

2007

PRODUCTS CATALOG



- ▶ **Multiservice Access Platform**
E1/T1 Access Nodes
Multiservice Access Multiplexers
CWDM
- ▶ **Last mile Copper and Fiber**
FMC / FOM / xDSL
- ▶ **Networking Tester**
- ▶ **Element Management System**

Network ▶ **Conversion** · **exTension** · **Communication**



We believe in building strong customer relationships.

About CTC UNION TECHNOLOGIES

Founded in 1993, CTC Union Technologies is staffed by Data/Telecom professionals. At CTC Union, professional products that suit the communication networking field are both designed and manufactured. CTC Union products are distributed through a world-wide network of Data/Telecom distributors.

CTC Union has formed many joint ventures with well known manufacturers. CTC Union was awarded ISO9001 certification in 1999 for design, development, production, installation and service. Strict QC requirements give our customers the assurance that all production criteria one might expect in a qualified manufacturer will be met.

CTC Union is well equipped to provide prompt delivery of orders. All of CTC Union's agents and dealers are experienced data communication engineering companies with strong technical and support backgrounds.

Network ▶ **C**onversion • **exT**ension • **C**ommunication

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ATM/ TDM Modem SHDTU03b

.bis



2/4-wire G.SHDSL bis Router with 4-port Switching HUB

The SHDTU03b, G.SHDSL bis Router Family are G.SHDSL bis (Single-Paired High Speed Digital Subscriber Loop) 2-wire/4-wire routers which comply with G.991.2 & G.994.1 (G.hs) standards and with optional feature of a built-in four port 10Base-T /100Base-TX auto-negotiation and auto-MDIX switching HUB. The SHDTU03 family provides business-class, multi-range 64Kbps to 5.7Mbps payload rates over exiting single pair copper wire. The SHDTU03b, G.SHDSL bis router 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 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 ports 10Base-T /100Base-T auto-negotiation and auto-MDIX switching ports may be configured for IEEE802.1q VLAN or port based VLAN application.

Features

- Standard G.SHDSL ITU-T G.991.2 & ITU-T G.994.1 (G.hs)
- Use existing copper loop infrastructures
- Can operate in back to back configurations
- Efficient single wire pair usage
- Up to 5.7Mbps symmetrical service bit rate;
Up to 11.4Mbps for the 4-wire model
(2-pairs, each pair can reach up to 5.7Mbps)
- Adaptive rate installation maximizes data rate based on loop conditions
- Local management interface with LCD display
- SHDSL Line performance monitoring
- Raw and time stamped statistics
- Bandwidth guarantee transmission equipment
- Complied with UL 1950, FCC part 15 ClassB, EN55022 & EN60950

Specifications

- Indicators**
 - General: Power
 - G.SHDSL: Link, Active
 - Ethernet: 1, 2, 3, 4, Alarm
- Physical/ Electrical**
 - Dimensions: 18.7 x 3.3 x 14.5cm (WxHxD)
 - Power:100~240VAC (via power adapter)
 - Power consumption: 9 watts
 - Temperature: 0~45°C for opetating ; 0~70°C for storage
 - Humidity: 0~95%
- Memory**
 - 2MB Flash Memory, 8MB SDRAM
- Ethernet**
 - 4-ports switching hub (for ET10RS model)
 - 10Base-T and 100Base-TX auto-negotiation, supports Auto-MDIX
- Hardware Interface**
 - WAN: RJ-11
 - LAN: RJ-45 x 4 (for ET10RS model)
 - Console port/ RS232: DB9F

Features \ Model	SHDTU03b-ET10R	SHDTU03b-ET10RS	SHDTU03Fb-ET10R	SHDTU03Fb-ET10RS	SHDTU03Ab-ET10RS	SHDTU03AFb-ET10RS
WAN	2-Wire	2-Wire	2-Wire	2-Wire	4-Wire	4-Wire
LAN	1	1	4	4	4	4
Auto-MDIX			▲	▲	▲	▲
Port-based VLAN		▲	▲	▲	▲	▲
802.1q VLAN		1 LAN / 8 WANs	4 LANs / 1 WAN	4 LANs / 8 WANs	4 LANs / 1 WAN	4 LANs / 8 WANs
Firewall		▲		▲		▲
IP Precedence		▲		▲		▲
Maximum Data Rate	5.7Mbps	5.7Mbps	5.7Mbps	5.7Mbps		Mbps
Mininum Date Rate	64Kbps	64Kbps	64Kbps	64Kbps	128Kbps	128Kbps

Specifications - Software

Routing

- Support TCP/ IP/ UDP/ ARP/ICMP/IGMP protocols
- IP routing with static routing and RIPv1 & RIPv2 (RFC1058/2453)
- IP multi-cast and IGMP proxy (RFC1113/2236)
- Network address translation and port address translation (NAT/PAT) (RFC1631)
- NAT/ ALG (Application Layer Gateway) for ICQ/Netmeeting/MSN/Yahoo Messenger
- DNS relay and caching (RFC1034/1035)
- DHCP server (RFC2131/2132)
- IP precedence (RFC 791) (for Firewall Router)

Bridging

- IEEE 802.1D transparent learning bridge
- Port-based VLAN (for ET10RS model)

Security

- DMZ host/ Multi-DMZ/ Multi-NAT functions
- Virtual server mapping (RFC1631)
- VPN server pass-through for PPTP/L2TP/IPSec tunneling
- Natural NAT firewall
- Advanced Stateful packet inspection (SPI) firewall (for Firewall Router)
- Application level gateway for URL and keyword blocking (for Firewall Router)
- User access control : deny certain access of PCs to Internet (for Firewall Router)

Management

- Easy-to-use Web based GUI for quick installation, configuration and management
- Menu-driven interface / command line interface (CLI) for local console and Telnet access management
- Password protected management and access control list for administration
- SNMP management with SNMPv1/ SNMPv2c (RFC1157/ 1901/1905) agent and MIBII (RFC1213/1493)
- Software upgrade via Web browser and TFTP server

ATM

- Up to 15 PVCs
- ATM forum UNI3.1/UNI4.0
- UBR/CBR/VBR-rt/VBR-nrt for QoS
- OAM F5 AIS/RDI and loopback
- AAL5 (ATM adaptation layer type5)

AAL5 Encapsulation

- VC multiplexing and SNAP/LLC
- Ethernet over ATM (RFC 2684/1483)
- PPP over ATM (RFC 2364)
- Classic IP over ATM (RFC 1577)

PPP

- PPPover Ethernet (RFC 2516)
- PPP over ATM (RFC 2364)
- User authentication with PAP/CHAP/MS-CHAP

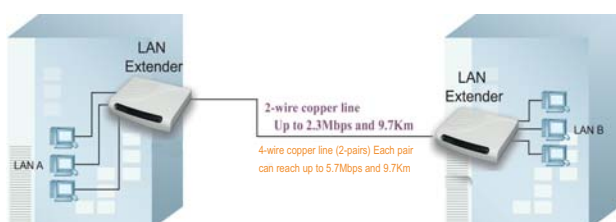
G.SHDSL

- SHDSL: ITU-T G.991.2 (Annex A, Annex B), ITU-T G.994.1(G.hs)
- Encoding scheme: 16-TCPAM
- Data Rate: N x 64Kbps (N=0~36, 0 for adaptive)
- Impedance: 135 Ohms

Ordering Info

- | | |
|----------------------------|--|
| ■ SHDTU03b-ET10R | Standalone 2-wire G.SHDSL bis router with single Ethernet port |
| ■ SHDTU03b-ET10RS | Standalone 2-wire G.SHDSL bis router with 4-port switching HUB |
| ■ SHDTU03Fb-ET10R | Standalone 2-wire G.SHDSL bis router with firewall protection and single Ethernet port |
| ■ SHDTU03Fb-ET10RS | Standalone 2-wire G.SHDSL bis router with firewall protection and 4-port switching HUB |
| ■ SHDTU03Ab-ET10RS | Standalone 4-wire G.SHDSL bis router with 4-port switching HUB |
| ■ SHDTU03AFb-ET10RS | Standalone 4-wire G.SHDSL bis router with firewall protection and 4-port switching HUB |

Application



Fiber Media Converter

Plastic Optic Fiber Platform FIB-10/100POF



Standalone Fiber Media Converter

Plastic Optic Fiber, or POF as it is widely known, offers affordable, high-end connectivity for 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-yourself users are numerous. The discrete 2mm x 4.5mm duplex cable is easily concealed under carpets or inside walls. While it's very lightweight and can be 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 red light to transfer data from one device to another. A quick glance inside the cable will indicate connectivity to the network a red light seen by the human eye means the network is connected; no red light means no connection. It's that simple.

POF is completely safe. Because it's a light-based solution, there is no EMI (electromagnetic interference) so it won't interfere with other electrical equipment. Even a beloved pet biting through it would not be harmed. Likewise POF and the content it carries are completely immune to electrical noise, so they are not affected by the electrical equipment the POF passes. Even other existing networks or wireless systems in the house cannot interfere with data passing through the its cable. POF, already used in millions of cars worldwide to drive entertainment and information networks, has proven reliability even in the most rugged environments.

Fiber Media Converter

Fiber Managed Platform FIB1-ET40/O & FIB1-ET40/S



Stand-Alone Fiber Optic Phone Line (POTS) Converter

The Fiber Optic Phone Line converter is intended to connect central-office voice signal to distance Plain old Telephone equipment (POTS) utilizing standard telephone signaling. FIB1-ET40/O and FIB1-ET40/S are required to implement an end to end system; FIB1-ET40/O connects to a telephone line or PBX and has the ability to detect ringing voltage and to act as a telephone. FIB1-ET40/S is the reciprocal unit and has the ability to act as Central Office and connects to a telephone device.

Fiber Media Converter

Fiber Managed Platform FIB1-1000DS



Stand-Alone Gigabit Ethernet Media Converter

The FIB1-1000DS are gigabit Ethernet Multi-mode to Single mode fiber media converters designed as standalone converters in the FIB1 Series or as line cards for the FRM301 Media Converter Rack. The FIB1-1000DS fully complies with the requirements for 100Base-SX to 100Base-LX and 1000Base-SX to 1000Base-LX conversion. The FIB1-1000DS have one SFP slot for 1000Base-SX multi-mode SFP module with LC type connectors for 62.5/125um fiber cable and one SFP slot for 1000Base-LX single mode SFP module with LC type connectors for 9/125um fiber cable. The actual SFP transceiver modules are options.

Features

- Compatible with FRM301 Chassis for SNMP management
- Convert Single mode to Single Mode or Multi-mode to Multi-mode (and vice versa)
- Performs optical repeater function (with 100Base-SX to 100Base-LX or 1000Base-SX to 1000Base-LX)
- Extend Fiber Optic distance up to 550m / 1,815 ft (Multi-mode)
- Extend Fiber Optic distance up to 120km / 3630 ft (Single mode)

Managed 2U Rack Type FRM220

Preliminary

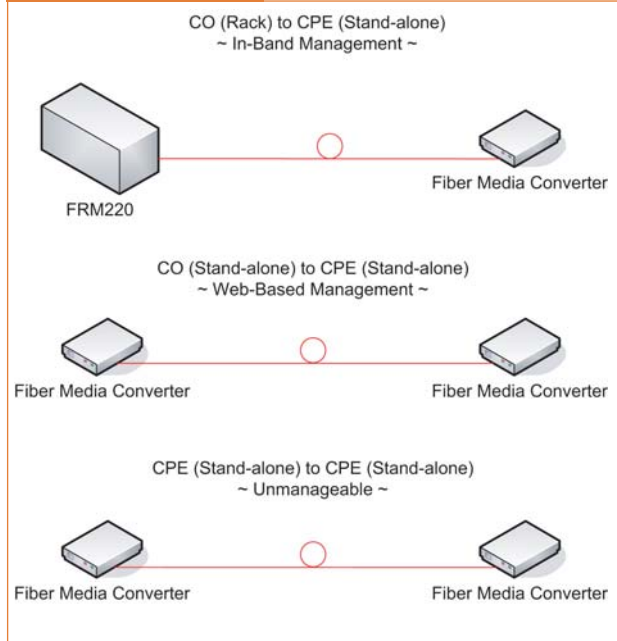
In-Band Management Media Converters for Broadband and Data Networks

This document specifies the functional as well as operation & maintenance requirements of the In-band media converters for broadband and data network. A major application of media converters is to make use of optical fiber as the transmission media for extending the reach of the following interfaces between two locations. Media converters are deployed in pairs, typically between a two CO sides or between a CO and CPE location or between two CPE location. The media converter should be transparent to Layer 2 and Layer 3 protocols including, IEEE 802.1q, VLAN tag, Spanning Tree Protocol, IPX, IP etc.

Features

- Local/Remote Module Control - Auto/Speed/Duplex
- Full Wire Speed In-Band Diagnostic (Loop back Test)
- TFTP on-line f/w upgrade
- SNTP Time Client
- Bandwidth Control Configuration (Egress/Ingress)
- Support Link Pass Through
- Configuration DIP Switch Support Auto/Speed/Duplex/Auto MDIX/MDIX
- Management Interface support Console/Telnet/SNMP

Application



CWDM

Rack Solution for CWDM Sigma Links 1000

4 ch 2.5G Transponder platform



The multirate transponder platform, Sigma Links 1000 (up to 2.5G transponder) 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 Fibre Channel, and other services, over a 100-GHz, ITU-compliant wavelength, with 50-GHz wavelength stability for future 64-channel operation. The 2.5G transponder card architecture contains a single client interface that is mapped to a single-line CWDM interface, without accessing its shelf 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, including ESCON, OC-3/STM-1, OC-12/STM-4, OC-48/STM-16, Gigabit Ethernet, 1-Gbps Fibre Channel/FICON, 2-Gbps Fibre Channel/FICON, as well as high-definition television (HDTV), and different fiber types (single- and multimode), wavelengths (850 and 1310 nm), and fiber reach (short reach/intra-office, intermediate reach/short haul, etc.). The SFP optics modules are equipped with LC connectors to enable high-density placement.

SDH Tester

High-speed testing and diagnosis HCT-SDH/155

Handheld SDH and PDH networks up to 155 Mbit/s Analyser

HCT-SDH/155 is a cost-effective handheld tester for the analysis and evaluation of SDH and PDH networks and equipment up to 155 Mbit/s. Thanks to its small size and light weight, this tester is the ideal solution for field work.



BERT Tester

E1/ Datacom BERT HCT-BERT/C

Color-LCD Analyzer

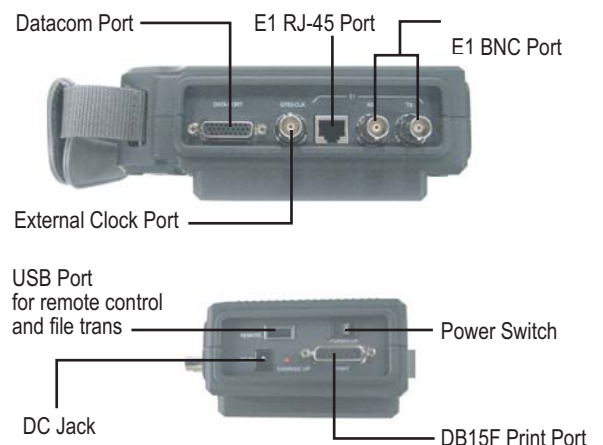
The HCT-BERT/C analyzer is a compact, color-LCD, graphic-interface-user, single hand E1 PCM measuring instrument designed for field use in analysis and maintenance of E1 (2.048Mbps) lines. The HCT-BERT/C performs framed, unframed, signaling analysis, drop and insert Nx64Kbps, or nx56Kbps data into any time slot. The HCT-BERT/C analyzer 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/ V.24/ RS-232/449/530/ X.21

Connectors



A. Digital Video Server



4-Channels/ 16-Channels DVS-8104 & DVS-8116



Embedded Real-time MPEG4 Video Server on Ethernet

The "DVS, Digital Video Server is connected to a computer network like a LAN. DVS digitizes analog video sources and distribute digital video over an IP network. It is the device to convert the analog video signal and compress digital signal to digital signal via a coded mechanism in MPEG4 format standard and transmit to video monitoring center via IP network. DVS is designed to be a 4-ch/16-ch video-in standard-alone video server. With 4-ch/16-ch video input with resolution configurable from QCIF in 4-ch/16-ch up to single D1 in one-ch and DSP algorithms.

DVS can be a most cost-effective solution for the cutting edge video server satisfying for versatile application. Besides, it also provides sync 4-ch/16-ch audio in and 1-ch/4-ch audio out accompanying with video, 4 sets of DI/DO, console port for local configuration, SNMP management function. Due to the characteristic of video server working on LAN, DVS is fully compatible with TCP/IP standard with necessary protocol implemented like, UDP, HTTP, ARP, DHCP (client), SMTP, RTSP, RTP, RTCP, DNS, DDNS, SNMP, PPPoE, IGMP v2, NTP.

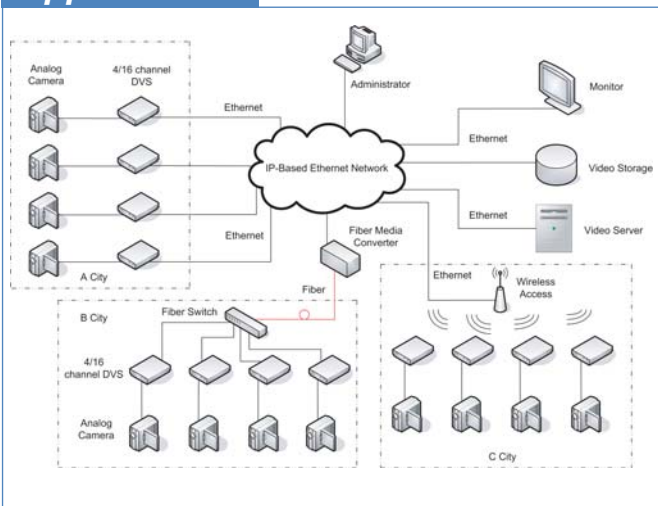
Features

- MPEG-4 compliant compression format
- Transmit live video up to 30 frames/second (D1 quality) with low bit rate (nominal 1.5Mbps)
- High-density with 4 or 16 ch video-in ports per unit
- Motion detect function user configurable
- Four/sixteen audio-in and one audio out for each unit
- Up to 4 sensor contact ports (DI/DO)per unit.NTSC, PAL user configurable
- Provide one data port RS-485/422/232 for PTZ used
- Support Pan/Tilt/Zoom configuration
- Support IGMP v2 multicast function
- Auto e-mail warning system via a set IP address
- 2 ports USB2.0 for WiFi and mass storage

Specifications

Video Interface		
Input Channel	DVS-8104	4 channel per card
	DVS-8116	16 channel per card
Video Format	NTSC, PAL, configurable	
Signal	1V p-p	
Impedance	75 ohms	
Video SNR	> 50 dB	
Interface Connector	4 * BNC	
Video Adjustment	Brightness, contrast, saturation, color tone level ajust	
Motion Detect	Yes (with sensitivity turning)	
Camera Control	Pan/Tilt/Zoom supported via serial port (RS-485/RS-422/RS-232 configurable)	
Audio Interface		
Channel Connectors	4 mono audio-in ports & 1 mono audio-out port per card	
Standard	Audio-in: G.726 (ADPCM) sample rate 8KHz/ Audio-out: MP3sample rate 44.1KHz	
I/O Signal	6V p-p, +10 dBm max	
I/O impedance	600 ohms balance or unbalance	
Frequency Response	20Hz ~ 20KHz	
Data Interface		
Interface Type	RS-485/RS-422/RS-232 configurable	
Baud Rate	115.2Kbps max	
BER	<1.0E ⁻¹⁰	
Interface Connector	DB9 Female	
Line(Network) Interface		
Ethernet Interface	IEEE 802.3 10Base-T, 802.3u 100Base-TX	
Protocol	TCP/IP, UDP/IP, HTTP, ARP, DHCP(client), SMTP, RTSP, RTP, RTCP, DNS, DDNS, SNMP, PPPoE, IGMPv2, NTP	
Interface Connector	1*RJ-45 for 10/100Base-TX (Auto-sensing)	
Contact Input/Output		
Channel	4 * duplex	
Output Format	Form C output 32 VDC/VAC max@100mA	
Input Format	DB-25 female	
USB Interface		
Interface Type	USB 2.0 Host, 2 ports	
Baud Rate	480Mbps	
Purpose	One for WiFi and the other for mass storage	
Connector Type	USB A type	
Image Compression		
Compression format	MPEG4 (ISO/IEC-14496-2)	
Resolution	Full D1:720*480 (NTSC)/ 720*576 (PAL), 4CIF: 702*480(NTSC)/ 702*576 (PAL), CIF:352*240 (NTSC)/ 352*288 (PAL), QCIF: 176*120(NTSC)/ 176*144	
Performance	DVS-8104	1 Ch D1:30 (NTSC)/ 25(PAL)FPS, 4 Ch D1:30 (NTSC)/ 25(PAL)FPS, 4 Ch CIF:120(NTSC)/100(PAL)FPS,
	DVS-8116	4 Ch D1: 120(NTSC)/100(PAL)FPS, 16 Ch D1:120(NTSC)/100(PAL)FPS, 16 Ch CIF: 480(NTSC)/400(PAL)FPS
Frame Rate	1 — 30 Adjustable	
Bit Rate	64K/128K/384K/512K/1024K/1.5M/2M	
Alarm Cut-Off Button	Yes	
Date & Time		
Mode	Synchronize with computer time Synchronize with NTP server/ Manually	
Overlay	Enable or Disable	
Management		
Local Interface	RS-232/DB9 for VT-100	
Telnet Access	Via 10/100Mbps Ethernet port	
Web Management	Via 10/100Mbps Ethernet port	
SNMP Management	Via 10/100Mbps Ethernet port	
Remote Management	Optional by SNMP line card	

Application



1. Fiber Series



Fiber Series Selection Table

R/Rack, L/Line card, S/Standalone, M/Management, SW/Switch

Fiber Media Converters				
Network Type	Product Name	Description	Product Type	Page
Managed Units				
Fiber media converter	FRM301	3U, 19" 16 slots SNMP Managed chassis	R, M	1-13
Fiber media converter	FRM401	4U, 19" 12 slots SNMP Managed chassis	R, M	1-14
Fiber media converter	FIB1-10/100F	100Base-TX to 100Base-FX MM or SM	L, S, M	1-2
Fiber media converter (With Internal PWR)	FIB2-10/100F	100Base-TX to 100Base-FX MM or SM	S, M	1-2
Fiber media converter	FIB1-Serial	(RS422/485/232) Terminal Block to MM or SM	L, S, M	1-3
Fiber media converter(With Internal PWR)	FIB2-Serial	(RS422/485/232)Terminal Block to MM or SM	S, M	1-3
Fiber media converter	FIB1-E1/T1	BNC or RJ45 to MM or SM	L, S, M	1-4
Fiber media converter(With Internal PWR)	FIB2-E1/T1	BNC or RJ45 to MM or SM	S, M	1-4
Fiber media converter	FIB1-DATA	(V.35/X.21/RS530/449/232) 26-pin to MM or	L, S, M	1-5
Fiber media converter(With Internal PWR)	FIB2-DATA	(V.35/X.21/RS530/449/232) 26-pin to MM or SM	S, M	1-5
Fiber media converter	FIB1-1000ES	10/100/1000Base-TX to 1000Base-SX/LX	L, S, M	1-6
Fiber media converter	FIB1-1000TG	1000BASE-TX to 1000Base-SX/LX GBIC	L, S, M	1-7
Fiber media converter	FIB1-1000MS	1000Base-SX to 1000Base-LX GBIC (MM to	L, S, M	1-8
Non Managed Units				
Fiber media converter	FRM301N	3U, 19" 16 slots Non-Managed chassis	R	1-15
Fiber media converter	FIB1-10/100N	100Base-TX to 100Base-FX MM or SM	L, S	1-10
Fiber media converter (With Internal PWR)	FIB2-10/100N	100Base-TX to 100Base-FX MM or SM	S	1-10
Fiber media converter	FIB1-Serial/FDC	(RS485/232) Terminal Block to MM or SM with Ring	L, S	1-9
Fiber media converter	FIB1-DATA/H	(V.35/X.21/RS530/449) 26-pin to MM or SM	L, S	1-5
SDH				
Network Type	Product Name	Description	Product Type	Page
SDH	FMUX155B	Ethernet and TDM services over STM-1	S	1-14
Coarse Wave Division Multiplexers (CWDM)				
Network Type	Product Name	Description	Product Type	Page
CWDM	SML-50-9051	5U, 19", 17 slots chassis	R, M	1-15
CWDM	SML-20-9021	2U, 19", 6 slots chassis	R, M	1-16
CWDM	SML-50-9210	SML-5000 SNMP card	L, M	1-16
CWDM	SML-20-9210	SML-2000 SNMP card	L, M	1-16
CWDM	SML-50-8012	1.25G, 2 channels Transponder	L, S, M	1-17
CWDM	SML-50-8022	2.5G, 2 channels Transponder	L, S, M	1-17
CWDM	SML-50-81XX	(4) or (4+1) or (8)or (8+1) Ch Mux/Demux	L, S, M	1-17
CWDM	SML-50-8210	Fiber Optic Protection	L, S, M	1-18
CWDM	SML-50-83XX	(1) or (2) Ch Drop/Insert OADM	L, S, M	1-18
Fiber Optical Multiplexers (FOM)				
Network Type	Product Name	Description	Product Type	Page
FOM	FMUX01A	E1/T1/Datacom/Ethernet Mixed Fiber Optic Multiplexer	R, M	1-19
FOM	FMUX04	4-port E1 Fiber Optic Multiplexer	S, M	1-21
Fiber Switch				
Network Type	Product Name	Description	Product Type	Page
Fast Ethernet Switch	FSW-2104	4-port 10/100Base-TX to 100Base-FX Unmanaged FE Switch	S	1-23
Gigabit Ethernet Switch	FSW-3226M	24-port 10/100Base-TX L2 Managed FE Switch + 2 SFP Dual Media	R, M	1-25
Gigabit Ethernet Switch	FSW-3208M	8-port 10/100/1000Base-TX Web-Smart GbE Switch + 2 SFP Dual Media	S, M	1-24
Gigabit Ethernet Switch	FSW-3224M	24-port 10/100/1000Base-TX Web-Smart GbE Switch + 2 SFP Dual Media	R, M	1-24
Gigabit Ethernet Switch	FSW-3168M	8-port 1000Base-TX + 16-port SFP Web-Smart GbE Switch	R, M	1-26

Fiber Managed Platform FIB1-10/100F & FIB2-10/100F

Stand-Alone Fast Ethernet to Fiber Media Converter

FIB1-10/100F and FIB2-10/100F series are Fast Ethernet 10/100Base-TX to 100Base-FX manageable standalone media converters, which give you the options to choose from the most popular fiber cabling connectors, ST, SC, or FC. Both multi-mode and single mode converter models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, depending on your specific network needs. LED indicators signal the power status of the converter, UTP port speed, Link, and duplex status, FX port Link and duplex status.



Features

- Ability to force 10Mbps or 100Mbps at TP port
- Auto Crossover for MDI/MDIX at TP port
- Auto Negotiation at TP port
- Compatible with FRM301 Chassis with SNMP management
- Full or Half-Duplex on copper
- Store and forward Switching mechanism
- Supports link-loss-forwarding function, loop-Back test, and remote state monitor Flow Control
- Support GUI, SNMP Management with FRM301 Chassis

Specifications

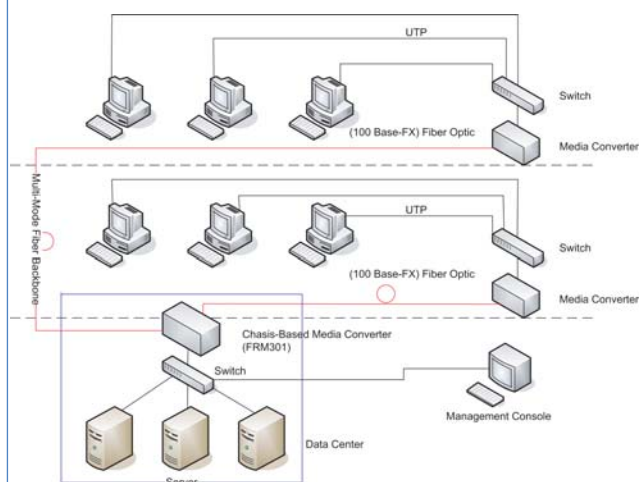
Standard	IEEE 802.3 10Base-T, 802.3u 100Base-TX and 100Base-FX standards	
LEDs	PWR, LLF, Fiber Link, TP Link/ Duplex/ Speed	
Power	FIB1	External AC Adapter; 9VDC@ 1A
	FIB2	AC Model: 100 — 240 VAC ± 10%; Frequency: 50 — 60Hz DC Model: 24 — 48VDC ±10%
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	20 — 80% non condensing (Operating); 10 — 90% (Storage)
Power Consumption	FIB1	< 4W
	FIB2	< 4W
Dimensions(WxDxH)	FIB1	85.6mm x 122.6mm x 20mm
	FIB2	85.6mm x 191.7mm x 30mm
Weight	FIB1	340g
	FIB2	550g
Compliance	CE, FCC Class A	
MTBF	257063 Hours	

Ordering Info

FIBX-10/100	X	XX	XXX	X
Product Type	Fiber Type	Connector Type	Connectivity Distance	Function Type
FIB1 Family	S: Single	ST	002: 2km	F: with advanced feature
FIB2 Family	M: Multi	SC	015: 15km	
	W: WDM	FC	030: 30km	
			050: 50km	
			080: 80km	
			120: 120km	
			*20A: 20km [WDM only]	
			*20B: 20km [WDM only]	
			*40A: 40km [WDM only]	
			*40B: 40km [WDM only]	
			*60A: 60km [WDM only]	
			*60B: 60km [WDM only]	

*020A must use couple with 020B
*040A must use couple with 040B

Application



Fiber Managed Platform FIB1-Serial & FIB2-Serial

Stand-Alone RS-232/423/485/422 Copper to Fiber Converter

The FIB1/FIB2-Serial provides a fiber converter solution to extend RS-232 or RS-485 transmission distance up to 2km over multimode fiber or up to 120km over single mode fiber. The converter is equipped with multiple interface circuits, for connection to RS-232, RS-423, or RS-485/422 (2 or 4 wire). The FIB-Serial secures data transmission over EMI resistant fiber at speeds up to 256kbps for RS-232 or up to 1024kbps for RS-422/485. When the FIB1/FIB2-Serial is linked to the FRM301 with FIB1-SERIAL card, it allows network engineers to get greater functionality through advanced SNMP features. The network administrator can manage any converter module from anywhere on the network, detect any link loss and maintain each loop.



Features

- Extend serial transmission from 2 to 120 km over fiber
- Selectable data I/F for RS232/ 423/ 422/ 485/ TTL
- Selectable two or four wire RS-485/ 422
- Selectable three or five wire RS-232/ 423
- SNMP management features with FRM301 Chassis
- Speeds up to 256Kbps for RS-232 (Async mode) and RS-423
- Speeds up to 1024Kbps for RS-485/ 422 and TTL
- Support auto-adjustment function, no extra attenuators needed

Specifications

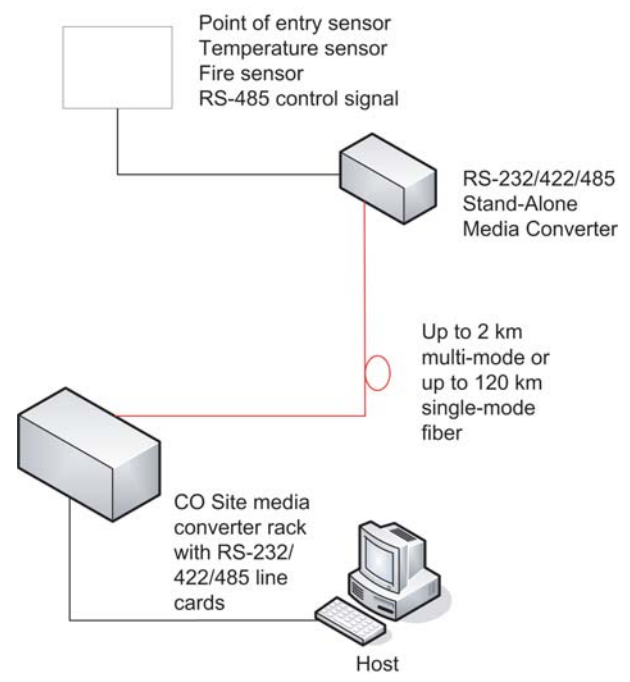
Standard	EIA/ TIA RS485/ 423/ 422/232	
LEDs	Power, Data, Test, Fiber Link	
Power	FIB1	External AC Adaptor required; 9VDC; 1A
	FIB2	AC Model: 100 — 240 VAC ± 10%; Frequency: 50 — 60 Hz DC Model: 24 — 48VDC ±10%
Environment	Temperature	0 — 50°C (Operating) ; 0 — 70°C (Storage)
	Humidity	up to 90% non-condensing
Power Consumption	FIB1	< 5W
	FIB2	< 5W
Dimensions(WxDxH)	FIB1	85.6mm x 122.6mm x 20mm
	FIB2	85.6mm x 191.7mm x 30mm
Weight	FIB1	300g
	FIB2	550g
Compliance	CE, FCC part 15 class A	
MTBF	257063 Hours	

Ordering Info

FIBX-Serial	X/-	XX-	XXX
Product Type	Fiber Type	Connector Type	Connectivity Distance
FIB1 Family	S: Single	ST	002: 2km
FIB2 Family	M: Multi	SC	015: 15km
	W: WDM	FC	030: 30km
			050: 50km
			080: 80km
			120: 120km
			*20A: 20km [WDM only]
			*20B: 20km [WDM only]
			*40A: 40km [WDM only]
			*40B: 40km [WDM only]
			*60A: 60km [WDM only]
			*60B: 60km [WDM only]

*020A must use couple with 020B
*040A must use couple with 040B

Application



Fiber Managed Platform FIB1-E1/T1 & FIB2-E1/T1

Stand-Alone E1/T1 to Fiber Converter

The FIB1/FIB2-E1 is a fiber media transport for G.703 E1 transmission. The BNC model provides unbalanced 75 Ohm coaxial connections while the RJ-45 model provides balanced 120 Ohm connections over twisted pair wiring. The FIB1/FIB2-T1 is a fiber media transport for G.703 T1 transmission and features an RJ-45 connector for connection to 100 Ohm twisted pair wiring. When the FIB1/FIB2-E1 or T1 card is placed in the FRM301 rack with SNMP management, the card status, type, version, fiber link status, E1 or T1 link status and alarms can all be displayed. Configuration is also available to enable or disable the port, reset the port, do far end fault setting, and initiate local or far end loop-back tests.



Features

- Network Management via Terminal or SNMP in FRM301 Chassis
- T1/E1 RJ-45 (USOC RJ-48C) or Coax (BNC) to Fiber converter
- Support AMI or B8ZS/HDB3 line codes
- Unframed (transparent clear channel)
- User selectable line code setting, Far End Fault (FEF) setting, Loop back test

Specifications

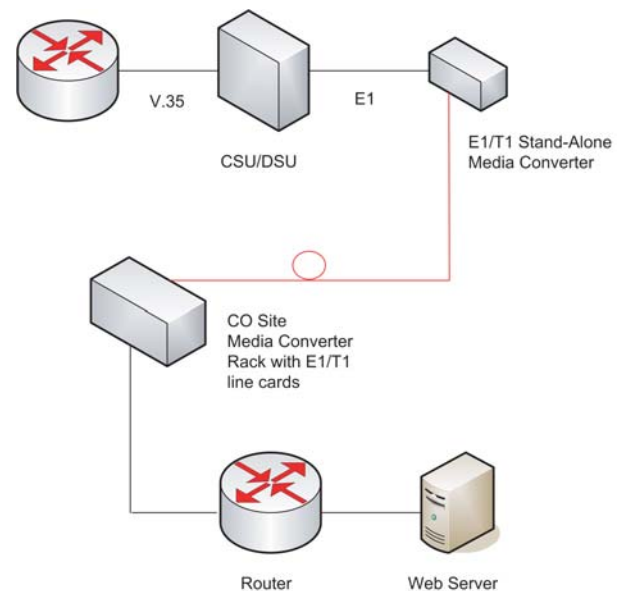
Standard	E1: ITU-T G.703, G.706, G.732, G.823; T1: ITU-T G.703, G.704, AT&T TR-62411, ANSI T1.403	
LEDs	Power, Fiber Link, Line (E1 or T1) Link, Test mode	
Power	FIB1	External AC adapter 9VDC @ 1A
	FIB2	100 — 240 VAC ± 10%; Frequency: 50 — 60 Hz
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	20 — 80% non condensing (Operating); 10 — 90% (Storage)
Power Consumption	FIB1	< 5W
	FIB2	< 5W
Dimensions(WxDxH)	FIB1	85.6mm x 122.6mm x 20mm
	FIB2	85.6mm x 191.7mm x 30mm
Weight	FIB1	300g
	FIB2	550g
Compliance	CE, FCC Class A	
MTBF	257063 Hours	

Ordering Info

FIBX-E1/T1	XXX-	XX-	XXX
Product Type	Interface Type	Connector Type	Connectivity Distance
FIB1 Family	E1R	ST	002: 2km
FIB2 Family	E1B	SC	015: 15km
	T1R	LC	030: 30km
			050: 50km
			080: 80km
			120: 120km
			*20A: 20km [WDM only]
			*20B: 20km [WDM only]
			*40A: 40km [WDM only]
			*40B: 40km [WDM only]
			*60A: 60km [WDM only]
			*60B: 60km [WDM only]

*020A must use couple with 020B
*040A must use couple with 040B

Application



Fiber Media Converter

Fiber Managed Platform FIB1-Data & FIB2-Data FIB1-Data/H & FIB2-Data/H

Stand-Alone V.35/RS-530/449/232/X.21 to Fiber Converter

The FIB1/FIB2-DATA is a media converter for V.35, RS-232, RS-530, X.21 or RS-449 high-speed (2.048Mbps) synchronous or low speed synchronous and asynchronous data transmission over optical fiber media. The FIB1/FIB2-DATA/H is a high speed media converter for V.35, RS-530, X.21 or RS-449 high-speed (8.192Mbps) synchronous data transmission over optical fiber media. When the FIB1/FIB2-DATA card is placed in the FRM301 rack with SNMP management, the card status, type, version, fiber link status, data link status and alarms can all be displayed. Configuration is also available 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.



Features

- 1 port data communication on HDB26 female (adapter cable required)
- Network management via Terminal or SNMP in FRM301 chassis
- Optical Bit Error Rate less than 10^{-11}
- User selectable $n \times 64\text{Kbps}$ ($n \times 256\text{Kbps}$ for H type) data rate, clock mode setting, asynchronous setting, Loop back tests

Specifications

Standard	ITU-T	
LEDs	PWR, Fiber Link, TD, RD, RTS, CTS, DCD, Test mode	
Power	FIB1	External AC adapter; 9VDC@1A
	FIB2	100 — 240 VAC \pm 10%; Frequency: 50 — 60 Hz
Environment	Temperature	0 — 50°C (Operating) ; 0 — 70°C (Storage)
	Humidity	20 — 80% non condensing (Operating); 10 — 90% (Storage)
Power Consumption	FIB1	< 5W
	FIB2	< 5W
Dimensions(DxWxH)	FIB1	85.6mm x 122.6mm x 20mm
	FIB2	85.6mm x 191.7mm x 30mm
Weight	FIB1	300g
	FIB2	550g
Compliance	CE, FCC Class A	
MTBF	257063 Hours	

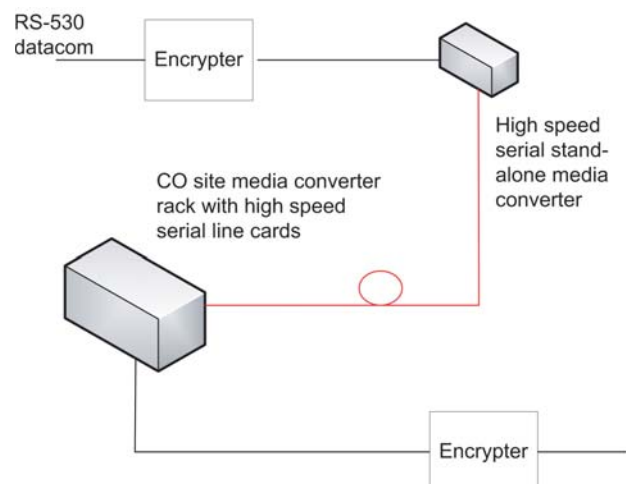
Ordering Info

FIBX-	XXX-	XX-	XXX
Product Type	Copper Interface Type	Connector Type	Connectivity Distance
FIB1 Family	V35	ST	002: 2km
FIB2 Family	232	SC	015: 15km
		LC	030: 30km
	X21		050: 50km
	449		080: 80km
			120: 120km
			*20A: 20km [WDM only]
			*20B: 20km [WDM only]
			*40A: 40km [WDM only]
			*40B: 40km [WDM only]
			*60A: 60km [WDM only]
			*60B: 60km [WDM only]

*020A must use couple with 020B

*040A must use couple with 040B

Application



Fiber Managed Platform FIB1-1000ES

Stand-Alone Gigabit Ethernet Media Converter



The FIB1-1000ES is a standalone optical fiber media converter for 10/100/1000Base TX to 1000Base-SX/LX that also provides NMS functions for Link- Loss-Forwarding, Remote-Monitoring-Status, and Loop-Back-Test. These optional features are especially useful when the standalone units are linked to our FRM301 with SNMP management. When auto-negotiation is selected, these units will automatically tailor themselves to convert speed or duplex, depending on your specific network needs.

Another unique feature of the FIB1-1000ES converter is the use of a common PCB card which may either be placed in the rack (FRM301 series line card) or used as a standalone converter (FIB1 series). When installed in a FRM301 rack with SNMP, network administrators are able to manage any converter module from anywhere on the network, detect any loss and maintain each loop.

