gigabit Ethernet POE PSE Media Converter

OFC-1000PSE
OFC-1000PSE/A

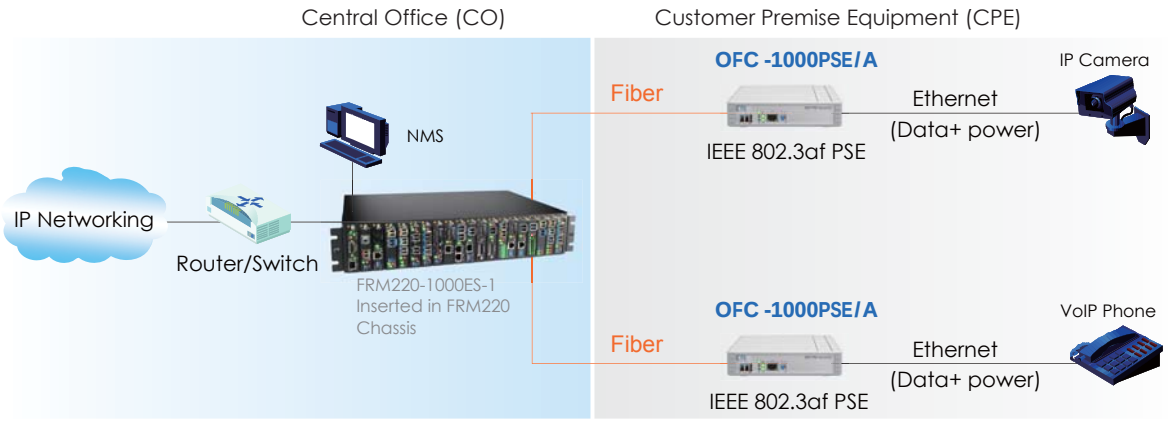
The OFC-1000PSE/A is a copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000 Base-T to 1000Base-SX/LX with SFP LC connector. The OFC-1000PSE complies with IEEE802.3af Power Over Ethernet standard with external AC power adapter or internal AC power build-in. This PoE media converter is a Power Sourcing Equipment (PSE) which combines data received over a TP link with 48VDC power, providing power to IEEE802.3af powered device (PD) over the existing CAT5 UTP cable. Other features include Link fault pass through (LFP), Store and Forward Switching, auto or forced mode setting for copper Ethernet as well as auto laser shutdown.

Features

- 10/100/1000Base-T to 1000Base-SX/LX SFP
- IEEE 802.3af Compliant PSE (power sourcing equipment)
- Auto-negotiation or forced mode
- Auto MDI/MDIX
- Store and Forward Switching Mechanism
- Supports 4K MAC address
- Supports 256K Byte Packet Buffer
- Forward 1632 bytes (max.) packets
- Supports Link fault pass through (LFP) function

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, SM 15/30/50/80/120km WDM 20/40/60km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	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 1000Base-T Cat 5, 5e or higher
	PSE Output Power	Class 0: 15.4w Class 1: 4w Class 2: 7w Class 3: 15.4w
Standards		IEEE 802.3, 802.3u, 802.3ab, 802.3z, 802.3af,802.3x
Indications		LED (Power, FX-Link, FX Duplex, TX-SPD, TX-Duplex, TX-Link)
Power Input		100~240VAC. 48VDC/0.5A
Power Consumption		< 5W (w/o PSE Output Power)
Dimensions		201 x 135 x 35mm (D x W x H)
Weight		0.58kg
Temperature		0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		75,000 hrs



Ordering Information

Model Name	Description
OFC-1000PSE/A	GE PSE media converter with DC 48V in AC adapter
OFC-1000PSE-AC	GE PSE media converter with built-in AC power 100 ~240V
OFC-1000PSE-DC	GE PSE media converter with built-in DC power 18 ~ 72V

OFC – □□□□□□□ – □□

Example: OFC – 1000PSE-AC

RS-232 to Fiber Media Converter

FIB-232A

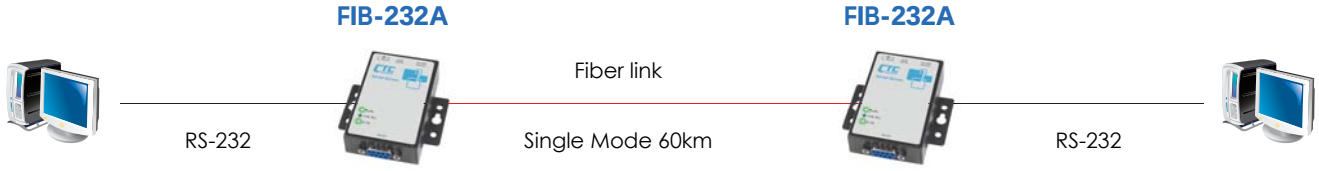
The FIB-232A is a low cost, compact, fiber converter designed to extend RS-232 transmissions up to 120Km without any repeaters. The transmissions run in fibers which provide for excellent data security as well as being immune to EMI/RFI, variations in ground potentials, and lightning strikes. With the selectable baud rate, the user can choose its own rate for the transmission. The FIB-232A operates at the physical layer (OSI Layer 1) and is completely transparent to the RS-232 transmissions and protocols. The FIB-232A may use an external power adapter. Utilizing an ST, SC fiber cable, the FIB-232A operates in Full Duplex mode for bi-directional transmissions. The FIB-232A RS-232 interface operates in DCE mode for direct connection to DTE devices such as PC DB9 port.

Features

- Extends RS-232 transmission distance
  - Up to 2km with multi-mode fiber
  - Up to 120km with single-mode fiber
- Baud rates up to 230.4Kbps
- External power source supplied
- Compact size

Specifications

Signal Format	EIA RS-232C, ITU V.24, V.28
Mode	Asynchronous
Connector	DB9 Female
Fiber Port	1 x 9(ST, SC)
Fiber Type	Single Mode, Multi-mode
Light Source	FP Laser, DFB Laser
Wavelength	1310 nm, 1550nm
Distance	2Km, 15Km, 30Km, 60Km, 80Km, 120Km
Baud Rate	Up to 230.4Kbps
BER	10^{-9}
Indications	LED (Power)
External Power	DC12V, 0.4A
Environment	0 ~ 50°C, 20 ~ 95% RH -20 ~ 80°C, < 95% RH
Certification	CE, FCC, RoHS



Ordering Information

Model Name	Description
FIB-232A	RS-232 to fiber media converter

Connector Type / Connectivity Distance

FIB – 232A – □□□□□

Example: FIB – 232A – SC002

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

Gigabit L2 OAM Managed Fiber Switch

ESW-4424A

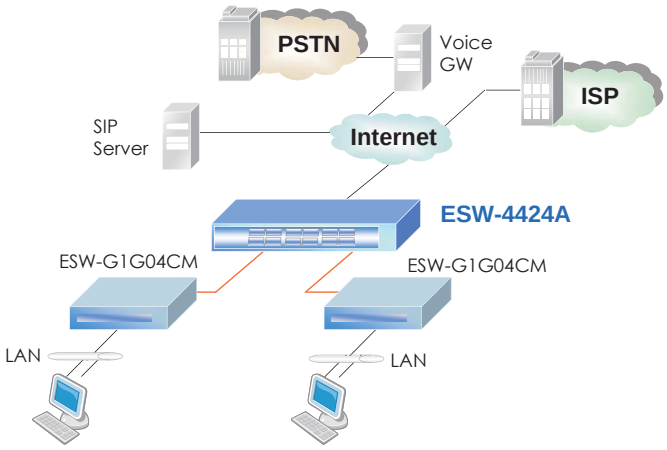
Switch ESW-4424A is a cost-effect high performance 24G L2 OAM Managed Ethernet Fiber switch. 24-port 100M/1G SFP 2-port 10G SFP+ and 1-slot 10G Module are supported are supported. This switch supports remote management by SNMP, Http and Telnet interfaces, and local management by console interface. ESW-4424A supports many L2 switch management functions, e.g. DHCP Snooping (including Option 82), QoS (Quality of Service), Spanning Tree RSTP/MSPT, 802.1Q VLAN, Port Trunking, 802.1x Port Security, Rate Control, Port Configuration, Port Mirroring, Port Statistics, MVR, IGMP Snooping functions, ... etc. AC (100 ~240VAC) and DC (-48VDC) dual power input with Power Redundancy.

Features

- 24x 100/1000X SFP+2x 10G SFP+ +1x 10G Slot
- Forwarding 9K bytes Jumbo Frame
- Console, SNMP, Http, Https, Telnet management
- 802.1Q VLAN, Port-based VLAN, Private VLAN
- VLAN Stacking(Q in Q)
- DHCP Relay Option 82
- IP-Port Binding
- Storm control
- 802.3ad LACP for link aggregation
- 802.1x for user authentication, Dynamic VLAN and Guest VLAN are supported
- IGMP snooping and query and MVR(Multicast VLAN Registration)
- 8 priority queues for Port-based, 802.1P QoS operation
- 802.1d Spanning Tree & 802.1w Rapid Spanning Tree
- Port rate limit for ingress/egress traffic
- Static MAC address binding / Dynamic Mac address
- Event log and Syslog
- Administrator IP/Subnet limit for security

Specifications

Interface	24x 100/1000X SFP + 2x 10G SFP+ +1x 10G Slot
Console Port	DB9 Console port
Filter & Forward Rate	Full line speed
Transmission method	Store-and-forward
Packet Buffer	32 Mbits
Mac Table Size	32K
Max Packet Size	9K bytes
Flow Control	Yes
Management	Console, SNMP, Telnet, web, 802.3ah OAM
DHCP	snooping / Relay Option 82
SNMP agent	MIB II(RFC1213)
VLAN	Q in Q, Tag-Base VLAN, Port Base VLAN
Security	Static Mac address forwarding
	Port security
	Static multicast Mac address forwarding
	ARP inspection
	Loop detection
LACP	Port trunking with 14 group
	Up to 8-port for each group
QoS	8 priority queues per port
STP	RSTP, MSTP
Port Mirror	Yes
IGMP Multicast	IGMP Proxy, IGMP v3 snooping
	MLDv2 snooping Dedicated Multicast VLAN(MVR)
Port Mirror	Yes
SNMP	SNMP v1, v2c, v3 , SNMP trap, RMON
Metro Ring Protocol	ITU-T G.8031 Linear Protection
	ITU-T G.8032 Ring
Rate Control	Engress / Ingress
Storm Control	Broadcast flooding/multicast control
Software upgrade	TFTP/Http/Https
Event Log	Yes
LED Display	Port Link/Act, duplex, Power, System
Power Input	100 ~ 240VAC, -36 ~ 72VDC
Power Consumption	<50W
Operating Temperature	0 ~ 50 °C
Humidity	5% ~ 90% (non-condensing)
Dimensions	440 x 172 x 44 (W x D x H)mm
Safety	CE, FCC, RoHS
Standards	IEEE 802u, 802.3z, 802.3ae, 802.3x, 802.1q, 802.1p, 802.1x, 802.1d, 802.1w, 802.1s, 802.3ad, 802.3ah



Ordering Information

Model Name	Description
ESW-A4G24CA	24x 100M/1G SFP + 2x 10G SFP+ with 1-slot 10G module L2 OAM managed fiber switch

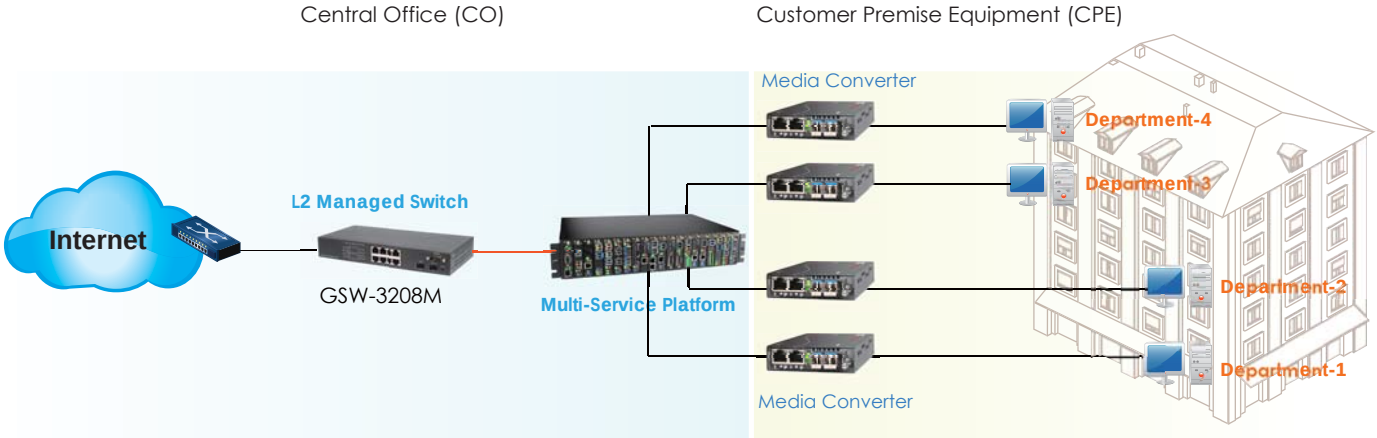
8x 10/100/1000-T + 2x1000-SX/LX SFP L2 Managed Switch

GSW-3208M

GSW-3208M is a cost-effect high performance L2 Ethernet management switch – 8 x 10/100/1000Mbps TX ports and 2* SFP ports are supported. This switch supports remote management by SNMP, Http and Telnet interfaces, and local management by console interface. GSW-3208M supports many L2 switch management functions, e.g. 802.1Q VLAN, 802.1x Port Security, Rate Control, Port Configuration, Port Mirroring, Port Statistics, QoS functions, ... etc. Auto-MDIX function is supported for every TX port of the switch for easy cable connection.

Features

- 8x RJ45 ports, with 10/100/1000Mbps, Full/Half duplex auto-negotiation and Auto-MDIX functions
- 2x SFP sockets, Port9 and Port10
- Jumbo Frame
- Out-band console and in-band SNMP/Http/Https/Telnet management interface
- CISCO-like Command Line Interface
- 802.1Q VLAN, 1024 active VLAN maximum with VID 1~4094
- Port-based VLAN
- Private VLAN
- DHCP Relay Option 82
- IP-Port Binding
- Broadcast Storm control
- Q in Q
- 802.3ad LACP for link aggregation
- 802.1x for user authentication, Dynamic VLAN and Guest VLAN are supported
- IGMP snooping and query and MVR
- 4 priority queues for Port-based, 802.1P QoS operation, with Strict Priority/WRR scheduling
- 802.1d Spanning Tree Compatible & 802.1w Rapid Spanning Tree
- Port rate limit for ingress/egress traffic
- Static MAC address binding / Dynamic Mac address number limit
- Event log and Syslog are supported
- Administrator IP/Subnet limit for security



Specifications

Ports	8x RJ45 ports, for 10/100/1000Mbps, Full/Half duplex auto-negotiation and Auto-MDIX and Force MDI/MDIX function 2* SFP Port 9 and Port10	Port Mirror	Yes
		Static Mac ID Limit	Yes, Limit on port
		Dynamic Mac ID Limit	Yes
		IP-Port Binding	Yes
Console Port	DB9 console port	IEEE 802.1x	Yes, Support Transparent and Authentication modes Dynamic VLAN & Guest VLAN are supported
Filter & Forward Rate	Full line speed		
Transmission method	Store-and-forward	Rate Control	Yes, 1~31 levels, with level is configured between 128Kbps ~ 30Mbps
Packet Buffer	500K Bytes		
Mac Table Size	8K	Storm Control	Broadcast/flooding/multicast control
Max Packet Size	1518 bytes (without tag), 9600 bytes for Jumbo Frame	IP Multicast	Yes, IGMP Snooping(256 Groups Max.) / query and MVR function
Flow Control	Back pressure for half duplex, IEEE802.3x for full duplex	Software Upgrade	Out-band: Xmodem, In-band: TFTP/Http
		Text Configuration	Yes, for easy edit
Management	Out-band : Console (CISCO-like Command Line Interface) In-band : SNMP/Telnet/Http/Https Administrator IP/Subnet limit is supported.	Event Log	Yes, and Syslog is supported
		Configuration	Yes
		Down/Upload Event Log	Yes, and Syslog is supported
DHCP	Support DHCP Client / Relay / Option 82 functions Version. 1, 2c		
SNMP agent	Support MIB II(RFC1213), Bridge MIB (RFC 1493), VLAN MIB (802.1Q, RFC2674), Private MIB	LED Display	Per Port : Link/Act (Green:Gigabit, Yellow:10/100M), Full Duplex Per Device : Power, System
VLAN	802.1Q VLAN with 1024 co-current groups maximum from 4094 VLANs Port-based VLAN Private VLAN	Input Power	100~240VAC, 50/60 Hz, 36 ~ 72VDC
		Power Consumption	Max. 8 Watt
Q in Q	Yes	Environmental	0 ~ 50°C
Trunking	Support up to 8 trunks using either static or dynamic trunking(LACP)	Humidity	10% ~ 90% (non-condensing)
		Standards	IEEE802.3(10BaseT Ethernet), IEEE802.3u(100Base Fast Ethernet), IEEE802.3ab(1000BaseT), IEEE802.3z(1000Base) IEEE802.1D, IEEE802.1w, IEEE802.1P, IEEE802.1Q, IEEE802.1x
QoS	Four priority queues per port for Port-based & 802.1p tagged-based QoS Strict Priority/WRR scheduling		
Spanning Tree	802.1d Spanning Tree Compatible & 802.1w Rapid Spanning Tree		

Ordering Information

Model Name	Description
GSW-3208M	8x 10/100/1000-T + 2x1000-SX/LX SFP L2 Managed Switch

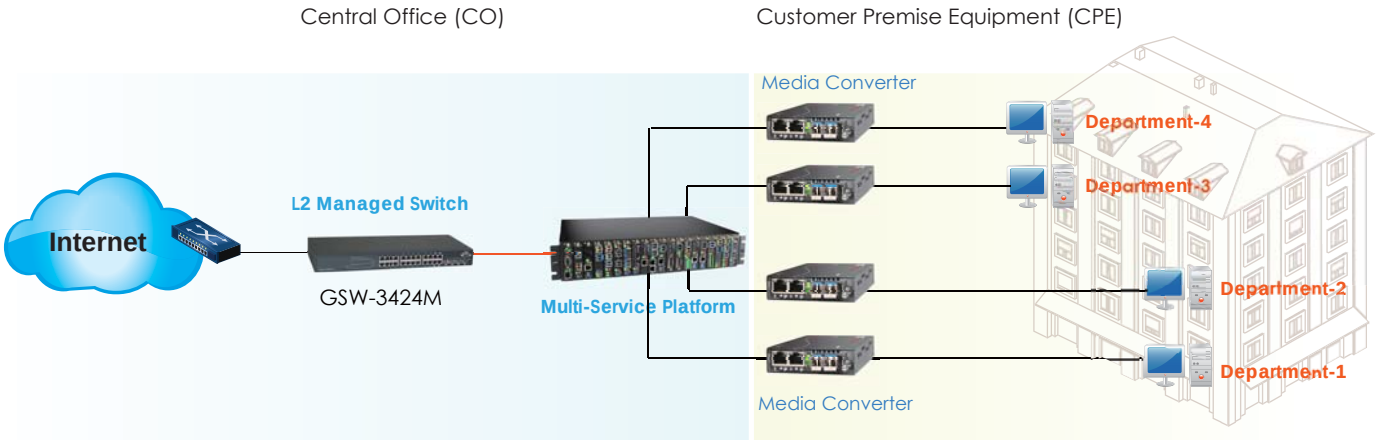
24x 10/100/1000-T + 4x1000-SX/LX SFP L2 Managed Switch

GSW-3424M

GSW-3424M is a cost-effect high performance 24G L2 Ethernet management switch – 24x 10/100/1000Mbps TX ports and 4x SFP ports are supported. This switch supports remote management by SNMP, Http and Telnet interfaces, and local management by console interface. GSW-3424M supports many L2 switch management functions, e.g. 802.1Q VLAN, 802.1x Port Security, Rate Control, Port Configuration, Port Mirroring, Port Statistics, QoS functions, ... etc. Auto-MDIX function is supported for every TX port of the switch for easy cable connection.

Features

- 24x 10/100/1000T + 4x 1000SX/LX SFP slot shared with Port 21~24 TX ports, auto-detect the connection
- Jumbo Frame
- Console, SNMP, Http, Https, Telnet management
- Command Line Interface
- 802.1Q VLAN, Port-based VLAN, Private VLAN
- VLAN Stacking(Q in Q)
- DHCP Relay Option 82
- IP-Port Binding
- Storm control
- 802.3ad LACP for link aggregation
- 802.1x for user authentication, Dynamic VLAN and Guest VLAN are supported
- IGMP snooping and query and MVR(Multicast VLAN Registration)
- 4 priority queues for Port-based, 802.1P QoS operation, with Strict Priority/WRR scheduling
- 802.1d Spanning Tree Compatible & 802.1w Rapid Spanning Tree
- Port rate limit for ingress/egress traffic
- Static MAC address binding / Dynamic Mac address number limit
- Event log and Syslog
- Administrator IP/Subnet limit for security



Specifications

Ports	24 ports 10/100/1000Mbps, RJ45 4x SFP ports	Spanning Tree	802.1d STP, RSTP
Console Port	DB9 console port	Port Mirror	Yes
Filter & Forward Rate	Full line speed	Static Mac ID Limit	Limit on port
Transmission method	Store-and-forward	Dynamic Mac ID Limit	Yes
Packet Buffer	500K Bytes	IP-Port Binding	Yes
Mac Table Size	8K	IEEE 802.1x	Yes, Support Transparent and Authentication modes
Max Packet Size	9600 bytes		Dynamic VLAN & Guest VLAN are supported
Switching Capacity	48 Gbps	Rate Control	128Kbps ~ 30Mbps
Packet Forward Rate	35.7Mpps	Storm Control	Broadcast/flooding/multicast control
Flow Control	Back pressure for half duplex,	IP Multicast	IGMP Snooping (256 Groups Max.) /
	IEEE802.3x for full duplex		query and MVR function
Management	Out-band : Console (CLI)	Software Upgrade	Xmodem, TFTP/Http/Https
	In-band : SNMP/Telnet/Http/Https	Text Configuration	Yes, for easy edit
	Administrator IP/Subnet limit	Event Log	Yes, and Syslog is supported
DHCP	DHCP Client / Relay / Option 82	LED Display	Link/Act, Full Duplex, Power, System
SNMP agent	MIB II(RFC1213), Bridge MIB (RFC 1493), V1,	Input Power	100~240VAC, 50/60 Hz
	2c VLAN MIB (802.1Q, RFC2674), Private MIB	Power Consumption	Max. 24W
VLAN	802.1Q VLAN with 1024 co-current groups	Operating Temperature	0 ~ 50°C
	maximum from 4094 VLANs	Humidity	10% ~ 90% (non-condensing)
	Port-based VLAN, Private VLAN	Dimensions	440W x 172D x 44H mm
Q in Q	Yes	Standards	IEEE802.3, IEEE802.3u, IEEE802.3ab,
Trunking	Static or dynamic trunking (LACP)		IEEE802.3z IEEE802.1D, IEEE802.1w,
QoS	4 priority queues per port for Port-based & 802.1p		IEEE802.1P, IEEE802.1Q, IEEE802.1x
	tagged-based QoS Strict Priority/WRR scheduling		

Ordering Information

Model Name	Description
GSW-3424M	24x 10/100/1000-T + 4x1000-SX/LX SFP L2 Managed Switch

Non-Managed Fast Ethernet Switch

FSW-2104

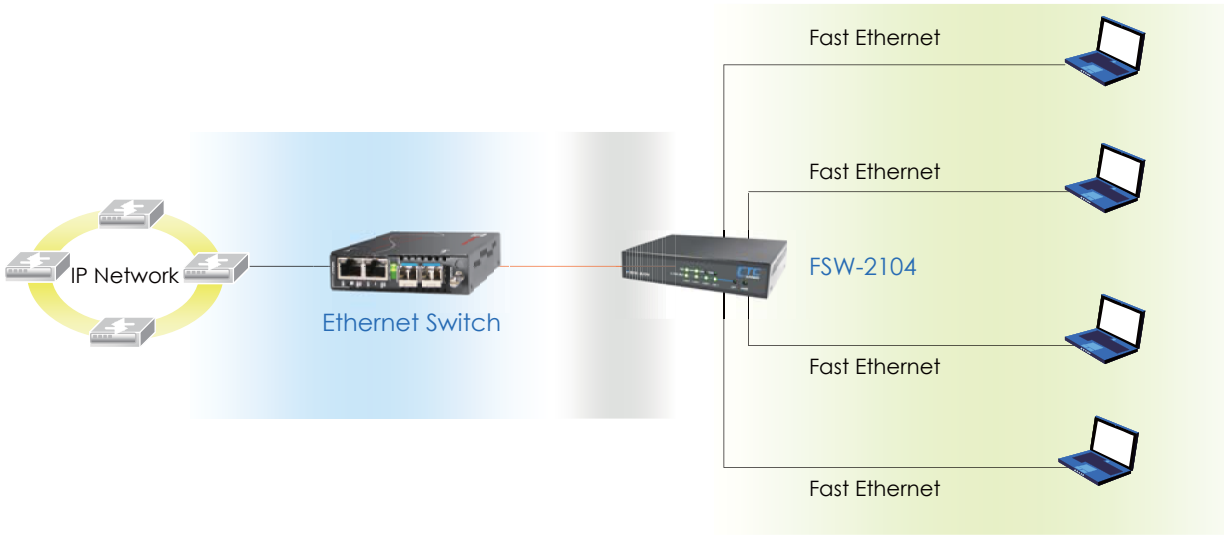
The FSW-2104 provides a low cost solution for non-managed Ethernet fiber switches. The FSW-2104 is a 4-port 10/100Base-TX plus 1-port 100Base-FX Fast Ethernet switch. It is designed for small workgroup applications that require a long distance connection to the backbone, such as between buildings, offices, or within a campus location. FSW2104 provide full-duplex capability on each auto-negotiating port, for enhanced performance. A wide range of transceiver selection provides fiber connection with SC, FC or ST type connectors in multimode or single mode and at distance from 2 to 120km as well as BiDi (single fiber) at distances of 20, 40, 60, or 80km.

Specifications

Optical Interface	Connector	1x9 (SC, ST)
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u
Indications		LED (FX Link, TX SPD, TX Link/Act)
Power Input		Card : 5 VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension		138 × 77 × 28mm (D x W x H)
Weight		0.45kg
Temperature		0 ~ 50°C (Operating), 0 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, RoHS
MTBF		65,000 hrs

Features

- 10/100Base-TX to 100Base-FX
- Auto-Negotiation
- Auto MDI / MDIX
- Forward 1552 bytes (Max.) packets
- Support 1K MAC address
- 512k bits packet buffer memory
- Supports broadcast storm protection



Ordering Information

Model Name	Description
FSW-2104	4x 10/100Base-TX to 100Base-FX unmanaged Switch

Connector Type / Connectivity Distance

FSW – 2104 – □□□□□

Example: FSW – 2104 – SC002

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

Non-Managed Fast Ethernet Switch

FSW-2202, FSW-2204 FSW-2206

The FSW-2200 family provides a low cost solution for non-managed Ethernet fiber switches. The FSW-2202 is a 2-port 10/100Base-TX plus 2-port 100Base-FX Fast Ethernet switch. The FSW-2204 is a 4-port 10/100Base-TX plus 2-port 100Base-FX Fast Ethernet Switch and The FSW-2206 is a 6-port 10/100Base-TX plus 2-port 100Base-FX Fast Ethernet Switch.

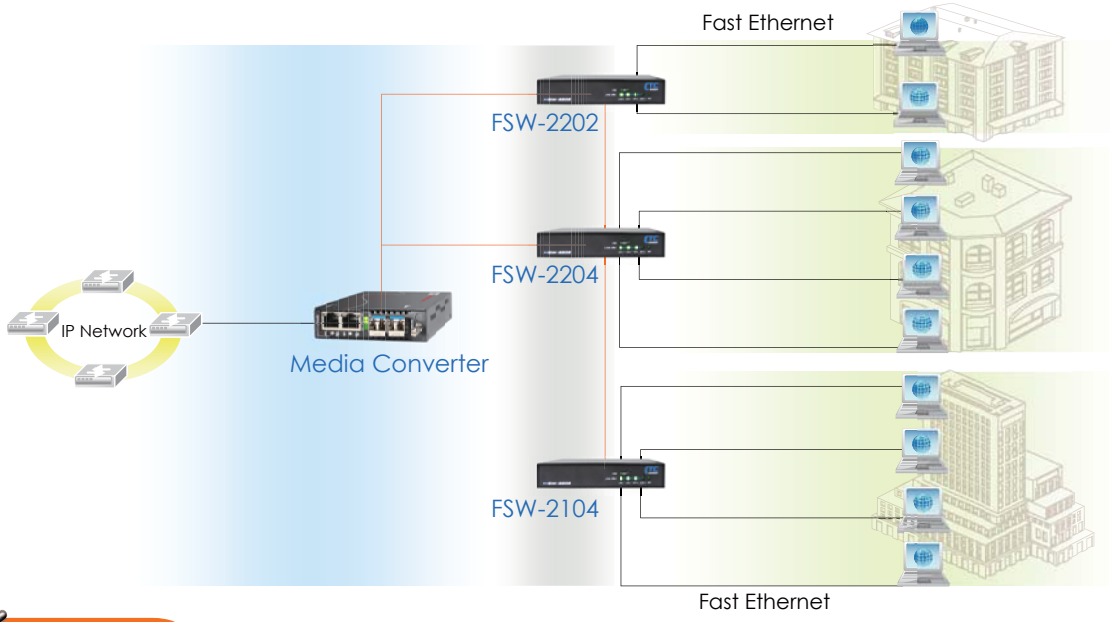
They are all designed for small workgroup applications that require a long distance connection to the backbone, such as between buildings, offices, or within a campus location. They provide full-duplex capability on each auto-negotiating port, for enhanced performance. A wide range of transceiver selection provides fiber connection with SC, FC or ST type connectors in multimode or single mode and at distance from 2 to 120km as well as BiDi (single fiber) at distances of 20, 40, 60, or 80km.

Features

- 10/100Base-TX to 100Base-FX
- Auto-Negotiation
- Auto MDI / MDIX
- Forward 1552 bytes (Max.) packets
- Support 1K MAC address
- 512k bits packet buffer memory
- Supports broadcast storm protection

Specifications

Optical Interface	Connector	1x9 (SC, ST)
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u
Indications		LED (FX Link, TX SPD, TX Link/Act)
Power Input		5VDC
Power Consumption		< 4W
Dimension		138 × 77 × 28mm (D x W x H)
Weight		0.45kg
Temperature		0 ~ 50°C (Operating), 0 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FSW-2202	2x 10/100Base-TX to 2x 100Base-FX unmanaged Switch
FSW-2204	4x 10/100Base-TX to 2x 100Base-FX unmanaged Switch
FSW-2206	6x 10/100Base-TX to 2x 100Base-FX unmanaged Switch

Connector Type / Connectivity Distance

FSW – □□□□ – □□□□□

Example: FSW – 2202 – SC002

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

OAM/IP Managed Fast Ethernet Media Converter with Fiber Cable Tray

FTH4-F1F01CM

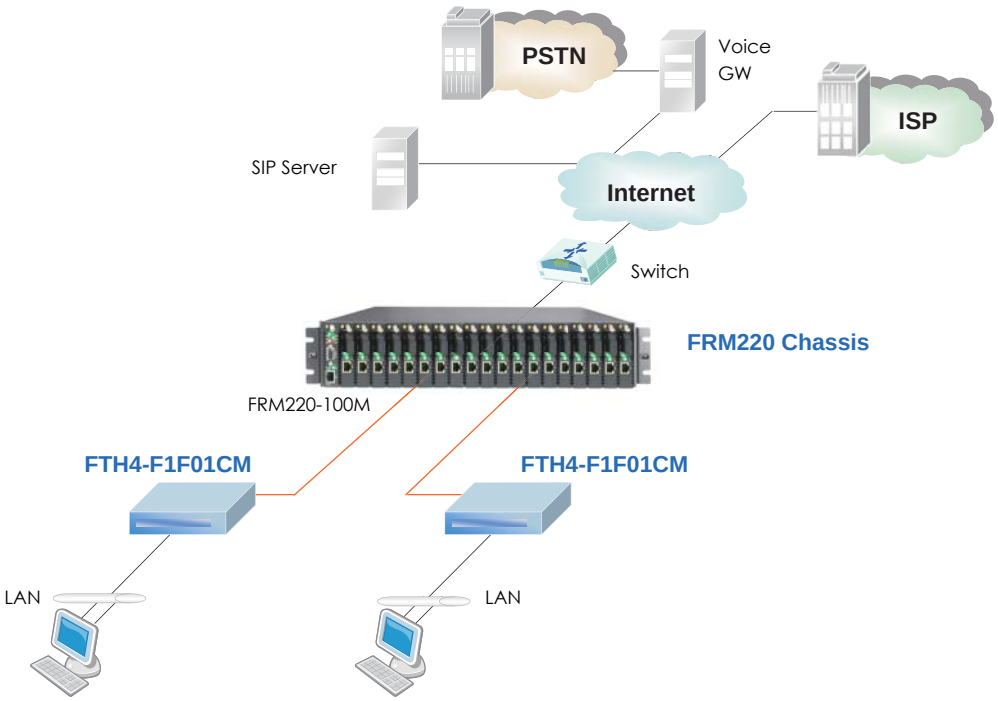
The FTH4-F1F01CM is an IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution designed to make conversion between 10/100Base-TX and 100Base-FX with SC, FC ,ST connector. The FTH4-F1F01CM has a built-in cable tray that allows the user to enclose the excessive fiber within the converter. When deployed as a stand-alone solution, this media converter incorporates an easy to use Web user interface for operation, administration and maintenance of both local and remotely. By offering 802.3ah OAM compliance, this converter can be linked to any 802.3ah compliant fiber switch and support loop back and dying gasp functions. All functions of this converter and the remotely connected converter can be configured and monitored via Web management, including band-width control, duplex, speed, VLAN configuration.

Features

- 10/100BASE-TX to 100BASE-FX Converter
- Forwarding 9k bytes Jumbo Packet
- Built-in fiber cable tray
- Ingress/Egress Bandwidth control
- Support 802.3ah-OAM/IP in-band management
- Firmware upgrade via Web
- Dying gasp (remote power failure detection)
- Support Link Fault Pass Through (LFP) Function
- Support Auto Laser Shutdown (ALS) Function
- Allow IP settings via Web management
- Support On-Line F/W upgrade (local) by the Web manager
- Support 16 Tag VLAN Group/ Q-in-Q
- RMON counters
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Support flow control Enable or Disable

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)(Option)
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u
Indications		LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension		220 x 140 x 27mm (D x W x H)
Weight		0.715kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



QoS with four priority queues

The QoS (Quality Of Service) function provides four priority queues to support different classifications of traffic. High priority packet streams experience less delay inside the FTH4-F1F01CM , which supports lower latency for certain delay-sensitive traffic. The FTH4-F1F01CM can classify the packet as one of the four priorities according to VIP port.

Dying Gasp

The Dying Gasp features enables FTH4-F1F01CM media converter to send out a SNMP trap to alert the SNMP manager in the event of remote power failure.

Remote Firmware Upgrade

The remote firmware upgrade feature enables the media converter can be updated remotely via firmware upgrade including the products that were already installed in the field. This feature eliminates the need for the users to ship the product back to the supplier.

Bandwidth Control

The Bandwidth Control function allows users to set the bandwidth of FTH4-F1F01CM media converter for both ingress and egress rate and can be allocated a variety of rates up to full bandwidth capability of the devices (64Kbps ~ 100Mbps).

Broadband Services

The FTH4-F1F01CM product philosophy allows the end user to follow and benefit fully from the fast developments in Fiber to the home-networking solutions. The CPE as the interface between the digital broadband network and the user peripheral equipment, such as routers, wireless access points, servers, and printers. With generations of computers and home networking equipment coming and going the FTH4-F1F01CM will be a constant and reliable factor for the delivery of broadband data services.

These services are not limited to today's broadband internet applications. In the next few years, end-users will also benefit from next generation health-care, security, communication and infotainment service. The FTH4-F1F01CM CPE platform fully supports today/s services and is ready for the next wave of new broadband services. Flexibility is key, since the CPE functionality must be matched to the requirements of those new services.

Quick installation

The installation of the wall-mount unit of FTH4-F1F01CM CPE is swift and straightforward. Because of its size and ideal dimensions, the FTH4-F1F01CM CPE can be positioned easily at the user residence or home. The FTH4-F1F01CM design allows easy access for mounting and does not need the small elements, making the installation process predictable and hassle-free. The wall-mount unit, including integrated fiber tray not only makes fiber handling and termination easy and robust, but also eliminates the need for optical patch cords.

Ordering Information

Model Name	Description
FTH4-F1F01CM	10/100Base-TX to 100Base-FX Web Smart OAM/IP managed media converter w/ cable tray

OAM/IP Managed Giga Ethernet Media Converter with Fiber Cable Tray

FTH4-G1G01CM

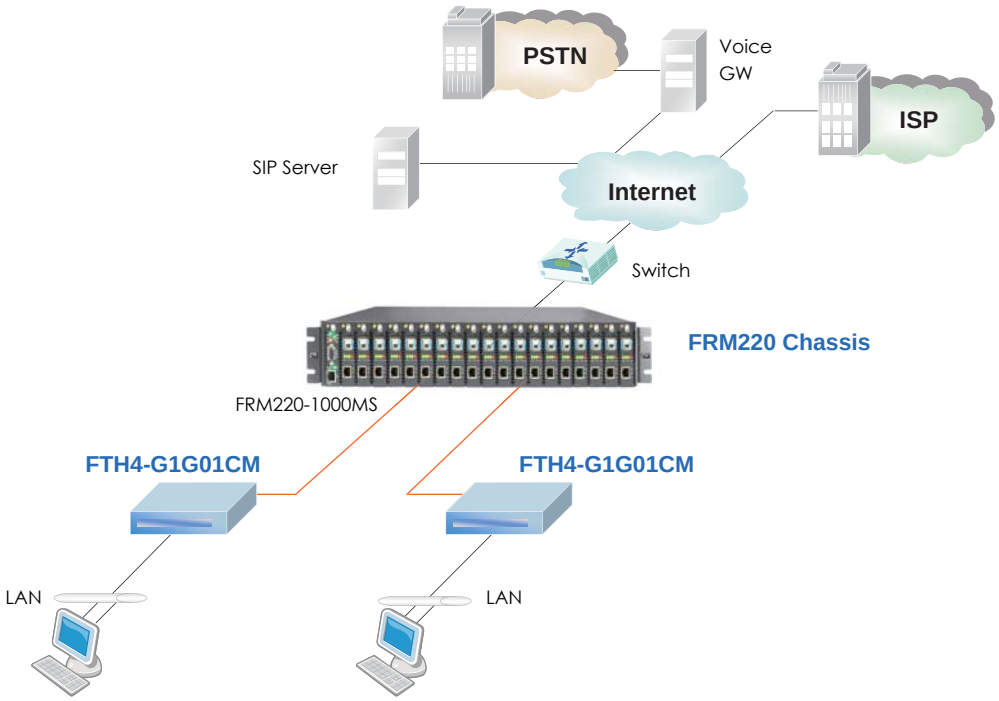
The FTH4-G1G01CM is an IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-T and 100/1000Base-X with SFP LC connector. The FTH4-G1G01CM has a built-in cable tray that allows the user to enclose the excessive fiber within the converter. When deployed as a stand-alone solution, this media converter incorporates an easy to use Web user interface for operation, administration and maintenance of both local and remotely. By offering 802.3ah OAM compliance, this converter can be linked to any 802.3ah compliant fiber switch and support loop back and dying gasp functions. All functions of this converter and the remotely connected converter can be configured and monitored via Web management, including band-width control, duplex, speed, VLAN configuration.

Features

- 10/100/1000Base-T to 100/1000Base-X
- Forwarding 9k bytes Jumbo Packet
- Built-in fiber cable tray
- Ingress/Egress Bandwidth control
- Support 802.3ah OAM/IP In-band management
- Firmware upgrade via Web
- Dying gasp (remote power failure detection)
- Support Link Fault Pass Through (LFP) Function
- Support Auto Laser Shutdown (ALS) Function
- Allow IP settings via Web management
- Support On-Line F/W upgrade (local) by the Web manager
- Support 16 Tag VLAN Group/ Q-in-Q
- RMON counters
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Support flow control Enable or Disable

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 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u IEEE 802.3ab, 802.3z
Indications		LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension		220 x 140 x 27mm (D x W x H)
Weight		0.715kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



QoS with four priority queues

The QoS (Quality Of Service) function provides four priority queues to support different classifications of traffic. High priority packet streams experience less delay inside the FTH4-G1G01CM , which supports lower latency for certain delay-sensitive traffic. The FTH4-G1G01CM can classify the packet as one of the four priorities according to VIP port.

Dying Gasp

The Dying Gasp features enables FTH4-G1G01CM media converter to send out a SNMP trap to alert the SNMP manager in the event of remote power failure.

Remote Firmware Upgrade

The remote firmware upgrade feature enables the media converter can be updated remotely via firmware upgrade including the products that were already installed in the field. This feature eliminates the need for the users to ship the product back to the supplier.

Bandwidth Control

The Bandwidth Control function allows users to set the bandwidth of FTH4-G1G01CM media converter for both ingress and egress rate and can be allocated a variety of rates up to full bandwidth capability of the devices (64Kbps ~ 1000Mbps).

Broadband Services

The FTH4-G1G01CM product philosophy allows the end user to follow and benefit fully from the fast developments in Fiber to the home-networking solutions. The CPE as the interface between the digital broadband network and the user peripheral equipment, such as routers, wireless access points, servers, and printers. With generations of computers and home networking equipment coming and going the FTH4-G1G01CM will be a constant and reliable factor for the delivery of broadband data services.

These services are not limited to today's broadband internet applications. In the next few years, end-users will also benefit from next generation health-care, security, communication and infotainment service. The FTH4-G1G01CM CPE platform fully supports today/s services and is ready for the next wave of new broadband services. Flexibility is key, since the CPE functionality must be matched to the requirements of those new services.

Quick installation

The installation of the wall-mount unit of FTH4-G1G01CM CPE is swift and straightforward. Because of its size and ideal dimensions, the FTH4-G1G01CM CPE can be positioned easily at the user residence or home. The FTH4-G1G01CM design allows easy access for mounting and does not need the small elements, making the installation process predictable and hassle-free. The wall-mount unit, including integrated fiber tray, not only makes fiber handling and termination easy and robust, but also eliminates the need for optical patch cords.

Ordering Information

Model Name	Description
FTH4-G1G01CM	10/100/1000Base-T to 100/1000Base-X Web Smart OAM/IP managed media converter w/ cable tray

OAM/IP Managed Giga Ethernet Switch with Fiber Cable Tray

FTH4-G1G04CM

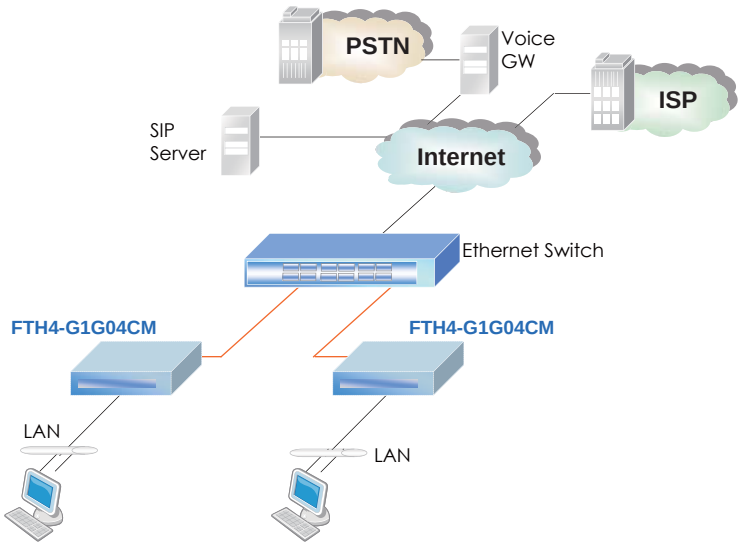
The FTH4-G1G04CM is an IEEE802.3ah OAM compliant Gigabit Ethernet switch designed to make conversion between 4x 10/100/1000Base-T and 1x 100/1000Base-X with SFP LC connector. The FTH4-G1G04CM has a built-in cable tray that allows the user to enclose the excessive fiber within the switch. When deployed as a stand-alone solution, this Ethernet switch incorporates an easy to use Web user interface for operation, administration and maintenance of both local and remotely. By offering 802.3ah OAM compliance, this Ethernet switch can be linked to any 802.3ah compliant fiber switch and support loop back and dying gasp functions. All functions of the switch can be configured and monitored via Web management, including band-width control, port trunking, IGMP snnoping, VLAN configuration.

Features

- 4 ports 10/100/1000Base-T + 100/1000Base-X
- Forwarding 9k bytes Jumbo Packet
- Built-in fiber cable tray
- Ingress/Egress Bandwidth control
- Support 802.3ah OAM/IP In-band management
- Firmware upgrade via Web
- Broadcast / Multicast Storm Suppression
- Port Mirroring
- Supports On-Line F/W upgrade (local) by the Web manager
- Supports 802.1q Tag VLAN
- Supports Port trunking with 2 trunking group
- Supports IGMP snooping
- RMON counters
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Supports flow control

Specification

Switching capacity	1x Giga Fiber port with 4 xGigabit Ethernet ports with non-blocking wise speed performance. 8 K MAC addresses Supports forward 9K jumbo packets Broadcast/Multicast Storm Suppression Port Mirroring
VLAN	Port-base VLAN IEEE802.1q tag-base VLAN, up to 32 active VLANs
Qos	Supports 802.1p QoS with four level priority queue
Bandwidth Control	Supports bandwidth rating per port ingress and egress rate limit 1000Mbps with 64kbps, step 64k
Green Ethernet	
Protocol	Port Trunk :Port trunking with 2 trunking group up to 4 ports for each group. Multicasting priority: Supports IGMP snooping enable and disable mode
Network Security	MAC address limitations per port Access control setting
Configuration and Network Management	Management and configuration via Web / HTTP Software upgrade using HTTP or TFTP DHCP client with options for getting management IP Auto Provisioning for firmware upgrade and configuration file SNMP v1,v2c, RFC 1213 MIB (MIB-II)
Optical Interface	Connector SFP-LC Wavelength：Single-mode: 1310TX/1550RX and 1550TX/1310RX 20km, 40km, 60km, 80km
Data Rate	100 Mbps and 1 Gbps speed
Fiber Management Tray	Flexible Fiber Input and Fiber handling Design Support Extension Power Cord Design Support Converter Protect Function when Abnormal Remove
Weight	0.715kg
Dimensions	220mm x 140mm x 27mm (D x W x H)



QoS with four priority queues

The QoS (Quality Of Service) function provides four priority queues to support different classifications of traffic. High priority packet streams experience less delay inside the FTH4-G1G04CM , which supports lower latency for certain delay-sensitive traffic. The FTH4-G1G04CM can classify the packet as one of the four priorities according to VIP port.

Remote Firmware Upgrade

The remote firmware upgrade feature enables the media converter can be updated remotely via firmware upgrade including the products that were already installed in the field. This feature eliminates the need for the users to ship the product back to the supplier.

Bandwidth Control

The Bandwidth Control function allows users to set the bandwidth of FTH4-G1G04CM media converter for both ingress and egress rate and can be allocated a variety of rates up to full bandwidth capability of the devices (64Kbps ~ 1000Mbps).

Broadband Services

The FTH4-G1G04CM product philosophy allows the end user to follow and benefit fully from the fast developments in Fiber to the home-networking solutions. The CPE as the interface between the digital broadband network and the user peripheral equipment, such as routers, wireless access points, servers, and printers. With generations of computers and home networking equipment coming and going the FTH4-G1G04CM will be a constant and reliable factor for the delivery of broadband data services.

These services are not limited to today's broadband internet applications. In the next few years, end-users will also benefit from next generation health-care, security, communication and infotainment service. The FTH4-G1G04CM CPE platform fully supports today/s services and is ready for the next wave of new broadband services. Flexibility is key, since the CPE functionality must be matched to the requirements of those new services.

Quick installation

The installation of the wall-mount unit of FTH4-G1G04CM CPE is swift and straightforward. Because of its size and ideal dimensions, the FTH4-G1G04CM CPE can be positioned easily at the user residence or home. The FTH4-G1G04CM design allows easy access for mounting and does not need the small elements, making the installation process predictable and hassle-free. The wall-mount unit, including integrated fiber tray, not only makes fiber handling and termination easy and robust, but also eliminates the need for optical patch cords.

Ordering Information

Model Name	Description
FTH4-G1G04CM	4x 10/100/1000Base-T + 100/1000Base-X Web Smart OAM/IP managed media converter w/ cable tray

Industrial Fast Ethernet Switch

IFC-1200X

The IFC-1200X is industrial grade fiber media converter that provides 2-port 10/100Base-TX and 1-port 100Base-FX. The reliable hardware design is suitable for keeping industrial automation application running continuously. Each IFC-1200X media converter comes with two relay output alarms and two redundant DC power inputs to help prevent damage and loss. The IFC-1200X media converter supports operating temperatures of -40 to 85 degree C.

Features

- 2-port 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation on two LAN port
- Auto MDI/MDIX
- Support max forwarding packet length 1552 bytes
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Support flow control (Pause)
- Supports Far End Fault
- Support two Relay out (Arc-Free Contact)

Industrial Grade Performance

- Power or Optical Fiber failure alarm by relay output
- Support DIN-Rail & wall mount
- -40°C ~ 85°C operating temperature range
- Redundant dual DC power inputs

Specifications

Optical Interface

Connector: 1x9 (SC,FC,ST)
Data rate: 100Mbps
Duplex mode: Full duplex
Fiber MM 50/125μm, 62.5/125μm. SM 9/125μm
Distance
MM 2km, SM 15/30/50/80/120km,
WDM 20/40/60/80km
Wavelength
MM 1310nm, SM 1310,1550nm
WDM 1310Tx/1550Rx (type A)
1550Tx/1310Rx (type B)

Electrical Interface

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

Standards

IEEE 802.3, IEEE 802.3u

LED Indications

PWR 1/2, FX-Link/Act, LAN1-Link/Act,
LAN2-Link/Act, Alarm
(Power or Optical Fiber Failure Alarm)

Power

Power Input
12-48 VDC
Power Consumption: < 4.8W

Mechanical

Dimensions
106 x 62.5 x 134.8mm (D x W x H)
Weight
0.46kg
Physical Characteristics
Housing: Metal
IP Protection
IP30

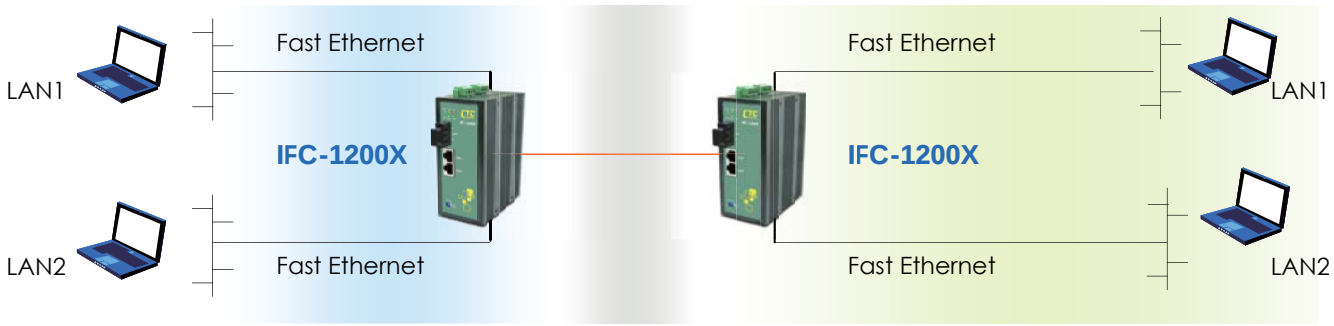
Environmental

Temperature
Operating: -40°C ~ 85°C
Storage: -40°C ~ 85°C
Humidity
0 ~ 90% non-condensing

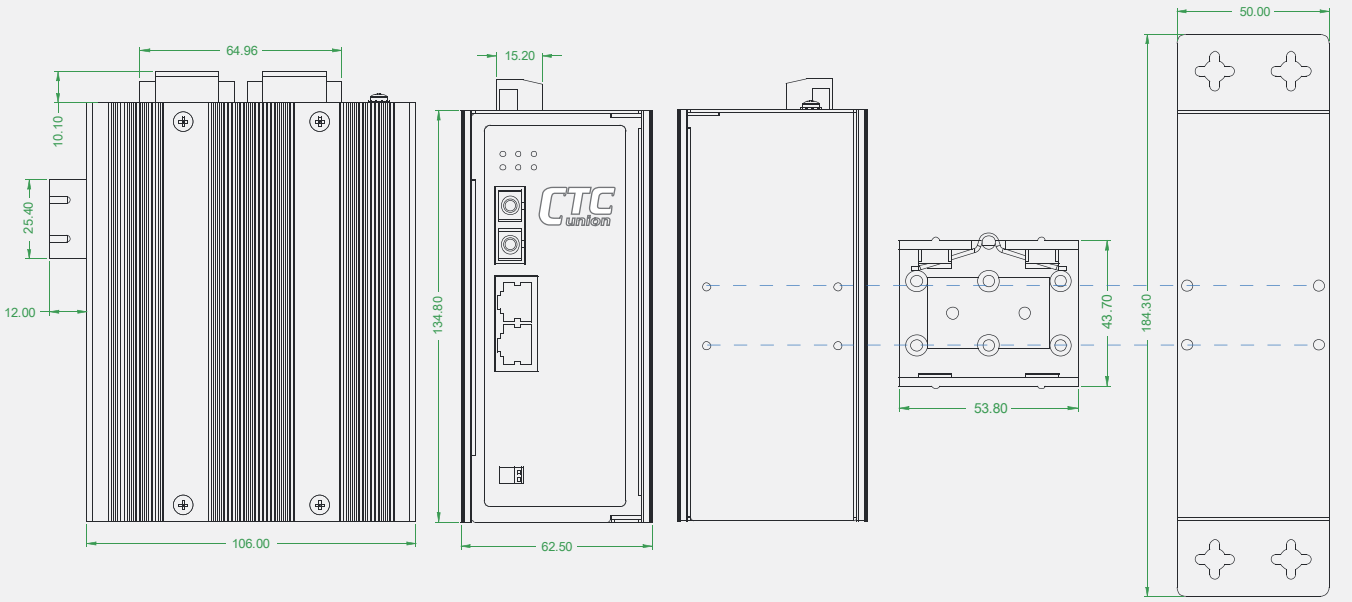
Approvals

Safety
EN60950-1
EMI
FCC Part 15, CISPR(EN55022) ClassA
EMC
EN61000-4-2 (ESD), Level3
EN61000-4-3 (RS), Level3
EN61000-4-4 (EFT), Level3
EN61000-4-5 (Surge), Level3
EN61000-4-6 (CS), Level3
EN61000-4-8
EN61000-4-11
MTBF 135,202 hrs

Applications



Dimensions



Ordering Information

Model Name	Description
IFC-1200	2x 10/100Base-TX to 100Base-FX Fast Ethernet switch ; Temperature Range : 0 ~ 60 degree C
IFC-1200X	2x 10/100Base-TX to 100Base-FX Fast Ethernet switch (wide range temp.); Temperature Range : -40 ~ 85 degree C

Connector Type / Connectivity Distance

IFC – □□□□ – □□□□□

Example: IFC – 1200 – SC002

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

* Standard model (IFC-1200) has 0 - 60°C operating range.
Note: Connectivity Distance: 120/80A/80B only for IFC-1200

Optional Accessories

IFC-DRK01	Din Rail Mounting Kit (standardized 35 mm wide)
IFC-WMK01	Wall Mounting Kit

Industrial Fast Ethernet Switch

IFC-1400X

The IFC-1400X is industrial grade Fast Ethernet Switch that provides 4-port 10/100Base-TX and 1-port 100Base-FX. The reliable hardware design is suitable for keeping industrial automation application running continuously. Each IFC-1400X media converter comes with two relay output alarms and two redundant DC power inputs to help prevent damage and loss. The IFC-1400X media converter is available in models that support operating temperatures of -40 to 85 degree C.

Features

- 4-port 10/100Base-TX to 100Base-FX Switch
- Auto-Negotiation on two LAN port
- Auto MDI/MDIX
- Supports max forwarding packet length 1552 bytes
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports flow control (Pause)
- Supports Far End Fault
- Supports two Relay out (Arc-Free Contact)

Industrial Grade Performance

- Power or Optical Fiber failure alarm by relay output
- Supports DIN-Rail & wall mount
- -40°C ~ 85°C operating temperature range
- Redundant dual DC power inputs

Specifications

Optical Interface

Connector: 1x9 (SC,FC,ST)
Data rate: 100Mbps
Duplex mode: Full duplex
Fiber MM 50/125μm, 62.5/125μm. SM 9/125μm
Distance
MM 2km, SM 15/30/50/80/120km,
WDM 20/40/60/80km
Wavelength
MM 1310nm, SM 1310,1550nm
WDM 1310Tx/1550Rx (type A)
1550Tx/1310Rx (type B)

Electrical Interface

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

Standards

IEEE 802.3, IEEE 802.3u

LED Indications

PWR 1/2, FX-Link/Act, LAN1-Link/Act,
LAN2-Link/Act, Alarm
(Power or Optical Fiber Failure Alarm)

Power

Power Input
12-48 VDC
Power Consumption: < 4.8W

Mechanical

Dimensions
106 x 62.5 x 134.8mm (D x W x H)
Weight
0.46kg
Physical Characteristics
Housing: Metal
IP Protection
IP30

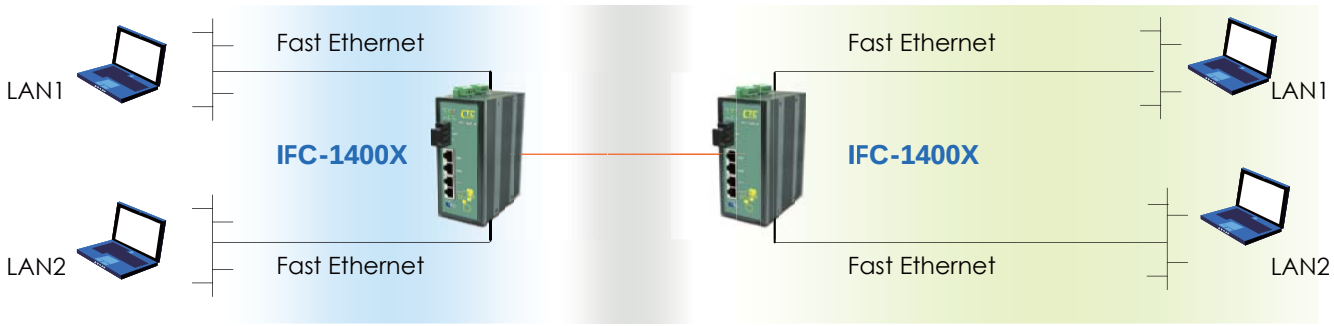
Environmental

Temperature
Operating: -40°C ~ 85°C
Storage: -40°C ~ 85°C
Humidity
0 ~ 90% non-condensing

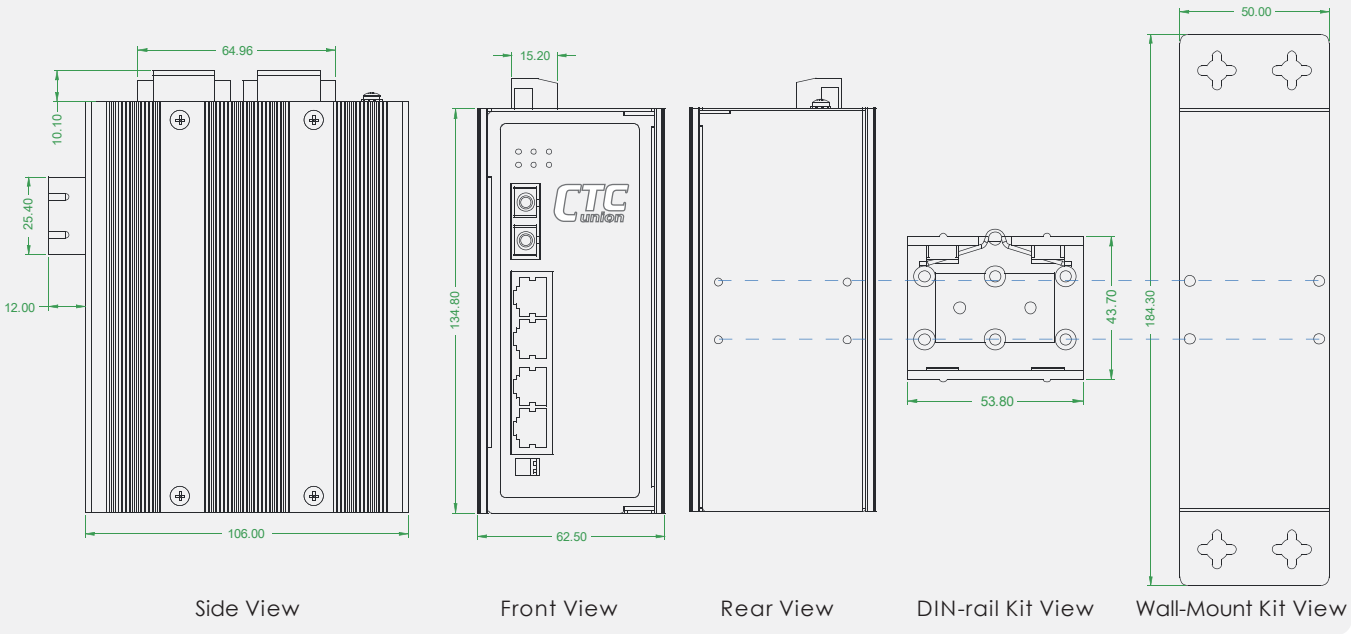
Approvals

Safety
EN60950-1
EMI
FCC Part 15, CISPR(EN55022) ClassA
EMC
EN61000-4-2 (ESD), Level3
EN61000-4-3 (RS), Level3
EN61000-4-4 (EFT), Level3
EN61000-4-5 (Surge), Level3
EN61000-4-6 (CS), Level3
EN61000-4-8
EN61000-4-11
MTBF 135,202 hrs

Applications



Dimensions



Ordering Information

Model Name	Description
IFC-1400	4x 10/100Base-TX to 100Base-FX Fast Ethernet switch; Temperature Range : 0 ~ 60 degree C
IFC-1400X	4x 10/100Base-TX to 100Base-FX Fast Ethernet switch (wide range temp.); Temperature Range : -40 ~ 85 degree C

Connector Type / Connectivity Distance

IFC – □□□□ – □□□□□

Example: IFC – 1400 – SC002

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

* Standard model (IFC-1400) has 0 - 60°C operating range.
Note: Connectivity Distance: 120/80A/80B only for IFC-1400

Optional Accessories

IFC-DRK01	Din Rail Mounting Kit (standardized 35 mm wide)
IFC-WMK01	Wall Mounting Kit

Industrial Gigabit Ethernet Managed Switch

IFC-2400GX

NEW

The IFC-2400GX is an industrial grade L2 managed switch that provides 4-port 10/100/1000Base-T and 2-port 100/1000Base-X with SFP connector. The local management allow network administrator to monitor and control the activity of switch settings including bandwidth control, QoS, VLAN, RSTP, duplex and speed configuration. The reliable hardware design is suitable for keeping industrial automation application running continuously. Each IFC-2400GX managed switch comes with two relay output alarm and two redundant DC power inputs to help prevent damage and loss. The IFC-2400GX managed switch is available in models that support operating temperatures of -40 ~ 85 degree C.

Features

- 4-port 10/100/1000Base-T to 2-port 100/1000Base-SX/LX SFP
- Intuitive web based management
- Auto-negotiation or forced mode
- Auto MDI/MDIX
- Forward 10K byte Jumbo frame packets
- Supports Bandwidth Control
- Supports Flow control
- Quality of Service support with four traffic classes
- 802.1Q VLAN support for 64 VLAN IDs
- 1K MAC address
- IEEE 802.1D Spanning Tree Protocol
- IEEE 802.1w Rapid Spanning Tree Protocol
- IEEE 802.1s Multiple VLAN Spanning Tree Protocol
- Supports VLAN configurations 802.1Q and Port Statistics

Industrial Grade Performance

- Power or Optical Fiber failure alarm by relay output
- Supports DIN-Rail & wall mount
- -40°C ~ 85°C operating temperature range
- Redundant dual DC power inputs

Specifications

Optical Interface

Connector: SFP-LC
Data rate: 100Mbps, 1000Mbps
Duplex mode: Full duplex
Fiber
MM 50/125μm, 62.5/125μm.
SM 9/125μm
Distance
MM 2km, SM 15/30/50/80/120km,
WDM 20/40/60/80km
Wavelength
MM 1310nm, SM 1310,1550nm
WDM 1310Tx/1550Rx (type A)
1550Tx/1310Rx (type B)

Electrical Interface

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

Standards

IEEE 802.3, 802.3u, 802.3ab, 802.3z, 802.1Q

LED Indications

PWR 1/2, FX1~FX2-Link/Act, LAN1~LAN4-Link/Act, LAN2-Link/Act, Alarm
(Power or Optical Fiber Failure Alarm)

Power

Power Input
12-48 VDC
Power Consumption: < 4.8W

Mechanical

Dimensions
106 x 62.5 x 134.8mm (D x W x H)
Weight
0.46kg
Physical Characteristics
Housing: Metal
IP Protection
IP30

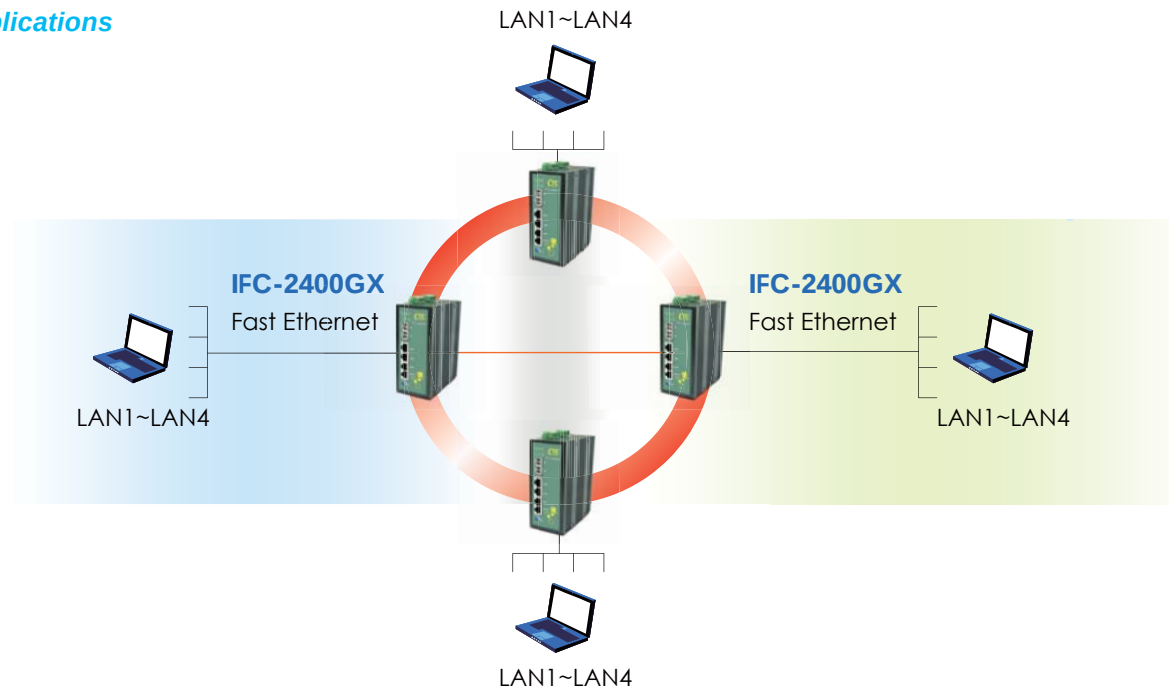
Environmental

Temperature
Operating: -40°C ~ 85°C
Storage: -40°C ~ 85°C
Humidity
0 ~ 90% non-condensing

Approvals

Safety
EN60950-1
EMI
FCC Part 15, CISPR(EN55022) ClassA
EMC
EN61000-4-2 (ESD), Level3
EN61000-4-3 (RS), Level3
EN61000-4-4 (EFT), Level3
EN61000-4-5 (Surge), Level3
EN61000-4-6 (CS), Level3
EN61000-4-8
EN61000-4-11
MTBF 135,202 hrs

Applications



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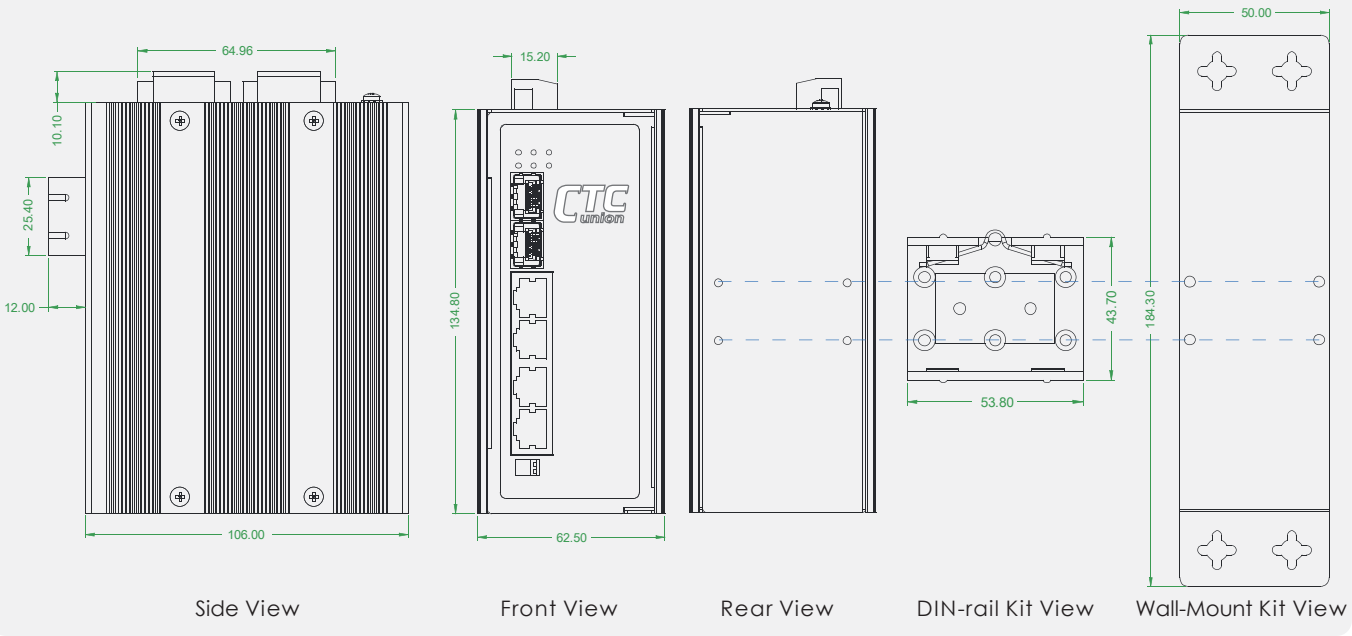


Ordering Information

Model Name	Description
IFC-2400	4x 10/100/1000Base-T to 2-port 1000Base-X SFP Gigabit Ethernet switch; Temperature Range : 0 ~ 60 degree C
IFC-2400GX	4x 10/100/1000Base-T to 2x 1000Base-X SFP Gibait Ethernet switch (wide range temp.); Temperature Range : -40 ~ 85 degree C

Connector Type / Connectivity Distance

IFC – □□□□ – □□□□□

Example: IFC – 2400 – SC002

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

* Standard model (IFC-2400) has 0 - 60°C operating range.
Note: Connectivity Distance: 120/80A/80B only for IFC-2400

Optional Accessories

IFC-DRK01	Din Rail Mounting Kit (standardized 35 mm wide)
IFC-WMK01	Wall Mounting Kit

RS485/232 Fiber Converter

IFC-485/232

The IFC-485/232 is industrial grade fiber media converter that provides a solution to extend asynchronous RS-485 or RS-232 transmission distance up to 2km over multimode fiber or up to 120km over single mode fiber. The converter is equipped with multiple interface circuits for connection to RS-232 or RS-485/422 (2 or 4 wire, full or half duplex). The IFC-485/232 secures data transmission over EMI resistant fiber at speeds up to 460kbps for RS-232 or up to 1024kbps for RS-485/422. The IFC-485/232 reliable industrial design is suitable for keeping your industrial automation applications running continuously. Each IFC-485/232 media converter comes with two relay output alarms and two redundant DC power inputs to help prevent damage and loss. The IFC-485/232 media converter is available in models that support operating temperatures of 0 to 60°C.

Features

- Extend asynchronous serial transmission from 2km to 120km over fiber
- Dip Switch selectable data interface for RS232/ 422/ 485
- Dip Switch selectable two wires (half duplex) or four wires full duplex) RS485
- Dip Switch selectable three or five wires RS232
- Speeds up to 256kbps for RS232 (Async. mode)
- Speeds up to 1Mbps for RS485/422

Industrial Grade Performance

- Power or Optical Fiber failure alarm by relay output
- Supports DIN-Rail & wall mount
- Redundant dual DC power inputs

Specifications

Optical Interface

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

Electrical Interface

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

Standards

EIA/TIA RS485, RS422, RS232

LED Indications

Power, FX Link, DI, DO, Test

Power

Power Input 12 ~ 48 VDC
Power Consumption < 5W

Mechanical

Dimensions
155 x 88 x 23mm (D x W x H)
Weight
0.46kg
Physical Characteristics
Housing: Metal
IP Protection
IP30

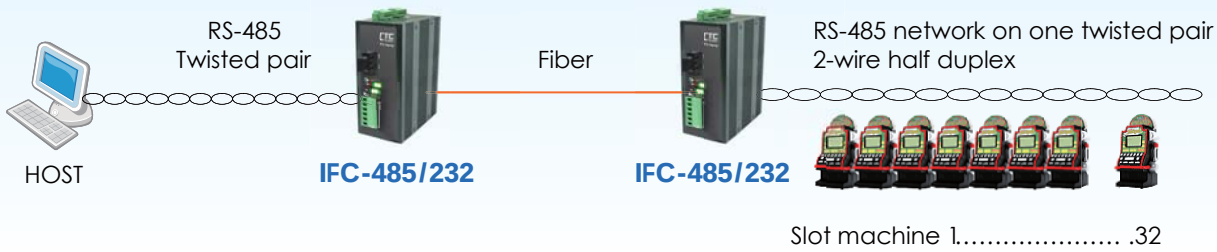
Environmental

Temperature
Operating: 0°C ~ 60°C ,
Storage: -10°C ~ 70°C
Humidity
10 ~ 90% non-condensing

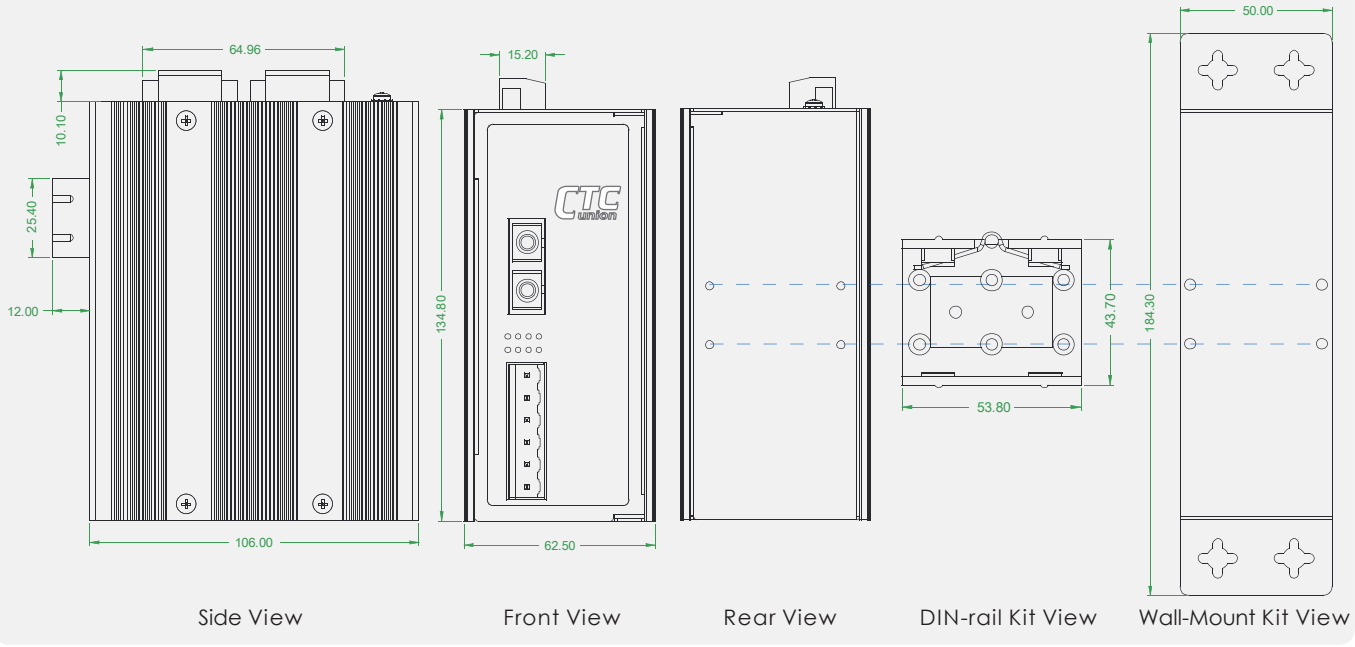
Approvals

Safety
EN60950-1
EMI
FCC Part 15, CISPR(EN55022) ClassA
EMC
EN61000-4-2 (ESD), Level3
EN61000-4-3 (RS), Level3
EN61000-4-4 (EFT), Level3
EN61000-4-5 (Surge), Level3
EN61000-4-6 (CS), Level3
EN61000-4-8
EN61000-4-11
MTBF
135,202 hrs

Applications



Dimensions



Ordering Information

Model Name	Description
IFC-485/232	RS-485/232 to fiber media converter; Temperature Range : 0 ~ 60 degree C
IFC-485/232-X	RS-485/232 to fiber media converter (wide range temp.); Temperature Range : -40 ~ 85 degree C

Connector Type / Connectivity Distance

IFC – 485/232 – □□□□□

Example: IFC – 485/232 – SC002

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

* Standard model (IFC-485/232) has 0 - 60°C operating range.
Note: Connectivity Distance: 120/80A/80B only for IFC-485/232

Optional Accessories

IFC-DRK01	Din Rail Mounting Kit (standardized 35 mm wide)
IFC-WMK01	Wall Mounting Kit

RS-485 Daisy Chain Fiber Converter

IFC-485FDC

The IFC-485FDC is industrial grade fiber media converter that provides a dual fiber connection converter solution to extend asynchronous RS-485 or RS-232 transmission distance up to 2km over multimode fiber or up to 120km over single mode fiber. The dual fiber inputs allow connecting multiple devices in a cascade or "daisy chain" fashion as well as creating ring architecture for fiber redundancy. The converter is equipped with multiple interface circuits for connection to RS-232 or RS-485/422 (2 or 4 wire, full or half duplex). The IFC-485FDC secures data transmission over EMI resistant fiber at speeds up to 256kbps for RS-232 or up to 1024kbps for RS-485/422. The IFC-485FDC reliable industrial design is suitable for keeping your industrial automation applications running continuously. Each IFC-485FDC media converter comes with two relay output alarms and two redundant DC power inputs to help prevent damage and loss. The IFC-485FDC media converter is available in models that support operating temperatures of 0 to 60°C.