Features

- Ability to force 10Mbps or 100Mbps or 1000Mbps on UTP port
- Auto-Cross over for MDI/MDIX on UTP port
- Auto-Negotiation on UTP port
- Compatible with FRM301 Chassis for SNMP management
- Full or Half-Duplex on UTP port
- Max. Packet Size: 1536 Bytes
- Store and Forward Switching Mechanism
- Supports Auto / Force Mode on FX port
- Supports link-loss-forwarding function, loop-Back test, remote state monitor

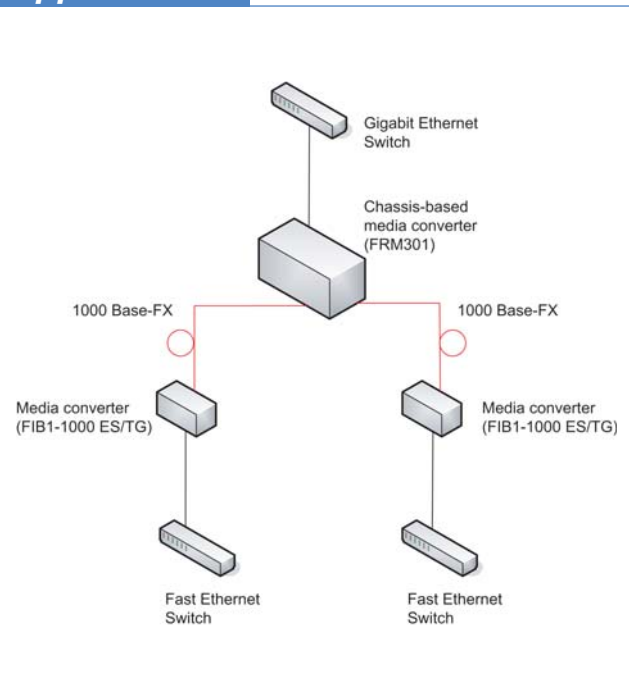
Specifications

Standard	IEEE 802.3 10Base-T, 802.3u 100Base-TX, 802.3ab 1000Base-T and 802.3z 1000Base-SX/LX standards	
Connector	TX	10/100/1000 Mbps RJ45
	FX	1000 Mbps SFP LC
LEDs	PWR, LLF, FX link, TP Link/Speed/Duplex	
Power	External AC adapter; 12VDC@ 1A	
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	20 — 80% non condensing (Operating); 10 — 90% (Storage)
Power Consumption	< 4W	
Dimensions(DxWxH)	85.6mm x 122.6mm x 20mm	
Weight	340g	
Compliance	FCC part 15 class A, CE	
MTBF	257063 Hours	

Ordering Info

FIB1-1000ES	10/100/1000Base-TX to 1000Base-FX Gigabit converter, SFP-LC type, SFP not included
SFP Module Options	
SFM-7000-S85	SFP, MM , 850nm , 550m, LC
SFS-7010-L31	SFP, SM, 1310nm , 10km, LC
SFS-7040-H31	SFP, SM, 1310nm, 40km, DFB,LC
SFS-7050-X55	SFP, SM, 1550nm, 50km, DFB, LC
SFS-7080-Z55	SFP, SM, 1550nm, 80km, DFB, LC
SFS-7010-WA	SFP, BiDi, T1310/R1550nm, 10Km, LC
SFS-7010-WB	SFP, BiDi, T1550/R1310nm, 10Km, LC
SFS-7020-WA	SFP, BiDi, T1310/R1550nm, 20Km, LC
SFS-7020-WB	SFP, BiDi, T1550/R1310nm, 20Km, LC
SFS-7040-WA	SFP, BiDi, T1310/R1550nm, 40Km, LC
SFS-7040-WB	SFP, BiDi, T1550/R1310nm, 40Km, LC
SFS-7060-WA	SFP, BiDi, T1310/R1550nm, 60Km, LC
SFS-7060-WB	SFP, BiDi, T1550/R1310nm, 60Km, LC

Application



Fiber Managed Platform FIB1-1000TS



Stand-Alone Gigabit Ethernet Media Converter

The FIB1-1000TS is a standalone optical fiber media converter for 1000Base-T to 1000Base-SX/LX that also provides NMS functions for Link-Loss- Forwarding, Remote-Monitoring-Status, and Loop-Back-Test. These optional features are especially useful when the standalone units are linked to one of our rack type units with SNMP management. When auto-negotiation is selected, these units will automatically tailor themselves to convert both half-duplex and full-duplex signals, depending on your specific network needs.

Another unique feature of the FIB1-1000TS converter is the use of a common PCB card which may either be placed in the rack (FRM301 series line card) or used as a standalone converter (FIB1 series). When installed in an FRM301 rack with SNMP, network administrators are able to manage any converter module from anywhere on the network, detect any loss and maintain each loop.

Features

- Auto-Cross over for MDI/MDIX in TP port
- Compatible with FRM301 Chassis for SNMP management
- Maximum package Size: 9K Byte
- Supports Link-Loss-Forwarding function, Loop-Back diagnostic test, remote state monitor
- Supports Force Mode in FX port

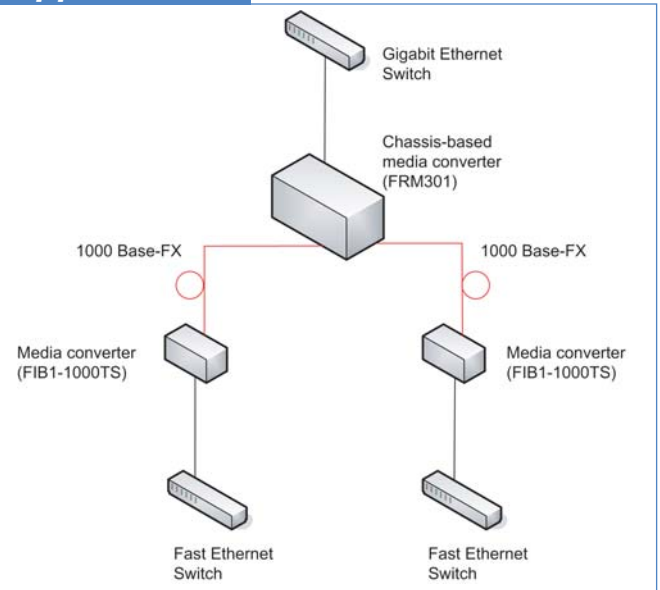
Specifications

Standard	802.3ab 1000Base-T, 802.3z 1000 Base-SX/LX standards	
LEDs	PWR, LLF, LBT, FX Link/Duplex, TP Link	
Power	External AC adapter; 12VDC@ 1A	
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	20 — 80% non condensing (Operating); 10 — 90% (Storage)
Power Consumption	< 4W	
Dimensions(WxDxH)	85.6mm x 122.6mm x 20mm	
Weight	340g	
Compliance	FCC part 15 class A, CE	
MTBF	257063 Hours	

Ordering Info

FIB1-1000TS	10/ 100/ 1000Base-TX to 1000Base-FX Gigabit converter, SFP LC type SFP not included
SFP Module Options	
SFM-7000-S85	SFP, MM , 850nm , 550m, LC
SFS-7010-L31	SFP, SM, 1310nm , 10km, LC
SFS-7040-H31	SFP, SM, 1310nm, 40km, DFB,LC
SFS-7050-X55	SFP, SM, 1550nm, 50km, DFB, LC
SFS-7080-Z55	SFP, SM, 1550nm, 80km, DFB, LC
SFS-7010-WA	SFP, BiDi, T1310/R1550nm, 10Km, LC
SFS-7010-WB	SFP, BiDi, T1550/R1310nm, 10Km, LC
SFS-7020-WA	SFP, BiDi, T1310/R1550nm, 20Km, LC
SFS-7020-WB	SFP, BiDi, T1550/R1310nm, 20Km, LC
SFS-7040-WA	SFP, BiDi, T1310/R1550nm, 40Km, LC
SFS-7040-WB	SFP, BiDi, T1550/R1310nm, 40Km, LC
SFS-7060-WA	SFP, BiDi, T1310/R1550nm, 60Km, LC
SFS-7060-WB	SFP, BiDi, T1550/R1310nm, 60Km, LC

Application



Fiber Managed Platform FIB1-1000MG

Stand-Alone Gigabit Fiber Media Converter/ Repeater



The FIB1-1000MG is a multimode (850nm) to single mode (GBIC module) fiber optical media converter and repeater that allows data rates up to 1.25Gbps. The converter performs re-amplification and re-shaping of the optical signal. This converter is compatible with fiber interfaces such as FDDI, STM-1, STM-4, OC1, OC3, OC12, OC24, 1G fiber channel, fast and Giga Ethernet.

Features

- Compatible with FRM301 Chassis for SNMP management
- Converts Single mode to Multi-mode or Multi-mode to Single Mode
- Extend Fiber Optic distance up to 550m / 1,815ft (Multi-mode)
- Extend Fiber Optic distance up to 120km / 75 miles (Single mode)
- Performs optical repeater function (Re-shape and re-amplify)

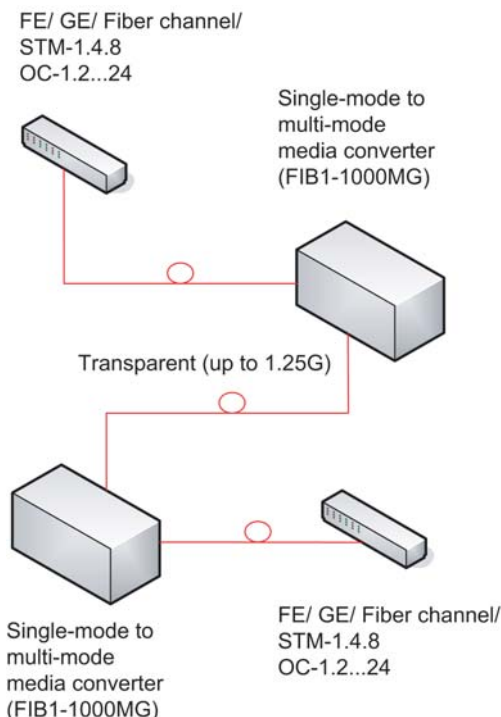
Specifications

Data Rates	Transparent mode up to 1.25Gbps FDDI, 100Mbit Ethernet STM-1, STM-4 OC1, OC3, OC12, OC24 ESCON Fiber Channel Gigabit Ethernet	
LEDs	PWR, MM Link, SM Link	
Power	External AC adapter; 12VDC@ 1A	
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	20 — 80% non condensing (Operating); 10 — 90% (Storage)
Power Consumption	< 4W	
Dimensions(WxDxH)	85.6mm x 122.6mm x 20mm	
Weight	340g	
Compliance	FCC part 15 class A, CE	
MTFB	257063 Hours	

Ordering Info

FIB1-1000MG	Fiber Media Converter, Multi-mode 850nm, 550m to GBIC, SC With AC power Adapter, 12VDC@1A
GBIC Module Options	
GBM-7000-S85	GBIC, MM, 850nm, 550m, SC
GBM-7000-L31	GBIC, MM, 1310nm, 2km, SC
GBS-7010-L31	GBIC, SM, 1310nm, 10km, SC
GBS-7040-H31	GBIC, SM, 1310nm, 40km DFB, SC
GBS-7050-X55	GBIC, SM, 1550nm, 50km, DFB, SC
GBS-7080-Z55	GBIC, SM, 1550nm, 80km, DFB, SC
GBS-7120-E55	GBIC, SM, 1550nm, 120km, DFB, SC
GBS-7010-WA	GBIC, BiDi, T1310/R1550nm, 10km, SC
GBS-7010-WB	GBIC, BiDi, T1550/R1310nm, 10km, SC
GBS-7020-WA	GBIC, BiDi, T1310/R1550nm, 20km, SC
GBS-7020-WB	GBIC, BiDi, T1550/R1310nm, 20km, SC
GBS-7040-WA	GBIC, BiDi, T1310/R1550nm, 40km, SC
GBS-7040-WB	GBIC, BiDi, T1550/R1310nm, 40km, SC
GBS-7060-WA	GBIC, BiDi, T1310/R1550nm, 60km, SC
GBS-7060-WB	GBIC, BiDi, T1550/R1310nm, 60km, SC

Application



Unmanaged Platform FIB1-Serial/FDC

RS232/ 485 Fiber Optic Ring/ Daisy-chain Modem



The FIB1-Serial/FDC is a asynchronous fiber optic Ring/ Daisy-chain modem which operates over a fiber link to connect remote terminals and computers, connected in multi-drop, to a central host. The FIB1-Serial/FDC allows for totally redundant, fault tolerant, self-healing operation, providing uninterrupted communications between networks nodes, even if a fiber break occurs in one device in the ring or chain fails.

Features

- Asynchronous transmission at data rate from DC to 256Kbps
- Auto-detect the slave device on the host side
- Automatically prevent a runaway data condition
- Host/Slave selectable
- In-band management will not cause any interruption for the Data communication
- LED indicators for easy-learning of failure-detection
- Multi-drop operation over a fiber link
- Provides in a linear bus topology or daisy-chain topology
- Provides support for RS-232 or RS-422(RS-485) I/F
- Total number of device (host + slave) can up to 256
- Transmission range up to 50Km over single mode fiber

Specifications

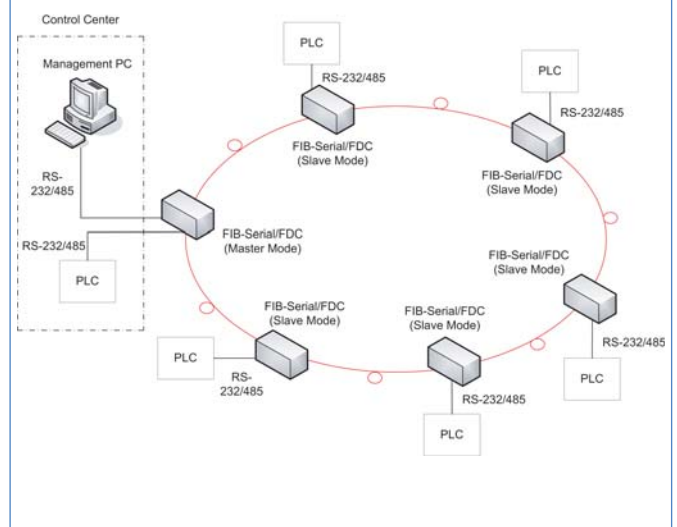
Standard	EIA/TIA RS-484/232	
LEDs	Power, TX link/ transmit, FX link/ transmit, Full/ Half duplex mode, LLF, Speed	
Power	External AC adapter required; 12VDC@1	
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	20 — 80% non condensing (Operating); 10 — 90% (Storage)
Power Consumption	< 4W	
Dimensions(WxDxH)	85.6mm x 122.6mm x 20mm	
Weight	340g	
Compliance	FCC part 15 class A, CE	

Ordering Info

FIB1-Serial/FDC	100X/	xx	xxx
	Fiber Type	Connector Type	Connectivity Distance
	S: Single	ST	002: 2km
	M: Multi	SC	015: 15km
	W: WDM	FC	030: 30km
			050: 50km
			080: 80km
			120: 120km
			*20A: 20km [WDM only]
			*20B: 20km [WDM only]
			*40A: 40km [WDM only]
			*40B: 40km [WDM only]
			*60A: 60km [WDM only]
			*60B: 60km [WDM only]

*020A must use couple with 020B
*040A must use couple with 040B

Application



Unmanaged Platform FIB1-10/100N & FIB2-10/100N

Stand-Alone Fast Ethernet to Fiber Media Converter

FIB1-10/100N and FIB2-10/100N series are 10/100Base-TX to 100Base-FX unmanaged standalone media converters, which give you the options to choose from the most popular fiber cabling connectors, ST, SC, or FC. Both multi-mode and single mode converters are available as well as BiDi which allow bi-directional transmissions using only a single fiber cable. With Auto-Negotiation function, these units will automatically tailor themselves to convert both half or full duplex Ethernet signals, depending on your specific network needs.



Features

- Ability to force 10Mbps or 100Mbps on UTP port
- Auto Negotiation on UTP port
- Auto Crossover for MDI/MDIX on UTP port
- Compatible with Unmanaged FRM301N Chassis
- Full or Half-Duplex on copper
- Link-Loss Forwarding
- Switch/ converter mode selectable

Specifications

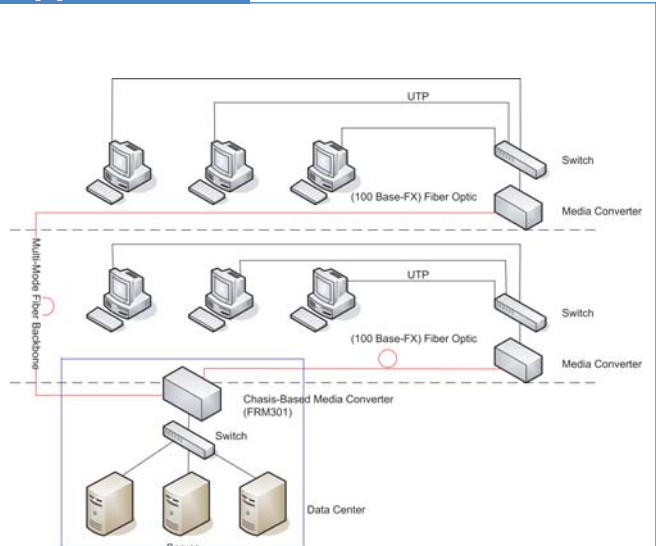
Standard	IEEE 802.3 10Base-T, 802.3u 100Base-TX and 100Base-FX standards	
LEDs	PWR, FX Link/Duplex, TP Link/Duplex/Speed	
Power	FIB1	External AC Adapter required; 9VDC @ 1A
	FIB2	AC Model: 100 — 240 VAC ± 10%; Frequency: 50 — 60 Hz DC Model: 24 — 48VDC ±10%
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	20 — 80% non condensing (Operating); 10 — 90% (Storage)
Power Consumption	FIB1	< 4W
	FIB2	< 4W
Dimensions(WxDxH)	FIB1	85.6mm x 122.6mm x 20mm
	FIB2	85.6mm x 191.7mm x 30mm
Weight	FIB1	340g
	FIB2	550g
Compliance	CE, FCC Class A	
MTBF	38,000 hours	

Ordering Info

FIBX-10/	100X/	XX	XXX	X
Product Type	Fiber Type	Connector Type	Connectivity Distance	Function Type
FIB1 Family	S: Single	ST	002: 2km	N
FIB2 Family	M: Multi	SC	015: 15km	
	W: WDM	FC	030: 30km	
			050: 50km	
			080: 80km	
			120: 120km	
			*20A: 20km [WDM only]	
			*20B: 20km [WDM only]	
			*40A: 40km [WDM only]	
			*40B: 40km [WDM only]	
			*60A: 60km [WDM only]	
			*60B: 60km [WDM only]	

*020A must use couple with 020B
*040A must use couple with 040B

Application



Managed 3U Rack Type FRM301



16-Slot Media Converter Chassis

The FRM301 is a standard 3U, 19 or 23 inch rack mountable, Platform Media Converter that features 16 line card capacity. Currently supported line cards include copper to fiber converters for 10/100Base-TX, or 10/100/1000Base-TX over multimode fiber (up to 2 km), single mode fiber (up to 120 km) or utilizing WDM (up to 60 km). WDM (Wave Division Multiplexing) converts each input-output data stream into separate wavelengths of light and transmits/receives these channels through the same optical fiber. Other FRM301 line cards can also support G.703 E1/T1, Datacom (V35, X.21, RS530/ 449/ 232) and Serial (RS485/ 422/ 232) data communication interfaces over fiber.

Features

- 3U, 19 (or 23) inch RACK with convertible standalone units, RACK accommodates up to 16 units
- CPE Remote status monitor
- Loop-back tests
- Once the converter is installed, it is hot-swappable to avoid any other network downtime.
- Rack with Dual power modules designed for redundant power application, AC and/or DC, cooling fans included
- SNMP, serial console, Telnet management
- Supports an auto recovery function; the system can restore all settings back to original working status when the power or the connection is resumed
- TFTP Firmware upgrade
- Windows Based GUI

Specifications

Material	Stainless paint	
Power	AC	90 — 264 VAC
	DC	-18 — -56 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	20 — 80% non condensing (Operating) 10 — 90% (Storage)
Power Consumption	80W	
Dimensions(WxDxH)	440mm x 280mm x 130.6mm	
Weight	7.875kg (include 1 AC power modules & two rack-mounting brackets)	
Compliance	FCC part 15 class A, CE Mark	
MTBF	279,908 hours	

Ordering Info

Rack Mount FRM301 Chassis	
FRM301-CH	3U, 19(23)" , 16-slot Chassis
Power Supply Module	
FRM301-AC	AC (90 to 264 VAC) power supply module, IEC connector
FRM301-DC	DC (18 to 56 VDC) power supply module, 3-pin terminal block
Network management	
FRM301-SNMP/C	SNMP card with RS-232 and 10/100Base-TX interface
FRM-SNMP-GUI	GUI (Graphical User Interface)

Line Card Modules

Model	Description	Distance	Connector
FRM301-10/100F	10/100 Base-TX to 100Base-FX MM or SM	MM: 2km	SC/FC/ST
FRM301-10/100W	10/100 Base-TX to 100 Base-FX BIDI	SM: 15/ 30/ 50/ 80/ 120km	
FRM301-1000TG	1000 Base-TX to 1000 Base-SX/LX GBIC	WDM: 20/ 40/ 60km	
FRM301-1000TS	1000 Base-TX to 1000 Base-SX/LX SFP		
FRM301-1000ES	10/100/1000Base-T to 1000Base SX/LX SFP		
FRM301-1000MG	1000 Base-SX to 1000Base-LX MM to SM		
FRM301-E1R/E1B	TDM G.703 E1 to FX		
FRM301-T1R	TDM G.703 T1 to FX		
FRM301-SERIAL	RS422/ 485/ 232/ 423 Terminal block to FX		
FRM301-DATA	V35/ RS232/ 530/ 449/ X21 HDB26 to FX		
FRM301-DATA/H	V.35/X.21/RS-530/449 26-pin to MM or SM		

Managed 4U Rack Type FRM401

12-Slot Media Converter Chassis



The FRM401 is a copper to fiber media converter chassis that fits in a 19 or 23 inch rack and occupies 4U (7 inch) of rack space. The Hot Swappable Line Cards for the FRM401 are available in 10/100Base-TX Ethernet standard to fiber (100Base-FX) connection for multi-mode (up to 2Km) or single mode (up to 120Km) with all the popular connector types such as SC, ST, or FC. Line Cards are also available with the latest WDM (Wave Division Multiplexing) technology (up to 60Km and must be coupled) which converts the transmission and receiving data streams into separate wavelengths

and allows bi directional transport through a single fiber strand.

Each Line Card contains four separate and identical media converters and may include optional features such as Link-loss forwarding, loop back testing, get remote status Packet size up to 1600 Bytes to support VLAN and QOS transmissions pass thru. A chassis, fully loaded with 12 Line Cards, can provide a total of 48 loops in a high density configuration especially suited for applications such as FTTH (Fiber to the Home).

Features

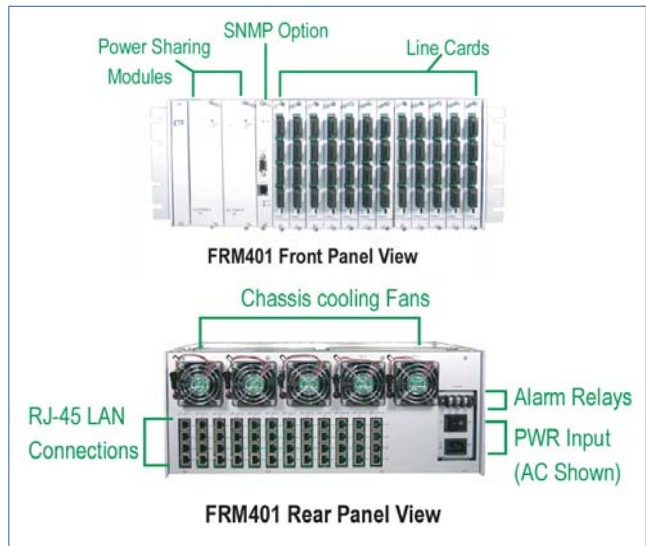
- 4U high, 19(or 23) inch RACK, accommodates up to 12 line cards, each converter card provides four complete fiber converters
- Once the converter is installed, it is hot-swappable to avoid any other network downtime.
- RACK with Dual power modules designed for AC or DC power sharing, cooling fans included
- SNMP, serial console, Telnet management
- Supports an auto recovery function; the system can restore all settings back to original working status when the power or the connection is resumed
- Windows Based GUI

Specifications

Power	AC	85 — 138 or 187 — 276 VAC
	DC	-42 — -60 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	10 — 90% non condensing
Power Consumption	150W	
Dimensions(WxDxH)	438mm x 285mm x 180mm	
Weight	790g (empty chassis plus bracket)	
Compliance	FCC part 15 class A, CE Mark	
MTBF	66,480 hours	

Ordering Info

Rack Mount FRM401 Chassis	
FRM401-CH/AC	4U, 19" 12-slot Chassis for AC power
FRM401-CH/DC	4U, 19" 12-slot Chassis for DC power
Power Supplier Module	
FRM4/AC-110	AC (85-138VAC) power supply module
FRM4/AC-220	AC (187-276VAC) power supply module
FRM4-DC	DC (42 to 60 VDC) power supply module
Network management	
FRM401-SNMP	SNMP card with RS-232 and 10 Base-T interface
FRM-SNMP-GUI	GUI (Graphical User Interface)



Line Card Modules

Model	Description	Distance	Connector
FRM401-10/100F	10/100Base-TX to 100Base-FX	MM : 2km SM : 15/30/50/80/120km	SC/FC/ST
FRM401-10/100W	10/100Base-TX to 100Base-FX BIDI	WDM : 20/40/60km	

Unmanaged 3U Rack Type FRM301N

16-Slot Chassis Media Converter



The FRM301N is a 3U high 19 or 23" rack mountable, 16-slot non-managed platform media converter. The FRM301N provides an economic solution in high density Fiber Converter installations such as central offices. The Power Modules are designed for redundant power supply operation and are hot-swappable for AC and/ or DC. There are 16 slots available for installation of FIB1-N type (non-managed) Converter Cards in the FRM301N rack. Each FIB1-N type Card is an independent fiber to Ethernet converter. A variety of cards are available that support multimode or single-mode fiber types and connections to SC, ST, FC or even the latest WDM (Wave Division Multiplexing) in ranges from 2Km to 120Km.

Features

- 3U, 19 (or 23) inch RACK with up to 16 units convertible standalone units
- Rack with Dual power modules designed for redundant power application, AC and/or DC, cooling fans included
- Once the converter is installed, it is hot-swappable to avoid any other network downtime.

Specifications

Power	AC module	90 — 264 VAC; Frequency: 47 — 63 Hz
	DC module	-18 — -56 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	10 — 90% (Storage)
Power Consumption	80W	
Dimensions(WxDxH)	440mm x 280mm x 130.6mm	
Weight	17.3lbs (7.875kgs) (include 1 AC power module & two brackets for rack-mounting)	
Compliance	FCC part 15 class A, CE Mark	
MTBF	38000 hours	

Ordering Info

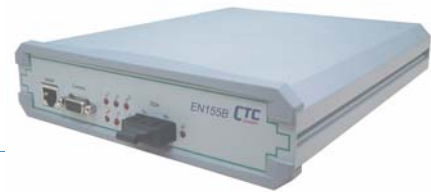
Unmanaged 3U fiber media concentrator	
FRM301N-CH	3U, 19(23)" , 16-slot Chassis
Power Supply Module	
FRM301-AC	AC (90 to 264 VAC) power supply module
FRM301-DC	DC (18 to 56 VDC) power supply module

Line Card Modules

Model	Description	Distance	Connector
FRM301-10/100N	10/100 Base-TX to 100Base-FX MM or SM	MM: 2km SM: 15/30/50/80/120km	
FRM301-10/100WN	10/100 Base-TX to 100Base-FX BIDI	WDM: 20/40/60km	SC/FC/ST

Ethernet and TDM services over STM-1

EN155B



4-port Ethernet/ STM-1 Converter

EN-155B is a standalone converter that enables simple and efficient connection of 4 ports Fast Ethernet 100BaseT or 4 x E1 2.048M traffic over STM-1 Fiber optic Interface lines. EN-155B serves as cost-effective alternative to ATM devices and routers. The EN-155B's packet-over-SDH encapsulation protocol enables virtually total utilization of SDH payload traffic, since only a small header is required. EN-155B supports VLAN bridging, flow control and backpressure, according to IEEE802.3x requirements.

Features

- Connects 10/100Base-T Ethernet LANs over STM1 line
- 1U high, 19' inch Rack mount units
- Selectable fiber optic or electrical interfaces
- Comply with G.957 Standard
- Supports SFP or 1x9 fiber transceiver Module
- Supports Virtual concatenation enables configuring the bandwidth of the IP channel in increments of 2Mbps (VC-12)
- Support SDH standards of Generic Framing Procedure (GFP) or Link Access Procedure (LAPS)
- Supports 1 port 10/100 Base-TX Ethernet on board, with a slot for optional 4 x E1 Module or 4 x 100Mbps Ethernet module
- Supports Bandwidth control over Ethernet in increments 2 Mbps, up to 100Mbps wire-speed
- Supports AC or DC power supply
- Supports one Order Wire phone port
- Supports console and SNMP management

Specifications

General Specifications

LEDs	PWR, SD, LOS, LOF, LOP, MS-AIS, P-AIS & P-RDI, LNK/ACT, FDX & 100, SYS & CLKMODE
Power	AC 90 — -264VDC
	DC -36 — -72VDC
Environment	Temperature 0 — 40°C (Operating); -20 — 65°C (Storage)
	Humidity 0 — 90% non condensing
Power Consumption	10W
Dimensions(WxDxH)	220mm x 285mm x 44.5mm
Weight	1.5Kg
Compliance	TBA
MTBF	TBA

Fiber Optical Port

Standard	ITU-T G.957
Rate	155.52 Mbit/s ± 20 ppm
Wavelength	1310nm: 1550nm
Operating wavelength	1261—1360nm
Coverage	1480 ~ 1580nm
Output Power	-15 — -8dBm
Sensitivity	-36dBm
Fiber Connector type	Standard SC/ SFP
Fiber Optical type	Single model optical fiber 9/125um

Electronic Port

Standard	ITU-T G.703
Rate	155.52 Mbit/s ± 20 ppm
Output Peak-to-peak voltage	1.0 ± 0.1V
Sensitivity	-15dBm
Connector Type	Standard BNC

100Base-Tx Port (mainboard)

Standard	IEEE802.3
Rate	100Mbps Full-duplex and auto-adapted
Support	Auto-MDIX Function
MACAddress table size	1024
Maximum Ethernet frame	1536Byte

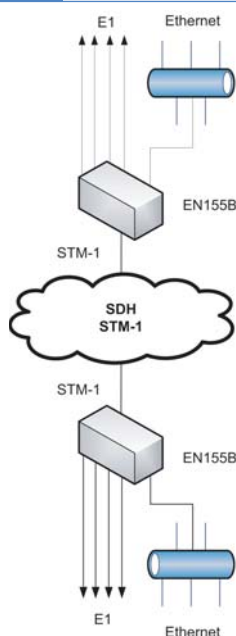
100Base-Tx Port (sub-card)

Standard	IEEE802.3
Rate	100Mbps Full-duplex
Support	Auto-MDIX Function
Maximum Ethernet frame	1600Byte

G.703-E1Port (sub-card)

Standard	G.703
Rate	2.048M

Application



Ordering Info

Master Unit:

EN-155B/AC	100BaseT RJ-45 to STM-1 155M; 1310nm, 30km, 21dBm, SM, SC; Internal AC power (100V ~240V AC)
EN-155B/DC	100BaseT RJ-45 to STM-1 155M SC; 1310nm, 30km, 21dBm, SM, SC; Internal -48 VDC power (±36 to ±72VDC)

Rack Solution for CWDM Sigma Links 5000



5U Chassis Rack Type

Sigma Links 5000 is a flexible, cost-effective optical transport system, designed to multiplex, demultiplex and switch high-speed data for storage, video and voice applications. Sigma Links 5000 is housed in a standard 5U, 19 or 23 inch rack mountable transport platform for CWDM application, which features 17 universal hot-swappable module slots. Currently supported module line cards include SNMP, Transponders, Mux/ Demux, OADM, Optical protection and optical channel monitors. The Sigma Links 5000 supports optional redundant power and SNMP management. Another unique feature of the Sigma Links 5000 is line card designs, which may be

transformed into standalone units. The use of a common PCB card which may either be placed in the rack or used as a standalone 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 high, 19 (or 23) inch Rack with convertible standalone units, rack accommodates up to 17 card modules
- All modules are hot-swappable with AC/DC Power redundant and cooling fans module
- Alarm Relay contacts
- Chassis Cascade up to 6 Chassis
- LED and LCD status indication with keypad control
- TFTP firmware upgrade
- Support Console, Telnet, SNMP, Web management
- Up to 8 CWDM wavelengths in compliance with ITU G.694.2

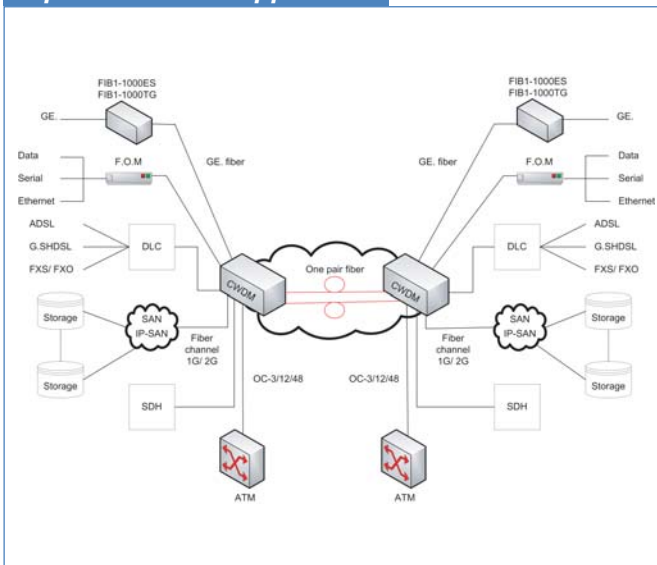
Specifications

Slots	17 slots in front for slide-in-module
	2 slots in front for power supply module
Power	AC module 90 — 264 VAC; Frequency: 47 — 63 Hz
	DC module -18 — -56 VDC
Environment	Temperature 0 — 50°C (Operating) ; -20 — 70°C (Storage)
	Humidity 10 — 90% (Storage)
Power Consumption	72W
Dimensions(WxDxH)	440mm x 247mm x 219.2mm
Weight	9.5kg (Not including any line-cards)

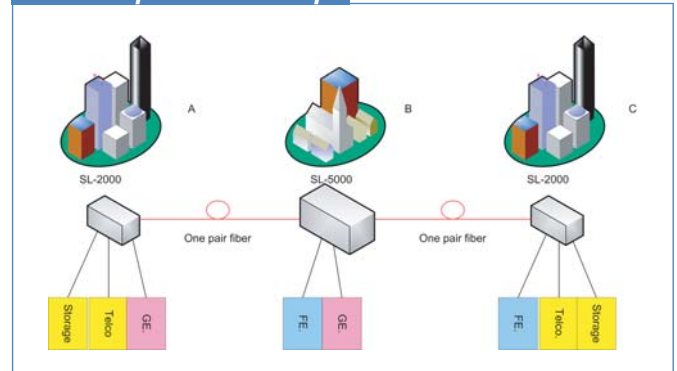
Ordering Info

Main Chassis	
SML-50-9051-R	19" 5U 17 slots Chassis
Network Management	
SML-50-9210-R	SNMP Card
Power	
SML-50-9110-R	AC power supply (90 to 264 VAC)
SML-50-9120-R	DC power supply (±18 to ±6 VDC)
SML-50-9121-R	DC power supply (±36 to ±72 VDC)

Application - Optical Network Approach



Application - Point to point add/ drop



Rack Solution for CWDM Sigma Links 2000



2U Chassis Rack Type

Sigma Links 2000 is a flexible, cost-effective optical transport system, designed to multiplex, demultiplex and switch high-speed data for storage, video and voice applications. Sigma Links 2000 is housed in a standard 2U, 19 or 23 inch rack mountable transport platform for CWDM application, which features 6 universal hot-swappable module slots. Currently supported module line cards include SNMP, Transponders, OADM, Mux/Demux, Optical protection and optical channel monitors. The Sigma Links 2000 supports optional redundant power and SNMP management. Another unique feature of the Sigma Links 2000 is line card designs which may be transformed

into standalone units. The use of a common PCB card which may either be placed in the rack or used as a standalone 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 high, 19 (or 23) inch Rack with convertible standalone units, rack accommodates up to 6 card modules
- All modules are hot-swappable with AC/DC Power redundant and cooling fans module
- Alarm Relay contacts
- LED status indication
- TFTP firmware upgrade
- Support Console, Telnet, SNMP, Web management
- Up to 8 CWDM wavelengths in compliance with ITU G.694.2

Specifications

Slots	6 slots in front for slide-in-module
	2 slots in back for power supply module
Power	AC module 90 — 264 VAC; Frequency: 47 — 63 Hz
	DC module -18 — -56 VDC
Environment	Temperature 0 — 50°C (Operating); -20 — 70°C (Storage)
	Humidity 10 — 90% (Storage)
Power Consumption	25W
Dimensions(WxDxH)	440mm x 260mm x 89mm
Weight	4.8kg (Not including any line-cards)

Ordering Info

Main Chassis	
SML-20-9021-R	19" 2U 6 slots Chassis
Network Management	
SML-20-9210-R	SNMP Card
Power	
SML-20-9110-R	AC power supply (90 to 264 VAC)
SML-20-9120-R	DC power supply (±18 to ±56 VDC)
SML-20-9121-R	DC power supply (±36 to ±72 VDC)

SNMP

Communicates with single or multiple chassis's control card via RS-485 serial protocol.



Specifications

Power	12VDC, 1.2A
Environment	Temperature 0-50°C (Operating) ; -20-70°C (Storage)
	Humidity 10 — 90% (Storage)
Power Consumption	5W
Dimensions(WxDxH)	162mm x 220mm x 25mm
Weight	0.9kg
Compliance	FCC part 15 class A, CE Mark

Features

- 2 x 100 Base-FX (SFP) ports
- 3 x 10/100M Base-TX ports
- In chassis cascade mode, the SNMP option is required only in chassis #0, the master chassis
- Management control to Mux/Demux card, Protection card & Transponder Card, OADM Card, SNMP v1 Trap, MIB file
- Real-Time Clock feature
- Supports Telnet access control
- Supports web browser control feature
- TFTP SNMP F/W upgradeable

Transponder



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, which 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 Wavelength: 850/ 1310/ 1550nm
- Line Side CWDM Wavelength 1471/ 1491/ 1511/ 1531/ 1551/ 1571/ 1591/ 1611nm
- Optical Connector: SFP-LC Type (Line Side), SFP-LC Type (Client Side)

Specifications

Wavelength	Client Side	850/1310/ 1550nm
	Line Side	1471/ 1491/ 1511/ 1531/ 1551/ 1571/ 1591/ 1611 nm
Power	12VDC, 1.2A	
Environment	Temperature	0 — 50°C (Operating) ; -20 — 70°C(Storage)
	Humidity	10 — 90% (Storage)
Power Consumption	5W	
Dimensions(WxDxH)	162mm x 220mm x 25mm	
Weight	0.9kg	
Compliance	FCC part 15 class A, CE Mark	

Mux/ Demux



Optical Mux/Demux (Multiplexes/Demultiplexes) cards are available in 4-channel or 8-channel models and are used to combine signals from one-channel or two-channel transponder cards on to a single pair of fiber. A 1311nm non-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.

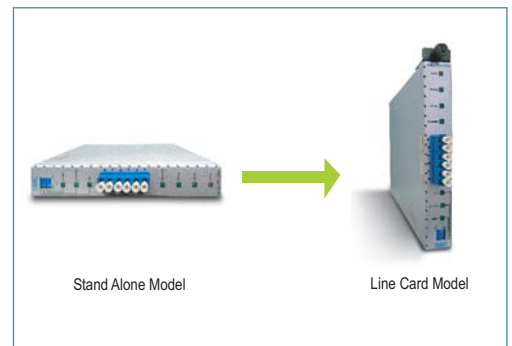
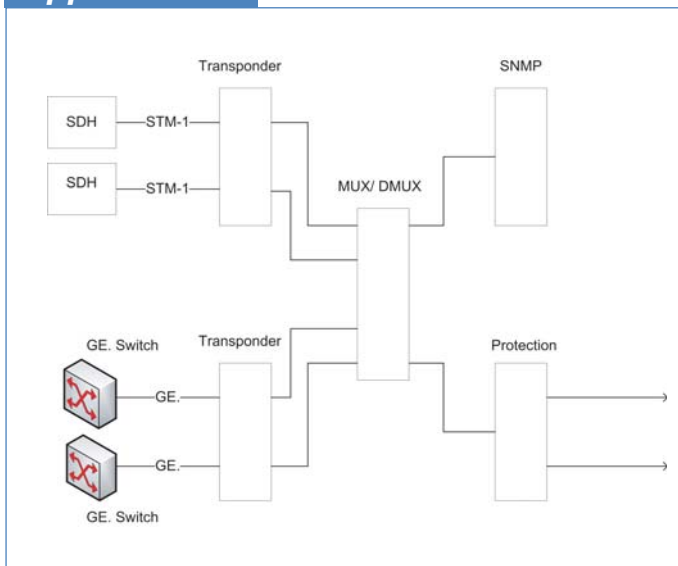
Features

- Four different CWDM Mux/ Demux are available: 4 channels, 4+1channels, 8 channels, 8+1 channels
- 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

Wavelength (according to ITU-T G.694.2)	4 channels	1531/ 1551/ 1571/ 1591 nm
	4+1 channels	1531/ 1551/ 1571/ 1591nm + 1311 nm
	8 channels	1471/ 1491/ 1511/ 1531/ 1551/ 1571 /1591/1611 nm
	8+1 channels	1471/ 1491/ 1511/ 1531/ 1551/ 1571/ 1591/ 1611nm +1311 nm
Environment	Temperature	0 — 50°C (Operating) ; -20 — 70°C (Storage)
	Humidity	10 — 90% (Storage)
Dimensions(WxDxH)	162mm x 220mm x 25mm	
Weight	0.9kg	
Compliance	FCC part 15 class A, CE Mark	

Application



Protection

CTCU offers an optical protection unit that is able to fiber path redundancy on a channel by channel basis. These unit 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 optic protection
- Low channel cross talk (< -55dB)
- Low insertion loss (< 6.5dB)
- The switch has "Latching" possibility, if power is lost, the switch remains in its current position
- Time from line failure to restored traffic is less than 50 ms
- The unit works for any combination of 1 ~16 wavelengths
- Traffic is switched under three mode Auto, Semi-Auto, Manual
- Optical Interface Type : LC connectors
- Working and protecting lines are physically separated fiber stretches that can be regarded as individual transmission links

Specifications

Power	12VDC, 1.2A
Environment	Temperature 0 — 50°C (Operating); -20 — 70°C(Storage)
	Humidity 10 — 90% (Storage)
Power Consumption	10W
Dimensions(WxDxH)	162mm x 220mm x 25mm
Weight	0.9kg
Compliance	FCC part 15 class A, CE Mark

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 < 2.5dB 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.



Optical Performance

Number of channels	CWDM: 1 add/drop channel, 2 add/drop channels
Operating Channel CWDM add & drop channel	Any channels out of 1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611, 1311 nm (to be defined via order information)
Channel width: CWDM channels	> =13nm (around center wavelength)
Insertion Loss	IN-OUT >= 2.5 dB
	Add to Drop < 2.0 dB
Isolation	CWDM adjacent channel Isolation >= 30dB
	CWDM non-adjacent ch's at CWDM drop port >= 35dB
Optical Return Loss	>= 50dB
PDL	>= 0.1dB

Specifications

Environment	Temperature	0 — 50°C (Operating); -20 — 70°C (Storage)
	Humidity	10 — 90% (Storage)
Fiber Type	9 / 125 / 250um	
Dimensions(WxDxH)	162mm x 220mm x 25mm	
Weight	0.9kg	
Compliance	FCC part 15 class A, CE Mark	

Ordering Info

Transponder	
SML-50-8011-L/S	1.25G, 1-Channel Transponder card, Line rates support 100Mbps to 1.25Gbps (without SFP Fiber Transceiver)
SML-50-8012-L/S	1.25G, 2-Channel Transponder card, Line rates support 100Mbps to 1.25Gbps (without SFP Fiber Transceiver)
SML-50-8021-L/S	2.5G, 1-Channel Transponder, Line rates support 100Mbps to 2.5Gbps (without SFP Fiber Transceiver)
SML-50-8022-L/S	2.5G, 2-Channel Transponder, Line rates support 100Mbps to 1.25Gbps (without SFP Fiber Transceiver)

Protection	
SML-50-8210-L/S	Optical Line Protection Switch

L: Line Card
S: Standalone

OADM	
SML-50-831X-L/S	1 channel, OADM Drop/Insert card X= 0:(1311),X=1:(1471),X=2:(1491), X=3:(1511),X=4:(1531),X=5:(1551), X=6:(1571),X=7:(1591),X= 8:(1611)nm
SML-50-832X-L/S	2 channels, OADM Drop/Insert card, LC X=1:(1471& 1491), X=2:(1551& 1571), X=3:(1551& 1571), X=4:(1591& 1611)nm

Mux/ Demux	
SML-50-8140-L/S	4 channel Mux/Demux unit (1531, 1551, 1571, 1591)nm
SML-50-8141-L/S	4+1 channel Mux/Demux unit (1311,1531 , 1551, 1571, 1591)nm
SML-50-8180-L/S	8 channel Mux/Demux unit(1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611)nm
SML-50-8181-L/S	8+1 channel Mux/Demux unit (1311,1471 , 1491, 1511, 1531, 1551, 1571, 1591, 1611)nm

Point to Point Solution F.O.M. Series FMUX01A



Fiber Optical E1/ T1/ Datacom/ Ethernet Multiplexer

The FMUX01A is a single unit (1U), 19" rack mountable, E1/T1, Datacom & Ethernet Bridge Multiplexer that transmits up to 16 channels over a single fiber optic link. The FMUX01A features a modular design that provides a wide variety of customized user configurations. The optical fiber interface modules are available in single mode or multi-mode fiber connections and a number of connector types. The FMUX01A 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 20-60VDC.

From the rear of the chassis, one to four quad E1 or T1 line cards, datacom (V.35, X.21, RS-530), or Ethernet Bridge cards are supported. All line cards provide completely transparent transmission of E1, T1, datacom, or Ethernet regardless of frame mode or timeslot assignment. Optional hardware cards are also available for external clock and SNMP. The standard FMUX01A configuration may be viewed or set via the front panel LCD/menu keys, serial VT-100 terminal connection or Telnet/SNMP with SNMP option.

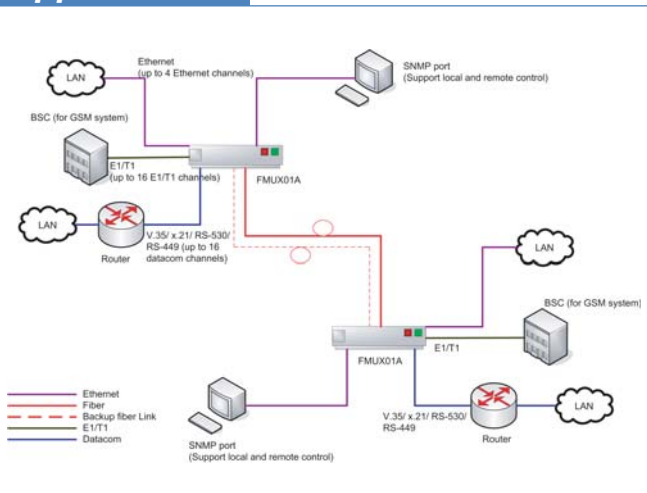
Features

- Alarm relay contacts provided which can offer major and minor alarms with audible and visible alarm output
- Auto Laser Shutdown (ALS) to prevent hazardous laser radiation to personnel
- Channel Capacity : 4,8,12 or 16 channels
- Configuration data is automatically stored into flash to avoid any loss caused by power disruption and will be restored immediately by the system at startup
- End to end propagation delay is less than 2 u sec
- Management : Local side can be managed via Keypad or Terminal. Remote side can be managed inband via keypad or Terminal. Telnet & SNMP local and remote management with optional SNMP
- Real Time Clock (RTC) run by backup battery to avoid time setting loss caused by power disruption
- Redundant Fiber 1+1 Protection, the switching time between is less than 50 m sec
- Supports embedded optical BERT
- Supports E1/ T1/ Datacom Local and Remote Loop-Back.
- Supports hot-swapping of a optical module; will not affect or interrupt the operation and communication
- TFTP remote software upgradeable (for SNMP option)

Specifications

Console	Interface	RS-232D(RJ-45) Asynchronous
	Baud rate	19200,8,N,1
Power	AC	90 — 260 VAC
	DC	20 — 60 VDC
Environment	Temperature	0 — 55°C (Operating); 0 — 70°C (Storage)
	Humidity	10 — 95% non condensing
Power Consumption	40W	
LEDs	PWR 1 & 2, Optical 1 & 2 (for optical signal and link status) Minor & Major Alarms, Far End & Near End Error System Failure, E1 & T1 (for signal status)	
Dimensions(WxDxH)	438mm x 43mm x 250 mm	
Weight	3.58Kg (without any I/F or optical modules)	
	4.5Kg (with 4 I/F & 2 optical modules)	
System Performance(BER)	<= 10 ⁻¹¹	
Alarm	4 relay contacts	
Compliance	FCC, Part 15, Sub B (Class A)	
	European standard EN55022:	
	1994/A1 : 1995/A2 : 1997 Class A,	
	EN61000-3-2:1995, EN61000-3-3:1995 and EN50082-1:1997	
MTBF	57,350 hours	

Application



Ordering Info - Unit

FMUX 01A- Power Module Type	XXXX/ Line Card I/F Type	X Fiber Redundant Type	XX Connector Type	XXX Distance Connectivity
AC	0: Empty	S:standard	SC	002: 2km
DC	A: Quad E1 BNC	R:redundant	ST	030: 30km
AC2	B: Quad E1 RJ-45		FC	050: 50km
DC2	C: Quad T1 RJ-45		LC	080: 80km
AD	D: Quad V.35		MT	120: 120km
	E: Quad RS-232			20A: 20km
	F: Quad RS-530			20B: 20km
	G: Single port Fast Ethernet 10/100			40A: 40km
	H: Quad X.21			40B: 40km
	I: Quad RS-449			60A: 60km
	J: Wire-Wrap I/F for Quad E1/T1			60B: 60km
	K: Quad High-speed V.35			
	L: Quad High-Speed RS-530			

*020A must be coupled with 020B *060A must be coupled with 060B
*040A must be coupled with 040B

Interface Modules



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	FC/PC
The switching time between is less than 50m sec	

E1 Interface 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

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 / AM
Receive Level	Short haul - 15dB
Line impedance	100 ohms ±5%
Connector	RJ-45 Wirewrap

Ethernet Interface Module	
Standard	ITU-T G.703, G.704
Ports	1 port
Data rate	10/100Mbps; Half Duplex 20/200Mbps; Full duplex
Filtering and Forwarding	WAN speed
Delay	1 frame
WAN Protocol	HDLC
Connector	Shielded RJ-45

Datacom Interface Module	
Standard	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)
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

High-speed Datacom Interface Module	
Standard	N/A
Card Type	V.35/ RS-530
Bit rate	n x 64K/ n x 256K, n = 1 to 32 V.35 & RS-530 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

NEW !!



Ordering Info - Modules

For Individual Purchase of Extra Modules		
E1/T1 Interface Card	FMUX01A-E1/BNC	4 x G.703 E1 BNC
	FMUX01A-E1/RJ45	4 x G.703 E1 RJ-45
	FMUX01A-T1/BNC	4 x G.703 T1 RJ-45
	FMUX01A-E1/ Wire-Wrap	4 x G.703 wire-wrap
Ethernet Interface Card	FMUX01A-Ethernet	1 x 10/100 Mbps Ethernet Bridge
External Clock	FMUX01A-EXT/CLK	External clock
SNMP	FMUX01A-SNMP	support console RS-232 port and 10/100Base-T Ethernet port, with SNMP MIB file
GUI	FMUX01A-GUI	GUI, support WIN 95, 98, 2000, XP
EMS	FMUX01A-EMS	EMS, server-client architecture with MS-SQL database

Optical Transceiver Interface		
Fiber Redundant	Connector Type	Distance Connectivity
S: standard	SC	002: 2km
R: redundant	ST	030: 30km
	FC	050: 50km
	LC	080: 80km
	MT	120: 120km
		20A: 20km
		20B: 20km
		40A: 40km
		40B: 40km
		60A: 60km
		60B: 60km

CPE/ CO Solution F.O.M. Series FMUX04



Fiber Optical E1/ T1 Multiplexer

The FMUX04 is a multiplexer for four (4) E1 or 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 four (4) channels. 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. Additional options include "Order Wire" phone connection (FXS port) and an SNMP option.

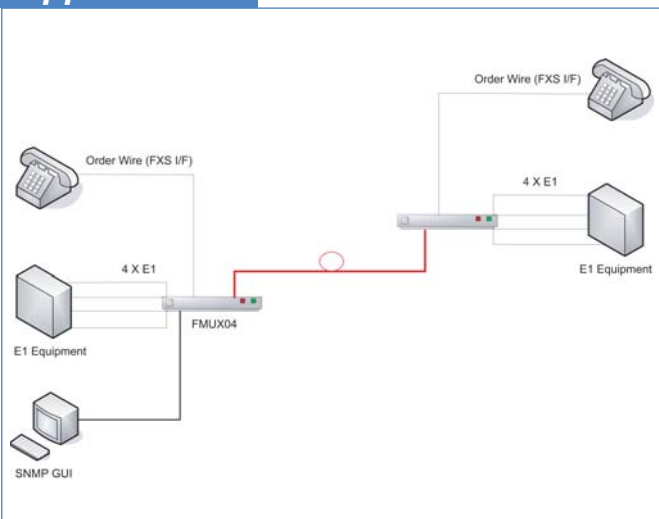
Features

- Standalone unit (1U, 1.75"). An optional mounting kit is available for single or side-by-side mounting in a 19" rack
- Channel service setting and remote loop-back setting via front panel DIP switch
- Far End Fault (FEF) on fiber link, selectable
- On-line Bit Error Rate monitor feature with four error-rate classes
- Provides 2 color based LEDs for clear indication
- Provides one optional dedicated order wire phone port, (FXS, RJ-11 port)
- Provides one supervisory port (DB9 connector) for ASCII terminal and one alarm relay contact
- SNMP management (Optional) with additional support for Telnet or Web based local or remote configuration
- Single mode or multimode fiber link distance up to 120Km depending on ordered model
- Supports M/M or S/M with ST, SC, FC, LC, or WDM(SC)
- System BER $\leq 10^{-11}$

Specifications

Console interface	Interface	RS-232D (RJ-45) Asynchronous
	Bit rate	19200,8,N,1
Power	AC	90 — 260 VAC
	DC	20 — 60 VDC
Environment	Temperature	0 — 55°C (Operating); 0 — 70°C (Storage)
	Humidity	10 — 95% non
Power Consumption	20W	
LEDs	PWR, Optical 1 (for optical signal and link status) Minor & Major Alarms, Far End & Near End Error System Failure, E1 & T1 (for signal status)	
Dimensions(WxDxH)	195mm x 45mm x 255 mm	
Weight	850g	
System	$\leq 10^{-11}$	
Performance(BER)		
Alarm	Single relay contact	
MTBF	57,350 hours	
Compliance	FCC, Part 15, Sub B (Class A) European standard EN55022: 1994/A1 : 1995/A2 : 1997 Class A, EN61000-3-2:1995, EN61000-3-3:1995 and EN50082-1:1997	

Application



Ordering Info

FMUX04-XX/	XX	XXX
Power Type	Connector Type	Distance Connectivity
AC	SC	002: 2km
DC	ST	030: 30km
	FC	050: 50km
	LC	080: 80km
		120: 120km
		20A: 20km
		20B: 20km
		40A: 40km
		40B: 40km
		60A: 60km
		60B: 60km

- *020A must be coupled with 020B
- *040A must be coupled with 040B
- *060A must be coupled with 060B

Individual Purchase	
FMUX04-Phone	Optional Phone (FXS)
FMUX04-SNMP	Optional SNMP agent

Interface Module

E1 Interface Mode

Standards	ITU-T G.703, G.736, G.775, G.823
Ports	4 ports
Framing	Transparent (clear channel)
Data rate	2.048 Mbps
Line code	HDB3/ AMI
Receive Level	-43dB
Line impedance	75 ohms $\pm 5\%$ / 120 ohms $\pm 5\%$
Connector	RJ-45 for 120 ohms BNC for 75 ohms
Pulse amplitude	Nominal 2.37V $\pm 10\%$ for 75 ohms Nominal 3.00V $\pm 10\%$ for 120 ohms
Zero amplitude	$\pm 0.1V$

T1 Interface Mode

Standards	ITU-T G.703, G.736, G.775, G.823
Ports	4 ports
Framing	Transparent (clear channel)
Data rate	1.544 Mbps
Line code	B8ZS/ AMI
Receive Level	-36dB
Line impedance	100 ohms $\pm 5\%$
Connector	RJ-45 for 120 ohms
Pulse amplitude	Nominal 3.00V $\pm 20\%$
Zero amplitude	$\pm 0.1V$



Unmanaged Fiber Switch FSW-2104



Fast Ethernet Switch

The FSW2104 contains four ports 10/100Base-TX plus one port 100Base-FX. This converting switch allows user to extend or interconnect their copper based Fast Ethernet network to a maximum distance up to 20km or more. The FSW2104 adapts the switching technology and function just like switch instead of a traditional converter. Moreover, the FSW2104 provides Wire-speed, Store and Forward, and Broadcast Storm protection switching features.

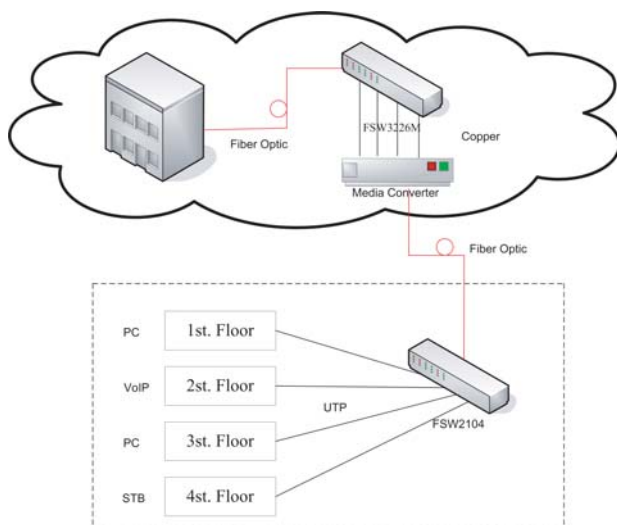
Features

- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation in TP port
- Four RJ-45 ports for 10/100Base-TX to one port 100Base-FX
- Full duplex IEEE 802.3x & half duplex back pressure Flow Control
- Full Wire speed reception and transmission
- MAX. packet size: 1536 byte
- Plug-and-Play installation
- Store & forward switching mechanism
- Support 64K MAC address table, 1M Bytes buffer memory
- Supports Broadcast storm protection

Specifications

Standard	IEEE 802.3 10Base-T and IEEE 802.3u 100Base-TX, 100Base-FX standards	
Interface	4 ports 10/100Base-TX RJ-45 to 1 port 100Base-FX	
LEDs	Power, Status, Link/Act, FDX/COL, 100M	
Power	100 — 240 VAC ± 10%; Frequency: 50 — 60 Hz	
Environment	Temperature	0 — 60°C (Operating); -10 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	< 5W	
Dimensions(WxDxH)	213mm x 106mm x 33mm	
Weight	670g	
Compliance	FCC part 15 class A, European standard	

Application



Ordering Info

FSW-2104-M02	4 ports 10/100Base-T/Tx to 1 port 100Base-FX Fiber Switch 850nm, SC, Multi-mode, 2Km
FSW-2104-S20	4 ports 10/100Base-T/Tx to 1 port 100Base-FX Fiber Switch 1310nm, SC, Single-mode, 20Km
FSW-2104-S40	4 ports 10/100Base-T/Tx to 1 port 100Base-FX Fiber Switch 1310nm, SC, Single-mode, 40Km
FSW-2104-S60	4 ports 10/100Base-T/Tx to 1 port 100Base-FX Fiber Switch 1310nm, SC, Single-mode, 60km
FSW-2104-S80	4 ports 10/100Base-T/Tx to 1 port 100Base-FX Fiber Switch 1310nm, SC, Single-mode, 80km
FSW-2104-W20A	4 ports 10/100Base-T/Tx to 1 port 100Base-FX Fiber Switch WDM 1310nmTX/1550nmRX, SC
FSW-2104-W20B	4 ports 10/100Base-T/Tx to 1 port 100Base-FX Fiber Switch WDM 1550nm TX/1310nm RX, SC, 20km
FSW-2104-W40A	4 ports 10/100Base-T/Tx to 1 port 100Base-FX Fiber Switch WDM 1310nmTX/1550nmRX, SC, 40km
FSW-2104-W40B	4 ports 10/100Base-T/Tx to 1 port 100Base-FX Fiber Switch WDM 1550nm TX/1310nm RX, SC, 40Km

Web Smart Managed Fiber Ethernet Switch FSW-3208M & FSW-3224M

Gigabit Layer 2 Switch

FSW-3208M/ FSW-3224M is a high performance web-smart switch that provides up to 8 or 24 10/100/1000Mbps copper Ethernet ports and 2 SFP Dual Media, this provides a great flexibility for nowadays variety of network application at lower cost, specially an unique function is also designed with these two ports (SFP), it can be used as switch port with SFP interface, moreover, it can also be configured as converter, then each paired ports can be used as RJ-45 to Fiber converter at Gigabit speed, this will greatly save converter cost at some application that don't need to switch packets in networks, such as FTTH (Fiber To The Home), FTTB, fiber connection,...etc. FSW-3208M/ FSW-3224M also provides users with common and simple control/setting function rather than sophisticated SNMP management function on every Ethernet ports through out-of-band Ethernet; this makes it very suitable for small or medium size company to build up simple network at beginning phase with lower cost. Moreover, an optional long-ear accessory also makes it possible to play as a backbone in the rack mount environment. A user friendly, mouse operation, web management is supported through browser; this provides you enjoy major control function same as SNMP switch but at smart cost. An out-of-band Ethernet port is supported for initial setup and out-of-band control, this out-of-band Ethernet can provide an independent control channel separated from malfunction network and provide management from both local and remote side as well.



Specially, an in-band control is also provided if user connects out-of-band port to one of 8 or 24 Ethernet ports, then in-band management can be performed, this give user a great flexibility to manage the device either through in-band or out-of-band. Non-blocking and maximum wire speed performance are designed on all switched ports, it not only supports Auto-Negotiation but also AUTO-MDIX function on all switched 8 or 24 10/100/1000 RJ-45 Gigabit copper ports no matter running with half or full duplex mode, these function make user easy to use and reduce the matching effort between straight and cross-over line issues. FSW-3208M/ FSW-3224M supports both port-based VLAN and Tag-based VLAN to catch-up the application needed in coming VLAN age. To increase bandwidth application, it supports 1 group with up to 4 ports Trunk, and moreover, these trunk ports are with fair-over function to provide redundant back-up when one or some of ports are malfunction. Totally front access design and fully LED status display ease user's installation, a reset bottom is also provided makes user easy to go back to default setting.

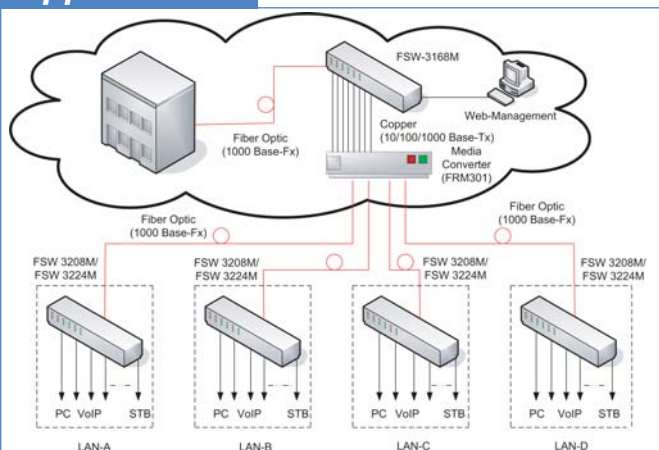
Features

- 8/24 ports 10/100/1000 RJ-45 (FSW-3208M/ FSW-3224M)
- Auto-Negotiation and Auto-MDIX on all 10/100/1000M copper ports
- MAC based Trunk with fail over
- Non-blocking, full-line speed, store-and-forward
- Port, Weighted Priority, and 802.1q-based QoS for four Queues
- Rack mount is optional with long ear
- Support broadcast storm prevention
- Support flow control for both half- or full-duplex operation
- Support jumbo frame, Max. packet length 9728 byte
- Support port based VLAN and 802.1q Tag VLAN
- Support rate limit control (ingress/ egress)

Specifications

Standard	IEEE 802.3 10BaseT Ethernet; IEEE 802.3u 100BaseTX Fast Ethernet; IEEE 802.3z 1000BaseSX/LX Gigabit Ethernet; IEEE 802.3x flow control; IEEE 802.1q Tag-based VLAN, Priority Control; IEEE 802.1v protocol-based VLAN	
Throughput	1000Mbps ethernet	1488100 packets per second per port
	100Mbps ethernet	148810 packets per second per port
	10Mbps ethernet	14880 packets per second per port
LEDs	Link, Activity, Speed	
Power	100 — 240 VAC ±10%; Frequency: 50 — 60 Hz	
Environment	Temperature	0 — 60°C (Operating) ; 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	FSW-3208M	20W
	FSW-3224M	40W
Dimensions(WxDxH)	FSW-3208M	252mm x 125mm x 44mm
	FSW-3224M	440mm x 184mm x 44mm
Weight	FSW-3208M	1.3Kg
	FSW-3224M	2.5Kg
Compliance	Class A FCC, CE, VCCI, C-Tick	

Application



Ordering Info

FSW-3208M	8-ports 10/100/1000Mbps copper ethernet and 2 SFP ports
FSW-3224M	24-ports 10/100/1000Mbps copper ethernet and 2 SFP ports

L2 Managed Fiber Ethernet Switch FSW-3226M



Fast Ethernet Layer 2 Switch

FSW-3226M is a high performance web-Managed SNMP Layer 2 switch that provides users with 24 10/100Mbps Ethernet and 2 1000Mbps Gigabit ports. This switch has SNMP management and remote control capabilities such as "Web Cluster". The Gigabit module, which can be copper or fiber media, supports 1000BASE-SX/LX or 1000BASE-T, allowing users to increase their network response time at gigabit speeds and with great flexibility. A RS-232 serial port provides an easy way for installation and initial se-up. FSW-3226M provides a

convenient way to operate layer 2 management through the browser. The User-friendly drop-down menu allows the user to easily learn, control and monitor. It supports not only traditional SNMP function, but also RMON 1,2,3,9 groups for advanced network analysis.

Features

- 24 10/100Base-TX RJ-45 and 2 pair gigabit ports of RJ-45 and SFP ports on board.
- Auto-Negotiation and Auto-MDIX on all 10/100-BASE-TX copper ports
- Non-blocking, full-line speed, store-and-forward, Max. packet length 1568 byte
- Support 4-level priority queuing
- Support 802.1x Authentication and Authorization
- Support broadcast storm filtering
- Support by-port Egress/Ingress rate control
- Support flow control for both half- or full-duplex operation
- Support IP Multicast, IGMP snooping
- Support management from single IP no matter from local side or remote side
- Support port-based VLAN and 802.1Q tag-based VLAN
- Support Port-Trunking with flexible load distribution control and fail-over functions
- Support Ping Function from switch
- Support RMON group 1,2,3,9
- Support STP and RSTP
- Support stackable function
- Support Web/SNMP/Console management
- Support rate limit control (ingress/ egress)

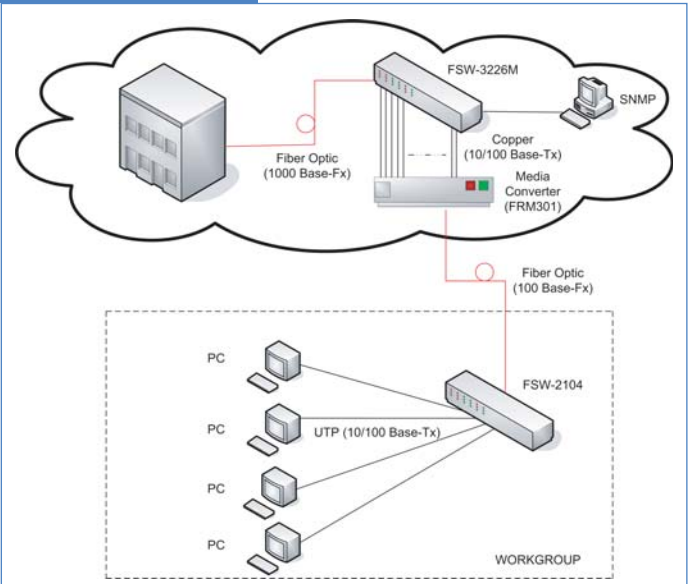
Ordering Info

FSW-3226M	24-port 10/100BASE-TX RJ45 to 2 ports 10/100/1000BASE-TX and 2-port 1000BASE-SX/LX SFP
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Specifications

Standard	IEEE 802.3 10BaseT Ethernet; IEEE 802.3u 100BaseTX Fast Ethernet; IEEE 802.3z 1000BaseSX/LX Gigabit Ethernet; IEEE 802.3x flow control; IEEE 802.1D Spanning Tree; IEEE 802.1q Tag-based VLAN, Priority Control; IEEE 802.1v protocol-based VLAN; IEEE 802.1x Authentication and Authorization	
Throughput	1000Mbps ethernet	1488100 packets per second per port
	100Mbps ethernet	148810 packets per second per port
	10Mbps ethernet	14880 packets per second per port
LEDs	Link, Activity, Speed	
Power	100 — 240 VAC ±10%; Frequency: 50 — 60 Hz	
Environment	Temperature	0 — 60°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	< 30W	
Dimensions(WxDxH)	440mm x 184mm x 44mm	
Weight	2.5kg	
Compliance	FCC part 15 class A, CE	

Application



Web Smart Managed Fiber Ethernet Switch

FSW-3168M



Gigabit Layer 2 Switch

FSW3168M is a high performance web-smart Layer 2 switch that provides users with switched 8 10/100/1000Mbps Ethernet ports and 16 SFP fiber Ethernet ports, this is specially designed for the use at the environment that needs high-density fiber ports and copper gigabit ports simultaneously, such as big enterprise company, big ISP and Telephone Company. When user adopts proper SFP fiber transceivers, single-mode or multi-mode, he may contracture a high speed backbone for large traffic data center or service center. Web interface management provides control capability over TCP/IP, this make user convenient and easy to manage switch with browser no matter at local or remote side. Non-blocking and maximum wire speed performance are designed on all switched ports, and it also supports Auto-Negotiation and MDI-MDIX function on all switched 8 10/100/1000M RJ-45 Gigabit ports, these function make user really easy to use and reduce the matching effort on straight and cross-over line issues and on different speed setting.

FSW3168M supports both port-based VLAN and Tag-based VLAN to catch-up the application needed in coming VLAN age. Tag-VLAN is getting important now, without Tag-VLAN, the smart switch or SNMP switch become powerless, and we specially design "back-up & restore" function to support this important & complicated function, VLAN setting needs professional people to configure the data, and this data should be well back-up, our "back-up & restore" function not only support user to store configuration data into PC but also use this function to perform copy/duplicate when other machines needs similar configured data. To increase bandwidth application, it supports 4 trunk groups with each Trunk up to 8 ports, moreover, these trunked ports are with fair-over function to provide redundant back-up when one or some ports become malfunction in that trunked group. In addition to in-band management through RJ-45 ports, it also provides RS-232 terminal port with CLI interface for user to do initial setting or operation while in-band domain is malfunction.

Features

- 8 10/100/1000 RJ-45 ports, 16 mini-GBIC ports with optional fiber transceivers
- 8K MAC entries, 4K VLAN entries
- 512 K bytes packet buffer
- Auto-Negotiation and Auto-MDIX on all 10/100/1000M copper ports
- Broadcom chipset inside
- LED display for each port status: link and activity
- Non-blocking, full-line speed, store-and-forward operation
- Port Protected to prevent flooded traffic
- Provide port statistics
- Provide back-up and restore function
- Reset bottom provide back to default value and password
- Support 802.1p Qos
- Support broadcast storm control
- Support flow control for both half- or full-duplex operation
- Support normal Ethernet frames and jumbo frames from 64 bytes to 9216 bytes
- Support port based VLAN and 4K 802.1q Tag VLAN
- Support rate limit control (ingress)
- Support port mirror
- Up to 4 groups, maximum 8 member ports for each Trunk, more over, with fail over function

Specifications

Standard	IEEE 802.3 10BaseT Ethernet; IEEE 802.3u 100BaseTX Fast Ethernet; IEEE 802.3ab 1000Base Gigabit Ethernet; IEEE 802.3x flow control; IEEE 802.1q Tag-based VLAN, Priority Control	
Software (Packet Forwarding and Filtering Rates):	1000Mbps ethernet	1488100 packets per second per port
	100Mbps ethernet	148810 packets per second per port
	10Mbps ethernet	14880 packets per second per port
Interface	8 1000BaseTX RJ-45 connector ports 16 mini-GBIC ports 1 RS-232 terminal port 1 hole provide reset bottom	
Buffer Memory	512MB for packet buffers; 8K entries for MAC; 4K entries for VLAN	
LEDs	1 power LED: Green (normal)	
	1 Diagnostics LED: Green (normal), blanking (error)	
	Port LEDs: 17 — 24 ports, left corner of each RJ-45 port, Green (Link ok), Blinking(Activity)	
	Speed LEDs: 17 — 24 ports, right corner of each RJ-45 port Green (1000M), Vanish (10 or 100M)	
	Fiber LEDs: 1 — 16 ports, Green (Link ok), Blinking (Activity) Power	
Power	100 — 240 VAC; Frequency: 50 — 60 Hz	
Environment	Temperature	5 — 45°C (Operating); -20 — 70°C (Storage)
	Humidity	10% — 90% non-condensing
Power Consumption	40W	
Dimensions(WxDxH)	440mm x 184mm x 44mm	
Weight	2.5Kg	
Compliance	Class A FCC, CE, VCCI, C-Tick	

Ordering Info

FSW-3168M	8 ports 10/100/100Base-TX to 16 ports 1000Base FX SFP LC
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Comparison Table

FIB (Ethernet)

Model Name		FIB1-10/100N	FIB2-10/100N	FIB1-10/100F	FIB2-10/100F	FIB1-1000ES	FIB1-1000TG	FIB1-1000MG
Fiber I/F	Data Rate (Mbps)	100	100	100	100	1000	1000	1000
	Transceiver (Fixed/ Portable)	1x9 fixed	1x9 fixed	1x9 fixed	1x9 fixed	SFP portable	GBIC portable	GBIC portable
Copper I/F	Data Rate (Mbps)	10/100	10/100	10/100	10/100	10/100/1000	1000	
	Connector Type	RJ-45	RJ-45	RJ-45	RJ-45	RJ-45	RJ-45	
	Auto/Half/ Full Duplex Negotiation	v	v	v	v	v	v	
	Max. Packet Size	1600	1600	1600	1600	1536	transparent	
	Auto MDI X	v	v	v	v	v	v	
Compatible Rack Type		FRM301N		FRM301		FRM301/ FRM301N	FRM301/ FRM301N	FRM301/ FRM301N
Power		DC 9V/1A	AC 90 ~ 260V	DC 9V/1A	AC 90 ~ 260V	AC 100 ~ 240V	AC 100 ~ 240V	AC 100 ~ 240V
			DC 24 ~ 48V		DC 24 ~ 48V	DC 12V/1A	DC 12V/1A	DC 12V/1A
Power Consumption (W)		4	4	4	4	5	5	5

FIB (TDM)

Model Name		FIB1-E1/T1	FIB2-E1/T1
Fiber I/F	Data Rate	100	100
	Transceiver (Fixed/ Portable)	1x9 fixed	1x9 fixed
E1 I/F	Data Rate	2.048	2.048
	Connector Type	BNC (75 ohm) RJ-45(120 ohm)	BNC (75 ohm) RJ-45(120 ohm)
T1 I/F	Data Rate	1.544	1.544
	Connector Type	RJ-45(100 ohm)	RJ-45 (100ohm)
Power		AC 110V or 200V	AC 90 ~ 260V
		DC 9V/1A	DC 24 ~ 48V
Power Consumption (W)		5	5

FIB (Serial)

Model Name		FIB1-Serial	FIB1-Serial/FDC	FIB2-Serial
Fiber I/F	Data Rate	100	100	100
	Transceiver (Fixed/ Portable)	1x9 fixed	1x9 fixed	1x9 fixed
Serial I/F	Baud Rate (Kbps)	1024 (RS-485) 256 (RS-232)	1024 (RS-485) 256 (RS-232)	1024 (RS-485) 256 (RS-232)
	Connector Type	RS-485 RS-232	RS-485 RS-232	RS-485 RS-232
Power		AC 110V or 220V	AC 110V or 220V	AC 90 ~ 260V
		DC 12V/1A	DC 12V/1A	DC 24 ~ 48V
Power Consumption (W)		5	5	5

FIB (Data)

Model Name		FIB1-Data	FIB1-Data/H	FIB2-Data
Fiber I/F	Data Rate (Mbps)	100	100	100
	Transceiver (Fixed/ Portable)	1 x 9 fixed	1 x 9 fixed	1 x 9 fixed
Data Port I/F	Data Rate	n*64Kbps, n=1~32 (64 ~ 2048 Kbps)	n*64Kbps, n=1~32 (64 ~ 2048 Kbps)	n*64Kbps, n=1~32 (64 ~ 2048 Kbps)
	Connector Type	V.35, X.21, RS-530/449/232	V.35, X.21, RS-530/449	V.35, X.21, RS-530/449/232
Power		AC 110V	AC Adapter	AC 90 ~ 260V
		DC 9V/1A	DC 9V/1A	DC 24 ~ 48V
Power Consumption (W)		5	5	5

FRM

Model Name		FRM301	FRM401	FRM301N
Physical Type		3U Rack Mountable	4U Rack Mountable	3U Rack Mountable
Fiber I/F	Ports	16	48	16
	Transceiver (Fixed/ Portable)	1 x 9/ SFP/ GBIC according to the inserted cards	1 x 9 fixed	1 x 9/ SFP/ GBIC according to the inserted cards
Copper I/F	Ethernet	up to 16	up to 48	up to 16
		10/100 Base (Auto)	10/100 Base (Auto)	10/100 Base (Auto)
		Full/Half/Auto	Full/Half/Auto	Full/Half/Auto
	Connector Type	RJ-45	RJ-45	RJ-45
E1/T1		v		v
	Datacom (V.35, X.21, RS-449/530, RS-232)	v		v
Power	AC Module (VAC)	(90 ~ 264)	(110 or 220)	(90 ~ 264)
	DC Module (VDC)	(-18 ~ -56)	(-42 ~ -60)	(-18 ~ -56)
Redundant Power		2 AC/2 DC/AC+DC	2 AC/2 DC	2 AC/2 DC/AC+DC
Dip Switch		v	v	v
Management	Console	v	v	
	SNMP-GUI, Telnet, MIB	v	v	
SNMP TFTP Upgrade		v	v	
Cooling Fan		v	v	v

Comparison Table

CWDM

Model Name		Sigma Link - 2000	Sigma Link - 5000
Physical Type		2U Chassis Rack	5U Chassis Rack
Slots	Front Side	6 (Line Card Module)	17 (Line Card Module)
	Back Side	2 (Power Supply Module)	2 (Power Supply Module)
Line Cards		SNMP	SNMP
		Transponder	Transponder
		MUX/DMUX	MUX/DMUX
		OADM	OADM
		Protection	Protection
SNMP/ Telnet/ Console Management		v	v
TFTP Firmware Upgrade		v	v
Alarm Relay		v	v
Power	AC Module	90~264 VAC	90~264 VAC
	DC Module	(-18~-56) VDC	(-18~-56) VDC
Power Consumption (W)		25	72

FOM

Model Name		FMUX01-A	FMUX04
Physical Type		1U Rack Mountable	1U Standalone
Fiber I/F	Ports	1+1 (redundant)	1
	Data Rate (Mbps)	50	50
	Transceiver	1x9	1x9
Copper I/F	E1	Ports	4
		Framing	Unframed
		Data Rate	2.048
		Connector	BNC (75ohm)/RJ-45 (120ohm)/ Wirewrap (120ohm)
	T1	Ports	4
		Framing	Unframed
		Data Rate	1.544
		Connector	RJ-45 (100ohm)/ Wirewrap (100ohm)
	Datacom	Card Type	V.35/X.21/RS-232, 530, 449
		Bit Rate	n*64 , n= 1~32
Connector		HD-68 D type female	
Ethernet	Ports	1	
	Data Rate	10/100	
	Connector	Shielded RJ-45	
SNMP/ Telnet/ Console Management		All	All
Power	AC Module	90~260 VAC	90~260 VAC
	DC Module	20~60 VDC	20~60 VDC
Power Consumption (W)		40	40

Fiber Switch

Model Name		FSW-2104	FSW-3208M	FSW-3224M	FSW-3226M	FSW-3168M
Fiber I/F	Ports	1	2	2	2	16
	Data Rate	100	1000	1000	1000	1000
	Transceiver	1x9	SFP	SFP	SFP	SFP
Copper I/F	Ports	4	8	24	24	8
	Data Rate	10/100	10/100/1000	10/100/1000	10/100	10/100/1000
	Connector	RJ-45	RJ-45	RJ-45	RJ-45	RJ-45
	Auto-Negotiation	v	v	v	v	v
	Max. Packet Size (Byte)	1536	9728	9728	1536	9728
	Auto- MDI/MDIX	v	v	v	v	v
SNMP/ Console Management		v	v	v	v	v
Power		100~240 VAC	100~240 VAC	100~240 VAC	100~240 VAC	100~240 VAC
Power Consumption (W)		5	20	40	30	40

PS: Fiber Transceiver Information can be referred to Page 1-29 & 1-30



Comparison Table

Transceiver - SFP

Transceiver		Media	Max. Data (bps)	Connector	Wavelength (nm)	Max. Output Power (dBm)	Min. Output Power (dBm)	Sensitivity (dBm)	Power Budget (dB)	Diode	BER	Note	
SFP	Standard	MM (550M)	1.25G	LC	850	-4	-9.5	-18	8.5	VCSEL	<10 ⁻¹²		
		MM (2KM)	155M	LC	1310	-14	-20	-31	11	LED	<10 ⁻¹⁰		
			1.25G	LC	1310	-1	-9	-19	10	FP	<10 ⁻¹²		
			2.5G	LC	1310	-3	-9	-20	11	FP	<10 ⁻¹²	DDM	
		SM (10KM)	1.25G	LC	1310	-3	-9.5	-20	10.5	FP	<10 ⁻¹²		
		SM (15KM)	2.5G	LC	1310/ 1550	0	-5	-20	15	DFB	<10 ⁻¹²	DDM	
		SM (30KM)	155M	LC	1310	-8	-15	-34	19	FP	<10 ⁻¹²		
		SM (40KM)	1.25G	LC	1310/ 1550	1	-4	-24	20	DFB	<10 ⁻¹²		
			2.5G	LC	1310	3	-2	-28	26	DFB	<10 ⁻¹²	DDM	
				LC	1550	4	-1	-21	20	DFB	<10 ⁻¹²	DDM	
		SM (50KM)	155M	LC	1310	0	-5	-35	30	FP	<10 ⁻¹⁰		
		SM (80KM)	1.25G	LC	1550	5	0	-24	24	DFB	<10 ⁻¹²		
			2.5G	LC	1550	3	-2	-28	26	DFB	<10 ⁻¹²	DDM	
		SM (120KM)	155M	LC	1550	5	0	-35	35	DFB	<10 ⁻¹⁰		
			1.25G	LC	1550	5	0	-30	30	DFB	<10 ⁻¹²		
		WDM (BiDi)	SM 20A (20KM)	155M	LC	Tx : 1310 Rx : 1550	-8	-14	-32	18	FP	<10 ⁻¹⁰	
			SM 20B (20KM)	155M	LC	Tx : 1550 Rx : 1310	-8	-14	-32	18	FP	<10 ⁻¹⁰	
			SM 40A (40KM)	155M	LC	Tx : 1310 Rx : 1550	0	-8	-34	26	FP	<10 ⁻¹⁰	
	SM 40B (40KM)		155M	LC	Tx : 1550 Rx : 1310	0	-8	-34	26	DFB	<10 ⁻¹⁰		
	SM 60A (60KM)		155M	LC	Tx : 1310 Rx : 1550	0	-5	-34	29	FP	<10 ⁻¹⁰		
	SM 60B (60KM)		155M	LC	Tx : 1550 Rx : 1310	0	-5	-34	29	DFB	<10 ⁻¹⁰		
	SM 10A (10KM)		1.25G	LC	Tx : 1310 Rx : 1550	-3	-9	-21	12	FP	<10 ⁻¹²		
	SM 10B (10KM)		1.25G	LC	Tx : 1550 Rx : 1310	-3	-9	-21	12	DFB	<10 ⁻¹²		
	SM 20A (20KM)		1.25G	LC	Tx : 1310 Rx : 1550	-2	-8	-23	15	FP	<10 ⁻¹²		
	SM 20B (20KM)		1.25G	LC	Tx : 1550 Rx : 1310	-2	-8	-23	15	DFB	<10 ⁻¹²		
	SM 40A (40KM)		1.25G	LC	Tx : 1310 Rx : 1550	2	-3	-23	20	DFB	<10 ⁻¹²		
	SM 40B (40KM)		1.25G	LC	Tx : 1550 Rx : 1310	2	-3	-23	20	DFB	<10 ⁻¹²		
	SM 60A (60KM)		1.25G	LC	Tx : 1310 Rx : 1550	5	0	-24	24	DFB	<10 ⁻¹²		
	SM 60B (60KM)		1.25G	LC	Tx : 1550 Rx : 1310	4	-2	-25	23	DFB	<10 ⁻¹²		
	CWDM		SM 040 (40KM)	1.25G	LC	1470/ 1490/ 1510 1530/ 1550/ 1570 1590/ 1610	1	-4	-24	20	DFB	<10 ⁻¹²	DDM
			SM 080 (80KM)	1.25G	LC	1470/ 1490/ 1510 1530/ 1550/ 1570 1590/ 1610	5	0	-23	23	DFB	<10 ⁻¹²	DDM
			SM 120 (120KM)	1.25G	LC	1470/ 1490/ 1510 1530/ 1550/ 1570 1590/ 1610	5	0	-30	30	DFB	<10 ⁻¹²	DDM
			SM 040 (40KM)	2.5G	LC	1470/ 1490/ 1510 1530/ 1550/ 1570 1590/ 1610	4	-1	-21	20	DFB	<10 ⁻¹²	DDM
		SM 080 (80KM)	2.5G	LC	1470/ 1490/ 1510 1530/ 1550/ 1570 1590/ 1610	3	-2	-28	26	DFB	<10 ⁻¹²	DDM	
		SM 120 (120KM)	2.5G	LC	1470/ 1490/ 1510 1530/ 1550/ 1570 1590/ 1610	5	0	-30	30	DFB	<10 ⁻¹²	DDM	

Note:

1. MM: Multi-Mode/ SM: Single-Mode
2. WDM (BiDi): Bi-Direction in one single fiber. *10A must be coupled with 10B, 20A must be coupled with 20B, and 40A with 40B, 60A with 60B.
3. CWDM: For Sigma Link 2000/5000 products use only
4. DDM: Digital Diagnostic Monitoring function

Comparison Table

1

Fiber Series

Access Series

xDSL Series

IP Networking

Testers

Interface Converter

Datacom Accessories

Network Management

Transceiver - GBIC

Transceiver	Media	Max. Data Rate	Connector	Wavelength	Max. Output Power	Min. Output Power	Sensitivity	Power Budget	Diode	BER	
				(nm)	(dBm)	(dBm)	(dBm)	(dB)			
GBIC Standard	MM (550M)	1.25G	SC	850	-4	-9.5	-18	8.5	VCSEL	<10 ⁻¹²	
	MM (2KM)	1.25G	SC	1310	-1	-9	-19	10	FP	<10 ⁻¹²	
	SM (10KM)	1.25G	SC	1310	-3	-9.5	-20	10.5	FP	<10 ⁻¹²	
	SM (40KM)	1.25G	SC	1310	3	-4	-23	19	DFB	<10 ⁻¹²	
		1.25G	SC	1550	1	-4	-23	19	DFB	<10 ⁻¹²	
	SM (80KM)	1.25G	SC	1550	5	0	-23	23	DFB	<10 ⁻¹²	
	SM (120KM)	1.25G	SC	1550	4	-1	-31	30	DFB	<10 ⁻¹²	
	WDM (BiDi)	SM 10A (10KM)	1.25G	SC	Tx : 1310 Rx : 1550	-3	-9	-20	11	FP	<10 ⁻¹²
		SM 10B (10KM)	1.25G	SC	Tx : 1550 Rx : 1310	-3	-9	-20	11	DFB	<10 ⁻¹²
		SM 20A (20KM)	1.25G	SC	Tx : 1310 Rx : 1550	-3	-8	-23	15	FP	<10 ⁻¹²
		SM 20B (20KM)	1.25G	SC	Tx : 1550 Rx : 1310	-3	-8	-23	15	DFB	<10 ⁻¹²
		SM 40A (40KM)	1.25G	SC	Tx : 1310 Rx : 1550	2	-3	-23	20	DFB	<10 ⁻¹²
		SM 40B (40KM)	1.25G	SC	Tx : 1550 Rx : 1310	2	-3	-23	20	DFB	<10 ⁻¹²
		SM 60A (60KM)	1.25G	SC	Tx : 1310 Rx : 1550	5	0	-24	24	DFB	<10 ⁻¹²
		SM 60B (60KM)	1.25G	SC	Tx : 1550 Rx : 1310	4	-2	-25	23	DFB	<10 ⁻¹²

Note:

1. MM: Multi-Mode/ SM: Single-Mode
2. WDM (BiDi): Bi-Direction in one single fiber. *10A must be coupled with 10B, 20A must be coupled with 20B, and 40A with 40B, 60A, 60A with 60B.