Features

- Extend asynchronous serial transmission from 2km to 120km over fiber
- Two fiber ports support daisy chain and ring architecture
- Multi-drop operation over fiber ring
- Dip switch selectable data interface for RS232/ 422/ 485
- Dip switch selectable two wires (half duplex) or four wires (full duplex) RS485
- Dip switch selectable three or five wires RS232
- Speeds up to 256kbps for RS232 (Async. mode)
- Speeds up to 1Mbps for RS485/422

Industrial Grade Performance

- Power or Optical Fiber failure alarm by relay output
- Supports DIN-Rail & wall mount
- Redundant dual DC power inputs

Specifications

Optical Interface

Connector : 1 x 9 (SC, ST, FC)
Data rate : 31.104Mbps
Line coding : Scrambled NRZ
Bit Error Rate : Less than 10^{-11}
Cable type : MM 62.2/125μm, 50/125μm. SM 9/125μm
Distance : MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
Wavelength : 1310nm, 1550nm

Electrical Interface

Connector: 6 pins Terminal block
Data: Signal Formats
RS485/422 2-wire , 4-wire
RS232 RTS/CTS 5-wire, 3-wire
RS423 RTS/CTS 5-wire, 3-wire
TTL 3-wire
Baud Rate : RS422, RS485 up to 1024kbps
RS232 up to 256kbps
TTL up to 1024kbps

Standard

EIA/TIA RS485, RS422, RS232

LED Indications

Power, FX-Link1, FX-Link2, Test, Master, Ring TD, RD

Power

Power Input 12 ~ 48 VDC
Power Consumption < 5W

Mechanical

Dimensions
DC12 : 160 x 88 x 24mm (D x W x H)
AC/DC48/AD: 201 x 135 x 35mm (D x W x H)
Physical Characteristics
Housing: Metal
IP Protection
IP30

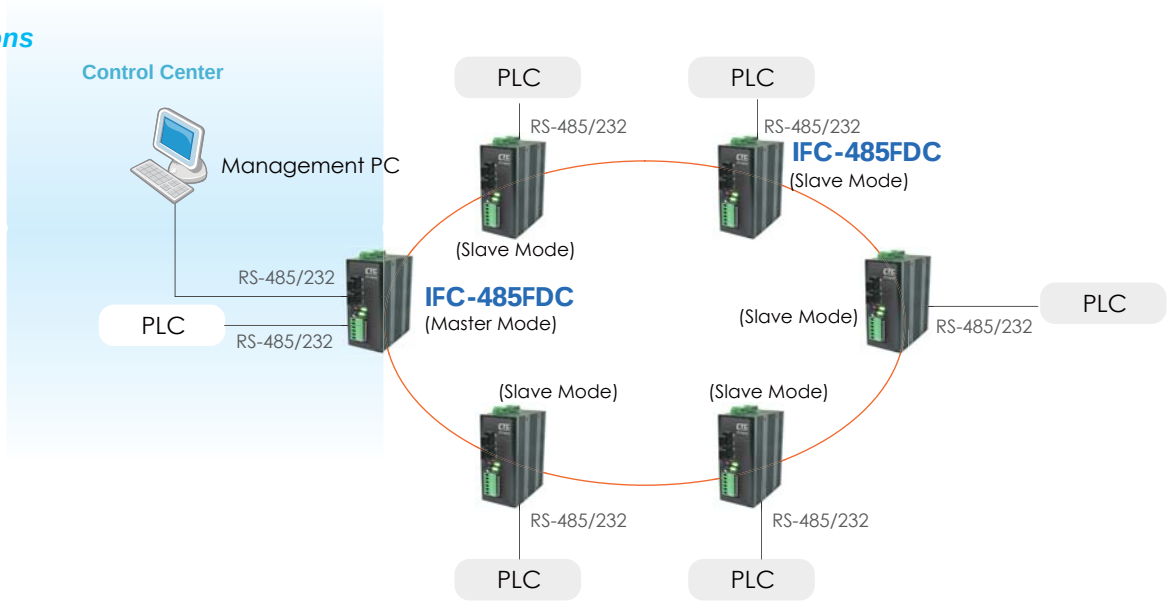
Environmental

Temperature
Operating: 0°C ~ 60°C ,
Storage: -10°C ~ 70°C
Humidity
0 ~ 90% non-condensing

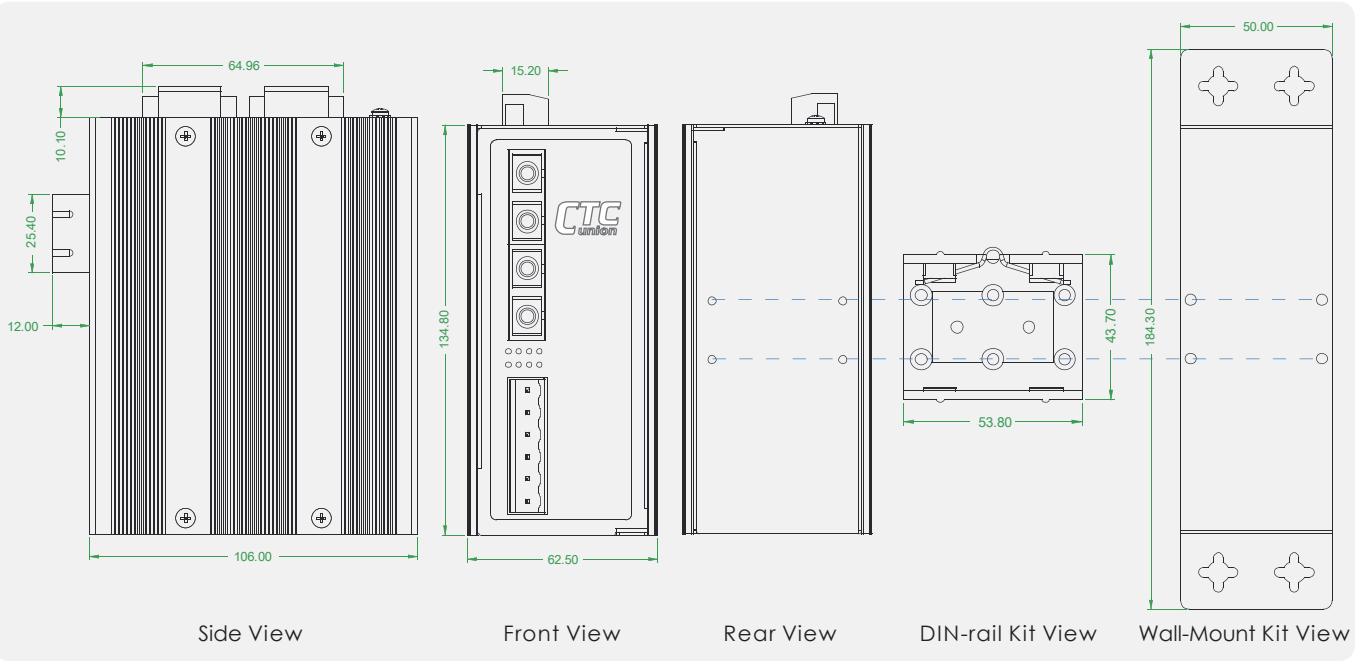
Approvals

Safety
EN60950-1
EMI
FCC Part 15, CISPR(EN55022) ClassA
EMC
EN61000-4-2 (ESD), Level3
EN61000-4-3 (RS), Level3
EN61000-4-4 (EFT), Level3
EN61000-4-5 (Surge), Level3
EN61000-4-6 (CS), Level3
EN61000-4-8
EN61000-4-11
MTBF
135,202 hrs

Applications



Dimensions



Ordering Information

Model Name	Description
IFC-485FDC	RS-485/232 to dual fiber media converter; Temperature Range : 0 ~ 60 degree C
IFC-485FDC-X	RS-485/232 to dual fiber media converter (wide range temp.); Temperature Range : -40 ~ 85 degree C

Connector Type / Connectivity Distance

IFC – 485FDC – □□□□□

Example: IFC – 485FDC – SC002

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

* Standard model (IFC-485FDC) has 0 - 60°C operating range.
Note: Connectivity Distance: 120/80A/80B only for IFC-485FDC

Optional Accessories

IFC-DRK01	Din Rail Mounting Kit (standardized 35 mm wide)
IFC-WMK01	Wall Mounting Kit

RS232 Daisy Chain Fiber Converter

IFC-232FDC

The IFC-232FDC is industrial grade fiber media converter that provides a dual fiber connection converter solution to extend asynchronous RS-485 or RS-232 transmission distance up to 2km over multimode fiber or up to 120km over single mode fiber. The dual fiber inputs allow connecting multiple devices in a cascade or "daisy chain" fashion as well as creating ring architecture for fiber redundancy. The converter is equipped with multiple interface circuits for connection to RS-232 or RS-485/422 (2 or 4 wire, full or half duplex). The IFC-232FDC secures data transmission over EMI resistant fiber at speeds up to 256kbps for RS-232 or up to 1024kbps for RS-485/422. The IFC-232FDC reliable industrial design is suitable for keeping your industrial automation applications running continuously. Each IFC-232FDC media converter comes with two relay output alarms and two redundant DC power inputs to help prevent damage and loss. The IFC-232FDC media converter is available in models that support operating temperatures of 0 to 60°C.

Features

- Extend asynchronous serial transmission from 2km to 120km over fiber
- Two fiber ports support daisy chain and ring architecture
- Multi-drop operation over fiber ring
- Dip switch selectable data interface for RS232/ 422/ 485
- Dip switch selectable two wires (half duplex) or four wires (full duplex) RS485
- Dip switch selectable three or five wires RS232
- Speeds up to 256kbps for RS232 (Async. mode)
- Speeds up to 1Mbps for RS485/422

Industrial Grade Performance

- Power or Optical Fiber failure alarm by relay output
- Supports DIN-Rail & wall mount
- Redundant dual DC power inputs

Specifications

Optical Interface

Connector : 1 x 9 (SC, FC, ST)
Data rate : 31.104Mbps
Line coding : Scrambled NRZ
Bit Error Rate : Less than 10^{-11}
Cable type : MM 62.2/125μm, 50/125μm. SM 9/125μm
Distance : MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
Wavelength : 1310nm, 1550nm

Electrical Interface

Connector: DB9 Female
Data: Signal Formats
RS485/422 2-wire , 4-wire
RS232 RTS/CTS 5-wire, 3-wire
RS423 RTS/CTS 5-wire, 3-wire
TTL 3-wire
Baud Rate : RS422, RS485 up to 1024kbps
RS232 up to 256kbps
TTL up to 1024kbps

Standards

EIA/TIA RS485, RS422, RS232

LED Indications

Power, FX-Link1, FX-Link2, Test, Master, Ring TD, RD

Power

Power Input 12 ~ 48 VDC
Power Consumption < 5W

Mechanical

Dimensions
DC12 : 160 x 88 x 24mm (D x W x H)
AC/DC48/AD: 201 x 135 x 35mm (D x W x H)
Physical Characteristics
Housing: Metal
IP Protection
IP30

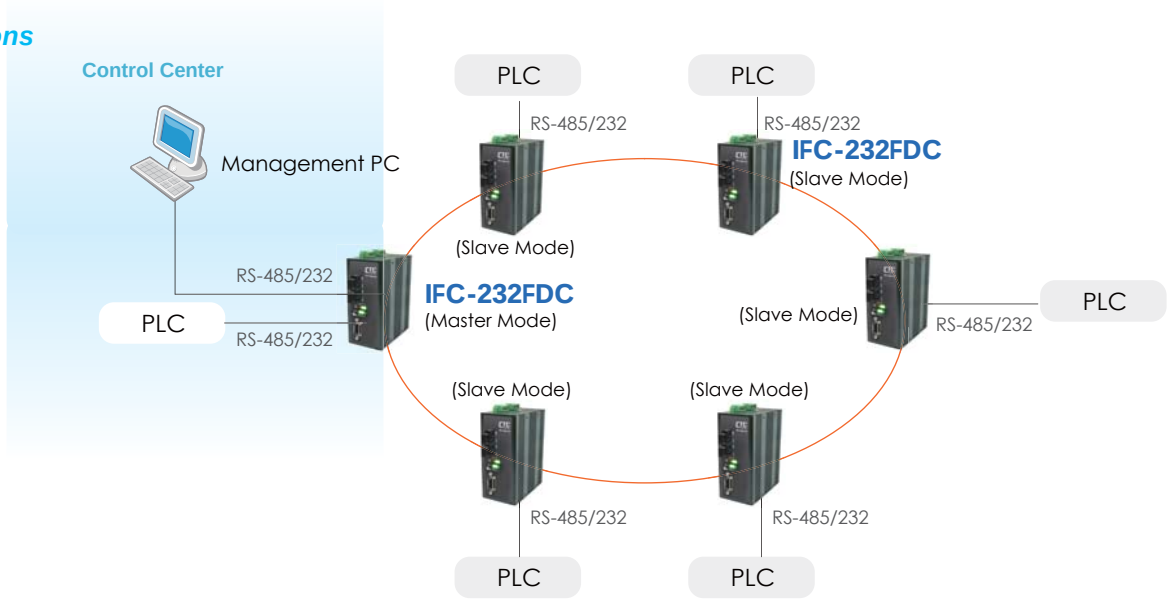
Environmental

Temperature
Operating: 0°C ~ 60°C ,
Storage: -10°C ~ 70°C
Humidity
0 ~ 90% non-condensing

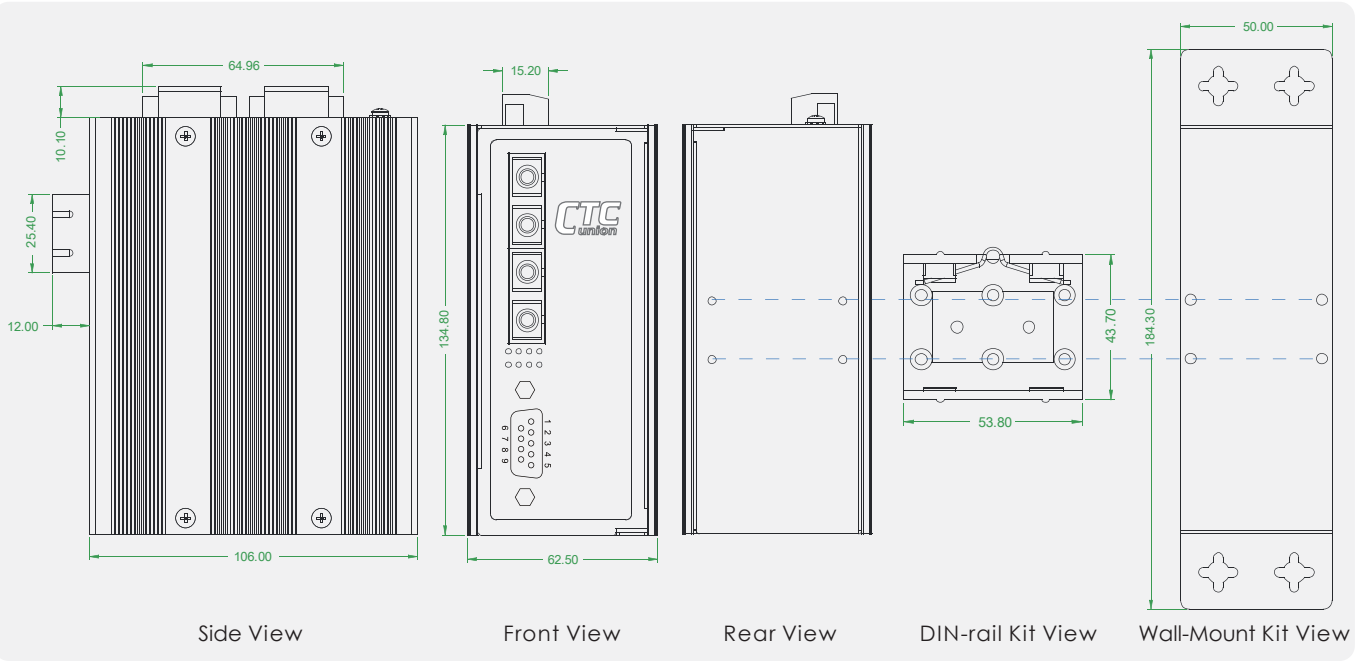
Approvals

Safety
EN60950-1
EMI
FCC Part 15, CISPR(EN55022) ClassA
EMC
EN61000-4-2 (ESD), Level3
EN61000-4-3 (RS), Level3
EN61000-4-4 (EFT), Level3
EN61000-4-5 (Surge), Level3
EN61000-4-6 (CS), Level3
EN61000-4-8
EN61000-4-11
MTBF
135,202 hrs

Applications



Dimensions



Ordering Information

Model Name	Description
IFC-232FDC	RS-485/232 to dual fiber media converter; Temperature Range : 0 ~ 60 degree C
IFC-232FDC-X	RS-485/232 to dual fiber media converter (wide range temp.); Temperature Range : -40 ~ 85 degree C

Connector Type / Connectivity Distance

IFC – 232FDC – □□□□□

Example: IFC – 232FDC – SC002

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

* Standard model (IFC-232FDC) has 0 - 60°C operating range.
Note: Connectivity Distance: 120/80A/80B only for IFC-232FDC

Optional Accessories

IFC-DRK01	Din Rail Mounting Kit (standardized 35 mm wide)
IFC-WMK01	Wall Mounting Kit

RS-232 IP Device Server

STE100A / RS232

The IP Serial Server provides the serial device server for Windows hosts to control serial devices located virtually anywhere through a TCP/IP or UDP/IP connection. The IP Serial Server has the asynchronous serial port connection on one side, and a 10/100 Mbps Ethernet connection on the other side. It connects devices, such as CNC, weight scales, and scanners. Applications include industrial/factory automation, automatic warehouse control, and hospital/laboratory automation. The IP Serial Server Windows driver is designed to control the IP Serial Server devices. The driver installs a virtual COM on Windows which maps the virtual COM port to the IP address of the IP Serial Server device across the network, enabling the Windows applications to access remote serial devices over Ethernet. IP Serial Server can function as a UDP or a server or client for TCP connection. The application scenarios are direct IP mode, virtual COM mode, and paired mode. When in the paired mode one IP Serial Server must set as a client and the other must set as a server in TCP connection.

Features

- 10/100Mbps Ethernet port
- 230.4kbps serial interface
- TCP Server, TCP client, Virtual com mode, UDP
- Supports for DHCP, HTTP, ICMP, ARP, IP, UDP, TCP
- Easy to use with Windows utility
- Configuration by web browser
- Compack size 53x85x21(mm)
- Low power consumption with single + 12V to +48V input

Specifications

General
LED: Ready, TP Link/Act, RS232 Tx/Rx
Push button for Load Default Configuration
OS supported: Windows XP/2000/2003/2008/VISTA/WIN7
Serial Interface RS-232
Serial Connector DB-9 male (DTE)
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, RTS/CTS
Data Packing Delimiter 1,2
LAN Interface
RJ-45 connector, IEEE802.3 10/100BaseT, Auto-detecting, Full/Half-duplex
Communication Modes
TCP Server, TCP Client, Virtual COM mode, UDP

Protocols
TCP, UDP, IP, ARP, ICMP, HTTP, DHCP, ICMP
Client requests connection at Power up
TCP Inactivity Time (TCP alive time)
Management
Web pages, Firmware upgrade
Security Password Access
Power AC Adapter, 12VDC output
Operating Temperature 0°C ~ 60°C
Storage Temperature -10°C ~ 70°C
Humidity 0 – 90% non-condensing
DIN rail mount Yes
Panel mount Yes
Dimensions 53 x 85 x 21mm (W x D x H)
Certifications CE, FCC

Ordering Information

Model Name	Description
STE100A/RS232	RS232 IP device server

NEW

RS-485 IP Device Server

STE100A / RS485

The IP Serial Server provides the serial device server for Windows hosts to control serial devices located virtually anywhere through a TCP/IP or UDP/IP connection. The IP Serial Server has the asynchronous serial port connection on one side, and a 10/100 Mbps Ethernet connection on the other side. It connects devices, such as CNC, weight scales, and scanners. Applications include industrial/factory automation, automatic warehouse control, and hospital/laboratory automation. The IP Serial Server Windows driver is designed to control the IP Serial Server devices. The driver installs a virtual COM on Windows which maps the virtual COM port to the IP address of the IP Serial Server device across the network, enabling the Windows applications to access remote serial devices over Ethernet. IP Serial Server can function as a UDP or a server or client for TCP connection. The application scenarios are direct IP mode, virtual COM mode, and paired mode. When in the paired mode one IP Serial Server must set as a client and the other must set as a server in TCP connection.

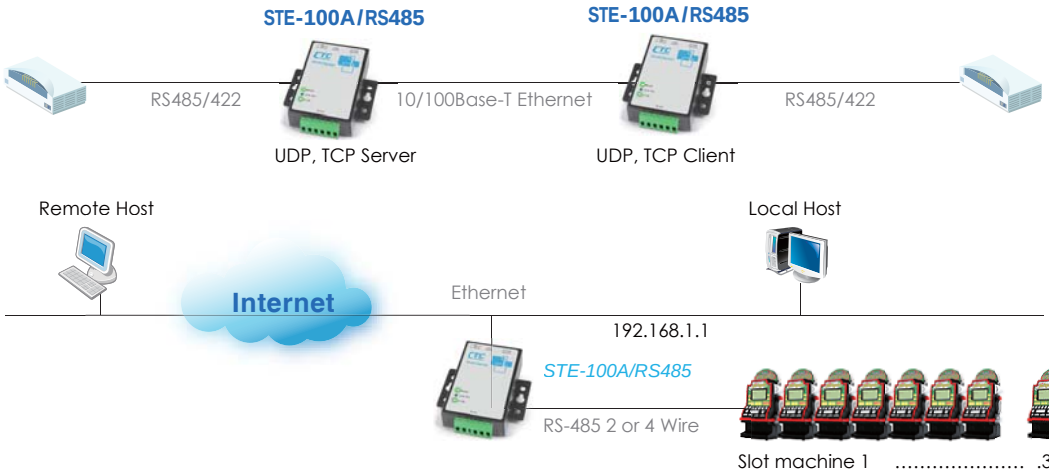
Features

- 10/100Mbps Ethernet port
- 230.4kbps serial interface
- TCP Server, TCP client, Virtual com mode, UDP
- Support for DHCP, HTTP, ICMP, ARP, IP, UDP, TCP
- Easy to use with Windows utility
- 2 Wire(half duplex) or 4 Wire(full duplex)RS-485
- Configuration by web browser
- Compack size 53x85x21(mm)
- Low power consumption with single + 12V to +48V input

Specifications

General
LED: Ready, TP Link/Act, Data Tx/Rx
Push button for Load Default Configuration
OS supported: Windows XP/2000/2003/2008/VISTA/WIN7
Serial Interface RS-485, RS-422 (2 or 4 Wire RS-485; 4 Wire RS-422)
Serial Connector Terminal Block
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 Full/ Half Duplex
Data Packing Delimiter 1,2
LAN Interface
RJ-45 connector, IEEE802.3 10/100BaseT, Auto-detecting, Full/Half-duplex
Communication Modes
TCP Server, TCP Client, Virtual COM mode, UDP

Protocols
TCP, UDP, IP, ARP, ICMP, HTTP, DHCP, ICMP
Client requests connection at Power up
TCP Inactivity Time (TCP alive time)
Management
Web pages, Firmware upgrade
Security Password Access
Power AC Adapter, 12VDC output
Operating Temperature 0°C to 60°C
Storage Temperature -10°C ~ 70°C
Humidity 0 – 90% non-condensing
DIN rail mount Yes
Panel mount Yes
Dimensions 53 x 85 x 21mm (W x D x H)
Certifications CE, FCC



Ordering Information

Model Name	Description
STE100A/RS485	RS485 IP device server

5U, 17-Slots CWDM Managed Chassis

SML-5000

The SigmaLinks 5000 is a flexible, cost-effective optical transport system, designed to multiplex, de-multiplex and switch high-speed data for storage, video and voice applications. The SML-5000 is housed in a 5U, 19" or 23" rack mountable transport platform for ITU G.694.2 compliant CWDM applications, which features 17 universal hot-swappable module slots. Currently supported module line cards include SNMP, Transponders, Mux/ Demux, OADM and Optical protection. The SML-5000 supports optional redundant power and SNMP management. Another unique feature of the SML-5000 is a line card design which may be transformed into stand-alone units. The use of a common PCB card which may either be placed in the rack or used as a stand-alone unit reduces manufacturing costs as well as the inventory of spares required by distributors, installers, and end users. The NMS (Network Management System) option includes an SNMP card (agent) and standard MIB file for importation and compilation into network management platforms such as HP OpenView or CA Unicenter. This allows remote configuration and system monitoring via industry standard network management software.

Features

- 5U 19 (23)" chassis accommodate up to 17 card modules
- All modules are hot-swappable
- Redundant AC, DC power and cooling fans
- Chassis cascade up to 6 with one IP management
- Temperature sensors constantly monitor internal environment
- LCD status indication with keypad control
- TFTP firmware upgrade
- Supports Console, Telnet, SNMP and Web management
- Alarm Relay contacts
- Up to 8 CWDM wavelengths in compliance with ITU G.694.2

Specifications

Connectors

Console port features an RS232 (DB9) connector,
Alarm : Terminal Block

Physical Specifications

Dimensions: 440 x 250 x 220mm (W x D x H)
Weight: 9.5kg w/o P/S

Power Characteristics

AC input: 100 ~ 240V AC
DC input: 24VDC, 48VDC, 72VDC

Environmental Specifications

Operating : 0°C ~ 50°C
Storage : -10°C ~ 70°C
Relative humidity 5% to 90% non-condensing
Predicted MTBF : 65,000 hrs

Certification

FCC class A, VCCI class A, CE, RoHS

SigmaLinks 5000 Major Components

Control Card with LCD menu operation
For power, temperature monitoring and local control

AC Power Module Hot swappable 90~264VAC

DC Power Module Hot swappable18~74VDC

Hot swappable Line Cards:
Transponder
Mux/Demux
Optical line Protection
Optical Add/Drop Mux (OADM)
SNMP

Field replaceable Intelligent Fan

5RU 19' or 23" rack mountable Main Chassis

Chassis cascade up to ID5

Alarm relay

Control card with LCD Menu Operation

This hot-swappable controller serves two basic and very important functions; It provides a local human interface for monitoring/provisioning the SML5000 and it provides a communication link to the SNMP card that supports remote management via Telnet, Web or SNMP. The local maintenance interface can employ a serial "dumb" terminal with user friendly menu system or a 16x2 character backlit LCD and push-button navigation menu for provisioning and monitoring power, temperature and alarm conditions of the chassis and cards.

Power Redundancy

SML5000 chassis power supplies are hot swappable and modular, installing two into a chassis provides redundancy should a single power supply fail.

Intelligent Cooling Fan

To further increase system reliability, the SML-5000 chassis is fitted with one fan module, incorporating five cooling fans, fixed on the rear of the chassis. The cooling fans may be manually controlled or programmed to start whenever the internal environmental temperature exceeds 40°C.

Chassis cascade

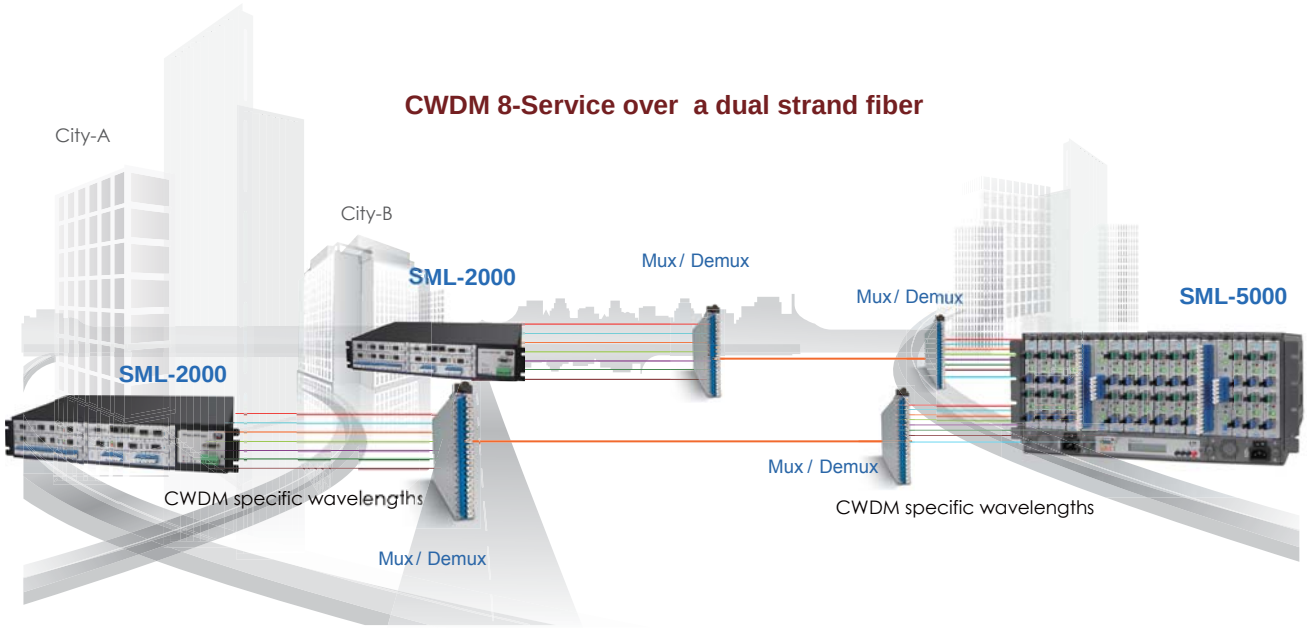
The SML-5000 features cascadeable management which allows managing a stack (up to 6 chassis) from a single IP address. Chassis are interconnected with standard UTP cables that carry control signals. Each chassis has its own ID, starting with the master chassis ID0 and cascading up to ID5.

Network Management

The SML-5000 chassis provides an SNMP card which can be installed into any slot of chassis. The SNMP card allows a network administrator with the ability to configure and monitor the status of the blades. Management can be achieved locally over RS232, or over the network by Telnet, Web or SNMP.

Protocol Supported

The SML-5000 chassis allows network administrators to deploy the chassis in a wide range of network. Technologies supported by the chassis included Transponder, Mux/Demux, Optical line Protection and Optical Add/Drop Mux (OADM).



Ordering Information

Model Name	Type	Description
SML50-Chassis	Chassis	5U, 19(23)" 17-slot chassis with hot swappable redundant power,
SML50-AC	Power	5U chassis AC power supply (90 ~ 264 VAC)
SML50-DC24	Power	5U chassis DC power supply (18 ~ 56 VDC)
SML50-DC48	Power	5U chassis DC power supply (36 ~ 72 VDC)
SML50-SNMP	NMC Card	5U Chassis SNMP card supports web, telnet, console , SNMP functions

Chassis Type

SML50 – ☐☐☐☐☐☐☐

Example: SML50 – Chassis

Power Type

SML50 – ☐☐

Example: SML50 – AC

2U, 6-Slots CWDM Managed Chassis

SML-2000

The SigmaLinks 2000 is a flexible, cost-effective optical transport system, designed to multiplex, de-multiplex and switch high-speed data for storage, video and voice applications. The SML-2000 is housed in a standard 2U, 19" or 23" rack mountable transport platform for ITU G.694.2 compliant CWDM applications, which features 6 universal hot-swappable module slots. Currently supported module line cards include SNMP, Transponders, Mux/Demux, OADM, Optical protection and optical channel monitors. The SML2000 supports optional redundant power and SNMP management. Another unique feature of the SML2000 is a line card design which may be transformed into stand-alone units. The use of a common PCB card which may either be placed in the rack or used as a stand-alone unit reduces manufacturing costs as well as the inventory of spares required by distributors, installers, and end users. The NMS (Network Management System) option includes an SNMP card (agent) and standard MIB file for importation and compilation into network management platforms such as HP OpenView or CA Unicenter. This allows remote configuration and system monitoring via industry standard network management software.

Features

- 2U 19 (23)" chassis accommodate up to 6 card modules
- All modules are hot-swappable
- Redundant AC, DC power and cooling fans
- TFTP firmware upgrade
- Supports Console, Telnet, SNMP and Web management
- Alarm Relay contacts
- Up to 8 CWDM wavelengths in compliance with ITU G.694.2

Specifications

Connectors

Console port features an RS232 (DB9) connector,
Alarm : Terminal Block

Physical Specifications

Dimensions: 440 x 250 x 89mm (W x D x H)
Weight: 4.8kg w/o P/S

Power Characteristics

AC input: 100 ~ 240V AC
DC input: 24VDC, 48VDC, 72VDC

Environmental Specifications

Operating : 0°C ~ 50°C
Storage : -10°C ~ 70°C
Relative humidity 5% ~ 90% non-condensing
Predicted MTBF : 65,000 hrs

Certification

FCC class A, VCCI class A, CE, RoHS

SigmaLinks 2000 Major Components

Power Redundancy

SML2000 chassis power supplies are hot swappable and modular, installing two into a chassis provides redundancy should a single power supply fail.

Power Redundancy

To further increase system reliability, the SML2000 chassis is fixed with two cooling fans on the rear of the chassis.

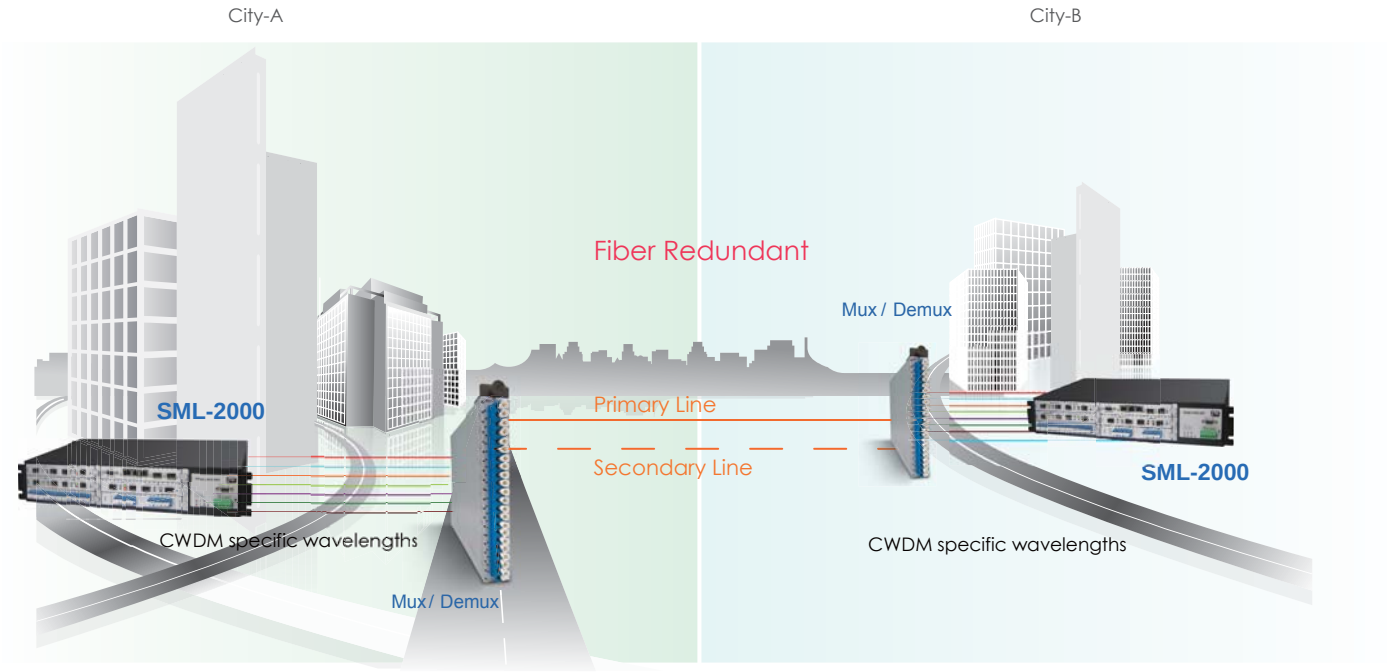
Network Management

The SML2000 chassis provides an SNMP card which can be installed into any slot of chassis. The SNMP card allows a network administrator with the ability to configure and monitor the status of the blades. Management can be achieved locally over RS232, or over the network by Telnet, Web or SNMP.

Protocol Supported

The SML2000 chassis allows network administrators to deploy the chassis in a wide range of network. Technologies supported by the chassis included Transponder, Mux/Demux, Optical line Protection and Optical Add/Drop Mux (OADM).

CWDM 8-Service over dual fiber with Protection



Ordering Information

Model Name	Type	Description
SML20-Chassis	Chassis	2U, 19(23)" 6-slot Chassis with hot swappable redundant power,
SML20-AC	Power	2U chassis AC power supply (90 ~ 264 VAC)
SML20-DC24	Power	2U chassis DC power supply (18~ 56 VDC)
SML20-DC48	Power	2U chassis DC power supply (36 ~ 72 VDC)
SML20-SNMP	SNMP Card	2U Chassis SNMP card supports web, telnet, console , SNMP functions

Chassis Type

SML20 – ☐☐☐☐☐☐☐

Example: SML20 – Chassis

Power Type

SML20 – ☐☐

Example: SML20 – AC

Network Management Controller

SML-SNMP

The SML-SNMP is the Network Management Controller card that can be placed in a compatible SML2000 or SML5000 chassis to provide network management functions. The management interface supports a local RS-232 serial console or remote TCPIP management by Telnet, HTTP or SNMP protocols. The card is designed to be hot swapped so that it may be field replaced without affecting any online service of any other rack cards. The card also supports online firmware upgrade from TFTP server, using any user interface. Support for any standard NMS is provided by the included proprietary MIB file.

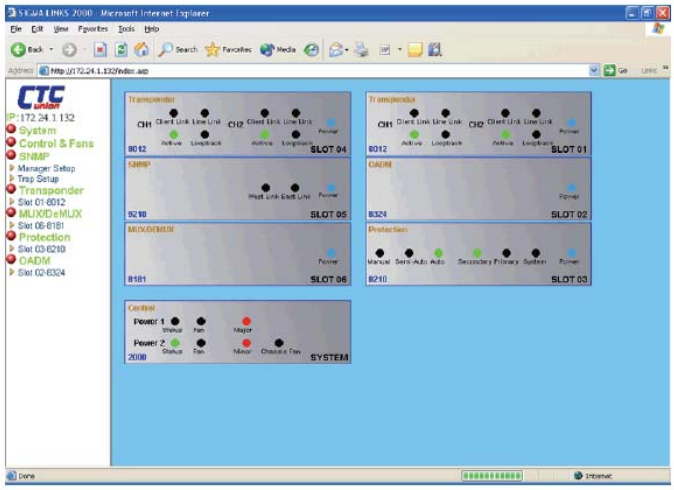
Features

- Communicated with CWDM Control Card by RS-485
- Management control to Mux/Demux card, Protection card and Transponder Card
- SNMP v1 Trap, MIB file
- 3 ports 10/100TX UTP ports plus 2 x100Mbps SFP slot
- Telnet access control
- Real-Time Clock feature
- TFTP SNMP F/W upgrade
- In chassis cascade mode, only chassis #0 SNMP card works, the other Chassis #1 to #5 SNMP cards are idle.

Specifications

Electrical	Console RS232 port
Interface	3x LAN 10/100Base-TX 2 x 100Base-FX SFP slot
Management Interface	· SNMP management: provide all system for Network management functions: software updates, and management system interaction through Ethernet port · Out-band management: supports Web, Telnet and SNMP management
Indications	PWR, LAN LNK/SPD
Dimensions	220 x 162 x 25mm (D x W x H)
Weight	0.9kg
Temperature	0°C ~ 50°C (Operating), -10 ~ 60°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Web GUI Manager



Console / Telnet Management

```
            ******************************************
            ***   CTC UNION TECHNOLOGIES CO., LTD  ***
            ***  Sigma Links 5000 Console Ver 1.02 ***
            ******************************************
                    CHASSIS ID : 00
SLOT #11 > 8210 Protection          [ Ver:0.02-0.0-0.1 ]

PRI Rx Power            SEC Rx Power              Working Path
 [ -62dBm ]              [ -62dBm ]                  [ PRI ]

1 : Protect Mode [ AUTO    ]
2 : Detect Level [ -33dB ]
-----------------------------------------
2 : Detect Level
 1. -5dB        6. -15dB        B. -25dB        G. -35dB
 2. -7dB        7. -17dB        C. -27dB
 3. -9dB        8. -19dB        D. -29dB
 4. -11dB       9. -21dB        E. -31dB
 5. -13dB       A. -23dB        F. -33dB

U. Firmware Upgrade.

Please select the items.   < ESC > to previous menu.
```

Ordering Information

Model Name	Type	Description
SML50-SNMP	NMC Card	5U Chassis SNMP card supports web, telnet, console , SNMP functions
SML20-SNMP	NMC Card	2U Chassis SNMP card supports web, telnet, console , SNMP functions

SML ☐☐ – SNMP
Example: SML50 – SNMP

WDM - Transponder

Dual Channel 1.25G/2.5G Transponder

SML-TR12, SML-TR22

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

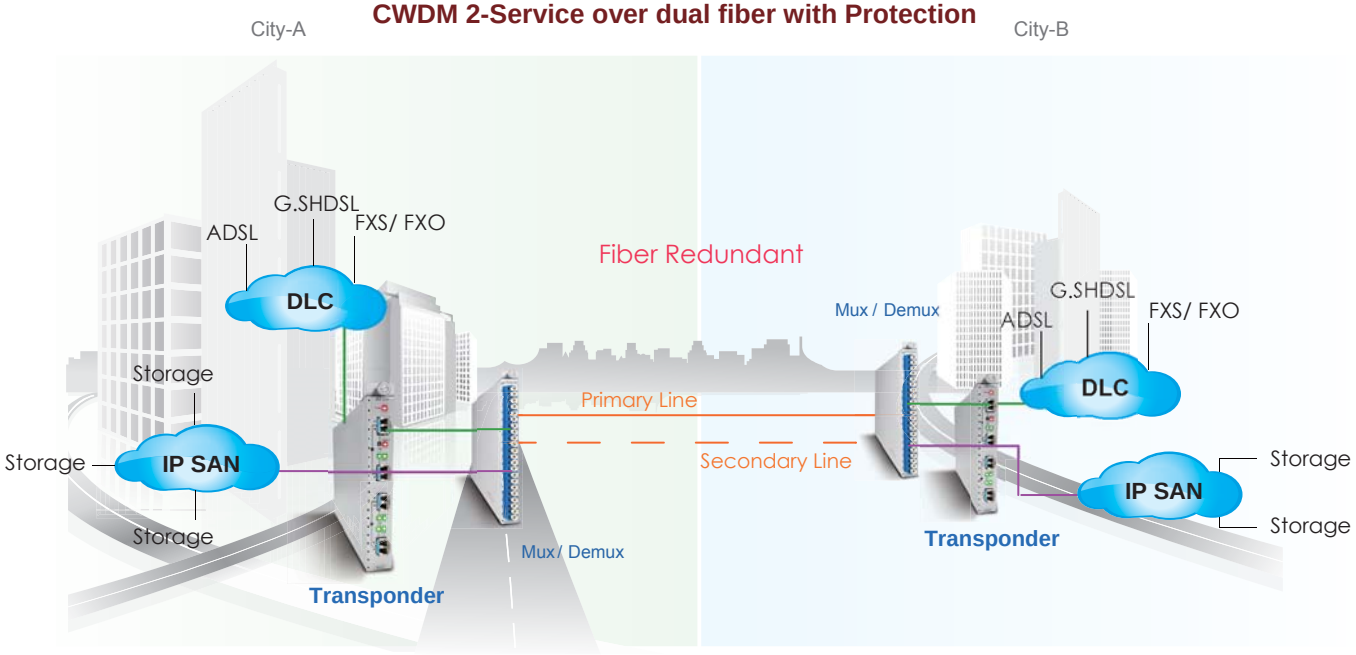
Features

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

Specifications

Optical Interface :	Connector : SFP LC
	Data rate : 100Mbps, 1.25Gbps, 2.5Gbps
	Fiber : MM 62.2/125μm, 50/125μm.
	Distance : SM 9/125μm
	Wavelength : 850, 1311, 1471 ~ 1611nm
Indication	Power, Link(Line), Link(Client), TX/Act, Loopback
Power Input	12 VDC
Power Consumption	1channel <5W, 2 channel <10W
Dimensions	220 x 162 x 25mm (D x W x H)
Weight	0.9kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

CWDM 2-Service over dual fiber with Protection



Ordering Information

Model Name	Type	Description
SML-TR12	NMC Card	1.25G, 2 Ch Transponder card
SML-TR22	NMC Card	2.5G, 2 Ch Transponder card

SML – □□□□

Example: SML – TR12

9 / 5 Channel MUX/DeMUX with Monitor Port

SML-MD91, SML-MD51

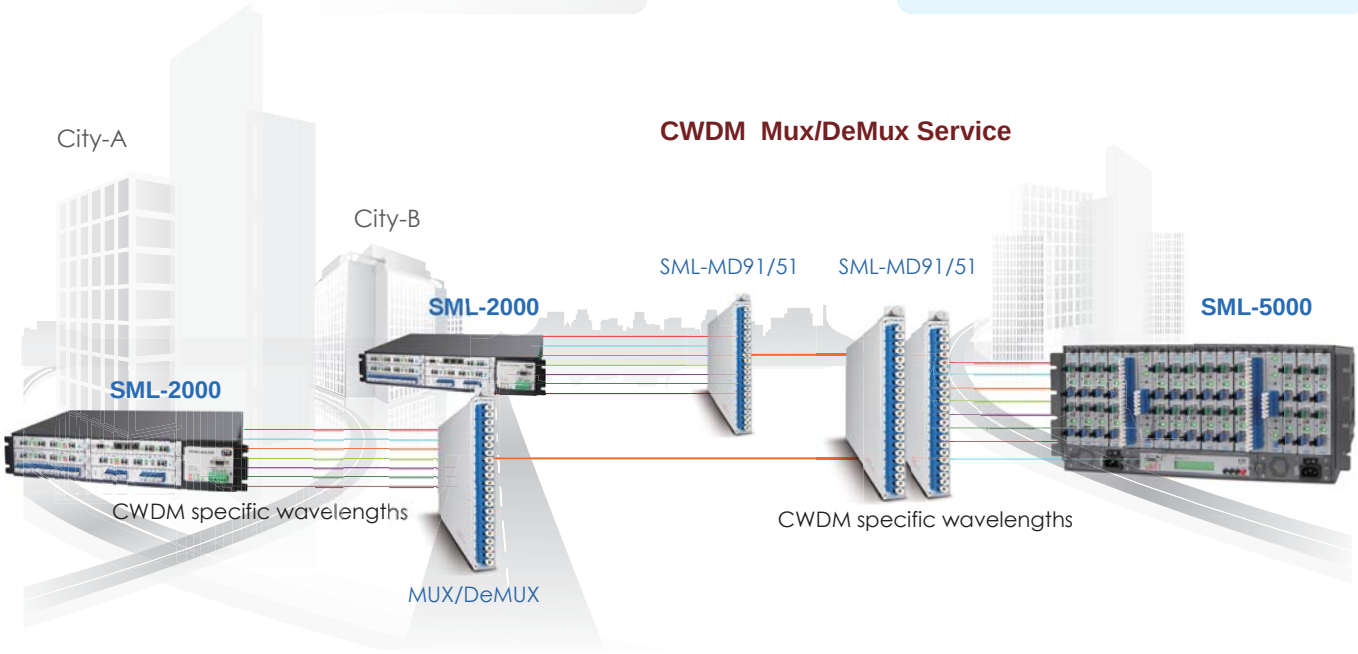
Optical Mux/Demux (Multiplexer/Demultiplexer) cards are available in 5-channel or 9-channel models and are used to combine signals from 1-channel or 2-channel transponder cards on to a single pair of fiber. A 1311nm CWDM channel is accessible separately. The MUX/DeMUX cards provide the primary wave division and combination functions. Line side wave lengths require translation to client side equipment via the transponder card.

Features

- Two different CWDM Mux/ DeMUX are available:
  5 Ch (1531/1551/1571/1591/ + 1611nm)
  9 Ch (1471/1491/1511/1531/1551/1571/1591/1611 + 1311nm)
- Full native mode performance
- Optical connectors: LC connectors, SMF 9/ 125mm
- Optical input/ output monitoring port
- Passive model requires no power
- Protocol transparent, no limitation
- Utilizes industry standard ITU CWDM wavelengths

Specifications

Connecter	LC
Standard	ITU-T G.694.2
Wavelength	SML-MD90 1311, 1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611nm
	SML-MD50 1311, 1551, 1571, 1591, 1611nm
Insertion Loss	SML-MD90 < 3.5dB for CWDM wavelength
	SML-MD50 < 5.0dB for CWDM wavelength
Return Loss	> 45dB
Dimensions	220 x 162 x 25mm (D x W x H)
Weight	0.9kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs



Ordering Information

Model Name	Description
SML-MD51	5Ch Mux/Demux (1530,1550,1570,1590,1610)nm with monitor port
SML-MD91	9Ch Mux/Demux (1310,1470,1490, 1510, 1530, 1550,1570,1590,1610)nm with monitor port

SML – □□□□

Example: SML – MD51

Optical Add-Drop Multiplexer

SML-OADM

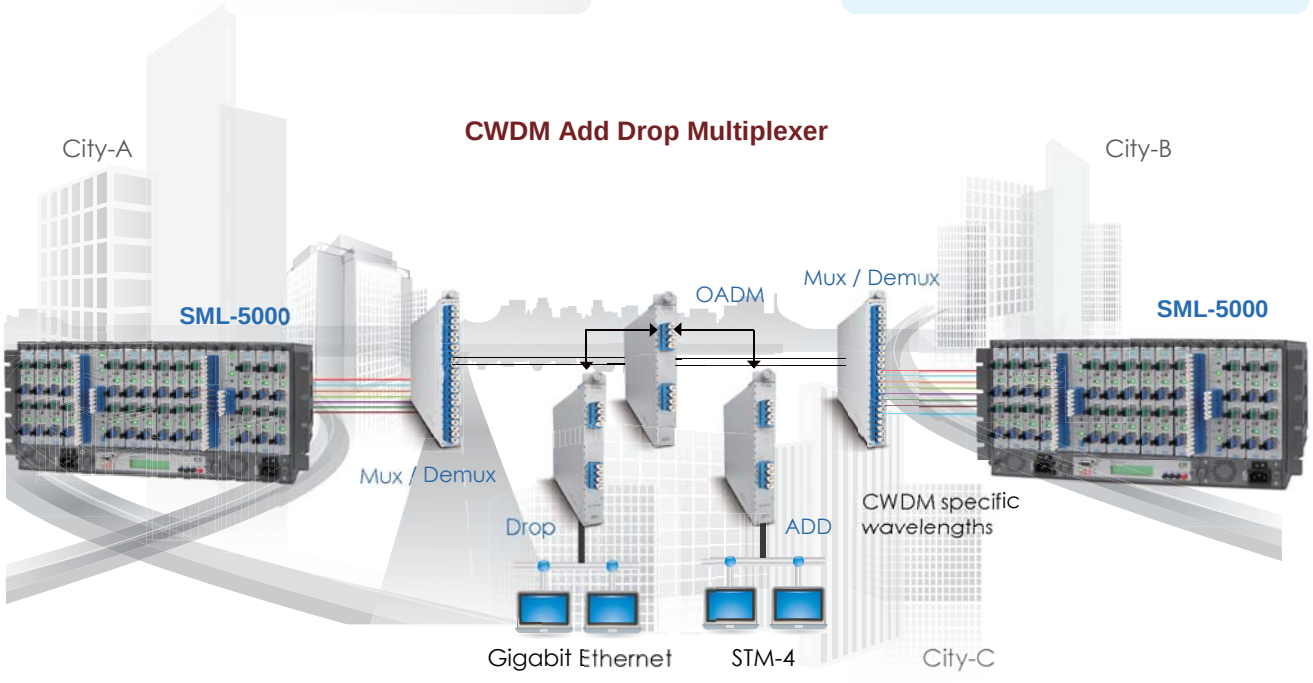
An Optical Add/Drop Multiplexer takes a single wavelength from a trunk, pulls the signal out, and allows a new signal at the same wavelength to be inserted into the trunk at roughly the same spot. All the other wavelengths pass through the Add/Drop Multiplexer with only a small loss of power (usually < 0.5dB including connectors and adapters). An Optical Add/Drop Multiplexer (OADM) is available allowing a single wavelength to be dropped or added at specific sites in linear Add/Drop topology.

Features

- Single Add/Drop Channel
- Operating channel : 1311,1471,1491,1511,1531,1551,1571, 1591,1611nm
- Passive optical module, no power required
- Protocol transparent, no limitation
- Utilizes Industry standard ITU CWDM wavelengths
- Optical connectors : LC

Specifications

Connecter	LC
Indication	Power System, Working Path, Protection Path, Work mode
Restoration Time	50ms
Range	Input PWR :+3 ~ -15dBm(TX), -2~-29dBm(RX). Detection: -5 ~ -29dBm
Loss	Insertion Loss < 6.5dB, Return Loss > 45dB
Dimensions	220 x 162 x 25mm(DxWxH)
Weight	0.9kg
Temperature	0°C ~ 50°C (Operating) ,-10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs



Ordering Information

Model Name	Description
SML-OADM-31	1310nm Drop / Insert card, LC
SML-OADM-47	1470nm Drop / Insert card, LC
SML-OADM-49	1490nm Drop / Insert card, LC
SML-OADM-51	1510nm Drop / Insert card, LC
SML-OADM-53	1530nm Drop / Insert card, LC
SML-OADM-55	1550nm Drop / Insert card, LC
SML-OADM-57	1570nm Drop / Insert card, LC
SML-OADM-59	1590nm Drop / Insert card, LC
SML-OADM-61	1610nm Drop / Insert card, LC

SML – OADM – □□

Example: SML – OADM – 31

Optical Line Protection Switch

SML-Protection

An optical protection unit is able to provide fiber path redundancy on a channel by channel basis. These units are particularly well suited for protection in fiber data transmission. The solution includes monitoring capabilities for both working and protection paths. The monitoring is available through the SNMP Management unit. In case of a fiber cut in the protecting path, traffic will be switched over to the protecting path in less than 50 ms.

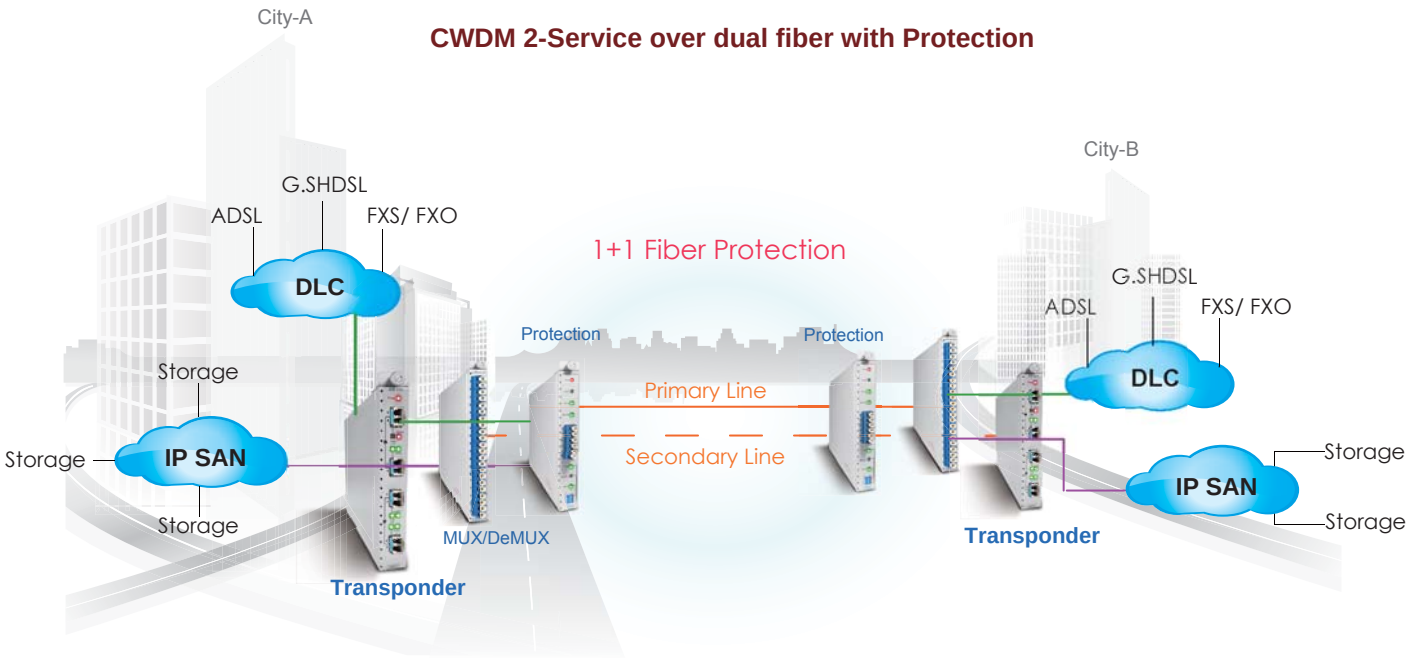
Features

- 1+1 full optical protection
- Low channel cross talk < -55dB ; Low insertion loss < 6.5dB
- Latch feature, if power is lost the switch remains in its current state
- Protection transition < 50 ms
- Works with any combination of 1 ~16 wavelengths
- Traffic is switched in one of three modes :
  Auto, Semi-Auto, Manual
- Optical Interface Type : LC connectors
- Working and protected lines are physically separated fiber

Specifications

Connecter	LC
LEDs	Power System, Working Path, Protection Path, Work mode
Power	DC 12V In
Restoration Time	50ms
Range	Input PWR :+3 ~ -15dBm(TX), -2~-29dBm(RX). Detection: -5 ~ -29dBm
Loss	Insertion Loss < 6.5dB, Return Loss > 45dB
Power Consumption	<10W
Dimensions	220 x 162 x 25mm (D x W x H)
Weight	0.9kg
Temperature	0°C ~ 50°C (Operating), 20°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

CWDM 2-Service over dual fiber with Protection



Ordering Information

Model Name	Description
SML-Protection	Optical Line Protection switch card

1U, 4 Channel Transponder Rack

SML-1000

The SML-1000 is a multi-rate transponder platform (up to 2.5G transponder) that provides the capability to transport a wide variety of service types from 155 Mbps to 2.48 Gbps, including services such as ESCON, SONET OC-3 through OC-48, SDH STM-1 through STM-16, Gigabit Ethernet, 1-or 2-Gbps Fiber Channel. The 2.5G transponder card architecture contains a single client interface that is mapped to a single-line CWDM interface, without accessing any cross-connect fabric.

The interface to the client is via a variety of Small Form-Factor Pluggable (SFP) optics modules, enabling a wide service mix and different fiber types (single- and multimode), wavelengths (850 and 1310 nm), and fiber reach (short reach/intra-office, intermediate reach/long haul, etc.). The SFP optical modules are equipped with LC connectors to enable high-density placement.

Features

- 1U 19" 4Ch Transponder Rack
- R2R regeneration (Re-amplification and reshaping)
- Line rate support from 100Mbps up to 2.5Gbps
- Client Side Wavelength: 850/ 1310/ 1550nm
- Line Side CWDM Wavelength 1471/ 1491/ 1511/ 1531 / 1551/ 1571/ 1591/ 1611nm
- optical Connector: SFP-LC (On both Line & Client Side)

Specifications

Connectors

SFP-LC (Line Side)

SFP-LC (Client Side)

Physical Specifications

Dimensions: 265 x 440 x 43mm (W x D x H)

Weight: 3.2kg w/o P/S

Power Characteristics

AC input: 100 ~ 240V AC

DC input: 48VDC, 72VDC

Environmental Specifications

Operating: 0°C ~ 50°C

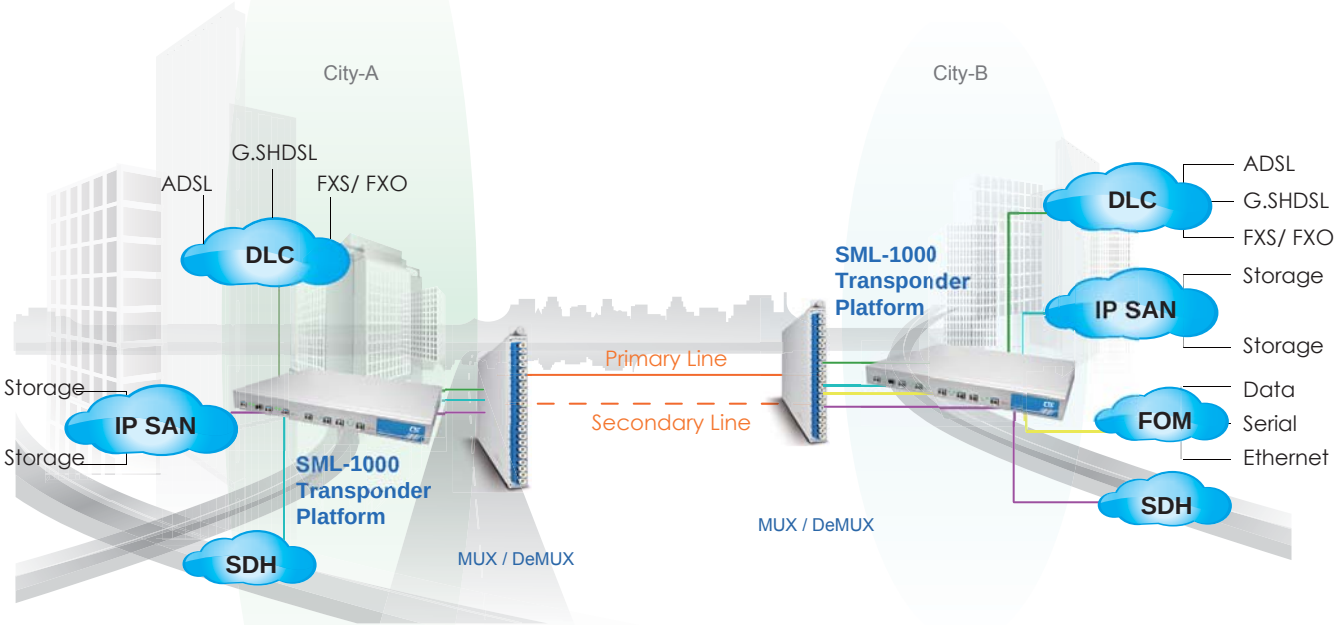
Storage: -10°C ~ 70°C

Relative humidity: 5% ~ 90% non-condensing

Predicted MTBF : 65,000 hrs

Certification

FCC , CE, RoHS



Ordering Information

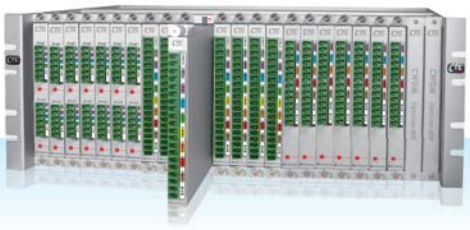
Model Name	Description
SML-1000-AA	1U 19" 4 Ch Transponder rack with Internal Dual AC power
SML-1000-DD	1U 19" 4 Ch Transponder rack with Internal Dual DC power
SML-1000-AD	1U 19" 4 Ch Transponder rack with Internal AC + DC power

SML – 1000 – ☐☐

Example: SML – 1000 – AA

4U, 24-Slot MUX / DeMUX Passive Rack

SML-4000



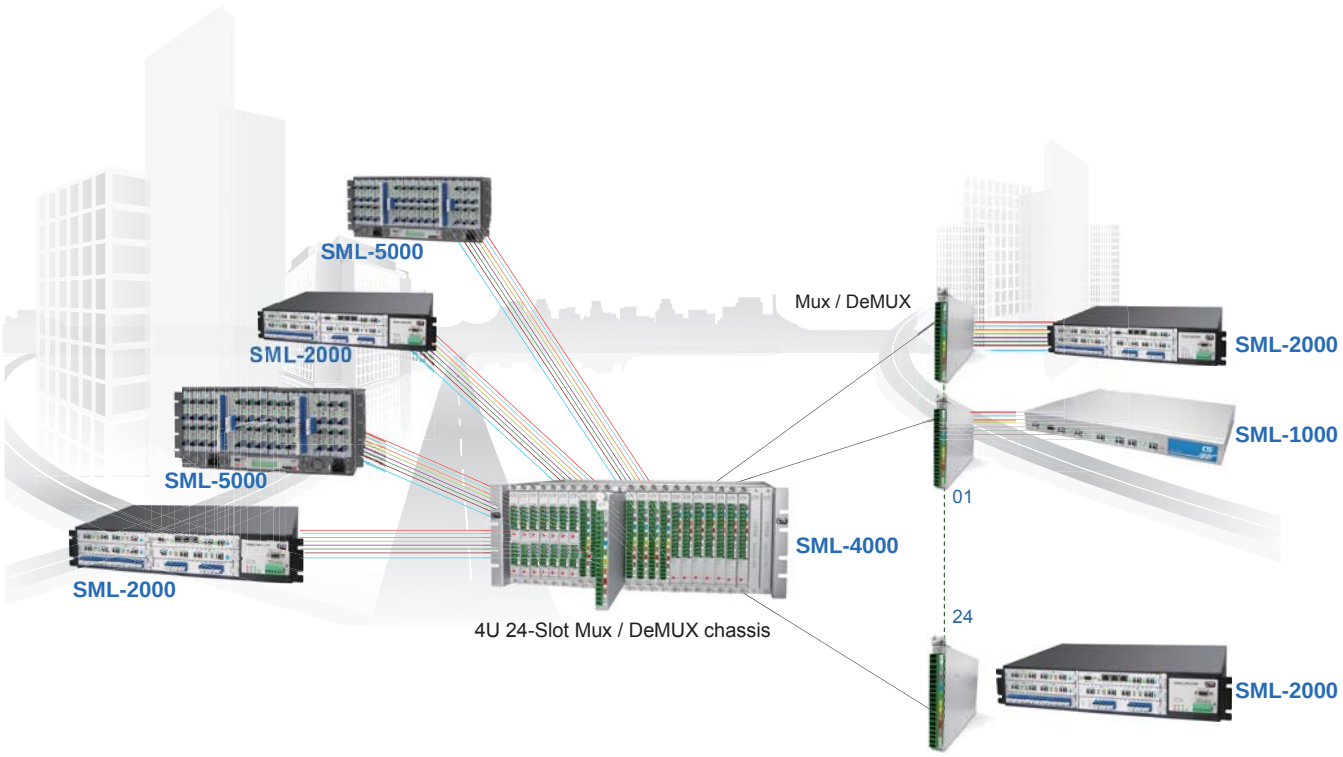
SML-4000 is a 4U 19-inch CWDM passive rack that features 24 cards capacity and supports SML-40-8181-L , 8+1 channels MUX/DEMUX cards. The 8+1 channels MUX/DEMUX card is a modular design for CWDM wavelengths including 1471nm, 1491nm, 1511nm, 1531nm, 1551nm, 1571nm, 1591nm, and 1611nm. The 1311nm CWDM channel is accessible separately. The MUX/DEMUX cards provide the primary wave division and combination functions for CWDM. Line side wave lengths require translation to client side equipment via a transponder card. The unique design makes the SML-4000 one of the highest density CWDM solutions in the industry.

Features

- 24 Slots for MUX/DEMUX card
- 4U, 19-inch Rack Mount
- Passive model requires on power
- Plug & Play Operation
- Optical connectors: LC connectors, SMF 9/ 125um
- Protocol transparent, no limitation
- Utilizes industry standard ITU-T CWDM wavelengths

Specifications

Connecter	LC
Physical Specifications	Dimensions: 4U passive chassis : 277 x 481 x 177 mm (D x W x H) Mux/ Demux card : 260 x 240 x 18.2 mm (D x W x H)
Environmental Specifications	Operating 0°C ~ 50°C Storage 0°C ~ 70°C Relative humidity 5% ~ 90% non-condensing
Certification	RoHS



Ordering Information

Model Name	Description
SML40-chassis	4U, 19(23)" 24-slot chassis

8 / 5 Channel MUX / DeMUX with Monitor Port

SML40-MD

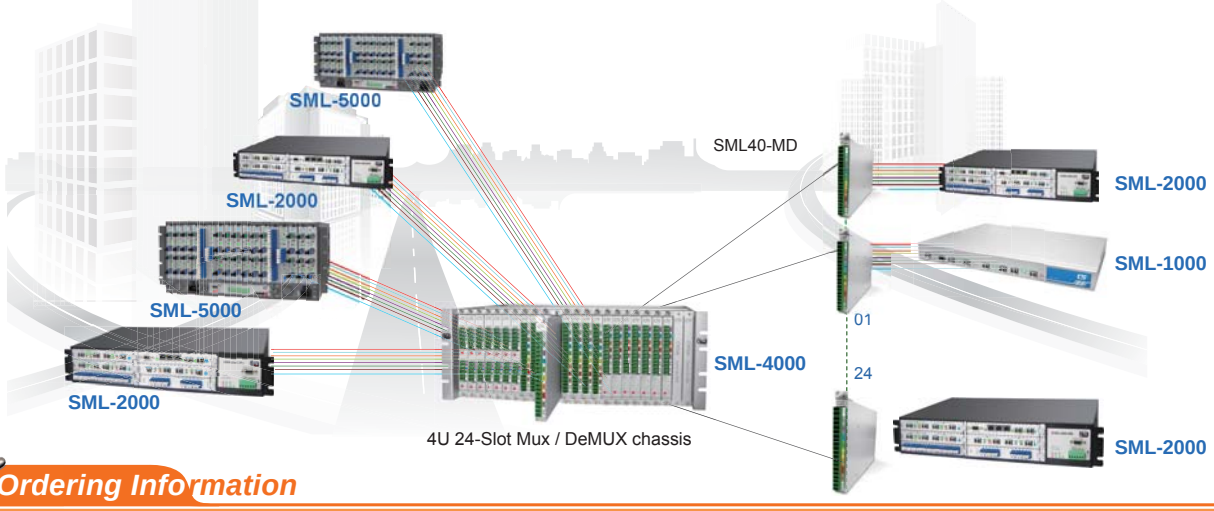
The SML-40-MD81 is 8 channels MUX/DeMUX, modular design card for CWDM wavelengths including 1471nm, 1491nm, 1511nm, 1531nm, 1551nm, 1571nm, 1591nm, 1611nm. The SML-40-MD81 is 8 channels MUX/DeMUX, modular design card with monitor port. The SML-40-MD51 is 5 channels MUX/DeMUX, modular design card for CWDM wavelengths including 1491nm, 1511nm, 1571nm, 1591nm, 1611nm. The SML-40-MD40 is a dual 4 channels Mux/Demux card, wavelength included 1471, 1491, 1551, 1531nm. The MUX/DEMUX cards provide the primary wave division and combination functions for CWDM. Line side wave lengths require translation to client side equipment via a transponder card.

Features

- Full native mode performance
- Optical connectors : LC connectors, SMF 9/125um
- Optical Input/Output monitor port
- Passive model requires no power
- Protocol transparent, no limitation
- Utilizes industry standard ITU CWDM wavelength

Specifications

Connector	LC
Standard	ITU-T G.694.2
Wavelength	1311,1471,1491,1511,1531,1551, 1571,1591,1611nm
Insertion Loss	< 3.5dB for CWDM wavelength
Return Loss	> 45dB
Dimensions	260 x 240 x 18.2mm (D x W x H)
Weight	0.6kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	75,000 hrs



Ordering Information

Model Name	Description
SML40-MD80-UPC-Wavelength	8 Ch Mux/Demux Card 1471 / 1491 / 1511 / 1531 / 1551 / 1571 / 1591 / 1611nm
	LC UPC wavelength selected from 1270 ~ 1610nm
SML40-MD80-APC-Wavelength	8 Ch Mux/Demux Card 1471 / 1491 / 1511 / 1531 / 1551 / 1571 / 1591 / 1611nm
	LC APC wavelength selected from 1270 ~ 1610nm
SML40-MD81-UPC-Wavelength	8 Ch Mux/Demux Card 1471 / 1491 / 1511 / 1531 / 1551 / 1571 / 1591 / 1611nm with Monitor port.
	LC UPC wavelength selected from 1270 ~ 1610nm
SML40-MD81--APC-Wavelength	8 Ch Mux/Demux Card 1471 / 1491 / 1511 / 1531 / 1551 / 1571 / 1591 / 1611nm with Monitor port.
	LC APC wavelength selected from 1270 ~ 1610nm
SML40-MD51-UPC-Wavelength	5 Ch Mux/Demux card 1491 / 1511 / 1571 / 1591 / 1611nm with Monitor Port
	LC UPC wavelength selected from 1270 ~ 1610nm
SML40-MD51-APC-Wavelength	5 Ch Mux/Demux card 1491 / 1511 / 1571 / 1591 / 1611nm with Monitor Port
	LC APC wavelength selected from 1270 ~ 1610nm
SML40-2D40-UPC-Wavelength	Dual 4 ch Mux/Demux card, single direction 1471 / 1491 / 1511 / 1531nm
	LC UPC wavelength selected from 1270 ~ 1610nm
SML40-2D40-APC-Wavelength	Dual 4 ch Mux/Demux card, single direction 1471 / 1491 / 1511 / 1531nm
	LC APC wavelength selected from 1270 ~ 1610nm
SML40-1D80-UPC-Wavelength	8 Ch Mux/Demux card, single direction 1471 / 1491 / 1511 / 1531 / 1551 / 1571 / 1591 / 1611nm
	LC UPC wavelength selected from 1270 ~ 1610nm
SML40-1D80-APC-Wavelength	8 Ch Mux/Demux card, single direction 1471 / 1491 / 1511 / 1531 / 1551 / 1571 / 1591 / 1611nm
	LC APC wavelength selected from 1270 ~ 1610nm
SML40-MD-31/CWDM-UPC	1310nm plus CWDM 1470 ~ 1610nm Mux/Demux LC UPC
SML40-MD-31/CWDM-APC	1310nm plus CWDM 1470 ~ 1610nm Mux/Demux LC APC

SML40 – □□□□ – □□□ – □□□□□□□□□□

Example: SML40 – MD80 – UPC – Wavelength

16Ch E1/T1, 8x 10/100/1000-T Ethernet Fiber Multiplexer

FMUX1000S

FMUX1000S is an innovative gigabit multi-service fiber optic transport system which can transmit both E1/T1 and Ethernet data streams over redundant gigabit fiber optic links. The gigabit wire-speed Ethernet traffic and a separated 16 E1/T1 transparent data are multiplexed into 1.25Gbps by using a patented physical coding method to achieve a high performance and economic broadband access solution.

The FMUX1000S can be adopted as a broadband backhaul of 3G mobile networks or private network access for campus and office building. FMUX1000S is a modular design which supports E1/T1 and combo Ethernet interface cards. There are 4 hot swappable tributary slots equipped for each FMUX1000S system. The Ethernet tributary card is equipped with two 10/100/1000 RJ45 and two Gigabit SFP fiber ports, These 4 ports are part of 4 gigabit ports in an Ethernet switch core. For E1/T1 card, the 4 E1/T1 ports can be programmed as either E1 or T1 individually. Any combination of Ethernet and E1/T1 cards can be placed in the four plug-in slots.

Features

- Wire-speed GbE traffic and separated 16E1 data are transmitted simultaneously
- 1Gbps throughput for aggregate Ethernet traffic
- Supports advanced Ethernet interface features like jumbo frame size(9K bytes), Provider Ethernet bridge by VLAN stacking (QinQ, IEEE802.1ad), QoS and traffic rate control
- Supports various loopback and BERT for system diagnosis
- 1+1 protection switch and Automatic Laser Shutdown[ALS] for aggregate fiber interfaces
- Built-in EOC channel for OAM&P
- Supports VT100, Telnet, SNMP and client server based NMS interfaces
- Loss of Power indication for power failure of the remote unit
- Remote software upgradable
- Supports order-wire for craft person's voice communication
- Supports one RS-232 Async. channel for auxiliary data communication
- AC and DC power redundancy
- Form C relay contacts for audible and visible alarm outputs
- Comply with the specifications of class A of CISPR 22 and class A of FCC Part 15 Subpart B Rules of U.S.A
- Comply with the electrostatic discharge immunity (ESD) IEC 61000-4-2 level 2
- RoHS Compliant

Specifications

System

System capacity
Any combination of E1/T1 and Combo Ethernet cards for 4 x hot swappable tributary plug-in slots. E1/T1 4ch, 8 ch,12 ch Max.16ch or GbE combo ports 2ch, 4ch, 6ch Max.8ch
Aggregate Ethernet throughput
1 Gbps wire-speed

Aggregate – Gigabit Optical Interface

Number of port 2, 1+1 protection
Line rate 1.25G bps
Optical central wavelength 1310 nm nominal
Connector type LC (SFP housing)

Management

Console Port Electrical: RS232, DCE Protocol: VT-100 Connector: DB9, female
Telnet Access via SNMP Ethernet port
SNMP SNMP v1, v2c; Up to 3 Trap IPs
Management Embedded operations channel over fiber
Loss of Power Loss of power indication for remote unit
Auxiliary Data Channel 300 – 115200 bps , RS232C
Order-wire 300 – 3.4K Hz voice channel, RJ11 4 wire telephone handset interface

Alarm

Alarm History Alarm Type
(i.e. RAI, AIS, LOS,RDI, LOF, AIS, CV, ES, SES, UAS, LPR, AOC)
Alarm Queue Maximum 100 alarm records which record the latest alarm type, location, and date & time
Alarm Threshold CV, ES, SES, UAS

Power

AC Module 90 to 240 VAC, 60 +/- 3Hz
48 VDC Module -42 to -56 VDC
Redundancy AC+DC, DC+DC or AC+AC
Power Consumption Max. 20W per system

Physical and Environmental

Dimensions
Standalone: 441x 445x 320 mm Rack: 430x 355x 370mm (W x H x D)
Temperature 0 - 45°C (shelf) or 0 - +65 °C @ 10 – 90 % RH, Non condensing (Outdoor)
Mounting 19 inch standalone desktop stackable and rack mount

Certification

EMC EN55022 Class A, EN55024, FCC Part 15 Class A
Safety EN60950-1, IEC60950-1

Standards Compliance

ITU-T G.703, G.704, G.823, G.826
IEC 61000-4-5 class 3
IEEE 802.3, 802.3u, 802.3z, 802.3x, 802.1q, 802.1ad (Q-in-Q)
IETF RFC 1643, RFC 1157, RFC 1213, RFC 1406, RFC 2863

Ordering Information

Model Name	Type	Description
FMUX1000i-CH	Chassis	Fiber Mux w/ LCD and In-band SNMP, optional SFP
FMUX1000S-AC	Power	AC power module 100~ 240VAC
FMUX1000S-DC	Power	DC power module -36 ~ -72V
FMUX1000-4E1/T1-R	Interface Module	4E1/T1 card with RJ45 connector
FMUX1000-4E1/T1-W	Interface Module	4E1/T1 card with Wire-wrap connector
FMUX1000-4E1-B	Interface Module	4E1 card with BNC connector
FMUX1000-GC	Interface Module	2 GbE Combo Ethernet card optional SFP module
FMUX1000-GF-4E1/T1-R	Interface Module	2 GbE SFP and 4x E1/T1 RJ45 card optional SFP module
FMUX1000-GT-4E1/T1-R	Interface Module	Dual 10/100/1000-T and 4E1/T1 RJ45 card

Chassis Type
FMUX1000i – □□
Example: FMUX1000i – CH

Power Type
FMUX1000S – □□
Example: FMUX1000S – AC

Card Type
FMUX1000 – □□□ / □□ – □
Example: FMUX1000 – 4E1/T1-R

E1 Interface Specification

E1 frame PCM31,PCM31C,PCM30,PCM30C and unframed, Framed (ITU-T G.703 and G.704 standard) Line Code HDB3
Rates 2.048Mbps+/-50ppm
Output Signal ITU-T G.703
Input Signal ITU-T G.703
Impedance 75 ohm unbalanced or 120 ohm balanced, software programmable
Jitter requirements Meet ITU-T G.823
Connector DB25 (optional DB25 to RJ45 or BNC connector available)
Channel 4 channels E1 per cacrd
Surge Protection IEC 61000-4-5 class 3

T1 Interface Specification

T1 frame SF, ESF and unframed, field selectable, Meet ITU-T G.703 and G.704 standard
Line Code AMI / B8ZS(selectable)
Rates 1.544M bps ± 50 ppm
Output Signal DS1 with 0, -7.5, -15 dB LBO
Input Signal DS1 with 0 dB to -26 dB ALBO
Impedance 100 ohm , balanced
Pulse Template Per AT&T TR 62411
Connector DB25 (optional DB25 to wire-wrap connector available)
Channel 4 channels T1 per card
Surge Protection IEC 61000-4-5 class 3

Gigabit Ethernet specification

Standard Comply with 802.3, 802.3u, 802.3ab and 802.3z
Data rate 10/100/1000Base-T for twisted pair GbE, 1000Base-X for optical GbE
Connector RJ45 for twisted pair GbE and LC (SFP) for optical GbE
No. of ports 2 x RJ45 and 2 x SFP combo / 2 x RJ45 / 2 x SFP

4Ch E1/T1 card

The 4 x E1/T1 4-Channel Port Cards for the Gigabit Fiber Multiplexer is modular PCAs which slide into the Gigabit fiber Multiplexer chassis and provide four completely independent ITU-T G.703 E1 or T1(DS1) interfaces. The PCA module terminates with a DB25F connector that is designed to connect to a physical adapter. The adapter is available in two options, one, with 4 pairs of BNC connectors for E1 75 Ohm unbalanced connections and the other with four RJ-45 jacks for E1 120 Ohm balanced or for T1 100 Ohm balanced connections. The 4 x E1/T1 card can be programmed as either E1 or T1 individually.