Transceiver - 1 x 9

Transceiver	Media	Max. Data Rate	Connector	Wavelength	Max. Output Power	Min. Output Power	Sensitivity	Power Budget	Diode	BER	
				(nm)	(dBm)	(dBm)	(dBm)	(dB)			
1x9 Standard	MM (550M)	1.25G	SC	850	-4	-9.5	-18	8.5	VCSEL	<10 ⁻¹²	
	MM (2KM)	155M	ST/SC	1310	-14	-20	-31	11	LED	<10 ⁻¹⁰	
	SM (30KM)	155M	ST/SC/FC	1310	-5	-15	-35	20	FP	<10 ⁻¹⁰	
	SM (50KM)	155M	ST/SC/FC	1310	2	-8	-36	28	FP	<10 ⁻¹⁰	
	SM (80KM)	155M	ST/SC/FC	1550	0	-5	-34	29	DFB	<10 ⁻¹⁰	
	SM (120KM)	155M	ST/SC/FC	1550	5	0	-35	35	DFB	<10 ⁻¹⁰	
	WDM (BiDi)	SM 20A (20KM)	155M	SC	Tx : 1310 Rx : 1550	-7	-15	-32	17	FP	<10 ⁻¹⁰
		SM 20B (20KM)	155M	SC	Tx : 1550 Rx : 1310	-7	-18	-32	14	FP	<10 ⁻¹⁰
		SM 40A (40KM)	155M	SC	Tx : 1310 Rx : 1550	0	-7	-32	25	FP	<10 ⁻¹⁰
		SM 40B (40KM)	155M	SC	Tx : 1550 Rx : 1310	0	-8	-32	24	DFB	<10 ⁻¹⁰
		SM 60A (60KM)	155M	SC	Tx : 1310 Rx : 1550	0	-5	-34	29	FP	<10 ⁻¹⁰
		SM 60B (60KM)	155M	SC	Tx : 1550 Rx : 1310	0	-5	-34	29	DFB	<10 ⁻¹⁰

Note:

1. MM: Multi-Mode/ SM: Single-Mode
2. WDM (BiDi): Bi-Direction in one single fiber. *20A must be coupled with 20B, 40A must be coupled with 40B, and 60A coupled with 40B, and 60A coupled with 60B.
3. The highlight 1x9 transceiver (550km, MM, 1.25G) is only used for our product "FIB1-1000MG".

2. Access Series



Access Series Selection Table

R/Rack, S/Standalone, C/Compact

E1 Family				
Network Type	Product Name	Description	Product Type	Page
G.703 E1	G703-FE1	E1 to Data (Fixed I/F)	C	2-3
G.703 E1	G703-FE1A	E1 to Data (Fixed I/F) Cascadable	C	2-3
G.703 E1	G703-E1-U	E1 Unframed to Data (Fixed I/F)	C	2-3
G.703 E1	ETU01	E1 to Data, Ethernet	S	2-4
G.703 E1	ETU01U	E1 Unframed to Data, Ethernet	S	2-5
G.703 E1	ETU01A	E1 to Data, Ethernet/ SNMP/ EMS	S	2-6
G.703 E1	ETU01-C	E1 MUX/ Data, Sub E1	S	2-7
G.703 E1	ETU01-D	E1 to Data, Ethernet	S	2-8
G.703 E1	ETU02-MUX	E1 MUX/ Data, Voice, Ethernet, Sub E1	S	2-9
G.703 E1	ETU02-A-MUX	E1 MUX/ Data, Sub E1	S	2-10
G.703 E1	ETU04	Ethernet over 4 E1 (Bridge)	S	2-11
G.703 E1	ETU05	16/30 Channels E1 Voice multiplexer	S	2-12
G.703 E1	ETU-DXC	E1 Digital Cross Connect (8 or 16 ch)	S	2-13
G.703 E1	Eoe-1	E1 to Ethernet	S	2-14
G.703 E1	ERM01	E1 to Data/ Ethernet (concentrator)	R	2-15
G.703 E1	ERM-Mux/Plus-LD	E1 MUX/ Data, Voice, Ethernet, Sub E1	R	2-17
G.703 E1	ERM-DXC	E1 Digital Cross Connect	R	2-21
G.703 E1	IPM-1SE	TDM over IP	S	2-23
T1 Family				
Network Type	Product Name	Description	Product Type	Page
DS1 T1	G703FT1	T1 Framed to Data (Fixed I/F)	C	2-25
DS1 T1	G703T1U	T1 Unframed to Data (Fixed I/F)	C	2-26
DS1 T1	TTU01	T1 to Data, Ethernet	S	2-27
DS1 T1	TTU02-MUX	T1 MUX/ Data, Ethernet, Sub T1	S	2-28
DS1 T1	TRM01	T1 to Data/ Ethernet (Concentrator)	R	2-29
G.703 64K Family				
Network Type	Product Name	Description	Product Type	Page
G.703/64K	G703/64A	64K co-directional to Data (Concentrator)	R	2-31
G.703/64K	G703/64A-STD	64K co-directional to Data	S	2-32
G.703/64K	G703/64-RM	64K co-directional to Data	C	2-33
G.703 E1/T1 Family				
Network Type	Product Name	Description	Product Type	Page
G.703 E1/T1	ETR01	E1/T1 Repeater	C	2-35
G.703 E1/T1	ETR04	E1/T1 Repeater	C	2-35
G.703 E1/T1	G703FTEC	E1/T1 Cross Rate Converter	S	2-36
G.703 E1/T1	ETU/TTU I/F Modules	Datacom, Ethernet Bridge/ Router Modules	C	2-37
G.703 E1/T1	ET100R	E1/T1 Ethernet Touter Modules	C	2-38

E1 NTU Series G703-FE1/ FE1-A/ E1-U



Single-Port E1/ Fractional E1 Access Units

The G.703 FE1/ FE1-A/ E1-U Access Units are single port access units for Unframed E1 or Fractional E1 services, depending on the model. Data Port rates are selectable via DIP-switches, for any multiple of 64Kbps up to 2048kbps (Fractional models only). User data is placed into the E1 frame, using only the required number of timeslots. Timeslot assignment is accomplished according to the Data Port speed and irandomly selected by DIP switches. The main E1 link may be clocked from the recovered receive clock (LBT), from the data port, or from an internal oscillator.

The data channel interface is standard E1A-530. Adapter cables are available for V.35, X.21 and RS-449. The G.703 FE1/ FE1-A/ E1-U's DIP and slide switches, located on the side and front panels, provide for easy setup and control of all functions. The G.703/FE1-A model may be cascaded as an E1 Multiplexer. The unused channel timeslots will pass through E1/Rx to E1/Tx.

Features

- Terminate E1/ Fractional E1 Service
- Clock Regeneration from incoming HDB3 data
- Decoded data in NRZ form
- Diagnostic loopbacks both for G.703 and Data Port sides
- Interface conversion between G.703 and RS-530, RS-449 (V.36), X.21 or V.35 interfaces (Cable Solution)
- LTU (Line Terminating Unit) built in unit
- DTE/ DCE switchable Data Port

Specifications

Data rate	G703E1-U	2048kbps
	G703FE1/ FE1A	DIP selectable sync N x 64kbps to 2048kbps
Framing	G703E1-U	CAS/CCS, Unframe/Frame
	G703FE1/ FE1A	FAS (CCS, PCM-31); MFAS (CAS, PCM-30)
Power	DC 9VAC Adapter for 110VAC or 220VAC	
Environment	Temperature	0 — 55°C (Operating); 0 — 70°C (Storage)
	Humidity	10 — 95% non condensing
Power Consumption	G703E1-U	< 4W
	G703FE1/ FE1A	< 4W
LEDs	G703E1-U	E1 Signal, timing loss
	G703FE1/ FE1A	WAN port TD/RD
Dimensions(WxDxH)	G703E1-U	79mm x 135mm x 28mm
	G703FE1/ FE1A	99mm x 179mm x 30mm
Weight	G703E1-U	180g
	G703FE1/ FE1A	360g
Compliance	FCC part 15 class A, CE, ITU-T G.703, G.704, G.723, G.823	
MTBF	TBA	

Ordering Info

G703-XXXXX/	XXX	X
	Copper Interface Type	Connector Type
G703-FE1	V35	F
G703-FE1-A	X21	M
G703-E1U	530	
	449	

Cables for different I/F solutions

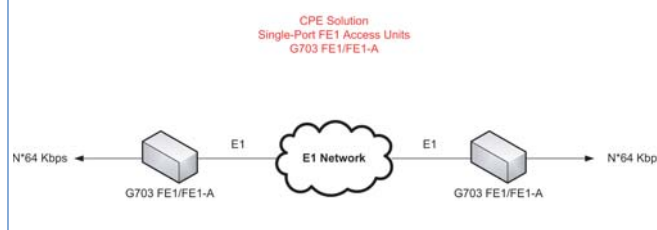
V35	DB25-V35 Cable
X21	DB25-DB15 Cable
530	DB25-DB25 Cable
449	DB25-DB37 Cable

Cables for connecting Cisco Routers directly

CAB-DB25MLHF60M3M	RS-530 adapter cable for high speed transmission, connect to Cisco LHF60
CAB-DB25MSSHP26M3M	RS-530 adapter cable for high speed transmission, connect to Cisco SSHP26

Adapter	DC 9V — 48V adapter
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Application



E1 NTU Series ETU01



Single-Port Fractional E1 Access Unit, modular I/F

The ETU01 is a single port access unit for Unframed E1, Fractional E1, or Fractional cascade E1 service. The ETU01 data channels support user-selectable transmission rates, which are integral multiples of 56 or 64kbps, up to a maximum 2.048Mbps, 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 packs the data channels into the E1 link in user-selected time slots. The unused time slots can insert IDLE code (in frame mode) or insert receive side same timeslots data (in cascade mode).

The ETU01 has many types of user-replaceable data channel modules, which directly support the following interfaces: V.35, X.21, RS-530, G.703 64k Codirectional, RS-232, 10/100 Base-TX Ethernet Bridge, 10/100 Base-TX Ethernet Router, and NRZ/BNC. RS-449 is supported by means of an DB25 to DB37 adapter cable. The ETU01 fully meets E1 specifications including ITU-T G.703, G.704, G.706, G.732, and G.823.

Features

- Terminate E1/ Fractional E1 Service
- User-replaceable data channel modules
- Multiple clock source selection
- Support user-selectable transmission rates
- V.54 diagnostic capabilities for performing local loopback and remote digital loopback.
- Supports rack mounting option

Specifications

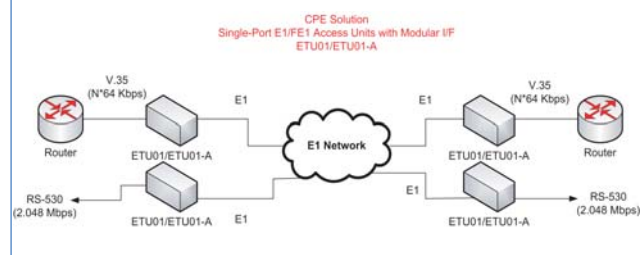
Clock modes	Clock mode 0 (DCE1)	Receive and transmit clock (recovered) to the synchronous DTE
	Clock mode 1 (DCE2)	Receive and transmit clock (internal oscillator) to the synchronous DTE
	Clock mode 2 (DTE1)	Receive clock to the synchronous, and transmit clock from the synchronous device
	Clock mode 3 (DTE2)	Receive and transmit clock from the Synchronous DCE (from ETC and ERC pin)
	Clock mode 4 (DTE3)	Receive and transmit clock from the Synchronous DCE (all from ETC pin)
Data rate	N x 56kbps or N x 64 kbps where N equals 1 to 31 in CCS or N equal 1 to 30 in CAS	
Power	AC	90 — 250 VAC
	DC	18 — 75 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	20W	
LEDs	PWR, TD, RD, RTS, DCD, Signal loss, Sync loss, Alarm	
Dimensions(WxDxH)	195mm x 255mm x 45mm	
Weight	1.5kg	
Test Switch/ Diagnostics	Digital local loopback	
	Digital remote loopback	
	Analog local loopback	
	Test pattern	
Compliance	CE, FCC part 15 class A, ITU-T G.703, G.704, G.706 and G.732.	
MTBF	TBA	

Ordering Info

ETU01/ET100-AC	ETU01 with 10/100 Base-T Ethernet bridge module & universal AC power supply
ETU01/ET100-DC	ETU01 with 10/100 Base-T Ethernet bridge module & DC power supply

Optional Interface Modules	
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-530 interface module plus RS-449 cable adapter
ETU/TTU-232	RS-232 interface module
ETU/TTU-G64K-CO	G.703/64K Co-directional I/F
ETU/TTU-NRZ	NRZ/BNC interface module
ETU/TTU-ET10/100	10/100Base-T Ethernet Bridge
ETU/TTU-ET100R	10/100Base-T Ethernet Router

Application



E1 NTU Series ETU01-U



Single-Port, unframed E1 Access Unit

The ETU01-U is a single port access unit for Unframed E1 service. Two models, one supporting AC (90-250V) and one supporting DC (18-72V), are available. The ETU01-U data channel supports a fixed transmission rate of 2.048Mbps. The built-in LTU with a line attenuation of up to 43 dB on twisted pair or coax cable, provides an approximate operating range up to 2km (using 22AWG). The ETU01-U packs the data channel into the E1 link transparently. The ETU01-U has many types of user-replaceable data channel modules, which directly support the following interfaces: V.35, X.21, RS-530, 10/100BASE-T Ethernet Bridge, and 10/100BASE-T Ethernet Router. RS-449 is

supported by RS-530 module and a DB25 to DB37 adapter cable. The ETU01-U fully meets all of the E1 specifications including ITU-T G.703 and G.823. The ETU01-U features V.54 diagnostic capabilities for performing local loopback and remote digital loopback. The operator at either end of the line may test both the ETU01-U and the line in the digital loopback mode. The loopback is controlled by either a manual switch or by the DTE interface for V.35 and RS-530. A front panel switch generates an internal 511 bit pseudo random test pattern, according to ITU-T, for direct end-to-end integrity testing. The Err indicator flashes for each bit error detected.

Features

- Includes many types of user-replaceable data channel modules
- Multiple clock source selection
- Support user-selectable transmission rates
- V.54 diagnostic capabilities for performing local loopback and remote digital loopback.

Ordering Info

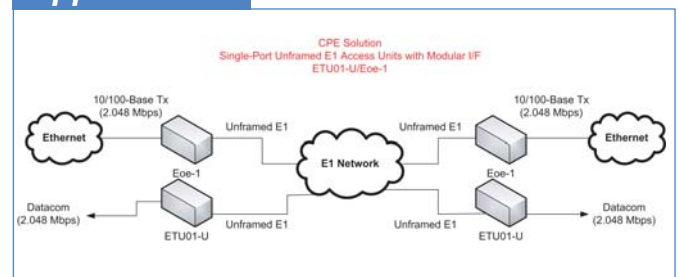
ETU01-U Unframed E1, no dataport	
ETU01-U/AC	AC type, no data port
ETU01-U/DC	DC type, no data port

Optional Interface Modules	
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-530 interface module plus RS-449 cable adapter
ETU/TTU-G64K-CO	G.703/64K Co-directional I/F
ETU/TTU-NRZ	NRZ/BNC interface module
ETU/TTU-ET100	10/100Base-T Ethernet Bridge
ETU/TTU-ET100R	10/100Base-T Ethernet Router

Specifications

Clock modes	Clock mode 0 (DCE1)	Receive and transmit clock (recovered) to the synchronous DTE
	Clock mode 1 (DCE2)	Receive and transmit clock (internal oscillator) to the synchronous DTE
	Clock mode 2 (DTE1)	Receive clock to the synchronous, and transmit clock from the synchronous device
	Clock mode 3 (DTE2)	Receive and transmit clock from the Synchronous DCE (from ETC and ERC pin)
	Clock mode 4 (DTE3)	Receive and transmit clock from the Synchronous DCE (all from ETC pin)
Data rate	2048Kbps (clear channel)	
Power	AC	90 — 250 VAC
	DC	18 — 36V, 36 — 72V
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
LEDs	PWR, TD, RD, RTS, DCD, signal loss, alarm	
Dimensions(WxDxH)	195mm x 255mm x 45mm	
Weight	1.5kg	
Test Switch/ Diagnostics	Digital local loopback	
	Analog local loopback	
	Digital remote loopback	
	Test pattern	
Compliance	CE, FCC part 15 class A, ITU-T G.703, G.706 and G.732.	
MTBF	TBA	

Application



E1 NTU Series ETU01-A



Single-Port, Modular, Fractional E1 Access Unit

The ETU01-A provides our best digital access solution for E1 and Fractional E1 network services. A DTE device may be linked to an ETU01-A at data rates of 56Kbps to 2048Kbps. The ETU01-A features user replaceable dataport modules for a number of interface standards; including V.35, X.21, RS-530, RS-449, and RS-232. The ETU01-A supports local control and diagnostics via LCD display, keypad and LED status indicators located on the front panel as well as via an 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 ETU01-A provides optional SNMP (Simple Network Management Protocol), which allow the user to remotely control, diagnose and monitor the system using industry standard SNMP protocol, our proprietary MIB-11, and any network management software.

Features

- Terminate E1/ Fractional E1 service
- In-band Control
- Integrates high speed data and E1 link with an intelligent E1/ Fractional E1 Access Unit.
- IDLE Code:00-FF by user setting
- Selectable data rates: Nx64Kbps, Nx56Kbps (N=1~32)
- Setup and Control via front Panel with LCD display or ASCII terminal
- SNMP enabled device (optional)

Specifications

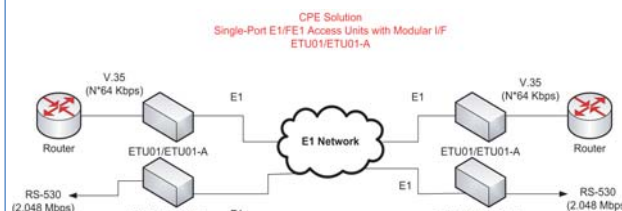
Local Control	16 x 2 character LCD with backlight
Loopback	Line loopback; Payload loopback; Local loopback; DTE loopback; remote loopback
BERT Test patterns	511, 2047, 2e15-1, 2e20-1, QRSS, 2e23-1, All 1, All 0, Alt, 0011, 3 in 24, 1 in 16, 1 in 8, 1 in 4 test patterns
Data rate	Selectable N*64Kbps, N*56Kbps (N=1~32)
Modular Interface	V.35, RS-530, X.21, RS-449, RS-232, G.703 64 codirectional, 10/100Base-T Ethernet, and NRZ/BNC
Power	AC 90 — 250 VAC
	DC 18 — 36V, 36 — 72V
Environment	Temperature 0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity 0 — 90% non condensing
Power Consumption	10W
LEDs	PWR, Sig Loss, SYNC Loss, Alarm, TD, RD, Error, Test
Dimensions(WxDxH)	195mm x 255mm x 45mm
Weight	1.5kg
Test Switch/ Diagnostics	Digital local loopback
	Analog local loopback
	Digital remote loopback Test pattern
Compliance	CE, FCC part 15 class A, ITU-T G.703, G.704, G.706 and G.732.

Ordering Info

Optional Interface Modules	
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-530 interface module plus RS-449 cable adapter
ETU/TTU-232	RS-232 interface module (128Kbps Max)
ETU/TTU-G64K-CO	G.703/64K Co-directional I/F
ETU/TTU-NRZ	NRZ/BNC interface module
ETU/TTU-ET100	10/100Base-T Ethernet Bridge
ETU/TTU-ET100R	10/100Base-T Ethernet Router

ETU01-A/AC	ETU01 & universal AC power supply
ETU01-A/DC	ETU01 & DC power supply
ETU01-A-SNMP	Optional SNMP card (installs at special slot)

Application



E1 NTU Series ETU01-C



Two-Ports, Fractional E1 Access Unit w/ E1 Sub-Link

The ETU01-C provides an economic multiplexing solution for Fractional E1 network services. Two DTE devices may be linked to the ETU01-C at data rates of 64Kbps to 2048Kbps. The ETU01-C also provides one E1 sub-link which may perform Drop & Insert with user-defined timeslot connections from a PABX or other E1 equipment to E1 network services. The ETU01-C supports local control and diagnostics via front panel LCD and menu pushbuttons or a serial RS-232 console port. This feature enables users to easily configure the unit, execute the in-service diagnostics and monitor the network status. The ETU01-C is available in two different voltage models. Voltage models include AC (100~240VAC) or DC (18~72VDC). The E1 interface is selectable as either unbalanced BNC (75 ohm) or balanced RJ-45 (120 ohm).

Features

- Terminate Fractional E1 service
- Setup and Control via front Panel with LCD display or ASCII terminal
- Built-in BERT testing function
- In-band Control
- IDLE Code:00-FF by user setting
- Integrates high speed data and E1 link with an intelligent E1/ Fractional E1 Access Unit.
- Selectable data rates: Nx64Kbps (N=1~32)
- Supports E1 drop & insert port
- Supports V.35 or RS-530 selectable data interface channel. (Cable Solution for V.35, X.21, or RS-449)
- Supports rack mount option

Specifications

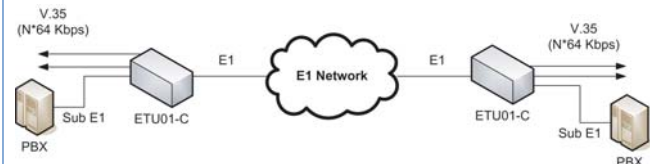
Local control	16 x 2 character LCD with backlight	
Data rate	Selectable Nx64Kbps, Nx56Kbps (N=1~32)	
Fixed cable solution Interface	V.35, RS-530, X.21, RS-449, RS-232, G.703 64 codirectional, 10/100Base-T Ethernet, and NRZ/BNC	
Power	AC	90 — 250 VAC
	DC	18 — 75 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
	Power Consumption	10W
LEDs	PWR, Sig Loss, SYNC Loss, Alarm, TD, RD, Error, Test	
Dimensions(WxDxH)	195mm x 255mm x 45mm	
Weight	1.5kg	
Test Switch/ Diagnostics	Digital local loopback	
	Analog local loopback	
	Digital remote loopback	
	Test pattern	
Compliance	CE, FCC part 15 class A, ITU-T G.703, G.706, G.723, G.823	
MTBF	TBA	

Ordering Info

ETU01-C-AC	ETU01C & AC power supply (with LCD)
ETU01-C-DC	ETU01C & DC power supply (with LCD)

Optional Cables for other I/F	
CAB-DB25MB34F-V35	DB25M to MB34F, DCE, length 1 meter
CAB-DB25MB15F-X21	DB25M to MB15F, DCE, length 1 meter
CAB-DB25DB37F-449	DB25M to MB37F, DCE, length 1 meter

Application



E1 NTU Series ETU01-D



Single-Port Fractional E1 Access Unit

The ETU01-D provides an economic digital access solution for E1 and Fractional E1 network services. A DTE device may be linked to an ETU01-D at data rates of 64Kbps to 2048Kbps. The ETU01-D features a fixed data port for standard interface - V.35. The ETU01-D supports local control and diagnostics via LCD display, keypad and LED status indicators located on the front panel as well as via an 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.

Features

- Terminates E1 fractional E1 service
- In-band Control
- Integrates high speed data and E1 link with an intelligent E1/ Fractional E1 Access Unit.
- IDLE Code: 00-FF by user setting
- Selectable data rates: Nx64Kbps, Nx56Kbps (N=1~32)
- Setup and Control via front Panel with LCD display or ASCII terminal
- SNMP enabled device (optional)*

* to be announced

Ordering Info

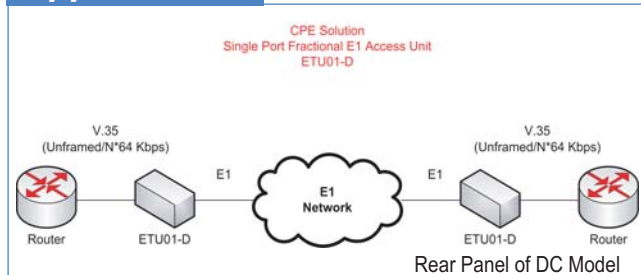
ETU01-D/AC	ETU01-D & universal AC power supply
ETU01-D/DC	ETU01-D & DC power supply



Specifications

Local Control	16 x 2 character LCD with backlight	
Data Rates	N x 64Kbps, Where N equal 1 to 31 in CCS, and N equal to 30 in CAS	
Connector	BNC & RJ-45 (USOC RJ-48C)	
Framing	Unframed/ Framed CCS(PCM31)/ CAS(PCM30)/ CRC4 on/off	
Bit rate	2.048Mbps ±50 ppm	
Line code	AMI/ HDB3	
Line impedance	75 ohm(BNC); 120 ohm(RJ-45)	
Relative receive level	0 to -43dB	
Transmit level	Pulse amplitude	Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm
Zero amplitude	±0.1V	
Loopback	Line loopback; Payload loopback Local loopback; DTE loopback	
Transmit frequency tracking	Internal timing ±30 ppm Loopback timing ±50 ppm External timing ±100 ppm	
Jitter performance	According to ITU-T G.823	
BERT Test patterns	2047, 2e15-1, QRSS	
Power	AC	90 — 250 VAC
	DC	36 — 75 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
LEDs	PWR, Signal Loss, SYNC Loss, Alarm, TD, RD, Error, Test	
Dimensions(WxDxH)	195mm x 255mm x 45mm	
Weight	1.5kg	
Surge Protection	DC Sparkover Voltage: 230±20%	
Compliance	ITU-T G.703, G.704, G.706 and G.732 and ETSI ETS 300 420	
MTBF	TBA	

Application



E1 Access Series ETU02-MUX



Fractional E1 2-Port/ 4-Port Multiplexer with sub E1

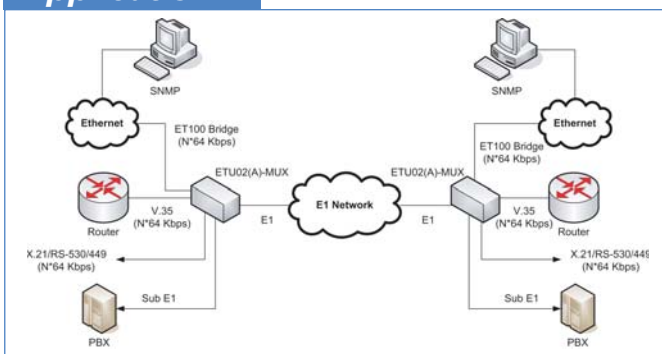
These units provide multiplexing solution for Fractional E1 network services. Up to four DTE devices may be linked to this model at data rates of 56Kbps to 2048Kbps. There is also provision for one optional E1 sub-link which will perform Drop & Insert with user-defined timeslot connections from a PABX or other E1 equipment to E1 network services. The Fractional E1 2 or 4 ports Multiplexer supports local control and diagnostics via an LCD display and LED status indicators located on the front panel or via a serial console port.

These features enable users to easily configure the unit, execute the in-service diagnostics and monitor the network status. The ETU02-MUX provides for optional SNMP Network Management System functions, which allow the user to remotely control and manage the system. These models fully meet all of the E1 specifications including ITU-T G.703, G.704, G.706, G.732, and G.823.

Features

- Terminates E1/ Fractional E1 service
- Integrates high speed data and E1 link with an intelligent fractional E1 access unit
- Supports up to 4 Data channels
- Modular interface design for other I/F solutions
- Optional E1 drop & insert port
- Setup and Control via front Panel with LCD display or RS-232 terminal
- SNMP enabled device (optional)
- Supports rack mounting option

Application



Ordering Info

Modules	
ETU02-SNMP	Optional SNMP card (installs in special slot)
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-530 interface module plus RS-449 cable adapter
ETU/TTU-G64K-CO	G.703/64K Co-directional I/F
ETU/TTU-NRZ	NRZ/BNC interface module
ETU/TTU-ET100	10/100Base-T Ethernet Bridge
ETU/TTU-ET100R	10/100Base-T Ethernet Router
E1	Sublink E1 Link Card (module)

Specifications

E1 & Sub-E1 Link		
Framing Framed	CCS(PCM31)/ CAS(PCM30)/ CRC4 on/ off	
Bit rate	2.048Mbps ±50 ppm	
Line code	AMI/ HDB3	
Line impedance	75 ohm(BNC)/ 120 ohm(DB-15)	
Relative receive level	0 to -43dB	
Transmit level		
Pulse amplitude	Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm	
Zero amplitude	±0.1V	
Transmit frequency tracking	Internal timing ±100 ppm Loopback timing ±100 ppm External timing ±100 ppm	
Jitter performance	According to ITU-T G.823	
Interface connectors	15-pin, D-type female, BNC	
User Data Channel		
Data Rate	N x 56Kbps or N x 64Kbps, Where N equal 1 to 31 in CCS, And N equal 1 to 30 in CAS	
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	
BERT Test patterns	511, 2047, 2e15-1, 2e20-1, QRSS, 2e23-1, All 1, All 0, Alt, 0011, 3 in 24, 1 in 16, 1 in 8, 1 in 4 test patterns	
Clock modes		
Clock mode 0 (DCE1)	Receive and transmit clock (recovered) to the synchronous DTE	
Clock mode 0 (DCE2)	Receive and transmit clock (internal oscillator) to the synchronous DTE	
Clock mode 0 (DCE3)	Receive and transmit clock from the Synchronous DCE (from ETC and ERC pin)	
Clock mode 0 (DCE4)	Receive and transmit clock from the Synchronous DCE (all from ETC pin)	
General Specification		
LEDs	Alarm LED Sync Loss, Signal Loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test.	
Power	AC 90 — 250VAC	
Environment	Temperature	0 — 60°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	20W	
Dimensions(WxDxH)	430mm x 235mm x 45mm	
Weight	2.9kg	
Surge Protection	DC Sparkover Voltage: 230 ±10% Impulse	
Compliance	CE, FCC part 15 Class A, ITU G.703, G.704, G.706, G.732, G.823	

E1 Access Series ETU02A-MUX

Fractional E1 2-Port/ 4-Port Multiplexer

The ETU02A-MUX provides an economic multiplexing solution for Fractional E1 network services. Up to four DTE devices may be linked to an ETU02A-MUX at data rates of 56Kbps to 2048Kbps. The ETU02A-MUX supports local control and diagnostics via an RS-232 console port connected to a standard serial terminal. This feature enables users to easily configure the unit, execute the in-service diagnostics and monitor the network status.



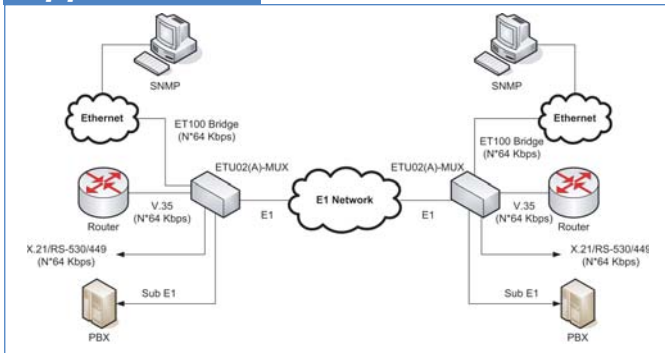
Features

- Terminates Fractional E1 Service
- Data Interface: Fixed DB25F (RS-530/232) utilizing hardware and software configuration and cable solution for V.35, RS-530, RS-449 and X.21
- Integrates high speed data and E1 link with an intelligent E1/ Fractional E1Access Unit
- Optional Sub-E1 interface module
- Setup and Control via DB9F, RS-232 terminal port
- Supports either two or four Data channels
- Supports rack mounting option

Specifications

E1 & Sub-E1 Link	
Framing Framed	CCS(PCM31) / CAS(PCM30) / CRC4 on/off
Bit rate	2.048Mbps ±50 ppm
Line code	AMI/ HDB3
Line impedance	75 ohm(BNC)/ 120 ohm(DB-15)
Relative receive level	0 to -43dB
Transmit level	
Pulse amplitude	Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm
Zero amplitude	±0.1V
Transmit frequency tracking	Internal timing ±100 ppm Loopback timing ±100 ppm External timing ±100 ppm
Jitter performance	According to ITU-T G.823
Return loss	12dB for 51~102KHz 18dB for 102~2048KHz 14dB for 2048~3072KHz
Interface connectors	15-pin, D-type female, BNC
User Data Channel	
Data Rate	N x 56Kbps or N x 64Kbps, Where N equal 1 to 31in CCS, And N equal 1 to 30 in CAS
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
BERT Test patterns	511, 2047, 2e15-1, 2e20-1, QRSS, 2e23-1, All 1, All 0, Alt, 0011, 3 in 24, 1 in 16, 1 in 8, 1 in 4 test patterns
Clock modes	
Clock mode 0 (DCE1)	Receive and transmit clock (recovered) to the synchronous DTE
Clock mode 0 (DCE2)	Receive and transmit clock (internal oscillator) to the synchronous DTE
Clock mode 0 (DCE3)	Receive and transmit clock from the Synchronous DCE (from ETC and ERC pin)
Clock mode 0 (DCE4)	Receive and transmit clock from the Synchronous DCE (all from ETC pin)
General Specification	
LED	Alarm LED Sync Loss, Signal Loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test.
Power	AC 90 — 250VAC DC 18 — 72VDC
Environment	Temperature 0 — 60°C (Operating); 0 — 70°C (Storage) Humidity 0 — 90% non condensing
Power Consumption	10W
Dimensions(WxDxH)	430mm x 235mm x 45mm
Weight	2.9kg
Surge Protection	DC Sparkover Voltage: 230±0% Impulse
Compliance	CE, FCC part 15 class A, ITU G.703, G.704, G.706, G.732, G.823

Application



Ordering Info

ETU02A-MUX.	X/	XX
	2	AC
	4	DC

Optional Interface cables	
E1	Sublink E1 Link Card (module)
CAB-DB25DB25F	RS-530 (RS-232)Extension cable
CAB-DB25MB34F	V.35 adapter cable (female)
CAB-DB25DB15F	X.21 adapter cable (female)
CAB-DB25DB37F	RS-449 adapter cable (female)

E1 Access Series ETU04



4E1 Inverse Multiplexer

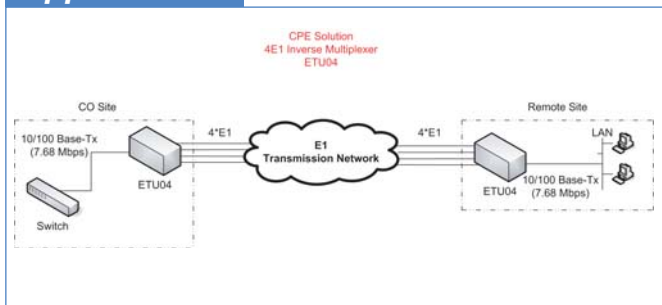
The ETU04 is an inverse E1 multiplexer that will multi-link up to 4 E1 lines and offers simple, cost-effective connection between E1 service and 10/100BaseT LANs. The ETU04 inverse multiplexer transmits a 7.68Mbps Ethernet bridge channel over 4 E1 links. The ETU04 bridges the gap between E1 and E3, allowing bridges to operate at faster rates. It also provides high speed access to SDH/SONET backbones where the only access service available is E1 lines. The ETU04 supports 4*2.048Kbps G.703 E1 lines, 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 ETU04 fully meets E1 specifications including ITU-T G.703 and G.823. The ETU04 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the ETU04 and the line in the digital loopback mode. The Ethernet interface supports auto-negotiation, allowing plug-and-play Ethernet connection without any additional configuration.

Features

- Ethernet over 4 E1
- Allows maximum of 8ms delay variance between E1 links, the system will automatically shut-down a link when the delay value is over-range
- Built-in bridge operating at Fast Ethernet rates
- Provides alarm indication output
- Supports data rates from 1.92Mbps to 7.68Mbps
- Unbalanced E1 I/F (BNC) complies with ITU-T G.703, G.704, and G.823 Balun available for balanced E1
- Link compatible with ERM04

Application



Specifications

E1 interface		
Frame format	Unframed (Transparent)	
Bit rate	2.048Mbps ±50ppm (up to 4 E1s)	
Line Code	Line code HDB3	
Receive sensitivity level	-43dB	
Line Impedance	Unbalanced 75 Ohms ±5%	
Jitter Performance	Complies with ITU-T G.823	
Pulse amplitude	Nominal 2.37V ±10%	
Delay Variance	8 ms (maximum)	
Connector	BNC pairs	
Ethernet Interface		
Data Rate	10/ 100Mbps; Half Duplex 20/ 200Mbps; Full duplex	
Throughput	1E1 channel 320 frame/sec 2E1 channels 632 frame/sec 3E1s channel 942 frame/sec 4E1 channels 1262 frame/sec	
Automatic aging duration	5 — 10 minutes	
MAC address	1024	
Delay	1 frame	
Connector	Shielded RJ-45	
General Specification		
Standard	IEEE 802.3U	
Power	AC	90 — 250VAC
	DC	-48 (-40 — -57VDC)
Environment	Temperature	0 — 50°C (Operating);
		0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
LEDs	PWR, LOS(A~D), LOF(A~D), CRC, TMO, LINK, TX, RX, LOOP	
Dimensions(WxDxH)	195mm x 235mm x 45mm	
Weight	1.5kg	
Surge Protection	DC Sparkover Voltage: 230±0% Impulse	
Compliance	ITU G.703, G.704, G.706, G.732, G.823	
MTBF	TBA	

Ordering Info

ETU04-AC	4 E1 lines to 10/100Mbps with AC power input
ETU04-DC	4 E1 lines to 10/100Mbps with DC power input

E1 Access Series ETU05



16/ 30 channels E1 Voice Multiplexer

The physical representation of the ETU05-16/30 voice multiplexing device is shown in the picture on the right. Utilizing advanced digital time-division multiplexing technology, a single ETU05-16/30 voice multiplexing device can connect up to 30 external user lines with one E1 channel in a 1U standard case. The unit can be cascaded to increase user capacity and realize seamless and smooth expansion. The device has call/in and call/out bidirectional communication functions, user circuitry inverse cost counter function and provides a data interface that can connect with a user data interface (V.35 or R350) for

comprehensive access of voice and data. The E1 interface complied with ISDN PRI standard, D channel signaling interface with ISDN Q921/Q931 30B+D subset (Corresponds with GBYDN 034.1-034.4). This device has self-diagnostics and a remote maintenance function that can perform centralized remote surveillance, alarm, configuration, management and maintenance of all online ETU05-16/30 voice multiplexing devices.