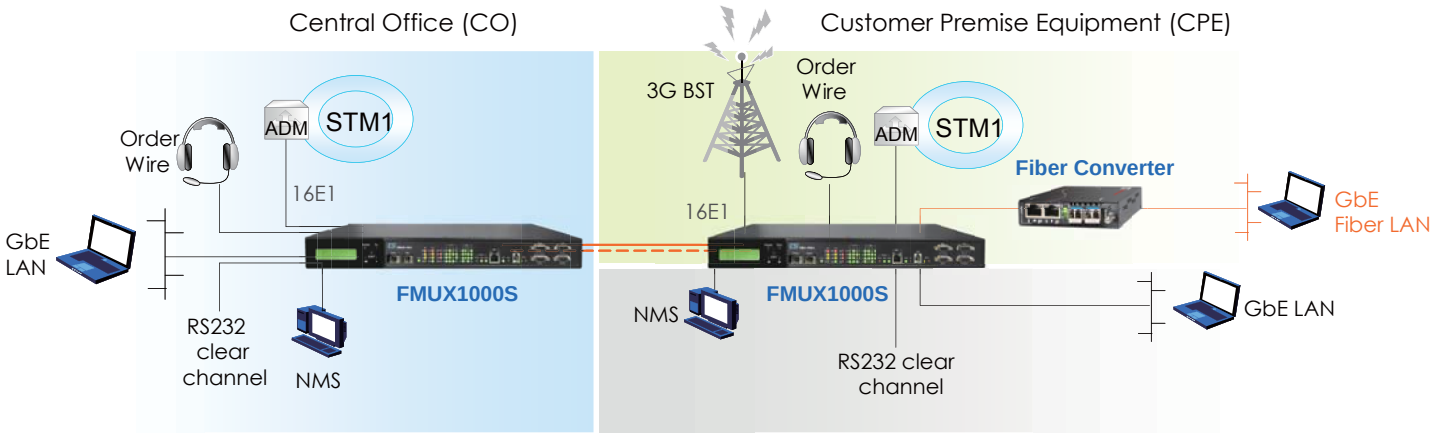
2Ch Combo Gigabit Ethernet card

The Gigabit Ethernet tributary card is equipped with 2 ports 10/100/1000 Base-T and 2 ports 1000Base-X SFP slots. The complete functions included Ethernet Bridge, VLAN stacking (QinQ, IEEE802.1ad) , Jumbo Frame packet, IEEE 802.1q VLAN, BPDU packet and Pause Frame transparency,Packet classification based on the 802.1P, 4 priority queues for packet classification, Strictly Priority or WRR Scheduling of the 4 priority queues and bandwidth control: 256Kbps, 512Kbps, 5Mbps and 50Mbps for different ranges of port speed.

E1/T1 plus Gigabit Ethernet Card

The E1/T1 plus Gigabit Ethernet tributary card is equipped with 2-port 10/100/1000 Base-T or 2-port Gigabit SFP slot plus E1/T1 4-Channel Port. The G.703 E1 or T1(DS1) interfaces module terminates is available in two options, one, with 4 pairs of BNC connectors for E1 75 Ohm unbalanced connections and the other with four RJ-45 jacks for E1 120 Ohm balanced or for T1 100 Ohm balanced connections. The 4 x E1/T1 can be programmed as either E1 or T1 individually.

Managed 16E1 + GbE Fiber Optical Multiplexer



16Ch E1/T1, 3x 10/100-T Ethernet Fiber Multiplexer

FMUX01A / Plus

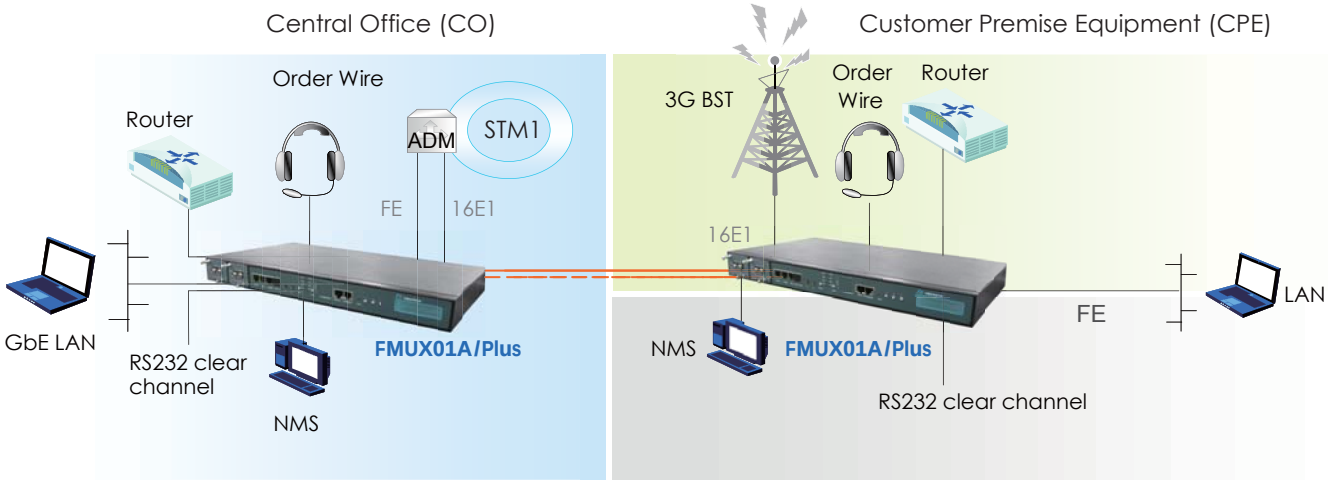
The FMUX01A/Plus is a 1U, 19" rack mountable, PDH fiber optic multiplexer that transmits up to 16 channels plus a wire speed 100Base-TX Fast Ethernet channel over a single fiber optic link. The FMUX01A/Plus chassis is available in five different power configurations: single AC, single DC, dual AC, dual DC or AC+DC. The AC supplies operate from 90~260VAC while DC supplies operate from 36~72VDC or 20~60VDC. 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 FMUX01A/Plus 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, 100Mbps Ethernet and RS-232 data (async)
- RS-232 port for system console
- One alarm output port, one Order Wire port
- SNMP management
- LCD plus menu keys for local configuration
- 2 plug-in I/O slots for optical interface cards

Specifications

Optical Interface	Connector :	1x9 (SC, ST, FC)
	Data rate :	155.52Mbps
	Bit Error Rate :	Less than 10-11
	Fiber :	MM 62.2/125μm, 50/125μm. SM 9/125μm
	Distance :	MM 2km. SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength :	1310, 1550nm
Electrical Interface	Console, SNMP :	RJ45
	Ethernet :	2 x RJ45
	Alarm :	RS232 (DB9F)
Standard		E1:ITU-T, T1:ITU-T, AT&T, ANSI, Ethernet: IEEE802.3x
Indication		PWR, Alarm, LBK, RD, LCK, RNG, ACO, Port, Channels
Power input		AC : 100 ~240V
		DC24 : 20 ~ 60V, DC48 : 36 ~ 72V
Power Consumption		< 40W
Dimensions		250 x 438 x 43mm (D x W x H)
Weight		3.58 kg
Temperature		0°C ~ 50°C (Operating), 0°C ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, RoHS
MTBF		57350 hours



Specifications - Modules

Fiber Optical Module I/F

Fiber Optical Module	
Ports	1 + 1 ports (redundant)
Fiber Cable	9/ 125 um for single mode ; 50/ 125 or 62.5/ 125 for multi-mode
System Power Gain	> 25dB@1*10-10
Wavelength Range	1280 — 1550nm
Connector	SC, FC, ST

The switching time between is less than 50m sec

FXO/FXS I/F

FXO/FXS Module	
Standards	G.711 A-law
Voice channel transparent	T.38 and Group III Fax relay at 2.4 ~14.4kbps Fax application
Distance	2km
Bandwidth	64K voice channel
Connector	RJ11*4 (4 voice channel /per unit)
Receive Level	Short haul - 15dB
Internet application	Support modem pass-through

E1 BNC I/F

E1 Wire-Wrap I/F

E1 Module	
Standards	ITU-T G.703, G.704, G.706, G.732
Ports	4 ports
Framing	Unframed (clear channel)
Data rate	2.048 Mbps ± 50 ppm
Line code	HDB3/AMI
Receive Level	Short haul - 15dB
Line impedance	75 ohms ± 5% / 120 ohms ± 5%
Connector	RJ-45 for 120 ohms BNC for 75 ohms Wirewrap for 120 ohms

Datacom I/F

Datacom Interface Module	
Standards	N/A
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 128Kbps (SYNC)
	V.35H & RS-530H up to 8Mbps
Line code	NRZ
Clock Mode	Transparent, Recovery
	External (From data port)
	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

T1 RJ - 45 I/F

T1 Interface Module	
Standards	ITU-T G.703, G.704, AT&T TR-62411,ANSI T1.403
Ports	4 ports
Framing	Unframed (clear channel)
Data rate	1.544 Mbps ±50 ppm
Line code	B8ZS / AMI
Receive Level	Short haul - 15dB
Line impedance	100 ohms ±5%
Connector	RJ-45 for 100 ohms Wirewrap for 100 ohms

Ordering Information

Model Name	Type	Description
FMUX01A/Plus - AC	Chassis w/Power	Chassis with 110 ~ 240 VAC
FMUX01A/Plus - DC24	Chassis w/Power	Chassis with 24VDC
FMUX01A/Plus - DC48	Chassis w/Power	Chassis with 48VDC
FMUX01A/Plus - AD24	Chassis w/Power	Chassis with one AC and one DC power for Redundant 24VDC
FMUX01A/Plus - AD48	Chassis w/Power	Chassis with one AC and one DC power for Redundant 48VDC
FMUX01A/Plus - AA	Chassis w/Power	Chassis with two 100 ~240VAC power for Redundant
FMUX01A/Plus - DD24	Chassis w/Power	Chassis with two DC power for Redundant 24VDC
FMUX01A/Plus - DD48	Chassis w/Power	Chassis with two DC power for Redundant 48VDC
FMUX01A/Plus - E1/BNC	Card	4 x G.703 E1 BNC interface card
FMUX01A/Plus - E1/RJ45	Card	4 x G.703 E1 RJ-45 interface card
FMUX01A/Plus - T1/RJ45	Card	4 x G.703 T1 RJ-45 interface card
FMUX01A/Plus - T1/Wire	Card	4 x G.703 T1 Wire-Wrap interface card
FMUX01A/Plus - E1/Wire	Card	4 x G.703 E1 Wire-Wrap interface card
FMUX01A/Plus - V35	Card	V35 interface card with one HD68M to 4 x MB34F cable
FMUX01A/Plus - 530	Card	RS-530 interface card with one HD68M to 4 x DB25F cable
FMUX01A/Plus - 449	Card	RS-449 interface card with one HD68M to 4 x DB37F cable
FMUX01A/plus - X21	Card	X.21 interface card with one HD68M to 4 x DB15F cable
FMUX01A/Plus - 232/Async	Card	RS-232 Async card with one HD68M to 4 x DB9F cable
FMUX01A/Plus - FXO	Card	4 x FXO interface card
FMUX01A/plus - FXS	Card	4 x FXS interface card
FMUX01A/Plus - EXT/CLK	Card	External Clock interface card
FMUX01A/Plus - SC002	Card	SC, MM, 2Km, 1310nm, 11dB
FMUX01A/Plus - FC002	Card	FC, MM, 2Km, 1310nm, 11dB
FMUX01A/Plus - ST002	Card	ST, MM, 2Km, 1310nm, 11dB
FMUX01A/Plus - SC015	Card	SC, 15Km, 1310nm
FMUX01A/Plus - FC015	Card	SC, 15Km, 1310nm
FMUX01A/Plus - ST015	Card	ST, 15Km, 1310nm
FMUX01A/Plus - SC030	Card	SC, 30Km, 1310nm
FMUX01A/Plus - FC030	Card	FC, 30Km, 1310nm
FMUX01A/Plus - ST030	Card	ST, 30Km, 1310nm
FMUX01A/Plus - SC050	Card	SC, 50Km, 1310nm
FMUX01A/Plus - FC050	Card	FC, 50Km, 1310nm
FMUX01A/Plus - ST050	Card	ST, 50Km, 1310nm
FMUX01A/Plus - SC080	Card	SC, 80Km, 1550nm
FMUX01A/Plus - FC080	Card	FC, 80Km, 1550nm
FMUX01A/Plus - ST080	Card	ST, 80Km, 1550nm
FMUX01A/Plus - SC120	Card	SC, 120Km,1550nm
FMUX01A/Plus - FC120	Card	FC, 120Km, 1550nm
FMUX01A/Plus - ST120	Card	ST, 120Km, 1550nm
FMUX01A/Plus - SC20A	Card	SC, 20km, Tx1310/Rx1550nm (A type)
FMUX01A/Plus - SC20B	Card	SC, 20km, Tx1550/Rx1310nm (B type)
FMUX01A/Plus - SC40A	Card	SC, 40km, Tx1310/Rx1550nm (A type)
FMUX01A/Plus - SC40B	Card	SC, 40km, Tx1550/Rx1310nm (B type)
FMUX01A/Plus - SC60A	Card	SC, 60km, Tx1310/Rx1550nm (A type)
FMUX01A/Plus - SC60B	Card	SC, 60km, Tx1550/Rx1310nm (B type)
FMUX01A/Plus - SC80A	Card	SC, 80km, Tx1310/Rx1550nm (A type)
FMUX01A/Plus - SC80B	Card	SC, 80km, Tx1550/Rx1310nm (B type)

Power Type / Card Type / Power Redundant Type / Connector Type / Distance Connectivity

FMUX01A/Plus – □□ – □□□□ – □ – □□□□□

Example: FMUX01A/Plus – AC – AAAA – S – SC002

Power Module Type	Line Card I/F Type		Fiber Redundant Type	Connector Type	Distance Connectivity	
AC, DC, AC2, DC2, AD	O : Empty	G : Single port Fast Ethernet 10/100	S: standard	SC, ST, FC	002: 2km	20A: 20km
	A : Quad E1 BNC	H : Quad X.21	R: redundant		030: 30km	20B: 20km
	B : Quad E1 RJ-45	I : Quad RS-449			050: 50km	40A: 40km
	C : Quad T1 RJ-45	J : Wire-Wrap I/F for Quad E1/ T1			080: 80km	40B: 40km
	D : Quad V.35	K : Quad High-Speed V.35			120: 120km	60A: 60km
	E : Quad RS-232	L : Quad High-Speed RS-530				60B: 60km
	F : Quad RS-530					

4 Ch E1/T1 Fiber Multiplexer

FMUX04

The FMUX04 is a 1U half 19" stand-alone or rack mountable point-to-point multiplexer for 4*E1 or 4*T1 (selectable) transmissions over a single fiber optic link. Its half-rack format makes it ideal for low cost multiplexing applications that require up to 4-channel. All channels provide completely transparent transmission of E1 or T1 regardless of frame mode, clock source or timeslot assignment. Available in either AC or DC models, the AC supplies operate from 100~240VAC while DC supplies operate from 18~72VDC. A wide range of transceiver selection provides fiber connection with SC, FC or ST type connectors in multimode or single mode and at distance from 2 to 120km as well as BiDi (single fiber) at distances of 20, 40, 60, or 80km. Additional options include "Order Wire" phone connection (FXS port) and a SNMP management.

Features

- 1U stand-alone unit
- Channel service setting and remote loop-back setting via front panel DIP switch or serial console
- Far End Fault (FEF) on fiber link, selectable
- On-line Bit Error Rate monitor feature with four error-rate classes
- Dual color LEDs indicators
- Optional dedicated Order Wire phone port (FXS, RJ-11 port)
- Console port and one alarm relay
- Optional SNMP management, Telnet, and Web Based local and remote configuration
- System BER 10^{-11}

Specifications

Optical Interface	Connector :	1x9 (SC, ST, FC)
	Data rate :	38Mbps
	Bit Error Rate :	Less than 10^{-11}
	Fiber :	MM 62.2/125μm, 50/125μm. SM 9/125μm
	Distance:	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength :	1310, 1550nm
Electrical Interface :	Console :	RS-232 (DB9F) Async
	SNMP :	RJ-45
	Order wire :	RJ11
	E1 :	BNC 75 Ω, RJ45 120 Ω
		T1 RJ45 100 Ω, 100 metersΩ
Standard		E1:ITU-T, T1:ITU-T, AT&T, ANSI
Indication		PWR, Alarm, Far End /Near End Error, System failure, E1/T1 status
Power input		AC : 100 ~240V
		DC24 : 18 ~ 36V, DC48 : 36 ~ 72V
Power Consumption		< 20W
Dimensions		235 x 195 x 45mm (D x W x H)
Weight		0.85kg
Temperature		0 ~ 50°C (Operating), 0 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, RoHS
MTBF		57,350 hrs

Customer Premise Equipment (CPE)

Customer Premise Equipment (CPE)

Ordering Information

Model Name	Description
FMUX04-AC/SC 015	SC, 15Km, 1310nm, 12dB
FMUX04-AC/SC 030	SC, 30Km, 1310nm, 20dB
FMUX04-AC/SC 050	SC, 50Km, 1310nm, 28dB
FMUX04-AC/SC 080	SC, 80Km, 1550nm, 29dB
FMUX04-AC/SC 120	SC, 120Km, 1550nm, 35dB, DFB Laser
FMUX04-AC/SC 20A	SC, 20km, Tx1310 /Rx1550nm (A type), 17dB
FMUX04-AC/SC 20B	SC, 20km, Tx1550 /Rx1310nm (B type) , 14dB
FMUX04-AC/SC 40A	SC, 40km, Tx1310 /Rx1550nm (A type), 25dB
FMUX04-AC/SC 40B	SC, 40km, Tx1550 /Rx1310nm (B type) , 22dB, DFB Laser
FMUX04-AC/SC 60A	SC, 60km, Tx1310 /Rx1550nm (A type), 29dB
FMUX04-AC/SC 60B	SC, 60km, Tx1550 /Rx1310nm (B type) , 29dB, DFB Laser
FMUX04-DC/SC 002	SC, MM, 2Km, 1310nm, 11dB
FMUX04-DC/SC 015	SC, 15Km, 1310nm, 12dB
FMUX04-DC/SC 030	SC, 30Km, 1310nm, 20dB
FMUX04-DC/SC 050	SC, 50Km, 1310nm, 28dB
FMUX04-DC/SC 080	SC, 80Km, 1550nm, 29dB
FMUX04-DC/SC 120	SC, 120Km, 1550nm, 35dB, DFB Laser
FMUX04-DC/SC 20A	SC, 20km, Tx1310 /Rx1550nm (A type), 17dB
FMUX04-DC/SC 20B	SC, 20km, Tx1550 /Rx1310nm (B type) , 14dB
FMUX04-DC/SC 40A	SC, 40km, Tx1310 /Rx1550nm (A type), 25dB
FMUX04-DC/SC 40B	SC, 40km, Tx1550 /Rx1310nm (B type) , 22dB, DFB Laser
FMUX04-DC/SC 60A	SC, 60km, Tx1310 /Rx1550nm (A type), 29dB
FMUX04-DC/SC 60B	SC, 60km, Tx1550 /Rx1310nm (B type) , 29dB, DFB Laser

Power Type / Connector Type / Connectivity Distance

FMUX04 – □□ / □□□□□

Example: FMUX04 – AC / SC015

4Ch E1 / T1+3-port 100M Ethernet Fiber Multiplexer

FMUX04E

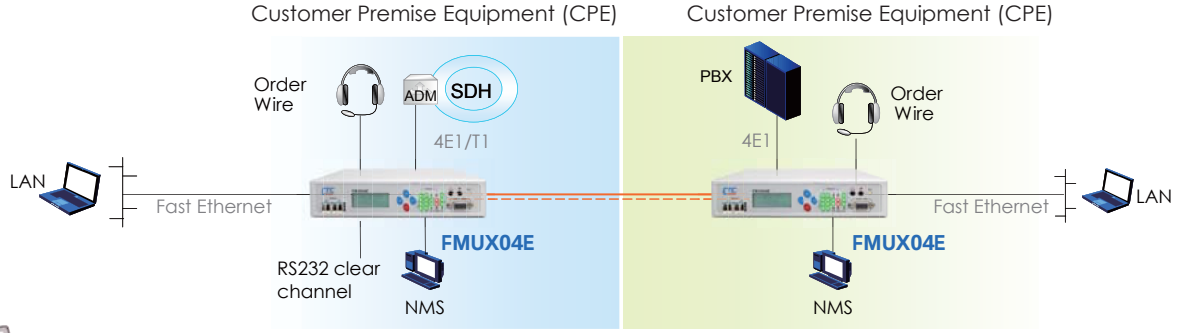
FMUX04E is a modular design for 4xE1 + Fast Ethernet multi-service to dual strand fiber PDH multiplexer. FMUX04E provides E1 transmission transparently, pure 100Mbps Fast Ethernet simultaneously. The fiber optic line is based on the SFP technology that allows a flexible use of Multimode or Single mode lines and enable the support of different wavelengths and distances. The use of bi-directional SFPs maximizes the utilization of the fiber optic line and results in saving line costs. The multiplexer is equipped by default with redundant AC and DC power supplies for redundant operation. With SNMP and Web-based management in the FMUX04E, the Network administrator can monitor, configure and control the activity remotely.

Features

- 4 channels unframed E1/T1
- 3 CH 10/100Base-TX Ethernet
- Auto MDI/MDIX
- Auto-Negotiation or Force mode
- Supports flow control
- Supports 1552 packets (max)
- One clear channel RS232 up to 250Kbps(Async)
- 1+1 fiber protection, less than 50ms
- Supports Digital Diagnostics Monitoring Interface (DDMI)
- AIS on signal loss on E1/T1 and fiber port
- VLAN function
- Loopback test on E1/T1, RS-232, fiber ports
- Supports Dying Gasp
- Supports local or remote In-band management
  Optional SNMP management
- Supports Order wire Ear / Microphone port.
- Supports On-Line F/W upgrade
  (local or remote) by the SNMP manager.
- Two power internal 1AC+1DC

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 120 ohms (RJ-45) Receiver sensitivity: Short haul "Pulse" Amplitude: Nominal 2.37V+/-10% for 75 ohms Nominal 3.00V+/-10% for 120 ohms Nom "Zero" Amplitude: +/-0.3V Transmit Frequency Tracking: w/external clock card option Internal Timing: +/-30 ppm Jitter Performance: According to ITU-T G.823 Performance monitoring: According to ITU-T G.821 Standard: ITU-T G.703, G.704, G.706 and G.732 Interface Connectors: RJ-45, Wire wrap, BNC Test Loops: LLB (Local Loop Back) NELB (Near End Loop Back) RLB (Remote Loop Back) RRLB (Request Remote Loop Back)
Ethernet	Interface Type: 10/100Base-TX Connector: 3x RJ-45 Standard: IEEE 802.3, 802.3u 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	236.4 x 195.2 x 44mm(D x W x H)
Operating Temperature	0 ~ 50°C (Operating) -10 ~ 20°C (Storage)
Humidity	10 ~ 90% non-condensing
Certifications	CE, FCC, RoHS



Ordering Information

Model Name	Description
FMUX04E-AC	Standalone FOM with built-in AC power, optional SNMP
FMUX04E-DC	Standalone FOM with built-in DC power, optional SNMP
FMUX04E-AD	Standalone FOM with built-in AC+DC power,optional SNMP
FMUX0E4-SNMP	SNMP management card, support web, telnet, SNMP functions

FMUX04E – □□
Example: FMUX04E – AC

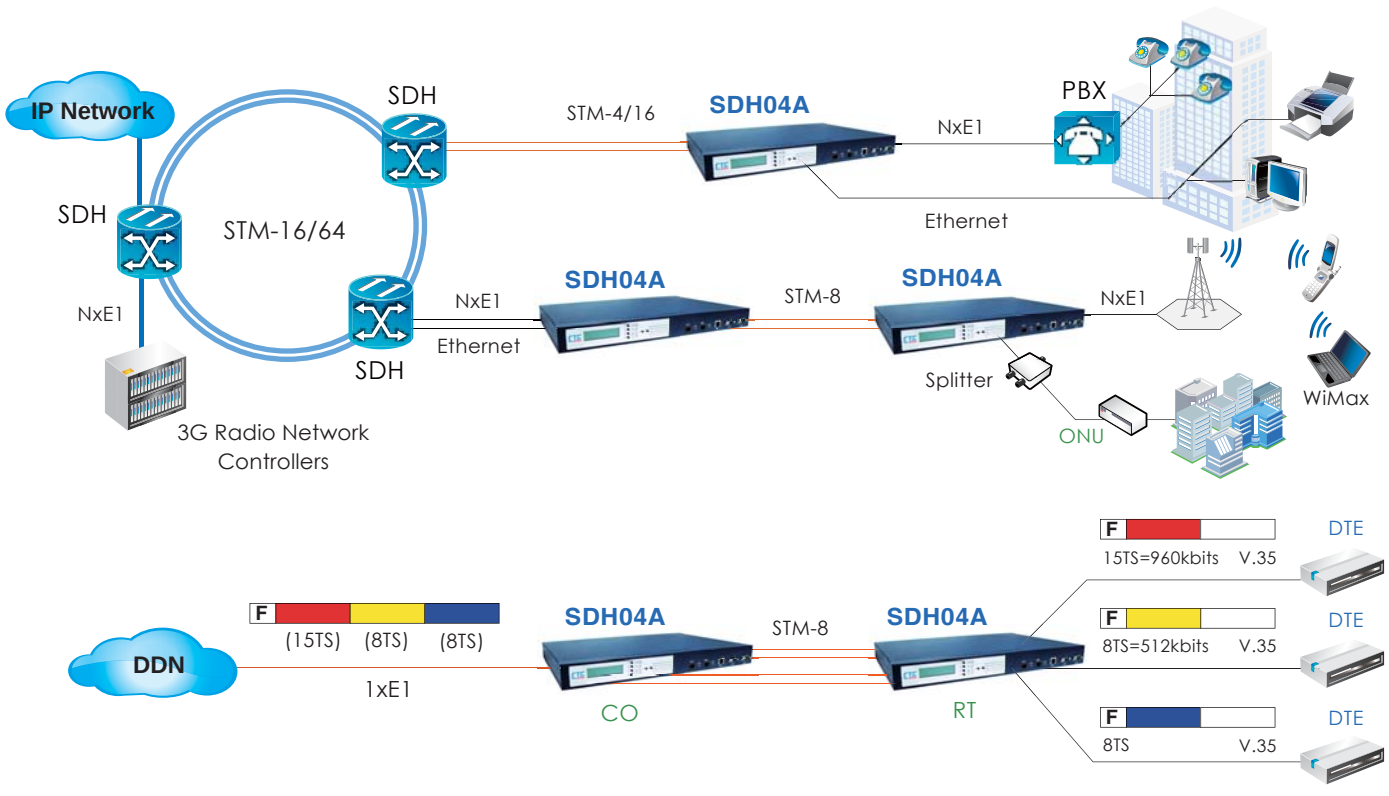
1U, STM 4 / STM 1 NG-SDH ADM Rack

SDH04A

The SDH04A is a compact NG-SDH equipment which supports STM-1/4 ADM and offers various tributary interfaces like E1/T1, V.35, FE/GbE, E3/ T3...etc to provide any service in any slot. SDH04A is suitable for the applications of GSM/UMTS base station radio access networks (RAN) / MSAN and wireless backhaul. The SFP cage design in SDH04A offers the plug-and-play flexibility to change fiber modules for different bit rate and higher availability to use off-the-shelf fiber modules. SDH04A is a 1U standard form factor making it easy to fit in any 19" or 23" chassis and outdoor cabinet; Although SDH04A is a compact NG-SDH box, it also has similar flexibility of shelf-type SDH equipment, such as hot-swappable tributary cards / fiber modules / power modules and 1+1 load-sharing redundant power design. In order to supply reliable networks to carry more upcoming broadband services from wireless / HSDPA base stations to central office, CTC SDH04A provides carrier-grade Ethernet (E-Line) bundled with L2 functions to totally control QoS between end to end. SDH04A also can work with CTC SDH01A series to have Ethernet private LAN (E-LAN) service in ring topology.

Features

- SDH04A provides multiple service solutions with standard STM-1/4 interfaces (SDH ADM/TM).
- Multiple hot-swappable tributary modules in any combination:
  4-channels E1 card (QE1R/B)
  8-channels E1/T1 card (8ET)
  8-channels E1 card (8E1R)
  4-ports Ethernet switch over SDH interface card (QSW)
  4-ports Gigabit Ethernet switch card (GbE)
  4-ports V.35 Data communication Interface card (QV35)
  Single port E3/T3 interface card (ET3)
- 4 slots to support combinations of traffics in a 1U-height box
- Ethernet traffic is encapsulated and transported over SDH using Generic Framing Procedure (GFP) & Virtual Concatenation (VCAT)
- Hot swappable fiber optical module in SFP with optional 1+1 automatic protection switching (APS) for optical links.
- Automatic Laser Shutdown (ALS) based on ITU-T G.958/G.664.
- Data Communication Channel for remote control and online remote upgrade.
- Various network management interfaces: RS-232/ Ethernet/ LCD
- 1+1 Redundant AC/DC power modules with load sharing.
- Cross connect for TDM traffic (E1 & V.35)
- EMS tool for SDH04A series (GMS)
- DHCP Client/Telnet/httpd for NMS port
- Keypad Lock/ Password for LCD security



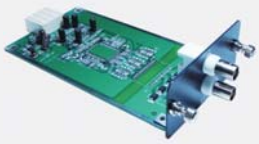
Specifications

Ethernet Tributary Interface (QSW)
Data rate :
4CH x 10/100Mbps with auto negotiation
Compliance : ITU-T G.7041 GFP-F, G.707 VCAT IEEE 802.3x, 802.1p, 802.1q (Q-in-Q),802.3ad
Mode : L2 Switch 100Mbps throughput
Connector : RJ-45

V.35 Tributary Interface (QV35)
Data rate : 4CHx Nx64Kbps (N=1~32)
Compliance : ITU-T V.35, ITU-T G.703
Clock Source : External, Internal and Recovery
Control Signal : DSR, CTS, DCD, RL, LL ...
Test Loops : Local/remote line/terminal/V.54 loopback
Connector : DB44 connector (DB44 to M34 converter cable)

E1 Tributary Interface (QE1B)
Bit rate : 4CHx2.048Mbps±50ppm
Compliance : ITU-T G.703, G.704, G.706, G.732, G.823
Impedance (connector) : 75Ω(BNC)
Line code : HDB3 / AMI

AC Power Card
Input Voltage : AC90V ~ 260V
Input Frequency : 47 ~ 63Hz
Power : 27W Max
DC Power Card
Input Voltage : DC-36V ~ -72V
Power : 27W Max



E3 /DS3 Tributary Interface (ET3)
Bit rate : 34.368 / 44.736 Mbps±20ppm
Compliance : ITU-T G.703, G.823, G.824
Impedance(connector) : 75Ω(BNC)
Line code : HDB3 / B3ZS
Software selectable E3/DS3 mode

8E1/ T1 Tributary Interface (8ET)
Bit rate :
8CHx2.048Mbps±50ppm /1.544Mbps±50ppm
Impedance(connector) :
120/100Ω software selective (wire-wrap)

Gigabit Ethernet interface (GbE)
Connector : 2xRJ45 + 2x SFP
Compliance : 802.3z, 802.3x, 802.1p,802.3u, 802.3, G.7041 GFP-F Up to 1Gbps through-put, 802.1Q VLAN support for the full 4096 VLAN ID Up to 8K MAC address, Port trunking, Traffic rate control, loopback test

Management Interface
Protocol : VT-100 ANSI/ Telnet and SNMP (EMS)
Craft interface : RS232 Asyc. (EIA561)
Telnet//SNMP/httpd : 10/100 BaseT (RFC 1406)
LCD : 2 X 16 LCD display with key control

Operation Requirement
Operating temperature : 0 ~ 55°C
Humidity : 0% ~ 100% (100% at 30°C)
MTBF: > 50000 hours
EMI : CISPR 22 class A
ESD : IEC-61000-4-2 level 2
Lightening and Surge : IEC-61000-4-5 class3

Dimension & Weight
(WxDxH) : 442 x 312 x 44mm 1U, 19" rack mount/ wall mount/ standalone
Weight : 3.7kg

Power Consumption
27W in full load

Ordering Information

Model Name	Type	Description
SDH04A-CH	Chassis	1U 19" 4 slot, STM4/1 ADM Rack without power module
SDH04A-AC	Power	30W AC power module for SDH04A rack
SDH04A-DC	Power	30W DC power module for SDH04A rack
SDH01-4E1B	Card	4 * E1 G.703 interface card BNC
SDH01-8E1B	Card	8 * E1 G.703 interface card 75 ohm RJ48 with 8 x 1ch RJ48 to BNC cables
SDH01-8E1R	Card	8 * E1 G.703 interface card 120 ohm RJ48
SDH01-8T1/E1W	Card	8 * T1/E1 G.703 interface card Wire-Wrap
SDH01-4V35	Card	4 * V35 interface card with 2 x 2ch M34 cables
SDH01-4SW	Card	Ethernet over SDH card, 4 * 10/100 BaseTx RJ45
SDH01-ET3	Card	E3/DS3 interface card
SDH04-GbE	Card	4 ports Giga switch tributary card

Chassis Type
SDH04A – ☐☐
Example: SDH04A – CH

Power Type
SDH04A – ☐☐
Example: SDH04A – AC

Card Type
SDH04A – ☐☐☐
Example: SDH04A – GbE

SHDSL

G.SHDSL.bis
TR-069
Ethernet
E1/V.35

ADSL2+

EFM LAN Extender
VDSL2 IP DSLAM
VPN Router

EFM LAN Extender

EFM-10/20/40

EFM is an Ethernet Network Extender designed to provide bonded high-speed Ethernet First Mile services over SHDSL on existing copper infrastructure. It is a bridge mode modem that delivers Ethernet services with symmetrical bandwidth at rates up to 22.8 Mbps (4 Pairs, Standard mode with TC-PAM 32) and 61 Mbps (4Pairs, Enhanced mode with TC-PAM 128). Implemented on IEEE 802.3ah EFM standards for advanced performance and management features. EFM ensures high reliability, low expense and maximum throughput. The introduction of EFM copper bonding technology allows delivery of higher bandwidth to longer distances over multiple copper pairs, enabling a good alternative in place where fiber is not economical to deploy. This Ethernet-pure solution provides a seamless integration into today and tomorrows networks. EFM extends the reach of Ethernet services to the sites by using bonded copper pairs. Up to 4 pairs can be bonded together for aggregated bandwidth over 45Mbps (Enhanced mode with TC-PAM 128 line coding technology). Designed with standard-based EFM technology (2BASE-TL), deployment of Ethernet services with EFM is quick and simple on the existing copper plant. It operates mainly in Point-to-Point connection between remote office and enterprise headquarters, providing symmetrical high-speed connectivity that is ideal for large and small-to-medium enterprises to deliver business-class Ethernet service.

Features

- Extending Ethernet Services to sites with existing copper infrastructure
- Support TC-PAM 32 for 5.7 Mbps over single pair copper
- EFM Bonding up to 61 Mbps (4 pairs, TC-PAN 128)
- Flexible and Rapid Service Deployment
- Flexible configuration as CPE or CO
- Support EFM OAM complying IEEE 802.3ah
- Low Delay, Jitter and Packet Loss for delay sensitive applications
- Comprehensive and easy OAM & P functions in provisioning and management
- QoS feature for guaranteed Ethernet service
- Future-proof Ethernet traffic management and QoS features

Specifications

Network Interface

LAN

- 4 port switching hub
- Auto MDI/MDI-X
- 10/100BASE-T auto-negotiation & sensing

WAN

- ITU-T G.991.2.(2004)
- EFM bonding (IEEE 802.3ah PAF)
- 2BASE-TL
- Data Rate:
  N x 64 Kpbs (N=3~89) using TC-PAM 16/32
  Max. 5.696Mbps (1-Pair)
  Max. 11.392Mbps (2-Pair)
  Max. 22.784Mbps (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. 61.184 Mbps (4-Pair)
- Support of Annex A , Annex B , Annex AF & Annex BG

LAN Protocols

- 802.1d Transparent Bridging
- Up to 2K MAC Address learning bridge

Hardware Interface

- DSL : RJ-45 x 1
- LAN : RJ45 x 4
- MGMT: RJ45 x 1
- Console Port x 1
- Reset Button : Load Factory Default
- DC Power Jack x 1

Indicator

- LAN : Link/Act, 10/100 per port
- WAN: Link per loop
- System: Power, Alarm, MGMT

Management Interface

- Easy to use web-based GUI for quick setup, configuration and management
- Menu-driven interface for local console and telnet access
- Password protected management and access control list for administration
- SNMP v1/v2 (RFC1157/1901/1905) agent and MIB II (RFC1213/1493)
- EFM OAM (IEEE 802.3ah)
- Software upgrade via web-browser / TFTP

VLAN Support

- IEEE 802.1q VLAN Tagging
- Port Based VLAN
- Up to 8k 802.1q VLANS (ID Range 1~4094)
- VLAN Stacking (Q-in-Q)

QoS Support

- Rate limiting by rule-based/port-based
- Traffic classification based on port/802.1p/ DSCP
- WRR (Weighted Round Robin) / SPQ (Strict Priority Queuing) scheduling algorithm

Environment

- Operating Temperature: 0°C ~ +50°C
- Storage Temperature: -40°C ~ +85°C
- Relative Humidity: 98%, non-condensing

Regulatory

- ISO 9001 Quality Management
- CE Approval

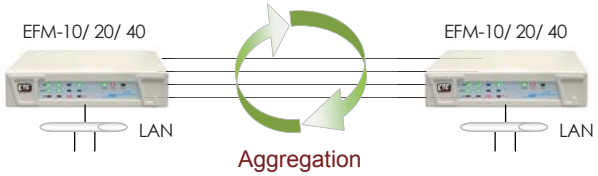
Physical / Electrical

- Dimension : 195 x 48 x 168mm (D x W x H)
- AC Power Adapter (100 ~ 240VAC with 50 ~ 60Hz)
- Weight: 1300g

Memory

- 2MB Flash Memory , 4MB SDRAM

Bandwidth Aggregation up to 22.8Mbps Over 4 pair of Copper wires



Ordering Information

Model Name	Description
EFM-10	2W, 2Base-TL EFM LAN Extender with 4x10/100TX
EFM-20	4W, 2Base-TL EFM LAN Extender with 4x10/100TX
EFM-40	8W, 2Base-TL EFM LAN Extender with 4x10/100TX

EFM – □□

Example: EFM – 10

VDSL2 LAN Extender

VDTU2A-301

The VDTU02A-301 is our lowest cost LAN extension solution using the G993.1/993.2 VDSL2 technology and providing up to 100Mbps throughput with only a single copper wire pair. A LAN extender is a device that forwards traffic between LANs transparently to higher network-layer protocols over distances that far exceed the distance limitations of standard Ethernet. A LAN is a high-speed data network (usually employing Ethernet technology) that connects computer workstations, printers, servers, and other devices. Designed specifically for LAN to LAN extension and supporting both symmetrical and asymmetrical transmission at up to 100/75Mbps within 300 meters or 10/10Mbps rate at 1000 meters, this is a perfect solution to extend a LAN to an adjacent building, garage or any location outside of the 100 meter reach of Ethernet UTP.

Features

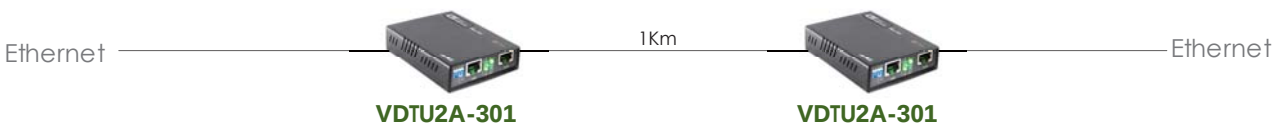
- Cost effective bridge function to connect two Ethernet LANs
- 100/75Mbps @ 300m (980 Ft)
- 10/10Mbps @ 1km (3300 Ft)
- Support flow control via Pause frame or back pressure
- 802.1Q VLAN tag transparent
- Selectable CPE and CO mode via DIP switch
- Selectable fast and interleaved mode
- Selectable target band plan
- Selectable target SNR margin 9dB or 6dB

Specifications

LAN Interface	Complies with IEEE 802.3 10Base-T and 802.3u 100Base-TX
	Connector: RJ45
	MTU: 1536 Bytes
VDSL2 Interface	Complies with ITU-T G993.1/993.2/ G997.1
	Connector: RJ45
	DMT encoding
	On-board surge protection
4-position DIP Switch	Selectable CO or CPE mode
	Selectable fast or interleave mode (Impulse noise protection)
	Selectable Band plan (Symmetric or Asymmetric)
	Selectable target SNR margin (6dB or 9dB)
Indicator	LAN: Act/Link, 10/100Mbps, Half/Full duplex
	VDSL: CO/CPE, Idle/Trained/Link, Power
Standard	ITU-T G.993.1, 993.2, IEEE802.3, 802.3u
Power	DC 12V via AC switching adapter
Power Consumption	4.2W
Dimensions	97 x 73 x 23mm (D x W x H)
Weight	80g
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	50,000 hrs

Rack to Standalone Solution

Standalone to Standalone Solution



Ordering Information

Model Name	Description
VDTU2A-301	VDSL2 LAN Extender with 1x10/100TX

VDSL2 Bridge LAN Extender with 4-Port 10/100Base-TX Ethernet

VDTU2A-304

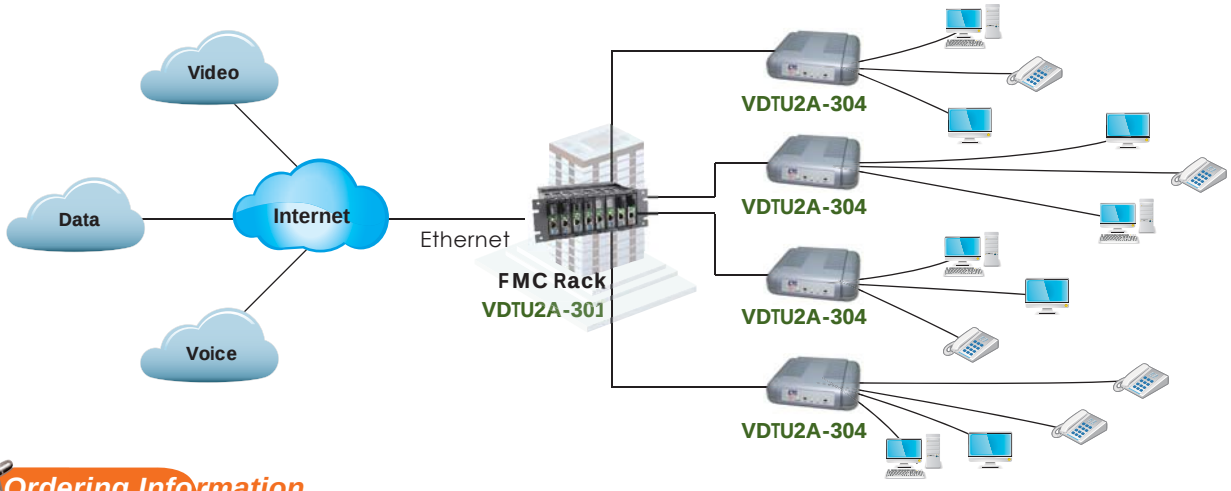
The VDTU2A-304 VDSL2 LAN Extender is a long reach Ethernet extender with four Ethernet ports and two phone jacks, in which one is for VDSL2 connection and the other is for POTS (Plain Old Telephone Service) connection. It has built-in POTS splitter to share the existing phone line with POTS eliminating the need for replacing the existing copper wiring. It is ideal for use as an Ethernet extender to an existing Ethernet network. While accommodating VDSL2 (Very-high-data-rate Digital Subscribe Loop) technology to extend Ethernet service over single-pair phone line, VDTU2A-304 can reach up to 100/75 Mbps bandwidth (line rate) within 300M or 40/10 Mbps bandwidth (line rate) for 1 Km long-range connections. By providing ultra-high speed, VDTU2A-304 LAN Extender makes your telephone line achieve its best performance ever. It has the advantage of minimum installation time (simple as plug-n-play) and minimum expense by allowing video streaming and data to share the same telephone pair without interference. VDTU2A-304 delivers everything needed to quickly deploy a high-speed IP-based network for providing high-speed Internet access, video-on demand services and voice services. The resulting compact, cost-effective form factor offers systems integrators and small business owners an attractive long reach Ethernet solution.

Features

- Cost effective bridge function to connect two Ethernet LAN
- Easy installation via simple plug-and-play
- Selectable CPE and CO mode
  Two working modes are built in the same unit, which keep the flexibility of installation and easy provision of service but lower inventory of service provider.
- Selectable fast and interleaved mode:
  Fast mode guarantees a minimum end to end latency less than 1 mS. Interleaved mode provides impulse noises protection for any impulse noise with duration less than 250uS. Interleaved mode has a maximum end to end latency of 10mS.
- Selectable target band plan:
  VDSL2 defines multiple band plans and configuration modes to allow asymmetric and symmetric services in same binder for data transmission.
- Asymmetric is selected that provides better downstream performance. Symmetric is selected that provides better upstream performance.
- Selectable target SNR margin:
  It has the ability to select fixed SNR margin value on 9 dB or 6db. The systems will maintain the SNR margin at their value across all usable loop length. The higher SNR value gets better line quality, but lower performance.

Specifications

VDSL2 standards	• Compliant with ITU VDSL2 standard G.993.2 Annex A, Annex B and Annex C • Support VDSL2 profile: 8a, 8b, 8c, 8d, 12a, 12b and 17a • Band plan profile: symmetric (Plan 997) and asymmetric (Plan 998) • Support fast and interleaved mode • Target SNR Margin: 6dB and 9dB • Built-in POTS splitter to share voice and data (Optional)
Management	• Web-based GUI for quick setup, configuration and management • Firmware upgradable from Web
LAN	• Filtering functions for MAC/IP/Port. • QoS for Port/VLAN/DSCP/TCP-UDP Port number. • Port Based VLAN & IEEE 802.1q VLAN Tagging. • Port configuration for Bandwidth/Duplex/Speed/ Flow control/Broadcast storm.
Interfaces	• Ethernet: 4 X RJ-45 connectors for Ethernet 10/100Mbps ports with Auto-MDI/MDIX • VDSL : 1 X RJ-11 connector for VDSL2 port • Phone: 1 X RJ-11 connector for POTS Splitter (Optional)
Indicators	• General : PWR and SYS • WAN(VDSL2) : CO, CPE, LINK and ALM • LAN (Ethernet) : 1,2,3,4 LNK/ ACT
Physical/Electrical	• External Power Adaptor: ・Input : AC 90~240V/50 ~ 60Hz ・Output : DC 12V/1A • Power consumption : 9 watts maximum. • Temperature : 0 ~ 45°C • Humidity : 0% ~ 95% (non-condensing)



Ordering Information

Model Name	Description
VDTU2A-304/US	VDSL2 LAN Extender with 4-port 10/100TX, splitter 600 ohm
VDTU2A-304/EU	VDSL2 LAN Extender with 4-port 10/100TX, splitter 150 ohm

VDTU2A – □□□/□□

Example: VDTU2A – 304/US

VDSL2 IP DSLAM

VDSM2-10

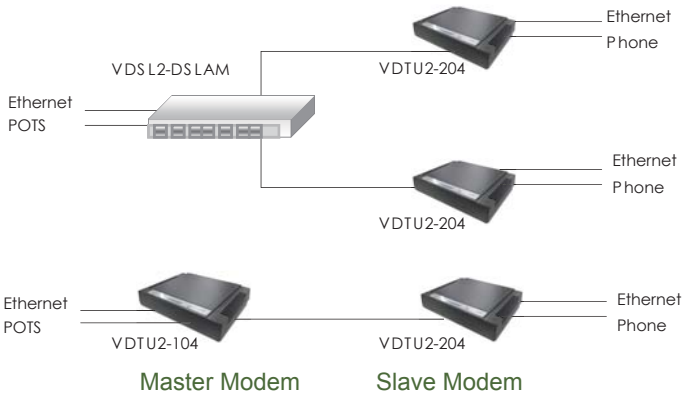
The VDSM2-10 is a VDSL2 IP DSLAM that aggregates 8 ports into Giga Ethernet uplinks for high-speed data/Internet services. Based on DMT VDSL2 technologies, VDSM2-10 extends data service with line rate of solution for services such as remote lecturing, telemedicine, video conferencing, Video-on-Demand (VoD), IP-TV, Internet access and other various high-speed data applications. When the number of subscribers increases, the second uplink Giga Ethernet interface can be used to daisy chain to another VDSM2-10. Alternatively, multiple VDSM2-10 can be connected to another LAN switch to form a two-tier configuration, thus supporting a lot more subscribers. The VDSM2-10 is an ideal solution for delivering cost-effective, high-performance broadband/multimedia services to Multi-Tenant Units (MTUs) or Multi-Dwelling Units (MDUs) such as hotels, campus, hospitals and telecom.

Features

- Support 8a, 8b, 8c, 8d, 12a, 12b, 17a and 30a full band profiles.
- Support 997 and 998 band plans.
- Supports Jumbo packet up to 9k byte.
- Supports interleave delay for noise resistant and Virtual Noise.
- Supports trellis modulation.
- Supports Echo cancellation.
- Supports SELT(Single-Ended Line Test).
- Support UPBO(Upstream PBO) and DPBO(Downstream PBO).
- Supports high bandwidth up to symmetric 100Mbps within 0.3km (984 feet) for VDSL2 ports.
- Supports bandwidth management (rate control) from 100k to 100Mbps.
- Supports IEEE 802.1q tagging VLAN with Q-in-Q.
- Supports quality of phone wiring detected with SNR(Signal to Noise Ratio) indicators.
- Supports TOS to IEEE-802.1p with 4 priority queues with DSCP.
- Supports HTTPS (SSL) web management.
- Supports Multicast IP table/IGMP v2 with 512 groups.
- Supports LACP IEEE-802.3ad port trunking (link aggregation).
- Support IEEE 802.1d STP / IEEE 802.1w RSTP & IEEE-802.1s MSTP.
- Support port mirroring (sniffer) and broadcast storm filtering.
- Supports port security with MAC address filtering.
- Supports remote syslog.
- Supports traffic storm control.
- Support web based and telnet for remote management.
- Support SNMP v1/v2/v3 RFC-1493 bridge MIBs, RFC-1643 Ethernet MIB, RFC-1213 MIBII.
- Support RMON groups 1(Statistics), 2(Alarm), 3(Event), 9(History).
- Support HTTP/TFTP for firmware upgrade.
- Support In-Band/Out-of-Band management.
- Support L2/L3/4 access control list(ACL).
- Support DHCP client and Relay & Option 82.
- Supports LLDP(Link Layer Discovery Protocol) protocol.
- Supports surge protection and splitter on board.
- EMI certified by FCC,CE class A.

Specifications

Ethernet Interface	IEEE802.3/802.3u/802.3ab/802.3z standards
	ITU-T G993.2, G994.1 standards
Interfaces	2 * RJ-45 Gigabit Copper & SFP combo ports
	8 * RJ-45 connector for VDSL2 connection
	8 * RJ-45 connector for POTS/ISDN connection
	1 * console port
Flow Control	Full-duplex: IEEE 802.3x
	Half-duplex: Back pressure
MAC Address Table	8K Entries
LED Indicators	Power and POST LED
	Link/Active/Speed/Duplex/Collision Status for Ethernet port
	LED, Show time lock LED for VDSL2 ports
VDSL2 Spectrum	138kHz ~ 30MHz
POTS/ISDN pass filter Spectrum	0 ~ 120 kHz
Operating Temperature	0°C ~ 50°C (32°F ~ 122°F)
Storage Temperature	-20°C ~ 70°C (-4°F ~ 158°F)
Humidity	10 to 90% (non-condensing)
Dimensions	435 x 255 x 44mm (17.13" x 10.04" x 1.73")
Chipset	Lantiq (Infineon)



Ordering Information

Model Name	Description
VDSM2-10	1U 8-port VDSL2 IP DSLAM with 2x GE uplink

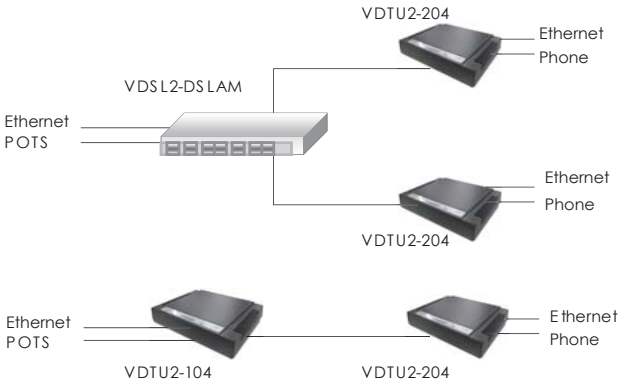
VDSL2 CO/ CPE Modem

VDTU2-104/ 204

The VDTU2-104 / VDTU2-204 are VDSL2 (Very-High-Bit-Rate Digital Subscriber Line 2) ITU-T G.993.2 standard modems used as an access technology that exploits the existing infrastructure of copper wires that were originally deployed for POTS services. They can be deployed from central offices, from fiber-fed cabinets located near the customer premises or within buildings. ITU-T G.993.2 VDSL2 is the newest and most advanced standard of DSL broadband wire line communications. Designed to support the wide deployment of "triple play" services such as voice, video, data, high definition television (HDTV) and interactive gaming, VDSL2 enables operators and carriers to gradually, flexibly, and cost efficiently upgrade existing xDSL infrastructure. ITU-T G.993.2 (VDSL2) is an enhancement to G.993.1 VDSL that permits the transmission of asymmetric and symmetric (Full-Duplex) aggregate data rates up to 200 Mbit/s on twisted pairs using a bandwidth up to 30 MHz. VDSL2 deteriorates quickly from a theoretical maximum of 250 Mbit/s at 'source' to 100 Mbit/s at 500m and 50 Mbit/s at 1km. From 1km and beyond, VDSL2 degrades at a much lower rate, performing the same as ADSL2 but still outperforming standard VDSL. This means that VDSL2-based systems, unlike VDSL1 systems, are not limited to short loops or MTU/MDUs only, but can also be used for medium range applications

Features

- Very High-speed Digital Subscriber Line version 2 (VDSL2) modem
- 4 ports 10/100BaseTX LAN
- Supports Router with firewall or Bridge mode
- Bandwidth control
- POTS/ISDN splitter on board
- Auto speed on VDSL2 port
- Supported protocols: HTTP, TFTP, PPPoE, uPnP, NAT/DHCP/DMZ
- Supports loopback test
- Supports SNR indication
- Surge protection on DSL port



Specifications

Standard	IEEE 802.3, IEEE802.3u, ETSI, ITU, ANSI VDSL2
Ports	VDSL2 Interface:
	Connector: RJ11
	VDTU02-104 for Master modem
	VDTU02-204 for Slave modem
	POTS/ISDN Splitter port RJ11
	Ethernet Interface:
	Connector: RJ45
	4 port 10/100Base-TX Ethernet Bridge & Router
Performance	100Mbps / 300meter
Management	Console port:RS232
	Support firmware upgrade
Indications	Power, Ethernet Link/Act, DSL link
Power Input	12VDC
Power Consumption	< 5W
Dimensions	184 x 146 x 40mm (D x W x H)
Weight	0.65kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	35,000 hrs

Band Profile Region

Profile Region	8a (US)	8b (EU)	8c (US)	8d (all)	12a (all)	12b (all)	17a (EU/US)	30a (APAC)
Bandwidth (MHz)	8.832	8.832	8.500	8.832	12.000	12.000	17.664	30.000
Tones	2047	2047	1971	2047	2782	2782	4095	3478
Tone Spacing (kHz)	4.3125	4.3125	4.3125	4.3125	4.3125	4.3125	4.3125	8.625
Line Power (dBm)	+17.5	+20.5	+11.5	+14.5	+14.5	+14.5	+14.5	+14.5

Ordering Information

Model Name	Description
VDTU2-104	VDSL2 Router with 4x10/100TX (CO modem)
VDTU2-204	VDSL2 Router with 4x10/100TX (CPE modem)

VDTU2 – □□□

Example: VDTU2 – 104

3U 24 / 48 / 72 / 96 / 120 Port Managed IP DSLAM with Two GE Ports

MD30

The MD30 is a 3U 19" rack mountable ADSL2+ IP DSLAM with temperature hardening. The modular design allows hot swapping of major components such as uplink trunk card, 24 port tributary cards and cooling fan module. The system provides 24/48/72/96/120 ADSL/2/2+ ports with built-in POTS splitters and is able to provide broadband data communication services and multimedia services on the same copper line. The unit is capable of delivering high speed data services, full-rate of ADSL2+ (up to 24mbps download) for 120 subscribers with 2 Gigabit uplinks. With advanced QoS features, the MD-30 is ideal for next generation broadband networks capable of delivering rich video content, DSL, POTS, and VoIP service over ADSL2+ link. The MD30 provides two uplink ports with both electrical and optical (SFP) Gigabit Ethernet (GbE) interfaces for cascading, ring architecture or 802.3ad link aggregation. The MD30 is suitable for small size applications or deployment in remote location such as business parks or street cabinets to extend the service reach distance from central office.

Features

- 3U 19(23)" 5 slot ADSL2/2+ chassis
- Modular design with hot swappable field replaceable units
- 1+1 Gigabit Ethernet trunk with combo SFP and RJ45
- Temperature monitor and system over temperature protection with trap alarm
- Backup firmware partition aids in upgrade failure recovery
- Configuration backup and restore via TFTP
- RS-232 serial CLI and separate LAN port for web based management
- NMS/EMS for Multiple nodes management based on SNMP (option)

Specifications

Network Interface
- 2 x 10/100/1000 Based-Tx or 2 x SFP (IP) Subscriber Interface
- ADSL2/2+/ POTS/ISDN(G.992.1 .2 .3 .5) or G.SHDSL

Line Interface : ADSL
- 24 ports per card
- Fast/Interleave latency modes for G.dmt
- Supports Interleave mode for G.Lite
- ADSL to ATM signal conversion
- Build-in POTS splitter circuit
- Power Consumption:25 W(max)

Line Interface : SHDSL
- 24 ports per card
- Signal modulation and demodulation
- G.SHDSL to ATM signal conversion
- Power Consumption:21 W(max)

Management Interface

Physical Layer: IEEE 802.3 (10Mbps)
Upper Layer: Ethernet, IP, SNMP,TL1

Service characteristics

ATM
- QoS(UBR, rt-VBR, nrt-VBR, CBR)
- PVC default priority and PVC-to VLAN maping
- Traffic scheduling/shaping/policing

Ethernet
- IEEE 802.1d Spanning Tree Protocol (STP)
- IEEE 802.3ad Link aggregation
- Password Security on console access

Management
- OSI Layer 2 Functionality
- MAC filtering and count limit
- Access control list (ACL)
- Multicasting support
- Port based and 802.1p/q Tag-based VLAN
- IGMP V1/V2 snooping and proxy
- SNMP V1/V2C

System Configuration
- Multiple session Telnet, Web based and SNMP
- Supports point to point VCC link
- Software remote upgrade

Alarm and Status

Automatic alarm/LED indication for alarm and system status

Management

Four housekeeping inputs and one alarm contact closure output Provides all system OAM&P functionalities, software remote updates.RS-232 local console interface for basic provisioning plus out-band Ethernet interface for Telnet or Web

Indications GbE 1/2 link, RST, ACO, ALM, SYS, DSL Status 1 ~48

Power Input

Input: -48 V DC (-42 V to -56 V)
Dual A+B -48 V DC power input terminal

Power Consumption 130W

Dimensions 133 x 482 x 304mm (H x W x D)

Weight 4.5kg

Temperature -40 ~ 65°C (Operating), -40 ~ 70°C (Storage)

Humidity 10 ~ 90% non-condensing

Certification CE, FCC, RoHS, ITU-T, ETSI

Ordering Information

Model Name	Type	Description
MD30-MA1A	Chassis	3U,19" 5 slot chassis with DC power, Cooling Fan
MD00-GE1A	Trunk Card	Giga Ethernet Uplink card with 2xGbe Combo
MD00-IM8A	Trunk Card	8E1 IMUX for ATM Uplink Card
MD00-AL5A	Link Card	24L, ANSI 600 ohm Splitter ANX-A
MD00-AL5B	Link Card	24L, ISDN Splitter ANX-B
MD00-AL5E	Link Card	24L, ETSI 270 Splitter ANX-A
MD00-SL6A	Link Card	24L, SHDSL w/o wetting current ANX A/B

Chassis Typ
MD30 – □□□□
Example: MD30 – MA1A

Card Typ
MD00 – □□□□
Example: MD00 – GE1A

2U, 24 / 48 / 72 Port Managed IP DSLAM with Two GE Ports

MD20

The MD20 is a 2U 19" rack mountable "pizza box" type ADSL2+ IP DSLAM with temperature hardening. The modular design allows hot swapping of major components such as uplink trunk card, 24 port tributary cards and cooling fan module. The system provides 24/48/72 ADSL/2/2+ ports with built-in POTS splitters and is able to provide broadband data communication services and multimedia services on the same copper line. The unit is capable of delivering high speed data services, full-rate of ADSL2+ (up to 24mbps download) for 72 subscribers with 2 Gigabit uplinks. With advanced QoS features, the MD20 is ideal for next generation broadband networks capable of delivering rich video content, DSL, POTS, and VoIP service over ADSL2+ link. The MD20 provides two uplink ports with both electrical and optical (SFP) Gigabit Ethernet (GbE) interfaces for cascading, ring architecture or 802.3ad link aggregation. The MD-20 is suitable for small size applications or deployment in remote location such as business parks or street cabinets to extend the service reach distance from central office.

Features

- 2U 19(23)" 3 slot ADSL2/2+ chassis
- Modular design with hot swappable field replaceable units
- 1+1 Gigabit Ethernet trunk with combo SFP and RJ45
- Temperature monitor and system over temperature protection with trap alarm
- Backup firmware partition aids in upgrade failure recovery
- Configuration backup and restore via TFTP
- RS-232 serial CLI and separate LAN port for web based management
- NMS/EMS for Multiple nodes management based on SNMP (option)

Specifications

Network Interface
- 2 x 10/100/1000 Based-Tx or 2 x SFP (IP) Subscriber Interface
- ADSL2/2+/ POTS/ISDN(G.992.1 .2 .3 .5) or G.SHDSL

Line Interface : ADSL
- 24 ports per card
- Fast/Interleave latency modes for G.dmt
- Supports Interleave mode for G.Lite
- ADSL to ATM signal conversion
- Build-in POTS splitter circuit
- Power Consumption:25 W(max)

Line Interface : SHDSL
- 24 ports per card
- Signal modulation and demodulation
- G.SHDSL to ATM signal conversion
- Power Consumption:21 W(max)

Management Interface

Physical Layer: IEEE 802.3 (10Mbps)
Upper Layer: Ethernet, IP, SNMP,TL1

Service characteristics

ATM
- QoS(UBR, rt-VBR, nrt-VBR, CBR)
- PVC default priority and PVC-to VLAN maping
- Traffic scheduling/shaping/policing

Ethernet
- IEEE 802.1d Spanning Tree Protocol (STP)
- IEEE 802.3ad Link aggregation
- Password Security on console access

Management
- OSI Layer 2 Functionality
- MAC filtering and count limit
- Access control list (ACL)
- Multicasting support
- Port based and 802.1p/q Tag-based VLAN
- IGMP V1/V2 snooping and proxy
- SNMP V1/V2C

System Configuration
- Multiple session Telnet, Web based and SNMP
- Supports point to point VCC link
- Software remote upgrade

Alarm and Status

Automatic alarm/ LED indication for alarm and system status

Management

Four housekeeping inputs and one alarm contact closure output Provides all system OAM&P functionalities, software remote updates.RS-232 local console interface for basic provisioning plus out-band Ethernet interface for Telnet or Web

Indications GbE 1/2 link, RST, ACO, ALM, SYS, DSL Status 1 ~48

Power Input

Input: -48 V DC (-42 V to -56 V)
Dual A+B -48 V DC power input terminal

Power Consumption 130W

Dimensions 304 x 482 x 88mm (D x W x H)

Weight 4.5kg

Temperature -40 ~ 65°C (Operating), -40 ~ 70°C (Storage)

Humidity 10~90% non-condensing

Certification CE, FCC, RoHS, ITU-T, ETSI

Ordering Information

Model Name	Type	Description
MD20-MA1A	Chassis	2U,19" 3 slot chassis with DC power, Cooling Fan
MD00-GE1A	Trunk Card	Giga Ethernet Uplink card with 2xGbe Combo
MD00-IM8A	Trunk Card	8E1 IMUX for ATM Uplink Card
MD00-AL5A	Line Card	24L, ANSI 600 ohm Splitter ANX-A
MD00-AL5B	Line Card	24L, ISDN Splitter ANX-B
MD00-AL5E	Line Card	24L, ETSI 270 Splitter ANX-A
MD00-SL6A	Line Card	24L, SHDSL w/o wetting current ANX A/B

Chassis Type
MD20 – □□□□
Example: MD20 – MA1A

Card Type
MD00 – □□□□
Example: MD00 – GE1A

G.SHDSL.bis EFM VPN Router

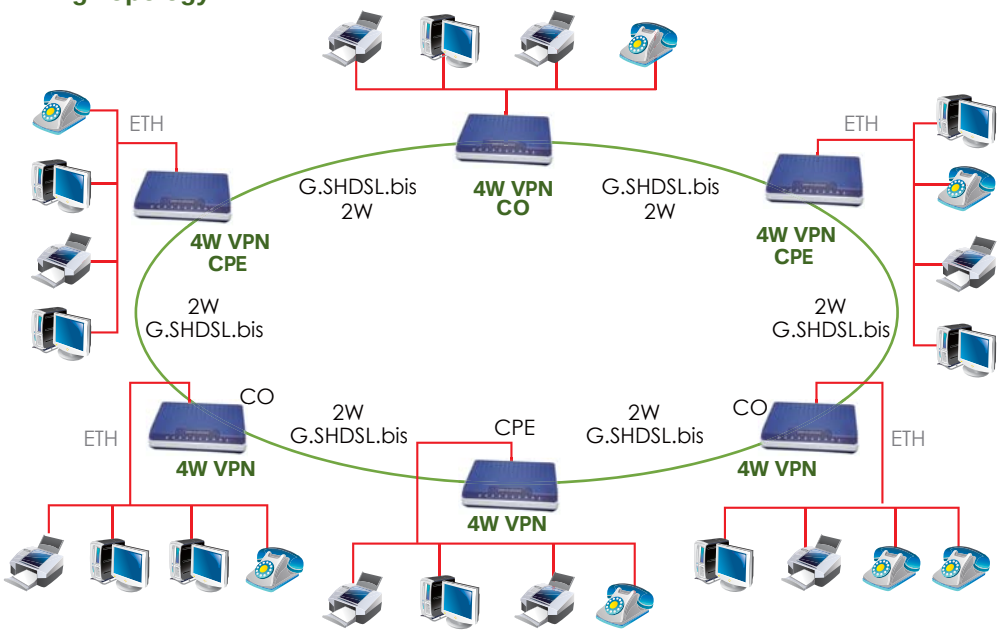
VPN10/20/40

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 date 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 32 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.

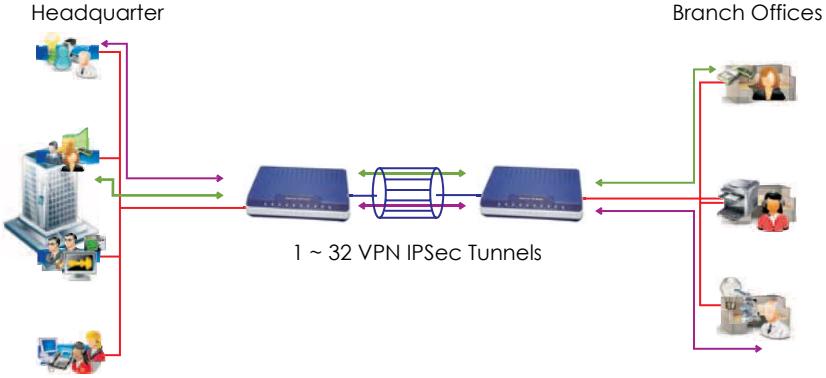
Features

- 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
- 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

Ring Topology



VPN IPSec Tunnels



Hardware Interfaces

WAN Interface :

- SHDSL.bis: (ITU-T G.991.2 (2004) Annex A/ B /F / G supported
- Support EFM Bonding and SHDSL M-Pair mode
- Line Code: TC-PAM 16/32/64/128
- Data Rate:

  N x 64 Kpbs (N=3~89) using TC-PAM 16 / 32
  Max. 5.696Mbps (1-Pair)
  Max. 11.392Mbps (2-Pair)
  Max. 22.784Mbps (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. 61.184 Mbps (4-Pair)

- Impedance: 135 ohms.

LAN Interface :

- 4-Ports 10/100M Switch, Auto-negotiation for 10/100Base-TX and Half/ Full Duplex, Auto-MDIX Supported.
- IEEE 802.1D Transparent Learning Bridge.
- IEEE 802.1Q and Port Based VLAN.
- Up to 2K MAC Addresses.
- Spanning Tree Protocol (STP)

USB (Optional) :

- Supports USB 2.0.
- Supports 3.5G
- Support USB Printer

Serial Console :

- RJ-45 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)
- ALARM (Red)

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

VPN

- IPSec (RFC2411) up to 4 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

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 TFTPEFM (IEEE 802.3ah) OAM

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 Server

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

ATM

- 8 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)

PPP

- PPPoE
- PAP/ CHAP/ MS-CHAP/ MS-CHAPv2
- Configurable timer to auto-reconnect and idle times for timeout.

QoS

- 802.1P Tag
- IPv4 TOS/ DiffServ
- Class-based Prioritization and Class-based Traffic Shaping
- Class-based DSCP Mark
- Up to 8 priority queues

Operating Environment

- Operating Temperature: 0 ~ 45°C
- Storage Temperature: -20°C ~ 70°C
- Operating Humidity: 20% ~ 95% (non-condensing)

Firewall

- SPI (Stateful Packet Inspection) and DoS (Denial of Service)
- DMZ
- Content Filtering, URL Blocking and Packet Filtering/Access Control List (ACL)

Regulatory

- ISO 9001 Quality Management
- CE Approval & EN60950 Certificate

Physical / Electrical

- Dimensions: 18.7 x 3.3 x 14.5cm (W x H x D)
- Power: 100~240VAC (via power adapter)
- Power Consumption: 9 watts Max

Ordering Information

Model Name	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: VPN10/U

Fast Ethernet / CATV over Coax Unmanaged Modem, P to P

EOC-10

The EOC-10 is point-to-point and point-to-multipoint EoCNA (Ethernet over Coax Network Alliance) solution that efficiently extends 10/100 Ethernet circuits up to 900 meters (2,952feet) at full Fast Ethernet speed using existing coaxial cable. The EOC-10 will allow Ethernet connectivity in existing facilities or homes without pulling extra cable. This is perfect solution for Ethernet on the factory floor where systems have been upgraded from slower serial communication to Ethernet networking. Installation is easy with absolutely no settings required. The EOC-10 is used in Coaxial cable systems to extend Ethernet connectivity over existing CCD/CATV grade Coaxial cable. The EOC-10 works by sharing the same cable with CATV signals, without interference to the existing CATV signals.

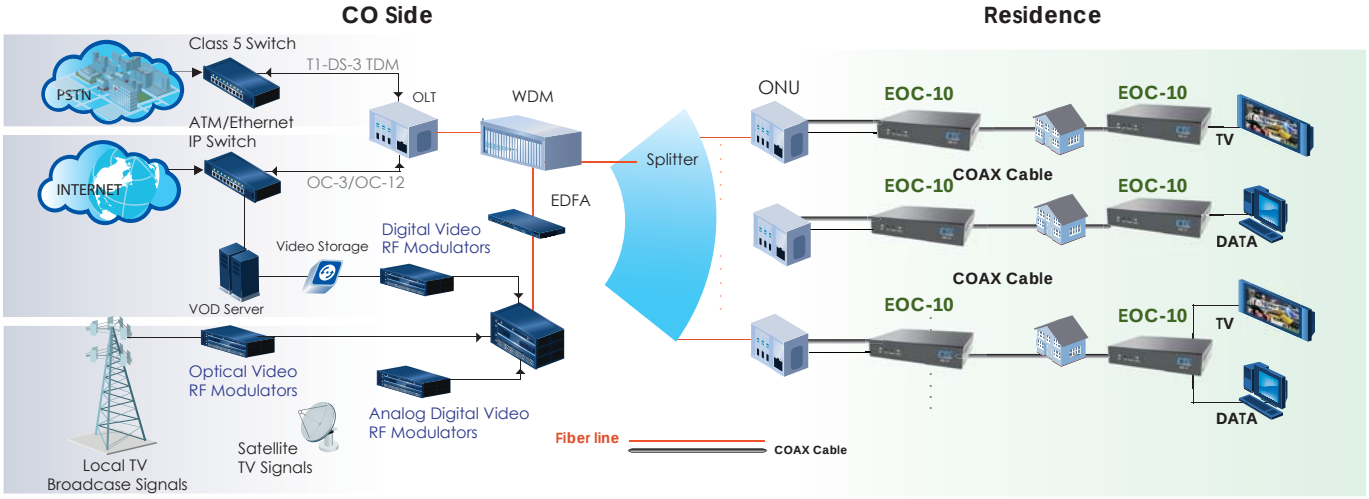
Features

- Extends LAN connectivity using existing coaxial cable
- Transmits CATV and Ethernet over the same coaxial cable
- 112Mbps (PHY speed) @ 900 meters (2,952feet)
- 32Mbps (PHY speed) @ 1.2Km (4,000feet)
- Supports point to point application
- Asymmetrical using EoCNA standard
- Operates transparently to high layer protocols such as TCP/IP
- Auto MDI / MDIX
- Auto negotiation
- Plug and Play, no configuration required
- Status LEDs for simple monitoring

Specifications

Ports	Fast Ethernet Interface 10/100 Mbps, RJ45 Coax Interface Two F-Type Female Coax Connectors, One for EoCNA, the other for TV Protocol Transparent to higher layer protocol Transmission Power and Spectrum 8 ±1 dBm, 12~28 MHz Physical layer transmission speed and distance Up to 112Mbps@900 meters Up to 32Mbps @ 1.2Km (-176dBm/Hz Noise Floor)
Indications	LEDs (PWR, LAN Link/Act, Coax Link/Act, Coax Sync)
Standard	ITU G.9954, IEEE802.3, IEEE802.3u, IEEE802.3x
Power Input	DC 5V (via AC switching adapter)
Power Consumption	6W
Dimensions	83 x 138 x28mm (D x W x H)
Weight	0.33kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

Ethernet / CATV over Coax application



Ordering Information

Model Name	Description
EOC-10	CATV+2x10/100TX over Coax Modem with AC Adapter

Gigabit Ethernet / CATV over Coax Unmanaged Modem, P to P

EOC-10A

The EOC-10A is point-to-point EoCNA (Ethernet over Coax Network Alliance) solution that efficiently extends 10/100/1000Mbps Ethernet circuits up to 700 meters (2,296feet) at full Fast Ethernet speed using existing coaxial cable. The EOC-10A will allow Ethernet connectivity in existing facilities or homes without pulling extra cable. This is perfect solution for Ethernet on the factory floor where systems have been upgraded from slower serial communication to Ethernet networking. Installation is easy with absolutely no settings required. The EOC-10A is used in Coaxial cable systems to extend Ethernet connectivity over existing CCD/CATV grade Coaxial cable. The EOC-10A works by sharing the same cable with CATV signals, without interference to the existing CATV signals.

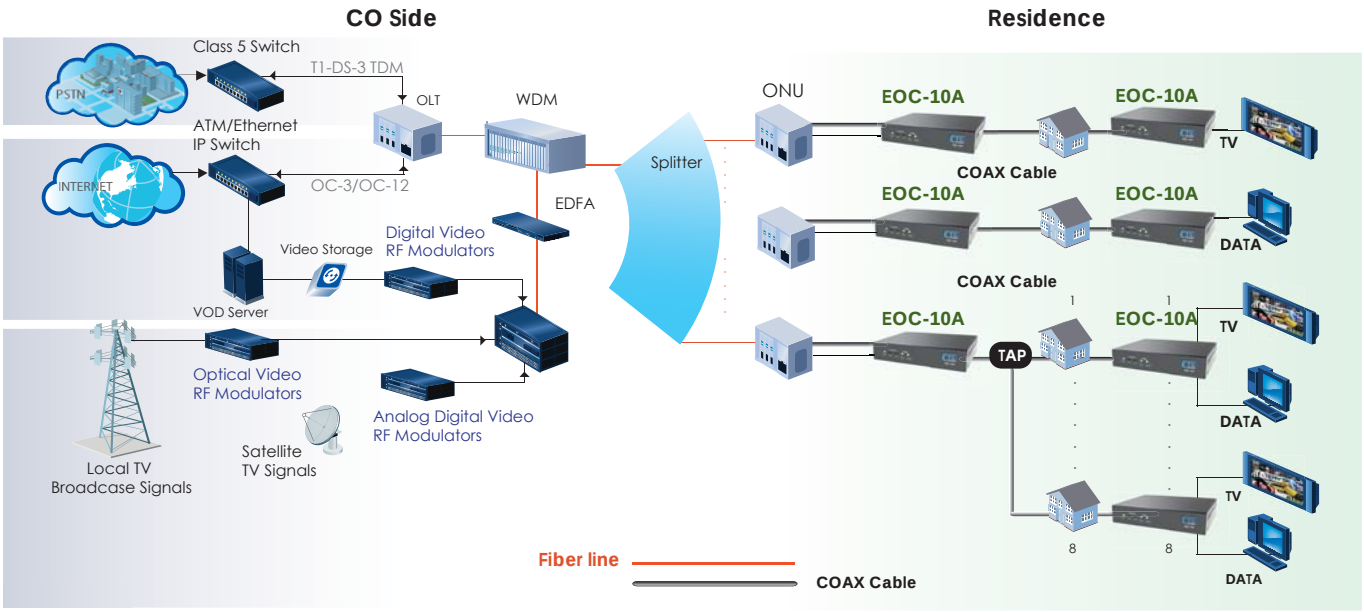
Features

- Extends LAN connectivity using existing coaxial cable
- Transmits CATV and Ethernet over the same coaxial cable
- 192Mbps @ up to 700 meters (2,296feet)
- 64Mbps @ 1.2Km (4,000feet)
- Supports point to point
  Supports point to multi-point up to 8 nodes over tap/splitter
- Asymmetrical using EoCNA standard
- Operates transparently to high layer protocols such as TCP/IP
- Auto MDI / MDIX
- Auto negotiation
- Plug and Play, no configuration required
- Status LEDs for simple monitoring

Specifications

Ethernet Interface	Two 10/100/1000 Mbps, RJ45
Coax Interface	Two F-Type Female Coax Connectors, One for EoCNA, the other for TV/ CCD
Protocol	Transparent to higher layer protocols
Transmission Power and Spectrum	0 dBm, 12~44 MHz
Physical layer transmission speed and distance	224Mbps maximum speed Up to 192Mbps@700 meters Up to 64Mbps @ 1.2Km (-176dBm/Hz Noise Floor)
Indications	LEDs (PWR, LAN Link/Act, Coax Link/Act, Sync)
Standard	IEEE802.3, IEEE802.3u, IEEE802.3ab, IEEE802.3x
Power Input	12VDC (via AC switching adapter)
Power Consumption	<4W
Dimensions	83 x 138 x28mm (D x W x H)
Weight	0.33kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Ethernet / CATV over Coax application



Ordering Information

Model Name	Description
EOC-10A	CATV+2x10/100/1000-T over Coax Modem with AC Adapter

Fast Ethernet / CATV over Coax Unmanaged Modem, P to M

EOC-20N, EOC-21N

The EOC-20N/21N is a Non-Managed point-to-multipoint EoCNA (Ethernet over Coax Network Alliance) solution that efficiently extends 10/100Mbps Ethernet circuits up to 700 meters (2,296feet) at full Fast Ethernet speed using existing coaxial cable. The EOC-20N is a master unit at 192Mbps which acts as a bridge and distributes bandwidth to up to Sixty EOC-21N subscriber units in a fashion similar to time division multiplexing. The EOC-20N/21N works by sharing the same cable with CATV signals, without interference to the existing CATV signals.