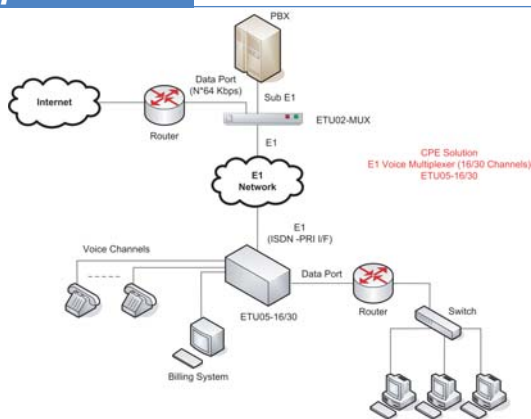
Features

- PBX line extender over E1, ISDN PRI
- This device corresponds with ISDN user-network interface regulation established by the original Ministry of Post and Telecommunication:
YDN 034.1-1997/YDN 034.2-1997/YDN 034.3-1997/YDN 034.4-1997
- This device complies with the following related industrial standards for telephony exchanger network access examination of public telephony network:
GB3378 (Telephony autoexchange network user signal mode)
GB3380 (Telephony auto exchange network bell stream and signal tone)
GB6879 (Technical specification of 2048KBIT/S 30 circuit impulse code modular multiplex device)
GB/T5444 (User signal technical indices test method of telephony auto exchange network)

Specifications

E1 interface		
Frame format	CCS(PCM31)	
Bit rate	2.048Mbps	
Line Code	HDB3	
Receiving level	-20/ -43dB	
Line Impedance	Unbalanced 75 Ohms ± 5%	
Jitter Performance	Complies with ITU-T G.823	
Recovery clock	From E1 circuit receive signal	
Internal clock	2.048Mbps ±50ppm	
User Line Interface		
Line Impedance	600 Ohms	
Feedback current	25mA	
Exterior line length	> 4Kms	
Bell stream parameter	Effective value 90V, 25Hz	
Data Port Interface		
Interface type	V.35, RS-530	
Interface rate	N x 64Kbps	
General Specification		
Case	1U 19 inch standard case	
Power	AC	90 — 250 VAC
	DC	-48 (-40 — -57)VDC
Environment	Temperature	0 — 40°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
LEDs	PWR, Alarm, Work	
Dimensions(WxDxH)	440mm x 380mm x 45mm	
Weight	2.5kg	
Surge Protection	DC Sparkover Voltage: 230±0% Impulse	
Compliance	ITU G.703, G.704, G.706, G.732, G.823	

Application



Ordering Info

ETU-05-16-AC	AC model, up to 16 channels voice multiplexing, with Dataport module
ETU-05-16-DC	DC model, up to 16 channels voice multiplexing, with Dataport module
ETU-05-30-AC	AC model, up to 30 channels voice multiplexing, with Dataport module
ETU-05-30-DC	DC model, up to 30 channels voice multiplexing, with Dataport module

Optional Interface cables	
CAB-DB25DB25M	RS-530 (RS-232)Extension cable (Male)
CAB-DB25DB25F	RS-530 (RS-232)Extension cable (Female)
CAB-DB25MB34M	V.35 adapter cable (Male)
CAB-DB25MB34F	V.35 adapter cable (Female)
CAB-DB25DB15M	X.21 adapter cable (Male)
CAB-DB25DB15F	X.21 adapter cable (Female)
CAB-DB25DB37M	RS-449 adapter cable (Male)
CAB-DB25DB37F	RS-449 adapter cable (Female)

E1 Access Series ETU-DXC



E1 Digital Cross Connect Access Unit

The ETU-DXC Digital Cross Connect offers two models, the ETU-DXC/8 and the ETU-DXC/16. These units provide 8 or 16 E1 circuits (inputs and outputs) respectively. Within the E1 circuits, non-blocking, fully transparent cross-connects between 64Kbps timeslots can be efficiently implemented. This equipment may be used as a core building block in a digital data network based upon multiple E1 lines. When combined with Time Division Multiplexing (TDM) equipment such as the ETU02-MUX or ERM-MUX/PLUS, the main functions of a DDN network may be performed. This equipment does not support signaling and is therefore not applicable for voice applications.

Features

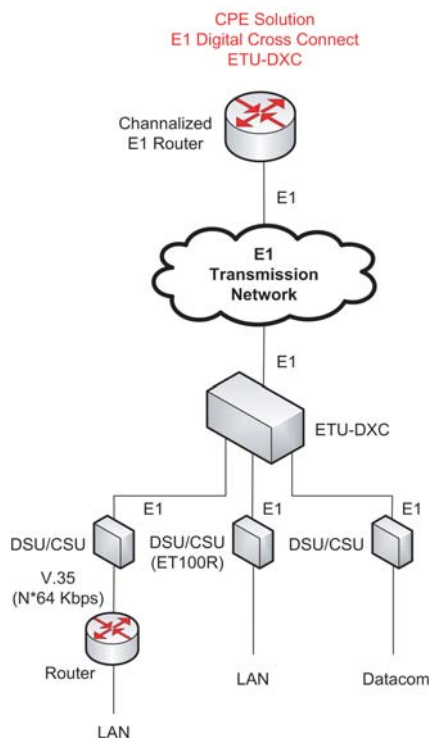
- 8 or 16 E1 ports depend on model.
- 19", 1U Standard, Standalone or rack mountable
- Balanced E1 (120ohm) or unbalanced E1(75ohm) switchable
- Complies with all ITU-T specifications
- E1 point-to-point 64Kbps transparent cross connect
- Provides user friendly interface NMP function
- System clock recovered from any E1 or from internal oscillator
- SNMP enabled device (optional)*

* to be announced

Specifications

Frame format	Unframed/ Framed CCS(PCM31)/ CAS(PCM30) CRC4 On/ Off	
Bit rate	2.048Mbps±50 ppm	
Line Code	AMI/ HDB3	
Receiving level	-20 / -43dB	
Line Impedance	75 ohm, unbalanced (BNC) 120 ohm, balanced (RJ-45) or High impedance	
Jitter Performance	According to ITU-T G.823	
Pulse amplitude	Nominal 2.37V ±10% for 75ohm Nominal 3.00V 10% for 120ohm	
Connector	DB25(adapter cable for 4xE1)	
Management	NMP management system	
Diagnostics	Local digital, local analog, remote loopback	
E1 system Tx clock source	Recovery	Recovery from any one E1 Rx signal
	Internal	2.048MHz ±50ppm
Power	AC	90 — 250VAC
	DC	-48 (-40 — -57)VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	20W	
LEDs	Alarm, Activity, Power	
Dimensions(WxDxH)	195mm x 235mm x 45mm	
Weight	2.5kg	
Compliance	ITU-T G.703, G.704, G.823	

Application



Ordering Info

ETU-DXC	XX-	XX
	Ports type	Power type
	8	AC
	16	DC
NMP		
Network Management Protocol software		
Optional Adapter Cable		
CAB-DB25BNCF8-E1	DB25 Male to BNC x 8	
CAB-DB25RJ45M4-E1	DB25 Male to RJ45 x 4	

E1 NTU Series Eoe-1



Single-Port 10/ 100 Base Ethernet Over G.703 Unframed E1 Access Unit

The EOe-1 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, unframed E1 via coaxial cable and BNC connectors or to 120 Ohm balanced, unframed E1 via twisted pairs and a shielded RJ-45 connector. The EOe-1 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 EOe-1 is very easy to configure by using simple DIP switch settings. Both the E1 and Ethernet Bridge configuration settings require only two 8-pole DIP switches. Once configured and set, the EOe-1 requires no further adjustments.

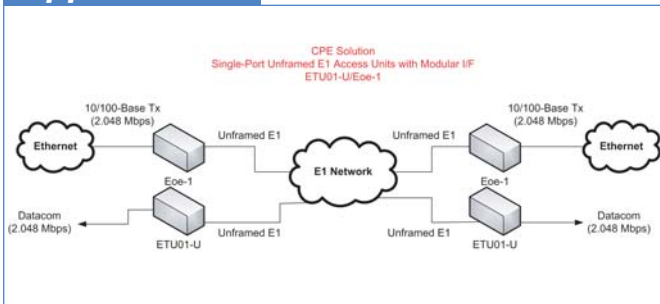
Features

- Terminates Unframed E1 service
- 10BASE-T/100BASE-TX, Full Duplex or Half Duplex
- 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
- Ethernet interface has automatic Twisted Pair polarity correction
- Forwarding and filtering rate at WAN speed with 2.048Mbps throughput latency of 1 frame
- HP Auto-MDI/MDIX detects and corrects crossed cable
- Real-time filtering with 256 address tables
- Up to 340 packet-buffering capacity

Specifications

G.703 E1 Specifications		
Framing	Unframed	
Bit rate	2.048Mbps	
Line code	AMI/ HDB3	
Line Impedance	75 ohm(BNC)/ 120 ohm(DB-15, RJ-45)	
Relative receive level	0 to -43dB	
Transmit level	Pulse amplitude	Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm
	Zero amplitude	±0.1V
	Jitter performance	According to ITU-T G.823
connectors	BNC(unbalanced), RJ-45 (balanced)	
Clock modes	Clock mode 0 (DCE1)	Receive and transmit clock (recovered) to the synchronous DTE
	Clock mode 1 (DCE2)	Receive and transmit clock (internal oscillator) to the synchronous DTE
Control signals	CTS constantly ON, DSR constantly ON,except during test loops DCD constantly ON or follows RTS,except during signal loss	
Test switches/Diagnostics	Digital local loopback, Analog local loopback,Digital remote loopback, Test pattern	
Compliance	ITU-T G.703, G.706 and G.732	
Ethernet Specifications		
Standard	IEEE 802.3/ 802.3u	
Connector	RJ45	
Data Rate	10/100Mbps; Half Duplex 20/200Mbps; Full duplex	
Filtering and Forwarding	90,000 packets/sec	
Delay	1 frame	
Frame Buffer	340 frames	
MAC Table	256 MAC address	
General Specifications		
Connector	RJ45	
Speeds	10BASE-T/100BASE-TX, Full or Half Duplex	
Protocol	Synchronous HDLC	
Power	AC	90 — 250 VAC
	DC	18 — 72 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	10 — 90% non condensing
Power Consumption	20W	
LEDs	PWR, Signal Loss, Alarm, Link, TD, RD, 100, Full, Error, Error, Test	
Dimensions(WxDxH)	195mm x 250mm x 45mm	
Weight	1.5kg	

Application



Ordering Info

EOe-1/AC	AC power input (90 — 250VAC)
EOe-1/DC	DC power input (18 — 72VDC)

E1 Access Series ERM01



E1 and Fractional E1 Concentrator

The ERM01 series is a rack type E1 DSU/CSU for unframed E1 and Fractional E1 Digital Access which is nested in a hub to provide solution for central office installations. There are 13 slots available for G.703 E1 cards for installation into the ERM01 RACK. An optional SNMP card can be installed into the last slot for configuration and management, leaving 12 slots available for line cards. The SNMP card provides both local control via an RS-232 Craft port and remote management using industry standard SNMP protocol via an Ethernet 10/100BASE-TX connection. A window(r) based GUI software is available to aid in configuring the chassis in a graphical environment.

Each E1 card may be linked to a remote E1/FE1 standalone Access Unit for various LAN, Video Conference, or Hosts over E1 network services. The ERM01 accommodates a redundant power supply as optional equipment, which may derive power from AC (90-250) or DC (-48V) power sources. On the rear panel, BNC, RJ-45 and Terminal Blocks are utilized for E1 Line interface connectors. Adapter cables are used to convert the DB26F DCE data ports to V.35, RS-530, X.21 or 10/100 Base Ethernet.

Features

- Terminates E1/ Fractional E1 service
- Hot swappable line cards
- Both unframed and Fractional E1 types
- Datacom, Ethernet Bridge or Router
- All connection on rear panel
- SNMP enabled device
- Supported by CTC's EMS

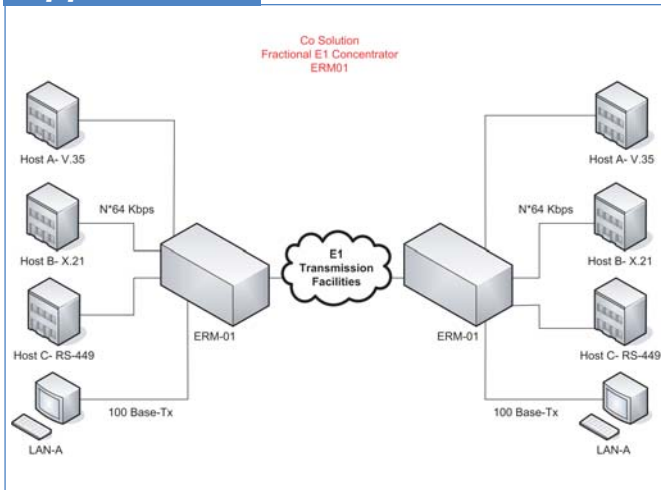
Specifications

E1 & Sub-E1 Link	
Frame format	Unframed/ Framed CCS(PCM31)/ CAS(PCM30)/ CRC4 on/off
Bit rate	2.048Mbps ±50 ppm
Line Code	AMI/ HDB3
Receiving level	0 to -43dB
Line Impedance	75 ohm(BNC)/ 120 ohm(Molex, 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 5 Pin Wire 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
Compliance	ITU-T G.703, G.704, G.706 and G.732 and ETSI ETS 300 420

User Data Channel Specification									
Interface types	RS-530/ RS-449/ RS-232 X.21/ V.35 10/100Base-TX Ethernet Bridge 10/100Base-TX Ethernet Router								
Connector	High density DB26 Female								
Line code	NRZ (except bridge and router)								
Data Rate	N x 56Kbps or N x 64Kbps, Where N equals 1 to 32								
Time slot allocation	User defined; E1-U is unframed only								
Control signals	CTS constantly ON DSR constantly ON, except during test loops DCD constantly ON or follows RTS, except during signal loss								
Alarm LED	Sync Loss, Signal Loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test.								
Loopback	Local analog loopback; Digital loopback; remote loopback								
Clock modes	<table border="1"> <tr> <td>Clock mode 0 (DCE1)</td> <td>Rx & Tx clocks (recovered) to the sync. DTE</td> </tr> <tr> <td>Clock mode 1 (DCE2)</td> <td>Rx & Tx clocks (internal oscillator) to the sync. DTE Clock mode 2 (DTE1) Rx clock to the sync. Device, Tx clock from the sync. Device</td> </tr> <tr> <td>Clock mode 3 (DTE2)</td> <td>Rx & Tx clocks from the sync. DCE (from ETC and ERC pin)</td> </tr> <tr> <td>Clock mode 4 (DTE3)</td> <td>Rx & Tx clocks from the sync. DCE (all from ETC pin)</td> </tr> </table>	Clock mode 0 (DCE1)	Rx & Tx clocks (recovered) to the sync. DTE	Clock mode 1 (DCE2)	Rx & Tx clocks (internal oscillator) to the sync. DTE Clock mode 2 (DTE1) Rx clock to the sync. Device, Tx clock from the sync. Device	Clock mode 3 (DTE2)	Rx & Tx clocks from the sync. DCE (from ETC and ERC pin)	Clock mode 4 (DTE3)	Rx & Tx clocks from the sync. DCE (all from ETC pin)
Clock mode 0 (DCE1)	Rx & Tx clocks (recovered) to the sync. DTE								
Clock mode 1 (DCE2)	Rx & Tx clocks (internal oscillator) to the sync. DTE Clock mode 2 (DTE1) Rx clock to the sync. Device, Tx clock from the sync. Device								
Clock mode 3 (DTE2)	Rx & Tx clocks from the sync. DCE (from ETC and ERC pin)								
Clock mode 4 (DTE3)	Rx & Tx clocks from the sync. DCE (all from ETC pin)								

General Specification		
Console port	RS-232, DB9F: 19200, 8, N, 1	
Power	AC	90 — 250VAC
	DC	-42 — -55VDC, 50 — 60Hz
Environment	Temperature	0 — 60°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	80W	
LEDs	Syns Loss, Signal Loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test	
Dimensions(WxDxH)	285mm x 438mm x 180mm	
Weight	6.6Kg (Chassis +1 power card)250g (Per line card)	

Application



Ordering Info



ERM01-SNMP

Optional Networking Management Module

ERM01-SNMP	SNMP plug-in card with both interfaces: RS-232 and 10/100 Base-TX, windows GUI software, proprietary MIB-II file
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ERM01-ET100R

ERM01-SERIAL

Card for ERM01 (without optical adapter cables)

ERM01-V35	LTU card: FE1 to V.35
ERM01-ET100	LTU card: FE1 to 10/100 Base-TX Bridge
ERM01-ET100R	LTU card: FE1 to 10/100 Base-TX Router
ERM01-SERIAL	LTU card: FE1 to Serial: RS-530/ RS-499/ X.21
ERM01-V35-U	LTU card: Unframed E1 to V.35
ERM01-ET100-U	LTU card: Unframed 10/100 Base-TX Bridge
ERM01-ET10R-U	LTU card: Unframed E1 to 10/100 Base-TX Router
ERM01-SERIAL-U	LTU card: Unframed E1 to Serial: RS-530/ RS-499/ X.21 (with selected cable)

Master Unit: Rack Mount ERM01 Chassis

ERM01/AC-CH	19 inch, 4U rack mount chassis for AC
ERM01/DC-CH	19 inch, 4U rack mount chassis for DC

Power Module for ERM01

RM01/AC	AC power plug-in module
RM01/DC	DC-48V power plug-in module

Cable (Not-included items)

CAB-HD26MB34M-V35	V.35 adapter cable: HD26 male to MB34 male, 2 meter
CAB-HD26MB34F-V35	V.35 adapter cable: HD26 male to MB34 female, 2 meter
CAB-HD26RJ45F-ET10	Ethernet adapter: HD26 male to RJ-45 female
CAB-HD26DB15M-X21	X.21 adapter cable: HD26 male to DB15 male, 2 meter
CAB-HD26DB15F-X21	X.21 adapter cable: HD26 male to DB15 female, 2 meter
CAB-HD26DB37M-449	RS-449 adapter cable: HD26 male to DB37 male, 2 meter
CAB-HD26DB37F-449	RS-449 adapter cable: HD26 male to DB37 female, 2 meter
CAB-HD26DB25M-530	RS-530 adapter cable: HD26 male to DB25 male, 2 meter
CAB-HD26DB25F-530	RS-530 adapter cable: HD26 male to DB25 female, 2 meter

E1 Access Series ERM-MUX/PLUS-LD

Multi-Service E1 Multiplexer



The ERM-MUX/PLUS-LD is a Rack Type E1 CSU/DSU Time Division Multiplexer for Fractional E1 network access which is designed for non-stop operation and provides an economic solution for central site installations. There are 10 slots available for hot-swappable ERM-MUX/PLUS-LD-I/O cards for installation into the ERM-MUX/PLUS-LD Rack. Two slots are provided for MUX-E1 cards, which may be configured as four separate E1 links or for redundant 2+2 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 stand by in case of primary card failure. Each MUX-E1 card may be linked to another ERM-MUX/PLUS-LD Rack to provide a variety of Datacom & Voice over E1 network services.

The ERM-MUX/PLUS-LD 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 ERM-MUX/PLUS-LD 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. Optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to RS-232 or HP68F DCE port of I/O card to V.35, RS-232, RS-530, RS-449, RS-422, X.21 and X.50. When cards are inserted in slots, LEDs will show the Line status on the front panel.

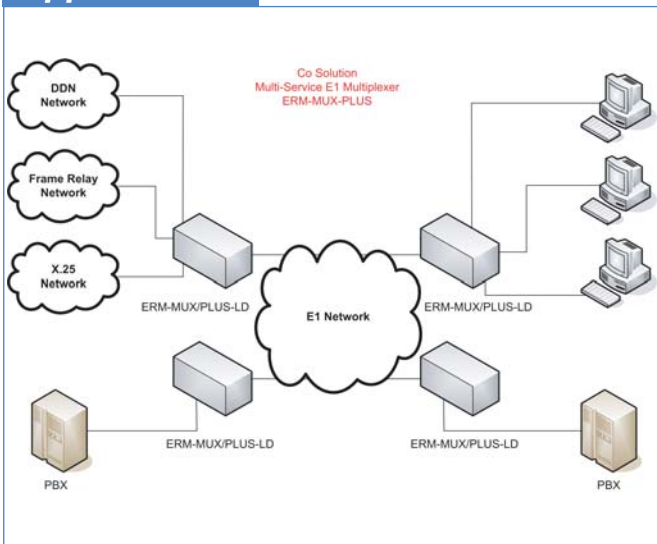
Features

- CPU redundancy (1+1)
- Drop & Insert function
- E1 redundancy (2+2)
- Datacom (V.35, RS-530, X.21), G.703/64 co-directional, Ethernet, DXO, FXS, KXS, E&M, LD
- NMP, SNMP and Web based management
- Power redundancy (1+1) [AC+AC, DC+DC, AC+DC]

Specifications

General Specification		
Power	AC	90 — 250VAC
	DC	-48VDC
Environment	Temperature	0 — 60°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
Dimensions(WxDxH)	350mm x 438mm x 176mm	
Weight	8kg (Chassis + dual power card + 8 I/O cards) 450g (per line card)	
Compliance	ITU-G.703, G.704, G.706, G.732, and G.823	

Application



Other Datacom I/O

Specifications

N x 64 Module, 4 channels, High Speed Data Interfaces	
Interfaces types	RS-530, X.21, V.35, RS-449 and RS-232
Connector	HD68 Female with appropriate cable adapter
Line code	NRZ
Data rate	N x 64kbps, where N equal 1 to 31 in CCS and N equal 1 to 30 in CAS
Async Module, 6 channels, <= 38.4kbps Async or 6 channels, 64/128kbps Sync	
Interfaces types	RS-232(V.24)
Connector	HD62 Female with appropriate cable adapter
Line code	NRZ
Data rate	<=38.4kbps x 6ch or 64/128kbps x 6 channels
G.703/64K Co-directional Module, 4 channels, Co-directional 64K	
Interfaces types	G.703/64K Co-directional
Connector	RJ-45 x 4
Line code	ITU-T G.703/64K, Co-directional
Data rate	64Kbps ±100ppm x 4 channels
Line impedance	120 ohm (balanced)
Frame mode	Unframed only
X.50 Module, 5 channels, <=19.2kbps, supports Async or Sync	
Interfaces types	RS-232(V.24)
Connector	High density DB62 connector, Female(DCE) with appropriate cable
Line code	NRZ
Data rate	From 2.4k — 19.2kbps x 5ch
Loopback type	Local loopback; Remote loopback

G.703 E1 I/O



Features

- 1+1 E1 protection or 2-E1 mode
- Hot-Swappable card
- 2 + 2 protection when 2 cards installed
- Unbalanced BNC or balanced RJ-45

Specifications - 1+1 E1 Line Card

Connectors	BNC for unbalanced; RJ45 Connector for balanced	
Framing	Unframed/Framed; CCS(PCM31)/ CAS(DCM30)	
Bit rate	2.048Mbps ±50 ppm	
Line code	AMI/ HDB3	
Line impedance	75 ohm, unbalanced (BNC) 120 ohm, balanced (RJ-45)	
Relative receive level	I O/ -43dB	
Transmit level	Pulse amplitude	Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm
	Zero amplitude	±0.1V
Transmit frequency tracking	Internal timing ±30 ppm Loopback timing ±50 ppm External timing ±100 ppm	
Jitter performance	According to ITU-T G.823	
Compliance	ITU-T G.703, G.704, G.706 and G.732	

Ethernet I/O

Features

- Auto padding of undersized packets to meet the minimum Ethernet packet size requirement
- Automatic address learning, aging and deletion after 5 minutes
- Bridge module - 2 channels
- Buffering modes can be selected according to the setting of WAN and LAN line speeds
- Ethernet interface has automatic Twisted Pair polarity correction LAN
- Forwarding and filtering rate at wire speed with through put latency of 1 frame
- Real-time filtering with 256 address tables
- Up to 340 packet-buffering capacity

Specifications - 2 ch Ethernet Bridge

LAN	
Standard	Fully compliant with IEEE 802.3/ 802.3u
Connector	RJ45
Speeds	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	
Protocol	Synchronous HDLC
Rates	n x 64(56) Kbps, up to 2048Kbps

Sub-E1 I/O

Features

- Each card provides two E1 loops, each loop provides E1A/E1B channel independently
- Hot-Swappable
- Each first E1 loop may provide external clock to be used as system clock source

Specifications - 2 ch Sub E1 Card

Connectors	BNC for unbalanced; RJ45 Connector for balanced	
Framing	Framed CCS(PCM31) / CAS(PCM30)	
CRC check	CRC4 On/Off	
Bit rate	2.048Mbps ±50 ppm	
Line code	AMI/ HDB3	
Line impedance	75 ohm, unbalanced (BNC) 120 ohm, balanced (RJ-45)	
Relative receive level	0/ -43dB	
Transmit level	Pulse amplitude	Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm
	Zero amplitude	±0.1V
Loopback type	Remote digital loopback	
Jitter performance	According to ITU-T G.823	
Compliance	ITU-T G.703, G.704, G.706 and G.732	

E&M Voice I/O

Features

- BD/GD wires are for battery and ground detection
- E&M card provides 6 independent channels
- E&M interface provides 1 pair of E and 1 pair of M
- E&M wires used in communicating control information
- Each E&M can support Type I, II, III, IV or V
- Each E&M voice channel can independently set Type
- 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 - 6 ch E&M Voice Card

Input level	0 to -16dB, in 0.5dB steps
Output level	0 to -16dB, in 0.5dB steps
Impedance	900 or 600 Ohms; option
Return loss	2Wire 300-600Hz: >12dB 2Wire 600-3400Hz: >15dB 4Wire 300-3400Hz: >20dB
Group delay	2Wire @-10dBm0: <750uSec 4Wire @-10dBm0: <600uSec
Total Distortion	according to ITU-T G.223
Channel Cross-talk	not exceed -65dB, 1020Hz@0dBm
Out-of-band signal attenuation	-25dBm@4.6K-72KHz
Level not to exceed	-50dBm
Noise	<-65dBm0p weighted
Interface Connector	RJ45 x 6

FXO Voice



Features

- FXO card provides 6 independent channels
- Card has one alarm LED and 6 ring indicator LEDs
- Connect directly to PSTN

Specifications - 6 ch FXO Card

Connectors	RJ-45 x 6
On-hook resistance	> 100K ohms
Off-hook resistance	< 300 ohms
Input level	0 to -5dB, adj. in 0.5dB steps
Output level	0 to -7.5dB, adj. in 0.5dB steps
Impedance	600 Ohms
Power	DC voltage >70V DC current >150mA

FXS Voice

Features

- FXS card provides 6 independent channels
- Card has one alarm LED and 6 ring indicator LEDs
- Connects to standard telephones

Specifications - 6 ch FXS Card

Connectors	RJ-45 x 6
Effective ring voltage	AC 75VRMS $\pm 15V$ @25Hz $\pm 3Hz$ sine less than 10% THD
Ring voltage	>AC50VRMS at 300mA load
Loop resistance	<1.8K Ohms; voltage -48VDC including 300 Ohms
Handset current	>18mA
On-hook current	10mA $\pm 3mA$
Loop current range	18-50mA(off-hook)
Surge protection	1000V, 10uSec transient response, decay to 50% in 700uSec 300VRMS for less than 200mSec; no damage to any components 220VRMS for 15 minutes damage only local loop, no fire hazard
Input level	0 to -5dB, adj. in 0.5dB steps
Output level	0 to -7.5dB, adj. in 0.5dB steps
Impedance	900 or 600 Ohms; option
Return loss	300-600Hz: >12dB; 600-3400Hz: >15dB
Group delay	-10dBm0: <750uSec
Total Distortion	According to ITU-T G.223
Channel crosstalk	< -65dB, 1020Hz@0dBm
Out-of-band signal attenuation	-25dBm@4.6K-72KHz; not to exceed -50dBm
Noise	< -65dBm0p weighted

Features

- FXO card provides 6 independent channels
- LD (loop detect) provides 4 independent channels
- Hot swappable card
- Connectors located on face

Specifications

Connectors	RJ-45 x 6
Effective ring voltage	AC 75VRMS ±5V@25Hz ±3Hz sine less than 10% THD
Ring voltage	>AC50VRMS at 300mA load
Surge protection	1000V, 10uSec transient response, decay to 50% in 700uSec 300VRMS for less than 200mSec; no damage to any components 220VRMS for 15 minutes damage only local loop, no fire hazard
Input level	0 to -5dBr, adj. in 0.5dB steps
Output level	0 to -7.5dBr, adj. in 0.5dB steps
Impedance	900 or 600 Ohms; option
Return loss	300-600Hz: >12dB; 600-3400Hz: >15dB
Group delay	@-10dBm0: <750uSec
Total Distortion	According to ITU-T G.223
Channel crosstalk	Not exceed -65dB, 1020Hz@0dBm
Out-of-band signal attenuation	-25dBm@4.6K-72KHz; not to exceed -50dBm
Noise	<-65dBm0p weighted

SNMP

Features

- Able to read and set or modify the configuration at the same time
- The NMS enables the administrator to load the default setting configuration or save setting for later recovery
- Support for Telnet to operate from remote site in terminal mode. TFTP function to upgrade firmware
- Card configuration can be saved for recall later or for use on replacement line cards
- Supports web based management and monitoring functions

EMS

Features

- Management systems design for common case, suitable for huge network
- Vendor specific management systems which is easy to implement vendor specific functions

Ordering Info

Master Unit : Rack Mount ERM-MUX/PLUS Chassis	
ERM-MUX/PLUS-LD/AA-CH	19", 4U rack mount chassis for AC+AC power
ERM-MUX/PLUS-LD/AD-CH	19", 4U rack mount chassis for AC+DC power
ERM-MUX/PLUS-LD/DD-CH	19", 4U rack mount chassis for DC+DC power
Optional SNMP Module for ERM-MUX/PLUS	
ERM-MUX/PLUS-LD/SNMP	SNMP interface module (installs onto the CPU card)
CPU Card	
ERM-MUX/PLUS-LD-CPU	CPU card for NMP management (without SNMP I/F module)
Voice Interface Card	
ERM-MUX/PLUS-LD-FXO	6 channels FXO voice interface card
ERM-MUX/PLUS-LD-FXS	6 channels FXS voice interface card
ERM-MUX/PLUS-LD-E&M	6 channels 2/4 wires E&M voice interface card
ERM-MUX/PLUS-LD-MAGNETO	6 channels MAGNETO interface card
ERM-MUX-PLUS-LD	4 channels loop detect voice card

Low-Speed Interface Card	
ERM-MUX/PLUS-LD-RS-232	6 channels RS-232(V.24) interface card
ERM-MUX/PLUS-LD-G64K	4 channels G.703 64Kbps Co-directional interface card
ERM-MUX/PLUS-LD-X50	5 channels RS-232(V.24) interface card
High-Speed Interface Card	
ERM-MUX/PLUS-LD-HS-SERIAL	4 channels V.35/X.21/RS-449/RS-530 (cable selected) interface card
ERM-MUX/PLUS-LD-ET10/100	2 Channels Ethernet (10/100Base Tx) interface card
Power Module for ERM-MUX/PLUS (Redundant Power Protection Available)	
ERM-MUX/AC	AC power plug-in module (110/220 VAC)
ERM-MUX/ACV	AC power plug-in module with Voice Support
ERM-MUX/DC	DC power plug-in module (±48VDC)
ERM-MUX/DCV	DC power plug-in module with Voice Support
LTU Card	
ERM-MUX/PLUS-LD-E1	2 channels main E1 LTU card: G.703/G.704 (Fractional E1)
ERM-MUX/PLUS-LD-SubE1	2 channels E1A/E1B card: G.703/G.704

E1 Access Series ERM-DXC

E1 Digital Cross Connect Rack Type



The ERM-DXC is a Rack Type E1 Digital Cross Connect for Fractional E1 network access which is nested in a hub and provides an economic solution for central site users. There are 11 slots available for ERM-DXC I/O cards for installation into the ERM-DXC rack. A CPU card is installed into the last slot for configuration and management. The CPU card provides both local control via an RS-232 craft port and remote management using proprietary NMP software. Each MUX-E1 card may be linked to another ERM-DXC Rack to provide the main function of a DDN network. The ERM-DXC 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 power sharing and are hot swappable even during the E1 cards' transmission. The ERM-DXC provides all interface connections on the rear panel. BNC and RJ-45 are used for E1 Line interface connection, while optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to V.35, RS-530, RS-449, RS-232 or X.21. When cards are inserted in slots, LEDs will show the Line status on the front panel. RS-530, RS-449, RS-422, X.21 and X.50. When cards are inserted in slots, LEDs will show the Line status on the front panel.

Features

- All Interface and connectors are on the Rear Panel
- Digital Cross Connect Solution in a Standard 19" Rack
- High density & compact design in a 4U high rack
- Hot Swapping of cards and redundant power supplies supported
- LED Line status display on each card
- Optional Power Source, AC or DC for power supplies
- Standard console port allows terminal to setup and monitor operation locally
- Up to 11 I/O cards may be installed

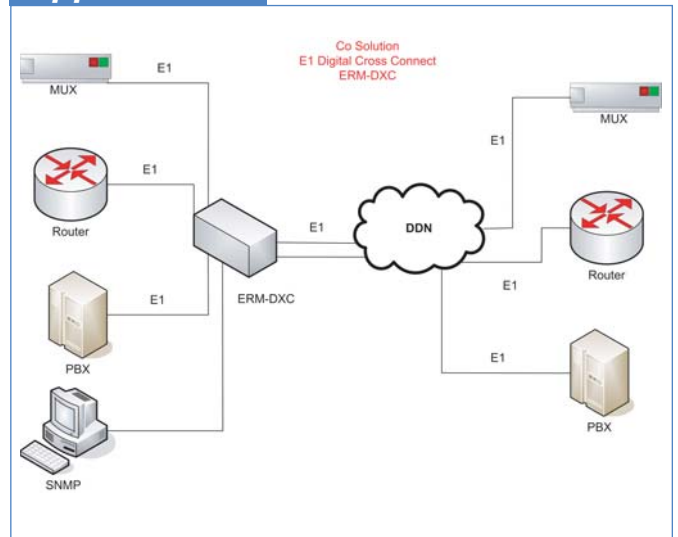
Specifications

Power	AC	90 — 250VAC
	DC	-48VDC
Environment	Temperature	0 — 60°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	80W	
Dimensions(WxDxH)	350mm x 438mm x 176mm	
Weight	8kg (Chassis + dual power card + 8 I/O cards) 450g (per line card)	
Compliance	ITU-G.703, G.704, G.706, G.732, and G.823	

Features - CPU

- Provides the timing systems selection and timing signals
- Provides the control and switching I/O modules parameters and functional conditions
- The core of the 64 lines E1 cross connector
- Hot Swapping of cards and redundant power supplies supported
- With function of Monitor, Cross-Connection

Application



Specifications - 8*E1 Voice I/O

Standard	G.703, G.704
connectors	BNC for unbalanced RJ45 Connector for balanced
Interface connector	High density DB62 Female with appropriate cable adapter
Framing	CCS(PCM31) / CAS(PCM30) CRC4 On/Off
Bit rate	2.048Mbps ±50 ppm
Line code	HDB3
Line impedance	75 ohm / 120ohm switchable via software
Jitter performance	According to ITU-T G.823
Compliance	ITU-T G.703, G.704, G.706 and G.732

Specifications - Ethernet I/O

Standard	IEEE 802.3/ 802.3u	
connector	RJ45	
Speeds	10Base-T/100Base-TX, Full or half duplex	
Frame	Supports 64 to 1522 byte packet length	
Length	Frames for VLAN tagging, etc	
Interface types	Ethernet 10Base-T I/F	
Connector	High density DB62 female with appropriate cable adapter	
Data rate	LAN	10Mbps; half duplex 20Mbps; full duplex
	WAN	N x 64kbps where N=1 to 31 in CCS; N=1 to 30 in CAS

Specifications - 4*E1 Voice I/O

Standard	G.703, G.704
connectors	BNC for unbalanced RJ45 Connector for balanced
Interface connector	High density DB62 Female with appropriate cable adapter
Framing	CCS(PCM31)/ CAS(PCM30) CRC4 On/Off
Bit rate	2.048Mbps ±50 ppm
Line code	HDB3
Line impedance	75 ohm/ 120ohm switchable via software
Jitter performance	According to ITU-T G.823
Compliance	ITU-T G.703, G.704, G.706 and G.732

Specifications - Power

AC	Input 110/ 220 VAC ±15
DC	Input 48VDC (-40 — 57V)

Specifications - Datacom

N x 64 Module, 4 channels, High Speed Data Interfaces	
Interfaces types	RS-530, X.21, V.35, RS-449 and RS-232
Connector	HD68 Female with appropriate cable adapter
Line code	NRZ
Data rate	N x 64kbps, where N equal 1 to 31 in CCS and N equal 1 to 30 in CAS
Async Module, 6 channels, <= 38.4kbps Async or 6 channels, 64/128kbps Sync	
Interfaces types	RS-232(V.24)
Connector	HD62 Female with appropriate cable adapter
Line code	NRZ
Data rate	<=38.4kbps x 6ch or 64/128kbps x 6 channels
G.703/64K Co-directional Module, 4 channels, Co-directional 64K	
Interfaces types	G.703/64K Co-directional
Connector	RJ-45 x 4
Line code	ITU-T G.703/64K, Co-directional
Data rate	64Kbps ±100ppm x 4 channels
Line impedance	120 ohm (balanced)
Frame mode	Unframed only
X.50 Module, 5 channels, <=19.2kbps, supports Async or Sync	
Interfaces types	RS-232(V.24)
Connector	High density DB62 connector, Female(DCE) with appropriate cable
Line code	NRZ
Data rate	From 2.4k — 19.2kbps x 5ch
Loopback type	Local loopback; Remote loopback
64K/128K Module, 3-64K or 3-128K Data Interfaces	
Interfaces types	RS-530, X.21, V.35, RS-449
Connector	High density DB62 female with appropriate cable adapter
Line code	NRZ
Data rate	64kbps x 3ch or 128kbps x 3xh

Ordering Info

Master Unit: Rack Mount ERMDXC Chassis	
ERM-DXC/AC-CH	19 inch, 4U rack mount chassis for AC
ERM-DXC/DC-CH	19 inch, 4U rack mount chassis for DC

Optical I/O card	
ERM-DXC/8E1	8 channels G.703/ G.704(E1) card, n*64K drop and insert
ERM-DXC/DC	4 channels G.703/ G.704(E1) Voice card
ERM-DXC/DC	2 channels Ethernet 10Base-T I/F card

Optional Networking Management Module	
ERM-DXC/ SNMP	SNMP card with both interfaces: RS-232 and 10Base-T

Optional Low-Speed Interface Card	
ERM-DXC-LS-232	4 channels RS-232 (V.24) interface card
ERM-MUX-50	5 channels X.50 interface card

Optional Mid-Speed Interface Card	
ERM-MUX-MS-Serial	3 channels V.35/ X.21/ RS-449/ RS-530 (cable selected) interface card

Optional High-Speed Interface Card	
ERM-MUX-HS-Serial	2 ports V.35/ X.21/ RS-449/ RS-530 (cable selected) interface card

Optional Cable (Non-included item)	
Please contact regional sales representative for detailed information	

E1 Access Series IPM-1SE

TDM over IP Access Units



The IPM-1SE provides a type of pseudowire (PW) function where a real-time bit stream (TDM) is transmitted over a packet switched network (PSN). By TDM (Time Division Multiplexing) we mean a T1 or E1 signal, while the PSN is based either on an IP or raw Ethernet network. Unlike other traffic types that can be carried over pseudowires (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 PBX, while still using IP based networks for.