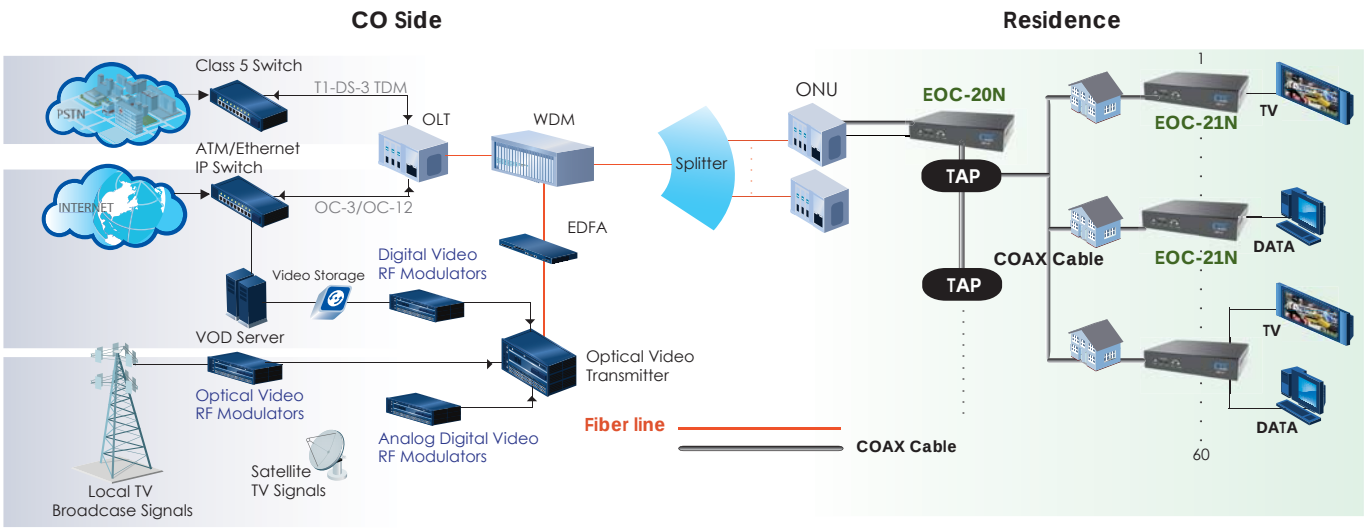
Features

- Extends LAN connectivity using existing coaxial cable
- Transmits CATV and Ethernet over the same coaxial cable
- 192Mbps @ 700 meters (2,296feet)
- 64Mbps @ 1.2Km (4,000feet)
- Supports point to multi-point up to 60 nodes over tap/splitter
- Asymmetrical using EoCNA standard
- Operates transparently to high layer protocols such as TCP/IP
- Auto MDI / MDIX, Auto negotiation on LAN port
- Status LEDs for simple monitoring
- Non-blocking wire-speed performance on 10/100/1000Mbps Ethernet port
- 8K entry MAC address, 128 KB on-chip frame buffer (only Master side)

Specifications

Ethernet Interface	2-port 10/100/1000T RJ45(EOC-20N), 2-port 10/100TX RJ45 (EOC-21N)
Coax Interface	Two-port F-type Female Coax connectors, one for EoCNA, the other for TV
Protocol	Transparent to higher layer protocols
Transmission Power and Spectrum	14 ±1 dBm, 12~44 MHz
Physical layer transmission speed and distance	224Mbps maximum speed Up to 192Mbps @ 700 meters Up to 64Mbps @ 1.2Km (-176dBm/Hz Noise Floor)
Quality of Service	Priority Based on IEEE802.1p and TCP/UDP port Priority Based on 802.1Q Tag Guaranteed QoS based on Layer II Parameterized QoS
Indications	
EOC-20N	PWR, LAN Link/Act, STB Link/Act, Coax Link/Act, Coax Sync
EOC-21N	PWR, Alarm, Sys, LAN Link/Act, STB Link/Act, Coax Link/Act, Coax Sync
Standard	ITU G.9954, IEEE802.3, IEEE802.3u, IEEE802.3x, IEEE802.1Q, IEEE802.1p, IGMPv1/v2
Power Input	12VDC (via AC switching adapter)
Power Consumption	< 4W
Dimensions	83 x 138 x 28mm (D x W x H)
Weight	0.33kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	35,000 hrs

Ethernet / CATV over Coax application



Ordering Information

Model Name	Description
EOC-20N	CATV+2x10/100/1000-T over Coax Modem with AC Adapter(Master)
EOC-21N	CATV+2x10/100TX over Coax Modem with AC Adapter (Salve)

EOC – □□□

Example: EOC – 20N

4U,16-Slot Managed G.SHDSL.bis TDM Chassis

SHRM03b TDM

The SHRM03b TDM chassis is a 4U 19(23)" rack that supports dual power and 16-slot for 2 wires dual channels, 4 wires single channel hot swappable cards for G.703 E1, T1, V.35 (RS-530/449/X.21) and bridged Ethernet. Utilizing industry standard SNMP protocol, the management feature can configure and monitor each local channel and the connected remote modems. In addition, RS-232 console and Telnet provide menu based management while embedded Web offers a user friendly graphical environment for OAM&P. This Rack is 100% compatible with our SHDTU03b standalone TDM based CPE modems for E1, serial data and Ethernet.

Features

- 4U 19(23)" 16-slot chassis
- Interface Cards for E1/T1, V.35, Ethernet (Bridge)
- Up to 30 ports per chassis (2 ports per card for 2 wires)
- Hot swappable
- Data rate 2 wire up to 5.7Mbps and 4 wire up to 11.4Mbps
- Adaptive rate feature maximizes data rate based on loop conditions
- Supports console terminal, Telnet, web and SNMP management
- Supports TFTP upgrade
- All interface connectors on the rear panel

Specifications

Connectors	• Console port (RJ45, RS232C) • WAN port RJ45 Jack (2-wire, 4-wire)
Physical Specifications	• Dimensions: 178mm x 440mm x 315mm (W x D x H) • Weight: 7.9kg w/o P/S
Power Characteristics	• AC : 90 ~ 230V AC 47/63Hz • DC : 24VDC, 48VDC, 72VDC
Environmental Specifications	• Operating 0°C ~ 50°C • Storage -10°C ~ 70°C • Relative humidity 5% ~ 90% non-condensing • Predicted MTBF : 65,000 hrs
Certification	• FCC class A, VCCI class A, CE, RoHS

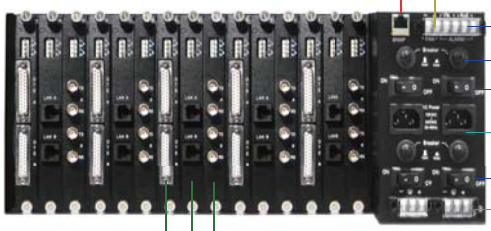
SHRM03b TDM front view

SNMP Management

16-slot for Line Card Removal / Replacement

Power Redundancy

SHRM03b TDM back view



SNMP Management Port

Cooling Fan Power Terminal

Alarm Relays

Circuit breakers provide over current protection for AC or DC inputs.

Main Switch control the input flow of AC or DC
IEC connector supply AC voltage (110-220VAC)
Terminal strip for DC power (48VDC)

Technologies supported E1, T1

Technologies supported 10/100Base-TX Ethernet.

Technologies supported Data (V35/X21/RS530)

Power Redundancy

All the SHRM03b TDM chassis power supplies are hot swappable and modular, installing two into a chassis, provides redundancy should a single power supply fail. A fully loaded chassis can run continuously with only one power module fitted into the chassis.

Cooling Fan

The cooling fan unit is an optional component. In a stacked chassis scheme, where ambient temperature may be higher than 25C (77F), or the chassis is fully loaded with line cards, the fan option is recommended to keep cooler air moving through the chassis. The fan box is designed to be placed on top of the SHRM03b chassis and pulls warm air up and out of the chassis, expelling it out the rear of the fan box. The cooling fan unit will add 1U rack space to the chassis for an overall total of 5U.

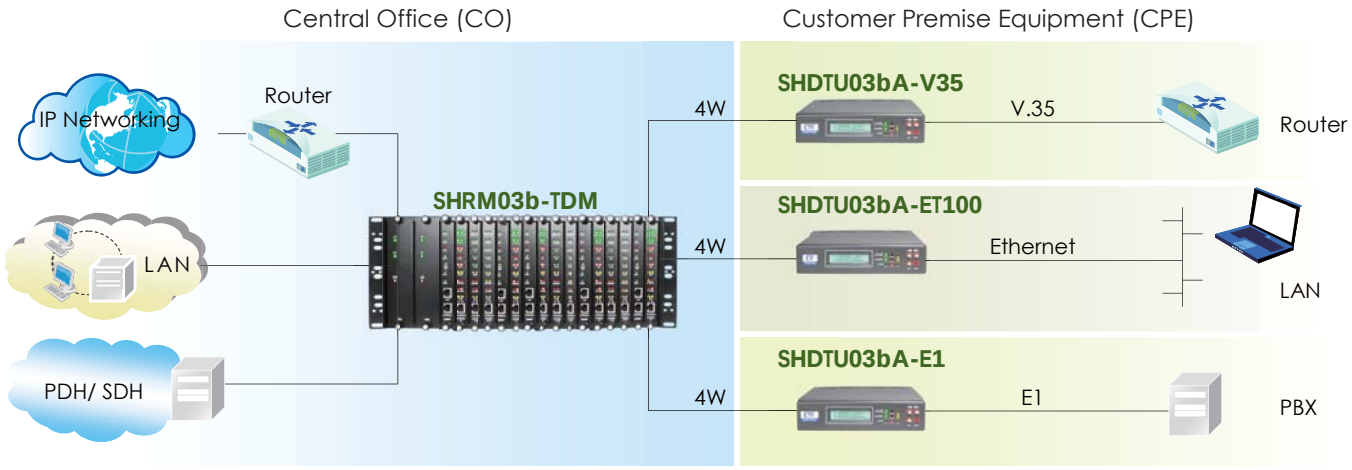
Network Management

The SHRM03b TDM chassis provides an SNMP Management card which must be installed into the SNMP slot of chassis. The SNMP card provides a network administrator the ability to configure and monitor the status of the blades. Management can be achieved locally over RS232, or over the network by Telnet, Web or SNMP. The management module can also configure and monitor the status of a remote CPE modem.

Protocol Supported

The SHRM03b TDM chassis has been designed as a Managed platform. This allows network administrators to deploy the chassis in a wide range of networks. Technologies supported by the chassis included E1, T1, Data (V35/X21/RS530), and 10/100Base-TX Ethernet.

TDM Based 2Wires, 5.7Mbps 4 Wires, 11.4Mbps



Ordering Information

Model Name	Type	Description
SHRM03b-CH-AD	Chassis	4U, 19" 16 Slot Chassis with One Dual AC/DC Power Moduel
SHRM03b-FAN	Fan	Chassis Cooling Fan Tray
SHRMb03-AD	Power	AC 110V~240V + DC36~72V Power Module
SHRM03b-SNMP	Card	SNMP Management Card
SHRM03bA-E1	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis wire-wrap to E1 BNC/RJ45 Card
SHRM03bA-T1	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis wire-wrap to T1 RJ45 Card
SHRM03bA-V35(1)	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis wire-wrap to V.35 Interface card with 1 x V.35 Cable
SHRM03bA-V35(2)	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis wire-wrap to V.35 Interface card with 2 x V.35 Cable
SHRM03bA-X21(1)	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis wire-wrap to X.21 Interface card with 1 x V.21 Cable
SHRM03bA-X21(2)	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis wire-wrap to X.21 Interface card with 2 x V.21 Cable
SHRM03bA-RS530(1)	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis wire-wrap to RS-530 Interface card with 1 x RS-530 Cable
SHRM03bA-RS530(2)	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis wire-wrap to RS-530 Interface card with 2 x RS-530 Cable
SHRM03bA-RS449(1)	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis wire-wrap to RS-449 Interface card with 1 x RS-449 Cable
SHRM03bA-RS449(2)	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis wire-wrap to RS-449 Interface card with 2 x RS-449 Cable
SHRM03bA-ET100	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis wire-wrap to 10/100TX RJ45 Ethernet Bridge Card
SHRM03bA-E1-RJ45	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis RJ45 to E1 BNC/RJ45 Card
SHRM03bA-T1-RJ45	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis RJ45 to T1 BNC/RJ45 Card
SHRM03bA-ET100-RJ45	Card	1 Ch/4W or 2 Ch/2W G.SHDSL.bis RJ45 to 10/100TX RJ45 Ethernet Bridge Card

Chassis Type Power Type
SHRM03b – □□ – □□
Example: SHRM03b – CH – AD

Power Type
SHRM03b – □□
Example: SHRM03b – AD

Card Type
SHRM03b □ – □□
Example: SHRM03bA – E1

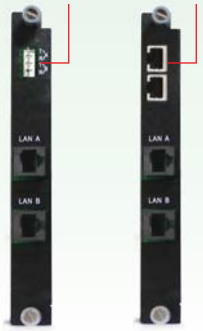
Fan
SHRM03b – □□□
Example: SHRM03b – FAN

SHRM03b-TDM Slide-in Card

Rear Panel

Data (V.35 / X.21 / RS-530) card

- Supports V.35/RS-530 or V.36/X.21 over SHDSL
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability
- Payload rates: Up to 5.696Mbps(for 2-wire model) or Up to 11.392Mbps(for 4-wire model)
- Local management interface with console
- Remote line loopback
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics
- Connector : DB-25 female for V.35 adapter cable
- Supports 2 wires / 2Ch or 4 wires / 1Ch per card

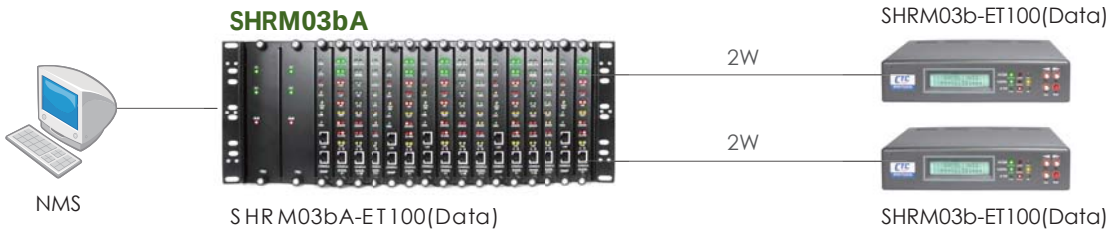


Rear Panel

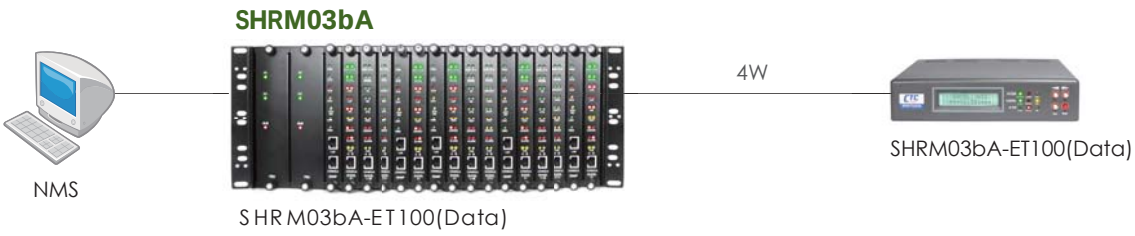
Ethernet card

- 10/100Mpbs Half / Full Duplex, Auto-sensing, Auto-Crossover
- Standard ITU G.991.2 (2004) supports improved reach, speed and
- interoperability
- Local management interface with console
- Remote line loopback
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics
- Supports 2 wires / 2Ch or 4 wires / 1Ch per card
- Connector : RJ-45 Ethernet Interface
- Up to 1024 MAC address learning, filtering bridge

TDM Based 2 Wires 2 Channels 5.7Mbps Application



TDM Based 4 Wires 1 Channels 11.4Mbps Application



SHRM03b-TDM Slide-in Card

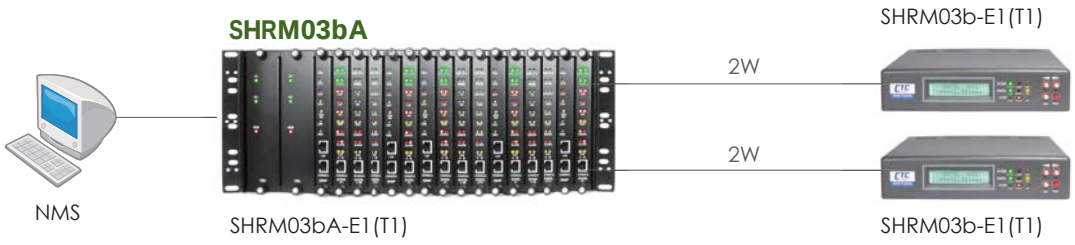
E1 card

- Supports E1 and fractional E1 over SHDSL
- Connection: RJ-48C for balanced 120Ω E1 cable and BNC for unbalanced 75Ω E1 cable
- Line Rate : 2048KHz +/- 50ppm
- Line code: HDB3/AMI
- Framing : PCM30/PCM30C/PCM31/PCM31C and Unframed
- Data Rate : 64Kbps to 2.048Mbps (Nx64Kbps , N=1 to 32)
- Operation : Full E1 and Fractional E1
- Local management interface with console
- 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
- Supports 2 wires / 2Ch or 4 wires / 1Ch per card

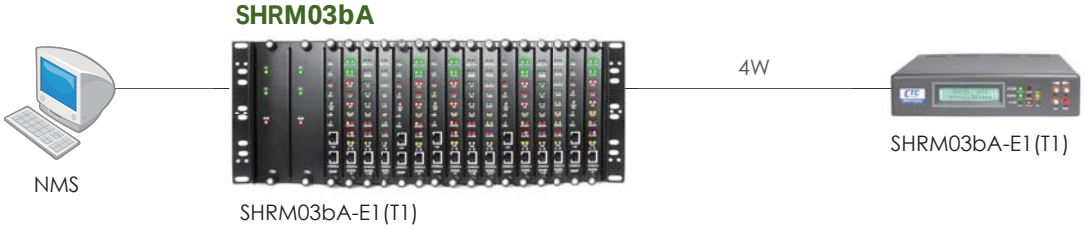
T1 card *G.703 Interface (as T1)*

- Connection: RJ-48C for balanced 100Ω T1 cable
- Line Rate : 1544KHz +/- 50ppm
- Line code: B8ZS
- Framing: SF/ESF/Unframed
- Data Rate : 64kbps to 1.536Mbps (N=1 to 24)
- Operation : Clear Channel and Factional T1
- Local management interface with console
- Remote line loopback
- T1 performance monitoring and alarm buffer
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics
- Supports 2 wires / 2Ch or 4 wires / 1Ch per card

TDM Based 2 Wires 2 Channels 5.7Mbps Application



TDM Based 4 Wires 1 Channels 11.4Mbps Application



2/4-Wire G.SHDSL.bis TDM E1 NTU

SHDTU03b-E1

The CTC SHDTU03b family of G.SHDSL.bis TDM based modems is a telecom product for carriers or SME users. The SHDTU03b-E1 offers an ITU-T G.703 CSU interface which works over an SHDSL line. The modem supports two different connectors for G.703 E1 application (balanced 120 Ohm RJ45 or unbalanced 75 Ohm dual BNCs) at bit rates from 64kbps to 2.048Mbps. The SHDTU03b-E1 can be configured and managed via LCD, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotely.

Features

- Supports E1 and fractional E1 over SHDSL
- Standard ITU G.991.2
- Fast and cost-effective services of voice or TDM on a single or two wire pair of existing copper loop infrastructure
- Wetting current sink to protect G.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

WAN Interface
Line Rate ITU G.991.2(2004)
Coding Trellis Coded Pulse Amplitude Modulation (TC-PAM16 and TC-PAM32)
Support Annex A ,B , F and G
Payload rates 64Kps to 5.696Mbps (N=1 to 89) for 2-wire model.
128Kbps to11.392Mbps (N=1 to 172) for 4-wire model
Connection RJ-45 jack (2-wire or 4-wire)
Impedance 135 ohms

E1 Interface
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 64Kbps to 2.048Mbps (Nx64Kbps , N=1 to 32)
Operation Full E1 and Fractional E1

Indications
LEDs (Power, Alarm, Test, SYNC, Error, LBK)

DSL Timing
• Internal • From E1 Recovery (as E1) • From DTE (as V.35 and Ethernet)

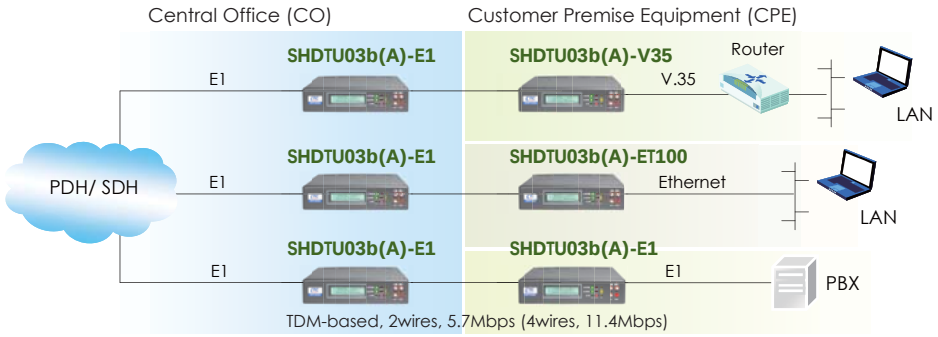
Performance Monitoring
ES, SES, UAS, LOWS, Alarms and Errors

Loopback Tests
• Local Digital Loopback
• Local Loopback
• Remote Line Loopback
• Remote Payload Loopback
• Far-end Line Loopback
• Far-end Payload Loopback
• Build-in 2047(2^{11}-1) bit BER tester

Management
• Configuration with keypads and LCD display
• Console port (RJ-45 , RS-232)
• Support firmware upgrade

Power Input
AC Input 100~240V, DC Input -36 ~ 72V
Dual power Input 100~ 240VAC, -36 ~ -72VDC

Power Consumption <10W
Dimensions 168 x 195 x 48mm (D x W x H)
Weight 0.85kg
Temperature 0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity 10 ~ 90% non-condensing
Certification CE, FCC, RoHS
MTBF 70,000 hrs



Ordering Information

Model Name	Description
SHDTU03b-E1-AD	E1 NTU with AC + DC Power
SHDTU03bA-E1-AD	E1 NTU with AC + DC Power

Note: SHDTU03b-E1: 2-wire (5.7Mbps) G.SHDSL.bis TDM E1 Modem
SHDTU03bA-E1: 4-wire (11.4Mbps) G.SHDSL.bis TDM E1 Modem

Power Type
SHDTU03b – E1 – □□
Example: SHDTU03b – E1 – AD

Power Type
SHDTU03bA – E1 – □□
Example: SHDTU03bA – E1 – AD

2/4-Wire G.SHDSL.bis TDM E1/T1 NTU

SHDTU03b-E1/T1

The CTC SHDTU03b family of G.SHDSL.bis TDM based modems is a telecom product for carriers or SME users. In one device, the SHDTU03b-E1/T1 offers two selectable DTE I/Fs (E1 or T1) for convenient use in North America or the rest of the world. The user-configurable interfaces provide flexible application for various connections. The modem supports different connectors for G.703 E1 / T1application (balanced 120 Ohm E1 or 100 Ohm T1 RJ45, unbalanced 75 Ohm dual BNCs) at bit rates from 64kbps to 2.048Mbps for E1 or 1.544Mbps for T1. The data rate of G.SHDSL.bis may be up to 5.7Mbps with one pair copper wire or 11.4Mbps with two pairs. At the reduced rate for E1/T1, these copper lines can be extended further. The SHDTU03b-E1/T1 can be configured and managed via LCD, or menu-driven VT100 compatible Async. Terminal Interface, either locally or remotely.

Features

- E1, T1 Interface G.SHDSL modem
- Supports fractional E1/T1 Nx64 over SHDSL
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.shdsl
- Fast and cost-effective services of voice, TDM and data on a single or two wire pair of existing copper loop infrastructure
- Local management interface with LCD display
- Remote line loopback
- E1/T1 performance monitoring and alarm buffer
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Specifications

WAN Interface

Line Rate ITU G.991.2 (2004)
Coding Trellis Coded Pulse Amplitude Modulation (TC-PAM16 and TC-PAM32)
Support Annex A ,B , F and G
Payload rates 64Kps to 5.696Mbps (N=1 to 89) for 2-wire model.
128Kbps to11.392Mbps (N=1 to 172) for 4-wire model
Connection RJ-45 jack (2-wire or 4-wire)
Impedance 135 ohms

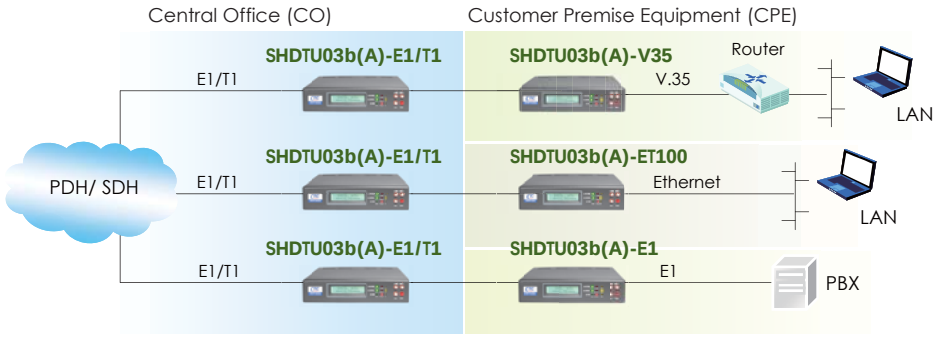
E1/T1 Interface

Connection RJ-45 for balanced 120Ω E1, 100Ω T1 for twisted pair cable or BNC for coaxial unbalanced 75Ω E1
Line Rate E1: 2048KHz +/- 50ppm , T1: 1.544Mbps
Framing PCM30/PCM30C/PCM31/PCM31C and Unframed T1
Data Rate 64Kbps to 2.048Mbps (Nx64Kbps , N=1 to 32)
Operation Full E1/T1 and Fractional E1/T1
Indications LEDs (Power, Alarm, Test, SYNC, Error, LBK, E1,T1)
DSL Timing
• Internal • From E1/T1 Recovery (as E1/T1)
Performance Monitoring ES, SES, UAS, LOWS, Alarms and Errors

Loopback Tests (E1/T1 interface only)
• Local Digital Loopback
• Local Loopback
• Remote Line Loopback
• Remote Payload Loopback
• Far-end Line Loopback
• Far-end Payload Loopback
• Build-in 2047(2^{11}-1) bit BER tester

Management
• Configuration with keypads and LCD display
• Console port (RJ-45, RS-232)
• Support firmware upgrade

Power Input AC Input: 100~240VAC, DC Input: -36 ~ 72VDC
Power Consumption < 10W
Dimensions 168 x 195 x 48 mm (D x W x H)
Weight 0.85kg
Temperature 0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity 10 ~ 90% non-condensing
Certifcation CE, FCC, RoHS
MTBF 70,000 hrs



Ordering Information

Model Name	Description
SHDTU03b-E1/T1-AD	E1/T1 NTU with AC + DC Power
SHDTU03bA-E1/T1-AD	E1/T1 NTU with AC + DC Power

Note: SHDTU03b-E1/T1: 2-wire (5.7Mbps) G.SHDSL.bis TDM E1/T1 Modem
SHDTU03bA-E1/T1: 4-wire (11.4Mbps) G.SHDSL.bis TDM E1/T1 Modem

Power Type
SHDTU03b – E1/T1 – □□
Example: SHDTU03b – E1/T1 – AD

Power Type
SHDTU03bA – E1/T1 – □□
Example: SHDTU03bA – E1/T1 – AD

2/4-Wire G.SHDSL.bis TDM Data (V.35/X.21/RS-530) NTU

SHDTU03b-Data

The CTC SHDTU03b family of G.SHDSL.bis TDM based modem is a telecom product for carriers or SME users. The SHDTU03b-V35 offers a V.35 DTE interface which works over an SHDSL line The V.35 interface provides high-speed TDM services by way of a DB25 I/F and adapter cable. The factory selected RS-530 interface will electrically support RS-530, X.21and RS-449 with appropriate adapter cable. The data rate of DB25 I/F may be up to 5.696Mbps with one pair copper wires or 11.392Mbps with two pairs copper wires. The SHDTU03b-V35 can be configured and managed via LCD, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotely.

Features

- Supports Nx64 V.35, X.21, RS-530, and RS-449 over SHDSL
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.SHDSL
- Fast and cost-effective services of TDM on a single or two wire pair of existing copper loop infrastructure
- Wetting current sink to protect G.SHDSL.bis line
- Local management interface with LCD display
- Remote line loopback
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Specifications

WAN Interface

Line Rate ITU G.991.2 (2004)

Coding Trellis Coded Pulse Amplitude Modulation (TC-PAM16 and TC-PAM32)

Support Annex A ,B , F and G

Payload rate 64Kps to 5.696Mbps (N=1 to 89) for 2-wire model.
128Kbps to11.392Mbps (N=1 to 172) for 4-wire model

Connection RJ-45 jack (2-wire or 4-wire)

Impedance 135 ohms

Data Interface

Payload rate Up to 5.696Mbps(for 2-wire model) or Up to 8.192Mbps(for 4-wire model)

Support V.35/RS-530 or V.36/X.21

Indications

LEDs (Power, Alarm, Test, SYNC, Error, LBK, TD, RD)

DSL Timing

- Internal
- From DTE (as V.35 and Ethernet)

Performance Monitoring ES, SES, UAS, LOWS, Alarms and Errors

Loopback Tests

- Local Digital Loopback
- Local Loopback
- Remote Line Loopback
- Remote Payload Loopback
- Far-end Line Loopback
- Far-end Payload Loopback
- V.54 Loopback (for V.35 interface)
- Build-in 2047(2^{11}-1) bit BER tester

Management

- Configuration with keypads and LCD display
- Console port (RJ-45, RS-232)
- Support firmware upgrade

Power Input

AC Input: 100~240V, DC Input: -36 ~ 72V

Dual power Input:100~ 240VAC, -36 ~ -72VDC

Power Consumption < 10W

Dimensions 168 x 195 x 48mm (D x W x H)

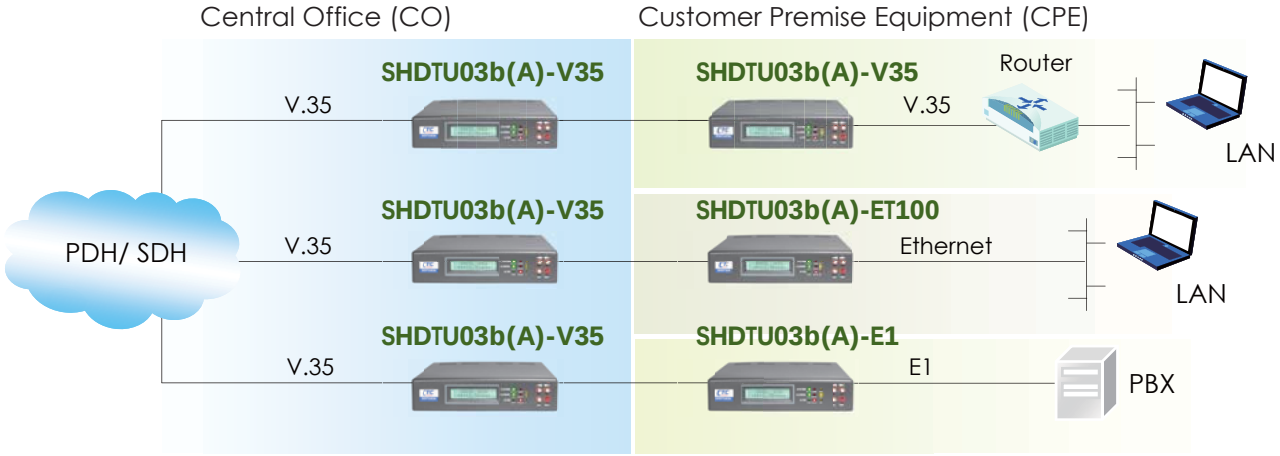
Weight 0.85kg

Temperature 0 ~ 50°C (Operating), -10 ~ 70°C (Storage)

Humidity 10 ~ 90% non-condensing

Certification CE, FCC, RoHS

MTBF 70,000 hrs



Ordering Information

Model Name	Interface	Description
SHDTU03b-V35-AD	V.35	V.35 NTU with AC+DC Power with 1 x V.35 Cable
SHDTU03b-X21-AD	X.21	X.21 NTU with AC+DC Power with 1 x V.21 Cable
SHDTU03b-RS530-AD	RS-530	RS-530 NTU with AC+DC Power with 1 x RS-530 Cable
SHDTU03b-RS449-AD	RS-449	RS-449 NTU with AC+DC Power with 1 x RS-449 Cable
SHDTU03bA-V35-AD	V.35	V.35 NTU with AC+DC Power with 1 x V.35 Cable
SHDTU03bA-X21-AD	X.21	X.21 NTU with AC+DC Power with 1 x V.21Cable
SHDTU03bA-RS530-AD	RS-530	RS-530 NTU with AC+DC Power with 1 x RS-530 Cable
SHDTU03bA-RS449-AD	RS-449	RS-449 NTU with AC+DC Power with 1 x RS-449 Cable

Note: SHDTU03b-Data: 2-wire (5.7Mbps) G.SHDSL.bis TDM Data (V.35, X.21, RS-530, RS-449) Modem
SHDTU03bA-Data: 4-wire (11.4Mbps) G.SHDSL.bis TDM Data (V.35, X.21, RS-530, RS-449) Modem

Interface Power Type
SHDTU03b – □□□ – □□
Example: SHDTU03b – V35 – AD

Interface Power Type
SHDTU03bA – □□□ – □□
Example: SHDTU03bA – V35 – AD

2/4-Wire G.SHDSL.bis TDM (Bridge) NTU

SHDTU03b-ET100

The CTC SHDTU03b family of G.SHDSL.bis TDM based modems is a telecom product for carriers or SME users. The SHDTU03b-ET100 offers a 10/100Base-TX interface which works over an SHDSL line. The Ethernet interface provides Ethernet over TDM services by way of a HDLC encapsulation and RJ-45 connector. The data rate of Ethernet I/F may be up to 5.696Mbps with one pair copper wires or 11.392Mbps with two pairs copper wire. The SHDTU03b-ET100 can be configured and managed via LCD, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotely.

Features

- Supports 10Base-T and 100Base-TX over SHDSL
- Standard ITU G.991.2
- Fast and cost-effective services of data on a single or two wire pair of existing copper loop infrastructure
- Wetting current sink to protect G.SHDSL.bis line
- Local management interface with LCD display
- Remote line loopback
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Specifications

WAN Interface

Line Rate ITU G.991.2 (2004)

Coding Trellis Coded Pulse Amplitude Modulation (TC-PAM16 and TC-PAM32)

Support Annex A ,B , F and G

Payload rate 64Kps to 5.696Mbps (N=1 to 89) for 2-wire model.
128Kbps to11.392Mbps (N=1 to 172) for 4-wire model

Connection RJ-45 jack (2-wire or 4-wire)

Impedance 135 ohms

Ethernet Interface

- Single Ethernet Interface
- 10/100Mpbs Half/Full Duplex, Auto-sensing, Auto-Crossover
- Up to 1024 MAC address learning

Indications

LEDs (Power, Alarm, Test, SYNC, Error, LBK, Link/Act, speed, Col)

DSL Timing

- Internal or Loop

Performance Monitoring ES, SES, UAS, LOWS, Alarms and Errors

Management

- Configuration with keypads and LCD display
- Console port (RJ-45, RS-232)
- Support firmware upgrade

Power Input

AC Input: 100~240V, DC Input: -36 ~ 72V

Dual power Input:100~ 240VAC, -36 ~ -72VDC

Power Consumption < 10W

Dimensions 168 x 195 x 48mm (D x W x H)

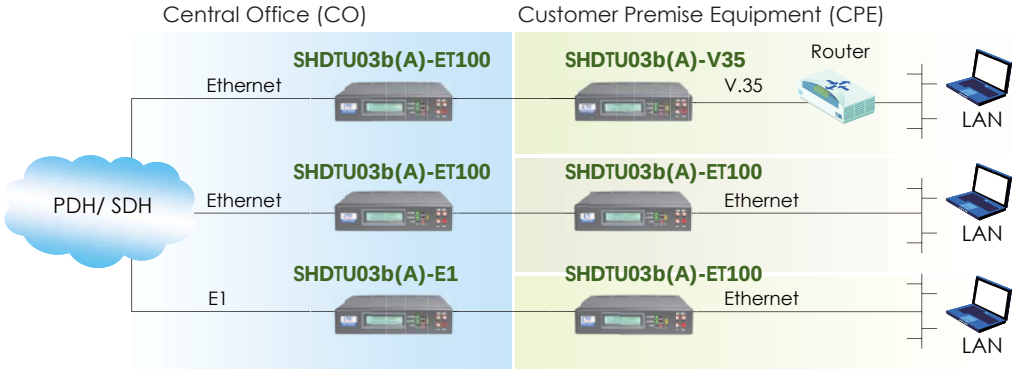
Weight 0.85kg

Temperature 0 ~ 50°C (Operating), -10 ~ 70°C (Storage)

Humidity 10 ~ 90% non-condensing

Certification CE, FCC, RoHS

MTBF 70,000 hrs



Ordering Information

Model Name	Description
SHDTU03b-ET100-AD	2-wire Ethernet 10/100Base-TX NTU with AC + DC Power
SHDTU03bA-ET100-AD	4-wire Ethernet 10/100Base-TX NTU with AC + DC Power

Note: SHDTU03b-ET100: 2-wire (5.7Mbps) G.SHDSL.bis TDM Ethernet Bridge Modem
SHDTU03bA-ET100: 4-wire (11.4Mbps) G.SHDSL.bis TDM Ethernet Bridge Modem

Power Type
SHDTU03b – ET100 – □□
Example: SHDTU03b – ET100 – AD

Power Type
SHDTU03bA – ET100 – □□
Example: SHDTU03bA – ET100 – AD

2/4-Wire G.SHDSL.bis TDM Multi-Interface (E1, V.35, LAN) NTU

SHDTU03b-31

The CTC SHDTU03b family of G.SHDSL.bis TDM based modem is a telecom product for carriers or SME users. In one device, the SHDTU03b-31 offers three DTE I/Fs (E1, V.35, and Ethernet), which can work simultaneously to share DSL bandwidth. The user-configurable interfaces provide flexible application for various connections. The modem supports two different connectors for G.703 E1 application (balanced 120 Ohm RJ45 or unbalanced 75 Ohm dual BNCs) at bit rates from 64kbps to 2.048Mbps. The V.35 interface provides high-speed TDM services by way of a DB25 I/F and adapter cable. The factory selected RS-530 interface will electrically support RS-530, X.21and RS-449 with appropriate adapter cable. The data rate of DB25 I/F may be up to 5.696Mbps within one pair copper wires or 11.392Mbps within two pairs copper wires. The modem provides 10/100Mbps auto-negotiated Fast Ethernet via an RJ45 LAN connector, which offers customer premise high-speed LAN over TDM services. The SHDTU03b-31 can be configured and managed via LCD, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotely.

Features

- 3-in-1 dot bis modem supports E1, fractional E1, Nx64 V.35, X.21, RS-530, RS-449 and Ethernet over SHDSL
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.SHDSL
- Fast and cost-effective services of voice, TDM and data on a single or two wire pair of existing copper loop infrastructure
- Wetting current sink to protect G.SHDSL.bis line
- Local management interface with console
- 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

WAN Interface
Line Rate ITU G.991.2 (2004)
Coding Trellis Coded Pulse Amplitude Modulation (TC-PAM16 and TC-PAM32)
Support Annex A ,B , F and G
Payload rates 64Kps to 5.696Mbps (N=1 to 89) for 2-wire model.
128Kbps to11.392Mbps (N=1 to 172) for 4-wire model
Connection RJ-45 jack (2-wire or 4-wire)
Impedance 135 ohms

G.703 Interface
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 64Kbps to 2.048Mbps (Nx64Kbps , N=1 to 32)
Operation Full E1 and Fractional E1

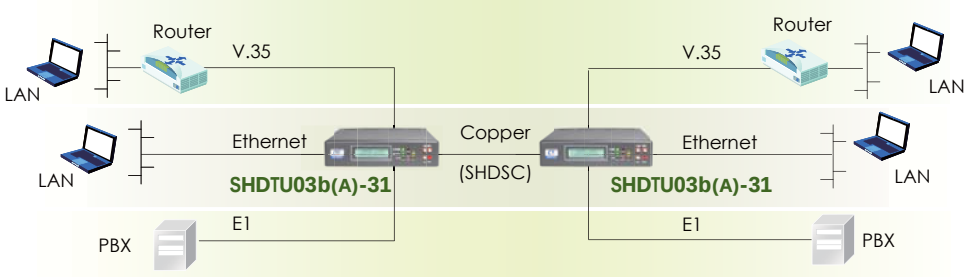
Data Interface
- Payload rates: Up to 5.696Mbps(for 2-wire model) or Up to 11.392Mbps (for 4-wire model)
- Support V.35/RS-530 or V.36/X.21

LAN Interface
- Single Ethernet Interface
- 10/100Mpbs Half/Full Duplex, Auto-sensing, Auto-Crossover
- Up to 1024 MAC address learning

Indications LEDs (Power, Alarm, Test, SYNC, Error, LBK, E1, Data, Eth)
DSL Timing
• Internal • From E1 Recovery (as E1) • From DTE (as V.35)
Performance Monitoring ES, SES, UAS, LOWS, Alarms and Errors
Loopback Tests
E1 and V.35 interface only
- Local Digital Loopback
- Local Loopback
- Remote Line Loopback
- Remote Payload Loopback
- Far-end Line Loopback
- Far-end Payload Loopback
- V.54 Loopback (for V.35 interface)
- Build-in 2047(211-1) bit BER tester

Management
- Configuration with keypads and LCD display
- Console port (RJ45 , RS232C)
- Support firmware upgrade

Power Input
AC Input: 100~240VAC, DC Input: -36 ~ 72VDC
Dual power Input:100~ 240VAC, -36 ~ -72VDC
Power Consumption < 10W
Dimensions 168 x 195 x 48mm (D x W x H)
Weight 0.85kg
Temperature 0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity 10 ~ 90% non-condensing
Certification CE, FCC, RoHS
MTBF 70,000 hrs



Ordering Information

Model Name	Description
SHDTU03b-31-AD	2-wire E1 / V.35 / LAN multi-interface NTU with AC+DC Power
SHDTU03bA-31-AD	4-wire E1 / V.35 / LAN multi-interface NTU with AC+DC Power

Note: SHDTU03b-31: 2-wire (5.7Mbps) G.SHDSL.bis TDM Multi-Interface Modem
SHDTU03bA-31: 4-wire (11.4Mbps) G.SHDSL.bis TDM Multi-Interface Modem

SHDTU03b – □□ – □□
Example: SHDTU03b – 31 – AD

SHDTU03bA – □□ – □□
Example: SHDTU03bA – 31 – AD

2/4-Wire G.SHDSL.bis TDM Multi-Interface (E1/T1, V.35, LAN) NTU

SHDTU03b-31T

The CTC SHDTU03b family of G.SHDSL.bis TDM based modem is a telecom product for carriers or SME users. In one device, the SHDTU03b-31T offers three DTE I/Fs (E1/T1, V.35, and Ethernet), which can work simultaneously to share DSL bandwidth. The user-configurable interfaces provide flexible application for various service connections. The modem supports two different connectors for G.703 E1/T1 applications (balanced 120 Ohm E1 or 100 Ohm T1 RJ45, unbalanced 75 Ohm dual BNCs) at bit rates from 64kbps to 2.048Mbps. The V.35 interface provides high-speed TDM services by way of a DB25 I/F and adapter cable. The factory selected RS-530 interface will electrically support RS-530, X.21and RS-449 with appropriate adapter cable. The data rate of DB25 I/F may be up to 5.7Mbps within one pair copper wires or 11.4Mbps within two pairs copper wires. The modem provides 10/100Mbps auto-negotiated Fast Ethernet via an RJ45 LAN connector, which offers customer premise high-speed LAN over TDM services. The SHDTU03b-31T can be configured and managed via LCD, or menu-driven VT100 compatible asynchronous terminal Interface, either locally or remotely.

Features

- Multi-Interface (E1/T1, V35, Ethernet) G.SHDSL.bis modem
- Supports fractional E1/T1 Nx64 V.35, X.21, RS-530, RS-449 and Ethernet over SHDSL, all at the same time
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.SHDSL
- Fast and cost-effective services of voice, TDM and data on a single or two wire pair of existing copper loop infrastructure
- Local management interface with console menu
- Remote line loopback
- E1/T1 performance monitoring and alarm buffer
- G.SHDSL.bis Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Specifications

WAN Interface

Line Rate ITU G.991.2 (2004)
Coding Trellis Coded Pulse Amplitude Modulation (TC-PAM16 and TC-PAM32)
Support Annex A ,B , F and G
Payload rates 192Kps to 5.696Mbps (N=3 to 89) for 2-wire model.
384Kbps to11.392Mbps (N=6 to 172) for 4-wire model
Connection RJ-45 jack (2-wire or 4-wire)
Impedance 135 ohms

E1/T1 Interface

Connection RJ-45 for balanced 120Ω E1, 100Ω T1 cable and BNC for unbalanced 75Ω E1 cable
Line Rate E1: 2048KHz +/- 50ppm , T1: 1.544Mbps
Framing PCM30/PCM30C/PCM31/PCM31C and Unframed E1/T1
Data Rate 64Kbps to 2.048Mbps (Nx64Kbps , N=1 to 32)
Operation Full E1/T1 and Fractional E1
Payload rates Up to 5.696Mbps(for 2-wire model) or Up to11.4Mbps (for 4-wire model)
Support V.35 or RS-530/V.36/X.21

LAN Interface

10/100Mbps RJ45 Interface
Half/Full Duplex, Auto-sensing, Auto-Crossover
Up to 1024 MAC address learning
Standard HDLC WAN encapsulation

Indications Power, Alarm, Test, SYNC, Error, LBK, E1, Data, Eth

DSL Timing

- Internal
- From E1/T1 Recovery (as E1/T1) • From DTE (as V.35)

Performance Monitoring ES, SES, UAS, LOWS, Alarms and Errors

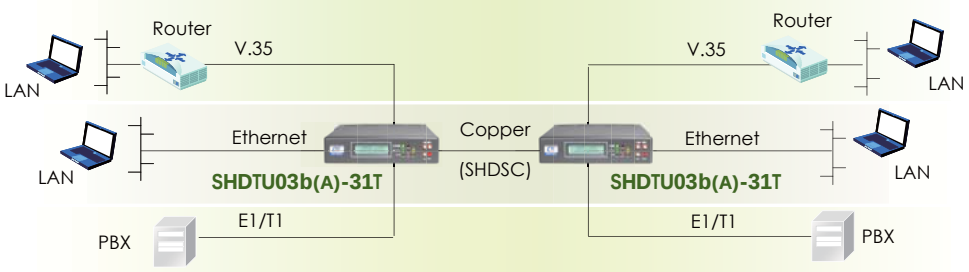
Loopback Tests E1/T1 and V.35 interface only

- Local Digital Loopback • Local Loopback
- Remote Line Loopback • Remote Payload Loopback
- Far-end Line Loopback • Far-end Payload Loopback
- V.54 Loopback (for V.35 interface) • Build-in 2047 pattern BER tester

Management

- Configuration with keypads and LCD display
- Console port (RJ-45 , RS-232)
- Supports firmware upgrade

Power Input AC Input: 100~240VAC, DC Input: -36 ~ 72VDC
Power Consumption < 10W
Dimensions 168 x 195 x 48 mm (D x W x H)
Weight 0.85kg
Temperature 0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity 10 ~ 90% non-condensing
Certifcation CE, FCC, RoHS
MTBF 70,000 hrs



Ordering Information

Model Name	Description
SHDTU03b-31T-AD	2-wire T1(E1)/V.35/LAN multi-interface NTU with AC+DC Power
SHDTU03bA-31T-AD	4-wire T1(E1)/V.35/LAN multi-interface NTU with AC+DC Power

Note: SHDTU03b-31T: 2-wire (5.7Mbps) G.SHDSL.bis TDM Multi-Interface Modem
SHDTU03bA-31T: 4-wire (11.4Mbps) G.SHDSL.bis TDM Multi-Interface Modem

SHDTU03b – □□□ – □□
Example: SHDTU03b – 31T – AD

SHDTU03bA – □□□ – □□
Example: SHDTU03bA – 31T – AD

4U 15-Slot Non-Managed G.SHDSL.bis ATM Chassis

SHRM03b ATM

The SHRM03b ATM chassis is a 4U 19(23)" rack that supports dual power and 15 slots for dual channel, hot swappable ET100R Bridge / Router Ethernet cards. The SHDTU03b-ET100R ATM card series are G.SHDSL 2-wire/ 4-wire routers which comply with G.991.2 & G.994.1 standards. The SHDTU03b family provides business-class, multi-range 192Kbps to 5.696/11.392Mbps payload rates over existing single pair or two pairs copper wire. The SHDTU03b is designed not only to optimize the service bit rate from central office to customer premises but also integrates high-end Bridging/ Routing capabilities with advanced functions such as Multi-DMZ, virtual server mapping and VPN. pass-through. The SHDSL.bis router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs.

Features

- 4U 19(23)" 15-slot chassis
- Interface Cards for Ethernet (Bridge & Routing)
- Up to 30 ports per chassis (2 ports per card for 2 wire model)
- Hot swappable
- Data rate 2 wire up to 5.7Mbps and 4 wire up to 11.4Mbps
- Adaptive rate feature maximizes data rate based on loop conditions
- All interface connectors on the rear panel

Specifications

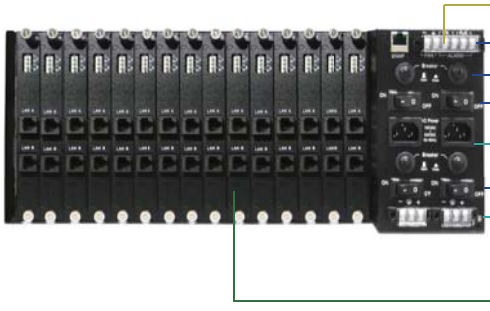
Connectors	• Console port (RJ-45, RS-232) card • WAN port RJ45 Jack (2-wire, 4-wire)
Physical Specifications	• Dimensions: 178 x 440 x 315mm (W x D x H) • Weight: 7.9kg w/o P/S
Power Characteristics	• AC : 90 ~ 230V AC 47/63Hz • DC : 24VDC, 48VDC, 72VDC
Environmental Specifications	• Operating 0°C ~ 50°C • Storage -10°C ~ 70°C • Relative humidity 5% ~ 90% non-condensing • Predicted MTBF : 65,000 hrs
Certification	• FCC class A, VCCI class A, CE, RoHS

SHRM03b ADM front view

15 slots for Line Card Removal / Replacement

Power Redundancy

SHRM03b ADM back view



Cooling Fan Power Terminal

Alarm Relay

Circuit breakers provide over current protection for AC or DC inputs.

Main Switch control the input flow of AC or DC
IEC connector supply AC voltage (110-220VAC)
Terminal strip for DC power (48VDC)

Technologies supported 10/100Base-TX Ethernet.

G.SHDSL.bis ATM Ethernet Router Slide-in Card

SHRM03b-ET100R

Data rate 2 wire up to 5.7Mbps

2 channel, 2 wires G.SHDSL.bis
10/100Base-TX ATM Router card
With Ethernet connector (HD26 to RJ45)
Embedded console & Web management

SHRM03bA-ET100R

Data rate 4 wire up to 11.4Mbps

1 channel, 4 wires G.SHDSL.bis
10/100Base-TX ATM Router card
With Ethernet connector (HD26 to RJ45)
Embedded console & Web management

Power Redundancy

All the SHRM03b ATM chassis power supplies are hot swappable and modular, installing two into a chassis, provides redundancy should a single power supply fail. A fully loaded chassis can run continuously with only one power module fitted into the chassis.

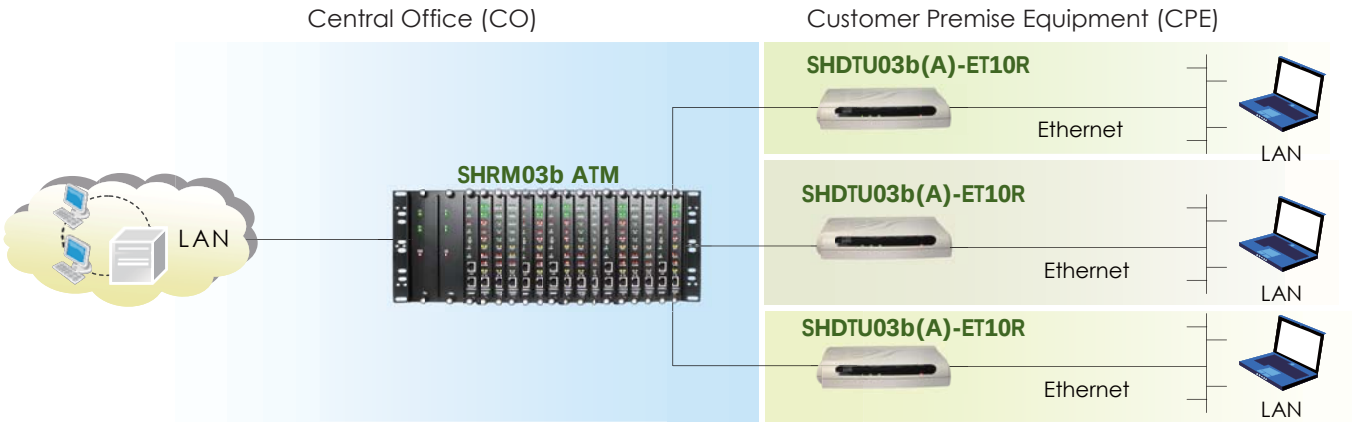
Cooling Fan

The cooling fan unit is an optional component. In a stacked chassis scheme, where ambient temperature may be higher than 25C (77F), or the chassis is fully loaded with line cards, the fan option is recommended to keep cooler air moving through the chassis. The fan box is designed to be placed on top of the SHRM03b chassis and pulls warm air up and out of the chassis, expelling it out the rear of the fan box. The cooling fan unit will add 1U rack space to the chassis for an overall total of 5U.

Protocol Supported

The SHRM03b ATM chassis has been designed as a Non-Managed concentrator. This allows network administrators to deploy the chassis in a wide range of network. Technologies supported 10/100Base-TX Ethernet Router.

TDM Based 2 Wires, 5.7Mbps 4 Wires, 11.4Mbps



Ordering Information

Model Name	Type	Description
SHRM03b-CH-AD	Chassis	4U, 19" 15-Slot Chassis with One Dual AC/DC Power Moduel
SHRM03b-FAN	Fan	Chassis Cooling Fan Tray
SHRMb03-AD	Power	AC 110V~240V + DC36~72V Power Module
SHRM03b-ET100R	Card	2 Ch/2W G.SHDSL.bis wire-wrap to 10/100Base-TX ATM Router Card
SHRM03bA-ET100R	Card	1 Ch/4W G.SHDSL.bis wire-wrap to 10/100Base-TX ATM Router Card
SHRM03bF-ET100R	Card	2 Ch/2W G.SHDSL.bis wire-wrap to 10/100Base-TX ATM Router Card
SHRM03bAF-ET100R	Card	1 Ch/4W G.SHDSL.bis wire-wrap to 10/100Base-TX ATM Router Card
SHRM03b-ET100R-RJ45	Card	2 Ch/2W G.SHDSL.bis RJ-45 to 10/100Base-TX ATM Router Card
SHRM03bA-ET100R-RJ45	Card	1 Ch/4W G.SHDSL.bis RJ-45 to 10/100Base-TX ATM Router Card
SHRM03bF-ET100R-RJ45	Card	2 Ch/2W G.SHDSL.bis RJ-45 to 10/100Base-TX ATM Router Card
SHRM03bAF-ET100R-RJ45	Card	1 Ch/4W G.SHDSL.bis RJ-45 to 10/100Base-TX ATM Router Card

Chassis Type Power Type

SHRM03b – □□ – □□

Example: SHRM03b – CH – AD

Power Type

SHRM03b – □□

Example: SHRM03b – AD

Card Type

SHRM03b□ – □□□□□□□

Example: SHRM03bA – EAT100R

Fan

SHRM03b – □□□

Example: SHRM03b – FAN

Data rate 2 wire up to 5.7Mbps

G.SHDSL.bis ATM Ethernet Router Slide-in Card

SHRM03b-ET100R
SHRM03bA-ET100R

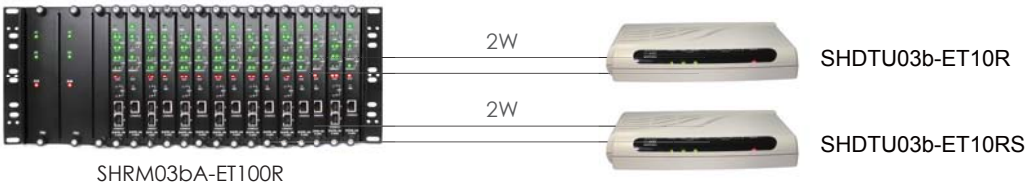
The SHRM03b-ET100R is a dual channel ATM G.SHDSL.bis 2-wire/ 4-wire router card which comply with G.991.2 & G.994.1 standards. The SHRM03 family provides business-class, multi-range 192Kbps to 5.696/11.392Mbps payload rates over existing single pair or two pairs copper wire. The SHRM03b is designed not only to optimize the service bit rate from central office to customer premises but also integrates high-end Bridging/ Routing capabilities with advanced functions such as Multi-DMZ, virtual server mapping and VPN pass-through. The SHDSL.bis router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs. This card is 100% compatible with our SHDTU03b standalone ATM based CPE Bridge/Router modems.

Data rate 4 wire up to 11.4Mbps

Features

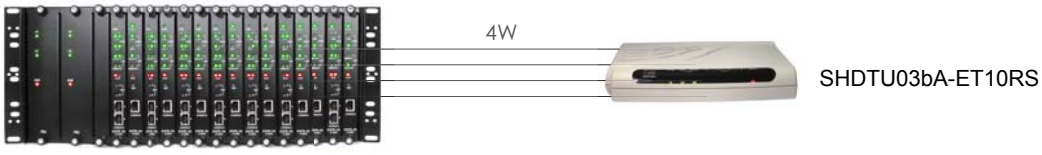
- Supports Ethernet over ATM over SHDSL
- Full ATM protocol stack implementation over G.SHDSL
- Adaptive rate installation maximizes data rate based on loop conditions
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.shdsl
- Supports point-to-point configurations
- Data rate 2 wire up to 5.7Mbps and 4 wire up to 11.4Mbps
- Local management interface via console port
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II
- Efficient IP routing and transparent learning bridge to support broadband Internet services
- VPN pass-through for safeguarded connections
- Build-in advanced SPI firewall (Firewall routers)
- 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
- SHDSL Line performance monitoring
- Raw and time stamped statistics
- Supports firmware upgrade via web interface

SHRM03b ATM



SHRM03bA-ET100R

SHRM03b ATM



SHRM03bA-ET100R

2/4-Wire G.SHDSL.bis EFM ATM Ethernet Bridge/Router

SHDTU03bF-ET10R(S)

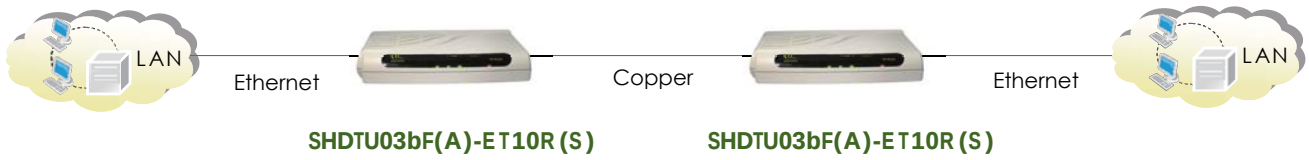
The SHDTU03bF-ET10RS is a G.SHDSL bis Bridge/Router in 2-wire or 4-wire which complies with G.991.2 (2004) standards and has an optional built-in four port 10Base-T /100Base-TX auto-negotiation and auto-MDIX switch. The SHDTU03bF family provides business-class, multi-range 192Kbps to 5.7Mbps (2-wire) or 384Kbps to 11.4Mbps (4-wire) payload rates over existing single or two pair copper wire. SHDTU03bF-ET10R 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 Multi-DMZ, virtual server mapping and VPN pass-through. The G.SHDSL.bis 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

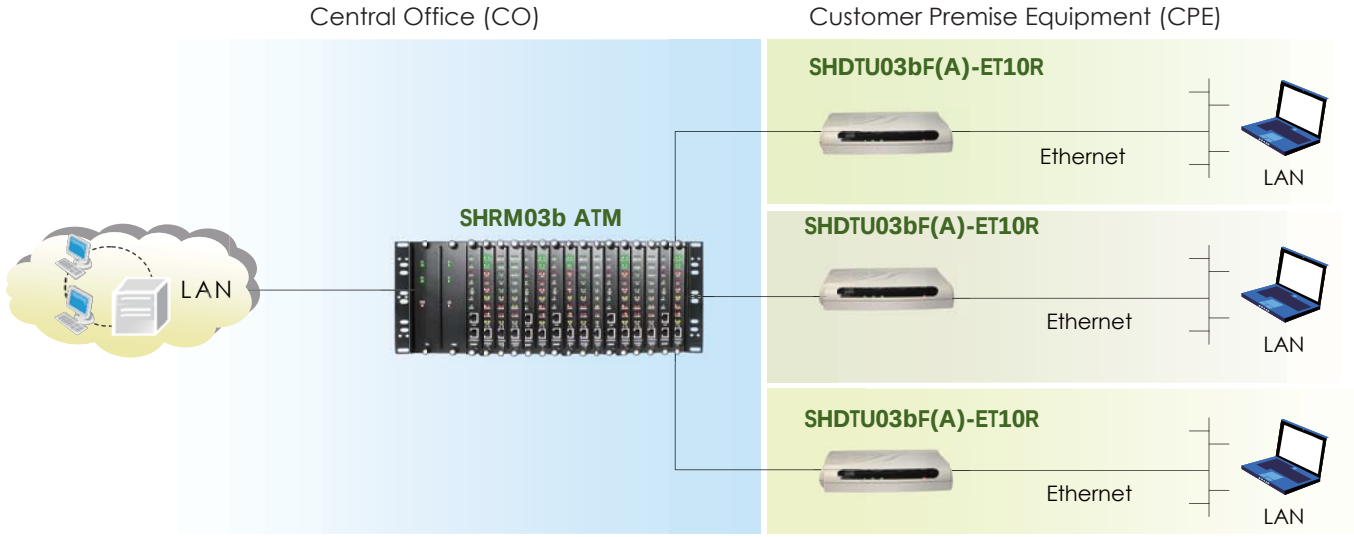
- Supports Ethernet over ATM over SHDSL
- Full ATM protocol stack implementation over G.SHDSL
- Adaptive rate installation maximizes data rate based on loop conditions
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.SHDSL
- Supports point-to-point configurations
- Data rate 2 wire up to 5.7Mbps and 4 wire up to 11.4Mbps
- Local management interface via console port
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II
- Efficient IP routing and transparent learning bridge to support broadband Internet services
- VPN pass-through for safeguarded connections
- Build-in advanced SPI firewall (Firewall routers) (option)
- 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
- Supports TR069 (Optional)
- EFM (Ethernet in the First Mile) bonding per IEEE 802.3-2005; 2/4-wire bonding for HDLC per G991.2

Specifications

Ports	LAN Interface : • 10Base-T /100 Base-TX auto-negotiation • Auto-MDIX Hardware Interface : • WAN: RJ-45 • Console port: RS-232 WAN Interface : • SHDSL: ITU-T G.991.2 2004(Annex A/B/F/G) • Encoding scheme: TC-PAM16, TC-PAM32 • Data Rate: N x 64Kbps (N=3~89) • Impedance: 135 ohm
ATM	• Up to 8 PVCs • OAM F4/F5 loopback test • AAL5
ATM QoS	• UBR (Unspecified Bit Rate) • CBR (Constant Bit Rate) • VBR-rt (Variable Bit Rate Real Time) • VBR-nrt (Variable Bit Rate Non-real Time)
AAL5 Encapsulation	• VC multiplexing and SNAP/LLC • Ethernet over ATM (RFC 2684/1483) • PPP over ATM (RFC 2364) • Classical IP over ATM (RFC 1577)
PPP	• PPP over Ethernet for fixed and dynamic IP (RFC 2516) • PPP over ATM for fixed and dynamic IP (RFC 2364) • User authentication with PAP/CHAP/MS-CHAP
Routing	• Support IP/TCP/UDP/ARP/ICMP/IGMP protocols • IP routing with static routing and RIPv1/RIPv2 (RFC1058/2453) • IP multicast and IGMP proxy (RFC1112/2236) • Network address translation (NAT/PAT) (RFC1631) • NAT ALGs for ICQ/Netmeeting/MSN/ Yahoo Messenger • DNS relay and caching (RFC1034/1035) • DHCP server, client and relay (RFC2131/2132)
Bridging	• IEEE 802.1D Transparent Bridging • IEEE 802.1q VLAN • Port-based VLAN
Security	• DMZ host/Multi-DMZ/Multi-NAT function • Virtual server mapping (RFC1631) • VPN pass-through for PPTP/L2TP/IPSec tunneling • Natural NAT firewall • Advanced stateful packet inspection (SPI) firewall • Denial of service protection • User access control; deny certain PCs access to internet services
Management	• Easy-to-use web-based GUI for quick setup, configuration and management • Menu-driven interface/Command-line interface (CLI) for local console and Telnet access • Password protected management and access control list for administration • SNMP management with SNMPv1/SNMPv2c (RFC1157/1901/1905) , MIB II (RFC1213/1493) • Software upgrade via web-browser/TFTP server
Indications	• General: PWR • WAN: LNK, ACT • LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R) • SHDSL: ALM
Power Input	DC 9V in
Power Consumption	< 9W
Dimensions	145 x 187 x 33mm (D x W x H)
Weight	0.58kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs



TDM Based
2 Wires, 5.7Mbps 4 Wires, 11.4Mbps



	SHDTU03bF-ET10R	SHDTU03bF-ET10RS	SHDTU03bAF-ET10RS
WAN	2-wire	2-wire	4-wire
LAN	1	4	4
Auto-MDIX	Yes	Yes	Yes
Port-based VLAN	None	Yes	Yes
802.1q VLAN	1LAN / 1WAN	4LAN / 8WAN	4LAN / 8WAN
Firewall	Yes	Yes	Yes
Maximum data rate	5.7Mbps	5.7Mbps	11.4Mbps
Minimum data rate	192Kbps	192Kbps	384Kbps

Ordering Information

Model Name	Description
SHDTU03bF-ET10R	1-Port 10/100Base-TX ATM Router w/Firewall
SHDTU03bF-ET10RS	4-Port 10/100Base TX ATM Router w/Firewall
SHDTU03bAF-ET10RS	4-Port 10/100Base-TX ATM Router w/Firewall

Note: SHDTU03bF-ET10R: 2-wire (5.7Mbps) G.SHDSL.bis ATM Ethernet Bridge / Router
SHDTU03bFA-ET10R: 4-wire (11.4Mbps) G.SHDSL.bis ATM Ethernet Bridge / Router

Card Type
SHRM03bF – □□□□□
Example: SHRM03bF – ET10R

4U, 13 Slot Managed G.SHDSL TDM Concentrator

SHRM03 TDM

The SHRM03 TDM chassis is a 4U 19(23)" rack that supports dual power and 12 slots for dual channel, hot swappable cards for G.703 E1, V.35 (RS-530/449/X.21) and bridged Ethernet. Utilizing industry standard SNMP protocol, the management feature can configure and monitor each local channel and the connected remote modems. In addition, RS-232 console and Telnet provide menu based management with embedded Web offers a user friendly graphical environment for OAM&P. This Rack is 100% compatible with our SHDTU03 standalone TDM based CPE modems for E1, serial data and Ethernet.

Features

- 4U 19(23)" 13 slot chassis
- Interface Cards for E1, V.35, Ethernet (Bridge)
- Up to 26 ports per chassis (2 ports per card)
- Hot swappable
- Data rate 2 wire up to 2.3Mbps
- Adaptive rate feature maximizes data rate based on loop conditions
- Supports console terminal, Telnet, web and SNMP management
- Supports TFTP upgrade
- All interface connectors on the rear panel

Specifications

SHDSL Interface :
- Line code : 16 level Trellis Coded PAM
- Line data rate : User selectable from 64kbps to 2.304Mbps
- Support : ANSI (Annex A) and ETSI (Annex B)
- Support wetting current : 4mA-20mA and alarm on failure
- Compliance: ITU-T G.991.2

Datacom Interface :
- User selectable as : V.35, RS-449, RS-530, X.21
- Data Rate : 64kbps to 2304kbps
- Connector : D25F (adapters available)
- Timing : Internal, External, and Recovery

Ethernet Interface :
- Supports 10/100Base-T auto sensing half/full duplex
- Complied with IEEE 802.3/IEEE 802.3u
- Operates as a self-learning bridge in transparent mode
- Supports up to 128 MAC learning addresses
- Supports bridge filter function

Performance
- SHDSL PM : ES-crc, SES-crc, UAS, LOSW seconds
- E1 PM : ES, SES, UAS seconds
- Current 15-minute period and 96 previous 15-minute periods of SHDSL and E1 performance parameters

Management
- Console port (RJ-45 , RS-232)
- Support firmware upgrade

LEDs
- E1 : PWR, SHDSL, FE1, LOF, LOS, TEST, LOOP, ALARM, and FAR ALARM
- V.35 : PWR, SHDSL, TD, RD, CTS, TEST, LOOP, ALARM, and FAR ALARM
- Ethernet : PWR, SHDSL, 10M/ACT, 100M/ACT, COL, TEST, LOOP, ALARM, and FAR ALARM

E1 Interface
- Line code: HDB3/AMI
- Data rate: 64kbps to 2048kbps
- Operation: full or fractional
- Impedance: 120 ohms balanced / 75 ohms unbalanced
- Framing: structured with or without CRC-4 or unstructured
- Timing: internal, and G.703
- Compliance: ITU-T G.703, G.704, G.706, G.821, G.823, G.826, CTR12
- Transmit level
  - Pulse amplitude: Nominal 2.37V+10% for 75 ohm / Nominal 3.00V+10% for 120 ohm
  - Zero amplitude: +0.1V
- Transmit frequency tracking
  - Internal timing : +/- 30ppm
  - Loopback timing :+/- 50ppm
  - External timing : +/- 100ppm
- Jitter performance : ITU-T G.823
- Interface connections : BNC for unbalanced, 5 pin wire connector for balanced

Power AC: 90~230VAC, 2A DC: -36~-72, 6A

Power Consumption

Maximum 200W, I/F line card: 12W maximum

Dimensions

Chassis : 285 x 440 x 180mm (D x W x H)

Line card: 280 x 25 x 260mm

Weight : 6.5kg

Temperature : 0 ~ 50°C (Operating), 0 ~ 70°C (Storage)

Humidity : 10 ~ 90% non-condensing

Certification : CE, FCC, RoHS

MTBF : 57,000 hours

G.SHDSL TDM Dual Channel Slide-in Card

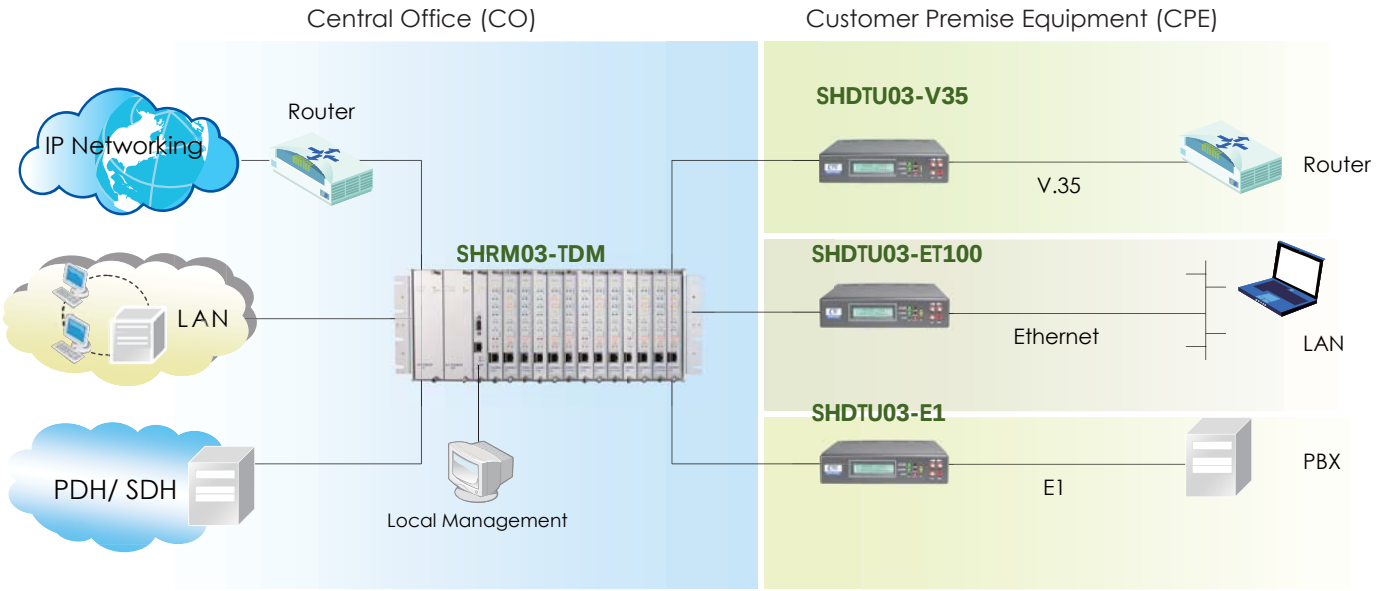
SHRM03-E1

SHRM03-V35

SHRM03-ET100

- Supports E1 and fractional E1 over SHDSL (E1 card)
- E1 performance monitoring and alarm buffer (E1 card)
- Supports Nx64 V.35, X.21, RS-530, and RS-449 over SHDSL (V.35 card)
- Supports 10Base-T and 100Base-TX over SHDSL (Ethernet card)
- Standard ITU G.991.2
- Fast and cost-effective services of voice or TDM on a single wire pair on existing
- Local management interface with console menu
- Remote line loopback
- G.SHDSL Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

TDM Based 2Wires, 2.3Mbps



Ordering Information

Model Name	Type	Description
SHRM03-AA-CH	Chassis	4U, 19" 13-Slot Chassis for Dual AC module
SHRM03-DD-CH	Chassis	4U, 19" 13-Slot Chassis for Dual 48V DC In
SHRM03-AD-CH	Chassis	4U, 19" 13-Slot Chassis for one AC module +one 48V DC In
SHRM03-AC	Power	AC 110V/AC 220V Power Module
SHRM03-FAN	Fan	Chasssis Cooling Fan Tray
SHRM03-SNMP	Card	SNMP card with console cable
SHRM03-E1	Card	2Ch / 2W E1 Card
SHRM03-V35/2T	Card	2Ch / 2W V.35 Card
SHRM03-X.21/2T	Card	2Ch / 2W X.21 Card
SHRM03-RS-530/2T	Card	2Ch / 2W RS-530 Card
SHRM03-RS-449/2T	Card	2Ch / 2W RS-449 Card
SHRM03-ET100/2T	Card	2Ch / 2W Ethernet 10/100Base-TX Card

Power Type Chassis
SHRM03 – □□ – □□
Example: SHRM03 – AA – CH

Power Type
SHRM03 – □□
Example: SHRM03 – AC

Card
SHRM03 – □□
Example: SHRM03 – E1

Fan
SHRM03 – □□□
Example: SHRM03 – FAN

2-Wire G.SHDSL TDM E1 NTU

SHDTU03-E1

The CTC SHDTU03 family of G.SHDSL TDM based modems is a telecom product for carriers or SME users. The SHDTU03-E1 offers an ITU-T G.703 CSU interface which works over an SHDSL line. The modem supports two different connectors for G.703 E1 application (balanced 120 Ohm RJ45 or unbalanced 75 Ohm dual BNCs) at bit rates from 64kbps to 2.048Mbps. The SHDTU03b-E1 can be configured and managed via LCD, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotely.

Features

- Supports E1 and fractional E1 over SHDSL
- Standard ITU G.991.2
- Fast and cost-effective services of voice or TDM on a single or two wire pair of existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console menu
- Remote line loopback
- E1 performance monitoring and alarm buffer
- G.SHDSL Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Specifications

WAN Interface

Line code 16 level Trellis Coded PAM
Line data rate User selectable from 64kbps to 2.304Mbps
Support ANSI (Annex A) and ETSI (Annex B)
Support wetting current 4mA-20mA and alarm on failure
Compliance ITU-T G.991.2

E1 Interface

Line code HDB3/AMI
Data rate 64kbps to 2048kbps
Operation full or fractional
Impedance 120 ohms balanced / 75 ohms unbalanced
Framing structured with or without CRC-4 or unstructured
Timing internal, and G.703
Compliance ITU-T G.703, G.704, G.706, G.821, G.823, G.826, CTR12
Transmit level
• Pulse amplitude: Nominal 2.37V+10% for 75 ohm / Nominal 3.00V+10% for 120 ohm
• Zero amplitude: +0.1V
Transmit frequency tracking
• Internal timing :+/- 30ppm
• Loopback timing :+/- 50ppm
• External timing :+/- 100ppm
Jitter performance ITU-T G.823
Interface connections BNC for unbalanced, RJ-45 for balanced

Performance

• SHDSL PM : ES-crc, SES-crc, UAS, LOSW seconds
• E1 PM : ES, SES, UAS seconds
• Current 15-minute period and 96 previous 15-minute periods of SHDSL and E1 performance parameters

Diagnostic

E1 line loopback / Local SHDSL loopback / Remote SHDSL loopback / Remote payload loopback

Management

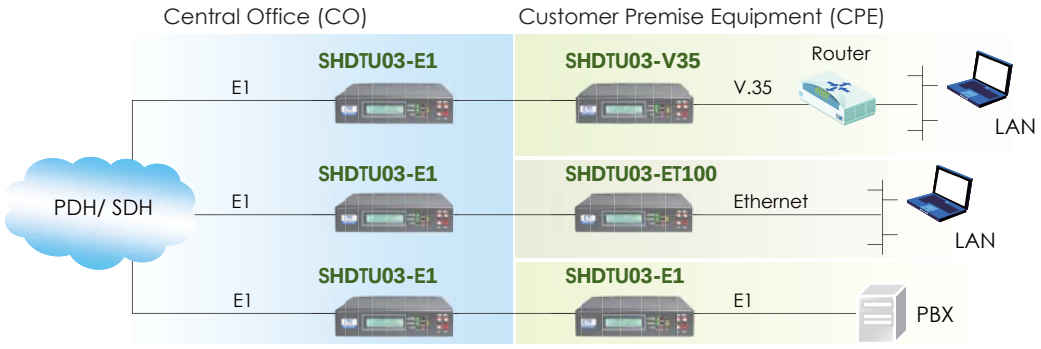
• Configuration with keypads and LCD display
• Console port (RJ-45, RS-232)
• Support firmware upgrade

Indications

LEDs (PWR, SHDSL, FE1, LOF, LOS, TEST, LOOP, ALARM, and FAR ALARM)

Power Input AC Input: 100~240VAC, DC Input: -36 ~ 72VDC
Power Consumption 10W
Dimensions 168 x 195 x 48mm (D x W x H)
Weight 0.85kg
Temperature 0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity 10 ~ 90% non-condensing
Certification CE, FCC, RoHS
MTBF 57,000 hrs

TDM-based, 2 wires, 2.3Mbps



Ordering Information

Model Name	Description
SHDTU03-E1-AD	2-wire E1 NTU with AC + DC Power

2-Wire G.SHDSL TDM V.35 NTU

SHDTU03-V35

The CTC SHDTU03 family of G.SHDSL TDM based modems is a telecom product for carriers or SME users. The SHDTU03-V35 offers a V.35 DTE interface which works over an SHDSL line. The V.35 interface provides high-speed TDM services by way of a DB25 I/F and adapter cable. The factory selected RS-530 interface will electrically support RS-530, X.21and RS-449 with appropriate adapter cable. The data rate of DB25 I/F may be up to 2.304Mbps with one pair copper wires. The SHDTU03-V35 can be configured and managed via LCD, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotely.

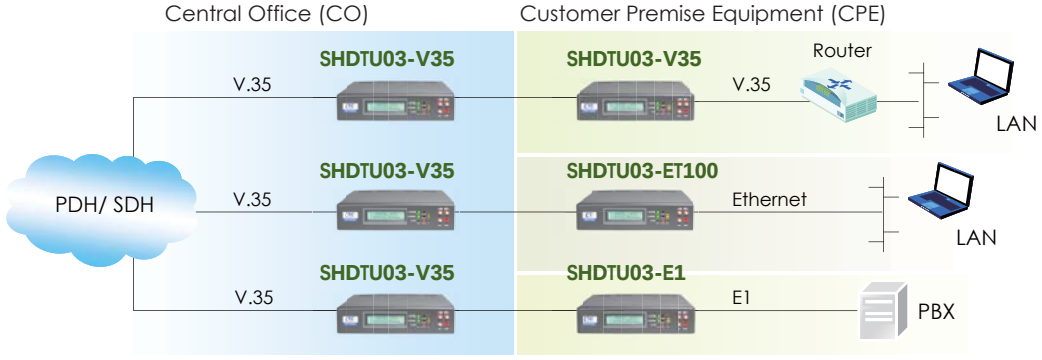
Features

- Supports Nx64 V.35, X.21, RS-530, and RS-449 over SHDSL
- Standard ITU G.991.2
- Fast and cost-effective services of TDM on a single or two wire pair of existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console menu
- Remote line loopback
- G.SHDSL Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Specifications

Ports	• Line code : 16 level Trellis Coded PAM
SHDSL Interface	• Line data rate : User selectable from 64kbps to 2.304Mbps • Support : ANSI (Annex A) and ETSI (Annex B) • Support wetting current : 4mA-20mA and alarm onfailure • Compliance: ITU-T G.991.2
Datacom Interface	• User selectable as : V.35, RS-449, RS-530, X.21 • Data Rate : 64kbps to 2304kbps • Connector : D25F (adapters available) • Timing : Internal, External, and Recovery
Performance	• SHDSL PM : ES-crc, SES-crc, UAS, LOSW seconds
Diagnostic	• Local SHDSL loopback / Remote SHDSL loopback / Remote payload loopback
Management	• Configuration with keypads and LCD display • Console port (RJ45 , RS232) • Support firmware upgrade
LEDs	• PWR, SHDSL, TD, RD, CTS, TEST, LOOP, ALARM, and FAR ALARM , and FAR ALARM
Power	AC Input: 100~240V DC Input: -36 ~ 72V
Power Consumption	10W
Dimensions	168 x 195 x 48mm (D x W x H)
Weight	0.85kg
Temperature	0 ~ 50°C (Operating), 0 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

TDM-based, 2 wires, 2.3Mbps



Ordering Information

Model Name	Type	Description
SHDTU03-V35-AD	V.35	V.35 NTU with AC + DC Power with 1 x V.35 Cable
SHDTU03-530-AD	RS-530	RS-530 NTU with AC + DC Power with 1 x RS-530 Cable
SHDTU03-449-AD	RS-449	RS-449 NTU with AC + DC Power with 1 x RS-449 Cable
SHDTU03-X21-AD	X.21	X.21 NTU with AC + DC Power with 1 x V.21 Cable

Interface Power Type

SHDTU03 – □□□ – □□

Example: SHDTU03 – V35 – AD

2-Wire G.SHDSL TDM Ethernet Bridge NTU

SHDTU03-ET100

The CTC SHDTU03 family of G.SHDSL TDM based modems is a telecom product for carriers or SME users. The SHDTU03-ET100 offers a 10/100Base-TX interface which works over an SHDSL line. The Ethernet interface provides Ethernet over TDM services by way of a HDLC encapsulation and RJ-45 connector. The data rate of Ethernet I/F may be up to 2.304Mbps with one pair copper wires. The SHDTU03-ET100 can be configured and managed via LCD, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotely.

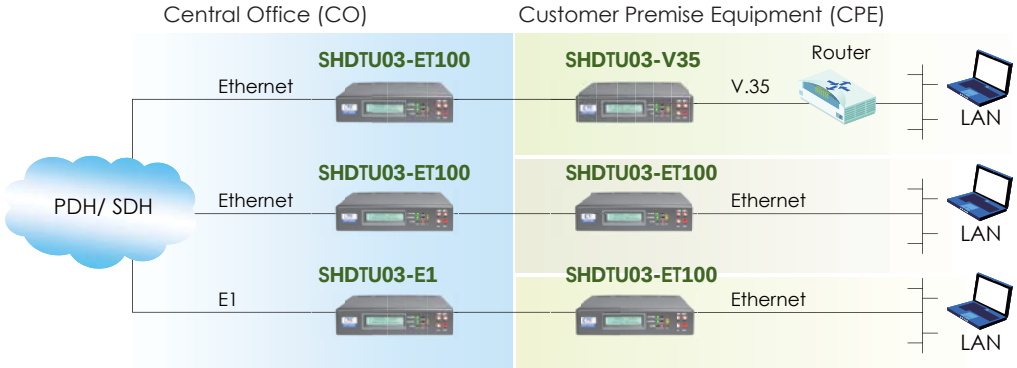
Features

- Supports 10Base-T and 100Base-TX over SHDSL
- Standard ITU G.991.2
- Fast and cost-effective services of data on a single or two wire pair of existing copper loop infrastructure
- Wetting current to protect copper line (optional)
- Local management interface with console menu
- Remote line loopback
- G.SHDSL Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Specifications

Ports	• Line code : 16 level Trellis Coded PAM
SHDSL Interface	• Line data rate : User selectable from 64kbps to 2.304Mbps • Support : ANSI (Annex A) and ETSI (Annex B) • Support wetting current : 4mA-20mA and alarm onfailure • Compliance: ITU-T G.991.2
Ethernet Interface	• Supports 10/100Base-T auto sensing half/full duplex • Complied with IEEE 802.3/IEEE 802.3u • Operates as a self-learning bridge in transparent mode • Supports up to 128 MAC learning addresses
Performance	• SHDSL PM : ES-crc, SES-crc, UAS, LOSW seconds
Management	• Configuration with keypads and LCD display • Console port (RJ45 , RS232) • Support firmware upgrade
LEDs	• Ethernet : PWR, SHDSL, 10M/ACT, 100M/ACT, COL, TEST, LOOP, ALARM, and FAR ALARM
Power	AC Input : 100~240V DC Input : -36 ~ 72V
Power Consumption	< 10W
Dimensions	168 x 195 x 48mm (D x W x H)
Weight	0.85kg
Temperature	0 ~ 50°C (Operating), 0 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hours

TDM-based, 2 wires, 2.3Mbps



Ordering Information

Model Name	Description
SHDTU03-ET100-AD	2w Ethernet 10/100Base-TX NTU with AC + DC Power

2-Wire G.SHDSL TDM (E1, V.35, LAN) NTU

SHDTU03-31

The CTC SHDTU03 family of G.SHDSL TDM based modem is a telecom product for carriers or SME users. In one device, the SHDTU03-31 offers three DTE I/Fs (E1, V.35, and Ethernet), which can work simultaneously to share DSL bandwidth. The user-configurable interfaces provide flexible application for various connections. The modem supports two different connectors for G.703 E1 application (balanced 120 Ohm RJ45 or unbalanced 75 Ohm dual BNCs) at bit rates from 64kbps to 2.048Mbps. The V.35 interface provides high-speed TDM services by way of a DB25 I/F and adapter cable. The factory selected RS-530 interface will electrically support RS-530, X.21and RS-449 with appropriate adapter cable. The data rate of DB25 I/F may be up to 2.3Mbps within one pair copper wires. The modem provides 10/100Mbps auto-negotiated Fast Ethernet via an RJ45 LAN connector, which offers customer premise high-speed LAN over TDM services. The SHDTU03-31 can be configured and managed via LCD, or menu-driven VT100 compatible Async. terminal Interface, either locally or remotely.

Features

- 3-in-1 G.SHDSL modem
- Supports E1, fractional E1, Nx64 V.35, X.21, RS-530, RS-449 and Ethernet over SHDSL
- Standard ITU G.991.2 (2004) supports improved reach, speed and interoperability compared to conventional G.SHDSL
- Fast and cost-effective services of voice, TDM and data on a single wire pair of existing copper loop infrastructure
- Local management interface with console
- Remote line loopback
- E1 performance monitoring and alarm buffer
- G.SHDSL Line performance monitoring (data rate and SNR)
- Raw and per time interval statistics

Specifications

WAN Interface
Line Rate ITU G.991.2 (2004)
Coding Trellis Coded Pulse Amplitude Modulation (TC-PAM16)
Support Annex A ,B
Payload rates 64Kps to 2.304Mbps for 2-wire model

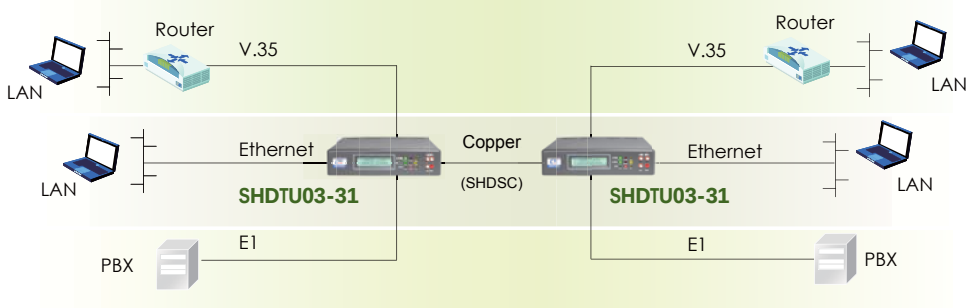
Connection RJ-45 jack (2-wire)
Impedance 135 ohms

G.703 Interface
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 64Kbps to 2.048Mbps (Nx64Kbps , N=1 to 32)
Operation Full E1 and Fractional E1

Data Interface
- Payload rates: Up to 2.3Mbps(for 2-wire model)
- Support V.35/RS-530 or V.36/X.21

LAN Interface
- Single Ethernet Interface
- 10/100Mpbs Half/Full Duplex, Auto-sensing, Auto-Crossover
- Up to 1024 MAC address learning

Indications LEDs (Power, Alarm, Test, SYNC, Error, LBK, E1, Data, Eth)
DSL Timing
• Internal • From E1 Recovery (as E1) • From DTE (as V.35)
Performance Monitoring ES, SES, UAS, LOWS, Alarms and Errors
Loopback Tests (E1 and V.35 interface only)
• Local Digital Loopback • Local Loopback
• Remote Line Loopback • Remote Payload Loopback
• Far-end Line Loopback • Far-end Payload Loopback
• V.54 Loopback (for V.35 interface) • Build-in 2047(211-1) bit BER tester
Management
• Configuration with keypads and LCD display
• Console port (RJ-45)
Power Input
100~240VAC, DC Input: -36 ~ 72VDC
Power Consumption < 10W
Dimensions 168 x 195 x 48mm (D x W x H)
Weight 0.88kg
Temperature 0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity 10 ~ 90% non-condensing
Certification CE, FCC, RoHS
MTBF 70,000 hrs



Ordering Information

Model Name	Description
SHDTU03-31-AD	2-wire E1/V.35/LAN multi-interface NTU with AC+DC Power

G.SHDSL ATM Ethernet Router Concentrator

SHRM03 ATM

The SHRM03 ATM based chassis is a 4U 19(23)" 13 slot card rack that allows customers to concentrate their G.SHDSL ATM based bridge/router Ethernet lines into a central location with hot swappable capabilities and redundant power supplies. The SHRM03 ATM line card is equipped with two independent channels that support adaptive auto-rate, Annex A or Annex B, bridging or routing, and embedded SNMP, Telnet and Web interface for de-centralized provisioning and management. This rack is 100% compatible with our SHDTU03/ET10R and ET10RS standalone 2.3M stand-alone modems.

Features

- 4U 19(23)" 13 slot chassis (Non-managed)
- Interface Cards for Ethernet (Router & Bridge)
- Up to 26 ports per chassis (2 ports per card)
- Hot swappable
- Adaptive rate feature maximizes data rate based on loop conditions
- All interface connectors on the rear panel

Specifications

Ports :

LAN Interface

• 10Base-T /100 Base-TX auto-negotiation • Auto-MDIX

Hardware Interface

• WAN: RJ-45 • Console port: RS232
• LAN: RJ-45 • RST: Reset button for factory default

WAN Interface

• SHDSL: ITU-T G.991.2 2004(Annex A/B/F/G)
• Encoding scheme: TC-PAM16, TC-PAM32
• Data Rate: N x 64Kbps (N=3~89)
• Impedance: 135 ohms

ATM :

• Up to 8 PVCs • OAM F4/F5 loopback test • AAL5

ATM QoS :

• UBR (Unspecified Bit Rate)
• CBR (Constant Bit Rate)
• VBR-rt (Variable Bit Rate Real Time)
• VBR-nrt (Variable Bit Rate Non-real Time)

AAL5 Encapsulation :

• VC multiplexing and SNAP/LLC • Classical IP over ATM (RFC 1577)
• PPP over ATM (RFC 2364) • Ethernet over ATM (RFC 2684/1483)

PPP :

• PPP over Ethernet for fixed and dynamic IP (RFC 2516)
• PPP over ATM for fixed and dynamic IP (RFC 2364)
• User authentication with PAP/CHAP/MS-CHAP

Routing :

• Support IP/TCP/UDP/ARP/ICMP/IGMP protocols
• IP routing with static routing and RIPv1/RIPv2 (RFC1058/2453)
• IP multicast and IGMP proxy (RFC1112/2236)
• Network address translation (NAT/PAT) (RFC1631)
• NAT ALGs for ICQ/Netmeeting/MSN/Yahoo Messenger
• DNS relay and caching (RFC1034/1035)
• DHCP server, client and relay (RFC2131/2132)

Bridging :

• IEEE 802.1D Transparent Bridging
• IEEE 802.1q VLAN • Port-based VLAN

Security :

• DMZ host/Multi-DMZ/Multi-NAT function
• Virtual server mapping (RFC1631)
• VPN pass-through for PPTP/L2TP/IPSec tunneling
• Natural NAT firewall
• Advanced stateful packet inspection (SPI) firewall
• Denial of service protection
• User access control; deny certain PCs access to internet services

Management : (on card)

• Easy-to-use web-based GUI for quick setup, configuration and management
• Menu-driven interface/Command-line interface (CLI) for local console and Telnet access
• Password protected management and access control list for administration
• SNMP management with SNMPv1/ SNMPv2c (RFC1157/1901/1905) agent and MIB II (RFC1213/1493)
• Software upgrade via web-browser/TFTP server

LEDs : • General: PWR • SHDSL: ALM
• WAN: LNK, ACT LAN: Link, ACT (ET10R)

Power : DC: -36V to -72V, 6A AC: 90V to 230V, 2A

Power Consumption : Total 200W Max
Interface Line Card: 12W maximum
Management Control Card: 5W maximum

Dimensions (D x W x H)mm :
Chassis: 285 x 440 x 180mm Line card: 280 x 25 x 260mm

Weight : 6.5kg

Temperature : 0 ~ 50°C (Operating), 0 ~ 70°C (Storage)

Humidity : 10 ~ 90% non-condensing

Certification : CE, FCC, RoHS

MTBF : 57,000 hours

Ordering Information

Model Name	Type	Description
SHRM03-AA-CH	Chassis	4U, 19" 13-Slot Chassis with One Dual AC/DC Power Moduel
SHRM03-DD-CH	Chassis	4U, 19" 13-Slot Chassis with One Dual DC Power Moduel
SHRM03-AD-CH	Chassis	4U, 19" 13-Slot Chassis with One Dual AC Power Moduel
SHRM03-FAN	FAN	Chasssis Cooling Fan Tray
SHRM03-AC	Power	AC 110V/AC 220V Power Module
SHRM03-ET100R/2A	Card	2Ch / 2-wires G.SHDSL to 10/100Base-FX ATM Router card

Power Type Chassis
SHRM03 – □□ – □□
Example: SHRM03 – AA – CH

Power Type
SHRM03 – □□
Example: SHRM03 – AC

Fan
SHRM03 – □□□
Example: SHRM03 – FAN

Card Type
SHRM03 – □□□□□□
Example: SHRM03 – ET100R/2A

G.SHDSL ATM Ethernet Slide-in Card

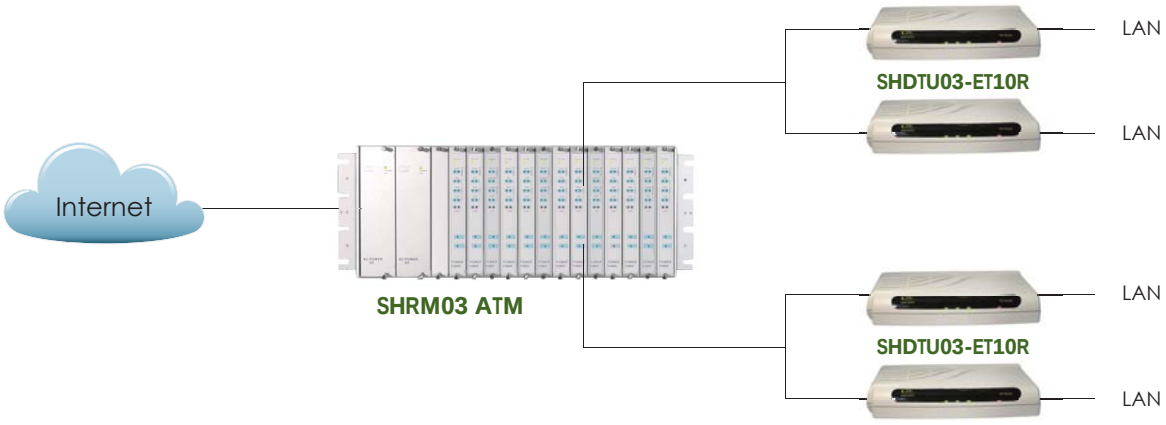
SHRM03-ET100R

The SHRM03-ET100R Blade is a Single-Line High Speed Digital Subscriber Line 2-wire bridge/router which complies with G.991.2 and G.994.1 standards. The SHRM03-ET100R provides business-class, multi-rate 64Kbps to 2.304Mbps payload rates over existing single pair or two pairs copper wire. The SHRM03-ET100R is designed not only to optimize the service bit rate from central office to customer premises but also integrates high-end Bridging/ Routing capabilities with advanced functions such as Multi-DMZ, virtual server mapping and VPN pass-through. Easy configuration and monitoring can be accomplished by using any browser. The SHRM03-ET100R card provides two independent channels and can be configured in either central or client mode providing a point-to-point solution in a rack concentrator. The SHDSL router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs.

Features

- Supports Ethernet over ATM over SHDSL
- Full ATM protocol stack implementation over G.SHDSL
- Adaptive rate installation maximizes data rate based on loop conditions
- Standard ITU G.991.2
- Supports point-to-point configurations
- Data rate 2 wire up to 2.3Mbps
- Local management interface via console port & menu
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II
- 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
- SHDSL Line performance monitoring
- Raw and time stamped statistics
- Supports firmware upgrade via web interface

ATM-based 2 Wires, 2 channels per card



Ordering Information

Model Name	Description
SHRM03-ET100R	2 Ch / 2W Ethernet 10/100Base-TX ATM Router Card

2/4 - Wire G.SHDSL ATM Ethernet Bridge/Router

SHDTU03-ET10R(S)

The SHDTU03 ATM modem family is a Single-Line High Speed Digital Subscriber Line 2-wire/ 4-wire bridge/router which complies with G.991.2 and G.994.1 standards. The SHDTU03 family provides business-class, multi-rate 192Kbps to 2.304/4.608Mbps payload rates over existing single pair or two pairs copper wire. The SHDTU03 is designed not only to optimize the service bit rate from central office to customer premises but also integrates high-end Bridging/ Routing capabilities with advanced functions such as Multi-DMZ, virtual server mapping and VPN pass-through. Easy configuration and monitoring can be accomplished by using any browser. The SHDTU03 can be configured in either central or client mode providing a point-to-point solution. The SHDSL router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs.

Features

- Supports Ethernet over ATM over SHDSL
- Full ATM protocol stack implementation over G.SHDSL
- Adaptive rate installation maximizes data rate based on loop conditions
- Standard ITU G.991.2
- Supports point-to-point configurations
- Data rate 2 wire up to 2.3Mbps
- Local management interface via console port
- Intuitive Web based management
- SNMP management with SNMPv1/v2 and MIB II
- Efficient IP routing and transparent learning bridge to support broadband Internet services
- VPN pass-through for safeguarded connections
- Build-in advanced SPI firewall (Firewall routers) (option)
- 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
- SHDSL Line performance monitoring
- Raw and time stamped statistics
- Supports firmware upgrade via web interface

Specifications

Ports

LAN Interface :

• 10Base-T /100 Base-TX auto-negotiation • Auto-MDIX

Hardware Interface :

• WAN: RJ-45 • Console port: RS232
• LAN: RJ-45 • RST: Reset button for factory default

WAN Interface :

• SHDSL: ITU-T G.991.2(Annex A/B)
• Encoding scheme: TC-PAM16, TC-PAM32
• Data Rate: N x 64Kbps (N=3~89)
• Impedance: 135 ohms

ATM :

• Up to 8 PVCs • OAM F4/F5 loopback test • AAL5

ATM QoS :

• UBR (Unspecified Bit Rate) • VBR-rt (Variable Bit Rate Real Time)
• CBR (Constant Bit Rate) • VBR-nrt (Variable Bit Rate Non-real Time)

AAL5 Encapsulation :

• VC multiplexing and SNAP/LLC
• Ethernet over ATM (RFC 2684/1483)
• PPP over ATM (RFC 2364)
• Classical IP over ATM (RFC 1577)

PPP :

• PPP over Ethernet for fixed and dynamic IP (RFC 2516)
• PPP over ATM for fixed and dynamic IP (RFC 2364)
• User authentication with PAP/CHAP/MS-CHAP

Routing :

• Support IP/TCP/UDP/ARP/ICMP/IGMP protocols
• IP routing with static routing and RIPv1/RIPv2 (RFC1058/2453)
• IP multicast and IGMP proxy (RFC1112/2236)
• Network address translation (NAT/PAT) (RFC1631)
• NAT ALGs for ICQ/Netmeeting/MSN/Yahoo Messenger
• DNS relay and caching (RFC1034/1035)
• DHCP server, client and relay (RFC2131/2132)

Bridging :

• IEEE 802.1D Transparent Bridging • IEEE 802.1q VLAN • Port-based VLAN

Security :

• DMZ host/Multi-DMZ/Multi-NAT function
• Virtual server mapping (RFC1631)
• VPN pass-through for PPTP/L2TP/IPSec tunneling
• Natural NAT firewall
• Advanced stateful packet inspection (SPI) firewall
• Denial of service protection
• User access control; deny certain PCs access to internet services

Management :

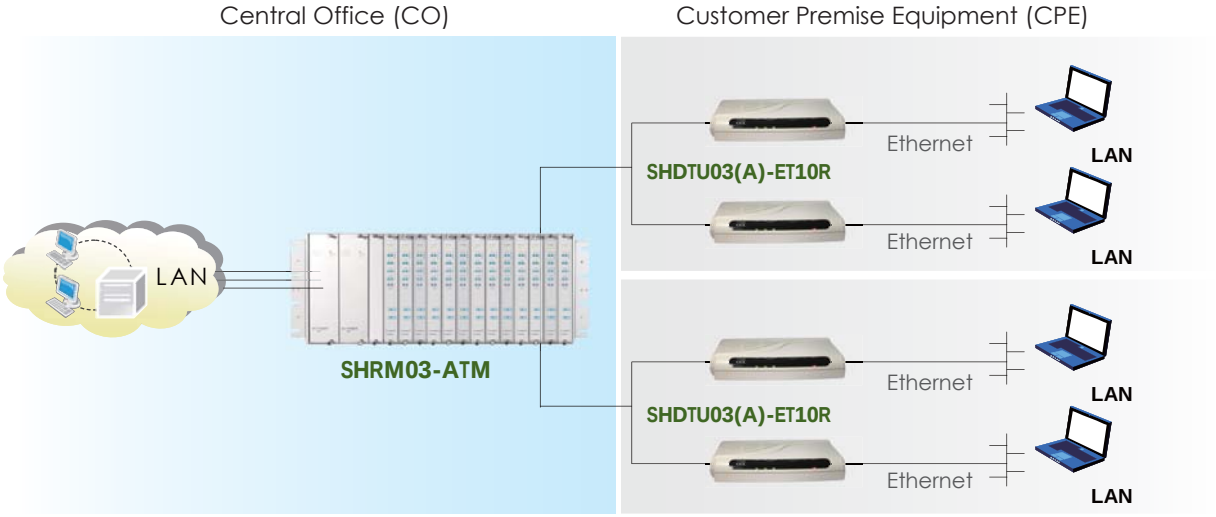
• Easy-to-use web-based GUI for quick setup, configuration and management
• Menu-driven interface/Command-line interface (CLI) for local console and Telnet access
• Password protected management and access control list for administration
• SNMP management with SNMPv1/SNMPv2c (RFC1157/1901/1905) agent and MIB II (RFC1213/1493)
• Software upgrade via web-browser/TFTP server

LEDs :

• General: PWR • WAN: LNK, ACT • SHDSL: ALM
• LAN: 1, 2, 3, 4 (ET10RS) LAN: Link, ACT (ET10R)

Power : DC 9V in
Power Consumption : 9W
Dimensions (D x W x H)mm :145 x 187 x 33mm
Weight : 0.4kg
Temperature : 0 ~ 50°C (Operating), 0 ~ 70°C (Storage)
Humidity : 10 ~ 90% non-condensing
Certification : CE, FCC, RoHS
MTBF : 57,000 hours

ATM Based, 2Wires, 2.3Mbps



	SHDTU03-ET10R	SHDTU03F-ET10R	SHDTU03-ET10RS	SHDTU03F-ET10RS	SHDTU03A-ET10RS	SHDTU03AF-ET10RS
WAN	2-wire	2-wire	2-wire	2-wire	4-wire	4-wire
LAN	1	1	4	4	4	4
Auto-MDIX	Yes	Yes	Yes	Yes	Yes	Yes
Port-based VLAN	None	None	Yes	Yes	Yes	Yes
802.1q VLAN	1LAN / 1WAN	1LAN / 1WAN	4LAN / 1WAN	4LAN / 8WAN	4LAN / 1WAN	4LAN / 8WAN
Firewall	No	Yes	No	Yes	No	Yes
Maximum data rate	2.3Mbps	2.3Mbps	2.3Mbps	2.3Mbps	4.6Mbps	4.6Mbps
Minimum data rate	64Kbps	64Kbps	64Kbps	64Kbps	128Kbps	128Kbps

Ordering Information

Model Name	Description
SHDTU03F-ET10R	1-Port 10/100Base-TX ATM Router w/firewall
SHDTU03F-ET10RS	4-Port 10/100Base TX ATM Router w/firewall
SHDTU03AF-ET10RS	4-Port 10/100Base-TX ATM Router w/firewall

Note: SHDTU03-ET10RS: 2-wire (2.3Mbps) G.SHDSL ATM Ethernet Bridge / Router
SHDTU03A-ET10RS: 4-wire (4.6Mbps) G.SHDSL ATM Ethernet Bridge / Router

SHDTU03F – □□□□□
Example: SHDTU03F – ET10R

G.SHDSL.bis Router / NTU Performance

4 wires Rate (kbps)	2 wires Rate (kbps)	N	AWG#26 (0.4mm)	AWG#26 (0.4mm)	AWG#24 (0.5mm)	AWG#24 (0.5mm)	AWG#22 (0.9mm)	AWG#22 (0.9mm)
			kft	km	kft	km	kft	km
384	192	3	24	7.3	30	9.1	54	16.5
512	256	4	23	7	28.5	8.6	51.5	15.7
1024	512	8	19.5	5.9	24	7.3	43.5	13.3
1920	960	15	17	5.2	21	6.4	38	11.6
2176	1088	17	16.5	5	20.5	6.2	37	11.3
2560	1280	20	16	4.9	20	6.1	36	11
3584	1792	28	14	4.3	17.5	5.3	31.5	9.6
3840	1920	30	14	4.3	17.5	5.3	31.5	9.6
4352	2176	34	13.5	4.1	16.5	5	30	9.1
4608	2304	36	13	4	16	4.8	29	8.8
5120	2560	40	12.5	3.8	15.5	4.7	28.0	8.5
5632	2816	44	12.5	3.8	15.5	4.7	28.0	8.5
6400	3200	50	12	3.7	15	4.5	27	8.2
6912	3456	54	11	3.4	13.5	4.1	24.5	7.5
7424	3712	58	11	3.4	13.5	4.1	24.5	7.5
7680	3840	60	10.5	3.2	13	3.9	23.5	7.2
7936	3968	62	10.5	3.2	13	3.9	23.5	7.2
8448	4224	66	10	3	12.5	3.8	22.5	6.9
8960	4480	70	10	3	12.5	3.8	22.5	6.9
9472	4736	74	9.5	2.9	11.5	3.5	21	6.4
10240	5120	80	9.5	2.9	11.5	3.5	21	6.4
11136	5568	87	8.5	2.6	10.5	3.2	19	5.8
11392	5696	89	8.5	2.6	10.5	3.2	19	5.8

2.3Mbps G.SHDSL Router / NTU Performance

Line Speed kbps	AWG#26 (0.4mm)	AWG#24 (0.5mm)	AWG#22 (0.9mm)
64	9.7	12.8	16.0
128	8.1	10.6	13.2
192	6.9	9.1	11.4
256	6.7	8.7	11.0
320	6.7	8.7	11.0
384	6.5	8.5	10.5
448	6.4	8.4	10.5
512	6.2	8.1	10.1
576	6.1	8.0	10.0
640	5.9	7.8	9.7
704	5.8	7.7	9.6
768	4.8	6.3	7.9
832	5.5	7.2	9.0
896	5.3	6.9	8.7
960	4.9	6.5	8.1
1024	5.1	6.7	8.5
1088	5.0	6.6	8.3
1152	4.8	6.3	7.9
1216	4.8	6.3	7.9
1280	4.3	5.6	7.0
1344	4.1	5.4	6.7
1408	4.4	5.8	7.2
1472	4.4	5.8	7.2
1536	4.3	5.6	6.9
1600	4.4	5.8	7.2
1664	4.4	5.8	7.2
1728	4.2	5.4	6.8
1792	4.2	5.4	6.8
1856	4.1	5.4	6.7
1920	4.1	5.4	6.7
1984	4.0	5.2	6.5
2048	3.6	4.2	5.5
2304	3.3	3.9	4.8

Superior Design with Real-Time Monitor and Control

EMS Element Management Software

GUI Graphic User Interface

CTC Union Smart View
Element Management System

EMS

The objective of EMS is to provide four major functions for telecommunication operators:

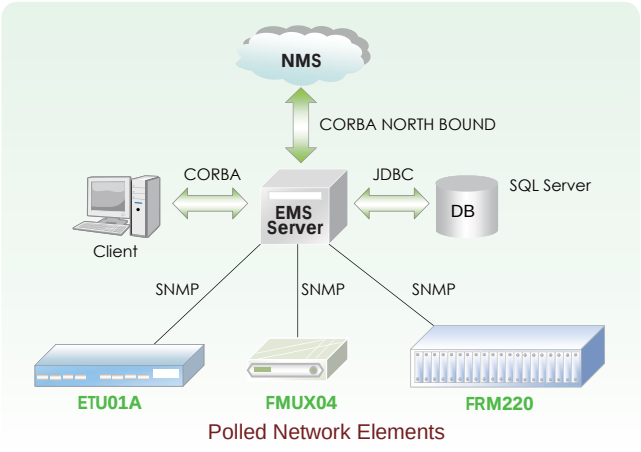
• Fault Management (FM) • Performance Management (PM) • Configuration Management (CM) • Security Management (SM)

The EMS Server is designed to provide all the configuration and maintenance functions for the communication device. The method to access EMS Server functions is via CORBA protocol according OMG CORBA Specification. When a user loads EMS Client software and sets up a link to the EMS Server, it will be possible to monitor and control all network devices via CORBA actions. EMS Server uses SNMP Protocol to monitor and control the network devices via SET GET and TRAP SNMP actions.

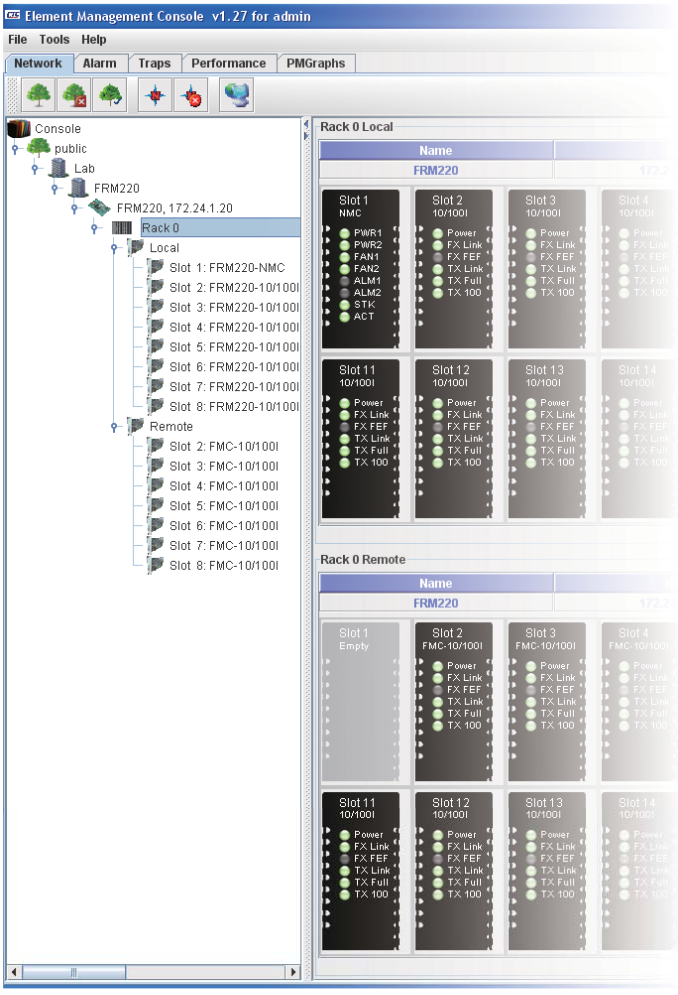
The major tasks include:

1. Collect configuration information from SNMP Agents via SNMP protocol and send to them control commands to change their state.
2. Guarantee storage of all information in external database server
3. Transfer control and configuration data to and from client SW via CORBA
4. Organize and maintain control objects in database and client configuration constructions, which describe system.
5. Provide role access to mentioned above objects

Network Scheme Diagram



Polled Network Elements



Agents

By utilizing a modular design, a large variety of configurations may be realized and the unit may be custom tailored for each specific application.

CORBA Server

CORBA Name Service provides the ORB (Object Request Broker) central component of CORBA. It encompasses the entire communication infrastructure necessary to identify and locate objects, handle connection management, deliver data and is responsible for communication of requests.

EMS server

EMS Server collects the information data from the specific SNMP agents and keeps updating it to the SQL server via the JDBC (Java DataBase Connectivity) driver.

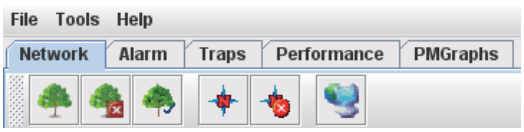
SQL Server

SQL Server is the place where the EMS collected data is stored, The database will store Alarm Trap and all informations.
CTC Union's EMS is compatible with MS-SQL 2000, 2005 and MS-SQL 2005 Express.

Workstation-Clients

Workstations act as clients in the CORBA architecture. They provide the JAVA applet GUI to monitor and control the agents at far end. They also receive the Alarm Traps from the corresponding SNMP AGENTS. Multiple workstations are allowed in this field.

Configure Command Tool Bar



Features

JAVA based
EMS is pure JAVA project and collects all benefits of this technology including multi platform support, module design, and client-server architecture.

Event driven
Using events as primary objects for communication minimizes network loading, increases performance and allows including a given quantity of network devices with predictable CPU and RAM loading, depending on this quantity.

Open architecture
Provides API and IDL files for integration with upper layer NMS systems.

Database support
Support for Microsoft SQL Server 2000,2005&2005 Express
Flexible SQL interface design for server and client optimization by customer.

Data integrity
All data is located in the same place. User profiles are stored to and loaded from one source. User created objects are stored and loaded remotely and/or locally. There are well-defined procedures for backup and restore configuration, topology, alarm and user data.

Standard SNMP and CORBA
support design has no assumption to any CORBA vendor. Tested with different Object Request Brokers.

Installation Screen

Available models

- FRM220
- ETU01A,
- FMUX01A,
- FMUX01A/Plus,
- FMUX04,
- SML2000/5000

Requirements

EMS	Hardware	Software	Operating System
EMS Server	P4 1.6G or higher, 512MB RAM, HD >2GB (free)	JAVA JRE. EMS Kit, ODBC Driver	Windows, Linux, BSD
SQL database Server	P4 1.6G or higher, 512MB RAM, HD >2GB (free)	MS-SQL Server 7.0 (or MS-SQL 2000) EMS Kit.	Windows 2000 Pro or Server, Windows 2003 Server, Windows XP, Vista
CORBA Server	PIII 800 or higher, 128MB RAM, HD >1GB (free)	JAVA JRE. EMS Kit	Windows, Linux,
Workstation-Clients	PIII 800 or higher, 128MB RAM, HD >1GB	JAVA JRE. EMS Kit	Windows, Linux,
All-In-One	P4 2.8G or higher, 1GB RAM, HD >10GB (free)	JAVA JRE, EMS kit, MS-SQL Server, ODBC Driver	Windows 2000 Pro or Server, Windows 2003 Server, Windows XP, Vista

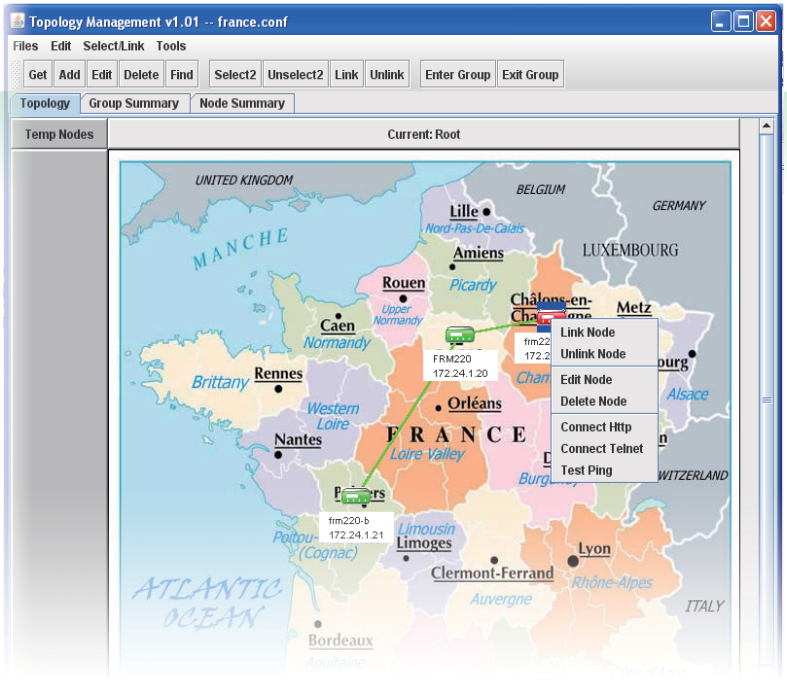
Ordering Information

Model Name	Type	Description
SV-PLF-05	Smart View Platform server	Platform server with 5 client user admission
SV-PLF-25	Smart View Platform server	Platform server with 25 client user admission
SV-PLF-50	Smart View Platform server	Platform server with 50 client user admission
SV-AGT-50	Smart View Device Agents	50 device agents
SV-AGT-100	Smart View Device Agents	100 device agents
SV-AGT-200	Smart View Device Agents	200 device agents
SV-AGT-500	Smart View Device Agents	500 device agents
SV-FOM	Managed Modules	FMUX04, FMUX01A, FMUX01A/Plus managed modules
SV-PDH	Managed Modules	ETU01A managed module; ERM01
SV-Fiber	Managed Modules	FRM220, FRM220A
SV-CWDM	Managed Modules	Sigma Links 5000/2000 managed module

SV – □□□ – □□□
Example: SV – AGT – 100

CTC Union Smart View
Element Management System

EMS Management Functions



Topology

Getting Topology Map node

User can load maps to SQL server, load maps from SQL server or delete attached maps. Download procedure is very simple.

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. Right clicking an object brings a popup window to select Telnet or Http management directly.

Fig. 1: Topology Manager ready to Get Agents

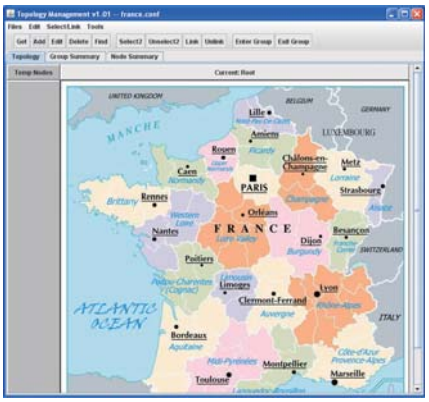
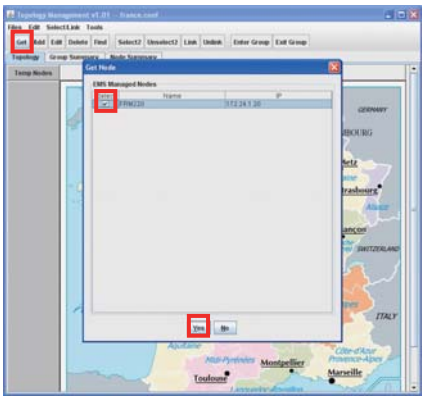
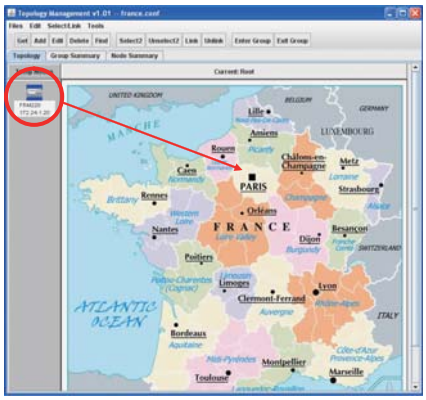


Fig. 2: Topology Manager Get Agents



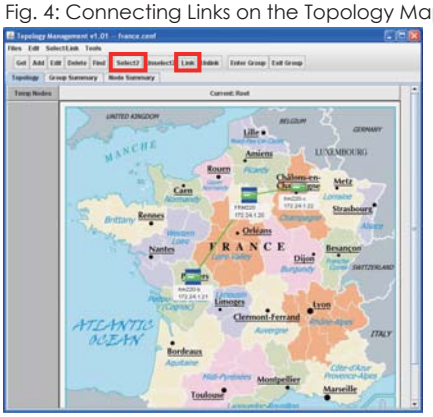
Select all of the nodes you want to include in this map from the 'Topology Management' main window.

Fig.3: Drag Agents into the Topology Map



Drag and Drop Agents

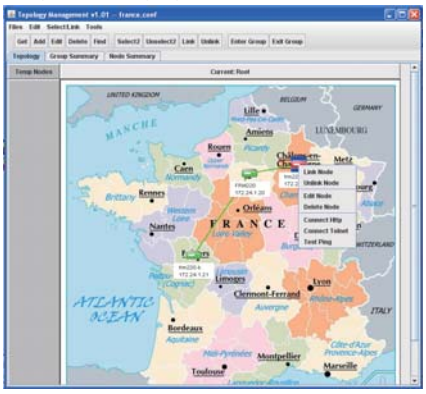
Fig. 4: Connecting Links on the Topology Map



To link two agents together

- First select one of the agents.
- Next click the"Select2" function button.
- Then click on the second Agent.
- When both are highlighted in Blue,
- Click the "Link" function button.

Fig. 5: Managing Alarms



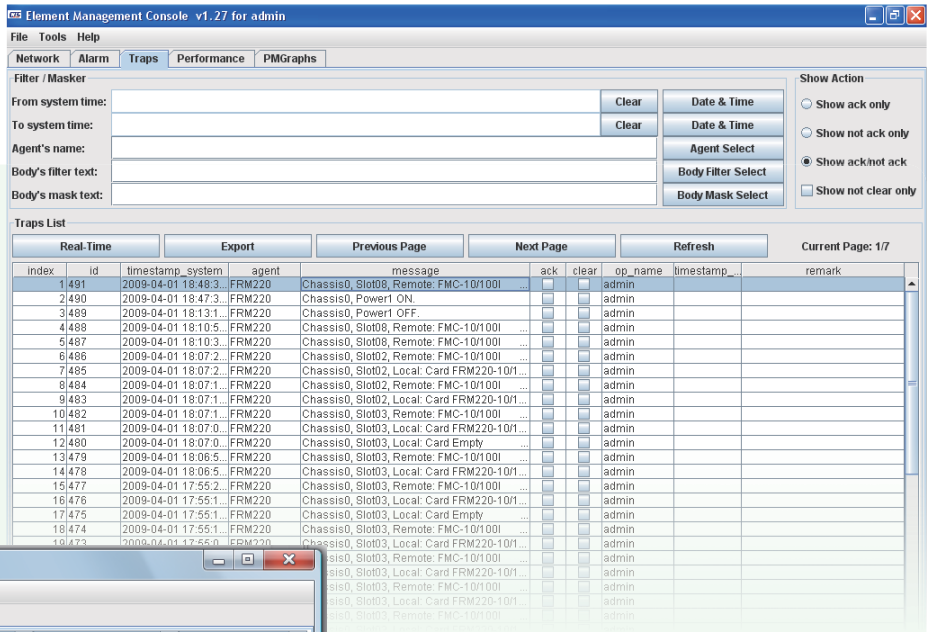
Troubleshooting Alarms

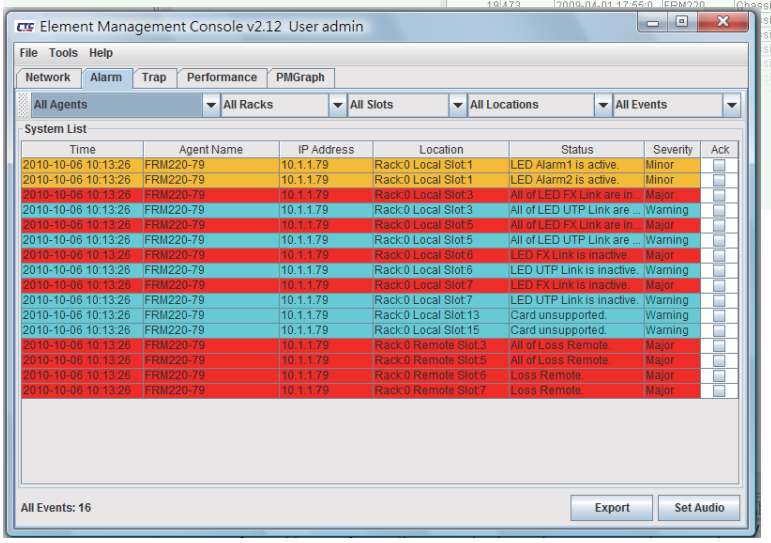
If any Agent experiences an alarm condition, the agent's icon color will change from "Green" to "Red". Use the mouse and 'Right-click' the Agent's icon. The pull-down menu will appear as the Figure5.

Fault Management

Trap List

All alarm traps will be stored in SQL database. In Traps page, press "Auto Refresh" button to get the current alarm trap records in database, and it will update status automatically. Press "Pause" button to halt the screen, then, operator can make "ack" or "clear" action. Press "refresh and save file" to get the current alarm trap records in database and save to "TrapList.txt" file in disk.





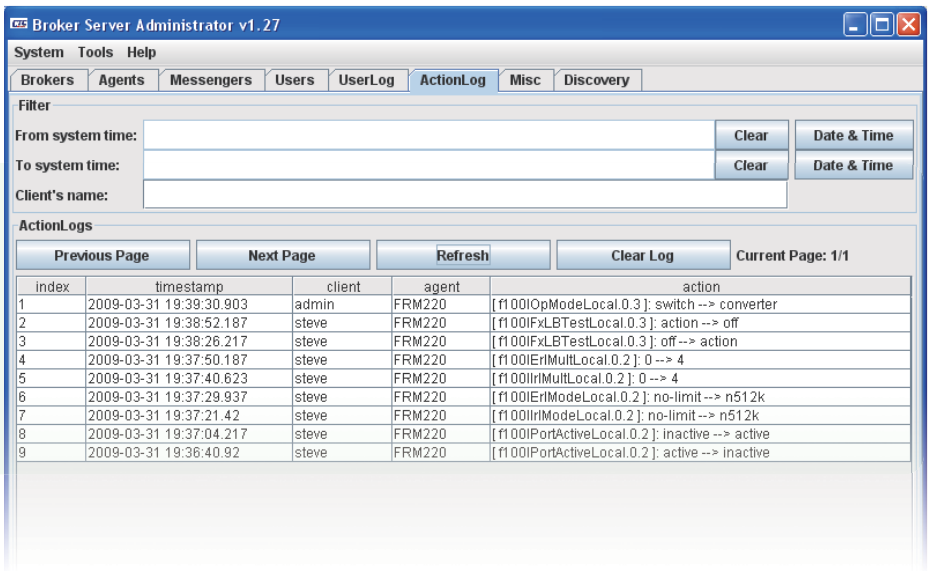
Active Alarm List

On the System tab, you can view all Active Alarm Lists. Three kinds of filters can be applied to alarm list. User may select one agents, local or remote rack, and specific status as filters to watch active alarms. The status filter can be categorize Major, Minor, Warning, and all statuses label or network element location name may be added to object .

Security

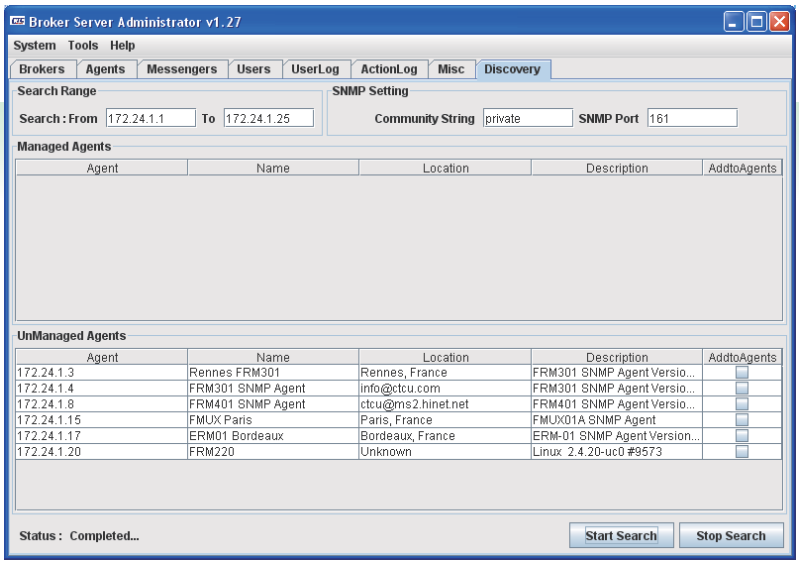
Activity Log

All activities performed on any Network Element are logged with time-stamping, the user making changes and the changes made.



CTC Union Smart View
Element Management System

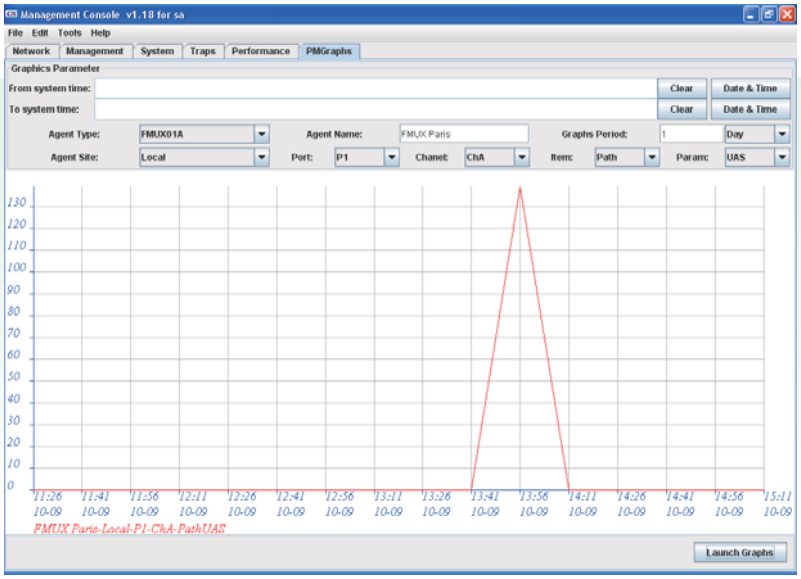
EMS Management Functions



Management & Alerts

Network Element Discovery

The EMS 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.

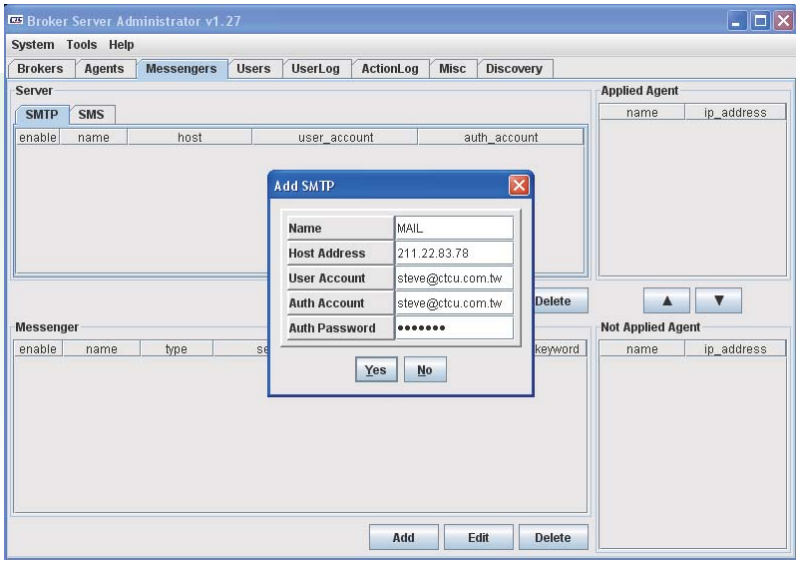


Performance Monitoring

Device performance is plotted over time using standard PM data such as ES, UAS, etc. PM data is typically only available for PDH devices such as the ETU01A and ERM01.

Alarms sent by E-mail & SMS

The EMS 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 fixed in the shortest time possible.



Management System - Graphical User Interface

FRM220-NMC

The Web GUI of FRM220-NMC behaves just like any other web based application. The following graphic (Figure 3.1) shows all of the areas that may be clicked for further configuration. Slots without any line card or without manageable line card will be shown as 'Empty'.

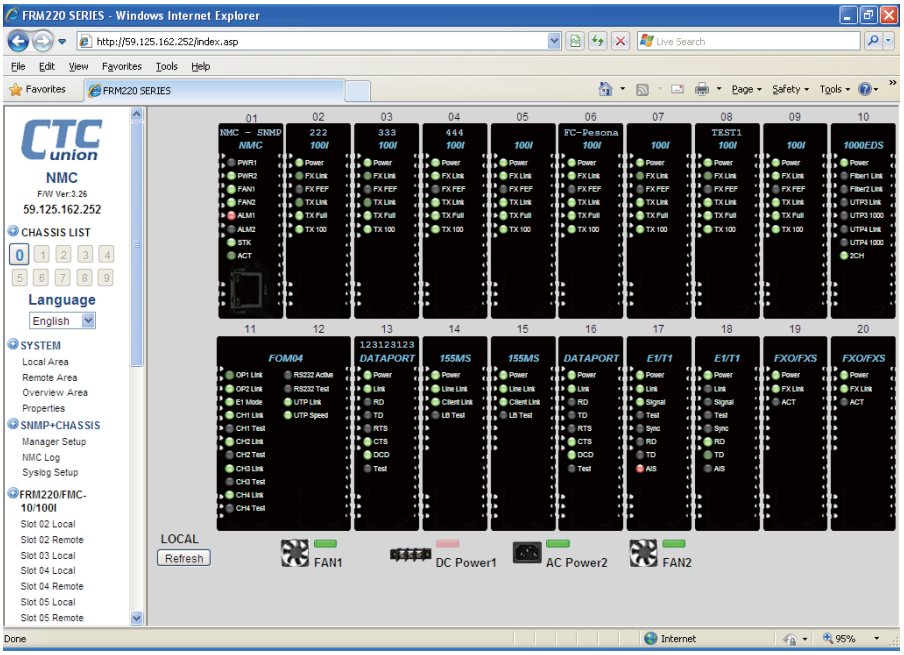


Figure 3.1 Selectable features of the Main Web GUI

Chassis List

Use the "Chassis List" control to select the chassis in the cascade group. Using only one IP address and one single point of management, up to 10 chassis (ID 0~9) can be managed.

Language

The NMC currently supports four different language interfaces; English, Simplified Chinese, Traditional Chinese and Japanese user interfaces.

System Information

Clicking on the "System" item will display an overview screen (Figure 3.2) that allows setting system information, TFTP kernel and file system update, date & time setting, and parameter management.

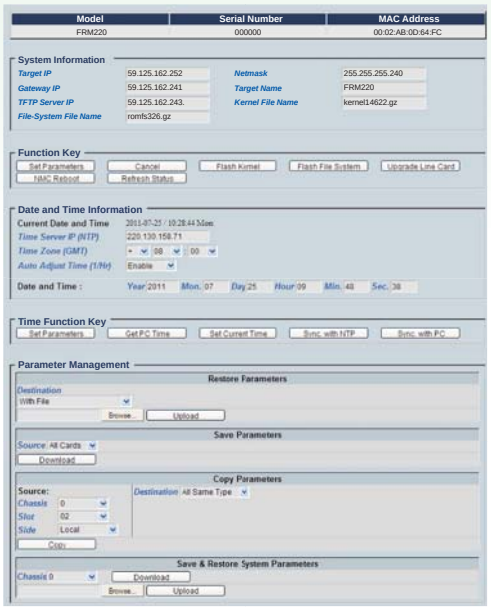


Figure 3.2 System Information

SNMP + Chassis

Click on "SNMP+Chassis" from the left hand window menu bar.

Header

The top header of Figure 3.3 displays the chassis ID (0 for the master chassis, 1~9 for cascaded slave chassis), the slot number for NMC is always 1, NMC is always in local and the version displayed in the format h/w-s/w. In the below example, the NMC hardware version is 1.0 while the software version is 3.263 and kernel build 14622.

Chassis Information

The Chassis Information group displays the power supply types and the power and fan status. There are slots for installing one or two power modules. They may hold either AC or DC type modules. Power 1 refers to the module installed in the left slot as viewed from the rear of the chassis, while Power 2 refers to the right slot. An OK status indicates the power module is working within normal parameters. Fan status is indicated with both the current RPM (speed) of the cooling fans and with a status of OK or Failed. If the RPM of the fan falls below 1650RPM, a failed status will be indicated.

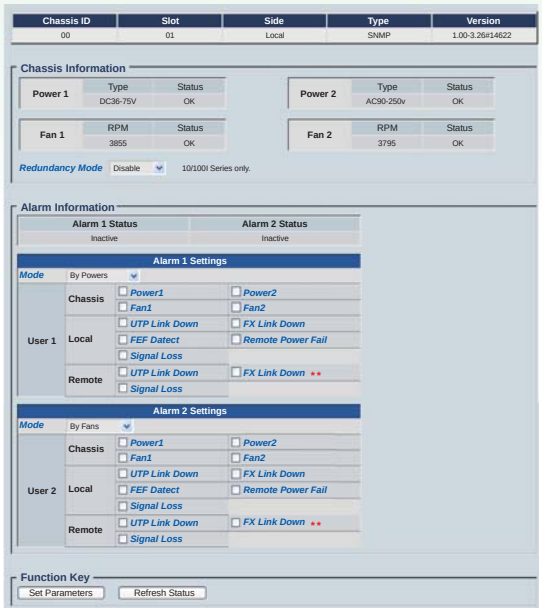


Figure 3.3 SNMP+Chassis Information

Management System - Graphical User Interface

FRM220A-GSW/SNMP

The Web GUI of FRM220A-GSW/SNMP behaves just like any other web based application. The following graphic (Figure 3.4) shows all of the areas that may be clicked for further configuration. Slots without any line card or without manageable line card will be shown as 'Empty'.

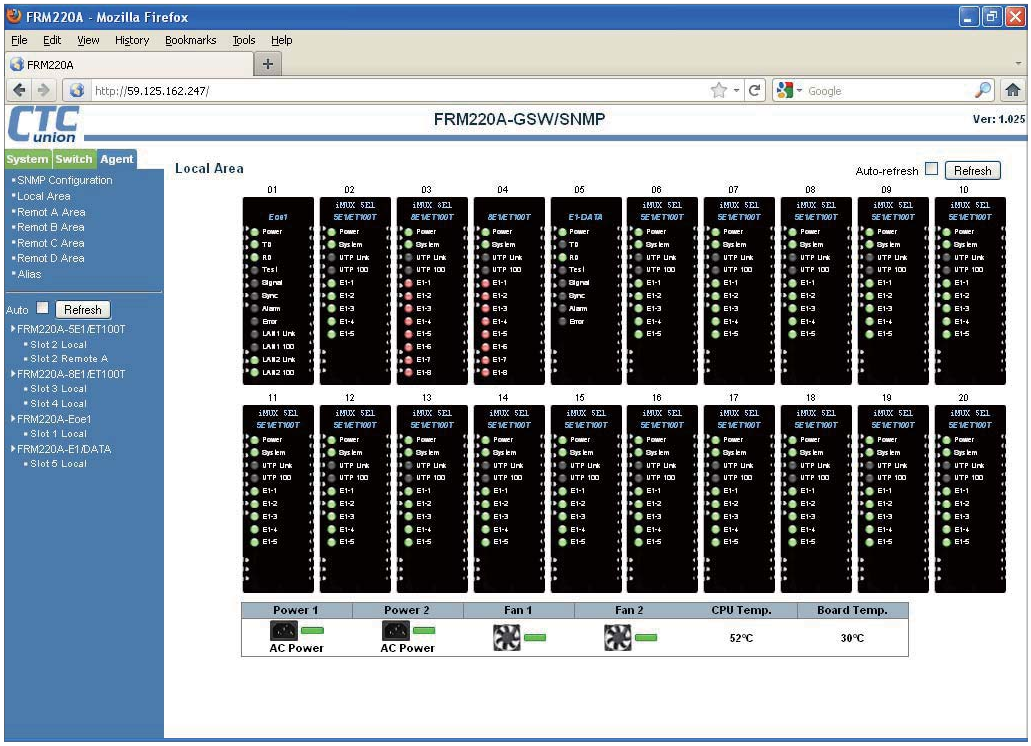


Figure 3.4 Selectable features of the Main Web GUI

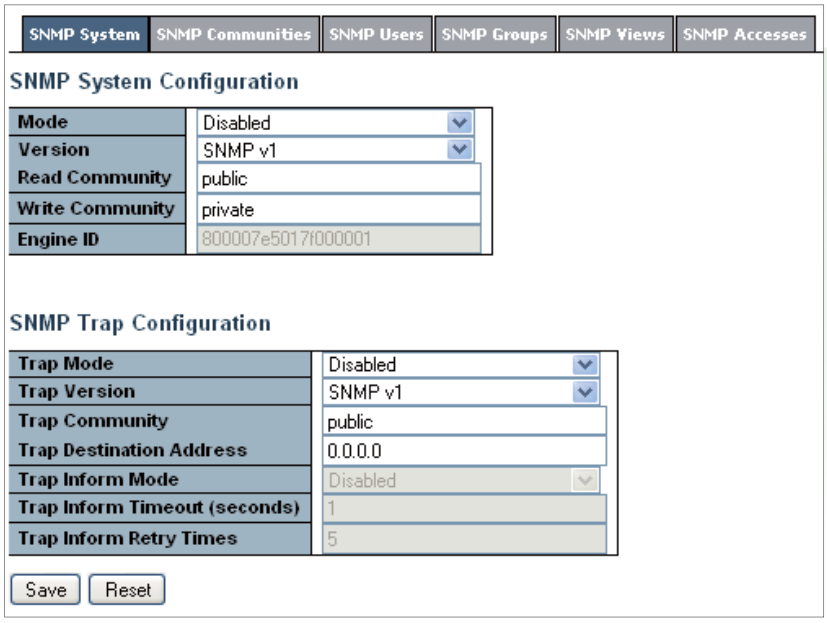


Figure 3.5 SNMP System Information

Alias Configuration

The Alias panel configuration allows for up to 10 ASCII characters to describe each of the local twenty slots as well as remote in-band connected converters. The names are then displayed for each card on the home page graphic.

SNMP Configuration

Clicking on the **"SNMP Configuration"** item will display an overview screen that allows setting the SNMP system information(Figure 3.5), including enabling the mode, selecting SNMP version, setting up trap management and configuring community strings.

Local/Remote Area

"Local Area"(Figure 3.6) will display a graphic representation of all the cards inserted in the chassis and the real-time status of all LEDs (this display is also the default 'Home' page of the web interface).

The graphic indicators at the bottom of the display show the real-time status of the two Power Modules, the two chassis fans and temperature. An error in any of these will result in the effected icon's LED blinking in RED.

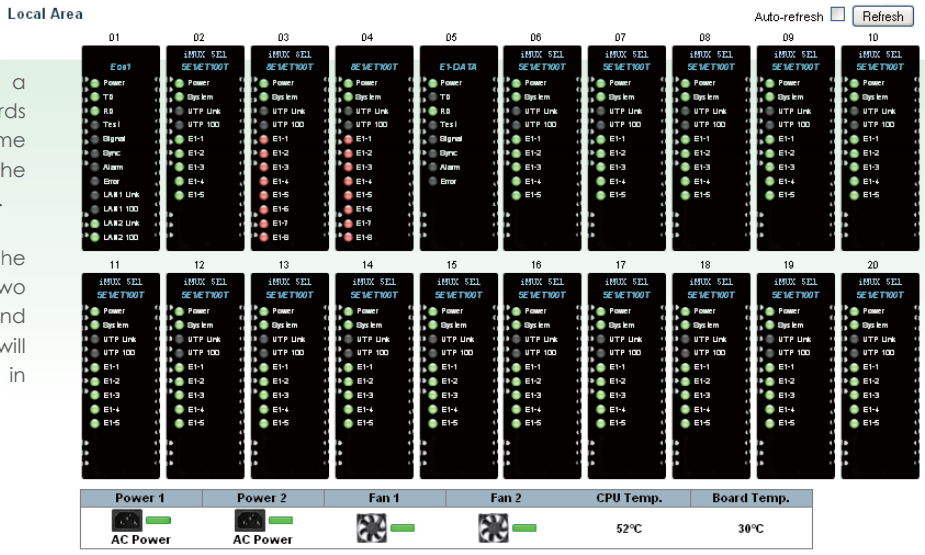


Figure 3.6 The real-time status of installation Card, Power Module and Fan.

System

The system settings include informational as well as configuration setting.

Information
Information about the system is displayed here, including the hardware version, the MAC address, firmware versions and software version information

Configuration
System information includes the MIB-2 variables for contact, name and location of the system.

IP Setup
The IP Setup provides the web based method to change the IP address, subnet mask, default gateway and the VLAN ID.

Date and Time
The Date & Time Setup provides the web based method to change the system time and configure SNTP time synchronization.

Password Setup
Enter the old password, if there is one, and enter new password twice.

Monitor
The Monitor screen will display system information for the type and status of Power 1 and Power 2, the fans status and RPM, the GSW CPU temperature and the GSW card board temperature (in Centigrade).

Alarm Setup
The Alarm screen will display current alarm status. Inactive means there are currently no alarms. Active means an alarm condition exists.

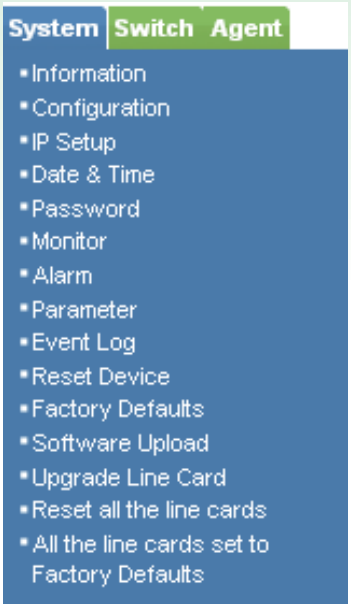
Parameters
The GSW/SNMP has backup and restore functions that work at a card level (backup individual card or all cards to PC, or restore parameters from a backup file on PC to single card or all other like cards).

Event Log
The event log keeps a running record of events that happen in the FRM220A-GSW/SNMP, including cards inserted/removed, card faults, power or fan faults, and remote login/logouts.

Reset Device
The reset device function will do a warm reboot of the GSW CPU/Switch.

Factory Defaults
The Factory Default function will return all configurations (except for the TCP/IP settings) to their factory defaults.

Software Upload
The Software Update function is the easy method to upgrade the operational software for the GSW/SNMP.



Upgrade Line Card
The Update Line Card function is the easy method to upgrade any of the line cards installed in the FRM220A CH20 chassis (except the 1000EAS/X).

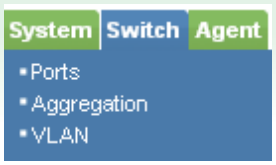
Reset All Line Cards
The reset all line cards function will do a warm reboot of all line cards installed and recognized in the 220A.

All Line Cards Set to Factory Default
The set all line cards to factory default function will return each installed card to its original factory default settings.

Switch

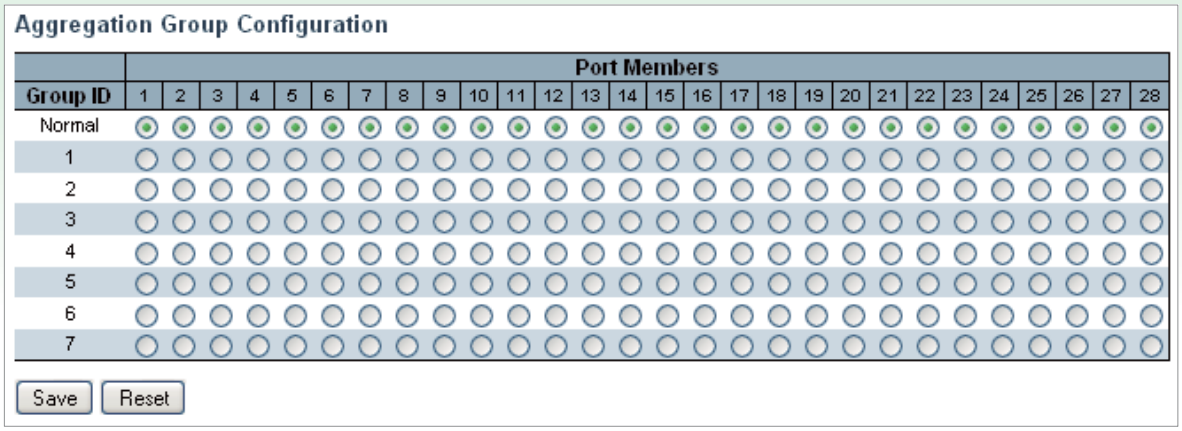
Ports

The 'Ports State Overview' screen will display the link status for all ports of the L2 switch. The indicators 1~20 refer to the CH20 slots 1~20, as viewed from the front of the chassis, numbered from left to right. Ports 21~24 are 10/100/1000 Base-T ports available at the rear of the CH20 chassis, located on the GSW/SNMP plug-in card. The additional ports 25~28 are SFP optical based and may be 1000Base-FX or 2500-FX.



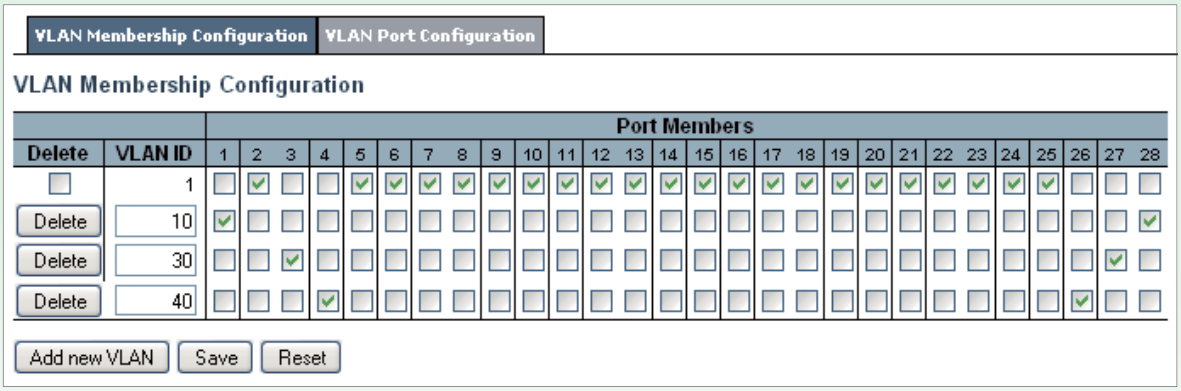
Aggregation

There are 8 aggregation groups that can be assigned any of the 28 available ports. A port can only be assigned to one group.

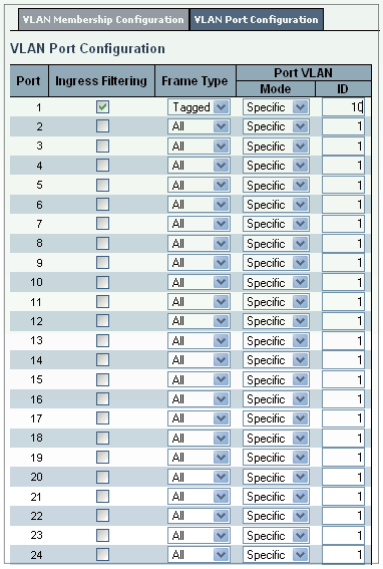


VLAN

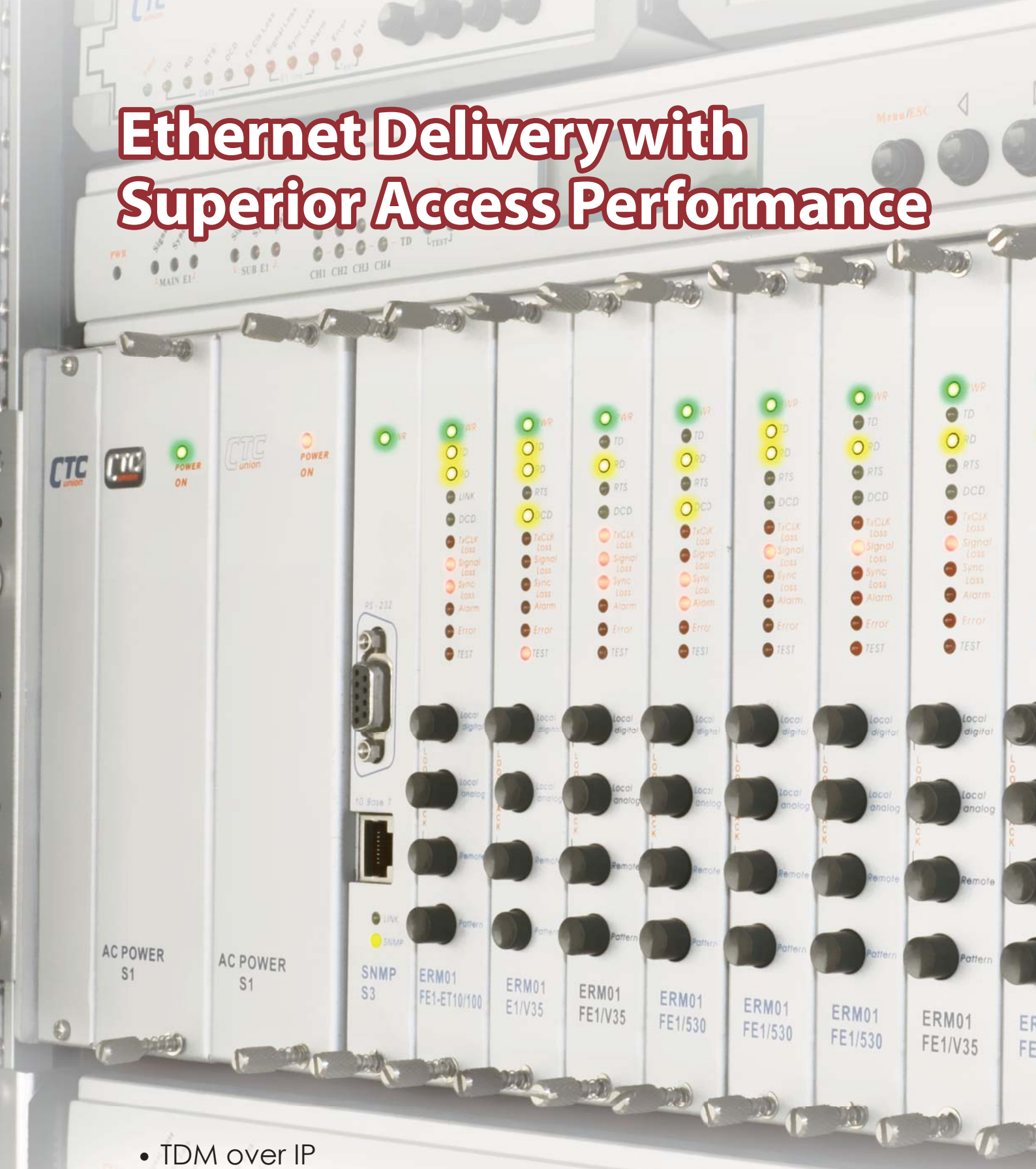
VLAN Membership Configuration



VLAN Port Configuration



Ethernet Delivery with Superior Access Performance



- TDM over IP
- E1/T1 Access Unit
- E1 Access Multiplexer

Single E1/T1/J1 over Ethernet (IP)

IPM-1SE

The IPM-1SE is a 1U half 19" stand-alone or rack mountable pseudo wire (PW) device that transmits a real-time bit stream of TDM data (Time Division Multiplexing) over a packet switched network (IP network). Unlike other traffic types that can be carried over pseudo wires (e.g. ATM, frame relay, and Ethernet), TDM is a real-time bit stream, which traditionally carries voice-grade telephony channels. One critical issue in implementing TDM over IP is clock recovery. In native TDM networks the physical layer carries highly accurate timing information along with the TDM data, but when emulating TDM over Packet Switched Networks this synchronization is absent. The IPM-1SE is able to accurately regenerate the timing signals to the exacting standards and conformance with ITU-T. As core networks continue their conversion from traditional switched technology to IP based networks, the IPM-1SE provides a solution to continue using legacy TDM equipment, such as PABX, while the core migrates to IP based networks.