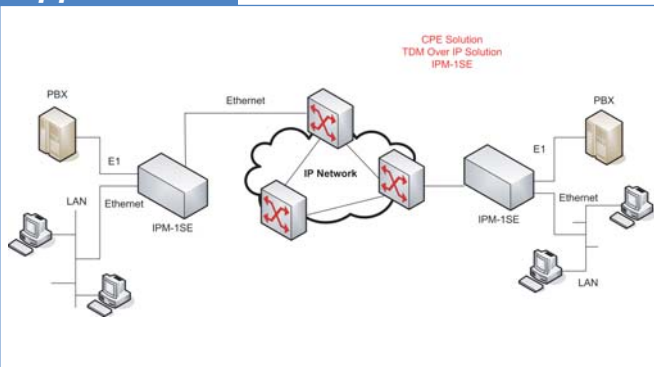
Features

- Configurable with CLI via: RS-232/V.24 & Telnet via Ethernet (Configuration stored in flash)
- Devices can be cascaded to increase the number of interfaces
- Point-to-point and point-to-multipoint applications
- Provides accurate E1/T1 clock recovery
- Remotely upgradeable
- Supports SNMP management
- Supports synchronous TDM-based and Ethernet services over IP and Ethernet networks
- Supports rack mounting option

Specifications

Uplink and LAN Ethernet specifications		
Standards	IEE 802.3, 802.3U, 802.1p and 802.1q	
Data Rate	10 or 100 Mbps, Half-Duplex or Full-Duplex	
Range	Up to 120m on UTP category 5	
Connector	RJ45	
E1 Link		
Port	1 port	
Framing	Unframed/ CCS(PCM31)/ CAS(PCM30)	
Bit rate	2.048Mbps	
Line code	HDB3	
Line impedance	75 ohm(BNC)/ 120 ohm(DB-15, 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	RJ-48C for 120 ohms/ BNC for 75 ohms	
Compliance	ITU-T G.703, G.704, G.706, and G.732.	
T1 Link		
Ports	1 port	
Framing	Unframed, D4, ESF	
Data rate	1.544 Mbps	
Line Code	B8ZS / AMI	
Receive Level	Short haul - 15dB/ Long haul - 36dB	
Line impedance	100 ohms	
Pulse amplitude	Nominal 3.0 ±20%	
Zero amplitude	±0.15V	
Connector	RJ48C	
Compliance	ITU-T G.703, G.704, AT&T TR-62411, ANSI T1.403	
Control interface		
Standards	RS-232/V.24 (DCE) (Direct connection to PC)	
Data rate	115200 baud	
Data format	One start bit/ 8 data bits/ No parity/ One stop bit	
Connector	DB-9 Female	
General Specifications		
Connector	AC Model: 3 Pin plug DC Model: Plug in type 3Pin terminal Blocks	
Power	AC	100 — 240 VAC
	DC	18 — 75 VDC
Environment	Temperature	0 — 40°C (Operating); 0 — 70°C (Storage)
	Humidity	10 — 90% non condensing
Power Consumption	15W	
LEDs	System, TDM, Uplink, LAN	
Dimensions(WxDxH)	196mm x 255mm x 44.4mm	
Weight	1.6kg	

Application



Ordering Info

IPM-1SE-AC	Provide one E1 and one ethernet port over IP network, AC Power (90 — 265 VAC, 47 — 63 Hz)
IPM-1SE-DC	Provide one E1 and one ethernet port over IP network, DC Power (18 ~ 75 VDC)

Comparison Table

E1 Access Series

Model Name	ETU01	ETU01-A	ETU01-U	Eoe-1	ETU01-C	ETU01-D	E1-U	FE1	FE1-A	
Modular I/F	v	v	v							
Unframed E1	v	v	v	v		v	v			
Fractional E1	v	v			v	v		v	v	
Fractional Cascade E1	v								v	
Sub-E1					v					
Data Port	V.35	v	v	v		v	v	v	v	
	X.21	v	v	v		v	v	v	v	
	RS-232	v	v							
	RS-530	v	v	v		v	v	v	v	
	RS-449	v	v	v		v	v	v	v	
	G.703/64K	v	v	v						
	NRZ/BNC	v	v	v						
	ET10/100	v	v	v	v					
ET100R	v	v	v							
SNMP Management		v								
Power	AC Model (VAC)	90~250	90~250	90~250	90~250	90~250	90~250			
	DC Model (VDC)	18~75	18~75	18~75	18~72	18~75	36~75			
	AC Adapter (VAC)							110 or 220	110 or 220	110 or 220
	DC Adapter (VDC)							9	9	9
Power Consumption (W)	10	10	10	10	10	10	4	4	4	

Fiber Series

2 Access Series

xDSL Series

IP Networking

Testers

Interface Converter

Datacom Accessories

Network Management

T1 NTU Series G703FT1



Single Port Fractional T1 Access Unit

This G.703 Fractional T1 Access Unit is a single port access unit for Unframed or Fractional T1 (DS1) services. Data Port rates are selectable via DIP-switches, for any multiple of 56 or 64Kbps up to 1544Kbps. User data is placed into the T1 frame, using only the required number of timeslots. Timeslot assignment is accomplished according to the Data Port speed and is selected by DIP switches. The main T1 link may be clocked from the recovered receive clock (LBT), from the data port, or from an internal oscillator. The data channel interface is standard RS-530, with cable solutions for V.35, X.21 and RS-449. The G.703 FT1's DIP and slide switches, located on the side and front panels, provide for easy setup and control of all functions.

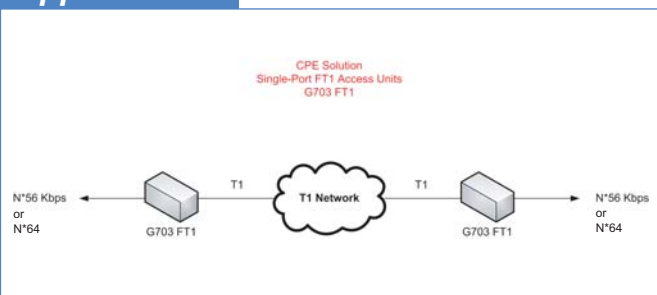
Features

- Terminate T1/ Fractional T1 service
- Clock Regeneration from incoming AMI or B8ZS data
- Data rate: DIP selectable sync Nx64Kbps to 1544Kbps
- Decoded data in NRZ form
- Diagnostic Loopbacks both for G.703 and Data Port sides
- Fully transparent signal conversion under unframed mode (1544Kbps)
- Interface conversion between G.703 and RS-530, RS-449 (V.36), X.21 or V.35.
- LTU (Line Terminating Unit) built in unit
- DTE/DCE switchable Data Port

Specifications

Framing	D4 or ESF selectable	
Data Rate	n*64Kbps where n equal to 1 to 24	
Power	9 VDC Adapter for 110VAC or 220VAC	
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	5W	
LEDs	DTE, DCE, TD, RD, TEST, ALARM, T-Clk Loss, R-Clk Loss	
Dimensions(WxDxH)	99mm x 170mm x 30mm	
Weight	360g	
Compliance	ANSI T1. 403, ITU-T G.703, G.704, G.706, G.824	

Application



Ordering Info

G703FT1/	xxx	x
	V35	F: Female connector
	X21	M: Male connector
	530	
	449	
Cables for different I/F solutions		
V35	DB25-MB34 Cable	
X21	DB25-DB15 Cable	
530	DB25-DB25 Cable	
449	DB25-DB37 Cable	
Cables for connecting Cisco Routers directly		
CAB-DB25MLHF60M3M	RS-530 adapter cable for high speed transmission, connect to Cisco LHF60	
CAB-DB25MSSHP26M3M	RS-530 adapter cable for high speed transmission, connect to Cisco SSHP26	

T1 NTU Series G703T1-U

Single Fractional T1 Access Unit

This G.703 T1 Access Unit is a single port access unit for Unframed T1 (DS1) service. Data Port rates support fixed 1544kbps (Unframed, clear channel). The main T1 link may be clocked from the recovered receive clock (LBT), from the data port, or from an internal oscillator. The data channel interface is standard RS-530, with cable solutions for V.35, X.21 and RS-449. The G703T1-U's DIP and slide switches, located on the front panel, provide for easy setup and control of all functions.



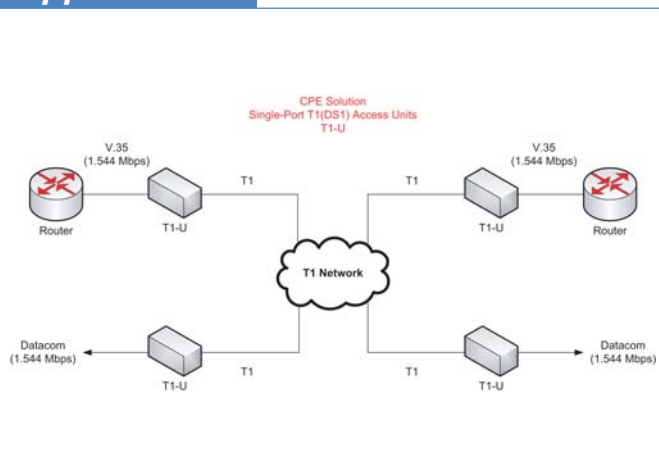
Features

- Terminate unframed T1 service
- Clock Regeneration from incoming AMI or B8ZS data
- Decoded data in NRZ form
- Diagnostic Loopbacks both for G.703 and Data Port sides
- Fully transparent signal conversion under unframed mode (1544Kbps)
- Interface conversion between G.703 and RS-530, RS-449 (V.35), X.21 or V.35.
- LTU (Line Terminating Unit) built in unit
- Single port access to T1/Fractional T1 services
- DTE/ DCE switchable Data Port

Specifications

Framing	Unframed	
Data Rate	1.544Mbps	
Power	9 VDC Adapter for 110VAC or 220VAC	
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
LEDs	DTE, DCE, TD, RD, TEST, ALARM, T-Clk Loss, R-Clk Loss	
Dimensions(WxDxH)	79mm x 135mm x 28mm	
Weight	180g	
Compliance	ANSI T1. 403, ITU-T G.703, G.704, G.706	

Application



Ordering Info

G703T1-U/	xxx	x
	V35	F: Female connector
	X21	M: Male connector
	530	
	449	
Cables for different I/F solutions		
V35	DB25-MB34 Cable	
X21	DB25-DB15 Cable	
530	DB25-DB25 Cable	
449	DB25-DB37 Cable	
Cables for connecting Cisco Routers directly		
CAB-DB25MLHF60M3M	RS-530 adapter cable for high speed transmission, connect to Cisco LHF60	
CAB-DB25MSSHP26M3M	RS-530 adapter cable for high speed transmission, connect to Cisco SSHP26	

T1 NTU Series TTU01



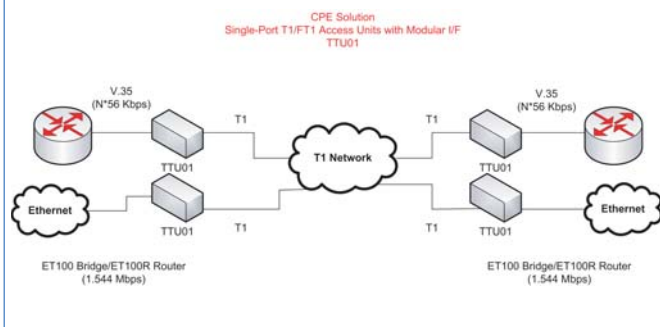
Single-Port Fractional Access Unit

The TTU01 is a single port access unit for DS1, Fractional DS1 or Fractional cascade DS1 service. The TTU01 data channels support user-selectable transmission rates, which are integral multiples of 56 or 64kbps, up to a maximum 1.536Mbps (64K x 24), 1544Mbps for unframed, for a line attenuation of up to 36 dB on two twisted pairs. The TTU01 packs the data channels into DS1 link time slots in user-selected time slots. The unused time slots can insert IDLE code (In frame mode) or insert the receive side time slots data (In cascade mode). The TTU01 has a number of different user-replaceable data channel modules available, which provide the desired interface: V35, X.21, RS-530, RS-232, Ethernet Bridge/Routing or G.703 64k codirectional.

Features

- Terminates Fractional T1 service
- User-replaceable data channel modules
- Multiple clock source selection
- Support user-selectable transmission rates
- V.54 diagnostic capabilities for performing local loopback and remote digital loopback.
- Supports rack mounting option

Application



Specifications

General Specifications	
Test switches/Diagnostics	Digital local loopback, Analog local loopback, Digital remote loopback, Test pattern
Data rate	Unframe, 1544Kbps, N x 56Kbps; N x 64Kbps where n = 1 to 24
Power	AC 90 — 250VAC
	DC 18 — 75VDC
Environment	Temperature 0 — 60°C (Operating); 0 — 70°C (Storage)
	Humidity 0 — 90% non condensing
Power Consumption	10W
LEDs	PWR, TD, RD, RTS, DCD, TxClk Loss, Red Alarm, Sync loss, Yellow Alarm, Err, Test
Dimensions(WxDxH)	195mm x 255mm x 45mm
Weight	1.5kg
Compliance	ANSI T1.403, AT&T TR-62411, ITU G.703, G.704, G.706 and G.733

DS1 (T1) Link Specification		
Connectors	15 pin, D-type Female/ Terminal Block/ RJ-45	
Framing	Unframed / Framed CCS(PCM31) / CAS(PCM30) / CRC4 on/off	
Bit rate	1.544Mbps ±50 ppm	
Line code	B8ZS/Am	
Line impedance	100 ohm (DB-15, RJ-45)	
Relative receive level	0 to -36dB	
Jitter performance	According to ITU-T G.824	
Transmit level	Pulse amplitude	Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 100ohm
	Zero amplitude	±0.1V
	Transmit frequency tracking	Internal timing ±30 ppm Loopback timing ±50 ppm External timing ±100 ppm
Compliance	ITU-T G.703, G.704, G.706 and G.732 and Ansi T1.403	

Ordering Info

TTU01/AC	TTU01 & universal AC power Supply
TTU01/DC	TTU01 & universal DC power Supply

Interface Modules	
ETU/TTU-35	V.35 interface module
ETU/TTU-X21	X.21 interface module
ETU/TTU-530	RS-530 interface module
ETU/TTU-449	RS-530 interface module plus RS-449 cable adapter
ETU/TTU-232	RS-232 interface module
ETU/TTU-G64K-CO	G.703/64K Co-directional I/F
ETU/TTU-NRZ	NRZ/BNC interface module
ETU/TTU-ET100	10/100Base-Tx Ethernet Bridge
ETU/TTU-ET100R	10/100Base-Tx Ethernet Router

T1 Access Series TTU02-MUX



Fractional T1 2-port/ 4-port multiplexer with subT1

The TTU02-MUX provides an economic multiplexing solution for DS1 and Fractional DS1 DSU/CSU network services. Up to four DTE devices may be linked to a TTU02-MUX at data rates of 56Kbps to 1544Kbps. It also provides for one optional DS1 sub-link which may be connected over a public DS1 network. The DS1 sub-link will perform Drop & Insert with user-defined timeslot connections from a PABX or other DS1 equipment to DS1 network services. The TTU02-MUX supports local control and diagnostics via an LCD display, keypad and LED status indicators located on the front panel.

A Console port (RS-232) is also available for local configuration via a terminal or modem-terminal combination. These features enable users to easily configure the unit, execute the in-service diagnostics and monitor the network status. TTU02-MUX also provides optional SNMP Network Management System functions, which allow the user to remotely configure, control and diagnose the system.

Features

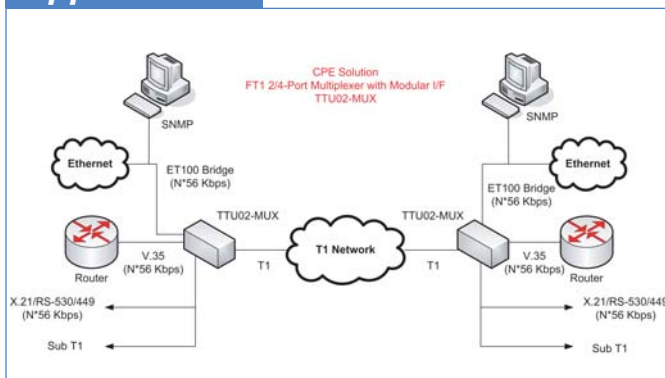
- Terminates Fractional T1 service
- Integrates high speed data and T1 link with an intelligent T1/ Fractional T1 Access Unit
- Optional DS1(T1) drop & insert port
- Setup and Control via front Panel with LCD display or serial console
- Selectable data rates: Nx64Kbps, Nx56Kbps (N=1~24)
- Supports up to 4 Data channels
- SNMP enabled device
- Transmit Timing Modes include recovery timing, transparent timing, dataport timing and internal oscillator.

Specifications

General Specification		
Number of Ports	TTU02-MUX.2	2 ports
	TTU02-MUX.4	4 ports
Data rate	Unframe, 1544Kbps, N x 56Kbps or N x 64Kbps where n = 1 to 24	
Craft port	RS-232, DB9F: 19200, 8, N, 1	
Power	AC	100 — 240VAC
	DC	18 — 72VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
Key Pad	4 operation keys	
LCD display	16 x 2 characters	
LEDs	17 status LEDs	
Dimensions(WxDxH)	430mm x 235mm x 45mm	
Weight	1.5kg	

DS1 (T1) Link Specification		
Connector	Link	15 pin, D-type Female
	Sub-Link	15-pin, D-type female and RJ-45 (ANSI T1.403)
Framing	Unframed/ Framed/ SF (D4)/ ESF	
Bit rate	1.544Mbps	
Line code	AMI/ B8ZS	
Line impedance	100 Ohms (balanced)	
Relative receive level	0 to -36dB	
Jitter performance	According to ITU-T G.824	
Transmit level	Pulse amplitude	Nominal 2.37V ±10% for 75ohm
		Nominal 3.00V ±10% for 120ohm
	Zero amplitude	±0.1V
Transmit frequency tracking	Internal timing ±30 ppm	
	Loopback timing ±50 ppm	
	External timing ±100 ppm	
Compliance	ANSI T1.403, AT&T TR-62411, ITU G.703, G.704, G.706 and G.733	

Application



Ordering Info

TTU02-MUX.	X/	XXX-	X
	ports type	Optional I/F Modules	Power
	2		AC
	4		DC

Modules	
TTU02-SNMP	Optional SNMP card (installs in special slot)
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-530 interface module plus RS-449 cable adapter
ETU/TTU-G64K-CO	G.703/64K Co-directional I/F
ETU/TTU-NRZ	NRZ/BNC interface module
ETU/TTU-ET100	10/100Base-Tx Ethernet Bridge
ETU/TTU-ET100R	10/100Base-Tx Ethernet Router

T1 Access Series TRM01

Fractional T1 Concentrator



The TRM01 series is a rack type T1 DSU/CSU for Fractional T1 Digital Access which is nested in a hub to provide solution for central office installations. There are 13 slots available for G.703 T1 cards for installation into the TRM01 RACK. An optional SNMP card can be installed into the last slot for configuration and management, leaving 12 slots available for line cards. The SNMP card provides both local control via an RS-232 console port and remote management using industry standard SNMP protocol via an Ethernet 10BASE-T connection.

Each T1 card may be linked to a remote TTU01 standalone T1 Access Unit for various LAN, Video Conference, or Hosts over T1 network services. The TRM01 accommodates a redundant power supply as optional equipment, which may derive power from AC (90-250) or DC (-48V) power sources. On the rear panel, RJ-45 and Terminal Blocks are utilized for T1 Line interface connectors. Adapter cables are used to convert the DB-26F DCE data ports to V.35, RS-530, X.21, or 10/100Base-T Ethernet bridge operation.

Features

- All Interface and connectors are on the Rear Panel
- Digital Cross Connect Solution in a Standard 19" Rack
- High density & compact design in a 4U high rack
- Hot Swapping of cards and redundant power supplies supported
- LED Line status display on each card
- Optional Power Source, AC or DC for power supplies
- Standard console port allows terminal to setup and monitor operation locally
- Up to 13 cards can be installed

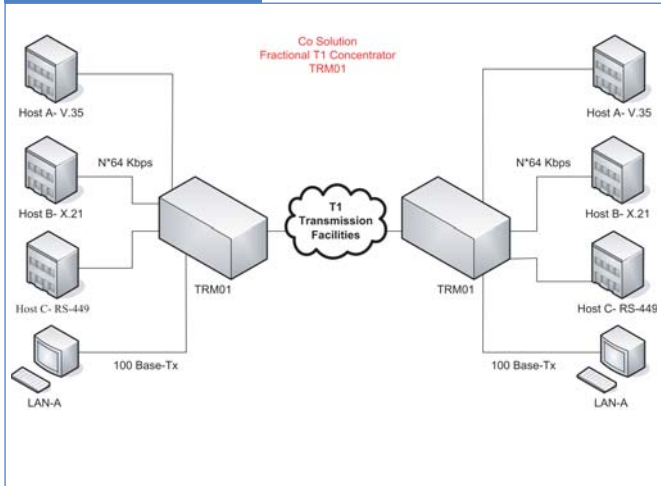
Specifications

T1 & Sub-T1 Link Specification		
Framing	Unframed/ Framed/ SF (D4)/ ESF	
Bit rate	1.544Mbps	
Line code	AMI/ B8ZS	
Line impedance	100 Ohms (balanced)	
Relative receive level	0 to -36dB	
Jitter performance	According to ITU-T G.824	
Transmit level	Pulse amplitude	Nominal 3.0V ±20%
	Zero amplitude	±0.1V
Connectors	5 Pin Wire Connector & Shielded RJ-45 (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	
Compliance	ANSI T1.403, AT&T TR-62411, ITU G.703, G.704, G.706, G.733	

General Specification		
Craft port	RS-232, DB9F: 19200, 8, N, 1	
Power	AC	90 — 250VAC
	DC	-42 — -55VDC
Environment	Temperature	0 — 60°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
LEDs	Syns Loss, Signal Loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test	
Dimensions(WxDxH)	285mm x 438mm x 180mm	
Weight	6.6Kg (Chassis +1 power card)	
	250g (Per line card)	

User Data Channel Specification		
Interface types	RS-530/RS-449/RS-232	
	X.21/V.35	
	10/100Base-T Ethernet Bridge	
	10/100Base-T Ethernet 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 24	
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	
Alarm LED	Sync Loss, Signal Loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test.	
Loopback	Local analog loopback; Payload loopback; Digital loopback; Remote loopback	
Clock modes	Clock mode 0 (DCE1)	Rx & Tx clocks (recovered) to the sync. DTE
	Clock mode 1 (DCE2)	Rx & Tx clocks (internal oscillator) to the sync. DTE
	Clock mode 2 (DTE1)	Rx clock to the sync. Device, Tx clock from the sync. Device
	Clock mode 3 (DTE2)	Rx & Tx clocks from the sync. DCE (from ETC and ERC pin)
	Clock mode 4 (DTE3)	Rx & Tx clocks from the sync. DCE (all from ETC pin)

Application



Ordering Info



TRM01-SNMP

Optional Networking Management Module

TRM01-SNMP	SNMP plug-in card with both interface: RS-232 and 10Base-T
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TRM01-ET100R

Optional Card for ERM01 (Without optional adapter cables)

TRM01-V35	LTU card: T1 to V.35 card
TRM01-ET100	LTU card: T1 to 10/100Base-T Bridge
TRM01-Serial	LTU card: FT1 to RS-530, X.21, RS-449
TRM01-ET100	LTU card: FT1 to 10/100 Base-TX Router

Master Unit: Rack Mount ERM01 Chassis

TRM01/AC-CH	19 inch, 4U rack mount chassis for AC power
TRM01/DC-CH	19 inch, 4U rack mount chassis for DC power

Power Module for ERM01

RM01/AC	AC power plug-in module
RM01/DC	DC 48V power plug-in module

Cable (Non-included item)

CAB-HD26MB34M-V35	V.35 adapter cable	HD26 male to MB34 male, 2 meter
CAB-HD26MB34F-V35	V.35 adapter cable	HD26 male to MB34 female, 2 meter
CAB-HD26RJ45F-ET10	Ethernet adapter	HD26 male to RJ-45 female
CAB-HD26DB15M-X21	X.21 adapter cable	HD26 male to DB15 male, 2 meter
CAB-HD26DB15F-X21	X.21 adapter cable	HD26 male to DB15 female, 2 meter
CAB-HD26DB37M-449	RS-449 adapter cable	HD26 male to DB37 male, 2 meter
CAB-HD26DB37F-449	RS-449 adapter cable	HD26 male to DB37 female, 2 meter
CAB-HD26DB25M-530	RS-530 adapter cable	HD26 male to DB25 male, 2 meter
CAB-HD26DB25F-530	RS-530 adapter cable	HD26 male to DB25 female, 2 meter

Single port G.703/64K Series G703/64A

G.703/ 64K CO-directional Interface Converter

The G703/64A interface converter allows full conversion between G.703 64Kbps co-directional services and a number of Data Port Interfaces including V.35, X.21, RS-530, RS-449 and EIA RS-232 hardware. The interface converters are very easy to implement. Simply select the model and appropriate interface settings and adapter cable, configure the required timing for translation via slide 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. This product may be used widely in the Packet Switching Network, ISDN and DDN. It is 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 such as SPAR series.



Features

- I/F conversion between G.703/64K and V.35, X.21, RS-232/449/530
- Fully transparent signal conversion
- Diagnostics: local and remote analog and local digital loopback
- Selectable codirectional, centradirectional or contradirectional
- Selectable timing modes: recovery, transparent, dataport or internal OSC
- Single port access to 64Kbps services

Specifications

ITU-T G.703 I/F Specifications		
Framing	Unframed	
Connector	RJ-45	
Impedance	120 ohm	
Pulse amplitude	Nominal 1.0V ±10%	
Zero amplitude	Nominal 0V ±0.1V	
Clock frequency	64KHz	
Freq. Tracking	±100ppm	
Compliance	ITU-T G.703 and G.823	
Data Port Specifications		
Connector	DB25/F with adapter cables	
Data Rate	64Kbps for Synchronous mode, 19.2Kbps for Asynchronous (RS-232) mode	
Line code	NRZ	
Type	RS-232 DB25 - DB25 Female RS-449 DB25 - DB37 adapter cable RS-530 DB25 -DB25 adapter cable V.35 DB25 - MB34 adapter cable X.21 DB25 - DB15 adapter cable	
General Specifications		
Power	AC	9V input power AC adaptor for 110VAC or 220VAC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
LEDs	Signal Loss, Timing Loss, RD, SD, PWR, GRD, GSD	
Dimensions(WxDxH)	10mm x 175mm x 24mm	
Weight	400g	

Application



Ordering Info

G703/64A	G.703/64K Interface converter: V.35/ RS-530/ RS-449/ X.21 cable solution
G703/64A-232	G.703/64K converter: RS-232

Cables for connecting Cisco Routers directly

CAB-DB25MLHF60M3M	RS-530 adapter cable for high speed transmission, connect to Cisco LHF60
CAB-DB25MSSHP26M3M	RS-530 adapter cable for high speed transmission, connect to Cisco SSHP26

Single port G.703/64K Series G703/64A-STD



G.703/64K CO-directional Interface Converter

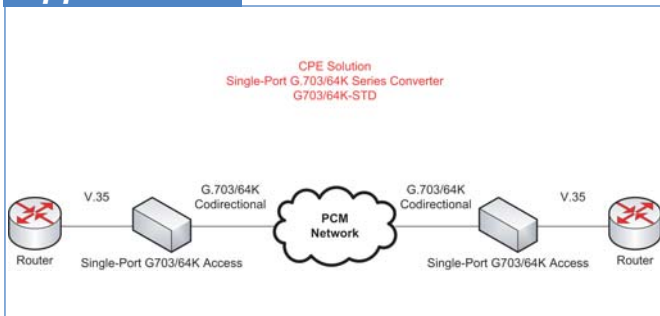
The G703/64A-STD interface converter allows full conversion between G.703 64Kbps services and a number of Data Port Interfaces including ITU V.35, X.21, RS-530, RS-449 and EIA RS-232 hardware. The interface converters are very easy to implement. Simply select the model and appropriate interface settings 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.

This product may be used widely in the Packet Switching Network, ISDN and DDN. It is 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 such as SPAR series.

Features

- I/F conversion between G.703/64K and V.35, X.21, RS-232/449/530
- Fully transparent signal conversion
- Diagnostics: local and remote analog and local digital loopback
- Selectable codirectional, centradirectional or contradirectional
- Selectable timing modes: recovery, transparent, dataport or internal OSC
- Single port access to 64Kbps services
- Data port provides 10 bit FIFO

Application



Specifications

ITU-T G.703 I/F Specifications

Framing	Unframed
Connector	RJ-45
Impedance	120 ohm
Pulse amplitude	Nominal 1.0V ±10%
Zero amplitude	Nominal 0V ±0.1V
Clock frequency	64KHz
Freq. Tracking	±100ppm
Compliance	ITU-T G.703 and G.823

Data Port Specifications

Connector	DB25/F with adapter cables
Data Rate	64Kbps for Synchronous mode, 19.2Kbps for Asynchronous (RS-232) mode
Line code	NRZ
Type	RS-232 DB25 - DB25 Female RS-449 DB25 - DB37 adapter cable RS-530 DB25 -DB25 adapter cable V.35 DB25 - MB34 adapter cable X.21 DB25 - DB15 adapter cable

General Specifications

Power	AC	90 — 240VAC
	DC	-36 — -75VDC; -18 — -36VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	10W	
LEDs	PWR, TD, RD, RTS, DCD, TX, RX, Signal, Timing, Err, Test	
Dimensions(WxDxH)	195mm x 255mm x 45mm	

Ordering Info

G703/64A-STD/AC	G703 Rack standalone with AC (90 —250VAC) cable
G703/64A-STD/DC	G703 Rack standalone with DC -48V (-36 — -75) cable
G703/64A-STD/+24	G703 Rack standalone with DC +24V (-18 — -36) cable

Cables for connecting Cisco Routers directly

CAB-DB25MLHF60M3M	RS-530 adapter cable for high speed transmission, connect to Cisco LHF60
CAB-DB25MSSHP26M3M	RS-530 adapter cable for high speed transmission, connect to Cisco SSHP26

G.703/64K Series G703/64-RM



G.703/64K to Data Port Concentrator

The G703/64-RM is a Rack Type ITU-T G.703/64K Interface Converter for network access which is nested in a shelf and provides an economic solution for central site operators. There are 13 slots available for G703/64-RM cards for installation into the G703/64-RM rack. An optional SNMP card can be installed into the last slot for configuration and management. The SNMP card provides both local control via an RS-232 craft port and remote management using industry standard SNMP protocol via an Ethernet 10Base-T connection. The G703/64-RM allows full conversion between

G.703 64Kbps services and a number of Data Port Interfaces including ITU-T V.35, X.21, RS-530, RS-449 and EIA RS-232. This model features full compliance with all the relevant ITU & EIA standards under 64Kbps network environments with high reliability and may be used widely in the ISDN, DDN, and Packet Switching Networks. The G703/64-RM is also useful for data terminals which access PCM, 64Kbps digital channels, as well as digital microwave channels. Additionally, the G703/64-RM may be connected to Satellite Communication Channels such as SPAR series.

Features

- All Interface and connectors are on the Rear Panel
- Central HUB Solution in a Standard 19" Rack
- Console port allows terminal to setup and monitor operation locally. (available W/SNMP option)
- Data Port provides 10 bit FIFO
- Diagnostics: local and remote analog and local digital loopback
- Fully transparent signal conversion
- High density & compact design in a 4U high rack
- Hot Swapping of cards supported
- LED Line status display on each card
- Optional power card for power sharing
- Optional SNMP network management system card
- Selectable timing modes: recovery, transparent, dataport or internal OSC
- Supports Interface for V.35, X.21, RS-530, RS-449 and RS-232
- Up to 13 cards can be installed

Specifications

ITU-T G.703 64K I/F Specifications

Line	4 wires, 0.5 -0.7mm twisted pair cable
Line code	64Kbps codirectional
Type	Codirectional/64Kbps
Framing	Unframed only
Connector	Wire-wrap and RJ-45 connector
Impedance	120 Ohms
Pulse amplitude	Nominal 1.0V ±10%
Zero amplitude	0V±0.1V
Clock frequency	64KHz
Freq. Tracking	±100ppm
Compliance	ITU-T G.703 and G.823

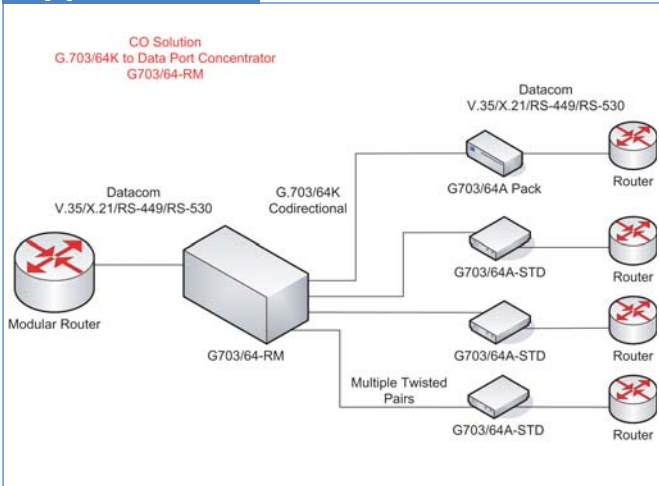
User Data Channel Specification

Interface types	RS-530/ RS-449/ RS-232/ X.21/ V.35
Connector	High density DB26 Female
Line code	NRZ (except bridge)
Data Rate	64Kbps
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
Alarm LED	Sync Loss, Signal Loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test.
Loopback	Local analog, local digital, remote loopback
Clock modes	Clock mode 0 (DCE1) Clock mode 1 (DCE2) Clock mode 2 (DTE1) Clock mode 3 (DTE2)

General Specification

Craft port	RS-232, DB9F: 19200, 8, N,1
Power	AC 90 — 250VAC
	DC -42 — -55VDC, 50 — 60Hz
Environment	Temperature 0 — 60°C (Operating); 0 — 70°C (Storage)
	Humidity 0 — 90% non condensing
Power Consumption	80W
LEDs	Sync Loss, Signal Loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test
Dimensions(WxDxH)	285mm x 438mm x 180mm
Weight	6.6Kg (Chassis +1 power card)250g (Per line card)

Application



Ordering Info



G703/64-RM-SNMP

Optional Networking Management Module	
G703/64-RM-SNMP	SNMP plug-in card with both interface: RS-232 and 10Base-T



G703/64-RM-Serial

Optical Card for G703/64-RM (without optical adapter cables)	
G703/64-RM-Serial	G.703/64K Line card (common)

Master Unit : Rack Mount G703/64-RM Chassis	
G703/64-RM-CH	19 inch, 4U rack mount chassis for AC power
G703/64-RM-CH	19 inch, 4U rack mount chassis for DC power

Optional Power Module for G703/64-RM	
RM01/AC	AC power plug-in module
RM01/DC	DC-48V power plug-in module

Optional Cable (Non-included item)		
CAB-HD26MB34M-V35	V.35 adapter cable	HD26 male to MB34 male, 2 meter
CAB-HD26MB34F-V35	V.35 adapter cable	HD26 male to MB34 female, 2 meter
CAB-HD26RJ45F-ET10	Ethernet adapter	HD26 male to RJ-45 female
CAB-HD26DB15M-X21	X.21 adapter cable	HD26 male to DB15 male, 2 meter
CAB-HD26DB15F-X21	X.21 adapter cable	HD26 male to DB15 female, 2 meter
CAB-HD26DB37M-449	RS-449 adapter cable	HD26 male to DB37 male, 2 meter
CAB-HD26DB37F-449	RS-449 adapter cable	HD26 male to DB37 female, 2 meter
CAB-HD26DB25M-530	RS-530 adapter cable	HD26 male to DB25 male, 2 meter
CAB-HD26DB25F-530	RS-530 adapter cable	HD26 male to DB25 female, 2 meter
CAB-HD26DB25M-232	RS-232 adapter cable	HD26 male to DB25 male, 2 meter
CAB-HD26DB25F-232	RS-232 adapter cable	HD26 male to DB25 female, 2 meter

E1/T1 Series ETR01/ ETR04

E1/ T1 Layer One Repeater



The ETR01 and ETR04 are E1/T1 long-haul, Layer One repeaters. The compact design, low cost, and easy operation make the ETR an excellent choice for E1 or T1 link extension. The ETR01 provides a simple 1 pair (Tx/ Rx) in, 1 pair (Tx/ Rx) out repeater interface, while the ETR04 provides a 1 (Rx) in, 4 (Tx) out interface. Setup is extremely simple. Just select the proper termination impedance from the three-position slide switches (75 or 120 Ohm for E1 or 100 Ohm for T1) and then selects the proper line code (AMI or B8ZS for T1, HDB3 for E1).

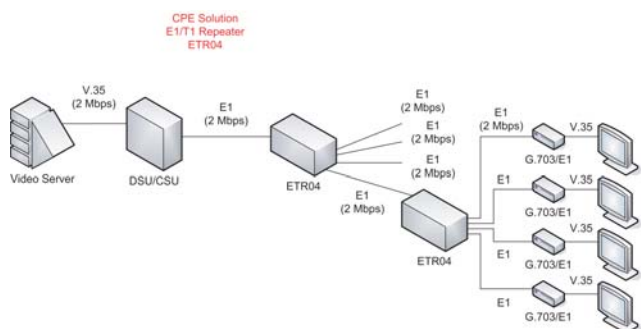
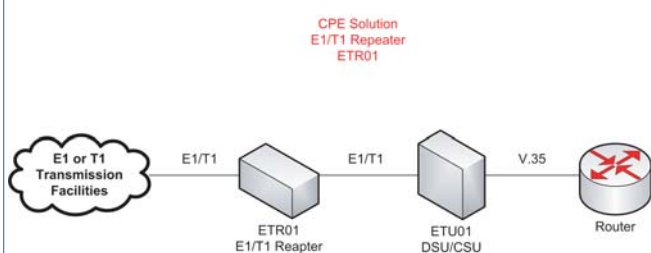
Features

- Fully signal and clock recovery
- Fully integrated transceivers for long-haul T1 or E1 interface
- Receiver sensitivity; fully restores the received signal after transmission through a cable with attenuation of 0 to 36dB @ 772KHz or 0 to 43dB @ 1024KHz
- Selectable E1 75/120 ohm or T1 100 ohm line impedance
- Selectable line codes; AMI, B8ZS, or HDB3

Specifications

E1 Link		
Bit Rate	2.048Mbps	
Connectors	RJ-45 (for ETR01) / BNC (for ETR01-BNC)	
Line Code	AMI/ HDB3	
Line Impedance	75 ohms (unbalanced)/ 120 ohms (balanced)	
Pulse Amplitude	2.37V±10%@75W/ 3.00V±10%@120W	
Zero Amplitude	±0.1V	
Receive Level	0 to -43dB	
T1 Link		
Bit Rate	1.544Mbps	
Connectors	RJ-45	
Line Code	AMI/ B8ZS	
Line Impedance	100 ohms	
Pulse Amplitude	3.00V±10%@100 ohms	
Zero Amplitude	±0.1V	
Receive Level	0 to -36dB	
General Specification		
Power	AC	100—240VAC input power
Power	DC	-48 VDC
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	20 — 80% non condensing
Power Consumption	10W	
LEDs	ETR01/ (-BNC)	PWR, IN1, IN2
	ETR04	PWR, IN
Dimensions(WxDxH)	195mm x 235mm x 45mm	
Weight	1.5kg	
Compliance	ANSI T1.403 and T1.408; ITU I.431, G.703, G.736, G.775 and G.823; ETSI 300-166 and 300-233; and AT&T Pub 62411	

Application



Ordering Info

ETR01	One RJ-45 to one RJ-45 connector, 1 in 1out
ETR01-BNC	One pair RJ-45 in, one pair BNC out
ETR04	One RJ-45 to fourRJ-45 connector, 1 in 4 out

E1/T1 Series G703FTEC



Stand-Alone E1/T1 Cross-Rate Converter

The G703-FTEC is a T1 (US Standard) /E1 (European Standard) converter and timeslot cross connect which enables conversion between one T1 signal and one E1 signal. T1 and E1 signals with frames employ u-Law and A-Law compander encoding principles respectively and encode those analog signals into 64kbps digital data. Tests and diagnostics can easily be performed from the front panel pushbutton switches. Diagnostics include T1 local/remote and E1 local/remote loop back. The T1 interface supports D4 or ESF frame formats with B8ZS or AMI line code. The E1 interface supports CCS (PCM31) or CAS (PCM30) frames without CRC-4 and frames with CRC-4.

The line code is HDB3. 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. The unit is built in a compact case that can be placed on a desktop, shelf or installed, by means of an optional adapter, in a 19 inch EIA rack. All setup controls can be performed via internal DIP switch settings or via the RS-232 console port and ASCII terminal.

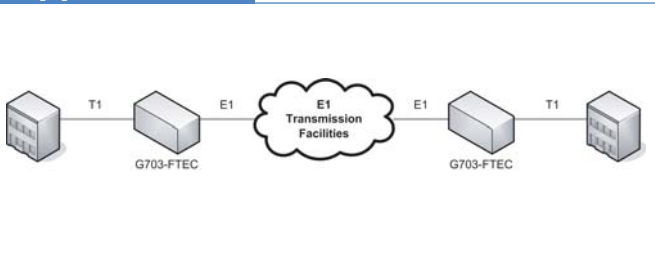
Features

- Converts between T1 and E1 data and signaling
- Configurable A-law/ u-law and signaling conversion
- Controlled slip for buffer over/underflow
- Enables equipment to operate at T1 and E1 rates
- Function setting via internal DIP switch setting or console port (RS-232 Async.)
- Local/remote loopback test capabilities on both T1 and E1 interface
- Signaling version: MFC R2
- Support G.802 Annex B
- The 24 timeslots of T1(nx64) can be inserted into E1(nx64), 30/CAS or 31/CCS timeslots
- Enables equipment to operate at T1 and E1 rates

Specifications

E1 Link		
Bit Rate	2.048Mbps ± 50ppm	
Framing	Unframed, CCS, CAS	
Connectors	BNC pairs, RJ-45	
Line Code	HDB3	
Line Impedance	Unbalanced 75 Ohms ±5%; balanced 120ohms ±5%	
Pulse Amplitude	Nominal 2.37V ±10% Nominal 3.00V ±10% @ 120ohms	
Zero Amplitude	±0.1V	
Receive Level	-43dB	
Jitter Performance	Complies with ITU-T G.823	
Pulse Mask	Complies with ITU-T G.703	
Delay Variance	8ms (maximum)	
T1 Link		
Bit Rate	1.544Mbps	
Framing	D4 or ESF selectable	
Connectors	RJ-45	
Line Code	AMI or B8ZS selectable	
Line Impedance	100 ohms balanced	
Equalization	0 — 655 feet settable	
CRC check	CRC-6 (when ESF)	
Receive Level	0 to -10dB	
Transmit pulse level	3.0V (±10%) B20	
General Specification		
Power	AC	90 — 250VAC input power
	DC	-48 VDC (-36 — -72)
Environment	Temperature	0 — 50°C (Operating); 0 — 70°C (Storage)
	Humidity	0 — 90% non condensing
	Power Consumption	20W
LEDs	System	PWR, FAIL
	T1 and E1	SIG LOSS, SYNC, BPV, AIS, YELLOW ALARM & TEST
Dimensions(WxDxH)	480mm x 330mm x 180 mm	
Weight	1.5kg	
Compliance	ITU-T G.703, G.704, G.823, G.824, ANSI T1.403 recommendations	

Application



Ordering Info

G703FTEC-AC/110	Fractional E1/T1 timeslot crossrate-convert with 90 — 250VAC power supply
G703FTEC-DC	Fractional E1/T1 timeslot crossrate-convert with -48 VDC power supply (-36 — -76 VDC)
G703FTEC-DC/+24	Fractional E1/T1 timeslot crossrate-convert with +24 VDC power supply (18 — 36 VDC)

E1/T1 ETU/TTU Interface Modules

Various Interface modules for E1/T1 Access Units

When purchasing one of our single port access units or multi-port multiplexers, our ETU/TTU Interface modules provide the total solution to your data interface needs. In addition to standard datacom interfaces, Ethernet modules are also available for bridging or routing of Ethernet over E1 or T1 network.