Features

- Supports synchronous TDM based and Ethernet service over IP network
- Devices can be cascaded to increase the number of interfaces
- Point to point application for E1/T1/J1 over IP
- Provides accurate E1/T1/J1 clock recovery
- Supports f/w upgrade
- Console terminal CLI, Telnet and MIB-2 SNMP support

Specifications

Ethernet	Data rate: 10/100Base-Tx, Half/full duplex Connector: RJ45
	Framing: framed/unframed traffic (ITU-T G.704) Bit rate: 2.048Mbps Line Code: HDB3 Line Impedance: 75 ohm(BNC) / 120 ohm(RJ-45) Pulse amplitude:Nominal 2.37V ±10% for 75ohm, Nominal 3.00V ±10% for 120ohm Zero amplitude: ±0.1V Receive level: short haul -15dB, long haul -43dB Connector: RJ45 for 120 ohms, BNC for 75 ohms
TDM interface	Framing: Unframed, D4, ESF, PCM30, PCM31 Bit rate: 1.544Mbps/ 2.048Mbps Line Code: B8ZS / AMI/ HDB3 Line Impedance: 100/75/120 ohms Pulse amplitude: Nominal 3.0 ±20%, Zero amplitude: ±0.15V Receive level: short haul -15dB, long haul -43dB Connector: RJ48C
Indications	System, TDM, Uplink, LAN
Standards	ITU-T G.703, G.704, G.706, G.732 and G.823 IEEE802.3, 802.3u
Power Input	AC: 100~240VAC DC: -18 ~72VDC
Power Consumption	15W
Dimensions	235 x 195 x 45mm (D x W x H)
Weight	1.6kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Ordering Information

Model Name	Description
IPM-1SE-AC	E1/T1 IP MUX with 100 ~ 240 VAC
IPM-1SE-DC+24	E1/T1 IP MUX with 24VDC
IPM-1SE-DC	E1/T1 IP MUX with 48VDC

IPM – 1SE – □□

Example: IPM – 1SE – AC

E1/V.35 Over Ethernet Multi-Service Access Platform

IPM-1SE / V35

IPM-1SE/V35 is designed as a multi-service access platform for PDH and V.35 over Ethernet applications. Structured/unstructured E1 and V.35 data can be mapped/de-mapped into/from Ethernet packets. An adaptive clock recovery method for Ingress PDH (PSN -> TDM) clock generation is implemented to support E1 (ITU-T G.824) Jitter performance.

Cost-effective LAN deployment (PDH and V.35 over ethernet)

IPM-1SE/V35 provides cost-effective applications of traditional circuit-switched system over Ethernet. With IPM-1SE/V35, it is easy to interconnect with existing phone systems and V.35 over Ethernet that are used to carry data, voice and video.

Transparent transmission

IPM-1SE/V35 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, V.35 and Ethernet devices with lower network expense.

Bypass international toll

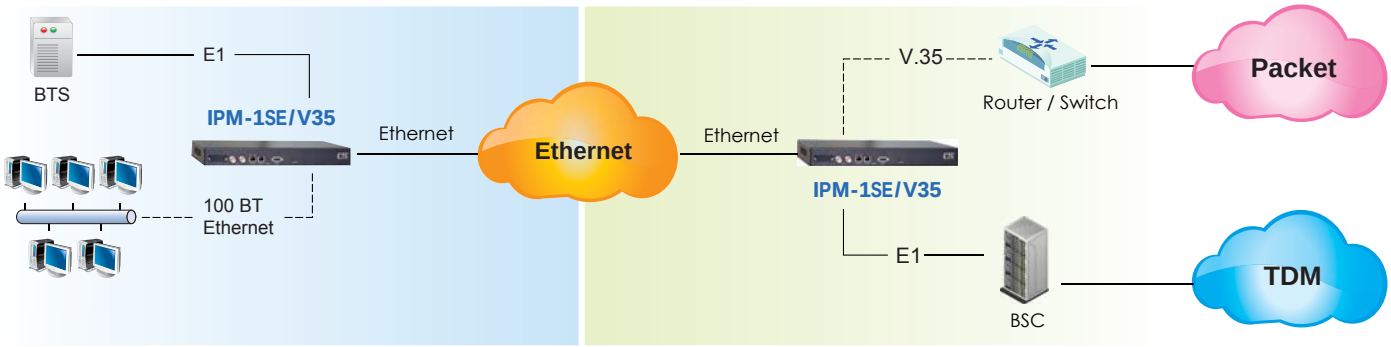
With a pair of IPM-1SE/V35 and guaranteed internet bandwidth, it is sure to save cost dramatically, and to ensure the QoS of voice based on interconnections of TDM telecommunications equipment.

Features

- Support IEFT RFC4533 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8.
- One E1 NRZ Serial Interface with LOS/AIS detection.
- One V.35 (Nx64K) interface.
- Use Raw Encapsulation method for PDH payload over Ethernet packet.
- Supports Circuit Emulation Service over Ethernet (CESoE) transport over Ethernet networks.
- Comply with IEFT 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.824 (E1 Jitter Control).
- Configurable jitter buffer depth to compensate up to 40ms of Packet Delay Variation.
- 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.

Specifications

User interface (CPE side)	Port: One E1 (ITU-T G.703) and one V.35. Interface: RJ-48c (120 Ohm), BNC (75 Ohm) and M/34 female (V.35, DCE). E1 Line Coding: HDB3
Ethernet interface (CPE/CO side)	Port: two 100 Base-T Ethernet. One is for downlink and the other is for uplink. Interface: RJ-45
Dimensions	44 x 370 x 215mm (H x W x D)
Main power supply	AC: 110 ~ 240V @ 47 ~ 65Hz DC: -72V ~ -36V (Option)
Environment condition	Ambient temperature: 0°C ~ 50°C (0°C ~ 65°C, optional) Storage temperature: 0°C~ 85°C Relative humidity: 5 ~ 95% non condensing
Configuration and management	RS-232 console port (Craft Terminal) or SNMP-based management



Ordering Information

Model Name	Description
IPM-1SE/V35-AC	E1/V35 over Ethernet access unit with 100 ~240VAC

4 port E1 over Ethernet (IP)

IPM-4SE

IPM-4SE is designed as a multiservice 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.

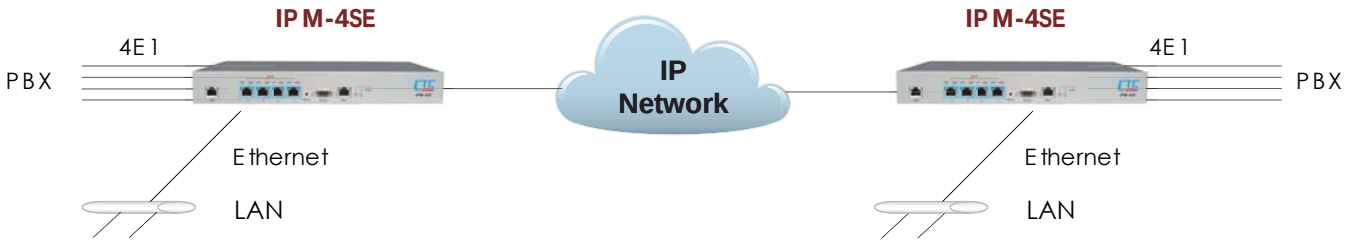
IPM-4SE provides cost-effective applications of traditional circuit switched system over IP. With IPM-4SE, it is easy to interconnect existing phone systems over IP that are used to carry data, voice and video. With high precision clock recovery technology, IPM-4SE is capable of supporting 2G/3G backhaul and provides smooth services. IPM-4SE can transparently transport proprietary signaling that is required to support PBX features, including call conference, call forwarding and SS7.

Features

- Support IEFT RFC4533 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8.
- 4 x E1 NRZ Serial Interface with LOS/AIS detection
- Use Raw Encapsulation method for PDH payload over IP packet.
- Support Circuit Emulation Service over IP.
- Comply with IEFT draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA.
- Support both Point-to-Point and Point-to-Multipoint operation.
- Support 4 independent Adaptive Clock recovery block for Ingress PDH (PSN -> TDM) clock generation. Recovered clock jitter is compliant with ITU-T G.824 (E1 Jitter Control).
- Independent configurable jitter buffer depth to compensate up to 250ms of Packet Delay Variation.
- Support framed/unframed traffic (ITU-T G.704)
- 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 PWL field or payload AIS generation at Egress direction (TDM -> PSN).
- Configurable IEEE 802.3 DA/SA assignment.
- Configuration can be made through RS-232 console port.

Specifications

User interface	Port: up to 4 x E1 (ITU-T G.703) Interface: RJ-48c (120 Ohm) Line Coding: HDB3
Ethernet interface	Port: 100 Base-T Ethernet Interface: RJ-45
Dimensions	44 x 370 x 215mm (H x W x D)
Main power supply	AC: 110 ~ 240V @ 47 ~ 65Hz DC: -72V ~ -36V (Option)
Environment condition	Ambient temperature: 0°C ~ 50°C (0°C ~ 65°C, optional) Storage temperature : 0°C~ 85°C Relative humidity: 5 ~ 95% non condensing
Configuration and management	RS-232 console port, CLI or SNMP-based management



Ordering Information

Model Name	Description
IPM-4SE-AD (CO)	4 E1 over Ethernet CO modem with AC+DC power
IPM-4SE-AD (CPE)	4 E1 over Ethernet CPE modem with AC+DC power

IPM – 4SE – □□(□□)
Example: IPM – 4SE – AD(CO)

4U 13-Slot Managed E1 Concentrator

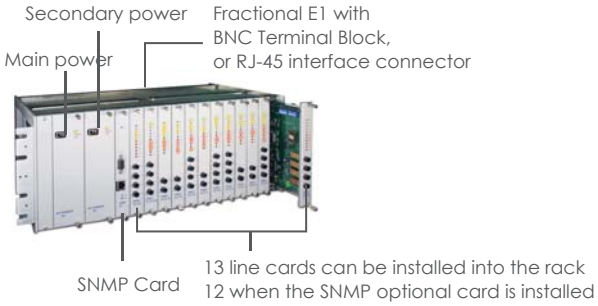
ERM01

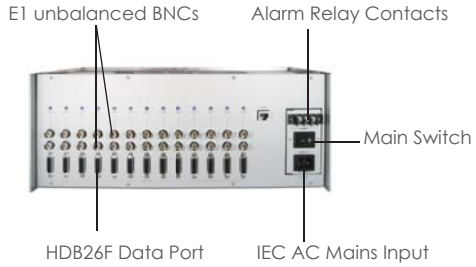
The ERM01 is a 4U 19(23)" concentrator rack type E1 DSU/CSU for Fractional and Unframed G.703 E1 Access for central office installations. There are 13 slots available for hot swappable G.703 E1 cards. An optional SNMP card can be installed into the last slot for configuration and management, leaving 12 slots available for G.703 cards. The SNMP card provides both local control via an RS-232 serial console port and remote IP management using Telnet or industry standard SNMP protocol. Each E1 card may be linked to a remote E1/FE1 stand-alone Access Unit for various LAN, Data, or hosts over E1 network services. The ERM01 accommodates an optional second hot swappable shared power supply module which may derive power from AC (90-250) or DC (-48V) power sources. On the rear panel, combinations of BNC, RJ-45 and wire-wrap terminals are utilized for E1 Line interface connections. Adapter cables are used to convert the HDB26F DCE data ports to V.35, RS-530, RS-449, X.21 or 10/100 Base Ethernet depending on the installed card.

Features

- Managed chassis (Optional) with DSU/CSU blades
- Supports Fractional and Unframed E1 with EOC control
- Hot swappable blades and power modules
- Interface Cards for V.35, X.21, RS-530, RS-449, RS-232, Ethernet Bridge and Router
- I/O connectors all 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
- Supports local serial Console, remote Telnet and SNMP
- Supported by SmartView EMS

ERM01 overview





Specifications

G.703 E1	
Frame format	Unframed/ Framed, CCS(PCM31)/ CAS(PCM30)/ CRC4 on/off
Bit rate	2.048Mbps±50 ppm
Line Code	AMI/ HDB3
Receiving level	0 ~ -43dB
Line Impedance	75 ohm(BNC) / 120 ohm (RJ-45)
Jitter Performance	According to ITU-T G.823
Pulse amplitude	Nominal 2.37V ±10% for 75ohm, Nominal 3.00V ±10% for 120ohm Zero amplitude ± 0.1V
Connector	BNC for unbalanced and RJ-45 for balanced
Transmit frequency tracking	Internal timing ±30 ppm Loopback timing ±50 ppm External timing ±100 ppm
Return loss	12dB for 51 ~ 102KHz 18dB for 102 ~ 2048KHz 14dB for 2048~ 3072KHz
User Data Channel	
Interface Types	RS-530/RS-449/RS-232,X.21/V.35, 10/100Base-T Ethernet Bridge & Router
Connector	High density DB26 Female
Line code	NRZ (except bridge)
Data Rate	N x 56Kbps or N x 64Kbps, Where N equal 1 to 32
Time slot allocation	User defined
Control signals	CTS constantly On, DSR constantly ON, except during test loops, DCD constantly ON or follows RTS, except during signal loss
Loopback	Line loopback, Payload loopback, Local loopback, DTE loopback
Clock modes	Clock mode 0 Rx & Tx clocks (recovered) to (DCE1) sync DTE Clock mode 1 Rx & Tx clocks (internal oscillator) to(DCE2) sync DTE Clock mode 2 Rx clock to sync device,(DTE1) Tx clock from sync device Clock mode 3 Rx & Tx clocks from (DTE2) sync DCE (from ETC and ERC pin) Clock mode 4 Rx & Tx clocks from sync DCE (DTE3) (all from ETC pin)
Standards	ITU-T G.703, G.704, G.706 and G.732 and ETSI ETS 300 420
Power Input	AC: 100~240VAC, DC: -42~-55
Power Consumption	80W
Dimensions	Chassis : 285 x 438 x 180mm (D x W x H) Line card: 260 x 22 x 180mm (D x W x H)
Weight	6.6kg
Temperature	0°C ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

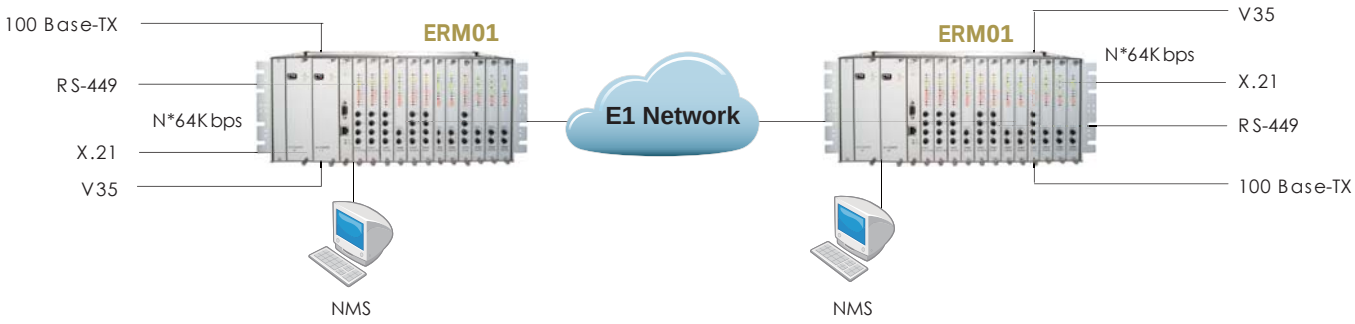
E1 CSU/ DSU Slide-in Card

Network Management Card
- ERM01-SNMP

Ethernet Bridge Card
Unframed/ Framed E1 to 10/100Base-TX
- ERM01-FE1/ET100
- ERM01-E1U/ET100

E1 to Data Card
Unframed/ Framed E1 to Data Card
- ERM01-FE1/V.35
- ERM01-FE1/RS-530
- ERM01-FE1/RS-449
- ERM01-FE1/X.21
- ERM01-FE1/RS-422
- ERM01-E1U/V.35
- ERM01-E1U/RS-530
- ERM01-E1U/RS-449
- ERM01-E1U/X.21
- ERM01-E1U/RS-422

Ethernet Router Card
Unframed/ Framed E1 to 10/100Base-TX
- ERM01-FE1/ET100R
- ERM01-E1U/ET100R



Ordering Information

Model Name	Type	Description
ERM01-BR/AC-CH	Chassis	4U 19" 13-Slot chassis AC power type w/ BNC, RJ-45 on rear panel
ERM01-BR/DC-CH	Chassis	4U 19" 13-Slot chassis DC power type w/ BNC, RJ-45 on rear panel
ERM01R/AC-CH	Chassis	4U 19" 13-Slot chassis AC power type w/ RJ-45 on rear panel
ERM01R/DC-CH	Chassis	4U 19" 13-Slot chassis DC power type w/ RJ-45 on rear panel
ERM01B/AC-CH	Chassis	4U 19" 13-Slot chassis AC power type w/ BNC on rear panel
ERM01B/DC-CH	Chassis	4U 19" 13-Slot chassis DC power type w/ BNC on rear panel
ERM01/AC	Power	AC Power plug-in module (90 to 250 VAC)
ERM01/DC	Power	-48 VDC Power plug-in module (±36 to ±76 VDC)
ERM01-SNMP	SNMP	SNMP card with both interfaces: RS-232 and 10/100Base-TX
ERM01-FE1/ET100	Card	Fractional E1 to 10/100Base-T/Tx Ethernet Bridge
ERM01-FE1/ET100R	Card	Fractional E1 to 10/100Base-T/Tx Ethernet Router
ERM01-FE1/V35	Card	Fractional E1 to V.35 card
ERM01-FE1/RS530	Card	Fractional E1 to Serial: RS-530 (cable selected)
ERM01-FE1/RS449	Card	Fractional E1 to Serial: RS-449 (cable selected)
ERM01-FE1/X21	Card	Fractional E1 to Serial: X.21 (cable selected)
ERM01-FE1/RS422	Card	Fractional E1 to Serial: RS-422 (cable selected)
ERM01-E1-U/ET100	Card	Unframed E1 <--> 10/100Base-T/Tx Ethernet Bridge
ERM01-E1-U/ET100R	Card	Unframed E1 <--> 10/100Base-T/Tx Ethernet Router
ERM01-E1-U/V35	Card	Unframed E1 <--> V.35 card
ERM01-E1-U/RS530	Card	Unframed E1 to RS-530 (cable selected)
ERM01-E1-U/RS449	Card	Unframed E1 to RS-449 (cable selected)
ERM01-E1-U/X21	Card	Unframed E1 to X.21 (cable selected)

ERM01 – □□ / □□ – □□
Example: ERM01 – BR/AC – CH

Network Management Card

ERM01-SNMP

This single slot card is installed in the last slot of the chassis, just before the power modules. The card has an RS-232 serial port on a DB9 female connector for connection of any standard dumb terminal for an easy menu driven configuration. The RJ-45 jack is a 10/100 Ethernet connector for IP based management. The SNMP card supports remote Telnet management with the same user friendly menu interface as local console. SNMP can be used by compiling the enterprise MIB into your favorite network management software.

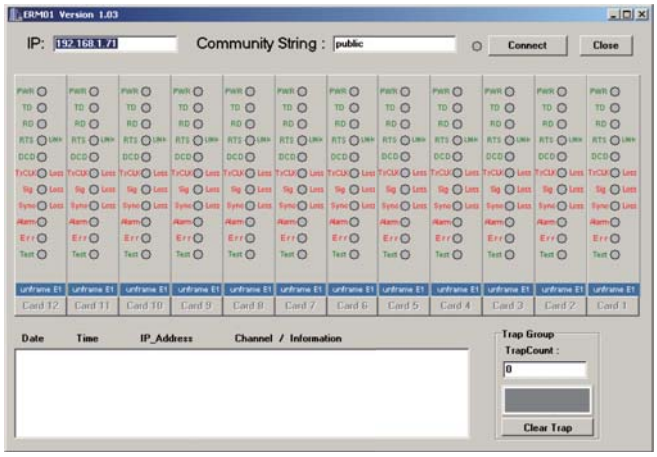
Specifications

Electrical Interface	Console RS-232 port LAN 10/100Base-TX
Network Management	· Network management: provide all system software updates, and management system interaction through Ethernet port. · Out-band management: supports Telnet and SNMP , EMS · Configuration Management · Performance Management · Fault Management · Status Monitoring
Indications	PWR, Link SNMP
Dimensions	260 x 22 x 180mm (D x W x H)
Weight	0.25kg
Temperature	0°C ~ 50°C (Operating) -10°C ~ 60°C (Storage)
Humidity	10 ~ 90% non-condensing
Certifications	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Features

- RS-232 port for dumb terminal at 38.4k 8bit no parity
- Ethernet port for 10/100Base-TX compliant with IEEE802.3u
- SNMP V1 and V2C support
- MIB file compliant to MIB-II ASN.1
- Firmware upgrade by TFTP
- Hot swappable

GUI Management



Serial Console Management

```
************************************************************
******* CTC UNION TECHNOLOGIES CO., LTD *******
******* ERM-01 NMS Terminal Mode V4.01 *******
************************************************************
Main Menu and Rack Status:
1:Slot #1 >> FE1 << || 7:Slot #7 >> FE1 <<
2:Slot #2 >> FE1 << || 8:Slot #8 >> FE1 <<
3:Slot #3 >> FE1 << || 9:Slot #9 >> FE1 <<
4:Slot #4 >> FE1 << || A:Slot #10 >> FE1 <<
5:Slot #5 >> FE1 << || B:Slot #11 >> FE1 <<
6:Slot #6 >> FE1 << || C:Slot #12 >> FE1 <<
Command Function Key:
'1' to '9', 'A' to 'C': I/O Cards Setting
'R': Refresh Status
'ESC' Logout
'S': System Configuration and TFTP Setup
'M': Manager Configuration Setup
```

Fractional E1 to 10/100Base-TX Ethernet Router Card

ERM01-FE1/ET100R

The ERM01-FE1/ET100R Router Card is a single slot card that can be installed in any available slot to provide IP over E1 transmission. The router engine uses an embedded system which can be configured and controlled from a serial port, Telnet or Web based user interface. It supports industry standard encapsulations of PPP and HDLC as well as proprietary header for Cisco router's HDLC.

Features

- Ethernet port IP Address/subnet mask
- WAN port IP Address/subnet mask
- Router Name / Password
- RS-232 Console Port Management
- Web/Telnet Management
- WAN port IP address/subnet mask
- DHCP server/client ; NAT Function
- Virtual Server Mapping ; SNMP MIB-2 supported
- Supports VPN pass through ; Forwarding IP multicast support
- DNS proxy server ; SNTP supported
- Simple Statistical ; Ping and Trace route
- Static Routing Setup
- Routing Table (manually set up to 32 entries minimum)
- Dynamic Routing RIP I & II, Send or Receive on Ethernet or WAN
- PPP, HDLC and Cisco HDLC WAN protocol encapsulatoin
- Flash Upgrade (via TFTP)

Specifications

Hardware	Samsung ARM9 integrated communications 166MHz processor, 8MB Flash, and 32MB pipeline RAM for code, data and buffers
Connection	1 x Ethernet LAN port (10/100)
WAN Speed	Synchronous Port N56/N64 up to 2048Kbps
LAN Speed	Ethernet LAN port 10/100 Mbps
Function	Proxy Routing, IP Routing, Static Routing, Dynamic Routing, DHCP Client/ DHCP Server, IP Mapping, Packet Filtering
Protocols	PPP, NAT, RIP 1/2, TCP/IP
Security	PAP/CHAP, NAT, Filter
LED	Link/ACT : On=link ; Flash=Activity 100 : On=100Base ; Off=10Base

Fractional E1 to 10/100Base-TX Ethernet Bridge Card

ERM01-FE1/ET100

The ERM01-FE1/ET100 Bridge Card is a single slot card that can be installed in any available slot to provide Ethernet over E1 transmission. The bridge engine uses an ASIC design for wire speed performance and supports industry standard HDLC encapsulation. The ERM01-E1U-ET100 bridge is an economical solution for LAN to LAN applications over framed or Unframed E1 transport.

Features

- High performance bridge for 10Base-T or 100Base-TX Ethernet extension.
- Auto-MDI/MDIX detects and corrects crossed cable.
- Ethernet LAN Interface on RJ-45 connector.
- Transparent half / Full duplex support on WAN / LAN interface.
- Automatic LAN table learning and aging.
- IEEE 802.3x flow control.
- Filter mode (pure bridge) or repeater mode selectable
- Provides Ethernet over E1 economically
- No IP address settings required
- Simple DIP switch setting to control filtering, packet buffer and Ethernet auto/forced mode

Specifications

Bridge	LAN Table: 256 MAC address with 5 minute automatic aging Filtering and Forwarding : wire speed Packet size; 64~1522 Bytes Buffer : 340 frames Delay : 1 frame
LAN	Standard : compliant to IEEE802.3 /803.2u Data rate : 10Base-T / 100Base-TX, Full or Half Duplex Connector : RJ45
General	IP bridging over G.703 E1 ISO standard HDLC encapsulation WAN Speed: Nx64 (where N=1 to 31) for Fractional E12048Kbps for Unframed E1

Fractional E1 to Data Card

ERM01-FE1/Data

The high-speed data cards are available in two E1 types; one for fractional E1 and one for Unframed E1 (transparent) and with data communication interfaces for V.35, RS-530, X.21 and RS-449(V.36). All line cards come with adapter cables that terminate in the appropriate user interface for DCE. Simple DIP Switch settings provide all the control for E1 and Dataport settings. When the ERM01 is equipped with optional SNMP, centralized management can configure and monitor the card and performance without manual DIP setting.

Features

- HS (up to 2Mb/s) Serial interface card for serial transport over G.703 E1.
- DIP switch or SNMP managed (Optional)
- Hot swappable without effecting any other line card
- Front panel pushbuttons to activate loop testing with integral 511 pattern BERT.
- LED status indicators for E1 Signal, Sync and Dataport TD, RD, and CD.

Specifications

- Compliant with ITU-T standards for V.35, RS-530, X.21 and V.36
- Synchronous transmission at Nx64 data rate (2.048M for Unframed)
- Line code: NRZ
- Control Signals: CTS always ON

Cable Adapter :

HDB26M to MB34F for V.35
HDB26M to DB25F for RS-530
HDB26M to DB37F for RS-449(V.36)
HDB26M to DB15F for X.21

Unframed E1 to 10/100Base-TX Ethernet Router Card

ERM01-E1U/ET100R

The ERM01-E1U/ET100R Router Card is a single slot card that can be installed in any available slot to provide IP over E1 transmission. The router engine uses an embedded system which can be configured and controlled from a serial port, Telnet or Web based user interface. It supports industry standard encapsulations of PPP and HDLC as well as proprietary header for Cisco router's HDLC.

Features

- Ethernet port IP Address/subnet mask
- WAN port IP Address/subnet mask
- Router Name / Password
- RS-232 Console Port Management
- Web/Telnet Management
- WAN port IP address/subnet mask
- DHCP server/client
- NAT Function
- Virtual Server Mapping
- SNMP MIB-2 supported
- Supports VPN pass through
- Forwarding IP multicast support
- DNS proxy server
- SNTP supported
- Simple Statistical
- Ping and Trace route
- Static Routing Setup
- Routing Table (manually set up to 32 entries minimum)
- Dynamic Routing RIP I & II, Send or Receive on Ethernet or WAN
- PPP, HDLC and Cisco HDLC WAN protocol encapsulatoin
- Flash Upgrade (via TFTP)

Specifications

Hardware	Samsung ARM9 integrated communications 166MHz processor, 8MB Flash, and 32MB pipeline RAM for code, data and buffers
Connection	1 x Ethernet LAN port (10/100)
WAN Speed	Synchronous Port 2048Kbps
LAN Speed	Ethernet LAN port 10/100 Mbps
Function	Proxy Routing, IP Routing, Static Routing, Dynamic Routing, DHCP Client/ DHCP Server, IP Mapping, Packet Filtering
Protocols	PPP, NAT, RIP 1/2, TCP/IP
Security	PAP/CHAP, NAT, Filter
LED	Link/ACT : On=link ; Flash=Activity 100 : On=100Base ; Off=10Base

Unframed E1 to 10/100Base-TX Ethernet Bridge Card

ERM01-E1U/ET100

The ERM01-E1U/ET100 Bridge Card is a single slot card that can be installed in any available slot to provide Ethernet over E1 transmission. The bridge engine uses an ASIC design for wire speed performance and supports industry standard HDLC encapsulation. The ERM01-E1U-ET100 bridge is an economical solution for LAN to LAN applications over an Unframed E1 transport.

Features

- High performance bridge for 10Base-T or 100Base-TX Ethernet extension.
- Auto-MDI/MDIX detects and corrects crossed cable.
- Ethernet LAN Interface on RJ-45 connector.
- Transparent half / Full duplex support on WAN / LAN interface.
- Automatic LAN table learning and aging.
- IEEE 802.3x flow control.
- Filter mode (pure bridge) or repeater mode selectable
- Provides Ethernet over E1 economically
- No IP address settings required
- Simple DIP switch setting to control filtering, packet buffer and Ethernet auto/forced mode

Specifications

Bridge	LAN Table: 256 MAC address with 5 minute automatic aging
	Filtering and Forwarding : wire speed
	Packet size; 64~1522 Bytes
	Buffer : 340 frames
	Delay : 1 frame
LAN	Standard : compliant to IEEE802.3 /803.2u
	Data rate : 10Base-T / 100Base-TX, Full or Half Duplex
	Connector : RJ45
General	IP bridging over G.703 E1
	ISO standard HDLC encapsulation
	WAN Speed: Nx64 (where N=1 to 31) for Fractional E12048Kbps for Unframed E1

Unframed E1 to Data Card

ERM01-E1U/Data

The high-speed data cards are available in two E1 types; one for fractional E1 and one for Unframed E1 (transparent) and with data communication interfaces for V.35, RS-530, X.21 and RS-449(V.36). All line cards come with adapter cables that terminate in the appropriate user interface for DCE. Simple DIP Switch settings provide all the control for E1 and Dataport settings. When the ERM01 is equipped with optional SNMP, centralized management can configure and monitor the card and performance without manual DIP setting.

Features

- HS (2Mb/s) Serial interface card for serial transport over G.703 E1.
- DIP switch or SNMP managed (Optional)
- Hot swappable without effecting any other line card
- Front panel pushbuttons to activate loop testing with integral 511 pattern BERT.
- LED status indicators for E1 Signal, Sync and Dataport TD, RD, and CD.

Specifications

- Compliant with ITU-T standards for V.35, RS-530, X.21 and V.36
- Synchronous transmission at 2.048Mbps
- Line code: NRZ
- Control Signals: CTS always ON

Cable Adapter :

HDB26M to MB34F for V.35
HDB26M to DB25F for RS-530
HDB26M to DB37F for RS-449(V.36)
HDB26M to DB15F for X.21

Single Modular Port E1 CSU/DSU w/ LCD and SNMP

ETU01A

The ETU01A single port stand-alone DSU/CSU 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-II, and any network management software.

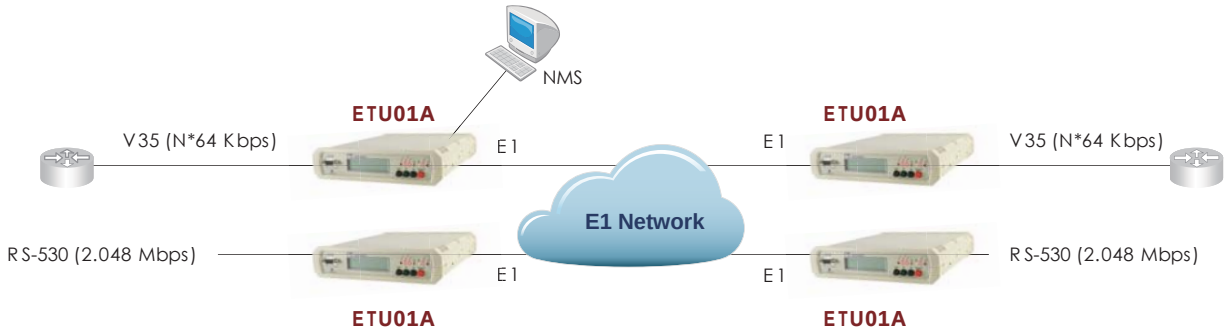
Features

- 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 EMS
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback

Specifications

G.703 E1 Specifications

Framing	Framed CCS (PCM31) CAS (PCM30) / Unframed CRC4 on/off
Line Code	AMI/ HDB3
LCD display	16*2 character LCD with backlight
Bit rate	N*56K or N*64Kbps, where N=1~31 in CCS or 1~30 in CAS
Relative receive level	0 to -43dB
Transmit level:	
Pulse	Nominal 2.37V ±10% for 75ohm
Amplitude	Nominal 3.00V ±10% for 120ohm Zero amplitude ±0.1V
Jitter performance	According to ITU-T G.823
Connectors	BNC(unbalanced), RJ-48(balanced)
Clock modes:	
Clock mode 0 (DCE1)	Receive & transmit clock (recovered) to the sync DTE
Clock mode 1 (DCE2)	Receive & transmit clock (internal oscillator) to the sync DTE
Clock mode 2 (DTE1)	Receive clock to the sync and transmit clock from the sync device
Clock mode 3 (DTE2)	Receive and transmit clock from the sync DCE (from ETC and ERC pin)
Clock mode 4 (DTE3)	Receive and transmit clock from the sync DCE (all from ETC pin)I
Diagnostics	local loopback,Digital remote loopback, Test pattern
Indications	LEDs (Power, TD, RD, RTS, DCD, Singal loss, Sync loss, Alarm)
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 45mm (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, LVD, RoHS
MTBF	65,000 hrs



Ordering Information

Model Name	Type	Description
ETU01A/AC	Power	1U, 19/2", Data port to framed E1 w/ 100 ~240VAC
ETU01A/DC	Power	1U, 19/2", Data port to framed E1 w/ -48VDC
ETU01A/AD	Power	1U, 19/2", Data port to framed E1 w/ -48VDC and 100 ~240VAC

Note: Please refer to page xx for optional interface module

ETU01A / □□
Example: ETU01A / AC

Single Modular Port E1 CSU/DSU

ETU011

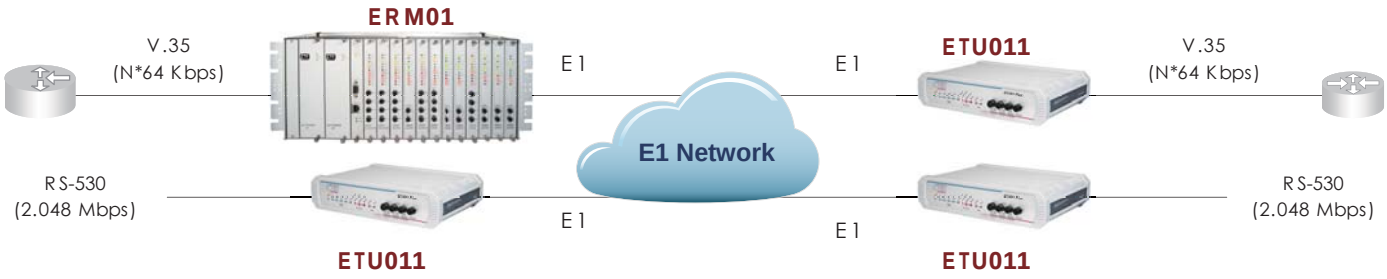
The ETU011 stand-alone DSU/CSU is a digital access unit for Unframed E1, Fractional E1, or Fractional cascaded E1 service. The ETU011 data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 64kbps, up to a maximum 2.048Mbps (unframed), 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 Specifications	
Framing	Framed CCS (PCM31) CAS (PCM30) / UnframedCRC4 on/off
Line Code	AMI/ HDB3
Relative receive level	0 to -43dB
Transmit level :	
Pulse	Nominal 2.37V ±10% for 75ohm
Amplitude	Nominal 3.00V ±10% for 120ohm Zero amplitude ±0.1V
Jitter performance	According to ITU-T G.823
Connectors	BNC(unbalanced), RJ-48(balanced)
Clock modes :	
Clock mode 0 (DCE1)	Receive & transmit clock (recovered) to the sync. DTE
Clock mode 1 (DCE2)	Receive & transmit clock (internal oscillator) to the sync. DTE
Clock mode 2 (DTE1)	Receive clock to the sync. and transmit clock from the sync. device
Clock mode 3 (DTE2)	Receive and transmit clock from the sync. DCE (from ETC and ERC pin)
Clock mode 4 (DTE3)	Receive and transmit clock from the sync. DCE (all from ETC pin)
Test Switches	Digital local loopback, Analog local
Diagnostics	Digital local and remote loopback, Analog local loopback, Test pattern
Indications	LEDs (Power, TD, RD, RTS, DCD, Singal loss, Sync loss, Alarm)
Standard	ITU-T G.703/G.704/G.706 & G.732
Power Input	AC: 90-250VAC, DC: -18 ~ -75VDC
Power Consumption	10W
Dimensions	250 x 195 x 45mm (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, RoHS
MTBF	57,000 hrs



Ordering Information

Model Name	Type	Description
ETU011-AC	Power	1U, 19/2", Data port to framed E1 w/ built-in AC 90 ~ 250 VAC
ETU011-DC	Power	1U, 19/2", Data port to framed E1 w/ built-in DC -18 ~ -72 VDC

ETU011 – □□

Example: ETU011 – AC

Note: Please refer to page 4-13 for optional interface module

Single V.35 Port E1 CSU/DSU

ETU01-Plus

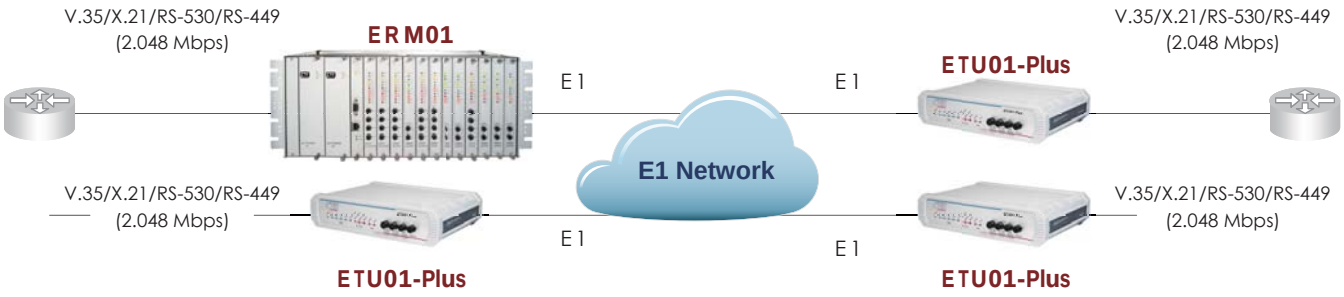
The ETU01-Plus stand-alone DSU/CSU is a digital access unit for Unframed E1 or Fractional E1 service. The ETU01-Plus data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 64kbps, up to a maximum 2.048Mbps (unframed), for a line 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
- I/O connectors all located 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
- Fixed V.35 port with MB34F connector

Specifications

G.703 E1 Specifications	
Framing	Framed CCS (PCM31) CAS (PCM30) / Unframed CRC4 on/off
Line Code	AMI/ HDB3
Data rate	N*56K or N*64Kbps, where N=1~31 in CCS or N equal 1~30 in CAS
Relative receive level	-43dB
Transmit level	
Pulse Amplitude	Nominal 2.37V ±10% for 75 ohm 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 (DCE1)	Receive & transmit clock (recovered) to the sync DTE
Clock mode 1 (DCE2)	Receive & transmit clock (internal oscillator) to the sync DTE
Clock mode 2 (DTE1)	Receive clock to the sync. and transmit clock from the sync device
Clock mode 3 (DTE2)	Receive and transmit clock from the sync DCE (from ETC and ERC pin)
Clock mode 4 (DTE3)	Receive and transmit clock from the sync DCE (all from ETC pin)
Indications	LEDs (Power, TD, RD, RTS, DCD, Singal 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 45mm (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, RoHS
MTBF	55,000 hrs



Ordering Information

Model Name	Type	Description
ETU01/Plus-AC	Power	1U, 19/2", Fixed V.35 port to framed E1 w/ built-in AC 90 ~ 250 VAC
ETU01/Plus-DC	Power	1U, 19/2", Fixted V.35 port to framed E1 w/ built-in DC -18 ~ -75 VDC

ETU01/Plus – □□
Example: ETU01/Plus – AC

Interface Modules for ETU Family Access Units

ETU/TTU

When purchasing one of our single or multi-port access units or multiplexers that support user replaceable interface modules, our ETU/TTU interface modules provide easily selectable electrical interfaces for a wide selection of user applications. In addition to standard datacom interfaces such as V.35, RS-530, X.21, RS-449, etc. Ethernet modules are also available for bridging or routing of Ethernet over E1 or T1 network services.

RS-232 Interface
ETU/TTU-232

Features :
Compliant with EIA RS-232-C (Unbalanced)
Compatible to ITU-T V.24 25-pin D Sub female connector
Synchronous data rate at 64 or 128Kb/s Asynchronous (transparent) at up to 19.2K or 38.4K Data Communications Equipment interface

V.35 Interface
ETU/TTU-V35

Features :
Compliant with ITU-T V.35 standards
Winchester type 34-pin MB34 M-Block female connector
Synchronous data rate at Nx64 (where N=1 to 32)
Data Communications Equipment interface Electrically compatible to ITU-T V.11 (RS-422)

RS-530 Interface
ETU/TTU-530

Features :
Compliant with Category 1 EIA-530 (Balanced) 25-pin D Sub female connector
Synchronous data rate at Nx64 (where N=1 to 32)
Data Communications Equipment interface Electrically compatible to RS-422

X.21 Interface
ETU/TTU-X21

Features :
Compliant with ITU-T X.21 standard (Balanced)
15-pin D Sub female connector
Synchronous data rate at Nx64 (where N=1 to 32)
Data Communications Equipment interface Electrically compatible to V.11

RS-449(V.36) Interface
ETU/TTU-449

Features :
Compliant with EIA/TIA-530-A (Balanced)
37-pin D Sub female connector
Synchronous data rate at Nx64 (where N=1 to 32)
Data Communications Equipment interface Electrically compatible to RS-422

Non-Return to Zero Interface
ETU/TTU-NRZ

Features :
4 BNC connectors: TxD,TxC,RxD and RxC (Data&Clock)
NRZ line coding Logic "1" 0V +/- 0.3V Logic "0" -1.5V +/- 0.3V
Synchronous data rate Nx64 (where N=1 to 32)

G.703 64K Co-directional Interface
ETU/TTU-G64

Features :
Pulse shape compliant with ITU-T G.703
Clock frequency: 64KHz
Pulse Amplitude: 1.0V
Zero Amplitude: 0V
Impedance: 120 Ohms
15-Pin D Sub connector
Range: up to 800m with 24AWG

Ordering Information

Model Name	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 (4 * BNC)
ETU/TTU-ET100	10/100 Base-T/Tx Ethernet E1 Bridge Function interface module
ETU/TTU-ET100R	10/100 Base-T/Tx Ethernet Routing Function interface module

ETU/TTU – □□□
Example: ETU/TTU – V35

10/100 Base-TX Ethernet Router

ETU/TTU-ET100R

When the E1/T1 standalone access units are installed with an ET100R Interface, the unit is not only an access unit for E1 or T1 but also becomes a high performance WAN Router for 10/100BASE-T Ethernet extension. The ET100R Ethernet Router interface module for CTC Union's ETU/TTU Series DSU/CSU Access Units may be accessed via the RS-232 asynchronous communication port, a serial crossover cable (provided) and text based terminal emulation software (Hyper Terminal TM). Once an IP address has been established for the subnet, the ET100R may also be accessed via Telnet or web GUI. The serial port and Telnet configuration CLI are identical and may include password protection.

Features

- Ethernet port IP Address/subnet mask
- WAN port IP Address/subnet mask
- Router Name / Password
- RS-232 Console Port Management
- Web/Telnet Management
- WAN port IP address/subnet mask
- DHCP server/client
- NAT Function
- Virtual Server Mapping
- SNMP MIB-2 supported
- Supports VPN pass through
- Forwarding IP multicast support
- DNS proxy server
- SNTP supported
- Simple Statistical
- Ping and Trace route
- Static Routing Setup
- Routing Table (manually set up to 32 entries minimum)
- Dynamic Routing RIP I & II, Send or Receive on Ethernet or WAN
- PPP, HDLC and Cisco HDLC WAN protocol encapsulatoin
- Flash Upgrade (via TFTP)

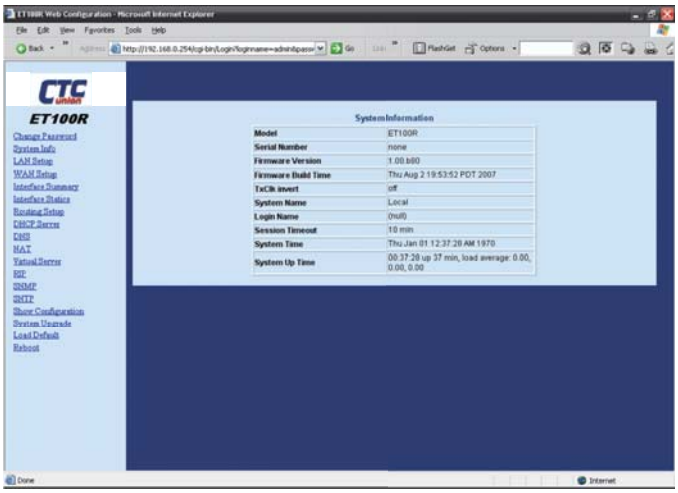
Specifications

Hardware	Samsung ARM9 integrated communications 166MHz processor, 8MB Flash, and 32MB pipeline RAM for code, data and buffers
WAN Speed	Synchronous Port N56/N64 up to 2048Kbps
LAN Speed	Ethernet LAN port 10/100 Mbps
Function	Static Routing, Dynamic Routing, DHCP Client/ DHCP Server, IP Mapping, Packet Filtering
Protocols	PPP, NAT, RIP 1/2, TCP/IP
Security	PAP/CHAP, NAT, Filter
LED	Link/ACT : On=link ; Flash=Activity 100 : On=100Base ; Off=10Base

CLI Commands

```
ET100R#show interface summary

name      hw type    hw addr            ip addr       ip mask      status

eth1      Ethernet   00:02:AB:06:00:01  192.168.0.1   255.255.255.0   up
hdlc1     Cisco HDLC ------              192.168.1.1   255.255.255.192 up
lo        Loopback   ------              127.0.0.1     255.0.0.0       up


ET100R#show ip route


Kernel IP routing table
Destination   Gateway      Genmask         Flags Metric Ref    Use Iface
192.168.1.0   0.0.0.0      255.255.255.192 U     0      0        0 hdlc1
192.168.0.0   0.0.0.0      255.255.255.0   U     0      0        0 eth1


ET100R#
```

Web GUI Management



Ordering Information

Model Name	Description
ETU/TTU-ET100R	10/100 Base-T/Tx Ethernet Routing Function interface module

10/100 Base-TX Ethernet Bridge

ETU/TTU-ET100

The ET100 Network Bridge is a high performance remote, self-learning, Ethernet bridge. Its compact size and low cost makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over bit stream type infrastructures. ET100 provides an Ethernet (IEEE802.3u) Bridge function over the WAN when matched to another ET100 module, ET100 standalone, or a compatible bridge utilizing standard HDLC (ISO 13239) protocol. The interface connection is a shielded RJ-45 connector for 10/100Base Ethernet and auto-MDIX and operates at any n56/n64 fractional or unframed E1 speed.

Features

- High performance bridge for 10Base-T or 100Base-TX Ethernet extension.
- Auto-MDI/MDIX detects and corrects crossed cable.
- Ethernet LAN Interface on RJ-45 connector.
- Transparent half / Full duplex support on WAN / LAN interface.
- Automatic LAN table learning and aging.
- IEEE 802.3x flow control.
- Filter mode (pure bridge) or repeater mode selectable
- Provides Ethernet over E1 economically
- No IP address settings required
- Simple DIP switch setting to control filtering, packet buffer and Ethernet auto/forced mode

Specifications

Bridge	LAN Table: 256 MAC address with 5 minute automatic aging Filtering and Forwarding : wire speed Packet size; 64~1522 Bytes Buffer : 340 frames Delay : 1 frame
LAN	Standard : compliant to IEEE802.3 /802.3u Data rate : 10Base-T / 100Base-TX, Full or Half Duplex Connector : RJ45
General	IP bridging over G.703 E1 ISO standard HDLC encapsulation WAN Speed: Nx64 (where N=1 to 31) for Fractional E1 2048Kbps for Unframed E1

Ordering Information

Model Name	Description
ETU/TTU-ET100	10/100Base-T/Tx Ethernet E1 Bridge Function interface module

Ethernet over Unframed E1 with SNMP Management

Eoe1A

The Eoe1A is a Channel Service Unit for unframed ITU-T G.703 E1 that features a built-in Ethernet bridge. The CSU has a built-in Network Terminating Unit (NTU) and may connect to either 75 Ohm unbalanced, BNC connectors or to 120 Ohm balanced, unframed E1 via twisted pairs and a shielded RJ-45 connector. The Eoe1A Ethernet Bridge uses HDLC encapsulation to transport Ethernet packets across the WAN and supports 10/100 auto-negotiation or manual settings for 10M, 100M, Full or Half Duplex Ethernet. The Ethernet port also supports a standard auto-MDIX feature that will completely eliminate Ethernet cross-over cables or the guessing that is sometimes involved in choosing a cable when connecting to a HUB or a PC. The Eoe1A is very easy to configure by a menu driven serial console interface. SNMP and proprietary MIB add the ability to manage the Eoe1A centrally through third party network management software or via CTC Union's EMS management system.

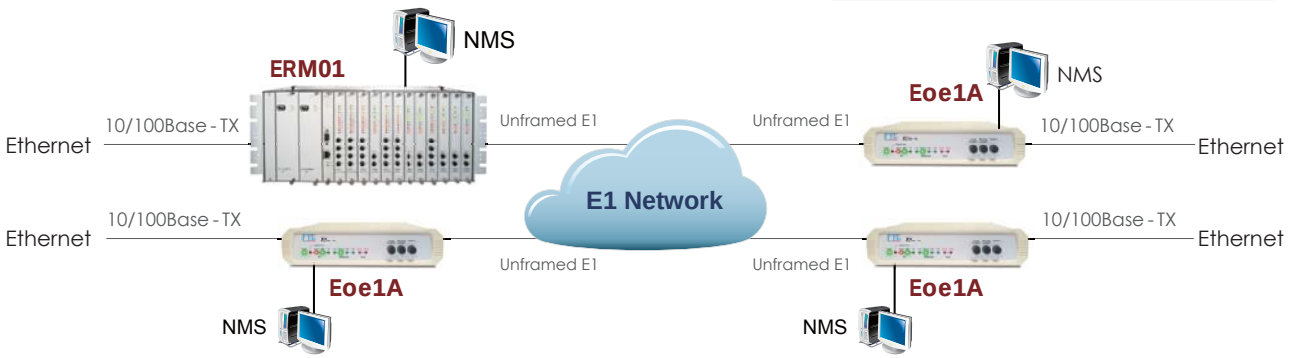
Features

- Supports 10/100Base-TX Ethernet over Unframed E1
- Automatic address learning, aging and deletion after 5 minutes
- Auto padding of undersized packets to meet the minimum Ethernet packet size requirement
- Buffering modes can be selected according to the setting of WAN and LAN line speeds
- Forwarding and filtering rate at WAN speed with throughput latency of 1 frame
- Auto MDI / MDIX
- Real-time filtering with 256 MAC address table
- Supports Console, SNMP and Web management
- Adjustable pay load rates of: 10K, 32K, 64K, 128K, 256K, 512K, 1024K & 2048K

Specifications

G.703 E1 Specifications	
Framing	Unframed
Line code	AMI/ HDB3
Bit rate	2.048Mbps (clear channel)
Relative receive level	0 to -43dB
Transmit level	Pulse Nominal 2.37V ±10% for 75ohm Amplitude Nominal 3.00V ±10% for 120ohm Zero amplitude ±0.1V
Jitter performance	According to ITU-T G.823
Connector	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
Diagnostics	
Test Switches	Digital local loopback, Analog local loopback, Digital local and remote loopback, 2047 Test pattern
Ethernet Specifications	
Connector	RJ-45
Data Rate	10/100Mbps; Half Duplex / 20/ 200Mbps; Full duplex
Filtering & Forwarding	90,000 packets/sec
Delay	1 frame
Frame Buffer	340 frames
MAC Table	256 MAC address
Protocol	Synchronous HDLC
Indications	LEDs (Power, Signal Loss, Alarm, Link, TD, RD, 100, Full,Error, Error, Test)
Standard	ITU-T G.703, G.706 and G.732, IEEE 802.3/802.3u
Management	Console, Web, SNMP
Power Input	AC: 90-250VAC ; DC: 18-72 VCD
Power Consumption	20W
Dimensions	250 x 195 x 45mm (D x W x H)
Weight	1.5kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Managed Unframed E1 Point to Point



Ordering Information

Model Name	Description
Eoe1A/AC	1U half 19" Ethernet over unframed E1 SNMP with AC power (100 ~ 240 V)
Eoe1A/DC	1U half 19" Ethernet over unframed E1 SNMP with DC power(18 ~ 75 V)
Eoe1A/AD	1U half 19" Ethernet over unframed E1SNMP with AC (100~240V) and DC (18 ~ 75 V)

Eoe1A / □□
Example: Eoe1A / AC

Ethernet Bridge over E1

Eoe1/Plus

The Eoe1/Plus is a standalone E1 Ethernet Bridge capable of providing 1x E1 line for the connection of 10/100BaseTX LANs over E1 transports. The Eoe1/Plus transmits up to a 2.048Mbps Ethernet bridge channel (HDLC encapsulated) over E1 link. The Eoe1/Plus 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 Eoe1/Plus fully meets E1 specifications including ITU-T G.703 and G.823. The Eoe1/Plus can be configured by dip switch setting and has the diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the Eoe1/Plus 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

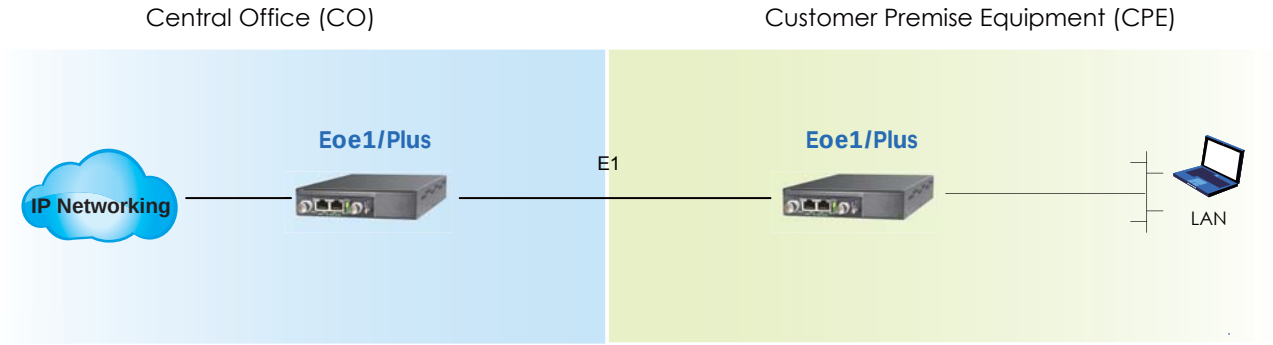
- Connects one Fast Ethernet over E1 links (1.984Mbps)
- Built-in HDLC bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Easily configure with simple DIP switches
- AC / DC power built-in
- LED Alarm indication

Specifications

Interface	**E1:**	
	Framing	CAS, CCS, Unframed/framed
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10% (75 ohm) Nominal 3.00V ± 10% (120 ohm)
	Connector	RJ45, BNC
	Diagnostics	Digital remote loopback
	Ethernet:	
	Standard	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex
	Connector	RJ45
Indications	Power, ALM,E1 signal loss , E1 Alarm（AIS，LOF， RAI, LOMF), LAN link /ACT, 10/100M , SD(100Base-FX)	
Power Input	AC 100 ~ 240V; 4DC	
Power Consumption	< 5W	
Dimensions	201 x 135 x 35mm (D x W x H)	
Weight	0.58kg	
Temperature	0°C ~ 60°C (Operating), -10°C ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS	
MTBF	65,000 hrs	

E1 Bridge

Delivering point-to-point Fast Ethernet service across E1 circuit



Ordering Information

Model Name	Description
Eoe1/AC	1U half 19" Ethernet over E1 with AC Power (100~240 V)
Eoe1/DC	1U half 19" Ethernet over E1 with DC Power (18 ~ 75 V)

Eoe1 / □□

Example: Eoe1 / AC

Ethernet to WAN (V.35, RS-530, RS-449, X.21) Bridge

ET100

The ET100 Network Bridge is a high performance remote, self-learning, Ethernet bridge. Its compact size and low cost makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over bit stream type infrastructures. The built-in n x 64(56)Kbps timing clock generator makes it easy to connect to other n x 64(56)Kbps related data equipment. Several options of data interfaces, including V.35, RS-530, RS-449, X.21 and RS-232, make this unit's connection between 10Base-T or 100Base-TX LAN and various data port interfaces convenient.

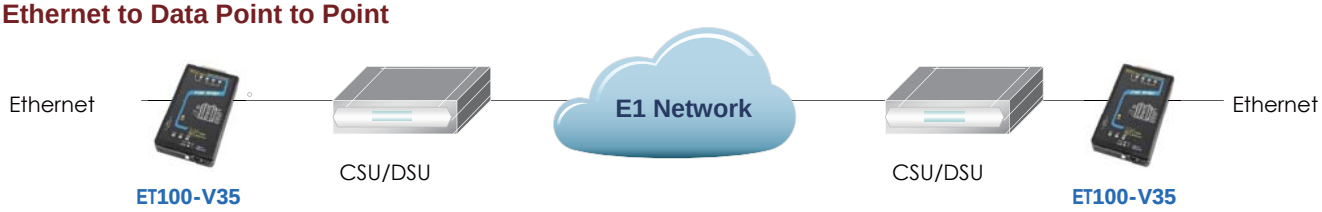
Features

- High performance bridge for 10Base-T or 100Base-TX Ethernet extension
- Auto MDI/MDIX
- Selectable data port : V.35, X.21, RS-530, RS-449, RS-232
- Transparent half / Full duplex support on WAN, LAN interface
- Nx64, Nx56 timing clock generator for Sync WAN link
- LEDs indication for LAN, WAN status

Specifications

WAN Interface	Interface : Selectable RS-232(Sync), V.35, RS-530/449, X.21 Connector : DB25M Type : DTE port Data rate: • RS-232 up to 128Kbps • V.35, X21, RS530, RS-449 up to 2Mbps • Nx64(56)Kbps up to 2048Kbps Clock source : Tx/Rx internal or external
LAN Interface	• Compliant with IEEE 802.3, 802.3u • Connector: RJ-45 • Speeds: 10/100Base-TX, Full/Half duplex • Frames: Support 64 ~ 1522 byte packet lengths
Bridge Specifications	• Protocol: Synchronous HDLC (ISO 13239) • Address learning, aging and deletion after 5 minutes • 256 addresses MAC table • 340 packet buffer
Indications	LEDs (PWR, WAN Rx/Tx, LAN Tx/Rx/Link/Err/Speed)
Standards	IEEE802.3, 802.3u
Power Input	9VDC
Power Consumption	< 5 W
Dimensions	135 x 79 x 25mm (D x W x H)
Weight	0.15kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	55,000 hrs

Ethernet to Data Point to Point



Ordering Information

Model Name	Description
ET100	Compact size, Ethernet to WAN (V.35, X21, RS-530, RS-449) bridge w/ DC 9V in AC adapter
Optional Accessories	
CAB-DB25FMB34M-V35	V.35 adapter cable: DB25 Female to MB34 Male , 1meter
CAB-DB25FMB34F-V35	V.35 adapter cable: DB25 Female to MB34 Female , 1meter
CAB-DB25FDB15M-X21	X.21 adapter cable: DB25 Female to DB15 Male , 1meter
CAB-DB25FDB15F-X21	X.21 adapter cable: DB25 Female to DB15 Female , 1meter
CAB-DB25FDB25M-530(232)	RS-530(232) adapter cable: DB25 Female to DB25 Male , 1meter
CAB-DB25FDB25F-530(232)	RS-530(232) adapter cable: DB25 Female to DB25 Female , 1meter
CAB-DB25FDB37M-449	RS-449 adapter cable: DB25 Female to DB37 Male , 1meter
CAB-DB25FDB37F-449	RS-449 adapter cable: DB25 Female to DB37 Female , 1meter

Ethernet to NRZ Bridge

ET100/NRZ

The ET100/NRZ Network Bridge is a high performance, remote, self-learning Ethernet bridge. Its solid design makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over NRZ bit stream type infrastructures. Multiple clocking options including a built-in n x 64(56)Kbps timing clock generator makes it easy to connect to other n x 64Kbps NRZ data equipment.

Features

- 10BASE-T/100BASE-TX, Auto, Full Duplex or Half Duplex
- HP Auto-MDI/MDIX detects and corrects crossed cable
- IEEE 802.3x flow control enable/disable
- Real-time filtering with 256 MAC address table
- Automatic address learning, aging and deletion after 5 minutes
- Up to 340 packet-buffering capacity
- Forwarding and filtering rate at wire speed with throughput latency of 1 frame.
- Auto padding of undersized packets to meet the minimum Ethernet packet size requirement
- Buffering modes can be selected according to the setting of WAN and LAN line speeds
- Built-in nx64K / nx56K timing clock generator for WAN link

Specifications

WAN Interface	Type: Fixed type NRZ Protocol: Synchronous HDLC (ISO 13239) Connector: 4x BNC Data rate: Nx64Kbps, up to 2048Kbps Clock source: Tx/Rx internal or recovery from NRZ
LAN Interface	• Compliant with IEEE 802.3, 802.3u • Connector: RJ45 • Data rate: Nx64Kbps • Speeds: 10/100Base-TX, Full/Half duplex • Frames: Support 64 ~ 1536 byte packet lengths
Bridge Specifications	• Protocol: Synchronous HDLC (ISO 13239) • Address learning, aging and deletion after 5 minutes • 256 addresses MAC table • 340 packet buffer
Indications	PWR, TD/RD, Link, LAN Rx/Tx, 100M, Full, Err, Test
Standards	IEEE802.3, 802.3u, ISO 13239
Power Input	AC: 100 ~240V, DC 18 ~ 72V
Power Consumption	<15W
Dimensions	235 x 195 x 45mm (D x W x H)
Weight	0.95kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Ethernet to NRZ Point to Point

Ordering Information

Model Name	Description
ET100/NRZ-AC	10/100BaseTx Ethernet to NRZ BNC interface with Internal AC 100~240V power
ET100/NRZ-DC	10/100BaseTx Ethernet to NRZ BNC interface with Internal DC 18~72V power

ET100/NRZ – □□

Example: ET100/NRZ – AC

Ethernet to G.703 Co-Directional 64K Bridge

ET100/G64

The ET100/G64 Network Bridge is a high performance remote, self-learning, Ethernet bridge. Its compact size and low cost makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over legacy 64Kbps co-directional bit stream type infrastructures. Multiple clock source settings including a built-in 64Kbps timing clock generator makes it easy to connect to other 64Kbps G.703 co-directional data equipment, making this unit's connection between 10Base-T or 100Base-TX LANs convenient.

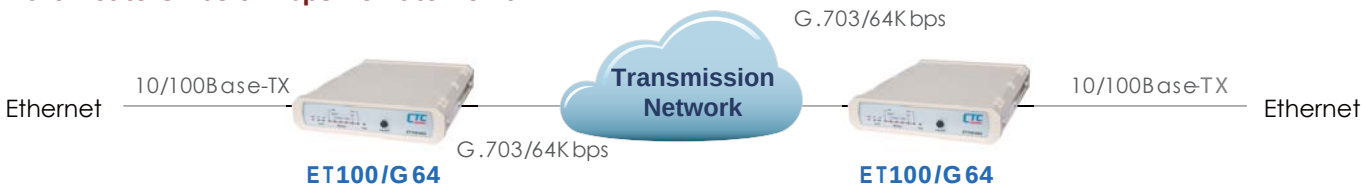
Features

- 10/100Base-TX, Full Duplex or Half Duplex
- Auto MDI/MDIX
- IEEE 802.3x flow control
- Real-time filtering with 256 MAC address tabl
- Auto address learning, aging and detection after 5 mins
- up to 340 packet-buffering capacity
- Built-in nx64K / nx56K timing clock generator for WAN link

Specifications

WAN Interface	Type: Co-directional 64Kbps Line code: Co-directional Line: 4 wires 19 to 26 AWG Range: up to 800 meters over 24 AWG Impedance: 120 ohms Pulse Amplitude: Nominal 1.0V±10% Zero Amplitude: Nominal 0V±0.1V Clock Frequency: ±100ppm Connector: RJ45 Frame format: Unframed
LAN Interface	• Compliant with IEEE 802.3, 802.3u • Connector: RJ45 • Data rate: 64Kbps • Speeds: 10/100Base-TX, Full/Half duplex • Frames: Support 64 ~ 1536 byte packet lengths
Bridge Specifications	• Protocol: Synchronous HDLC (ISO 13239) • Address learning, aging and deletion after 5 minutes • 256 addresses MAC table • 340 packet buffer
Indications	PWR, TD/RD, Link, LAN Rx/Tx, 100M, Full, Err, Test
Standard	IEEE802.3, 802.3u, ITU-T G.703, G.823
Power Input	AC: 100 ~240V, DC 18~72V
Power Consumption	< 5W
Dimensions	235 x 195 x 45mm (D x W x H)
Weight	0.95kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Ethernet to G.703 64Kbps Point to Point



Ordering Information

Model Name	Description
ET100/G64-AC	Ethernet to G.703 Co-directional 64K bridge with AC power
ET100/G64-DC	Ethernet to G.703 Co-directional 64K bridge with DC power

ET100/G64 – □□
Example: ET100/G64 – AC

4U, 10 I/O Slot Data, Ethernet, Voice E1 Managed Multiplexer

ERM-MUX-PLUS

The ERM-Mux / plus is a 4U 19(23)" 14 slot rack type E1 Time Division Multiplexer for Fractional E1 network access which is designed for non-stop operation.There are 10 slots available for hot-swappable ERM-Mux / plus-I/O cards. Two slots are provided for Mux-E1 cards, which may be configured as four separate E1links or for redundant 1+1 operation of the E1 lines, safe guarding against expensive network down time. Two slots are also available for CPU cards, with the second CPU card acting as a hot standby in case of primary card failure. Each Mux-E1 card may be linked to another ERM-Mux / plus Rack to provide a point-to-point variety of datacom, Ethernet & voice over E1 network services. The ERM-Mux/plus optionally accommodates up to two separate powerpplies, which may derive power from AC (110/220) or DC (-48V) 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 ERM-Mux/plus provides all interface connections on the front panel. BNC and RJ-45 are used for E1 Line interface connections, RJ-45 connections are used for all voice (FXO, FXS, E&M), for 10/100 Ethernet Bridge and G.703-64K co-directional / contra-directional / center. Optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to 6xRS-232, HP68F DCE port of I/O card to 4x V.35, RS-232, RS-530, RS-449, RS-422 and X.21 or 5x X.50 channels.

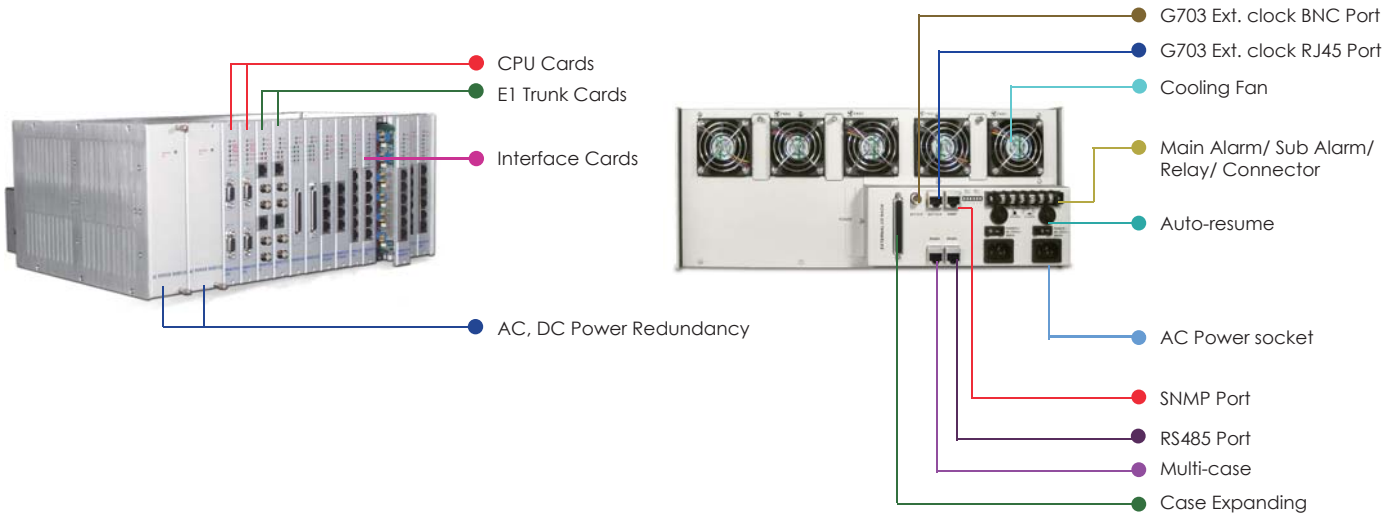
Features

- CPU redundancy (1+1)
- E1 redundancy (1+1) and E1 card redundancy
- Power redundancy (1+1) [2AC, 2DC, AC+DC]
- DCE hot swappable card types
- 4ch V.35 (nx64K)
  - 4ch G.703 64K co-directional /contra-directional / center mode
  - 2ch Ethernet bridge
  - 6ch RS232
  - 6ch FXS voice
  - 6ch FXO voice
  - 6ch E&M voice
- Drop & Insert function
- Console, NMP,SNMP, management

Specifications

Connectors	Console port (RJ45, RS232C) WAN port RJ45 Jack (2-wire, 4-wire)
Physical Specifications	Dimensions: 350 x 438 x 176mm (W x D x H) Weight: 8kg (chassis+dual power+8 I/O cards) 0.45kg per card
Power Characteristics	AC : AC 90 ~250VAC, DC : DC -48VDC
Environmental Specifications	Operating 0°C ~ 60°C Storage 0°C ~ 70°C Relative humidity 0% ~ 90% non-condensing Predicted MTBF : 65,000 hrs (25°C)
Certification	CE

ERM-Mux/plus overview



1+1 Redundant

The ERM-MUX/PLUS supports complete redundant functions for the electrical input service, the power module cards, CPU card and E1 card. The E1 backup provides 1+1 modes. All of these cards are capable of automatic switchover in case of failure. The system has complete warning and diagnostic functions for stable and reliable operation.

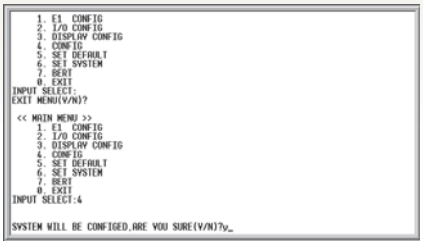
Network Management

The ERM-MUX/PLUS supports SNMP and/or NMP GUI network management with local PC or via a dedicated timeslot from the E1 line. The NMP GUI can manage more ERM-MUX/PLUS equipment via the E1 network in-line or in nested structures. A console terminal mode is supported as well. When SNMP management mode is available and selected, remote Telnet and HTTP embedded web server are also available for management.

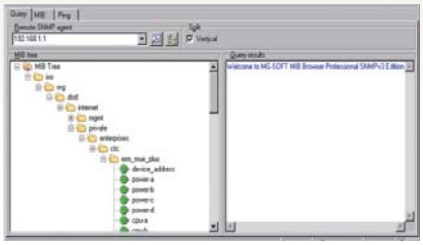
ERM-Mux / Plus Management

The intelligent NMS provides the support that the network manager needs. It consists of three parts :

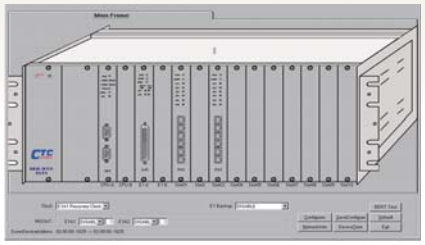
1. Terminal mode: Configuration by local RS-232 serial port; Maintenance & alarm.



2. MIB file SNMP: Configuration by RJ-45 10/100 Ethernet port; Complies with MIB-II standard.



3. GUI SNMP: Configuration by RJ-45 10/100 Ethernet port; Real time monitoring & trap alarm in Window® graphic mode.



Cascade

RS-485 interface is used for cascading expansion rack, and are provided by RJ-45 x 2 connectors. DB62 connector for connecting backplane data to expansion rack.

Power Redundancy

Power supply options for 110V AC, 220V AC or -48V DC, ensure maximum flexibility for central office installations. This equipment complies fully with all ITU-T standards for E1 transmissions. The modules are hot-swappable, capable of automatic switch over in case of module failure, stable, and reliable.

Performance and BERT test

System supports performance monitoring and BERT test through NMP or Terminal console according RFC 1406 recommendation. CRC-4 and BPV monitoring: CURR ES / UAS , LONG ES / UAS. Loopback test and BERT test: display Rx error amounts, Error counts and Bit-error-rate. Test patterns: 2e9-1, 2e11-1 and 2e15-1. Error Insertions and rates: Single, 10e-1, 10e-2, 10e-3, 10e-4, 10e-5, 10e-6, 10e-7.

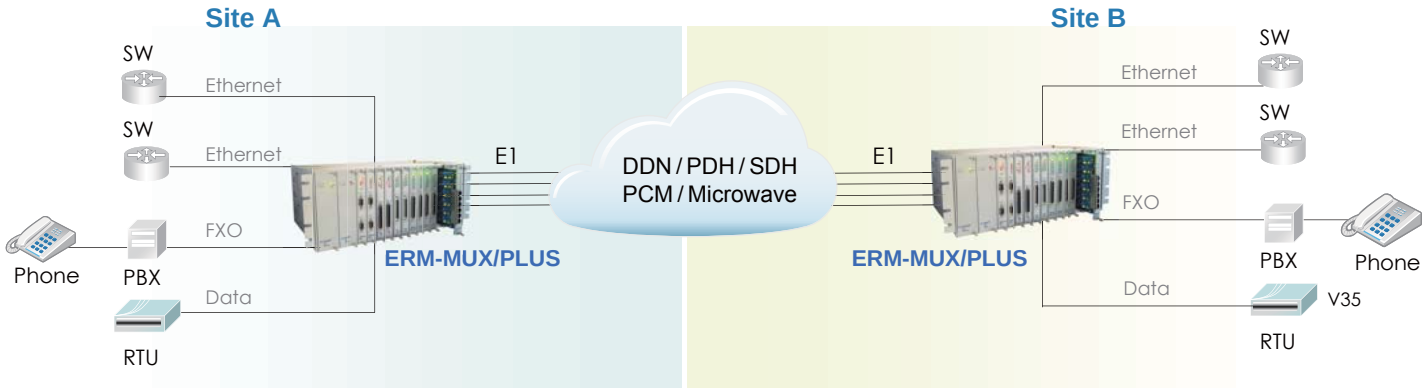
Ordering Information

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-4E1R	Card	4 Ch Main-E1 LTU card(V1.2); w/DB37M to 4xRJ45 cable
ERM-MUX-PLUS-4E1B	Card	4 Ch Main-E1 LTU card(V1.2); w/DB37M to 4xBNC 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)
ERM-MUX-PLUS-RS-232	Card	6 Ch RS-232 interface card (V4.0)
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)

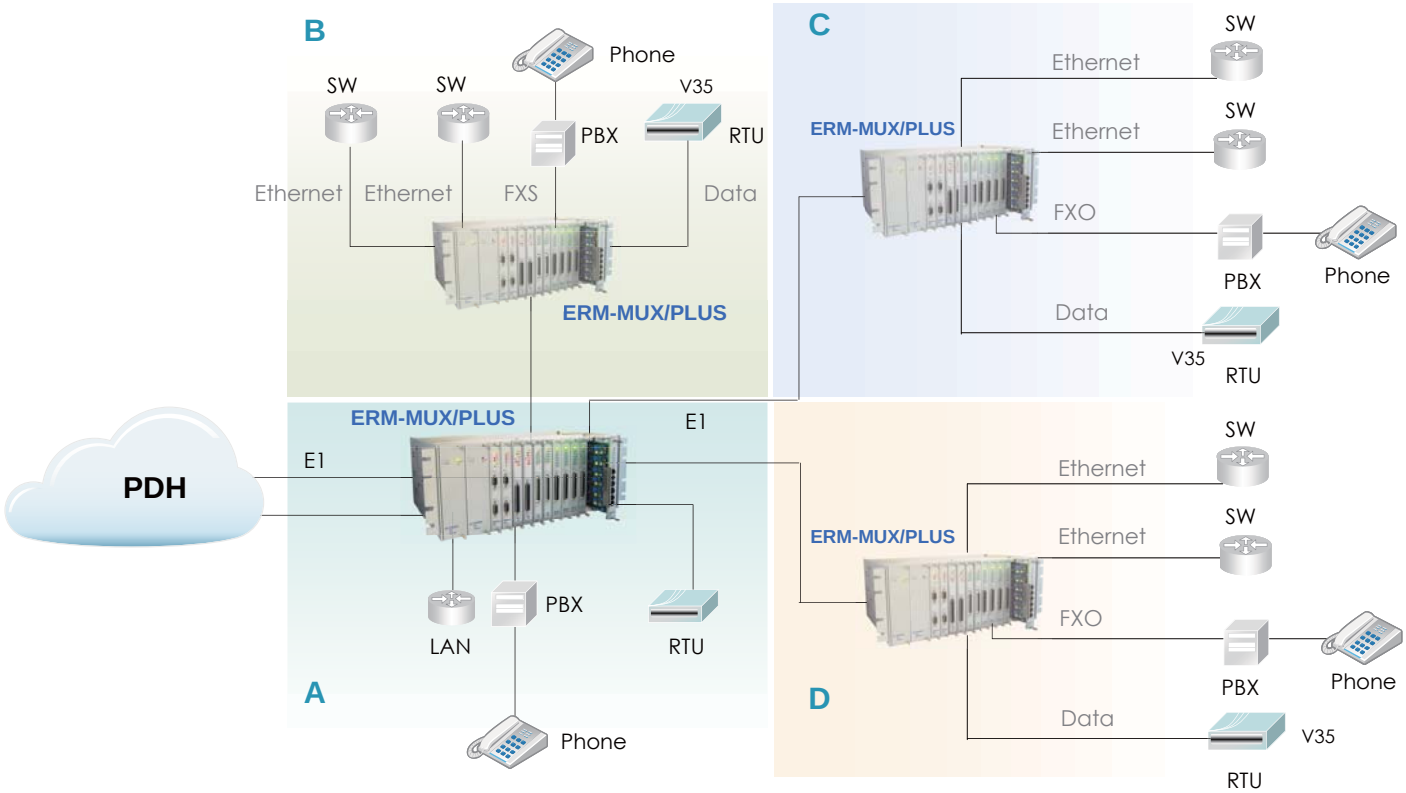
ERM – MUX – PLUS – □□□□

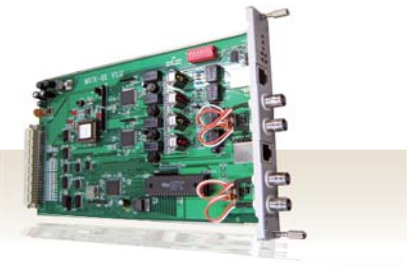
Example: ERM – MUX – PLUS – 2E1R

Connection with PBX (Private Branch Exchange)



The extension and expansion of DDN (Distributed Data)





G.703 E1 Aggregate Card

ERM-Mux/Plus-E1

The ERM-Mux/plus has two dedicated slots for installing E1 aggregate cards. Currently E1 cards are available with 2, 4 or 8E1 ports. In the backplane design of the ERM-Mux/plus, a maximum of 4 E1s can carry data to and from tributary (I/O) cards. One typical application could be to install two 4E1 cards in the chassis and have the cards act as one master and one hot-standby card for E1 redundancy. For other applications, an 8E1 card could be used to cross connect E1 timelots prior to assignment to the four available backplane channels. Another application can use the 'extra' E1 aggregate channels for drop & insert (Sub-E1) rather than performing cross connection. It can quickly be seen that a large number of applications are possible with the ERM-Mux/plus's flexible design.

Features

- Available in 2, 8 E1 channels
- Supports PCM31 or PCM30 framing
- Can provide path/card redundancy
- E1 timeslots can support cross-connect function
- E1 channel can act as Sub-E1 for Drop&Insert
- Hot Swappable

Specifications

Frame format	CAS(PCM30) / CCS(PCM31)
CRC on/off	
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
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

CPU Control Card

ERM-Mux/Plus-CPU

CPUA and CPUB slots can insert two CPU modules that automatically work in redundant operation mode. CPU modules are responsible for all parameter setup from local PC or from the selected in-band E1line. The setup of the ERM-MUX/Plus may be accomplished by:
Local PC connected by Ethernet to SNMP
(can be extend to multiple cases with RS485 twisted-pair).
Local PC connected by serial NMP port to Windows® NMP GUI.E1 network connected to SNMP/NMP GUI.Local terminal console mode.

Specifications

- 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

Fast Ethernet Bridge Tributary Card

ERM-Mux/Plus-ET100

The ERM-Mux/plus Ethernet Bridge Tributary Card provides Ethernet over E1 capability. Incorporating two separate channels, this transparent bridge supports industry standard HDLC encapsulation. The WAN data rate depends on the number of E1 timeslots assigned (Nx64). The front panel has two RJ-45 shielded connectors for connection of 10Base-T or 100Base-TX Ethernet and status LEDs for each channel to display link state, speed, duplex and activity. Rounding out each bridge channel are support for 256 MAC filter address learning table and 340 packets buffer to aid in handling LAN side burst traffic.

Features

- Two 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, IEEE802.3u
Automatic address learning, aging and deletion after 5 min.	
Throughput latency	1 frame
MDI / MDIX	Auto
Filtering	256 MAC address table
Buffer	340 packets
Encapsulation	HDLC
10Base-T/100Base-TX, Full or half duplex	
Packet sizes	64 ~ 1522 bytes
Temperature	0°C ~ 50°C
Humidity	5 ~ 95% (non-condensing)
MTFB	65,000 hrs

Nx64 Synchronous Serial Tributary Card

ERM-Mux/Plus-Data

The ERM-Mux/plus Nx64 Serial Tributary Card provides V.35/ X.21/ RS-530/ RS-449 Synchronous data capability. Incorporating four separate channels, each channel can independently assign any Nx64 timeslots from the aggregate E1. The single HD68 connector mates to a 1 to 4 cable that terminates to the required connector type. Four different cables provide connection to V.35's MB34, X.21's DB15, RS-530's DB25 or RS-449's DB37 female connectors. Please be sure to select the right cable for your application when ordering this card.

Features

- Four independent Synchronous channels
- Nx64 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

ITU-T and ANSI compliant Datacom interfaces	
Multiplexing Nx64K data onto E1 time-slot.	
Data speed	Nx64K(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
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

Asynchronous RS-485/442 Serial Tributary Card

ERM-Mux/Plus-RS485

The ERM-Mux/plus Asynchronous RS485/422 Serial Tributary Card provides six independent RS-485/ RS-422 data channel capability. Incorporating six separate channels, each channel can independently assign any Nx64 timeslots from the aggregate E1. Each channel uses a pluggable 4-pin terminal block for connection one or two twisted pair wires. No cables are provided with this card. When connecting to RS-485, the channel supports 4-wire Full Duplex or 2-wire Half Duplex RS-485 transmissions for serial control or data acquisition.

Features

- Six independent channels
- Nx64 setting from any E1 channel
- Transparent asynchronous rates up to 128kbps
- Diagnostic loop backs
- Hot Swappable

Specifications

Interface	RS-422 4 wire, RS485 4/2 wire
LEDs	RS-485/422 TD/RD, Power, Alarm
Baud Rate	Async mode <= 128K
Bit Error Rate	Less than 10^{-10}
Connector	4pin Terminal Block x 6
Duplex	Full / Half
Temperature	0°C ~ 50°C
Humidity	5~95%
MTFB	65,000 hrs

RS232 Sync/Asyn Tributary Card

ERM-Mux/Plus-RS232

The ERM-Mux/plus Sync/Async RS232 Serial Tributary Card provides six independent RS-232 data channel capability. Incorporating six separate channels, each channel can independently assign any Nx64 timeslots from the aggregate E1. The single DB62 connector mates to a 1 to 6 cable that terminates to DB25 female connectors. These serial data channels may be linked to leased line modems for further extension or connected to other data terminal or data acquisition devices. When configured for synchronous use, the data connectors carry both clock and data. For asynchronous use, the clock signals can be ignored.

Features

- Six independent channels
- Nx64 setting from any E1 channel
- Transparent asynchronous rates up to 115.2kbps
- Synchronous 64 or 128Kbps, DCE mode
- Diagnostic loop backs
- LED indicators for Power, Alarm, RD/TD activity
- Hot Swappable

Specifications

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

G.703 64K Co-directional Tributary Card

ERM-Mux/Plus-G64K

The ERM-Mux/plus G64K Tributary Card provides 4 independent G.703 64Kbps Co-directional data channel capability. Each channel can independently assign any 64Kbps timeslot from the aggregate E1. Individual Shielded RJ-45 connectors that conform to USOC RJ-48C standard wiring provide the G.703 connections. Standard UTP or alternately shielded UTP are both acceptable cabling media. These data channels may be linked to multiplexers, terminal equipment or satellite/micro-wave transmission equipment. In Co-directional signaling, the clock signals are recovered from the received G.703 data stream. Only Tx and Rx pairs or a total of 4 wires are required in 64Kbps co-directional transmission.

Features

- 4 independent channels
- 1x64 setting from any E1 channel
- Transparent synchronous rate of 64kbps
- Co-directional clock recovered from Rx G.703
- Diagnostic loop backs
- LED indicators for Power, Alarm, Tx/Rx activity
- Hot Swappable

Specifications

ITU-T G.703, G.823 64kbps compliant interfaces
Multiplexing 1x64K data onto E1 time-slot.

Data speed	: 64Kbps +/-100ppm.
Data access	: RJ-45 per USOC RJ-48C standard
Line code	: Co-directional
Pulse shape	: according to G.703
Transmit distance	: 600M or less (0.5~0.7mm TP)
Diagnostics	: Local /Remote /Bi-directional Loop
Temperature	: 0°C ~ 50°C
Humidity	: 5~95%
MTFB	: 65,000 hrs

E&M Voice Tributary Card

ERM-Mux/Plus-E&M

The ERM-Mux/plus E&M Voice Tributary Card provides six independent Ear & Mouth Voice channel capability. Each channel can independently assign any 64Kbps timeslot from the aggregate E1. Individual Shielded RJ-45 connectors provide the voice connections. Standard UTP or alternately shielded UTP are both acceptable cabling media. These voice channels may be linked to PBX (Private Branch Exchange) to facilitate voice to voice connections. The channels support selection of Type 1~5, support 2 or 4 wire operation and have 0.5dB steps for signal attenuation. When using this card, an appropriate voice compatible power module must be used in the ERM-MUX/Plus.

Features

- Six independent channels
- 2/4 wire independent setting
- 1x64 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@0dBm0
Noise	: < -65dBm0p weighted
Temperature	: 0°C ~ 50°C
Humidity	: 5~95%
MTFB	: 65,000 hrs

FXO Voice Tributary Card

ERM-Mux/Plus-FXO

The ERM-Mux/plus FXO Voice Tributary Card provides six independent Foreign Exchange Office Voice channel capability. Each channel can independently assign any 64Kbps timeslot from the aggregate E1. Individual Shielded RJ-45 connectors provide the voice connections. Standard UTP or alternately shielded UTP are both acceptable cabling media. These voice channels may be linked to PBX (Private Branch Exchange) or PSTN (Public Switched Telephone Network) to facilitate voice to voice connections. When using this card, an appropriate voice compatible power module must be used in the ERM-Mux/plus.

Features

- Six independent channels
- 2 wire
- G.711 Codec
- 1x64 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
Return loss	: 300-600Hz >12dB (2W) 600-3400Hz >15dB (2W) 300-3400Hz >20dB (4W)
Channel crosstalk	: < -65dB, 1020Hz@0dBm0
Noise	: < -65dBm0p weighted
Temperature	: 0°C ~ 50°C
Humidity	: 5~95%
MTFB	: 65,000 hrs

FXS Voice Tributary Card

ERM-Mux/Plus-FXS

The ERM-Mux/plus FXS Voice Tributary Card provides six independent Foreign Exchange Station Voice channel capability. These 6 channel tributary cards are designed for voice applications over E1. Typically, an FXS connects to a standard telephone set. The FXS needs to sense on-hook, off-hook or disconnected status. It also must be able to provide ring function to a telephone set and it must pass caller-ID information. In the ERM-Mux/plus point-to-point application, the FXS can connect to a remote FXO (Foreign Exchange Office) when deployed as an extension from PBX (Private Branch Exchange) or PSTN (Public Switched Telephone Network). It may also connect to a remote FXS, also for extension from PBX or as a direct 'hotline' voice connection. Individual Shielded RJ-45 connectors provide the voice connections. When using this card, an appropriate voice compatible power module must be used in the ERM-Mux/plus.

Features

- Six independent channels
- 2 wire
- G.711 Codec
- 1x64 setting from any E1 channel
- Provides ring function
- Supports caller-ID forwarding
- PSTN extension or direct "Hot-line"
- Links PBX to PBX or extends POTS
- LED indicators for Power, Alarm, 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.
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
Channel crosstalk	: < -65dB, 1020Hz@0dBm0
Noise	: < -65dBm0p weighted
Temperature	: 0°C ~ 50°C
Humidity	: 5~95%
MTFB	: 65,000 hrs

1U, 3 I/O Slot Data, Ethernet, Voice E1 Managed Multiplexer

ETU02-MUX-Plus

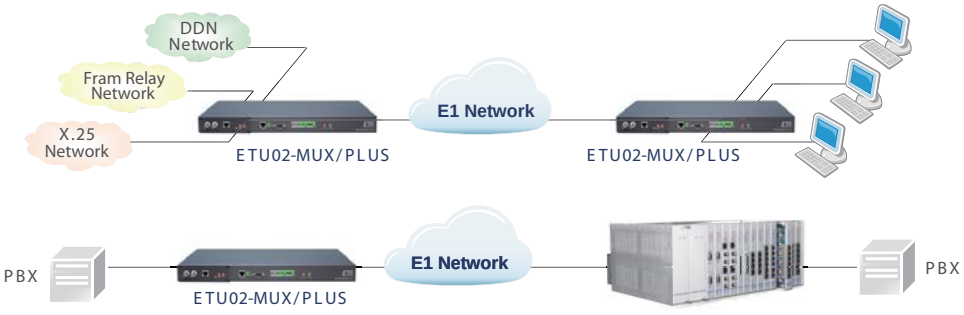
The ETU02-MUX/PLUS is a 1U 19(23)" 3 slot rack type E1 Time Division Multiplexer for Fractional E1 network access which provides an economic solution for central site or remote installations. There are 3 slots available for hot-swappable ETU02-MUX/PLUS-I/O cards. One slot is provided for MUX-E1 card, which provides either single E1 main link or main E1 link plus a drop and insert sub-E1 port. The MUX-E1 card may be linked to another ETU02-MUX/PLUS or ERM-MUX/PLUS Rack to provide a point-to-point variety of datacom, Ethernet & voice over E1 network services. The ETU02-MUX/PLUS optionally accommodates up to two separate power supplies, which may derive power from AC (110/220) or DC (-48V) 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 ETU02-MUX/PLUS provides BNC and RJ-45 for E1 Line interface connections, RJ-45 connections are used for all voice (FXO, FXS, E&M), for 10/100 Ethernet Bridge and G.703/64K Co-directional. Optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to 4xRS-232 or HP68F DCE ports of I/O card to 2x V.35, RS-530, RS-449, RS-422 and X.21 channels.

Features

- 1U 19" 3-slot chassis
- Provides 3 slots, removable interfaces: V35, X21, RS530, RS449, RS232, G.703 Co-directional, Ethernet Bridge, FXO, FXS and E&M
- Optional drop and insert E1 port (Sub E1)
- Setup and Control via RS-232 terminal
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Optional SNMP management

Specifications

Indications	Power, Signal loss, Sync loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test
Standard	ITU-T G.703/G.704/G.706 & G.732, G823
Power / Consumption	AC: 90 ~250V / 20W
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
MTBF	57,000 hrs



FXO

- Provides 4 independent channels
- Connects directly to PSTN

Specifications

Connector	RJ-45*4	
Impedance	600 ohms	
Level Gain	On Tx side 0 dB	On Rx side -3.5dB
Ring current impedance	> 7.5k ohms	
Direct current resistance	< 300 ohms	
Maximum direct current borne	> 70V	

8E1-DXC

- 8 independent channels

Specifications

Connectors	BNC for unbalanced ; RJ-45 for balanced
Framing Format	Unframed / Framed CCS(PCM31) / CAS (PCM30)
CRC check	CRC4 on/off
Bit rate	2.048Mbps±0 ppm
Line code	AMI / HDB3
Line impedance	75 ohm(BNC) / 120 ohm(DB-15, RJ-45)

Ordering Information

Model Name	Type	Description
ETU02-MUX/PLUS/AC	Chassis	1U 19" 3+1 slot Chassis with SNMP card and AC Power
ETU02-MUX/PLUS/DC48	Chassis	1U 19" 3+1 slot Chassis with SNMP card and DC 48V Power
ETU02-MUX/PLUS/DC24	Chassis	1U 19" 3+1 slot Chassis with SNMP card DC 24V Power
ETU/E1SUB	Card	E1 Trunk Module with One Main E1 and One Sub E1 Lines in BNC Type Both
ETU/E1	Card	E1 Trunk Module with One Main E1 Line in BNC Type
ETU/N64	Card	2Ch V.35/X.21/RS-449 Modue, N X 64Kbps
ETU/232	Card	4Ch RS-232 Modul
ETU/232-C	Card	4Ch RS-232 Module with Clock
ETU/ET100	Card	2Ch 10/100Base-T EthernetModule RJ-45
ETU/FXS	Card	4Ch FXS Interface Module RJ-45
ETU/FXO	Card	4Ch FXO Interface Module R-J45
ETU/E&M	Card	4Ch E&M Interface Module R-J45
ETU/G64	Card	2Ch G.703 64Kbps Co-directional Module RJ-45
ETU/8E1-DXC	Card	8ch E1-DXC Card

ETU02 – MUX / PLUS / □□

Example: ETU02 – MUX / PLUS / AC

G.703/64K co-directional card

- 2-channels, Co-directional 64K interface

Specifications

- **Interface types** G.703/64K, Co-directional
- **Connector** RJ45 x 2
- **Line code** ITU-T G.703/64K, Co-directional
- **Data rate** 64kpbs±100ppm x 2 channels
- **Line impedance** 120 ohms (balanced)
- **Frame mode** Unframed only

FXS

- Provides 4 independent channels
- Connects to standard telephones

Specifications

- **Connector** RJ45 x 4
- **Impedance** 600 ohms
- **Level Gain** On Tx side 0 dB; On Rx side -3.5dB
- **Ring current Output** 75±15V
- **Frequency** 25±3Hz
- **Feeding voltage** -48
- **Loop resistance** 1800 ohms
- **Connecting distance** up to 4km
- **Wire Gauge** 0.4mm
- **Feeding working current** 20mA

RS-232 card

- 4-channels
- Data rate: Asynchronous mode <= 38.4Kbps (4-channels),
- Synchronous mode = 19.2/38.4/64/128Kbps

Specifications

- **Interface type** RS-232
- **Connector** HD62F (female) with cable adapter
- **Line code** NRZ
- **Data rate** 3.84kbps x 4ch or 64/128kbps x 4ch

E&M

- BD/GD wires are for battery and ground detection
- E&M card provides 4 independent channels
- E&M interface provides 1 pair of E and 1 pair of M
- Each E&M can support Type I, II, III, IV or V
- Loop current range is normally 5-30mA, 70mA max
- Timeslot 16 complies with ITU-T G.711
- TX / RX attenuation, and 2 / 4 wire operation

Specifications

- **Input level** 0 to -16dBr, in 0.5dB steps
- **Output level** 0 to -16dBr, in 0.5dB steps
- **Impedance** 600 ohms, option
- **Return loss** 2-wire 300-600Hz: >12dB
  2-wire 600-3400Hz: >15dB
  4-wire 300-3400Hz: >20dB
- **Group delay** 2-wire @ -10dBm: < 750μ second
  4-wire @ -10dBm: < 600μ second
- **Total distortion** According to ITU-T G223
- **Channel cross-talk** Not exceed -65dB, 1020Hz@0dBm
- **Out-of-band Signal attenuation** -25dBm@4.6~72KHz
- **Level not to exceed** -50dBm
- **Noise** <-65dBm
- **Interface connector** RJ-45*4

E1 and Sub E1 module

- Single E1 or 1+1 E1 card (E1 and Sub-E1), provides unbalanced BNC or balanced RJ45 connector
- Each E1 loop provides clock to be used as system clock source

Specifications

- **Connectors** BNC for unbalanced ; RJ-45 for balanced
- **Framing Format** Unframed / Framed CCS (PCM31) / CAS (PCM30)
- **CRC check** CRC4 on/off
- **Bit rate** 2.048Mbps±0 ppm
- **Line code** AMI / HDB3
- **Line impedance** 75 ohm(BNC) / 120 ohm(DB-15, RJ-45)
- **Relative receive level** 0 to -43dB
- **Transmitter driver reach** 1.5Km
- **Pulse amplitude** Nominal 2.37V ±10% for 75ohm
  Nominal 3.00V ±10% for 120ohm
- **Zero amplitude** ±0.1V
- **Transmit frequency** Internal timing ±30 ppm
- **Tracking** Recovery timing ±50 ppm
- **External** timing±100 ppm
- **Jitter performance** According to ITU-T G.823
- **Compliance** ITU G.703, G.704, G.706, G.732

Nx64 card

- 2-channels , High speed data interface
- Data rate: N*64kbps, where N=1 to 31 in CCS N=1 to 30 in CAS

Specifications

- **Interface types** RS-530, X.21, V.35, RS-449, RS-232
- **Connector** HD68F (female) with cable adapter
- **Line code** NRZ
- **Data rate** Nx64kbps

ET-100 Ethernet Bridge card

- 2 independent channels, Ethernet bridge interface
  10/100Base-TX bridge
  Auto-Negotiation, Auto MDI/MDIX
  Forward 1522 bytes (Max.) packets
  Supports IEEE 802.1q Tag VLAN pass thru
  Support flow control (Pause)

Specifications

LAN Specifications

- **Standard** Fully compliant with IEEE 802.3/802.3u
- **Connector** RJ-45x2, 10/100Base-TX, Auto-negotiation
- **Speed** 10Base-T/100Base-TX, Full or half duplex
- **Frames** Supports 64 to 1522 byte packet lengths standard and extended length frames for VLAN tagging, etc.

WAN Specifications

- **Protocol** Synchronous HDLC
- **Rates** N*64 or N*56Kbps, up to 2048Kbps

G.703 64Kbps Co-Directional to V.35 / RS-530 / 449 / 232 / X.21

G703 / 64A-STD

The G703/64A-STD is a 1U half 19" stand-alone or rack mountable interface converter that allows full conversion between G.703 64Kbps co-directional services and a number of data port interfaces including ITU V.35, X.21, EIA RS-530, RS-449 and RS-232 hardware. The interface converters are very easy to implement. Simply select the mode, appropriate interface settings and adapter cable, configure the required timing for translation via internal DIP switches, and connect to appropriate power. This model features full compliance with all the relevant ITU & EIA standards under 64Kbps network environments with high reliability. G.703 64K Family of products may be used in Packet Switching Networks, ISDN and DDN. They are also useful for data terminals which access PCM, 64K/2048Kbps digital channels as well as digital microwave channels. Additionally, it may be connected to satellite communication channels.

Features

- 1U half-19" single port G703 64kbps access unit
- Interface: V.35, X.21, RS530, RS449 and RS232 with cable
- Data rate: 64Kbps Sync and Async RS232 up to 19.2Kbps
- Fully transparent signal conversion
- Selectable timing modes: recovery, transparent, data port or internal OSC
- Data port provides 10bit FIFO
- Diagnostics: local and remote analog and local digital loopback

Specifications

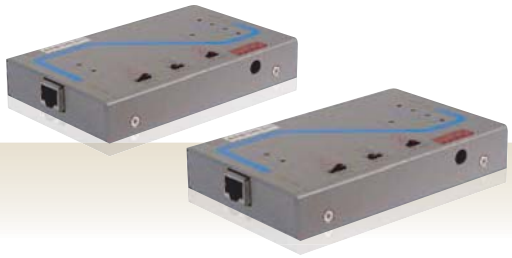
Interface	Types: co-directional, centra-directional, or contra-directional 64Kbps Frame format: Unframed Line: 4 wires, 0.5 ~0.7mm twisted pair cable Range: up to 800 meters over 24AWG Impedance: 120 ohm Pulse amplitude: Nominal 1.0V ±10 Zero amplitude: ±0.1V Clock frequency: 64KHz Frequency tracking: ±100ppm Connector: DB9F
Data interface	Types: V.35, X.21, RS-530, RS-449, RS-232 with adapter cable Data rate: 64kbps for Sync. 19.2kbps for Async Connector DB25F
Indications	LEDs (Power, TD, RD, RTS, DCD, TX, RX, Signal, Timing, Err, Test)
Standards	ITU-T G.703, G.823
Power Input	AC: 90 ~ 250 VAC DC24: -18 ~ -36 VDC, DC48: -36 ~ -72 VDC
Power Consumption	10W
Dimensions	235 x 195 x 45mm (D x W x H)
Weight	1.6kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	57,000 hrs

Single - Port G703 / 64K Access **Single - Port G703 / 64K Access**

Ordering Information

Model Name	Description
G703/64A-STD/AC	Access Units with AC power supply (90 ~ 250 VAC) Support interface: V.35 / RS-530 / RS-449 / X.21 / RS-232
G703/64A-STD/DC	Access Units with -48 VDC power supply (±36 ~ ±75 VDC) Support interface: V.35 / RS-530 / RS-449 / X.21 / RS-232
G703/64A-STD/DC+24	Access Units with +24 VDC power supply (±18 ~ ±36 VDC) Support interface: V.35 / RS-530 / RS-449 / X.21 / RS-232

G703/64A – STD / □□
Example: G703/64A – STD / AC



G.703 64Kbps Co-Directional Compact Standalone Unit

G703 / 64A

The G703/64A is a compact stand-alone interface converter that allows full conversion between G.703 64Kbps co-directional services and a number of data port interfaces including ITU V.35, X.21, EIA RS-530, RS-449 and RS-232 hardware. The interface converters are very easy to implement. Simply select the mode and appropriate interface settings by DIP switch, select an adapter cable, configure the required timing for translation via internal DIP switches, and connect to appropriate power. This model features full compliance with all the relevant ITU & EIA standards under 64Kbps network environments with high reliability. G.703 64K Family of products may be used in Packet Switching Networks, ISDN and DDN. They are also useful for data terminals which access PCM, 64K/2048Kbps digital channels as well as digital microwave channels. Additionally, it may be connected to satellite communication channels

Features

- Palm size single port G703 64kbps access unit
- Interface: V35, X21, RS530, RS449 and RS232 with cable adapters.
- Data rate : 64Kbps Sync and Async RS232 up to 19.2Kbps
- Fully transparent signal conversion
- Selectable timing modes: recovery, transparent, data port or internal OSC
- Selectable co-directional, centra-directional or contra-directional
- Diagnostics: local analog and digital loopback

Specifications

Interface	G.703/64K interface Types: Co-directional, Centra-directional, or Contra-directional 64Kbps Frame format: Unframed Line: 4 wires, 0.5 ~0.7mm twisted pair cable Range: up to 800 meters over 24AWG Impedance: 120 ohm Pulse amplitude: Nominal 1.0V ±10 Zero amplitude: ±0.1V Clock frequency: 64KHz Frequency tracking: ±100ppm Connector: RJ-45
Data interface	Types: V.35, X.21, RS-530, RS-449, RS-232 with adapter cable Data rate: 64kbps for Sync. 19.2kbps for Async Connector DB25F
Indications	LEDs (Power, RD, SD, GRD, GSD, Signal loss, Timing loss)
Standard	ITU-T G.703, G.823
Power Input	9VDC
Power Consumption	5W
Dimensions	135 x 79 x 30mm (D x W x H)
Weight	0.18kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	57,000 hrs

Ordering Information

Model Name	Description
G703/64A-232	G.703 64kbps Converter with single RS-232 interface with adapter cable
G703/64A	G.703 64k Converter with DB25 interface Optional Cables solution for V.35 / RS-530 / RS-449 / X.21

G703/64A – □□□
Example: G703/64A – 232

- Coax to Twisted Pair
- Balun Patch Panel
- Mini Balun

24 port BNC to RJ45 E1 Balun Rack

BP20

The ITU-T G.703 balun panel matches multiple sets of dual 75 ohm coax connections to multiple 120 ohm twisted pair connections, supporting data stream rates of 2-8 Mbps for E1 and E2. The patch panel bi-directionally matches not only signal impedance, but also the pulse shapes of the signals according to the ITU-T G.703 standard. The modular construction allows up to 24 separate G.703 BALUN Modules in a 19" rack mountable chassis. This modular design provides a cost-effective solution and can be purchased in separate components.

Features

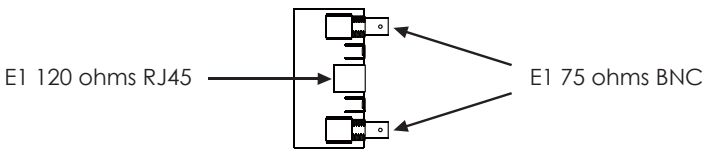
- Connects 75 ohm dual coax to 120 ohm twisted pair
- Mounts in standard 19" Rack
- No AC power or batteries needed
- Link-to data isolation: Mini. 250V
- Bi-directional signal conversion
- Operating temperature 0°C ~ 75°C
- Typical distance: 180m via Cat.5e cable

Specifications

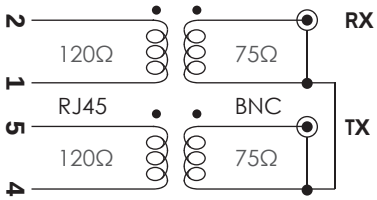
Data Rate	2 to 8Mbit/s speed version for E1，E2 data streams
Impedance	75 ohm to120 ohm
Insertion loss	Max 0.3dB(2Mbps); Max 0.5dB(8Mbps)
Return loss	75 ohm -47.5dB(2Mbps); -37.9dB(8Mbps) 120ohm -43.5dB(2Mbps); -34.5dB(8Mbps)
Dimension	483 x 88 x 46.2mm (D x W x H)
Weight	2.3kg

24 port G703 patch panel

G.703 BALUN Modules



G.703 BALUN Pin Assignment



Ordering Information

Model Name	Description
BP20-CH	2U, 19" 24 ports G703 balun patch panel rack
	Fixed type G703 balun module not included
BP20-M01	1-port fixed type G703 Balun module
	Female BNC to STP RJ45 on the same side

BP20 – □□
Example: BP20 – CH

G.703 Mini Balun

BLN-3010/4010/5010/6010

A balun is a type of electrical transformer that can convert electrical signals that are balanced to signals that are unbalanced and vice versa. They are also used to change impedance of twisted pair's 120 ohm to coaxial's 75 ohm. An E1 balun's function is generally to convert an E1 carrier signal from coaxial cable to UTP CAT-5 cable. The BLN4010 is miniature Balun designed for applications where space is restricted due to small dimensions or high densities. The fully shielded design is intended for panel mounting and IDC twisted pair termination is available in either standard BNC or 1.6/5.6 jack unbalanced connectors.

Features

- Converts between 75 ohm coax and 120 ohm twisted pair for E1(2048Kbps)
- Works in either direction
- Body parts plated with minimum 5u Ni(Nickel)
- Contacts plated with minimum 1.25u Ni(Nickel) and 1.25uAu(Gold)
- Coax connectors with BeCu spring contacts and Teflon insulators
- Coaxial connector insertion cycle > 500
- IDC contacts Phosphor Bronze
- IDC connect/disconnect cycle > 20
- IDC to suit 24.26.28 AWG Copper wire
- Integrated cable anchor allows cable to be inserted after termination on IDC

Specifications

Data rate	2048Kbps
Unbalanced interface	75 ohm impedance, 1xBNC or 1x 1.6/5.6 Jack
Balanced interface	120 ohm impedance, IDC
Dimensions	1.7cm x 1.6cm x 4.8cm (D x W x H)
Weight	15g
Compliance	ITU G.703 standard pulse

BLN-3010 : 1.6 / 5.6 Jack to Krone IDC

BLN-5010 : BT43 to Krone IDC

BLN-4010 : BNC to Krone IDC

BLN-6010 : SMZ to Krone IDC

Ordering Information

Model Name	Description
BLN-3010	75 ~ 120 ohm Balun, 1.6/5.6 Jack to Krone IDC
	IDC Pin Assignment PA(-), PB(+), PG(G)
BLN-4010	75 ~ 120 ohm Balun, BNC/F to Krone IDC
	IDC Pin Assignment PA(-), PB(+), PG(G)
BLN-5010	75 ~ 120 ohm Balun, BT43 to Krone IDC
	IDC Pin Assignment PA(-), PB(+), PG(G)
BLN-6010	75 ~ 120 ohm Balun, SMZ to Krone IDC
	IDC Pin Assignment PA(-), PB(+), PG(G)

BLN – ☐☐☐☐

Example: BLN – 3010

G.703 Coax to Twisted Pair

Balun-P/S / Balun-B1/B2

A balun is a type of electrical transformer that can convert electrical signals that are balanced to signals that are unbalanced and vice versa. They are also used to change impedance of twisted pair's 120 ohm to coaxial's 75 ohm. An E1 balun's function is generally to convert an E1 carrier signal from coaxial cable to UTP CAT-5 cable.

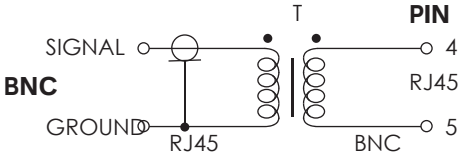
Features

- Converts between 75 ohm coax and 120 ohm twisted pair for E1 (2048Kbps)
- Easy to install
- No power required
- Small, light-weight Balun
- Works in either direction
- Works for balanced and unbalanced E1

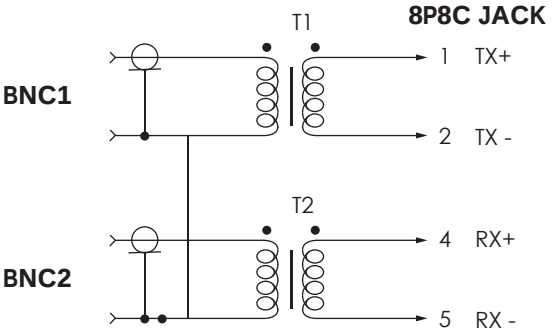
Specifications

Data rate	2048Kbps
Unbalanced interface	75 ohm impedance, 2xBNC
Balanced interface	120 ohm impedance, 1xRJ-45
Dimensions	Balun-B2/S , Balun-B2/S-2
	4.4 x 5.4 x 2.5cm (W x D x H)
	Balun-B1
	2.2 x 5.6 x 2.1cm (W x D x H)
	Balun-P/S , Balun-P/S-2
	2.2cm x 22.4cm x 2.1cm
Weight	Balun-B2/S , Balun-B2/S-2 35g
	Balun-B1 65g
	Balun-P/S , Balun-P/S-2 45g
Compliance	ITU G.703 standard pulse

PIN Assignment for Balun-B1



PIN Assignment for Balun-P & Balun-B2



Ordering Information

Model Name	Description
Balun-P/S	Two BNC pigtail type
	RJ45 Shielded - 2xBNC/M with 6" pigtail
	RJ45 PIN ASSIGNMENT: P1(+) / P2(-) , P4(+) / P5(-)
Balun-B1/S	One BNC box type
	RJ45 Shielded - 1xBNC/F
	RJ45 PIN ASSIGNMENT: P4(+) / P5(-)
Balun-B2/S	Two BNC box type
	RJ45 Shielded - 2xBNC/F
	RJ45 PIN ASSIGNMENT: P1(+) / P2(-) , P4(+) / P5(-)

Balun – ☐ / ☐

Example: Balun – P/S

- POE Surge Protector
- Ethernet Surge Protector
- V35 Surge Protector
- G703 E1 BNC Surge Protector
- Telephone Surge Protector

POE Surge Protector

SP-POE-01

The SP-POE-01 is a single port, Ethernet surge protector designed to protect all 8 lines used in a standard CAT5e cable. The product is compatible with 10/100 BaseT networks and 48V Power-over-Ethernet systems. The Standard 802.11af allows the methods of implementing PoE: The SP-POE-01 applies data to the pairs (pins 1/2 and pins 3/6) and power to the unused pairs (pins 4/5 and pins 7/8). The SP-POE-01 offered protection is provided on all 8 Ethernet pins (6.8V clamping on Data pins 1,2,3,6 and 53V clamping on POE pins 4,5,7,8). Network connections are made via standard female RJ45 connectors. Grounding is accomplished via a ground wire.

Specifications

Voltage	Data 5V ; POE 48V
Clamping Voltage	6.8V Data (Pins 1,2,3,6) 53V POE (Pins 4,5,7,8)
Max Surge Discharge Current	5KA (8/20uS)
Peak Pulse Current	100A (10/1000uS)
Pins Protected	Data : 1, 2, 3, 6 POE : 4, 5, 7, 8
Insulation Lost	< 0.5dB (10Mbps)
Data Rate	10/100 Mbps
Response Time	line/line <1 ns; line/ground < 100ns
Operating Temperature	-20°C ~ +75°C
Storage Temperature	-40°C ~ +85°C
Operating Humidity	0% ~ 95% non condensing
Size	106.2 x 37.6 x 25.6 mm (L x W x H)
Weight	75 g

Features

- 10/100Mbps data rate
- Compatible with 48V power over Ethernet systems
- 6.8V Data / 53V POE clamping voltage
- 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

Ordering Information

Model Name	Description
SP-POE-01	1-port RJ45 10/100BaseT POE Ethernet Surge Protector (Data: 1,2,3,6. POE: 5,6,7,8)
SP-POE-08	8-port RJ45 10/100BaseT POE Ethernet Surge Protector (Data: 1,2,3,6. POE: 5,6,7,8)
SP-POE-16	16-port RJ45 10/100BaseT POE Ethernet Surge Protector (Data: 1,2,3,6. POE: 5,6,7,8)
SP-POE-24	24-port RJ45 10/100BaseT POE Ethernet Surge Protector (Data: 1,2,3,6. POE: 5,6,7,8)

SP-POE – □□
Example: SP-POE – 01

Telephone Surge Protector

TSP-10

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 TSP-10 will ensure the reliable operation of POTS based equipment such as telephones, FAX machines and dialup modems.

Specifications

Surge current	8 x 20u sec of 500A
DC spark over voltage	160 ~ 240VDC
Dimensions	80 x 30 x 27mm (D x W x H)
Weight	20g
Compliance	UL 1449 (2nd Edition)

Features

- Protect FAX and dialup modems from surges on telephone lines
- Control transient over voltage to a low level to ensure maximum protection for your equipment
- LED indicator flashes for ring indication and lights during device off-look operation
- Meet UL 1449

Ordering Information

Model Name	Description
TSP-10	In Line Telephone Surge Protector with RJ-11 Jacks

Fast Ethernet Surge Protector

SP-ETH-01

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-08: 8 pins SP-ETH-01-8: 8 pins SP-ETH-16: 8 pins SP-ETH-01-4: 4 pins SP-ETH-24: In: 8 pins
Attenuation in dB	< 0.5dB (100MHz)
Capacitance	< 40pF
Dimensions (D x W x H)	85 x 55 x 24 mm (1 port) 73 x 143 x 44mm (8 port) 73 x 480 x 44mm (16/24 port)
Weight	75g (1 port); 0.44kg (8 port) 1.38kg (16 port); 1.40kg (24 port)
Certification	IEC 61644-1

Ordering Information

Model Name	Description
SP-ETH-01-4	1-port RJ45 10/100TX Ethernet Surge Protector (pin 1,2,3,6)
SP-ETH-01-8	1-port RJ45 10/100TX Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-ETH-08	8 Port RJ45 10/100TX Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-ETH-16	16 Port RJ45 10/100TX Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-ETH-24	24 Port RJ45 10/100TX Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)

SP – ETH – □□ – □
Example: SP – ETH – 01 – 4

Gigabit Ethernet Surge Protector

SP-GE-01

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 degree
Dimension (D x W x H)	85 x 55 x 24 mm (1 port) 73 x 148 x 44mm (8 ports) 73 x 480 x 44 mm (16/24 ports)
Weight	75g (1 port); 0.44kg (8 ports) 1.4kg (16/24 ports)
Certification	IEC 61644-1

Ordering Information

Model Name	Description
SP-GE-01	1-port RJ45 10/100/1000T Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-GE-08	8 Port RJ45 10/100/1000T Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-GE-16	16 Port RJ45 10/100/1000T Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)
SP-GE-24	24 Port RJ45 10/100/1000T Ethernet Surge Protector (pin 1,2,3,4,5,6,7,8)

SP – GE – □□
Example: SP – GE – 01

V35 Surge Protector

SP-V35-01

The SP-V35-01, V.35 Data Line Surge protector, prevents damage to V.35 data ports and data errors due to electrical surges. These surges originate from a wide variety of sources, including lightning strikes, static charge buildup, electric motors, fluorescent lights or the normal AC power protection equipment. Data line transients can be damaging to V.35 hardware. The surge protector intercepts harmful data line transients and diverts them safely to chassis ground through a grounding wire. The SP-V35-S01 plugs directly into an M/34 data port. All standard data, clocking and control signals on the ITU-T V.35 interface are protected. The SP-V35-S01 uses sophisticated circuits, which allow the unit to operate at the data rates up to 10 Mbps. The SP-V35-S01 can take repeated surge "hits" without degrading in performance or letting harmful energy through to the data port.

Features

- Standard V.35 data Lines on the M/34 cable adapter
- Data Rates up to 10 Mbps
- Plugs Directly into V.35 Port
  (One Male, One Female M/34 cable adapter)
- Diverts Harmful Transients to Chassis Ground through Braided Metal Strap
- Able to take Repeated Surges without Degrading in Performance
- Prevents equipment in case of a Severe Surge
- Surge Handling Capacity of 1,500 Watts

Specifications

Interface	V.35
Maximum Data Rate	10 Mbps
Connectors	(1) 34-pin M-block male (2) 34-Pin M-block female
Leads/Signals Protected	All V.35 leads/signals
Capacitance	< 40pF
Maximum Surge Protection (Current, 8 x 20 µs at Standard Clamp Voltage)	370 amps
Standard Clamp Voltage	30 volts
Series Resistance	None
Temperature	- 40°C ~ 85°C
Humidity	10 ~ 90% relative, non-condensing
Dimensions	120 x 52 x 30mm (D x W x H) plus 50 cm of cable(fully extended) on either side for a total length 70 cm
Weight	0.3kg

Ordering Information

Model Name	Description
SP-V35-01	V35 Data line surge protector

E1 Surge Protector

SP-SE-B01

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-SE-B01 will ensure the reliable operation of coaxial based networking equipment running ArcNet, Satellite/CCTV and 75 ohm E1 communication systems.

Features

- Protect E1 Access Units using coaxial cable from transient surge voltages
- Compact in-line installation
- Low shunt capacitance to reduce signal loss
- Maximum system up time
- State of the art, avalanche diode technology

Specifications

Type	SP-SE-B01
Connection	BNC
Un	10V
U-max	18V
Discharge current	10KA
Response time	< 10ns
Insertion loss (40MHz)	0.5dB
Dimensions	38 x 68 x 27mm (D x W x H)
Weight	70g
Compliance	IEC 61644-1, draft 98

Ordering Information

Model Name	Description
SP-SE-B01	5 ohm, BNC, 1 port Coax cable surge protector

Offers the Power Stability and Reliability Necessary

- Optical Fiber Tester
- E1 BERT
- Protocol Analyzer
- PCM Analyzer
- LAN Cable Tester

Single Mode Optical Time Domain Reflectometer

OTDR-30A

The OTDR-30A is an OTDR (Optical Time Domain Reflectometer) based optical fault locator and analysis tool for optical fiber networks. The OTDR features a light, compact, hand-held design with an intelligent user interface that is easy and quick to use. The color LCD display with bright backlight makes testing work more comfortable and convenient, whether during daylight or in low light conditions. As a fault locating and analyzing tool, the OTDR-30A is much more economical than traditional OTDRs. In addition to its 300 plus internal curve storage, the OTDR-30A can save and transfer the measurement curves data to a PC via serial or USB port for further analysis or printing with Window ® based "Trace Manager" software. When set in auto measurement mode, the user can activate the measurement operations easily by the push of only one button. The OTDR-30A is ideal for optical fiber installation, maintenance, field construction, and other on-site fault-location analysis.

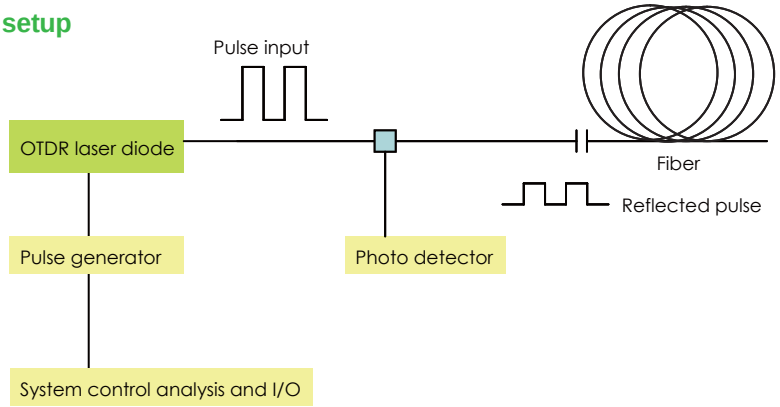
Features

- Auto off function conserves battery energy
- Backlight supports testing work at low light conditions
- Built-in NiMH rechargeable battery supports 5 hours continuous operation
- Dual wavelength capability (1310 & 1550 nm)
- Dust, damp and shock resistant design for field application
- Easy to use, no tedious learning process
- Fast test & color LCD displays all measurement information
- Large memory capacity (300 test curves)
- LCD indicators for battery charge and LD lasing status
- Low battery Indicator
- Lightweight, portable and economical
- RS-232/USB data upload ports
- Trace Manager PC software for previously stored data analysis and reporting

Specifications

Dynamic Range	24dB
Wavelength	1310/ 1550 ±20nm
Fiber Type	Single Mode
Optical Connection	Single Port
Emitter Type	LD
Connector Type	FC/PC, SC/PC or ST/PC
Selectable Range	1.3, 2.5, 5, 10, 20, 40, 80 120km
Selectable pulse width	30ns, 100ns, 275ns, 1µs, 2.5µs
Measurement Time	15s, 30s, 1min, 2min, 3min
Attenuation Deadzone	25m
Event Deadzone	10m
Sampling Range	1m ~ 10m
Distance Measure Accuracy	±(1m + 5x10-5 x Distance + sampling space)
Attenuation Detect Accuracy	±0.05dB/ dB
Reflection Detect Accuracy	±4dB
Data Storage	300 test traces
Data Interface	RS-232 and USB port
Power Input	1600mA/ h AC adapter (internal NiMH rechargeable battery)
Environmental	Temperature -10°C ~ 50°C (Operating) -20°C ~ 65°C (Storage) Humidity 0 ~ 95% non condensing
Dimensions	196 x 100 x 60mm (W x D x H)
Weight	0.87kg

An OTDR component setup



Ordering Information

Model Name	Description
OTDR-30A-FC	24/24dB, 1310/1550nm, Single mode OTDR tester with FC connector
OTDR-30A-SC	24/24dB, 1310/1550nm, Single mode OTDR tester with SC connector
OTDR-30A-ST	24/24dB, 1310/1550nm, Single mode OTDR tester with ST connector

OTDR – 30A – □□□□

Example: OTDR – 30A – FC

STM-1 and G.703 E1 Analyzer / BERT

HCT-SDH155

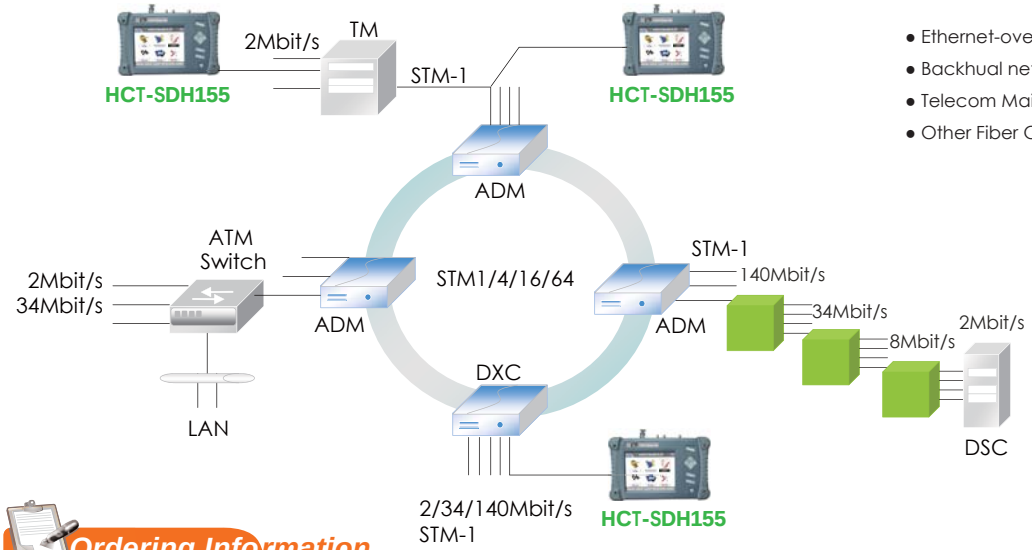
he HCT-SDH155 combines advanced PDH and SDH test functions in a single unit, eliminating the need for multiple, purpose-built test platforms for the commissioning or troubleshooting of E1 to STM-1 circuits. The extensive list of PDH and SDH features available on the HCT-SDH155 allows users to perform a wide range of tests from simple bit-error-rate (BER) analysis to more advanced network characterization and troubleshooting.

Features

- Mixed and bulk payload generation and analysis from 64kbit/s to155Mbit/s
- High-order mappings: STS-1/3c AU-3/AU-4
- Low-order mappings: VT1.5/2/6, VC-11/12/2/3
- Section/RS, line/MS, high-order (HO) and low-order (LO) path overhead manipulation and monitoring
- Section/RS, line/MS, high-order and low-order path alarm/error generation and monitoring
- Performance monitoring: G.821, G.826, G.828, G.829, M.2100, M.2101
- Automatic protection switching and service disruption time measurements
- Round-trip delay measurements
- Frequency offset generation
- Frequency analysis and power measurement
- Through mode analysis
- Programmable error/alarm injection
- Fractional E1 testing
- Tandem connection monitoring

Specifications

Test Mode	SDH Path, SDH Demux, SDH Mux, SDH Monitor, SDH Through PDH Path, PDH Monitor, PDH Through
Ports	Electric port：BNC, unbalanced Optic port：SFP-LC (1310nm, 1550nm)
Frequency offset	±99 ppm, 1ppm per step
Clock sources	Internal, External and Recovery
PRBS	2n-1 (n=9, 11, 15, 20, 23), all "1" or all "0"
SOH	Customer can edit insertion and analyzing overhead J0, B1, B2, E1, E2, F1, D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, S1, M1
POH	J1, B3, C2, G1, F2, H4, F3, K3, N1, V5, J2, N2, K4 Pointer sequence adjustment according to ITU-T G.783 Monitor alarm and performance according to ITU-T G.783, G.958
SDH	LOS, AIS, OOF, EFAS, LOF, RS/HP/LP TIM, MS/ AU/TU AIS, MS/HP/LP RDI,AU/TU LOP, HP/LP UNQ, TU LOM, HP/LP PLM, RFI MS-/HP-/LP-FERF
PDH	LOF, RAI, CRCL, MAIS, CASL, MRAI
TCM	UNQ, LTC, RDI, ODI, TIM, AIS From D1 ~ D3, D4 ~ D12, E1, E2, F1 transparent channel, insert/pick-up PRBS ITU-T mappings for SDH, including the concatenated ones
Standards	ITU-T G.703, G.957, G.783, G.958
Power Input	C12V with AC switching adapter
Dimensions	100 x 196 x 60mm (W x D x H)
Weight	0.87kg
Temperature	0°C ~ 50°C (Operating), 0°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
MTBF	30,000 hrs



- Ethernet-over-TDM network
- Backhual network
- Telecom Maintenance
- Other Fiber Optical Measurement

Ordering Information

Model Name	Description
HCT-SDH155	SDH & PDH analyzer

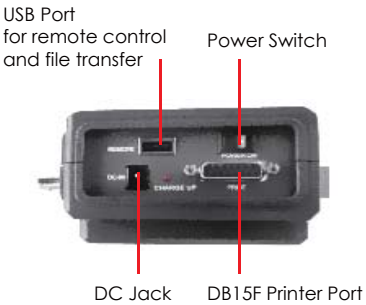
E1 BER Tester with Color LCD

HCT-BERT/E1

The HCT-BERT/E1 tester is a compact, color-LCD, graphic-user-interface, single hand E1 Bit error rate tester designed for field use in error testing E1 (2.048Mbps) lines. The HCT-BERT/E1 tester provides a variety of E1 line statuses, transmission performance testing (BERT) and monitoring. On the E1 line, the HCT-BERT/E1 may be used as a generator or receiver.

Features

- Color LCD display graphic mode
- USB port for remote control
- Results Report
- Support G.821/826, M.2100 BERT analysis
- Sa bits setup and monitor
- Internal Memory storage of test result; Direct display on LCD screen
- Print out via Parallel Printer port
- Portable for field use
- Upgradeable for advanced features
- Rechargeable battery with battery low indicator
- Supports CRV & BPV performance analysis
- Available for E1 BERT analysis



Specifications

E1 interface	1). E1 Receiving Interface • Line code: HDB3/AMI • Pulse feature: ITU G.703 • Dithering tolerance: ITU G.823 • Input port: BNC (non-balance), RJ45 (balance) • Input mode: Impedance: 75ohm (unbalance), 120ohm (balance) • Bridging mode: Impedance > 1000 ohm 2). E1 Transmission Interface • Line code: HDB3/AMI • Pulse feature: ITU G.703 • Pulse amplitude: Nominal 2.37V for BNC 75 ohm Nominal 3.00V for RJ45 120 ohm • Zero amplitude: 0.1 V at max • Dithering tolerance: ITU G.823 • Output port model: BNC (non-balance), RJ45 (balance) • Source of clock transmission: External clock: take clock from external clock interface Resume clock: take clock from receiving terminal 3). E1 Frame Format • PCM31, PCM31+CRC, PCM30, PCM30+CRC • Non-framing mode, Automatic detection
Error Rate Test (BERT Test)	1). BERT Pattern (Patterns) 511, 2047, 2E15-1, 2E15-1 (reverse), 2E20-1, 2E20-1 (reverse), QRSS, 2E23-1, 2E23-1 (reverse), all 1, all 0, alternate, 1100, 3 IN 24, 1 IN 16, 1 IN 8, 1 IN 4, User programming 1/2/3 2). BERT Display Format • Error counting, Alarm counting, ITU G.821, ITU G.826 • M.2100, Histogram 3). BERT Transmission Error Rate • Insert one error compulsorily • Apply an error rate of 10-3-10-7 compulsorily 4). Quality Analysis: • Receiving seconds, Error seconds, Alarm seconds • Free-of-error seconds, Error rate, Valid seconds • Serious error seconds, G.821 error seconds • G.826 error seconds, Invalid seconds
Other Functions	1). Color Display Screen: Character/graphic mode 2). Test Results Report • 100 pieces of test results at max available in storage • Direct display on LCD screen • Print via printer port available 3). Modular Design for Easy Update
Indications	LEDs (DTE, DCE, DATA PORT, TD, RD, DCD, RTS, CTS, DTR, DSR, TC, RC XTC)
Power Input	AC230V adapter to DC 9V 2A
Dimension	134 x 179 x 68mm (W x D x H)
Weight	0.8kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
MTBF	35,000 hrs

Ordering Information

Model Name	Description
HCT-BERT/E1	E1 analyzer

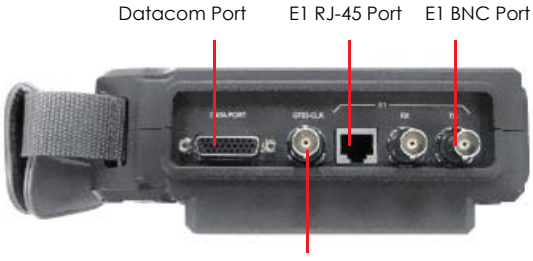
E1 / T1 / Datacom BER Tester with Color LCD

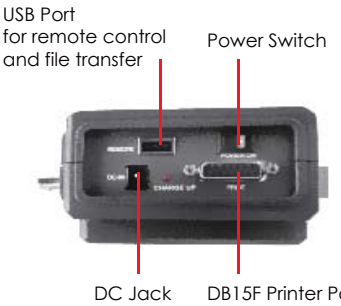
HCT-BERT/C

The HCT-BERT/C tester is a compact, color-LCD, graphic-user-interface, single hand E1 Bit error rate tester designed for field use in analysis and maintenance of data communications (V.35, RS530, X.21, RS232) and E1 (2.048Mbps) lines. The HCT-BERT/C performs framed, unframed drop and insert Nx64Kbps, or nx56Kbps data into any time slot. The HCT-BERT/C tester also provides a variety of E1 line statuses, transmission performance testing (BERT) and monitoring. On the E1 line, the HCT-BERT/C may be used as a generator or receiver.

Features

- Color LCD display graphic mode
- USB port for remote control
- Results Report
- Support G.821/826, M.2100 BERT analysis
- Sa bits setup and monitor
- Internal Memory storage of test result; Direct display on LCD screen
- Print out via Parallel Printer port
- Portable for field use
- Upgradeable for advanced features
- Rechargeable battery with battery low indicator
- Supports CRV & BPV performance analysis
- Datacom BERT analysis available for V.35, RS-530, X.21 and RS-449





Specifications

E1 interface	1). E1 Receiving Interface • Line code: HDB3/AMI • Pulse feature: ITU G.703 • Dithering tolerance: ITU G.823 • Input port: BNC (non-balance), RJ45 (balance) • Input mode: Impedance: 75ohm (unbalance), 120ohm (balance) • Bridging mode: Impedance > 1000 ohm 2). E1 Transmission Interface • Line code: HDB3/AMI • Pulse feature: ITU G.703 • Pulse amplitude: Nominal 2.37V for BNC 75 ohm Nominal 3.00V for RJ45 120 ohm • Zero amplitude: 0.1 V at max • Dithering tolerance: ITU G.823 • Output port model: BNC (non-balance), RJ45 (balance) • Source of clock transmission: Internal clock: 2.048 MHz 50ppm, 100ppm. External clock: take clock from external clock interface Resume clock: take clock from receiving terminal 3). E1 Frame Format • PCM31, PCM31+CRC, PCM30, PCM30+CRC • Non-framing mode, Automatic detection
Error Rate Test (BERT Test)	1). BERT Pattern (Patterns) 511, 2047, 2E15-1, 2E15-1 (reverse), 2E20-1, 2E20-1 (reverse), QRSS, 2E23-1, 2E23-1 (reverse), all 1, all 0, alternate, 1100, 3 IN 24, 1 IN 16, 1 IN 8, 1 IN 4, User programming 1/2/3 2). BERT Display Format • Error counting, Alarm counting, ITU G.821, ITU G.826 • M.2100, Histogram 3). BERT Transmission Error Rate • Insert one error compulsorily • Apply an error rate of 10-3-10-7 compulsorily 4). Quality Analysis: • Receiving seconds, Error seconds, Alarm seconds • Free-of-error seconds, Error rate, Valid seconds • Serious error seconds, G.821 error seconds • G.826 error seconds, Invalid seconds 5). Data Port BEST Test • Data rate of the multiple of 64Kbps: N*64Kbps (N=1~36)
Other Functions	1). Color Display Screen: Character/graphic mode 2). Test Results Report • 100 pieces of test results at max available in storage • Direct display on LCD screen • Print via printer port available 3). Modular Design for Easy Update
Indications	LEDs (DTE, DCE, DATA PORT, TD, RD, DCD, RTS, CTS, DTR, DSR, TC, RC XTC)
Power Input	AC230V adapter to DC 9V 2A
Dimension	134 x 179 x 68mm (W x D x H)
Weight	0.8kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
MTBF	35,000 hrs

Ordering Information

Model Name	Description
HCT-BERT/C	E1 E1 & Datacom analyzer

128Kbps Protocol Analyzer with 2M BERT

HCT-6000

The HCT-6000 is a portable, battery powered communication tester, designed for a wide range of protocol analysis up to 128K bps and BERT (Bit Error Rate Tester) at full T1 (1.544Mbps) or E1 (2.048Mbps) speeds and is fully suitable for equipment installations, on-line or off-line diagnostics, debugging, and interface development. It features a backlit Liquid Crystal Display (LCD), tactile membrane switch keyboard, interface lead indicator LEDs, and internal rechargeable batteries. The unit includes a full assortment of interface adapter cables, comprehensive User Guide, AC power adapter (100 to 240VAC) and a sturdy zippered nylon carry case. The HCT-6000A has the same features as the HCT-6000 with the exception of BERT support only to 128K bps.

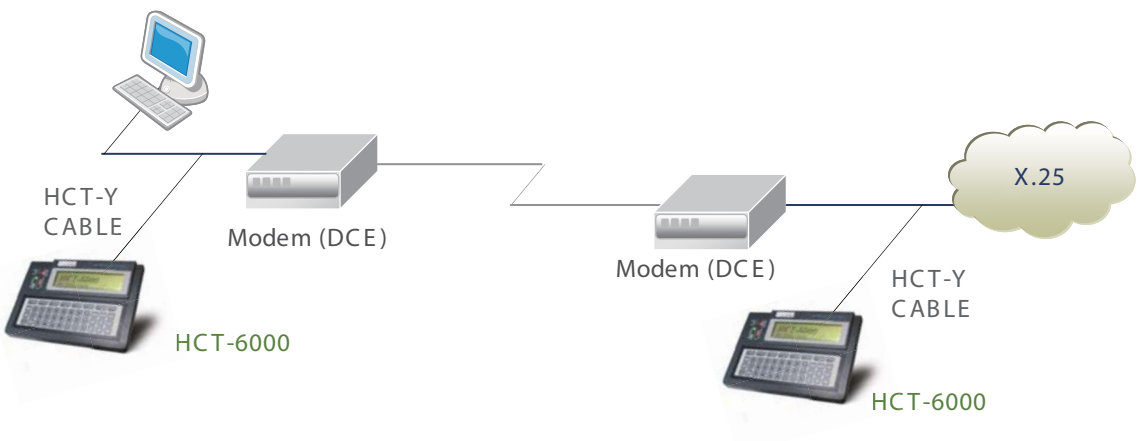
Features

- Menu driven setup
- Auto Configuration and Scan
- ASYNC terminal emulation
- 128K BERT (Low Speed)
- 2M BERT (High Speed)
- Frame Relay Analysis (option)
- System Reset Function
- Up/Down Load
- On-Line Monitor
- File Management
- Remote Control
- Self Tests and Diagnostics

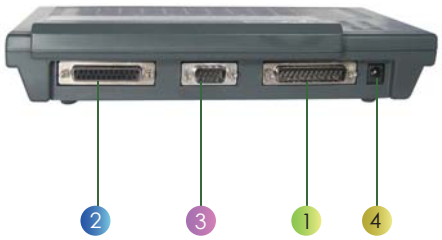
Specifications

Basic Interfaces	RS-232C/D(V.24), RS-449(V.36), RS-530, X.21,V.35, printer port, remote control port (RS-232 async)
Protocols	ASYNC, SYNC(BSC), HDLC, SDLC, X.25, DDCMP
Optional software	Frame Relay, PPP/SLIP, SNA ROM, G.826
Data rate	**ASYNC :** 50-115,200bps, **SYNC :** 150-128,000bps
Data code	ASCII, EBCDIC, HEX, IPARS, TRANSCODE, EBCD
Data Length	**ASYNC Mode:** 5,6,7, or 8 bits **SYNC Mode:** 8 bits
Parity Bit	**ASYNC Mode:** None, Odd, Even
Stop Bits	**ASYNC Mode:** 1, 1 1/2, 2
Display Mode	LSB or Inverted, Normal or Inverted, Full/Half Duplex, Data and Lead Status, Frame and Packet
Error Check	None, Parity, LRC, CRC-16, CRC-CCITT
LCD Display	8 lines, 32 characters per line, with backlight and contrast controls
Capture Buffer	512KB static ram, battery backed up.
Line Monitor	DTE; DCE; DTE & DCE
Emulation	DTE; DCE; MONITOR only
BERT Patterns	63, 511, 2047, FOX (ASCII), SPACE, MARK, ALT
BERT Speed	2Mbps (except HCT-6000A) 128Kbps
Counter & Timer	5 each internal counter and timer
Indications	LEDs (TD, RD, RTS, CTS, DSR, DTR, DCD, TC, RC, XTC, DTE,ECE, Sync loss)
Power Input	100~240VAC adapter to 12VDC 600mA
Dimension	237 x 173 x 37mm (W x D x H)
Weight	1.2 Kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	35,000 hrs

Line Testing application



HCT-6000 Back view



1 ***COMMUNICATION***
V.24/RS232, V.35, or RS-449. (switch selectable)
note: G.703 available with optional external adapter and set to RS-449 mode.

2 ***PRINTING*** CENTRONICS Parallel port.

3 ***REMOTE*** Serial port used for remote control.

4 ***Power*** DC9V in.

PROTOCOL ANALYSIS
The HCT-6000 is capable of performing protocol analysis for ASYNC, SYNC, HDLC, SDLC(NRZI), SDLC, DDCMP, X.25 (Frame and Packet), and FRAME RELAY, as well as options for testing TCP/IP, SLIP, PPP, and detailed testing of FRAME RELAY.

AUTO CONFIGURATION
The HCT-6000 provides the ability to analyze line data to automatically detect and set communication protocol type, data RATE, data CODE, data FORMAT, parity and synchronous PATTERN.

BERT/BLERT : Bit/block Error Rate Test
a. Transmit/ Receive Patterns : Includes Mark, Space, ALT, FOX, 63, 511, 2047. The 2Mbps BERT also includes 2^{15}-1, 2^{20}-1, 2^{23}-1 and QRSS.
b. Data Block Size : Under CCITT specifications, 63, 511, 1000, 2047 bits.
c. Error Rate Test : Contains a bit counter, bit erroe numbers, a block counter, block error numbers, error seconds, forced errors, and bit error rate as a calculation of total no. of received error bits total no. of received bits.

INTERNAL TIMERS & COUNTERS
The HCT-6000 contains five registers for Timers (in milliseconds) and five registers for Counters (in units) for program start/stop.

HARD COPY PRINT
A standard centronics interface with Female DSUB-25 connector is provided for printing captured data, programming, setup configuration information, and BERT results.

TERMINAL EMULATION
The HCT-6000 provides a complete setup of all communication parameters, Baud rate, data bits, stop bits, parity bit, etc., including Half duplex (local echo) and Full Duplex (remote echo) modes and in either DCE (data communication equipment, such as modems) or DTE (data terminal equipment, terminals) configurations.

DATA LINE MONITOR
Simulation : DCE or DTE, Data and Status, Frame and Packet. Record data in real-time into capture memory.
Monitor : DTE only, DCE only, or DTE/DCE at the same time.
Protocols : SDLC, SDLC(NRZI), HDLC, SYNC(BSC), ASYNC, DDCMP, X.25, FRAME RELAY.

SUPPORTED INTERFACE STANDARDS
V.35, RS-422, X.20/X.21, RS-485, RS-449, RS-530, RS-232 interfaces.

BCC / Error Checking
ASYNC LRC, CRC-16, NONE. SYNC CRC-16, LRC, CRC-CCITT, NONE. HDLC CRC-CCITT, SDLC CRC-CCITT, X.25 CRC-CCITT
Frame Relay CRC-CCITT

DATA CODES
ASCII, EBCDIC, HEX, IPARS, TRANSCODE, EBCD.

2M BERT Test Patterns
The transmit patterns under 2M BERT include 63/127/511/2047, MARK (all 1's), SPACE (all 0's), ALT(0101), 2e15-1, 2e20-1, 2e23-1, and QRSS. In SYNC mode only.

2M BERT Test Speeds
The speeds available under 2M BERT are 48k, N64 values of 64k, 128k, 192k, 256k, 320k, 384k, 448k,512k, 576k, 640k, 704k, 768k, 832k, 896k, 960k,1024k, 1088k, 1152k, 1216k, 1280k, 1344k, 1408k,1472k, 1536k, 1544k, 1600k, 1664k, 1728k, 1792k, 1856k, 1920k, 1984k, 2048k, plus N56 values of 56k, 112k, 168k, 224k, 280k, 336k, 392k, 448k, 504k, 560k,616k, 672k, 728k, 784k, 840k, 896k, 952k, 1008k,1064k, 1120k, 1176k, 1232k, 1288k, 1344k, 1400k,1456k, 1512k, 1568k, 1624k, 1680k, 1736k, and 1792kbps.

Ordering Information

Model Name	Description
HCT-6000	128K Protocol Analyzer & 2M BERT

Optional Function

Frame-Relay : s/w package
SNA ROM : SNA ROM Package
TCP/IP : TCP/IP,PPP,SLIP s/w package
G.826 : G.826 ITU recommendation

Dual Port E1 Datacom Protocol Analyzer and BER Tester

HCT-7000

The HCT-7000, our flagship tester, is a portable, battery powered E1 and data communication tester, designed for a wide range of protocol analysis and BERT (Bit Error Rate Test) at full E1 speeds (2.048Mbps) and is fully suitable for equipment installations, on-line or off-line diagnostics, debugging, and interface development. The HCT-7000 features a backlit Liquid Crystal Display (LCD), push-button switch keyboard, interface lead indicator LEDs, user replaceable data port interface modules and internal rechargeable Li-Ion battery. The unit includes the Basic Interfaces, basic operational firmware, comprehensive User Guide, universal AC power adapter (100~240 VAC) and a sturdy hard shell carry case.

Features

- E1, Datacom, Protocol Analyzer and BERT
- Protocols: Frame Relay, SS#7, X.25, PPP (Sync.), V5.1. V5.2, ISDN-D, Sync (BSC), HDLC, SDLC, Async
- Dual pluggable interface ports with available modules:
  Datacom Module: RS-232C/D (V.24), RS-449 (V.36), RS-530, X.21, V.35, E1 Module: G.703 E1 (2048K)
- Supports Centronics printer & control serial port.
- LCD Display: 320x240 graphic (30 lines x 40 characters), with backlight
- Auto Configuration
- Menu driven setup
- ASYNC terminal Emulation
- File Management
- Self Tests and Diagnostics
- Display Modes: Full /Half Duplex Data, Frame / Packet and Lead Status
- Error Check: None, Parity, LRC, CRC-16, CRC-CCITT.
- Capture Buffer: SDRAM
- Line Monitor: DTE; DCE; DTE & DCE
- Emulation: DTE; DCE; MONITOR only
- Counters & Timers: 5 each internal counters and timers.
- MUX/DEMUX BERT (E1 & Datacom BERT)

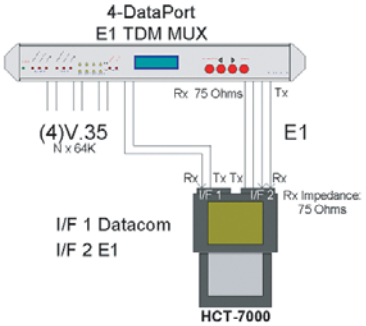
Specifications

Ports	Data Rate: Async (50 ~ 256Kbps); Sync (150 ~ 2048Kbps) Data Code: ASCII, EBCDIC, HEX, IPARS, Transcode, EBCD Data Length: ASYNC Mode: 5,6,7, or 8 bits SYNC Mode: 8 bits Parity Bit: ASYNC Mode:None, Odd, Even, Mark, Space. Stop Bits: ASYNC Mode: 1, 2 E1 I/F Module: Signal Present, HDB3, Signal Loss, FAS Loss, AIS, RAI, MRAI, MFAS Loss, CAS Loss, Pattern Loss, Excess Zero, Error.
Indications	System: External power, I/F 1 Error, I/F 2 Error, Paused. Datacom I/F Module:TD, RD, RTS, CTS, DSR, DTR, DCD, RI, XTC, TC, RC, RL, LL, TM.
Power Input	AC100~240V adapter to DC 19V/2.9A
Dimensions	275 x 220 x 65mm (W x D x H)
Weight	2.5 Kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	35,000 hrs

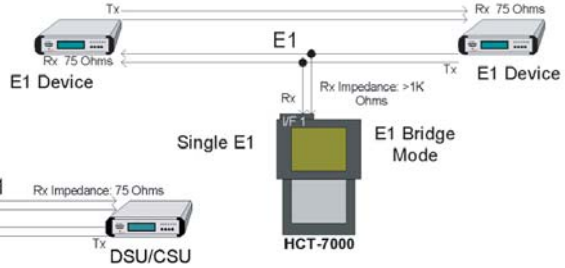
Product Overview (Connectors)

Product Overview (Misc.)

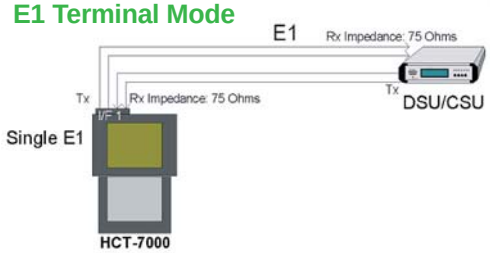
MUX feature - E1 BERT & Datacom BERT



E1 Bridge Mode



E1 Terminal Mode



Specifications for G.703 E1 BERT

- BERT Patterns
  63, 127, 29^{-1} (511), 2^{-11} (2047), 2^{-15} ITU standard,
  2^{-15} non- standard (inverted), 2^{-20} ITU standard,
  2^{-20} non-standard (inverted), QRSS, 2^{-23} ITU standard,
  2^{-23}-1 non-standard (inverted), ALL ONEs (Mark), ALL ZEROs (Space)
  ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable
- BERT Display Format
  ITU G.821 , ITU G.826
- BERT Transmit Error Rate
  Force Single Error: Logic (Bit), Frame, CRC, and BPV(Bipolar Violation)
  Force 10-3 to 10-7 Error Rate: Logic (Bit), Frame, CRC, and BPV
- Performance Analysis:
  Logic, Frame, CRC, BPV, E-bit Errors
  Receive Counter ; Error Seconds
  Error Free Seconds ; Error Rate
  G.821 Available Seconds ; G.821 Degraded Minutes
  G.821 Severely Error Seconds ; G.821 errored Seconds
  G.821 Unavailable Seconds ; G.826 Blocks
  G.826 Available Seconds ; G.826 errored block (EB)
  G.826 Background block error (BBE)
  G.826 errored second (ES) ; G.826 Severely error second (SES)
  G.826 errored second ratio (ESR)
  G.826 Severely error second ratio (SESR)
  G.826 Background block error ratio (BBER)
  LOF (Loss of Frame) Events ; Severely Error Frame Count
  COFA (Change of Frame Alignment) Events

Specifications for Datacom BERT

DTE or DCE Synchronous BERT

- Interface : RS-232, V.35, X.21, RS-449, RS-530
- Data rates for 56Kbps Multiples; Nx56Kbps (n=1~32)
  56k, 112k, 168k, 224k, 280k, 336k, 392k, 448k, 504k,
  560k, 616k, 672k, 728k, 784k, 840k, 896k, 952k, 1008k,
  1064k, 1120k, 1176k, 1232k,1288k, 1344k, 1400k, 1456k,
  1512k, 1568k,1624k, 1680k, 1736k, and 1792k bps
- Data rates for 64Kbps Multiples; Nx64Kbps (n=1~32)
  64k, 128k, 192k, 256k, 320k, 384k, 448k, 512k, 576k, 640k,
  704k, 768k, 832k, 896k, 960k, 1024k, 1088k, 1152k, 1216k, 1280k,
  1344k,1408k, 1472k, 1536k, 1544k, 1600k, 1664k, 1728k, 1792k,
  1856k, 1920k, 1984k, and 2048k bps.
- BERT Patterns:
  63, 127, 29^{-1} (511), 2^{-11} (2047), 2^{-15} ITU standard,
  2^{-15} non- standard (inverted), 2^{-20} ITU standard,
  2^{-20} non-standard (inverted), QRSS, 223 -1 ITU standard,
  2^{-23} non-standard (inverted), ALL ONEs (Mark), ALL ZEROs (Space),
  ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable
- Tx Clock Source:
  The Tx Clock may be set to internal or external.
  The polarity may also be inverted.
- Rx Clock Source:
  The Rx Clock is set to external. The polarity of
  the external clock may also be inverted
- BERT Transmit Error Rate: single, 10e-3, 10e-4, 10e-5, 10e-6, or 10e-7
- Flow Control:
  DCE permitted to transmit on RTS signal or not,
  DTE permitted to transmit on CTS signal or not.

Ordering Information

Model Name	Description
HCT-7000	A Master unit with Backlight LCD, Tactile switch keyboard, Interface LED indicators, Internal rechargeable battery AC power adapter (90~260VAC), Sturdy Carry Case ***Standard Accessories*** Two slots for Slide-In-Module, Optional expanding RAM Remote control port and printer port Standard accessories : Remote control cable DB9/M to DB9/F x 1 Printer cable DB15/M to C36/M x 1 The hardware optional modules and the software packages are required for separate order.
Hardware Options	
Datacom Interface Module	Datacom 2M BERT with the following protocol analysis Frame Monitor and Emulation Pack Async, Sync, SDLC, HDLC, X.25,and DDCMP Two HD26 ports supporting RS-232,V.35,RS-530/RS-449 X.21. programmable interface with the optional adapted cable Standard accessory : HD26/M to V.35(F/M) cable x 1
E1 Interface Module	E1 Logic, Frame, CRC, BPV, E-bit BERT,G.821.826 BERT ITU M.2100 BERT; CCS analysis for SS#7,ISDN,V5 Optional software for the E1 Frame Relay protocol analysis and Two BNC ports,one DB15 for Balance and one Bantam for receiving external clock The standard accessories are two BNC to BNC 75 ohm cables
Software Options	
Frame Relay (A) Protocol	Frame Relay Analysis Software package; 2M Frame Monitor Emulation based on ITU Q.933, T1.618/T1.617; RFC1490 (RFC2427) packets
Frame Relay (B) Protocol	LMI analysis Application Software package; Performance Statistics Automatic DLCI detection; Pings for end-to-end routing tests DLCI statistics; Filtering
Analysis Software Package	
PPP Protocols	PPP Frame Monitor and Emulation Pack.
SS#7 F/W	E1 CCS SS#7 Protocol Analysis Firmware Pack.
ISDN F/W	E1 CCS ISDN/PRI Protocol Analysis Firmware Pack.
V5 F/W	E1 CCS V5.1/V5.2 Protocol Analysis Firmware Pack.

E1/T1 Analyzer and BER Tester

BTM10

The BTM10 E1/T1 analyzer is a compact, sub-note sized E1/T1 PCM measuring instrument designed for field use in analysis and maintenance of data communications (V.35, RS-530/449/232/422 and X.21), E1 (2.048Mbps) or T1 (1.544Mbps) lines. The BTM10 performs framed, unframed, signaling analysis, drop and insert 8K voice, Nx64Kbps, or Nx56Kbps data into any time slot. The BTM10 analyzer also provides a variety of E1 or T1 line statuses, transmission performance testing (BERT) and monitoring. On the E1 or T1 line, the BTM10 may be used as a generator or receiver.

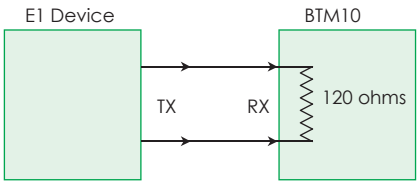
Features

- E1 BERT Analysis: E1/T1frame, code, CRC, and BPV performance analysis and generator.
- Alarm Setting: Manual or automatic alarm setting.
- VF Access: Drop and Insert 8K voice; frequency generator (transmit VF Frequency from 60 to 3950 Hz, transmit VF level from 0dBm to -55dBm) and measurement (A-law and u-law). Voice access by using telephone handset. E1/T1 pulse shape analysis. E1/T1 PCM level meter and frequency analysis.
- Pulse Shape: E1/T1 pulse shape analysis
- Signal Result: E1/T1 PCM level meter and frequency analysis
- Signaling Setting: ABCD bit setting
- Signaling Display: Display all channel's of ABCD bits
- BERT on Data port: Data port BERT performance analysis
- Remote control: Remote controlled by PC terminal or modem
- SS7 analysis: Decode and performance analysis of levels 2, 3, 4
- V5.1/V5.2 Analysis: Monitoring V5 Signaling information
- ISDN Analysis: Digital Subscriber Signaling System No.1 (DSS 1)-Monitoring ISDN D-Channel Signaling information (ITU Q.921,Q.931)
- Example Analysis: off-line analysis of BERT performance
- External Drop and insert: Acts as a fractional E1 or T1 converter
- User Programmable pattern setting: There are three 32 bit programmable patterns, which can be inserted onto the E1/T1 line and drop for analysis available, by passed, or idle
- Timeslot setting: Timeslot, Drop and Insert Nx64k data onto E1/T1 line
- Timeslot mapping data: Analyze any channel data of two frames
- Slip measure: Uncontrolled, Controlled, Frame, and Timing SLIP measure
- Sa bits setup and monitor: Multi-frame Sa bits setup and monitor.(E1 only)
- File management: Ten configuration and result memory locations can be stored and recall by user
- Datacom clock measurement
- Round trip delay measurement

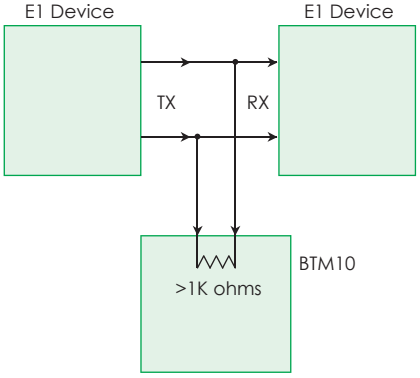
Specifications

General	• 1 port E1 (BNC unbalanced and DB15 balanced), T1 (DB15 balanced) ITU G.703(E1), ANSI T1.403(T1) & ITU G.703(T1) • 1 port data communications s/w selectable V.35, RS530, X.21, RS-232 • 1 port RS-232 console, remote • 1 port parallel printer port Print out via parallel Port • LCD display 32 Characters x 8 Lines, Text / Graphic mode
Indications	LEDs (TD, RD, RTS, CTS, DSR, DTR, DCD, TC, RC, XTC, DTE, DCE, Sync loss)
Power Input	AC100~240V adapter to DC 12V 1A
Dimensions	137 x 235 x 54mm (W x D x H)
Weight	1.6 Kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	35,000 hrs

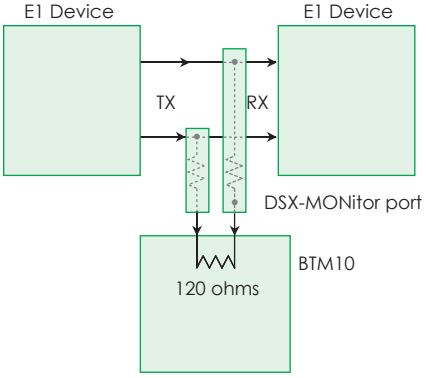
Receiver in Terminal Mode



Receiver in Bridge Mode



Receiver in Monitor Mode



E1 Specification

1. Receiver Interface of E1/CEPT

- Line Code: HDB3/AMI
- Pulse characteristics: meets ITU G.703
- Jitter Tolerance: meets ITU G.823
- Input Port Type: Coaxial pair Symmetrical pair DB15 (balanced)
- Input mode (with AGC):
  Termination: Coaxial Pair Impedance:75ohm resistive (unbalanced)
  Symmetrical Pair Impedance:120ohm resistive (balanced)
  Return Loss: >18dB
  Receive Sensitivity:+3dB to -40dB
  Bridge Mode: Impedance: >1000ohm Receive Sensitivity: +3dB to -30dB
  DSX-Monitor Mode: Coaxial Pair Impedance 75ohm resistive(unbalanced)
  Symmetrical Pair Impedance:120 ohm resistive (balanced)
  Receive Sensitivity: +6dBdsx to -30dBdsx
  Receive Timing Range: 2.048MHz±4000Hz

2. Transmitter Interface of E1/CEPT

- Bit Rate:2048K bit/s+/-3ppm
- Line Code:HDB3/AMI
- Pulse characteristics: Meets ITU G.703
- Pulse Amplitude: Nominal 2.37V for Coaxial Pair 75 ohm
  Nominal 3.00V for Symmetrical Pair 120 ohm
- Zero Amplitude:+0.1 V max.
- Jitter Tolerance: Meets ITU G.823
- Output Port Type: Coaxial pair: BNC (unbalanced)
  Symmetrical pair: Bantam or DB15 (balanced)
- TX Clock Source:
  1.Internal Timing: 2.048MHz+/-3ppm.
  2.Internal Timing plus 50ppm offset(30ppm factory option)
  3.Internal Timing minus 50ppm offset(30ppm factory option)
  4.Recovery from RX Timing (Loop Timing)
  5.External Timing
  6.Data Port Timing

3. E1/CEPT Frame Structure

Unframed / FAS (PCM31) / FAS+CRC4 (PCM31 with CRC)
FAS+CAS (PCM30) / FAS+CRC4+CAS (PCM30 with CRC)

4. Line Build Out

0dB / -7.5dB / -15dB / -22.5dB (Accuracy: +/-1dB)

5. E1/T1 Analyzer Mode

1. Channel Map
2. Line Attenuation
3. Slip Measure
4. Signaling
5. General Status: Signal Present / HDB3 / Pattern Sync / Frame Sync / Looping
6. Results: Bit Errors / BPV Errors / Frame Errors / CRC Errors / G.821 Analysis / G.826 Analysis
7. Alarm/Warning: Signal Loss(Pulses) / Frame Loss / Pattern Loss / Excess Zero Error / One Density / AIS / SLIP / RAI / MRAI
8. Print out of test results.