Data Port Interface Module Options

Type	Photo	Description
RS-530		Connector: RS-530/DB25F Speed: Fractional E1 (N64/N56) Model: ETU/TTU-530
RS-449		Connection: RS-530/DB25F /RS-449M(F) additional Cable Speed: Fractional E1 (N64/N56) Model: ETU/TTU-449
G.703/64		Connector: DB15F G.703/64Kbps Codirectional Speed: 64Kbps Model: ETU/TTU-G64
ET100		Connection: RJ-45 10Base-T/100Base-Tx (Ethernet Bridge) Speed: Fractional E1 Model: ETU/TTU-ET100
ET100R		Connection: RJ-45 10/100Base-T/Tx (Ethernet Routing) Speed: Fractional E1 Model: ETU/TTU-ET100R

Type	Photo	Description
V.35		Connector: V.35/MB34F Speed: Fractional E1 (N64/N56) Model: ETU/TTU-V35
X.21		Connector: X.21/DB15F Speed: Fractional E1 (N64/N56) Model: ETU/TTU-X21
RS-232		Connector: RS-232/DB25F RS232 Sync(Async) Speed: 128Kbps (19.2Kbps) Model: ETU/TTU-232
NRZ		Connector: BNC(x4) NRZ Speed: Fractional E1 Model: ETU/TTU-NRZ



ETU01-A Rear

E1/T1 ET100R



E1/T1 to Ethernet Router

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, is design based upon the engine of the IPR 1600 synchronous IP router. The ET100R 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. The serial port and Telnet configuration menus are identical and may include password protection.

Features

- DHCP function/ NAT function
- Flash Upgrade (via TFTP)
- IP Mapping/ Client Filtering
- RIP I, RIP II, Send or Receive on Ethernet or WAN
- Router Ethernet port IP Address/ subnet mask
- Router Name/ Password
- Routing Table (manually set up to 16 entries)
- WAN PPP or HDLC Encapsulation
- WAN port IP address/ subnet mask

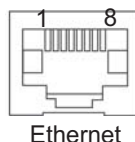
Specifications

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

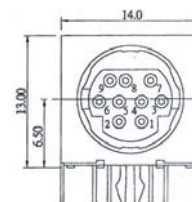
The physical interfaces for the ET100R are an RJ-45 connector and mini DIN9 connector with the pin assignments as follows :

Mini DIN9 Pin Assignment

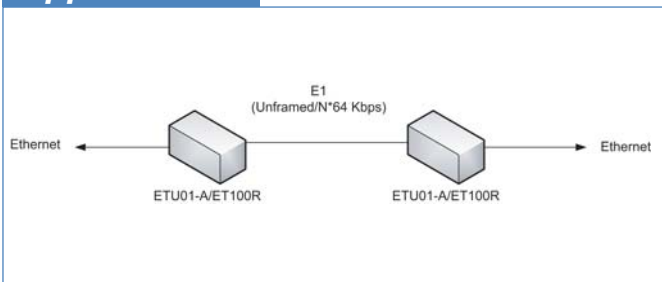
Pin	Circuit	Direction	Description
1	NC		
2	RD	Output	Receive Data
3	TD	Input	Transmit Data
4	DTR	Input	
5	GND	--	Signal Ground
6	DSR	Output	
7	RTS	Input	Request to Send
8	CTS	Output	Clear to Send
9	NC		



Normal	
1.	Tx+
2.	Tx-
3.	Rx+
6.	Rx-



Application



Ordering Info

The Following Models Can be Ordered with Router Module

ETU01	Single port fractional E1 access unit
ETU01-A	Single port fractional E1 access unit
ETU01-U	Single port E1 access unit
ETU02-MUX	4 port E1 multiplexer
TTU01	Single port fractional T1 access unit
TTU02-MUX	4 port T1 multiplexer

3. xDSL Series



xDSL Selection Table

R/Rack, L/Line card, S/Standalone, SW/Switch, C/Compact

A-DSL Family				
Network Type	Product Name	Description	Product Type	Page
ADSL	ALS-R50	6U, 19", 16 slots (384 loop max)	R	3-3
ADSL	ALS-R60	6.75U, 19", 20 slots (640 loop max)	R	3-4
ADSL	ALS-R100-32P	1U, 19", 3/4 slots (96 loop max)	R	3-5
ADSL	ALS-P10	ADSL MDF Type filter	C	3-6
ADSL	ALS-12	ADSL splitter	C	3-7
ADSL	ALS-M12	ADSL/ VDSL micro filter	C	3-7
ADSL	ALS-10-IT	Regional ADSL splitter for Italy	C	3-8
ADSL	ALS-10-UK	Regional ADSL splitter for UK	C	3-8
ADSL	ALS-10-FI	Regional ADSL splitter for Finland	C	3-8
ADSL	ALS-10-FA	Regional ADSL splitter for France	C	3-8
ADSL	ALS-10-EU/I	ADSL/ ISDN splitter	C	3-9
ADSL	ATU-R140	10/100M BASE TX to ADSL	S	3-10
ADSL	ATU-R210	(4) 10/100M BASE TX to ADSL	S	3-11
ADSL	MD-20	Digital Subscriber Line Access Multiplexer	S	3-12
G.SH-DSL Family				
Network Type	Product Name	Description	Product Type	Page
G.SHDSL TDM Series	SHRM03-E1	E1 to G.SHDSL, 2W/TDM	L	3-13
G.SHDSL TDM Series	SHRM03-V35	V.35 to G.SHDSL, 2W/TDM	L	3-13
G.SHDSL TDM Series	SHRM03-ET100	10/100 BASE TX to G.SHDSL, 2W/TDM	L	3-13
G.SHDSL TDM Series	SHDTU03-E1	E1 to G.SHDSL, 2W/TDM	S	3-15
G.SHDSL TDM Series	SHDTU03-V35	V.35 to G.SHDSL, 2W/TDM	S	3-16
G.SHDSL TDM Series	SHDTU03-ET100	10/100 BASE TX to G.SHDSL, 2W/TDM	S	3-17
G.SHDSL ATM Series	SHRM03-ET100R	10/100 BASE TX to G.SHDSL, 2W/ATM	L	3-18
G.SHDSL ATM Series	SHDTU03-ET10R	2-wire SHDSL router	S	3-19
G.SHDSL ATM Series	SHDTU03F-ET10R	2-wire SHDSL router with firewall protection	S	3-19
G.SHDSL ATM Series	SHDTU03A-	4-wire SHDSL router	S	3-19
G.SHDSL ATM Series	SHDTU03AF-ET10RS	4-wire SHDSL router with firewall protection	S	3-19
I-DSL Family				
Network Type	Product Name	Description	Product Type	Page
IDSL	I-DSL128	2-wire 2B1Q Leased Line Modem	S	3-20
IDSL	I-DSL64	2-wire 2B1Q Leased Line Modem	S	3-21

Fiber Series

Access Series



xDSL Series

IP Networking

Testers

Interface Converter

Datacom Accessories

Network Management

ADSL Splitter Series ALS-R50

Rack Type Splitter

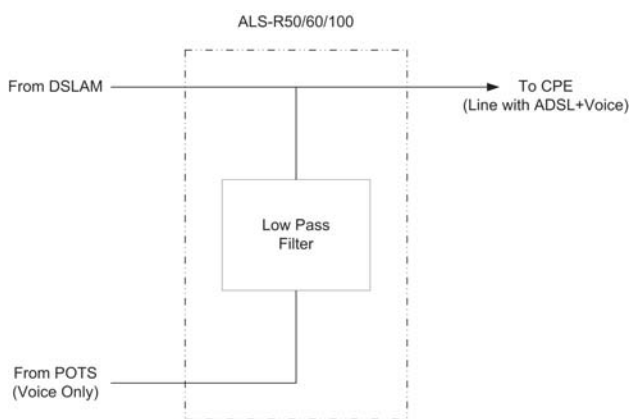


The ALS-R50 rack connections are organized into two-card sets. Each physical card provides 24 loops. A two card set provides 48 loops. Each card set provides high density connections to the central office DSLAM using 2-50 pin (2.54mm pitch) locking header connector and ribbon cables. Each ribbon Connector supports 24 loops. POTS and line connections are provided via two sets each of 12x4 wire wrap terminals.

Features

- 6U high 19" Rack
- Consists exclusively of all passive elements
- Designed for implementation of ADSL CO application
- Handles all POTS loop current from 0mA to 100mA
- If the power supply or ATU-C/ATU-R fails, telephone service on the ADSL line will operate normally
- Provides excellent isolation between DSL and POTS
- Up to 16 cards (384 loop max)

Application



Specifications

Standard	Annex E.2 of ITU-T G.992.1	
Impedance	900 ohms	
Insertion Loss	1004Hz short loop	1dB
	1004Hz Long loop	0.75dB
Attenuation distortion	200 to 3.4KHz short loop	-1.5 — 1.5dB
	3.4 to 300KHz short loop	-2 — 2dB
	200 to 3.4KHz long loop	-1.5 — 0.5dB
	3.4 to 300KHz long loop	-1.5 — 1dB
Cut off frequency	-3dB	8KHz
ADSL band	30 — 300KHz	-65dB
Attenuation	300 — 1104KHz	-55dB
Delay Distortion	600 — 3.2KHz	200us
	200 — 4KHz	250us
Return Loss	ERL	8dB
	SRL-L	5dB
	SRL-H	5dB
Common Mode Rejection Ration	600 — 3.2KHz	-100dB
DC Resistance	20Ohms	
Isolation resistance to	5M Ohms	
Longitudinal	200 — 1KHz	-60dB
	1 — 3KHz	-60dB
DC Current carrying capacity	100mA	
Environment	Temperature	-10 — 70°C (Operating); -15 — 80°C (Storage)
	Humidity	0 — 90% non condensing
Dimensions(WxDxH)	434mm x 285mm x 265.6mm	
Weight	18kg	

Ordering Info

ALS-R50-P	ADSL Line Splitter Rack, for CO application, w/wire wrap and 50pin locking ribbon cable connections
ALS-R50 24P-11 Card	ADSL Line Splitter Card, 24 Loops, 600 ohm, 8k Hz

ADSL Splitter Series ALS-R60



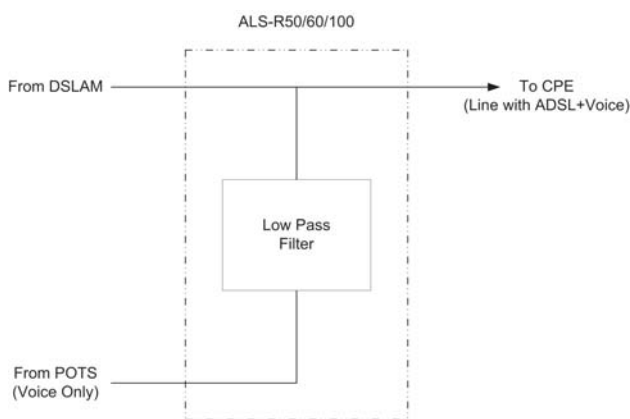
Rack Type Splitter

The ALS-R60 is a rack mount solution for central office or service providers, containing up to 20 cards with 32 each ADSL line splitters which provide low-pass filters designed to provide POTS (Plain Old Telephone System) service to a line that is utilizing ADSL technology. This device is designed to eliminate interference to POTS equipment by blocking the high frequency ADSL signal (20 KHz-12 MHz).

Features

- 8U high 19" Rack
- Consists exclusively of all passive elements
- Designed for implementation of ADSL/ ADSL2/ ADSL2+ CO application
- Handles all POTS loop current from 0mA to 100mA
- If the power supply or ATU-C/ATU-R fails, telephone service on the ADSL line will operate normally
- Provides excellent isolation between DSL and POTS
- Up to 20 cards (640 loop max)

Application



Specifications

Standard	Annex E.2 of ITU-T G.992.3	
Impedance	900 ohms	
Insertion Loss	1004Hz short loop	1dB
	1004 Hz Long loop	0.75dB
Attenuation distortion	200 to 3.4Khz short loop	-1.5 — 1.5dB
	3.4 to 300KHz short loop	-2 — 2dB
	200 to 3.4KHz long loop	-1.5 — 0.5dB
	3.4 to 300KHz long loop	-1.5 — 1dB
Cut off frequency	-3dB	8Khz
ADSL band	30 — 300KHz	-65dB
Attenuation	300 — 1104KHz	-55dB
Delay Distortion	600 — 3.2KHz	200us
	200 — 4KHz	250us
Return Loss	ERL	8dB
	SRL-L	5dB
	SRL-H	5dB
Common Mode Rejection Ration	600 — 3.2KHz	-100dB
DC Resistance	20Ohms	
Isolation resistance to Longitudinal	200 — 1KHz	-60dB
	1 — 3KHz	-60dB
DC Current carrying capacity	100mA	
Environment	Temperature	-10 — 70°C (Operating); -15 — 80°C (Storage)
	Humidity	0 — 90% non condensing
Dimensions(WxDxH)	436mm x 300mm x 300mm	
Weight	18kg	

Ordering Info

ALS-R60-8	ADSL Line Splitter Rack, for CO application, w/wire wrap and IDC 68pins cable connections
ALS-R60 32P-11 Card	ADSL Line Splitter Card, 32 Loops, 900 ohm, 8KHz

ADSL Splitter Series ALS-R100

Rack Type Splitter

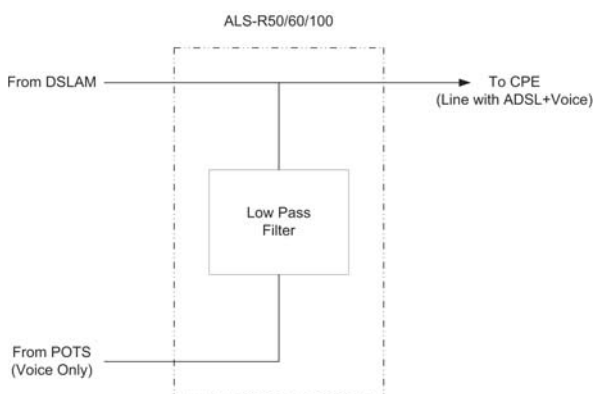


The ALS-R100 is a rack mount solution for central office or service providers, which nests up to 3 cards containing 32 each ADSL line splitters or up to a maximum 96 loops. The splitter provides low-pass filters designed to provide POTS (Plain Old Telephone System) service to a line that is utilizing ADSL technology. This device is designed to eliminate interference to POTS equipment by blocking the high frequency ADSL signal (20 KHz~1.1MHz). The design of the ALS-100 ensured that when maintenance job is performed on single loop, any insertion or removal will not cause any interruption on any telephone service for any users on this card module.

Features

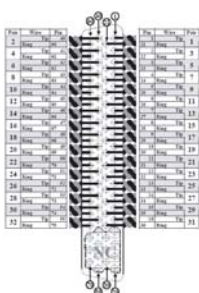
- 1U high 19" Rack, supports stacking
- Consists exclusively of all passive components
- Designed for implementation of ADSL CO application
- Handles all POTS loop current from 0mA to 100mA
- If the power supply or ATU-C/ATU-R fails, telephone service on the ADSL line will operate normally
- Provides excellent isolation between DSL and POTS
- Up to 3 slots for 32 loops line card (96 loop max)
- When the telephone service is idle or occupied, any insertion or removal of the card module will not cause any service break

Application



Specifications

Standard	Annex E.2 of ITU-T G.992.3	
Impedance	900 ohms	
Insertion Loss	1004Hz short loop	1dB
	1004 Hz Long loop	0.75dB
Attenuation distortion	200 to 3.4KHz short loop	-1.5 — 1.5dB
	3.4 to 300KHz short loop	-2 — 2dB
	200 to 3.4KHz long loop	-1.5 — 0.5dB
	3.4 to 300KHz long loop	-1.5 — 1dB
Cut off frequency	-3dB	8KHz
ADSL band	30 — 300KHz	-65dB
Attenuation	300 — 1104KHz	-55dB
Delay Distortion	600 — 3.2KHz	200us
	200 — 4KHz	250us
Return Loss	ERL	8dB
	SRL-L	5dB
	SRL-H	5dB
Common Mode Rejection Ration	600 — 3.2KHz	-100dB
DC Resistance	20Ohms	
Isolation resistance to	5M Ohms	
Longitudinal	200 — 1KHz	-60dB
	1 — 3KHz	-60dB
DC Current carrying capacity	100mA	
Environment	Temperature	-10 — 70°C (Operating); -15 — 80°C (Storage)
	Humidity	0 — 90% non condensing
Dimensions(WxDxH)	443mm x 313mm x 44.5mm	
Weight	card:1.2kg; empty chassis: 4.15kg;	
	total: 7.75kg	
Compliance	IEC61000-4-5 and FCC part 68	



PIN Assignment ALS-R100-32P

Ordering Info

ALS-R100-CH	ADSL/VDSL Line Splitter Rack, for CO application, w/wire wrap 78 pin
ALS-R100-32P	ADSL/VDSL Line Splitter Card, 32 Loops, 600 ohm, 8k Hz

ADSL Splitter Series ALS-P10



ADSL MDF Type Splitter

The ALS-P10 filters can be directly plugged into the existing terminals of the CO one by one, as needed, thus eliminating need for extra terminal blocks and cabling. This leads to lower costs compared with ordinary splitters, which require operators to install large splitter racks and equipment awaiting presumable future use. With Siemens/ Krone type terminals, no extra cabling or terminal blocks are needed at all; with Krone LSA Plus terminals only minor new cabling are needed. The plug type filters are easy to install onto the terminal blocks; no tools are needed.

Filters act like disconnection plugs: the contacts inside the terminal are disconnected and the filter connects in series to the pair. Individual filters can be plugged adjacent to each other and they don't block neighboring pairs from insertion of new wires. Thus ADSL can be connected to subscribers independently, which is an asset. The plug type splitter requires the space of two pairs of LSA Plus terminal block.

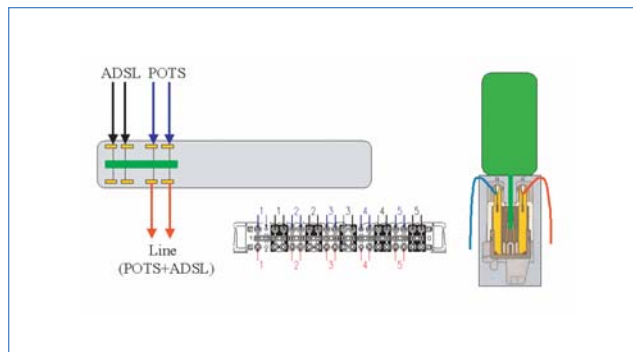
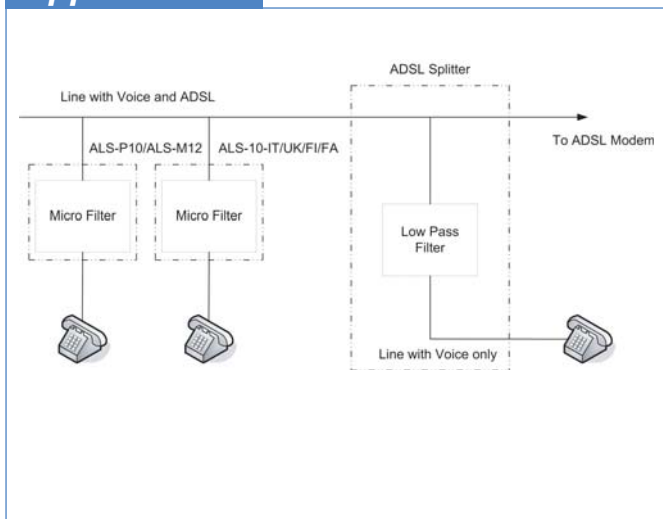
Features

- Individual splitter
- Integrates directly in MDF, no racks required
- Minimum number of contact points
- POTS service available with splitter removed (make-before-break)
- Various splitter designs available (POTS, ISDN, ...)
- Tinned Krone LSA Plus test plug reed connectors

Specifications

Filter Type	Low pass	corner freq. 7kHz (± 1 kHz), optimal matching 600ohms, DC path max. 100mA
	High pass	corner freq. 22kHz (± 2 kHz), optimal matching 135ohms, no DC path
Over voltage	Filter adapted to POTS voltages (max. ± 200 V)	
Dimensions(WxDxH)	18mm x 104mm x 20mm	
Weight	45g	

Application



Ordering Info

ALS-P10 ADSL MDF Type Splitter

ADSL Splitter Series ALS-12/ ALS-M12

ADSL Splitter and Micro Filter

The ALS-12/ ALS-M12 are low-cost, compact, passive low-pass filters designed to provide POTS (Plain Old Telephone System) service to a line that is utilizing ADSL/VDSL technology. This device is designed to eliminate interference to POTS equipment by blocking high frequency energy (20 KHz~12MHz).



ALS-12

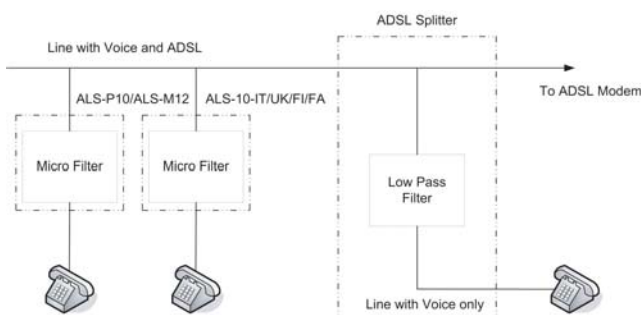


ALS-M12

Features

- Compact size
- Consists exclusively of all passive elements
- Designed for implementation of ADSL CPE application
- Handles all POTS loop current from 0mA to 100mA
- If the power supply or ATU-C/ATU-R fails, telephone service on the ADSL line will operate normally
- Provides excellent isolation between DSL and POTS
- The POTS splitter at remote end shall provide the RJ-11 connector for ATU-R/VTU-R line interface
- The POTS splitter and Low-pass filter shall provide the RJ-11 connectors for ADSL/VDSL line interfaces as well as POTS interface of splitter/Low-pass filter at remote end

Application



Specifications

Standard	Annex E.2 of ITU-T G.992.3	
Impedance	600 Ohms	
Insertion Loss	1004Hz short loop	1dB
	1004 Hz Long loop	0.75dB
Attenuation distortion	200 to 3.4KHz short loop	-1.5 — 1.5dB
	3.4 to 300KHz short loop	-2 — 2dB
	200 to 3.4KHz long loop	-1.5 — 0.5dB
	3.4 to 300KHz long loop	-1.5 — 1dB
Cut off frequency	-3dB	10KHz
ADSL band Attenuation	30 — 300KHz	65dB
	300 — 1104KHz	55dB
Delay Distortion	600 — 3.2KHz	200us
	200 — 4KHz	250us
Return Loss	ERL	6dB
	SRL-L	5dB
	SRL-H	3dB
Common Mode Rejection Ration	600 — 3.2KHz	-100dB
DC Resistance	20Ohms	
Isolation resistance to Longitudinal	200 — 1KHz	58dB
	1 — 3KHz	53dB
DC Current carrying capacity	100mA	
Environment	Temperature	-10 — 70°C (Operating); -15 — 80°C (Storage)
	Humidity	0 — 90% non condensing
Dimensions(WxDxH)	ALS-12	45mm x 34mm x 24mm
	ALS-M12	45mm x 34mm x 24mm
Weight	ALS-12	70g
	ALS-M12	70g

Ordering Info

ALS-12	ADSL Line Splitter for ADSL/VDSL CPE application, 600 ohm, 8K Hz , DSL is RJ-11
ALS-12-C	ADSL Line Splitter with surge protector for ADSL/VDSL CPE application, 600 ohm, 8K Hz , DSL is RJ-11
ALS-M12	The ADSL/ VDSL micro Filter

ADSL Splitter Series ALS-M10-IT/ UK/ FI/ FA



ALS-M10-IT(ITALY)



ALS-M10-UK(UK)

Regional ADSL/VDSL Splitters and Micro Filter

The ALS-10-IT/ UK/ FI/ FA are low-cost, compact, passive low-pass filter designed to provide POTS (plain Old Telephone System) service to a line that utilizing ADSL technology. This device is designed to eliminate interference to POTS equipment by blocking high frequency energy (20 KHz~1.1MHz).



ALS-M10-FI(Finland)



ALS-M10-FA(FRANCE)

Features

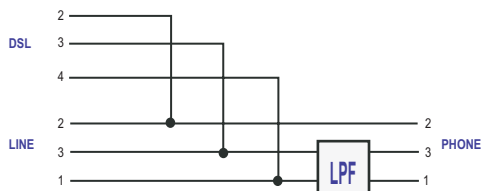
- Compact size
- Consists exclusively of all passive components
- Designed for implementation of ADSL/VDSL CPE application
- Handles all POTS loop current from 0mA to 100mA
- If the power supply or ATU-C/ATU-R fails, telephone service on the ADSL line will operate normally
- Provides excellent isolation between DSL and POTS
- The POTS splitter at remote end shall provide the RJ-11 connector for ATU-R/VTU-R modem interface
- The POTS splitter and Low-pass filter shall provide the Regional connectors for ADSL/VDSL line interfaces as well as POTS interface of splitter/Low-pass filter at remote end

Specifications

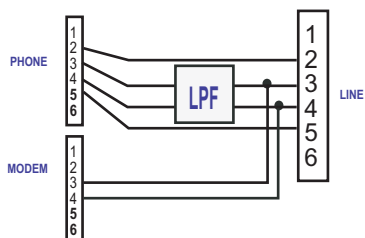
Standard	Annex E.2 of ITU-T G.992.3.	
Impedance	600 Ohms	
Connector	RJ-11	
Insertion Loss	1004Hz short loop	1dB
	1004 Hz Long loop	0.75dB
Attenuation distortion	200 to 3.4KHz short loop	-1.5 — 1.5dB
	3.4 to 300KHz short loop	-2 — 2dB
	200 to 3.4KHz long loop	-1.5 — 0.5dB
	3.4 to 300KHz long loop	-1.5 — 1dB
Cut off frequency	-3dB	12KHz
ADSL band	30KHz	-25dB
Attenuation	50KHz	-40dB
Delay Distortion	600 — 3.2KHz	200us
	200 — 4KHz	250us
Return Loss	ERL	6dB
	SRL-L	5dB
	SRL-H	3dB
Common Mode Rejection Ration	600 — 3.2KHz	-100dB
DC Resistance	20Ohms	
Isolation resistance to	5MOhms	
Longitudinal	200 — 1KHz	58dB
	1 — 3KHz	53dB
DC Current carrying capacity	100mA	
Environment	Temperature	-15 — 70°C (Operating); -10 — 80°C (Storage)
	Humidity	15 — 90% non condensing
Dimensions(WxDxH)	ALS-M10-IT	TBA
	ALS-M10-UK	TBA
	ALS-M10-FI	TBA
	ALS-M10-FA	TBA
Weight	ALS-M10-IT	TBA
	ALS-M10-UK	TBA
	ALS-M10-FI	TBA
	ALS-M10-FA	TBA
Compliance	ITU-T K.21	

Ordering Info

ALS-10-IT	Italy standard ADSL Splitter
ALS-10-UK	UK standard ADSL Splitter
ALS-10-FI	Finland standard ADSL Splitter
ALS-10-FA	France standard ADSL Splitter



ALS-M10-IT/ UK/ FI



ALS-M10-FA

ADSL Splitter Series ALS-10-EU/I



ADSL ISDN Splitter

The ALS-10-EU/I is a low-cost, compact, designed to implement the functionality of low pass filter in ISDN-BA with 2B1Q or 4B3T baseband linecodes over ADSL application. It integrates low pass filters that block the high frequency energy from reaching the ISDN-BA device and provide isolation from impedance effects of the ISDN-BA device on ADSL. Because the ISDN splitter connects directly to the subscriber loop media, it must also provide some protection for externally induced line hits or faults which could damage any attached equipment or endanger humans interacting with the installed equipment.

The circuit protection will be provided mostly by standard central office line protection means and additional protection measures built into splitter to protect against line overstress which could damage the splitter itself. The electrical and transmission specification is based on ETSI TS 101 952-1-3 V1.1.1 for ISDN-BA requirements.

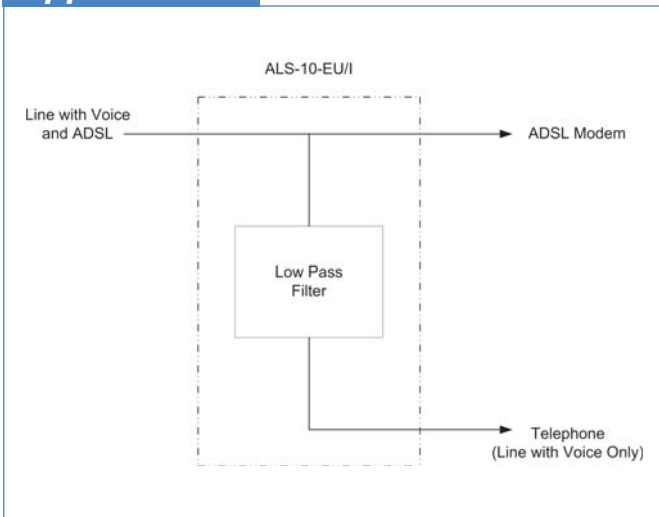
Features

- Consists exclusively of all passive components
- Designed for implementation of ADSL CPE application
- Handles all ISTN loop current from 0 to 60 mA
- If the power supply or ATU-C/ATU-R fails, telephone service on the ADSL line will operate normally
- Provides excellent isolation between DSL and ISDN

Specifications

Standard	ETSI TS 101-952-1-3 V.1.1.1	
Impedance	135/ 150 Ohms	
Isolation	Wire A to B	5 Mohms
	DC resistance	12.5 Ohms
Insertion loss	1 — 40KHz	0.8dB
	40 — 80KHz	2dB
	1 — 60KHz	1.2dB
	60 — 80KHz	2dB
Insertion loss in ADSL band	150 — 1104KHz	65dB
Insertion loss between ADSL port to LINE port	120 — 170KHz	2dB
	170 — 1104KHz	1dB
Return loss at ISDN port	1 — 40KHz	16dB
	40 — 80KHz	14dB
	1 — 60KHz	16dB
	60 — 80KHz	14dB
Unbalance about earth	300 — 30KHz	40dB
	30 — 1104KHz	46dB
	1104KHz — 3MHz	40dB
Group delay distortion	300 — 80KHz	20us
Environment	Temperature	-10 — 60°C (Operating); -10 — 80°C (Storage)
	Humidity	15 — 90% non condensing
Dimensions(WxDxH)	56mm x 86mm x 26mm	
Weight	70g	
Compliance	Annex E.2 of ITU-T G.992.1	

Application



Ordering Info

ALS-10-EU/I	European standard ADSL Splitter for ISDN
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ADSL Modem Series ATU R-140



ADSL2+ Bridge/ Router Modem

The new standards ADSL 2 and ADSL 2+ provide greater reach and higher data rates. The two technologies were developed side by side, and are downwardly compatible with the existing G.992.1 ADSL standard. ADSL 2+ (G.992.5) brings ADSL access to users who until now were located too far from the operator's central office. The increased reach is possible because of new modulation techniques in conjunction with improved error correction through trellis coding.

Essentially an upgrade to traditional ADSL technologies, ADSL 2+ brings the possibility of multi-megabit bandwidth and greater reach for broadband services, meaning easy deployment and expansion into rural areas, where coverage is low. With up to 24 megabit connections possible, mass-market applications such as video on demand, premium access and networked gaming are improved tremendously.

Features

- Texas Instruments Chip solution
- ADSL/ADSL2/ADSL2+ supported
- All Digital Loop ADSL supported
- Comprehensive Firewall & Security Function
- Cost-effective sharing of a single DSL connection
- Ethernet supported for LAN connection
- Reach Extended ADSL2 (READSL2) supported
- UPnP NAT Traversal & Device Identification supported
- USB Interface (Optional)
- Web-based interface for easy configuration

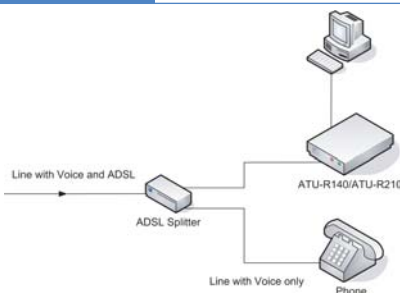
Specifications

Software Specifications	
ADSL Modem	ANSI T1.413 issue 2 All Digital Loop ADSL G.994.1 (G.hs, Multimode) ITU-T G.992.1 (G.dmt)/ITU-T G.992.2 (G.lite) ITU-T G.992.3 (ADSL2 G.dmt.bis)/ ITU-T G.992.4(ADSL2.G.lite.bis) ITU-T G.992.5 (ADSL2+, Annex A, B, I, J, L & M)
PPP supports	PPP over ATM PVC (RFC2364) PPP over Ethernet (RFC2516) PPP authentication:PAP, CHAP & MS-CHAP
Security	Demilitarized Zone (DMZ) Management Utility Password-protected Deny of Service (DoS) protection Firewall with NAT Packet Filtering ; Content Filtering Stateful Packet Inspection (SPI) firewall VPN pass through (IPsec, PPTP)
ATM Attributes	Adaptation Layers AAL5, AAL2 and AAL0 are supported OAM F4/F5 loop back Up to 8 PVCs
Bridge Mode	Bridge Filtering IEEE 802.1D transparent bridging RFC 1483 Bridge
Router Mode	DHCP (RFC1541) Server, Relay and Client DNS relay/ IGMP v1 and v2/ ToS supported Network Address Translation (NAT)/ Network Address Port Translation (NAPT) RFC 1483 Route/ IPoA (RFC1577) RIP 1 & 2 supported
Regulatory Approvals	FCC Part 15 ; FCC Part 68, CE, LVD (upon customer's request)
Quality of Service (QoS)	Constant Bit Rate (CBR), Real-Time Variable Bit Rate (VBR-rt), Non-Real-Time Variable Bit Rate (VBR-rt) and Unspecified Bit Rate (UBR)
Management	Remote/ local configuration & management through SNMP v1/v2, web and telnet Firmware upgrade and reset to default via Web management

Specifications

General Specification		
Physical Interface	WAN	One ADSL line RJ-11 port
	LAN	Four LAN RJ-45 port for 10/100M Ethernet LAN connection
Power	9VDC, AC Power Adapter for 110VAC or 220VAC	
Environment	Temperature	0 — 40°C (Operating); -20 — 70°C (Storage)
	Humidity	10 — 90%
Power Consumption	10W	
LEDs	INTERNET/PPP, PWR, WAN, LAN	
Dimensions(WxDxH)	145mm x 175mm x 34mm	
Weight	230g	
Compliance	FCC Part 15, CE	

Application



Ordering Info

ATU-R140A	ADSL2/2+ Bridge/ Router Modem with RJ-11 & RJ-45, Annex-A
ATU-R140B	ADSL2/2+ Bridge/ Router Modem with RJ-11 & RJ-45, Annex-B

ADSL Modem Series ATU R-210



ADSL2+ Bridge/ Router Modem

The new standards ADSL 2 and ADSL 2+ provide greater reach and higher data rates. The two technologies were developed side by side, and are downwardly compatible with the existing G.992.1 ADSL standard. ADSL 2+ (G.992.5) brings ADSL access to users who until now were located too far from the operator's central office. The increased reach is possible because of new modulation techniques in conjunction with improved error correction through trellis coding.

Essentially an upgrade to traditional ADSL technologies, ADSL 2+ brings the possibility of multi-megabit bandwidth and greater reach for broadband services, meaning easy deployment and expansion into rural areas, where coverage is low. With up to 24 megabit connections possible, mass-market applications such as video on demand, premium access and networked gaming are improved tremendously.

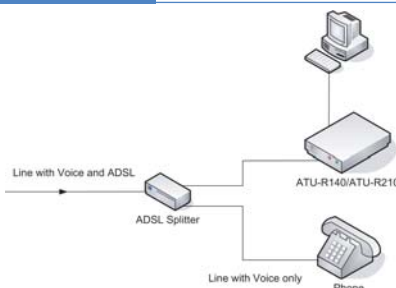
Features

- Broadcom Chip solution
- ADSL/ADSL2/ADSL2+ supported
- Asymmetrical data rate up to 24 Mbps downstream and upstream up to 2.5 Mbps
- Browser-based configuration environment
- Firmware upgrade available from TFTP via Ethernet port
- Support both bridging or routing and PPP function modes
- Support ITU-T G.992.3, ITU-T G.992.4 & ITU-T G.992.5

Specifications

General Specification		
Standard	ITU-T G.992.1, G.992.2, G.992.3, G.992.4, G.992.5	
Physical Interface	WAN	One ADSL line RJ-11 port
	LAN	Four LAN RJ-45 port for 10/100M Ethernet LAN connection
Power	15 VDC, AC Power Adapter for 110VAC or 220VAC	
Environment	Temperature	0 — 40°C (Operating); -20 — 70°C (Storage)
	Humidity	10 — 90%
Power Consumption	10W	
LEDs	INTERNET/PPP, PWR, WAN, LAN	
Dimensions(WxDxH)	145mm x 130mm x 34mm	
Weight	250g	
Compliance	FCC Part15,16 CE	
MTBF	60000 hrs	

Application



Specifications

Software Specifications	
ADSL Modem	ANSI T1.413 issue 2 All Digital Loop ADSL G.994.1 (G.hs, Multimode) ITU-T G.992.1 (G.dmt)/ ITU-T G.992.2 (G.lite) ITU-T G.992.3 (ADSL2 G.dmt.bis)/ ITU-T G.992.4(ADSL2.G.lite.bis) ITU-T G.992.5 (ADSL2+, Annex A, B, I, J, L & M)
PPP supports	PPP over ATM PVC (RFC2364) PPP over Ethernet (RFC2516) PPP authentication:PAP, CHAP & MS-CHAP
Security	Demilitarized Zone (DMZ) Management Utility Password-protected Deny of Service (DoS) protection Firewall with NAT Packet Filtering ; Content Filtering Stateful Packet Inspection (SPI) firewall VPN pass through (IPsec, PPTP)
ATM Attributes	Adaptation Layers AAL5, AAL2 and AAL0 are supported OAM F4/F5 loop back Up to 8 PVCs
Bridge Mode	Bridge Filtering IEEE 802.1D transparent bridging RFC 1483 Bridge
Router Mode	DHCP (RFC1541) Server, Relay and Client DNS relay/ IGMP v1 and v2/ ToS supported Network Address Translation (NAT)/ Network Address Port Translation (NAPT) RFC 1483 Route/ IPoA (RFC1577) RIP 1 & 2 supported
Regulatory Approvals	FCC Part 15 ; FCC Part 68, CE, LVD (upon customer's request)
Quality of Service (QoS)	Constant Bit Rate (CBR), Real-Time Variable Bit Rate (VBR-rt), Non-Real-Time Variable Bit Rate (VBR-rt) and Unspecified Bit Rate (UBR)
Management	Remote/ local configuration & management through SNMP v1/v2, web and telnet Firmware upgrade and reset to default via Web management

Ordering Info

ATU-R210	Standalone ADSL2+ Bridge/Router Modem, with 4-port switch HUB
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ADSL2+ Mini DSLAM MD-20



Digital Subscriber Line Access Multiplexer

The MD-20 is a mini-DSLAM designed for efficient scalability and easy deployment for access networks. This broadband access solution provides an exceptional way to extend ADSL reach further from central office DSLAM equipment to new customers, resulting in increased revenue generating service for both IP and ATM networks. The energy-efficient compact enclosure design fits perfectly inside temperature hardened and space limited rack space of telecommunication curbside cabinet.

Features

- Bring ADSL service to previously unreachable customers
- Supports ADSL, ADSL2, ADSL2+ via POTS/ISDN interface
- Provides 24 ~ 72 ports of ADSL in one 2U chassis
- Modular design with hot swappable and field replaceable units
- Build-in POTS/ISDN Splitters
- System Overheating Protection
- Full diagnostic and alarm reporting capability
- SNMP, Telnet, CLI and Web based management
- Dual A+B -48V DC power input terminal

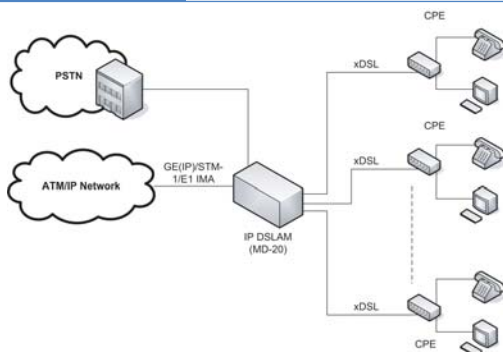
Specifications

General Specifications		
Power	DC	-48 (-42 — -56)VDC
Environment	Temperature	-40 — 65°C (Operating); 0 — 70°C (Storage)
	Humidity	5 — 95% non condensing
Power Consumption	130W (maximum)	
Dimensions(WxDxH)	482mm x 304mm x 88mm	
Weight	4.4 Kg with no units installed, fan card 2U: 0.25 Kg	
Compliance	ITU-T K.20, K.21, ETSI 300-019, 300-386, EN 60950, Conform to CE requirements	
MTBF	20150 hours	

Interface Cards	
Network Interface	STM-1 8 x E1 IMA 2 x 10/100/1000 Based-Tx or 2 x 1000 Base-FX SFP
Subscriber Interface	ADSL2+/POTS/ISDN (G.992.1 .2 .3 .5) 24 ports card
Service Characteristics	
ATM	QoS (UBR, rt-VBR, nrt-VBR, CBR) PVC default priority and PVC-to-VLAN mapping Traffic scheduling/shaping/policing
Ethernet	IEEE 802.1d Spanning tree protocol (STP) IEEE 802.3ad Link aggregation IEEE 802.1g port (Tag Based/ LAN) Security on console access
OSI Layer 2 Functionality	MAC filtering and count limit Access control list (ACL) Hardware-based multicasting Broadcast control and broadcast rate limit Port-based virtual local area network (VLAN) IGMP snooping v1 and v2 SNMP v1 and v2c Remote Monitoring (1, 2, 3, 9 groups)

Management Information Base (MIB)
 RFC 2514, 2515 ATM MIB, RFC 1213 SNMP MIB II, RFC 1493
 Bridge MIB, RFC 1643 Ethernet MIB, RFC 2674 Q MIB, RFC 1757
 RMON MIB, group 1,2,3,9, IMA-MIB, SHDSL Line-MIB, ADSL Line
 MIB, CTC Union proprietary MIB

Application



Ordering Info

MD-20 Mini DSLAM Chassis	
MD-20-MA1A	19" 2U Rack mount Chassis Up to 3 slots + 1 Slot (for Network Interface card) With DC power & Cooling Fan& Filter
Trunk Card	
MD-00-GE1A	2 x 100/1000 Based-TX or 2 x SFP uplink Card (IP)
MD-00-IM8A	8 x E1 IMA Uplink card (ATM)
MD-00-ST1A	STM-1 155M uplink card (ATM)

Line Card	
MD-00-AL5A	ADSL 24L ETSI 270 Splitter Annex-A
MD-00-AL5B	ADSL 24L ISDN Splitter Annex-B
MD-00-SL6A	SHDSL 24L W/O WET Current Annex-A/B, 2 wire, ATM base
1.25G SFP	
SFM-7000-S85	MM, 550m, 850nm, LC, 8.5dBm, (w/o DD)
SFS-7010-L31	SM, 10km, 1310nm DFB, LC, 10.5dBm (w/o DD)
SFS-7040-L31	SM, 40km, 1310nm DFB, LC, 19dBm (w/o DD)
SFS-7080-Z55	SM, 80km, 1550nm DFB, LC, 23dBm (w/o DD)

TDM Modem Series

SHRM03-E1/ V35/ ET100



G.SHDSL Modem Concentrator

The SHRM03 offers Three different ways to connect customers over high-speed DSL services; TDM based G.703 E1, TDM based serial DCE port or TDM based Ethernet Bridge. The SHRM03 is equipped with an adaptive auto rate capability that identifies the maximum line rate supported by the copper loop. This powerful automatic configuration capability makes installation and service provisioning simple and painless. Further flexibility is provided by the ability to manually set the maximum speed at different levels for different customer-tailored service offerings. This Rack is 100% compatible with our SHDTU03 standalone CPE modem.