T1 Specification

1. Receiver Interface of T1/DS1

- Line Code: B8ZS/AMI
- Pulse characteristics: meets ITU G.703
- Jitter Tolerance: meets ITU G.824
- Input Port Type: Symmetrical pair: Bantam or DB15 (balanced), and BNC Symmetrical pair
- Input mode (with AGC):
  Termination: Symmetrical Pair Impedance: 100ohm resistive +/- 5% resistive(unbalanced)
  Return Loss: >18dB
  Receive Sensitivity:+6dB to -36dB
  Bridge Mode: Impedance: >1000ohm
  Receive Sensitivity: +6dB to -36dB
  DSX-Monitor Mode: Symmetrical Pair Impedance:
  100ohm resistive +/- 5% resistive(unbalanced)
  Receive Sensitivity: up to -30dBdsx
  Receive Timing Range: 1.544MHz +/- 4000Hz

2. Transmitter Interface of T1/DS1

- Bit Rate: 1544K bit/s+/-3ppm
- Line Code: B8ZS/AMI
- Pulse characteristics: Meets ITU G.703
- Pulse Amplitude: Nominal 3.00V for Symmetrical Pair 100 ohm
- Zero Amplitude: +0.1 V max.
- Jitter Tolerance: Meets ITU G.824
- Output Port Type: Symmetrical pair: Bantam or DB15 (balanced)
- TX Clock Source:
  1. Internal Timing: 1.544MHz +/-3ppm
  2. Internal Timing plus 50ppm offset (30ppm factory option)
  3. Internal Timing minus 50ppm offset (30ppm factory option)
  4. Recovery from RX Timing (Loop Timing)
  5. External Timing
  6. Data Port Timing

3. T1/DS1 Frame Structure

ESF / ESF+CRC6 / D4(SF) / SLC-96 / T1DM / Unframed

4. Line Build Out:

0dB , -7.5dB , -15dB , -22.5dB (Accuracy: +/-1dB)

Specifications for G.703 E1/T1 BERT

1. BERT Patterns

- 63, 127, 29-1 (511), 211-1 (2047), 215-1 ITU standard,
- 215-1 non- standard (inverted), 220-1 ITU standard,
- 220 -1 non-standard (inverted), QRSS, 223 -1 ITU standard,
- 223-1 non-standard (inverted), ALL ONEs (Mark), ALL ZEROs (Space), ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable

2.BERT Display Format

- Normal ITU-M.2100 (option) / ITU G.821 / ITU G.826

3. BERT Transmit Error Rate

- Force Single Error: Logic (Bit), Frame, CRC, and BPV (Bipolar Violation)
- Force 10-3 to 10-7 Error Rate: Logic (Bit), Frame, CRC, and BPV

4. Performance Analysis

- Logic, Frame, CRC, BPV, E-bit Errors
- Receive Counter
- Error Seconds
- Error Free Seconds
- Error Rate
- G.821 Available Seconds
- G.821 Degraded Minutes
- G.821 Severely Error Seconds
- G.821 Error Seconds
- G.821 Unavailable Seconds
- G.826 Blocks
- G.826 Available Seconds
- G.826 errored block (EB)
- G.826 background block error (BBE)
- G.826 errored second (ES)
- G.826 severely errored second (SES)
- G.826 errored second ratio (ESR)
- G.826 severely errored second ratio (SESR)
- G.826 background block error ratio (BBER)
- LOF (Loss of Frame) Events
- COFA (Change of Frame Alignment) Events
- Severely Errored Frame Count.

Specifications for Datacom BERT

Mode A: DTE or DCE Synchronous BERT

- Interface
  RS-232, V.35, X.21, RS-449, RS-530
- Data rates for 56Kbps Multiples; Nx56Kbps (n=1~24)
  56k, 112k, 168k, 224k, 280k, 336k, 392k, 448k, 504k, 560k, 616k, 672k, 728k, 784k, 840k, 896k, 952k, 1008k, 1064k, 1120k, 1176k, 1232k,1288k, 1344k, 1400k, 1456k, 1512k, 1568k,1624k, 1680k, 1736k, and 1792k bps.
- Data rates for 64Kbps Multiples; Nx64Kbps (n=1~32)
  64k, 128k, 192k, 256k, 320k, 384k, 448k, 512k, 576k, 640k, 704k, 768k, 832k, 896k, 960k, 1024k, 1088k, 1152k, 1216k, 1280k, 1344k,1408k, 1472k, 1536k, 1544k, 1600k, 1664k, 1728k, 1792k, 1856k, 1920k, 1984k, and 2048k bps.
- BERT Patterns:
  63, 127, 29-1 (511), 211-1 (2047), 215-1 ITU standard, 215-1 non- standard(inverted), 220-1 ITU standard, 220 -1 non-standard(inverted), QRSS, 223 -1 ITU standard, 223-1 non-standard(inverted), ALL ONEs (Mark), ALL ZEROs (Space),
  ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable
- Tx Clock Source:
  The Tx Clock may be set to internal or external. The polarity may also be inverted.
- Rx Clock Source:
  The Rx Clock is set to external. The polarity of the external clock may also be inverted.
- BERT Transmit Error Rate:
  single, 10e-3, 10e-4, 10e-5, 10e-6, or 10e-7.
- Flow Control:
  DCE permitted to transmit on RTS signal or not,

Mode B: DTE or DCE Synchronous BERT

1. Data Rate

- Asynchronous: from 50 to 115.2K bps.
- Synchronous: from 150 to 72K bps.

2. BERT Patterns

- 63, 511, 2047, FOX, SPACE, MARK, and ALT

3. Tx Clock Source

- DTE or DCE

4. Flow Control

- Xon/Xoff, RTS/CTS, or disable

Ordering Information

Model Name	Description
BTM10-E1	E1 analyzer (Full function ; with pulse shape/datacom function)

Optional Function

Datacom Feature	Datacom BERT External drop/insert
Pulse shape Feature	Pluse shape Analysis Singal result level measurement
BTM10-SS # 7	Decode or Level 2,3 and 4 Performance Measurement
BTM10-ISDN	ITU Q.921, Q.931 recommendation
BTM10-V5 (V5.1, V5.2)	ITU G.964, G.965 recommendation
BTM10-M.2100	ITU M.2100 recommendation

Handy LAN Cable Continuity Tester / Cable Identifier

LCT-300/400

The LCT-300/LCT-400 LAN Cable Testers are intelligent continuity testers for LAN cables which save time on the job. Their intuitive operations keep you from wasting time working through complex menus. A remote terminator helps in identifying cables when labeling after installation.

Features

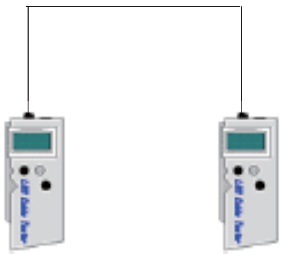
- Hand-held and easy to operate
- Battery low indicator
- Can review the captured pin assignment and failure status
- Easy to read cable status to verify cable continuity; open, short, and mismatches
- Easy to read LCD display, with 2 line by 12 characters with LCD back light
- Automatic power shut down feature for extended battery life
- Identify and trace the other end's ID (using supplied terminator)
- Maximum testing length is up to 1030 meters
- Standard pin configurations and (4) user defined cable modes memorized in CPU
- Suggestion mode for intelligent cable identification (Cable type each)
- Tests for shielded and non-shielded cable types (Extra feature for LCT-400)
- Easy to identify RJ-45 and BNC cable types against preset wiring schemes

Specifications

General	
Connector	RJ45
Control Key	ENTER, Mode, ESC
Power Input	DC 9V battery
Dimensions	154 x 65 x 35mm (W x D x H)
Weight	0.3kg
Temperature	0°C ~ 50°C (Operating),-10°C ~ 70°C (Storage)
Humidity	10~90% non-condensing
MTBF	35,000 hrs
Cable & Recognized Wiring Schemes	• Tests for shielded and non-shedlded cable types • Unshielded twisted pair (UTP) 100 ohms category 3, 4 & 5 • Foil shiedlded twisted pair (FTP) 100 ohms & 120 ohms category 3 • Shielded twisted pair (STP) 150 ohms type 1 & 6 • 10Base-T, 100Base-TX and 100Base-T4 • TP-PMEDIA / TIA-568A/B • Token ring • USOC • 10Base / HUB (AT&T 258A) • Plus user defined

Local Test

Remote Test



Terminator Loopback

Ordering Information

Model Name	Description
LCT300BK	RJ-45 LAN cable tester with LCD backlight
LCT400BK	RJ-45/BNC cable tester with LCD backlight
LCT-T/x-R	RJ-45 Terminator with "id" code ; where "x" =id of terminators (#1--#8)

□□□□□□□□

Example: LCT300BK

Real-Time Intelligent Analysis

iDVS

- H.264 DVS Encoder / Decoder
- Intelligent Digital Video Server (iDVS)

2U 20-Slot Managed Chassis

IPS20

The CTC Union IPS20 is a 2U 19" rack with 20 slots for holding up to 20 interchangeable and hot-swappable CTC Union blades such as Digital Video Encoder, Decoder and Fiber Media Converter. The power modules are designed for redundant power supply capability for reliable and professional installation. The IPS20 gives flexibility, scalability, and functionality to construct a multi-task system.

Features

- 2U 19" 20 slots Chassis with AC/DC power redundancy
- Chassis mainboard consists of passive components
- All modules and cards support hot-swap function
- Support Intelligent Digital Video Server blade card
- Supports H.264 Digital Video Encoder and Decoder blade card
- Support Fiber Media Converter series product

Specifications

Physical Specifications	Dimension	303 x 438 x 88mm (W x D x H)
	Weight	5.2kg without power supply
Power Characteristics	AC	100 ~ 240VAC
	DC24	18 ~ 36VDC
	DC48	36 ~ 75VDC
Environmental Specifications	Operating	-10°C ~ 60°C
	Storage	-20°C ~ 70°C
	Relative humidity	10% ~ 90% non-condensing
	Predicted MTBF	75,000 hrs
Certification	FCC class A, VCCI class A, CE, RoHS	

20 Slot Multi-service Platform

Technologies Supported:

- DVS-8501E blade Card(1-slot, 1-ch H.264 digital video encoder)
- DVS-8501E-H blade Card (2 slots, 1-ch H.264 digital video encoder with hard disk interface)
- DVS-8504E-FD blade Card (2 slots, 4-ch H.264 digital video encoder)
- DVS-8501D blade Card (1 slot, 1-ch H.264 digital video decoder)
- iDVS-01 blade Card(2 Slots Intelligent video server for Surveillance and Transportation applications)
- Fiber Media Converter series products. (Refer to FRM220 series)

Thermal fan Holes

Chassis backplane consists of passive components

Hot swappable cooling fans

Single or optional redundant power supply

1 Channel Digital Video Encoder

DVS-8501E

- H.264/ M-JPEG Video Compression
- Up to D1 resolution @ 30FPS,(NTSC) @ 25FPS (PAL)
- 1 Video in, 1 audio in/out
- 1 Digital Input/ 1 Digital Output
- 1xRS-485(DB9 interface)
- Pelco D, P PTZ Protocol

1 Channel Digital Video Encoder with H.D.D Interface

DVS-8501E-H

- Support 2.5" SATA hard-disk tray for local storage
- H.264/ M-JPEG Video Compression
- Up to D1 resolution @ 30FPS,(NTSC) @ 25FPS (PAL)
- 1 Video in, 1 audio in/out
- 1 Digital Input/ 1 Digital Output
- 1xRS-485(DB9 interface)
- Pelco D, P PTZ Protocol

1 Channel H.264 Intelligent Digital Video Encoder

iDVS-01

Video Encoder

- Multiple H.264 streams
- D1 resolution @ 30FPS(NTSC), @ 25FPS (PAL)
- 1 video in / out, 1 audio in / out
- Built-in Web server for management
- Supports HTTPS and password protection
- Supports logic (AND / OR) event alarms
- Supports two-way audio
- 1 Digital Input / 1 Digital Output

Intelligent function

- Tripwire Detection
- Intrusion Detection
- Virtual Fence Detection
- Missing Left Detection (option)
- Abandoned Objects Detection
- Video Loss Detection
- Scene change Detection (option)

1 Channel Digital Video Decoder

DVS-8501D

- Complies with H.264 compression
- Provides high quality analog video and audio decoding
- Programmable sequence mode for multiple video sources
- Decodes video source up to 64CH
- Support two-way audio

Fiber Media Converter

- Support FRM220 Fast Ethernet and Gigabit Ethernet series slide-in card
- Increase surveillance platform transmission capability
- Allow network administrators to deploy the chassis in wide range of network
- Easy to build flexible and scalable network infrastructure

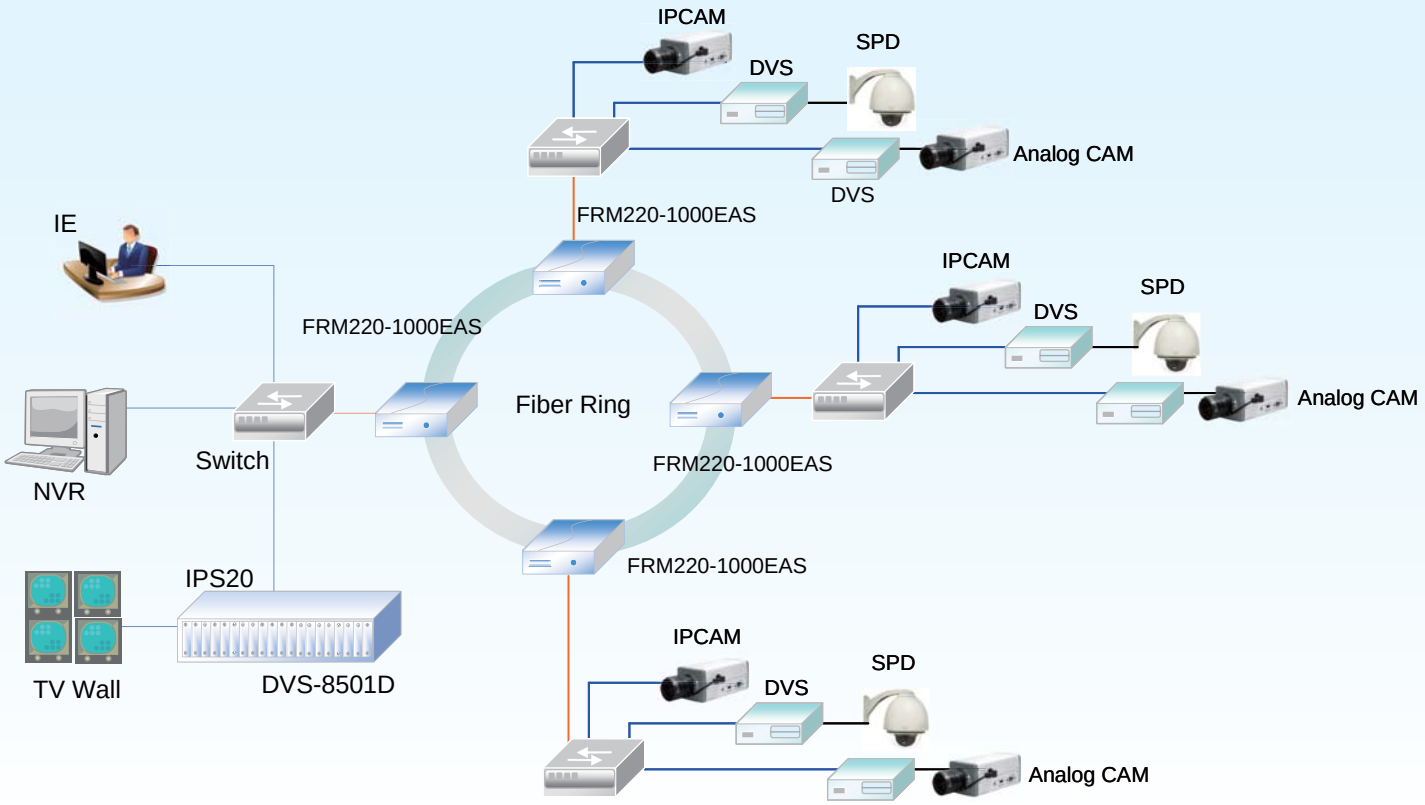
Ordering Information

Model Name	Type	Description
IPS20	Chassis	2U, 19" 24 ports G703 balun patch panel rack
IPS20-AC	Power	100 ~ 240VAC power supply module, IEC connector
IPS20-DC24	Power	18 ~ 36 VDC power supply module, 3 pin terminal block
IPS20-DC48	Power	36 ~ 72 VDC power supply module, 3 pin terminal block

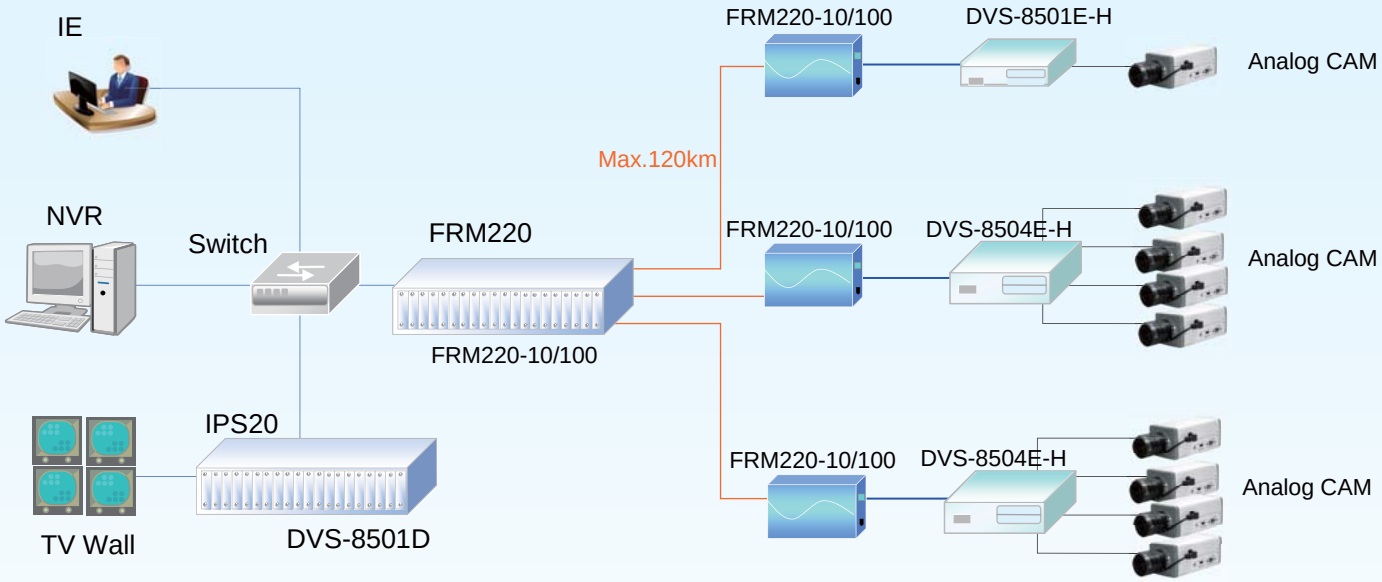
IPS20 – □□□□

Example: IPS20 – DC24

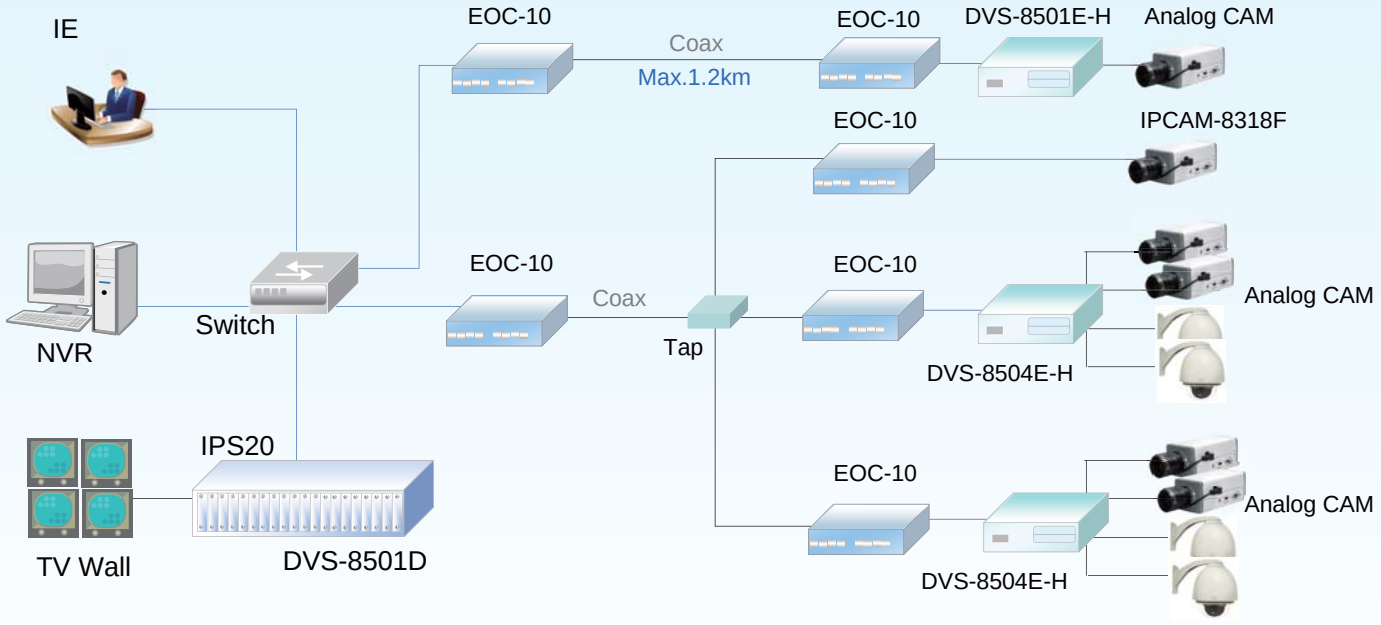
IP Surveillance Ethernet Fiber Ring Application



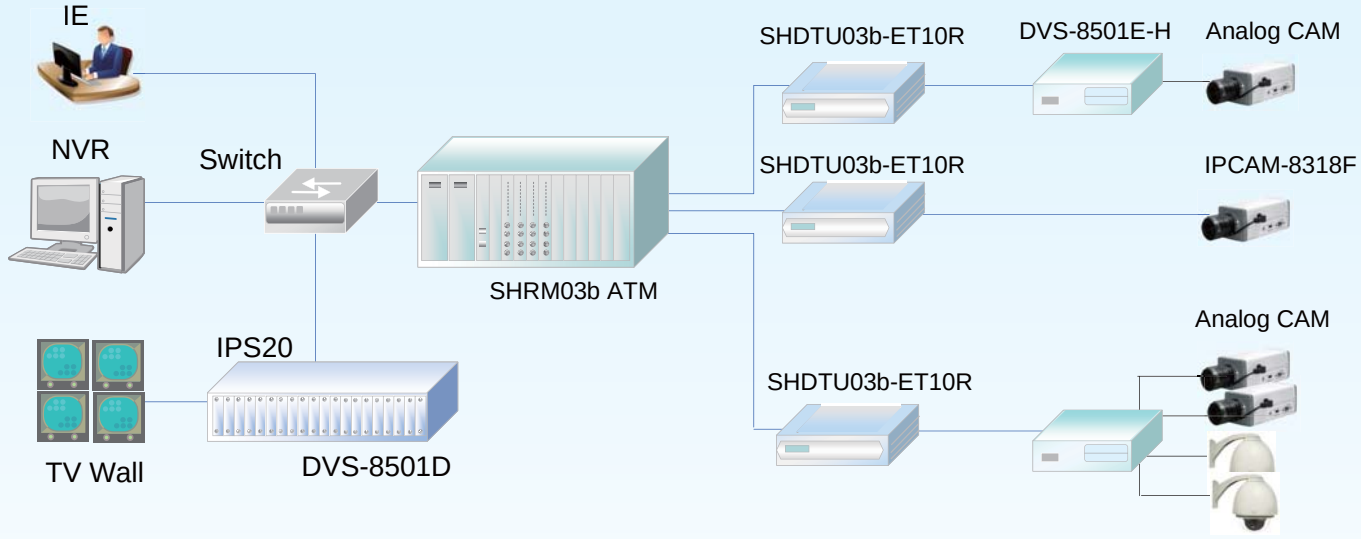
IP Surveillance Ethernet over Fiber Application



IP Surveillance with Ethernet over Coax Application



IP Surveillance with G.SHDSL.bis Application



IP Surveillance Blade Card Chassis

CTC Union's IP surveillance solution is a highly efficient system based on a universal blade design. The high quality H.264 DVS (Digital Video Server) can provide full D1 resolution with 30/25 (NTSC/PAL) FPS.

DVS blades can fit in IPS series racks together with CTC Union's FRM fiber series blades to form a complete and multi-functional solution. The hot swappable blades also enable a quick replacement of internal drives for lower maintenance cost and less Mean Time To Repair.

The risk of video data loss resulting from transmission or central system error will never be a trouble again. CTC Union's DVS series provides unique and powerful local storage capability to minimize this kind of risk, thanks to CTC Union's modular blades design. Now customers can build up an IP surveillance system according to the exact channels they want. By using the 1 channel single blades design, customers have the best flexibility and scalability ever! In addition to DVS, CTC Union also provides various IP cameras for customers who intend to build up a pure IP surveillance system directly. As for the monitoring and recording tasks, CTC Union's high performance NVR (Network Video Recorder) can provide a convenience and easy-to-use platform for analyzing, distributing, and managing image data.

CTC Union is dedicated to providing our customers the most efficient way to build up a system and create value!

1- Slot H.264 Digital Video Encoder / Decoder Chassis

IPS01

The CTC Union IPS01 is a single slot rack for holding one CTC Union blades such as Digital Video Encoder and Fiber Media Converter. The built-in power module is designed for convenience and professional installation. The IPS01 gives flexibility, scalability, and functionality to make a high performance standalone.

Features :

- 1-slot chassis for encoder, decoder line cards.
- Available in six types: external power adapter or power built-in AC, DC, AC+DC, AC+AC or DC+DC.
- Fanless
- Dimensions :
  external power 139 x 88 x 24mm (D x W x H)
  internal power 180 x 135 x 30mm (D x W x H)

1 slot Multi-service Platform Technologies Supported

- DVS-8501E (1-slot, 1-ch H.264 digital video encoder)
- DVS-8501D blade Card (1-slot, 1-ch H.264 digital video decoder)
- Fiber Media Converter series products. (Refer to FRM220 series)

Power Input :

Power adapter

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

Ordering Information

Model Name	Description
IPS01	1 Slot Chassis with 100 ~240VAC to 12VDC adpator
IPS01-AC	1 Slot Chassis with 100 ~240VAC Power
IPS01-DC	1 Slot Chassis with 18 ~75VDC Power
IPS01-AD	1 Slot Chassis with 100~240VAC + 18 ~75VDC Power

IPS01 – □□
Example: IPS01 – AC

2- Slot H.264 Digital Video Encoder / Decoder Chassis

IPS02

The CTC Union IPS02 is a 2-slot rack for holding up to 2 interchangeable and hot-swappable CTC Union blades such as Digital Video Server and Fiber Media Converter. The IPS02 gives flexibility, scalability, and functionality to make a high performance standalone device.

Features :

- 2-slot chassis for encoder, decoder line cards
- Supports either one or two single width blades or one double width blade.
- Power type: external power adapter
- Fanless
- Dimensions: 139 x 88 x 44.5mm (D x W x H)

Power Input :

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

2-slot Multi-service Platform Technologies Supported

- DVS-8501E (1-slot, 1-ch H.264 digital video encoder)
- DVS-8501E-H Blade Card
  (2-slot, 1-ch H.264 digital video encoder w/hard disk)
- DVS-8504E-FD Blade Card (2-slot, 4-ch H.264 digital video encoder)
- DVS-8501D Blade Card (1-slot, 1-ch H.264 digital video decoder)
- Fiber Media Converter series products. (Refer to FRM220 series)

Ordering Information

Model Name	Description
IPS02-DC12-1	2 slot Chassis with 100 ~240VAC to 12VDC adpator(1 DC Jack)
IPS02-DC12-2	2 slot Chassis with 100 ~240VAC to 12VDC adpator(2 DC Jack)

IPS02 – □□□□ – □
Example: IPS02 – DC12 – 1

4- Slot H.264 Digital Video Encoder / Decoder Chassis

IPS04

The CTC Union IPS04 is a 4-slot rack for holding up to 4 interchangeable and hot-swappable CTC Union blades such as Digital Video Server and Fiber Media Converter. The IPS04 gives flexibility, scalability, and functionality to help construct a multi-task system.

Features :

- Four slots chassis for encoder, decoder line cards
- Supports backplane connection between four slots
- Supports one to four single width blades or two double width blades.
- Fanless
- Dimension : 162 x 87 x 88mm (D x W x H)

Power Input :

Power adapter

Input voltage : 100 ~ 240VAC 50/60Hz Output voltage :12VDC 3A
AC power : 100 ~ 240VAC DC power : 24VDC, 48VDC, 72VDC

4-slot Multi-service Platform Technologies Supported

- DVS-8501E (1-slot, 1-ch H.264 digital video encoder)
- DVS-8501E-H Blade Card
  2-slot, 1-ch H.264 digital video encoder w/hard disk)
- DVS-8504E-FD Blade Card (2-slot, 4-ch H.264 digital video encoder)
- DVS-8501D Blade Card (1-slot, 1-ch H.264 digital video decoder)
- Fiber Media Converter series products. (Refer to FRM220 series)

Ordering Information

Model Name	Description
IPS04	4 slot Chassis with 100 ~240VAC to 12VDC adpator

1-Ch H.264 Digital Video Encoder

DVS-8501E

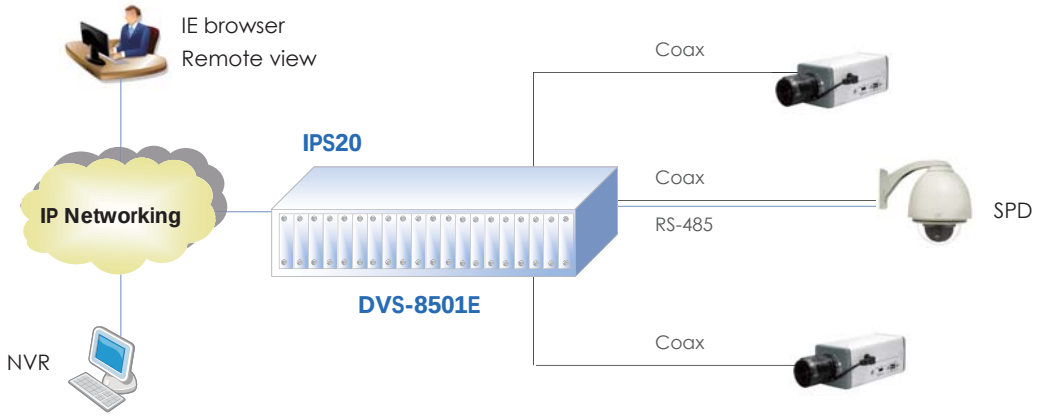
CTC Union DVS-8501E Video Encoder Blade is a 1-ch video encoder provides H.264 & M-JPEG cutting edge video compression technologies. It can deliver multiple or individual configurable video streams simultaneously with full D1 resolution at 30/25 (NTSC/PAL) FPS and remote monitoring. This means that several video streams can be configured with different resolutions, frame rates and bit rate for different needs. The DVS-8501E can also provide dual-stream transmissions for recording and monitoring. The web management offers the convenience user access to detailed alarm detection and actions. When the DVS-8501E blades are used with CTC IPS series racks, this combination can effectively convert the analog security systems to high efficient performance IP based solution.

Features

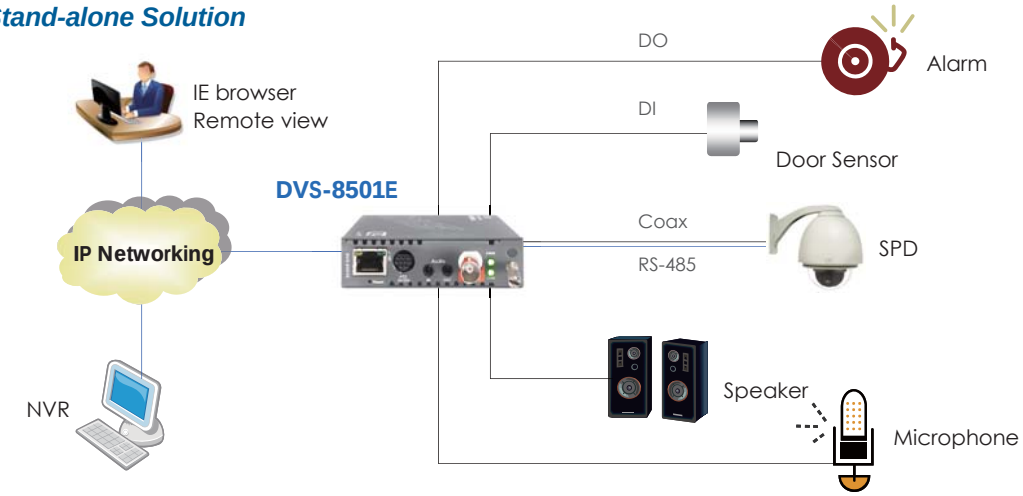
- Multiple H.264 streams
- D1 resolution @ 30FPS,(NTSC) @ 25FPS (PAL)
- 1 video in, 1 audio in / out
- Built-in Web server for management
- Supports HTTPS and password protection

- Multiple H.264 streams
- D1 resolution @ 30FPS,(NTSC) @ 25FPS (PAL)
- 1 video in, 1 audio in / out
- Built-in Web server for management
- Supports HTTPS and password protection

DVS 8501E Rack Solution



DVS 8501E Stand-alone Solution



Ordering Information

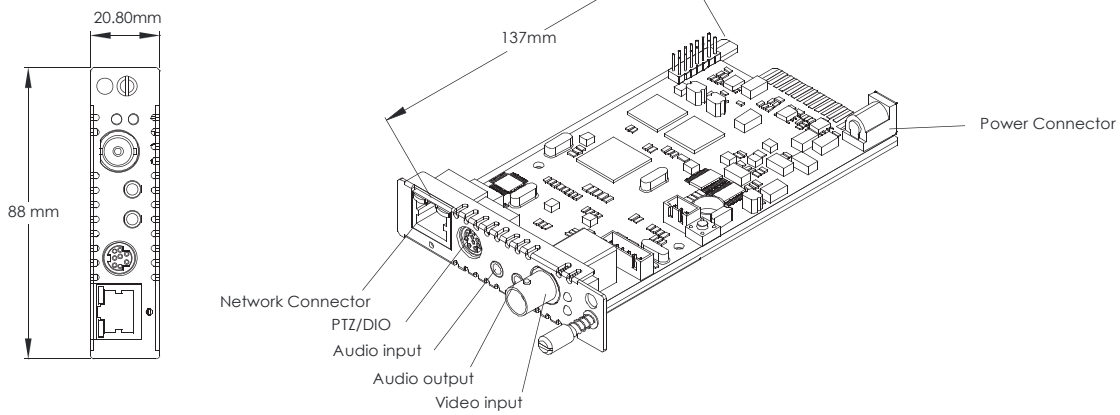
Model Name	Description
DVS-8501E	1-Ch H.264 Digital Video Encoder

Specifications

Video Compression
H.264/M-JPEG
Video Stream
Main Stream, Sub stream (Main Stream to select D1 or 4CIF)
(Slave stream only to select CIF or QCIF)
Video Resolutions
D1: 720x480(NTSC)/720x576(PAL)
4CIF: 704x480(NTSC)/704x576(PAL)
2CIF: 704x240(NTSC)/704x288(PAL)
CIF: 352x240(NTSC)/352x288(PAL)
QCIF: 176x120(NTSC)/176x144(PAL)
Operating System
Embedded Linux
Video Frame Rate
1 ~ 30 FPS
Video Quality
5 levels (Medium, standard, good, detailed, excellent), Auto
Video Input
1, BNC, 75 ohm, 1 Vp-p
Network Connector
RJ-45, IEEE 802.3 10Base-T, 802.3u 100Base-TX
Network Protocols
TCP, UDP, IP, ICMP, PPPoE, ARP, UPnP, HTTP, HTTPS, FTP, SMTP, DHCP, DNS, DDNS, RTP, RTSP, NTP
Audio Inputs
1 channel audio, Microphone in
Audio Output
1 channel audio, Line out
Audio Compression
ADPCM G.711
Audio Stream
Two-way (H.264 only)
Input / Output Signal
6V p-p, +10dBm max
Input / Output Impedance
600 ohms
Terminal Block
1xRS-485 (DB9 interface), 1 alarm input, 1 alarm output
PTZ Protocol
Pelco D, P
PTZ Baud Rate
2400, 4800, 9600, 12800, 19200 Kbps
PTZ Control Speed
Pan, Tilt, Zoom, Focus, Iris
PTZ Preset
32 Preset positions
PTZ Patrol
4 Tour mode (Each mode has 10 positions)

Remote Management
Web (CGI), SNMP v1/v2c
Dimension
Line card type: 88 x 137 x 20.8mm (W x D x H)
Operating condition
-10 ~ 60 degree (Celsius)
Storage condition
-20 ~ 85 degree (Celsius)
Operating Humidity
0 ~ 95% (non-condensing)
Power Input
12VDC, 1A
System Reset
Reset button (factory default)
LED Indications
Power, LAN, video status
Motion Detection
Drag and drop configurable detection windows
Configuration Backup /Recovery
Web browser
Firmware Upgrade
Web browser
NTP
Sync with PC, Sync with NTP server, Manual
Video Adjustment
Brightness, contract, saturation, color tone level
User Account
Up to 10 user accounts for configurable
Event Action
FTP, E-mail, DO1, SMS, remote storage, PTZ preset
Event Sending Path
FTP; E-mail (forwarding JPEG picture)
Digital Zoom
4x
Snapshot
Live view mode (JPEG format)
Event Define
User define video frame rate and video resolution and video quality when alarm input and motion detection
Text Overlay
Configurable text color, background color, date/time, display position
Privacy Mask
Support 3 privacy mask window
System Language
English, Simplified Chinese, Traditional Chinese
Log
System log, operating log
NVR Support
CTC Union , NUUO

DIMENSION DIAGRAM



1-Ch H.264 Digital Video Encoder w/ Hard Disk

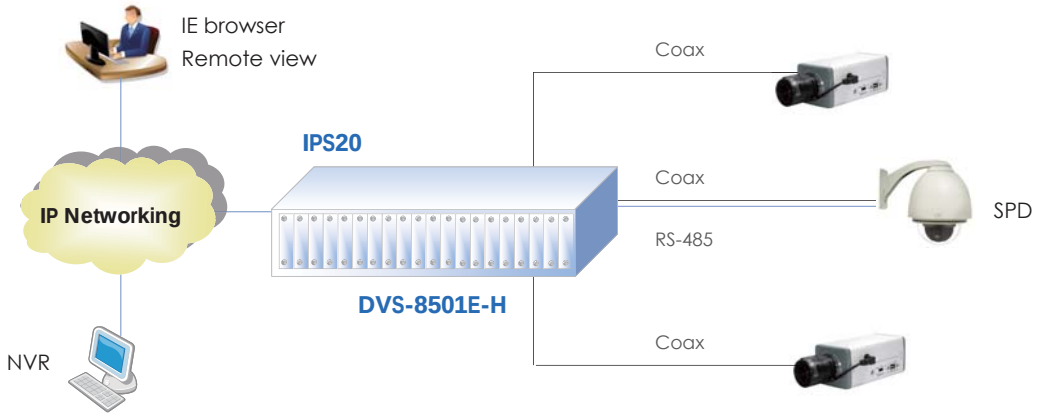
DVS-8501E-H

CTC Union DVS-8501E-H Video Encoder Blade is a 1-ch video encoder provides H.264 & M-JPEG high performance video compression technologies. It can deliver multiple or individual configurable video streams simultaneously with full D1 resolution at 30/25 (NTSC/PAL) FPS and remote monitoring. The DVS-8501E-H can also provide dual-stream transmissions for recording and monitoring. The built-in SATA interface enables powerful storage capability for the DVS-8501E-H to do the video streaming transmission and local storage at the same time. The web management offers the user convenience access to detailed alarm detection and actions. When DVS-8501E blades are used with CTC IPS series racks with various channels choices, this combination can effectively convert the analog security systems to high performance IP based solution.

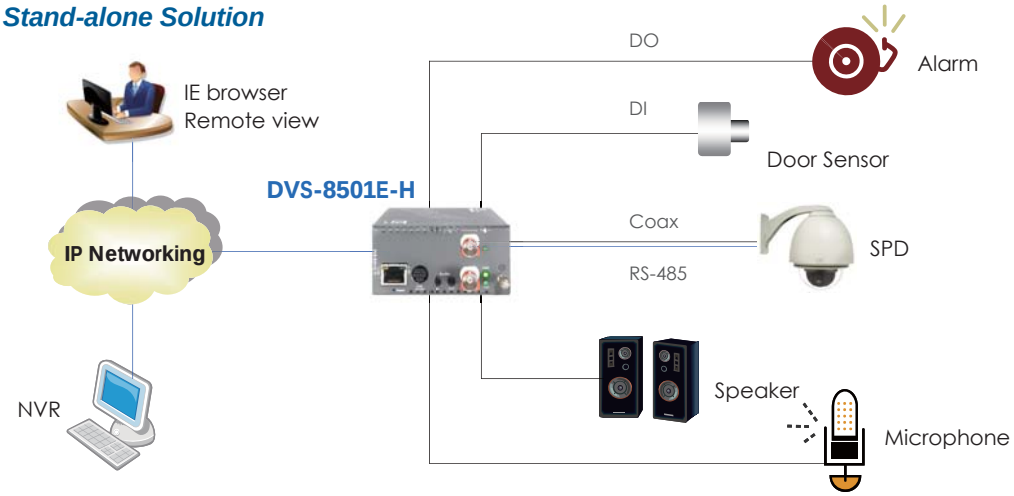
Features

- Multiple H.264 streams
- D1 resolution @ 30FPS(NTSC), @ 25FPS (PAL)
- 1 video in / out, 1 audio in / out
- Built-in Web server for management
- Supports HTTPS and password protection
- Supports 2.5" SATA hard-disk tray for local storage
- Provides main and sub video streams with different resolution
- Supports logic (AND / OR) event alarms
- Supports two-way audio
- 1 Digital Input / 1 Digital Output connections
- Supports privacy mask
- Fan less design

DVS 8501E-H Rack Solution



DVS 8501E-H Stand-alone Solution



Ordering Information

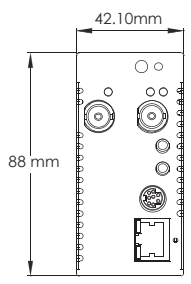
Model Name	Description
DVS-8501E-H	1-Ch H.264 Digital Video Encoder with Hard Dish Interface

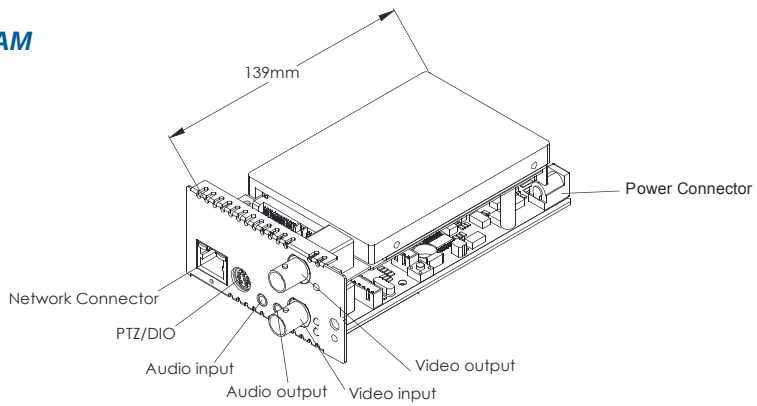
Specifications

Video Compression
H.264/M-JPEG
Video Stream
Main Stream, Sub stream (Main Stream to select D1 or 4CIF)
(Slave stream only to select CIF or QCIF)
Video Resolutions
D1: 720x480(NTSC)/720x576(PAL)
4CIF: 704x480(NTSC)/704x576(PAL)
2CIF: 704x240(NTSC)/704x288(PAL)
CIF: 352x240(NTSC)/352x288(PAL)
QCIF: 176x120(NTSC)/176x144(PAL)
Operating System
Embedded Linux
Video Bit Rate
32K/64K/128K/256K/384K/512K/768K/1024K/1.5M/2M
Video Frame Rate
1 ~ 30 FPS
Video Quality
5 levels (Medium, standard, good, detailed, excellent), Auto
Video Input
1, BNC, 75 ohm, 1 Vp-p
Video Output
1, BNC, 75 ohm, 1 Vp-p
Network Connector
RJ-45, IEEE 802.3 10Base-T, 802.3u 100Base-TX
Network Protocols
TCP, UDP, IP, ICMP, PPPoE, ARP, UPnP, HTTP, HTTPS, FTP, SMTP, DHCP, DNS, DDNS, RTP, RTSP, SNMP, NTP, IGMP
Audio Inputs
1 channel audio, Microphone in
Audio Output
1 channel audio, Line out
Audio Compression
ADPCM G.711
Audio Stream
Two-way (H.264 only)
Input / Output Signal
6V p-p, +10dBm max
Input / Output Impedance
600 ohms
Terminal Block
1xRS-485 (DB9 interface), 1 alarm input, 1 alarm output
PTZ Protocol
Pelco D, P
PTZ Baud Rate
2400, 4800, 9600, 12800, 19200 Kbps
PTZ Control Speed
Pan, Tilt, Zoom, Focus, Iris
PTZ Preset
32 Preset positions
PTZ Patrol
4 Tour mode (Each mode has 10 positions)

Remote Management
Web (CGI)
Dimension
Line card type: 88 x 139 x 42.1mm (W x D x H)
Operating condition
-10 ~ 60 degree (Celsius)
Storage condition
-20 ~ 85 degree (Celsius)
Operating Humidity
0 ~ 95% (non-condensing)
Power Input
12VDC, 2A
System Reset
Reset button (factory default)
LED Indications
Power, LAN, video status
Motion Detection
Drag and drop configurable detection windows
Configuration Backup /Recovery
Web browser
Local Storage
2.5" SATA HDD *1 (Hard drive is not include)
Firmware Upgrade
Web browser
NTP
Sync with PC, Sync with NTP server, Manual
Video Adjustment
Brightness, contract, saturation, color tone level
User Account
Up to 10 user accounts for configurable
Event Action
FTP, E-mail, DO1, SMS, SNMP, remote storage, PTZ preset
Event Sending Path
FTP; E-mail (forwarding JPEG picture)
Digital Zoom
4x
Snapshot
Live view mode (JPEG format)
Playback
Playback via IE browser
Event Define
User define video frame rate and video resolution and video quality when alarm input and motion detection
Text Overlay
Configurable text color, background color, date/time, display position
Privacy Mask
Support 3 privacy mask window
System Language
English, Simplified Chinese, Traditional Chinese
Log
System log, operating log
NVR Support
CTC Union , NUUO

DIMENSION DIAGRAM





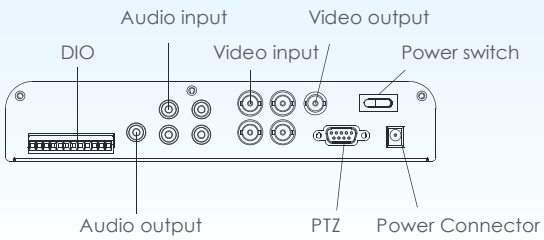
4 - Ch H.264 Digital Video Encoder

DVS-8504E-H

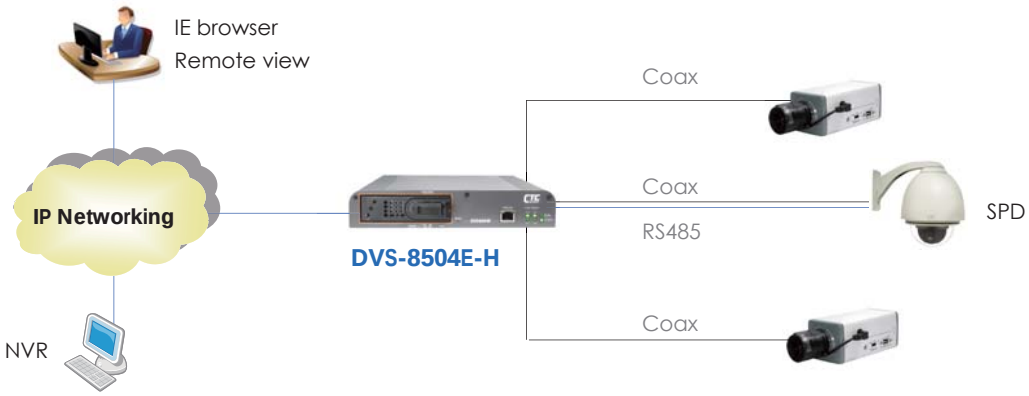
CTC Union DVS-8504E-H is a standalone H.264 video encoder. It can connect up to 4 analog video cameras and transfer these streams from analog format to digital format simultaneously through H.264 video compression technology. The DVS-8504E-H provides high resolution and various video layouts from 1CH/ D1 to 4CH/ CIF and can also delivers multiple or individual configurable video streams at the same time. The DVS-8504E-H can be also provides dual-stream transmissions for recording and monitoring. The built-in SATA interface enables powerful storage capability for the DVS-8504E-H to do the video streaming transmission and local storage at the same time. The web management offers the user convenience access to detailed alarm detection and actions. CTC Union DVS-8504E-H provides an easy way to migrate the analog system to high performance IP based solution.

Features

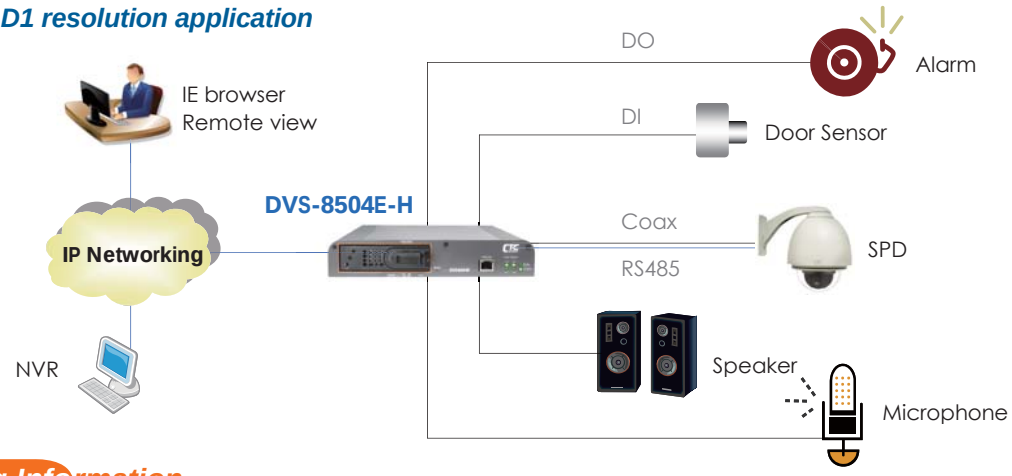
- Multiple H.264 streams
- D1 resolution @ 30FPS, CIF resolution@120FPS
- 1-CH D1 / 2-CH 2CIF / 4-CH CIF
- Built-in Web server for management
- Supports HTTPS and password protection
- Supports 3.5" SATA hard-disk tray for local storage
- Provides main and sub video streams with different resolution
- Supports logic (AND / OR) event alarms
- Supports two-way audio
- 4 Digital Input / 2 Digital Output connections
- Supports privacy mask
- Fan less design



DVS 8504E-H CIF resolution application



DVS 8504E-H D1 resolution application



Ordering Information

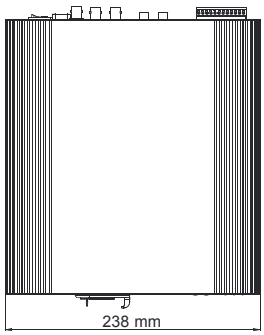
Model Name	Description
DVS-8504E-H	4-Ch H.264 Digital Video Encoder with Hard Dish Interface

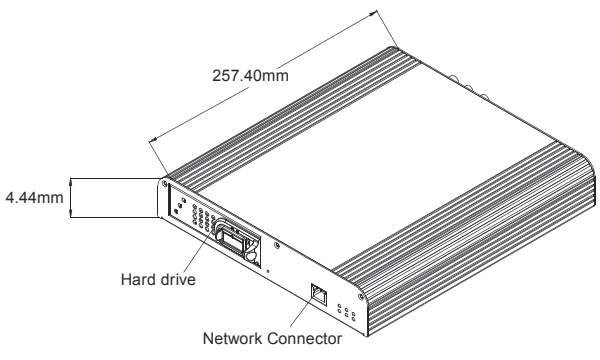
Specifications

Video Compression
H.264/M-JPEG
Video Stream
Main Stream, Sub stream (Main Stream to select D1 or 4CIF)
(Slave stream only to select CIF or QCIF)
Video Resolutions
D1: 720x480(NTSC)/720x576(PAL)
4CIF: 704x480(NTSC)/704x576(PAL)
2CIF: 704x240(NTSC)/704x288(PAL)
CIF: 352x240(NTSC)/352x288(PAL)
QCIF: 176x120(NTSC)/176x144(PAL)
Operating System
Embedded Linux
Video Bit Rate
32K/64K/128K/256K/384K/512K/768K/1024K/1.5M/2M
Video Frame Rate
1 ~ 30 FPS
Video Quality
5 levels (Medium, standard, good, detailed, excellent), Auto
Video Input
4, BNC, 75 ohm, 1 Vp-p
Video Output
1, BNC, 75 ohm, 1 Vp-p
(D1/4CIF supported full screen, 2CIF/CIF supported quad mode)
Network Connector
RJ-45, IEEE 802.3 10Base-T, 802.3u 100Base-TX
Network Protocols
TCP, UDP, IP, ICMP, PPPoE, ARP, UPnP, HTTP, HTTPS, FTP, SMTP, DHCP, DNS, DDNS, RTP, RTSP, SNMP, NTP
Audio Inputs
4 channels mono audio (RCA)
Audio Output
1 channel mono audio (RCA)
Audio Compression
ADPCM G.711
Audio Stream
Two-way (H.264 only)
Input / Output Signal
6V p-p, +10dBm max
Input / Output Impedance
600 ohms
Terminal Block
1xRS-485 (DB9 interface), 4 alarm input, 2 alarm output
PTZ Protocol
Pelco D, P
PTZ Baud Rate
2400, 4800, 9600, 12800, 19200 Kbps
PTZ Control Speed
Pan, Tilt, Zoom, Focus, Iris
PTZ Preset
32 Preset positions
PTZ Patrol
4 Tour mode (Each mode has 10 positions)

Remote Management
Web (CGI)
Dimension
Line card type: 238 x 257.4 x 44mm (W x D x H)
Operating condition
-10 ~ 60 degree (Celsius)
Storage condition
-20 ~ 85 degree (Celsius)
Operating Humidity
0 ~ 95% (non-condensing)
Power Input
12VDC, 2A
System Reset
Reset button (factory default)
LED Indications
Power, LAN, video status
Motion Detection
Drag and drop configurable detection windows
Configuration Backup /Recovery
Web browser
Local Storage
3.5" SATA HDD *1 (Hard drive is not include)
Firmware Upgrade
Web browser
NTP
Sync with PC, Sync with NTP server, Manual
Video Adjustment
Brightness, contract, saturation, color tone level
User Account
Up to 10 user accounts for configurable
Event Action
FTP, E-mail, DO1, DO2, SMS, SNMP, local storage, remote storage, PTZ preset
Event Sending Path
FTP; E-mail (forwarding JPEG picture)
Digital Zoom
4x
Snapshot
Live view mode (JPEG format)
Playback
Playback via IE browser
Event Define
User define video frame rate and video resolution and video quality when alarm input and motion detection
Text Overlay
Configurable text color, background color, date/time, display position
Privacy Mask
Support 1 privacy mask window
System Language
English, Simplified Chinese, Traditional Chinese
Log
System log, operating log
NVR Support
CTC Union , NUUO

DIMENSION DIAGRAM





1- Ch H.264 Digital Video Decoder

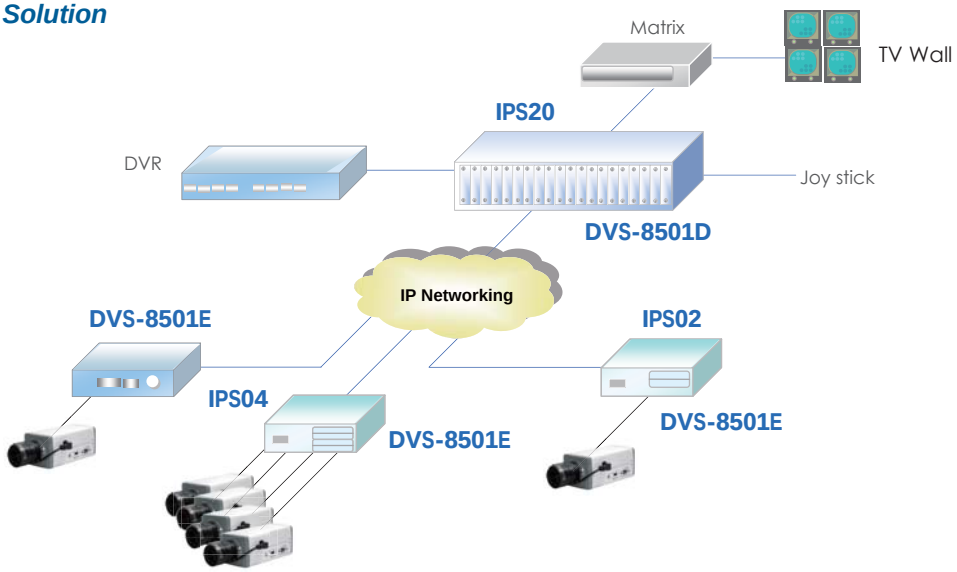
DVS-8501D

CTC Union DVS-8501D is a 1-ch video decoder with cutting edge H.264 video compression technology compatible with the CTC Union H.264 video encoders. It enables convert the digitalized video data back to analog format for various back-side devices such as TV wall, legacy DVR, and Joysticks. The DVS-8501D can decode video source up to 64 channels. When DVS-8501D blades are used with CTC IPS series racks with various channels choices, the DVS-8501D can become standalone type with VGA port for LCD monitor video output or rack type for professional installation in the control room.

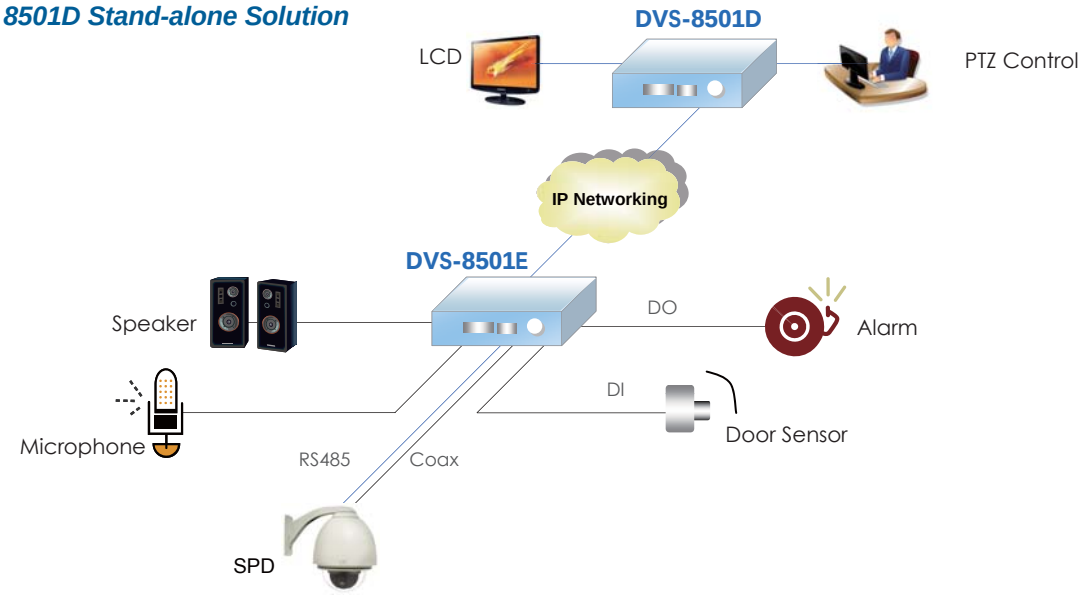
Features

- Complies with H.264 compression technology
- Provides high quality analog video and audio decoding
- Programmable sequence mode for multiple video sources
- Decodes video source up to 64 channels (Sequence display mode)
- Built-in Web server for easy management
- Supports secure management and encrypted video streams
- VGA port for stand-alone type (DVS-8501DV only)
- Supports two-way audio
- Card fits in one-slot or 20-slot chassis

DVS 8501D Rack Solution



DVS 8501D Stand-alone Solution

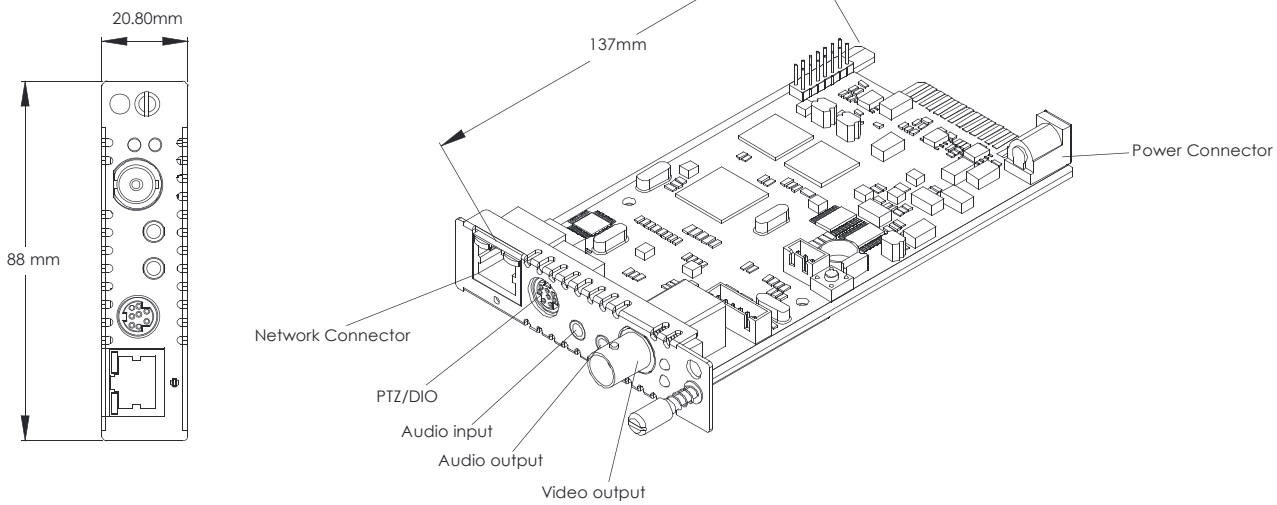


Specifications

Video Decoding
H.264 video with resolution up to D1
64 different video sources
(support manual cycling、automatic cycling)
Video Resolutions
D1 720x480(NTSC)/720x576(PAL)
4CIF: 704x480(NTSC)/704x576(PAL)
2CIF 704x240(NTSC)/704x288(PAL)
CIF 352x240(NTSC)/352x288(PAL)
QCIF 176x120(NTSC)/176x144(PAL)
Operating System
Embedded Linux
Frame rate
Frame rates up to 30 (NTSC) / 25 (PAL) in all resolution
Decoding Source
CTCU DVS-8504E-H / DVS-8501E / DVS-8501E-H / DVS-8504E-FD
Video Output
1, BNC, 75 ohm, 1 Vp-p (for DVS-8501D)
1 BNC & 1 VGA (for DVS-8501DV series product)
Output Channel
1 channel mono audio, 3.5mm phone jack
Audio Compression
ADPCM G.711
Microphone
Omni-directional
Alarm and PTZ Interface
RS-485 (DB9 Interface), 1x alarm input, 1x alarm output

Remote Management
Web (CGI)
Network Connector
RJ-45, IEEE 802.3 10Base-T, 802.3u 100Base-TX
Network Protocols
TCP, UDP, IP, ICMP, PPPoE, ARP, UPnP, HTTP, HTTPS, FTP, SMTP, DHCP, DNS, DDNS, RTP, RTSP
System Configuration
Backup and recovery all setting via web browser operation
Firmware Upgrade
Web browser
User Interface Language
English, Simplified Chinese, Traditional Chinese
Log
System log, operating log
Operating condition
-10 ~ 60 degree (Celsius)
Storage condition
-20 ~ 85 degree (Celsius)
Operating Humidity
Humidity 0 ~ 95% (non-condensing)
Power Input
12VDC, 1A
System Reset
Reset button (factory default)
LED Indications
Power, LAN, video status
Dimension
Line card type: 88 x 137 x 20.8mm (W x D x H)
Net Weight
Line card type: 100g

DIMENSION DIAGRAM



Ordering Information

Model Name	Description
DVS-8501D	1-Ch H.264 Digital Video Decoder
DVS-8501DV-DC	1-Ch H.264 Digital Video Decoder with VGA Connector and Internal DC power
DVS-8501DV-AC	1-Ch H.264 Digital Video Decoder with VGA Connector and Internal AC power

DVS – □□□□
Example: DVS – 8501D

1- Ch MPEG4 Digital Video Server

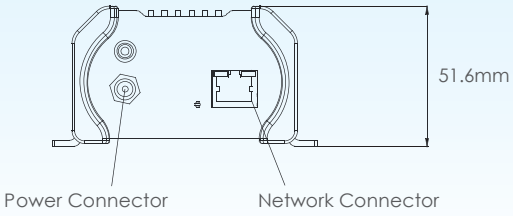
DVS-8301

The DVS-8301 converts a single analog video stream to digital format. It delivers dual stream (MPEG-4 and MJPEG) @30 fps, 4CIF resolution for remote monitoring anywhere. In addition, the DVS-8301 supports 3GPP mobile protocol, which enables users to monitor via 3G cell phones or any RTSP (Real Time Streaming Protocol) compatible multimedia software on the go.

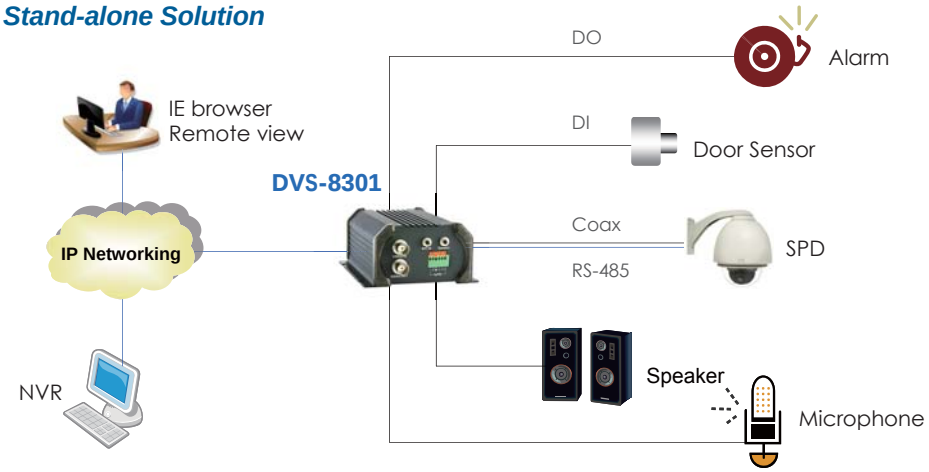
A complete set of security features includes user access management and HTTPS encryption. DVS-8301 provides one audio stream for two-way audio applications, is a PoE (Power over Ethernet) enabled unit and has powerful event management that includes image upload to FTP server, alarm notification and I/O control. Pan/Tilt/Zoom control is done over RS-485.

Features

- Simultaneous Motion-JPEG & MPEG-4 streams, up to 4CIF resolution
- Excellent image quality with up to 30 fps in all resolutions
- PoE (Power over Ethernet) enabled device
- Supports two-way audio
- Digital I/O for external alarm or sensor
- Supports 3GPP/ISMA RTSP
- Supports multiple PTZ control protocols through RS-485
- UPnP for fast and easy installation
- Bundled 16 channel surveillance software



DVS 8301E Stand-alone Solution



Ordering Information

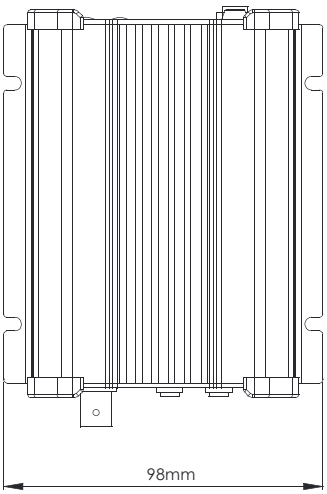
Model Name	Description
DVS-8301	1-Ch MPEG4 Digital Video Encoder

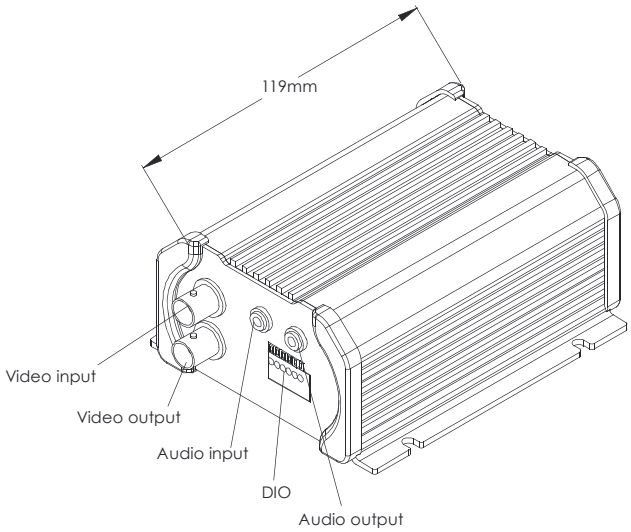
Specifications

Video Input
BNC, looping, 75ohms, 1Vp-p
Video Compression
MPEG4 Simple Profile, Motion JPEG
Bit Rate
64K ~ 2Mbps
Video Adjustment
Brightness, Contrast, Hue, Saturation, Constant Bit Rate (CBR), Variable Bit Rate (VBR)
PTZ Interface
RS-485
PTZ protocols
Pelco D/P
PTZ application
32 preset position, 4 patrol function
Processor and memory
32 Bits RISC Processor, 8MB Flash, 64MB SDRAM, Embedded Linux
LED Indications
Network, Power
Ethernet
RJ-45 10BaseT/100BaseTX PoE
Terminal Block Connector
RS-485/1 alarm input/ 1 relay output
Audio streaming
Two-way
Audio Input
3.5 mm mic/line in
Audio Output
3.5 mm line out jack
Audio compression
ADPCM 64Kbps

Alarm Trigger
External input, Motion detection
Alarm Events
Pre and post alarm buffer
File upload via FTP
Notification via email
External output activation
Network Protocol
TCP/IP, DHCP, PPPoE, ARP, ICMP, FTP, SMTP, DNS, NTP, IGMP, UPnP, RTSP, RTP, HTTP, TCP, UDP, 3GPP/ISMA RTSP
Application Program
CTCU IP installer (Win32 Application)
16 channel recording software (SVP-Express)
Security
Password protection, HTTPS encryption, user access log
Operating Condition
0 ~ 50°C
Storage Condition
0 ~ 70°C
Operating Humidity
20 ~ 80% RH (non-condensing)
Power
12VDC, 1A
Dimension
119 x 98 x 51.6 mm (D x W x H)
Approvals
CE, FCC, RoHS
Include Accessories
CD with installation and management software, Power supply
NVR Support
CTC Union

DIMENSION DIAGRAM





1- Ch H.264 Intelligent Digital Video Encoder

iDVS-01

iDVS-01 (Intelligent Digital Video Server) not only offer highly-effective H.264 Video but also can analyze and identify at front side when the rule of alarm event were set up. Once event is triggered, iDVS-01 will transmit a video and snapshot with object frame and send alarm message to Alarm server and NVR.

Features

Video encoder

- Multiple H.264 streams
- D1 resolution @ 30FPS(NTSC), @ 25FPS (PAL)
- 1 video in / out, 1 audio in / out
- Built-in Web server for management
- Supports HTTPS and password protection
- Supports logic (AND / OR) event alarms
- Supports two-way audio
- 1 Digital Input / 1 Digital Output connections

Intelligent function

- Tripwire Detection
- Intrusion Detection
- Virtual Fence Detection
- Abandoned Objects Detection
- Video Loss Detection

Specifications

Intelligent analysis

Function
Tripwire Detection/ Intrusion Detection/ Virtual Fence Detection/ Abandoned Objects Detection/ Video Loss Detection

Video encoder

Operating System
Embedded Linux
Compression
H.264 / M-JPEG
Frame rate
30/25(NTSC/PAL) fps in all resolution
Video Stream
Multiple H.264 streams
Resolution
D1 720x480(NTSC)/720x576(PAL)
4CIF 704x480(NTSC)/704x576(PAL)
2CIF 704x240(NTSC)/704x288(PAL)
CIF 352x240(NTSC)/352x288(PAL)
QCIF 176x120(NTSC)/176x144(PAL)
Video Bit rate
32K/ 64K/ 128K/ 256K/ 384K/ 512K/ 768K/ 1024K/ 1.5M/ 2M
Video Quality
Medium / Standard / Good / Detailed / Excellent
Video Input / Output
1, BNC, 75 ohm, 1Vp-p
Image Adjustment
brightness, contrast, saturation, hue

Audio

Audio Streaming
Two way audio
Audio Compression
ADPCM G.711 (H.264)
Audio Input
1 channel Line in
Audio Output
1 channel Line out

Network

Ethernet
RJ-45, 10/100 Base-T
Remote Management
Web(CGI)
Network Protocols
RTSP, RTCP, RTP, TCP, IPV4, UDP(Unicast), HTTP, HTTPS, SMTP, NTP, DHCP, FTP, UPnP, DNS ,DDNS, ARP, PPPOE
Firmware upgrade
Web Browser
NTP
Sync with PC, Sync with NTP server, Manual

Event

DIO
1-channel DI and 1-Channel DO
Motion Detection
Drag and drop configurable detection windows
Event Action
FTP, E-mail, DO, SMS
Event Sending path
FTP, E-mail (forwarding Snapshot picture)
Event define
User define video frame rate and video resolution and quality when alarm input and motion detection

General

Operation Temperature
-10 ~ 50°C
Storage Temperature
-20 ~ 60°C
Power Source
DC12V±10%
Power Consumption
3A Max
External Dimension
Line card type: 88 x 139 x 42.1mm(W x D x H)

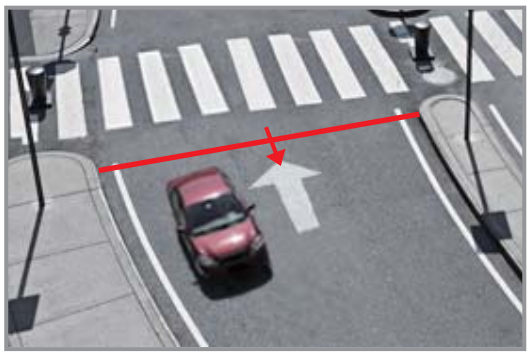
Intelligent Video Analytics

Intrusion Detection

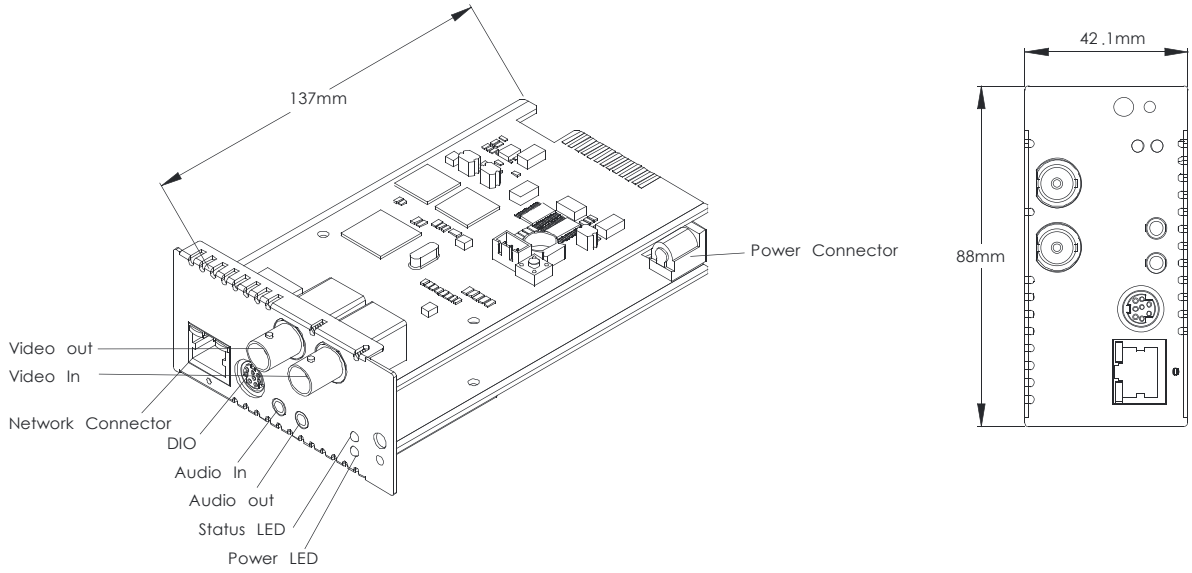
Abandoned Objects Detection

Tripwire Detection

Virtual Fence Detection



DIMENSION DIAGRAM



Ordering Information

Model Name	Description
iDVS01-S	1-Ch H.264 Intelligent Digital Video Encoder

Product Selection Table 2012

Chapter 1 Fiber Series

Multi-Service Platform

Product Selection Table 2012

Chapter 1 Fiber Series

Multi-Service Platform

FMC Small Pack Media Converter

Ethernet Switch

Residential Access Device

Industrial Fiber

IP Device Server

Product Selection Table 2012

Chapter 1 Fiber Series

WDM

Fiber Optical Multiplexers

Next Generation SDH Multiplexer

Chapter 2 DSL Series

LAN Extender

VDSL2 / ADSL2+

VPN Router

Home PNA

Product Selection Table 2012

Chapter 2 DSL Series

SHDSL

Chapter 3 Management

Element Management Software Series

Graphic User Interface Series

Product Selection Table 2012

Chapter 4 PDH Series

Product Selection Table 2012

Chapter 5 Balun

Chapter 6 Surge Protector

Product Selection Table 2012

Chapter 7 Tester Series

Chapter 8 IP Surveillance

Intelligent Digital Video Server

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