Features

- All interface connectors on the rear panel
- Central solution in standard 19 inch rack
- Downloadable software for easy upgrade
- E1 and fractional E1 capable
- Each line card supports two channels of single pair (two-wire) for E1/Datacom/Ethernet solution N x 64k rate selectable from 64kbps to 2.304Mbps
- Hot swappable cards and redundant (optional) power supplies
- Menu oriented console screens for ease of use
- Optional SNMP network management system card
- Up to 13 cards (26 loops) can be installed + 1 SNMP card

Specifications

General Specification		
Power	AC 100V/ 220V, DC -48V	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	100W	
Dimensions(WxDxH)	438 x 285 x 180mm	
Weight	6.5kg	

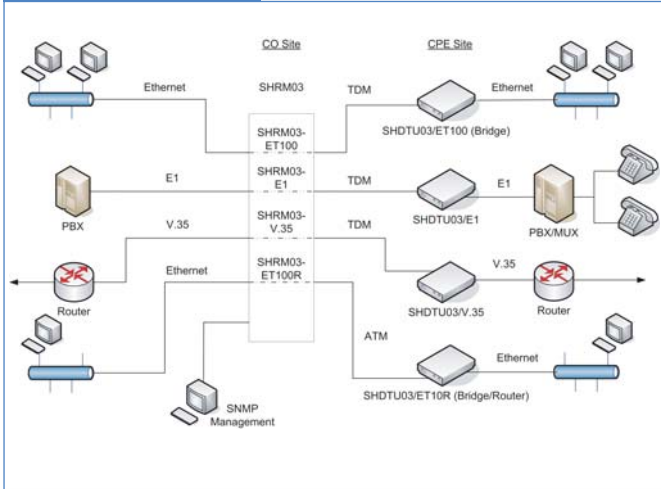
E1 Specifications		
Line code	HDB3/ AMI	
Data rate	64 — 2048kbps	
Operation	Full or Fractional	
Impedance	120 ohms balanced/ 75 ohms unbalanced	
Framing	Structured with or without CRC-4 or	
Timing	Internal clock or G.703 recovery	
Jitter performance	ITU-T G.823	
Connectors	BNC for unbalanced, 5 pin wire connector or RJ-45 for balanced	
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

Ethernet Interface Specifications	
Standard	IEEE 802.3/IEEE 802.3u
Encapsulation	Raw HDLC
packet size	maximum 1536
SHDSL Interface Specifications	
Standard	ITU-T G.991.2
Line code	16 level Trellis coded PAM
Data rate	64kbps — 2.304Mbps
Support	ANSI (Annex A) and ETSI (Annex B)
Datacom Interface Specifications	
Data Rate	64kbps — 2304kbps
Connectors	HD26 (cable adapters available)
Timing	Internal, External

Specifications - Software

Software Specification		
Performance	SHDSL PM	ES-crc, SES-crc, UAS, LOSW seconds
	E1 PM	ES, SES, UAS seconds
Diagnostic	Current 15-minute period and 96 previous 15-minute periods of SHDSL and E1 performance parameters	
	Current 24-hour period and 7 previous 24-hour periods of SHDSL and E1 performance parameters	
LEDs indication	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

Application



Ordering Info



SHRM03-AC



SHRM03-SNMP

Rack Mount SHRM03 Chassis	
SHRM03-AA/CH	4U, 19" 14 slots Chassis for AC + AC Power
SHRM03-AD/CH	4U, 19" 14 slots Chassis for AC + DC Power
SHRM03-DD/CH	4U, 19" 14 slots Chassis for DC + DC Power
SHRM03-AC	AC100V, AC220V Power Module
SHRM03-SNMP	SNMP I/F card with MIB and Console cable



SHRM03-E1/2T



SHRM03-V35/2T



SHRM03-ET100/2T

Optional Line Card	
SHRM03-E1/2T	G.SHDSL (2W) E1 (2 channels) TDM line card with E1 connector adapters
SHRM03-V35/2T	G.SHDSL (2W) V35 (2 channels) TDM line card
SHRM03-ET100/2T	G.SHDSL (2W) 10/100Base TX Bridge (2 channels) TDM line card with RJ-45 adapters

Fiber Series

Access Series

3 XDSL Series

IP Networking

Testers

Interface Converter

Datacom Accessories

Network Management

TDM Modem Series SHDTU03-E1



E1 SHDSL Modem

The SHDTU03-E1 connects customers to high-speed G.703 E1 services via TDM based G.SHDSL at up to 2.048Mbps. The SHDTU03-E1 is configured and managed via a menu-driven VT-100 compatible asynchronous terminal interface on RS-232. The SHDTU03-E1 acts as either a CO or CPE in point-to-point applications or as a CPE device when connected to our SHRM03 TDM based rack.

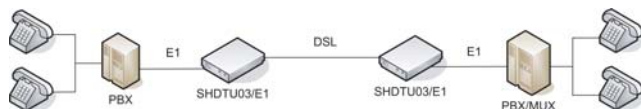
Features

- Adaptive rate installation maximizes data rate based on loop conditions
- Bandwidth guaranteed transmission equipment
- Can operate in back to back configurations
- Efficient single wire pair usage
- Fast and cost-effective provisioning of traditional or TDM leased line services
- Local management interface with LCD display
- Raw and time stamped statistics
- Remote loopback
- SHDSL Line performance monitoring
- Standard G.SHDSL (ITU G.991.2) support for improved reach/speed and greater interoperability
- Use existing copper loop infrastructures
- Up to 2.048Mbps symmetrical service bit rate

Specifications

Line Rate	SHDSL per ITU G.991.2	
Coding	Trellis coded pulse amplitude modulation	
Support	ANSI (Annex A) and ETSI (Annex B)	
Payload rates	192kbps to 2.048Mbps	
Connector	RJ-45	
Framing	G.703/G.704 (unframed / framed) CRC 4 enable/disable	
DSL Timing	Network (Recovery)/ Internal/ DTE	
G.703 Interface	RJ-48C for E1(120ohms) & BNC for E1 (75 ohms)	
Loopback	Local Loopback/ Digital Loopback Remote Loopback/ Built-in bit error rate tester	
Performance Monitoring	ES, SES, UAS, Alarms, Errors for E1/T1*, SHDSL Threshold Crossing Notification	
Power	AC	90 — 240VAC
	DC	-48VDC
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	10W	
Dimensions(WxDxH)	19.5cm x 16.8cm x 4.8cm	
Weight	850g	
Compliance	CE, FCC	

Application



Ordering Info

SHDTU03-E1/2T-AC	G.703 E1 interface, LCD panel & AC Type
SHDTU03-E1/2T-DC	G.703 E1 interface, LCD panel & DC Type

TDM Modem Series SHDTU03-V35



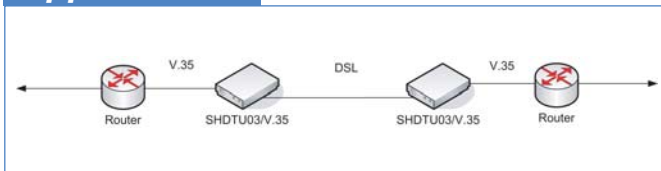
Datacom SHDSL Modem

The SHDTU03-V35 connects customers to high-speed data communication services via TDM based G.SHDSL at up to 2.304Mbps. The SHDTU03-V35 is configured and managed via a menu-driven VT-100 compatible asynchronous terminal interface on RS-232. The SHDTU03-V35 acts as either a CO or CPE in point-to-point applications or as a CPE device when connected to our SHRM03 TDM based rack. This modem is equipped with an adaptive rate capability that identifies the maximum line rate supported by the copper loop. This powerful feature makes installation and service provisioning simple and painless.

Features

- Adaptive rate installation maximizes data rate based on loop conditions
- Bandwidth guaranteed transmission equipment
- Can operate in point-to-point configurations
- Efficient single wire pair usage
- Fast and cost-effective provisioning of traditional TDM leased line services
- Local management interface with LCD display
- Raw and time stamped statistics
- Remote loopback
- SHDSL Line performance monitoring
- Standard G.SHDSL (ITU G.991.2) support for improved reach/speed and greater interoperability
- Use existing copper loop infrastructures
- Up to 2.304Mbps symmetrical service bit rate

Application



Specifications

Line Rate	SHDSL per ITU G.991.2	
Coding	Trellis coded pulse amplitude modulation	
Support	ANSI (Annex A) and ETSI (Annex B)	
Payload rates	192kbps to 2.304Mbps	
Connector	RJ-45	
DSL Timing	Network (Recovery)/ Internal/ DTE	
Loopback	Local Loopback/ Digital Loopback Remote Loopback/ Built-in bit error rate tester	
Performance Monitoring	ES, SES, UAS, Alarms, SHDSL Threshold Crossing Notification	
Power	AC	90 — 240VAC
	DC	-48VDC
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	10W	
Dimensions(WxDxH)	19.5cm x 16.8cm x 4.8cm	
Weight	850g	
Compliance	CE, FCC	

Ordering Info

SHDTU03-V35/2T-AC	G.703 V.35 interface, LCD panel & AC Type with DB25 Male to MB34 Female
SHDTU03-V35/2T-DC	G.703 V.35 interface, LCD panel & DC Type with DB25 Male to MB34 Female
SHDTU03-X.21/2T-AC	G.703 X.21 interface, LCD panel & AC Type with DB25 Male to DB15 Female Cable
SHDTU03-X.21/2T-DC	G.703 X.21 interface, LCD panel & DC Type with DB25 Male to DB15 Female Cable
SHDTU03-449/2T-AC	G.703 449 interface, LCD panel & AC Type with DB25 Male to DB37 Female Cable
SHDTU03-449/2T-DC	G.703 449 interface, LCD panel & DC Type with DB25 Male to DB37 Female Cable
SHDTU03-530/2T-DC	G.703 530 interface, LCD panel & AC Type with DB25 Male to DB25 Female Cable
SHDTU03-530/2T-DC	G.703 530 interface, LCD panel & DC Type with DB25 Male to DB25 Female Cable

TDM Modem Series SHDTU03-ET100



Ethernet SHDSL Modem

The SHDTU03-ET100 connects customers to Ethernet Bridging via TDM based G.SHDSL at up to 2.304Mbps. The SHDTU03-ET100 is configured and managed via a menu-driven VT-100 compatible asynchronous terminal interface on RS-232. The SHDTU03-ET100 acts as either a CO or CPE in point-to-point applications or as a CPE device when connected to our SHRM03 TDM based rack. This modem is equipped with an adaptive rate capability that identifies the maximum line rate supported by the copper loop. This powerful feature makes installation and service provisioning simple and painless.

Features

- Adaptive rate installation maximizes data rate based on loop conditions
- Bandwidth guaranteed transmission equipment
- Can operate in point-to-point configurations
- Efficient single wire pair usage
- Fast and cost-effective provisioning of traditional frame relay (FR or T-HDLC) or TDM leased line services
- Local management interface with LCD display
- Raw and time stamped statistics
- Remote loopback
- SHDSL Line performance monitoring
- Standard G.SHDSL (ITU G.991.2) support for improved reach/speed and greater interoperability
- Use existing copper loop infrastructures
- Up to 2.304Mbps symmetrical service bit rate

Specifications

Line Rate	SHDSL per ITU G.991.2	
Coding	Trellis coded pulse amplitude modulation	
Support	ANSI (Annex A) and ETSI (Annex B)	
Payload rates	192kbps to 2.304Mbps	
Connector	RJ-45	
DSL Timing	Network (Recovery)/ Internal/ DTE	
Loopback	Local Loopback/ Digital Loopback Remote Loopback/ Built-in bit error rate tester	
Performance Monitoring	ES, SES, UAS, Alarms, SHDSL Threshold Crossing Notification	
Power	AC	90 — 240VAC
	DC	-48VDC
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	10W	
Dimensions(WxDxH)	19.5cm x 16.8cm x 4.8cm	
Weight	850g	
Compliance	CE, FCC	

Application



Ordering Info

SHDTU03-ET100/2T-AC	10/100 Base-T Ethernet interface, LCD panel & AC Type
SHDTU03-ET100/2T-DC	10/100 Base-T Ethernet interface, LCD panel & DC Type

ATM Modem Series SHRM03-ET100R



SHRM03-ET100R Line Card

G.SHDSL Modem Concentrator

The SHRM03 ATM based line card rack 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 provisioning and management. This rack is 100% compatible with our SHDTU03/ET10R and ET10RS standalone cpe modems.

Features

- All interface connections on the rear panel
- Central solution in 19" rack
- Software upgrade via TFTP or Web interface
- IP based in-band management
- Each card supports two channels of single pair (two wire) for Ethernet Bridging or Routing solution at nx64 rates up to 2.304Mbps.
- Hot swappable cards and redundant (optional) power supplies
- Web browser screens for easy use
- SNMP agent embedded in each channel
- Up to 13 cards (26 loops) may be placed in one rack

Specifications - SHRM03-ET100R

Routing
DHCP server, client and relay (RFC2131/ 2132)
DNS relay and caching (RFC1034/ 1035)
IP multicast and IGMP proxy (RFC1112/ 2236)
IP routing with static routing and RIPv1/ RIPv2 (RFC1058/ 2453)
NAT ALGs for ICQ/ Netmeeting/ MSN/ Yahoo Messenger
Network address translation (NAT/ PAT) (RFC1631)
Support IP/TCP/UDP/ARP/ICMP/IGMP protocols
Bridging
IEEE 802.1D transparent learning bridge
IEEE 802.1q VLAN
Spanning tree protocol
Security
Advanced Stateful packet inspection (SPI) firewall (Optional Firewall Router)
Application level gateway for URL and keyword blocking (Firewall Router)
DMZ host/ Multi-DMZ/Multi-NAT function
Natural NAT firewall
User access control: deny certain PCs access to Internet service (Firewall Router)
Virtual server mapping (RFC1631)
VPN pass-through for PPTP/ L2TP/ IPSec tunneling
Management
Easy-to-use web-based GUI for quick setup, configuration and management
Menu-driven interface/Command-line interface (CLI) for Telnet access
Password protected management and access control list for administration
SNMP management with SNMPv1/ SNMPv2 (RFC1157/ 1901/ 1905) agent and MIB II(RFC1213/ 1493)
Software upgrade via web-browser/ TFTP server
ATM
AAL5
OAM F5 AIS/RDI and loopback
Up to 8 PVCs
ATM QoS
CBR (Constant bit rate)
UBR (Unspecified bit rate)
VBR-rt (Variable bit rate real-time)
VBR-nrt (Variable bit rate non-real-time)
AAL5 Encapsulation
Classical IP over ATM (RFC 1577)
Ethernet over ATM (RFC 2684/1483)
PPP over ATM (RFC 2364)
VC multiplexing and SNAP/LLC
PPP
PPP over ATM for fixed and dynamic IP (RFC 2364)
PPP over Ethernet for fixed and dynamic IP (RFC 2516)
User authentication with PAP/CHAP/MS-CHAP

Specifications

General Specification		
Power	AC 100V/ 220V, DC -48V	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumptin	100W	
Dimensions (WxDxH)	438 x 285 x 180mm	
Weight	6.5kg (empty chassis)	

Ordering Info

Rack Mount SHRM03 Chassis	
SHRM03-AA/CH	4U, 19" 14 slots Chassis for AC + AC Power
SHRM03-AD/CH	4U, 19" 14 slots Chassis for AC + DC Power
SHRM03-DD/CH	4U, 19" 14 slots Chassis for DC + DC Power
SHRM03-AC	AC100V, AC220V Power Module
SHRM03-ET100R	G.SHDSL (2loop/2W) 10/100Base-T Ethernet Router and Bridge (2 channels) ATM Base Line card

ATM Modem Series SHDTU03-ET10R/ SHDTU03F-ET10R SHDTU03A-ET10RS/ SHDTU03AF-ET10RS



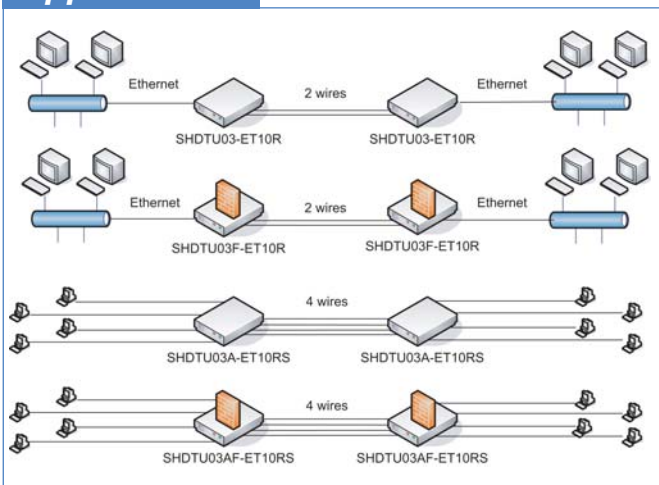
2-Wire/ 4-Wire SHDSL Router with single port or 4-port Switching Hub

The SHDTU03 ATM modem series are G.SHDSL2-wire/ 4-wire routers which comply with G.991.2 standards. The SHDTU03 family provides business-class, multi-range 64Kbps to 2.304/4.608Mbps payload rates over exiting single pair or two pairs copper wire. The SHDTU03, SHDSL router, 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 router allows customers to leverage the latest in broadband technologies to meet their growing data communication needs.

Features

- Adaptive rate installation maximizes data rate based on loop conditions
- Bandwidth guaranteed transmission equipment
- Can operate in point-to-point configurations
- Efficient single wire pair usage
- 'A' model support 4 wire operation
- Raw and time stamped statistics
- SHDSL Line performance monitoring
- Standard G.SHDSL (ITU G.991.2) support for improved reach/ speed and greater interoperability
- Use existing copper loop infrastructures
- Up to 2.304Mbps (2-wire) or 4.608Mbps (4-wire) symmetrical service bit rate

Application



Specifications

General Specification		
Standard	G991.2	
LEDs	General	PWR
	WAN	LNK, ACT
	LAN	10M/ACT, 100M/ACT (1-port router)
	SHDSL	ALM
Power	DC	-48VDC
Environment	Temperature	0 — 45°C (Operating); 20 — 70°C (Storage)
	Humidity	0% — 95% non-condensing
Power Consumption	9W	
Dimensions(WxDxH)	18.7cm x 14.5cm x 3.3cm	
Weight	400g	
Compliance	CE, FCC	
MTBF	TBA	

Ordering Info

SHDTU03-ET10R	Standalone 2-wire SHDSL router with single Ethernet port
SHDTU03-ET10RS	Standalone 2-wire SHDSL router with 4-port switching HUB
SHDTU03F-ET10R	Standalone 2-wire SHDSL router with firewall protection and single Ethernet port
SHDTU03F-ET10RS	Standalone 2-wire SHDSL router with firewall protection and 4-port switching HUB
SHDTU03A-ET10R	Standalone 4-wire SHDSL router with 4-port switching HUB
SHDTU03A-ET10RS	Standalone 4-wire SHDSL router with single Ethernet port
SHDTU03AF-ET10R	Standalone 4-wire SHDSL router with firewall protection and single Ethernet port
SHDTU03AF-ET10RS	Standalone 4-wire SHDSL router with firewall protection and 4-port switching HUB



Single port rear



4-port rear

IDSL Modem Series

I-DSL128



2-wire 2B1Q Leased Line Modem

DSL128 (Network Termination Unit) is designed for high speed data communication and internetworking transport services. It utilizes 2B1Q line coding and echo cancellation technique for full duplex and synchronous data transmission over a 2-wire line up to 5.5 Km. I-DSL128 supports power-on self-test and diagnostic capability for optimal speed calibration and trouble shooting. The diagnostic capabilities include Analog loopback, Digital loopback and BER Test. I-DSL128 is elegantly designed and easy to operate.

Its front panel is equipped with one 16 x 2 LCD, 4 push-buttons for configuration and 9 LEDs for status indication. The configuration procedure goes through a friendly menu-driven program. I-DSL128 is designed and suitable for providing Remote Access, LAN/WAN interconnection, Host connection, Internet transport etc. meeting high speed data services.

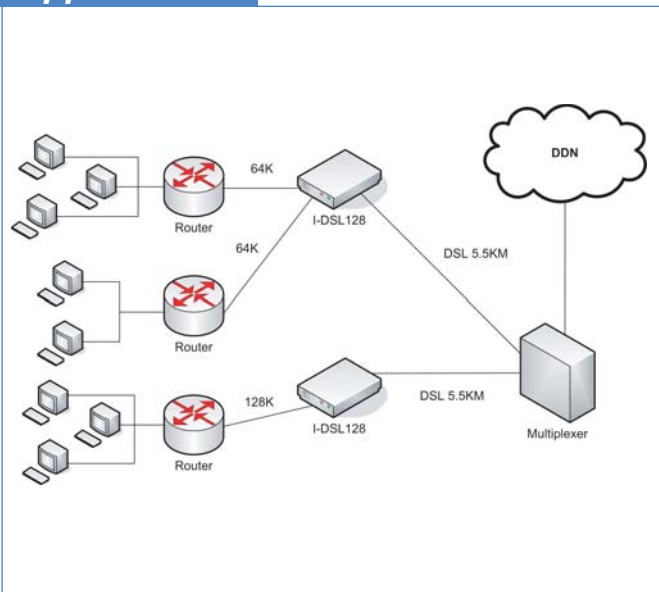
Features

- 2-wire full duplex operation
- DTE interface alternatives: EIA 530, RS449(via DB37), V.35 (via M34), V.36(via DB37)
- Line Coding: 2B1Q
- Menu-driven LCD (16 x 2), control panel for easy operation
- IRange: Up to 5.5Km over 26 gauge wire
- Synchronous: 64K or 128Kbps

Specifications

Network Interface		
Type	Full duplex with adaptive echo cancellation	
Line coding	2B1Q	
Line type	Unconditioned twisted pair, 19-26 AWG	
Surge protection	Meets FCC Part 68 subpart D	
Connector	RJ-11	
Diagnostics Test		
Loopbacks	Local Loopback ITU-T V.54 DTE Loopback ANSI T1.601 Payload Loopback	
Operation Range (BER<10 ⁻⁷)		
2-wire mode	Up to 5.5Km over 26 gauge wire Up to 7.0Km over 24 gauge wire	
Customer DTE Interface		
Number of Ports	1+1(optional)	
Data Rate	64K or 128Kbps (synchronous)	
Connector	EIA530, RS449 (via DB37 adapter), V.35 (via M34 adapter), V.36 (via DB37 adapter)	
General Specifications		
Standard	TBA	
Clock Source	Internal, Line, DTE-A or DTE-B	
Keypad	4 operation keys	
LEDs	PWR, ACT, TST, DTE-A [TD, RD, ERR], DTE-B [TD, RD, ERR]	
Power	AC 100 — 240VAC	
Environment	Temperature	0 — 50°C (Operating); -20 — 65°C (Storage)
	Humidity	10 — 90% non condensing
Power Consumption	10W	
Dimensions(WxDxH)	19.5cm x 16.8cm x 4.8cm	
Weight	850g	
Compliance	CE, FCC	
MTBF	TBA	

Application



Ordering Info

I-DSL128-AC	Standalone IDSL Modem, 2-wire, 2B1Q leased line CPE modem with one DTE interface connector, LCD panel, AC type
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IDSL Modem Series I-DSL64



2-wire 2B1Q Leased Line Modem

I-DSL64 is a G.703 64K co-directional Network Termination Unit designed for low-speed data communication and internetworking transport services. It utilizes 2B1Q line coding and echo cancellation technique for full duplex and synchronous data transmission over a 2-wire line up to 5.5 Km. I-DSL64 supports power-on self-test and diagnostic capability for troubleshooting. The diagnostic capabilities include analog loopback, digital loopback and BERT TEST. I-DSL64 is an easy to operate and elegantly designed equipment. Its front panel is equipped with one 2 x 16 LCD, 4 buttons for configuration and 7 LEDs for status indication. The configuration procedure goes through a friendly menu-driven program.

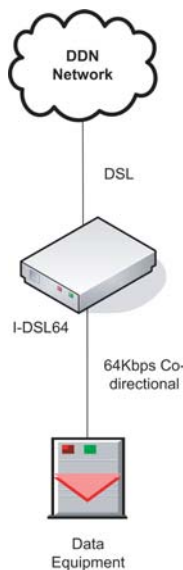
Features

- 2-wire full duplex operation
- Line coding: 2B1Q
- Menu-driven LCD (2 x 16), control panel for easy operation
- Range: Up to 5.5Km over 26 gauge wire
- Synchronous: G.703/64K Co-directional

Specifications

Network Interface		
Type	Full duplex with adaptive echo cancellation	
Line coding	2B1Q	
Line type	Unconditioned twisted pair, 19-26 AWG	
Surge protection	Meets FCC Part 68 subpart D	
Connector	RJ-11	
Diagnostics Test		
Loopbacks	Local Loopback ANSI T1.601 Payload Loopback	
Operation Range (BER<10⁻⁷)		
2-wire mode	Up to 5.5Km over 26 gauge wire Up to 7.0Km over 24 gauge wire	
Customer G703/64K Co-directional interface		
Data rate	64K	
Connector	DB15 Female	
Line Code	Co-directional	
General Specifications		
Standard	G.703	
LEDs	PWR, ERR, SYNC, BERT, Tx, Rx	
Power	AC	90 — 240VAC
	DC	-48VDC
Environment	Temperature	5 — 50°C (Operating); -20 — 65°C (Storage)
	Humidity	10 — 90% non condensing
Power Consumption	10W	
Dimensions(WxDxH)	19.5cm x 16.8cm x 4.8cm	
Weight	850g	
Compliance	CE, FCC	
MTBF	TBA	

Application



Ordering Info

I-DSL64	Standalone IDSL Modem, 2-wire, 2B1Q leased line CPE modem, support G.703/64 co-directional transmission LCD panel, support AC or DC type.
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4. IP Networking



IP Networking Selection Table

C/Compact

Ethernet Family				
Network Type	Product Name	Description	Product Type	Page
IP Router	IPR10	10M BASE TX to RS-232	C	4-3
IP Router	IPR20	10M BASE TX to RS-232	C	4-3
WAN Bridge	ET-100	10/100M BASE TX to RS530, V35, RS449, X.21, RS232	C	4-4
Serial Access Unit	STE-10	Serial Stream over IP Network	C	4-5

Fiber Series

Access Series

XDSL Series

4
IP
Networking

Testers

Interface
Converter

Datacom
Accessories

Network
Management

LAN/ WAN Ethernet Router IPR10/ IPR20



Stand-Alone Modem Ethernet IP Router

The Ethernet Series IP Router is a compact, low cost solution for LAN IP routing, remote access or LAN-to-LAN routing. The IP Router functions allow small offices to incorporate corporate-like features in their networks, yet are simple enough to not require a full-time network administrator. The IP Router has models that support one (1), two (2), or four (4) WAN ports. The ports are designed for direct connection with standard modems or ISDN Terminal Adapters. The WAN ports may be configured for Internet access, remote access, or LAN-to-LAN routing.

Features

- Allow remote access to the LAN for mobile users
- ASYNC WAN Ports provide RS-232 up to 460 Kbps
- Compatible with existing 14.4, 28.8, 33.6, and 56K modems or ISDN TAs
- Connect branch or remote offices over standard dial-up phone lines
- Connect the entire network to the Internet with just one modem and ISP account
- Installation wizard for easy setup under Windows or NT
- Provides DHCP function to supply client IP address, subnet, DNS, and Gateway
- User password setting or Radius authentication for Remote Access
- Share modems and phone lines for increased bandwidth

Specifications

Standard	IEEE802.3 10Base-T	
Number of port	IPR10	1LAN (UTP); 1WAN (RS-232)
	IPR20	1LAN (UTP); 2WAN (RS-232)
WAN port speed	460Kb	
Bandwidth Control	User/ Traffic/ Detect	
Network Management S/W	Monitor & Log	
Configuration	GUI/Console	
Flash Memory	256Kb	
LEDs	PWR, LAN Link, Serial TD and RD	
Power	AC	12VAC
Environment	Temperature	0 — 50°C (Operating); -20 — 65°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	50W	
Dimensions(WxDxH)	7.9mm x 13.5mm x 2.5mm	
Weight	150g	
Compliance	FCC Class B, CE	
MTBF	TBA	

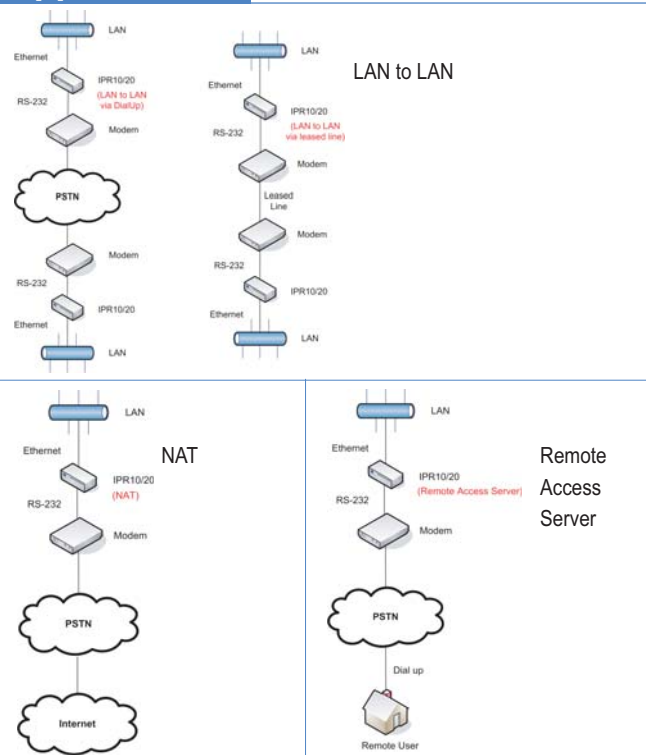
Technical Features

Internet Access	Protocol:TCP/IP
	NAT (network address translation)
	Dial-out
	Dial-on-demand
Remote Access Server	IP Mapping
	Protocol:TCP/IP, IPX/SPX
	Static Routing
	Dial-in (with call back)
	Supports RADIUS client authentication
LAN-to-LAN Routing	Novell client
	DHCP client server
	Protocol:TCP/IP
	LAN-to-LAN IP Routing
	Dial-on-demand
	Supports RADIUS client authentication
	Dial-in/Dial-out (with call back)
	DHCP client server

Ordering Info

IPR10	LAN Port: UT P x 1 Speed: 10 Base-T WAN Port: RS-232 x 1 Speed: 460Kbps
IPR20	LAN Port: UT P x 1 Speed: 10 Base-T WAN Port: RS-232 x 2 Speed: 460Kbps

Application



10/100Mbps Ethernet Bridge ET100

Ethernet network connections over 2Mbps lease lines

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 and 100Base-TX LAN and various dataport interfaces convenient.



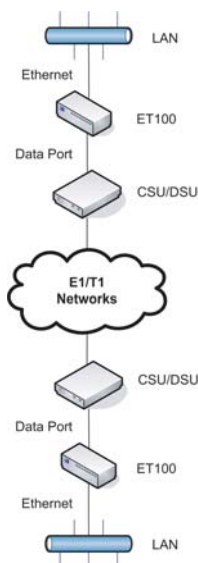
Features

- Automatic LAN table learning and aging
- Auto-MDI/MDIX detects and corrects crossed cable
- Built-in n x 64K / n x 56K timing clock generator for Sync WAN link
- IEEE 802.3x flow control
- High performance bridge for 10Base-T or 100Base-TX Ethernet extension
- Selectable data port interfaces: V.35, RS-530, RS-449, X.21, and RS-232. (with cable adapters)
- Transparent half / Full duplex support on WAN / LAN interface

Specifications

Standard	IEEE 802.3/10Base-T, IEEE 802.3u/100Base-TX	
Connector	RJ-45	
Bridge	LAN Table	256 MAC address with 5 minute automatic aging
	Filtering and Forwarding	15,000 frame/sec
	Buffer	256 frames
	Delay	1 frame
LEDs	LAN/ WAN Link and activity status	
Power	DC 9VDC	
Environment	Temperature	0 — 50°C (Operating); -20 — 65°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	<5W	
Dimensions(WxDxH)	7.9mm x 13.5mm x 2.5mm	
Weight	150g	
Compliance	FCC, CE	
MTBF	TBA	

Application



Ordering Info

Model Number	WAN (Dataport)	LAN Port
ET100/ V35	V.35 Interface	10/100Base-TX
ET100/ X21	X.21 Interface	10/100Base-TX
ET100/ 530	RS-530 Interface	10/100Base-TX
ET100/ 449	RS-449 Interface	10/100Base-TX
ET100/ 232	RS-232 Interface	10/100Base-TX

Serial stream over IP Network STE-10

Serial Access Unit



The STE-10 Serial Access Unit is a low cost, compact, serial access server or terminal server for connecting asynchronous serial devices (RS-232) over Ethernet (10Base-T) using a TCP/IP protocol stack. The STE-10 may operate in either a client mode or as a server, allowing connection of a serial line directly over a LAN or WAN. Configuration may be performed either via the DB25 pin RS-232 port with an ASCII terminal or via Telnet and Ethernet connection to the RJ-45 LAN port. The serial port is DTE, which allows direct connection to DCE equipment such as Modems. For connection to other DTE equipment such as a PC, a NULL Modem or crossover cable is required.

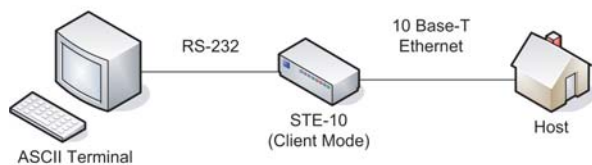
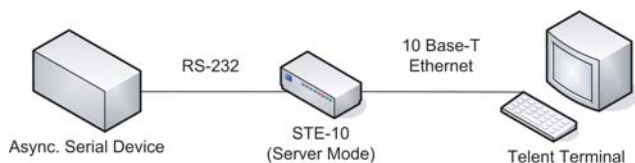
Features

- Complete TCP/IP protocol stack (OSI Network Layer 3)
- Low cost, compact design
- Operates in either server or client mode
- Provides packetization of serial data
- Serial connection over Ethernet

Specifications

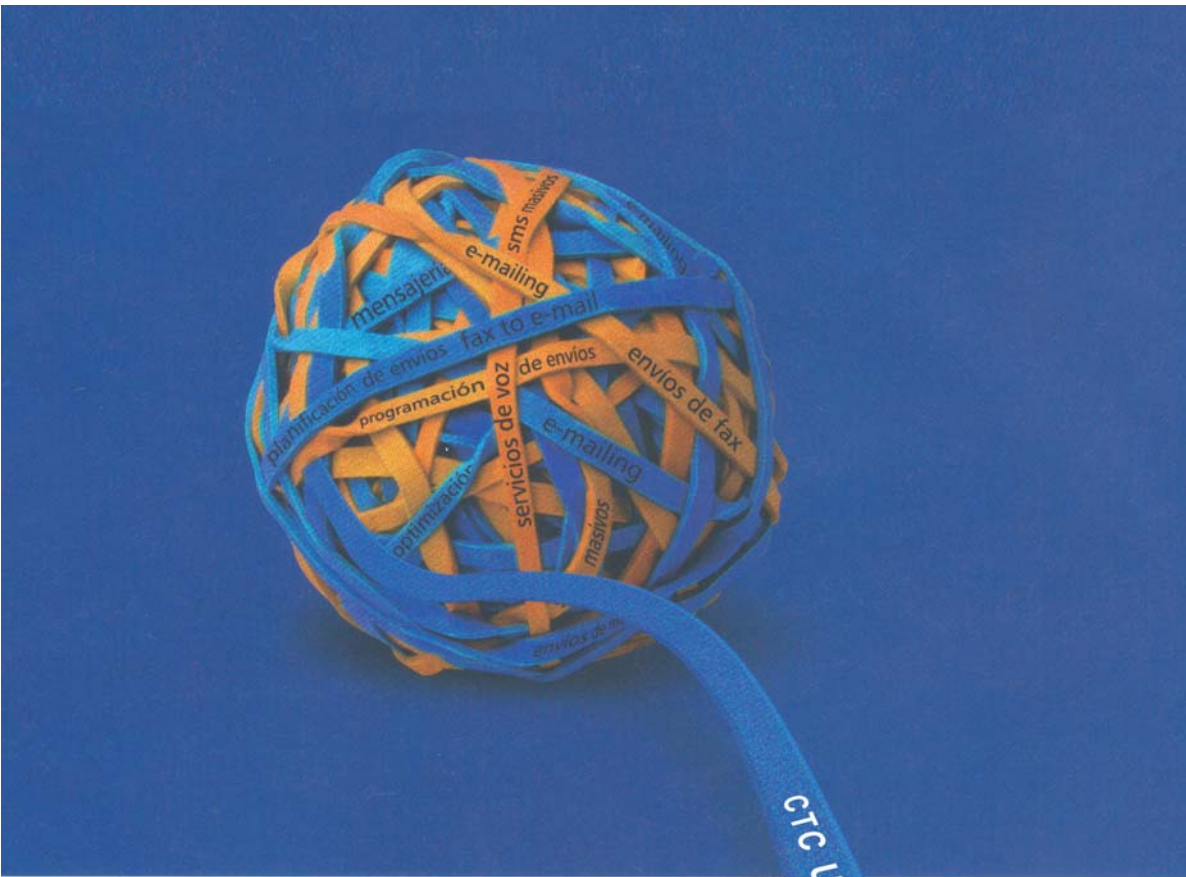
Standard	IEEE802.3 10Base-T Ethernet	
Connector	RJ-45	
CPU	80188	
ROM/ RAM	256K Flash/ 256K DRAM	
Interface	EIA RS-232 Async serial, DB25M	
Baud Rates	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800	
Data Length	5, 6, 7, or 8 bits	
Parity	None, Odd, or Even	
Stop Bits	1 or 2 bits	
Handshaking	None, RTS/CTS, or Xon/Xoff	
Flash ROM	Boot without network host; provision for easy software upgrades	
Protocols	TCP/IP, ARP, ICMP protocols	
Functions	Telnet/ Reverse Telnet	
Configuration	Telnet, ASCII terminal, or Remote Dial-in	
LEDs	PWR, LAN Link, Serial TD and RD	
Power	AC	12VAC
Environment	Temperature	0 — 50°C (Operating); -20 — 65°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	50W	
Dimensions(WxDxH)	79mm x 135mm x 25mm	
Weight	150g	
Compliance	FCC, CD	
MTBF	TBA	

Application



Ordering Info

STE10	Serial-10-Ethernet, server 10 BaseT/ RJ45 to RS232 Serial interface/ DB25
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ARE YOU
LOOKING FOR
THE BEST NETWORK
SOLUTIONS?

5. Telecom Testers



Telecom Testers Selection Table

S/Standalone

Protocol Tester				
Network Type	Product Name	Description	Product Type	Page
Tester	HCT-7000	E1/ T1/ Datacom, Protocol and BERT	S	5-3
Tester	HCT-6000	Datacom Protocol and BERT tester	S	5-5
Tester	HCT-6000A	Datacom Protocol and BERT tester	S	5-5
Tester	HCT-BERT/H	E1/ T1/ Datacom, BERT	S	5-6
PCM Analyzer				
Network Type	Product Name	Description	Product Type	Page
Tester	BTM10	E1/ T1/ Datacom Transmission Analyzer/ BERT	S	5-7
LAN				
Network Type	Product Name	Description	Product Type	Page
Tester	LCT-300	LAN cable continuity/ ID tester	S	5-10
Tester	LCT-400	LAN cable continuity/ ID tester	S	5-10
Fiber				
Network Type	Product Name	Description	Product Type	Page
Tester	OTRD30A	Handheld OTDR	S	5-11
Tester	OPM-100	Optical Power Meter	S	5-12
Tester	OPM-250	Optical Power Meter	S	5-12

Fiber Series

Access Series

XDSL Series

IP Networking

5 Testers

Interface Converter

Datacom Accessories

Network Management

Bert & Protocol Analyzers HCT-7000

E1/ T1/ Datcom, Protocol and BERT tester

The HCT-7000 is a portable, battery powered 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.



I/F Module

Features

- Auto Configuration
- ASYNC terminal emulation
- File Management, upload/download file or captured data to PC for analysis
- Menu driven setup
- Self Tests and Diagnostics
- Frame Relay Analysis S/W Package:
 - 1). 2M frame monitor and emulation based on ITU Q.933, ANSI T1.618/T1.617 and RFC1490 (RFC2427) packets
 - 2). PING
 - 3). LMI setup
- User password setting or Radius authentication for Remote Access
- Histogram Analysis (optional)

Specifications

General Specifications		
Interface Modules (Dual Port)	Datcom Interface Module E1 Interface Module	RS-232C/D (V.24), RS-449 (V.36), RS-530, X.21, V.35 G.703 E1 (2048K)
Basic Interfaces	Centronics printer & Craft control serial port	
Protocols	Async, Sync (BSC), HDLC, SDLC, X.25, Frame Relay, SS#7, PPP (Sync.), V5.1.	
Data Rate	ASYNC SYNC	50 — 256Kbps 150 — 2048Kbps
Data Code	ASCII, EBCDIC, HEX, IPARS, Transcode, EBCD	
Data Length	ASYNC SYNC	5,6,7, or 8 bits 8 bits
Parity Bit	ASYNC	None, Odd, Even, Mark, Space
Stop Bits	ASYNC	1, 2
Display Modes	Data only Data and Lead	Full Duplex/ Half Duplex Status/ Frame and Packet
Error Check	None, Parity, LRC, CRC-16, CRC-CCITT	
LCD Display	320 x 240 dots graphic	
Capture Buffer	SDRAM	
Line Monitor	DTE, DCE, DTE & DCE	
Emulation	DTE, DCE & MONITOR only	
LEDs	System Datcom I/F Module E1 I/F Module	External power, I/F 1 Error, I/F 2 Error, Paused TD, RD, RTS, CTS, DSR, DTR, DCD, RI, XTC, TC, RC, RL, LL, TM Signal Present, HDB3, Signal Loss, FAS Loss, AIS, RAI, MRAI, MFAS Loss, CAS Loss, Pattern Loss, Excess Zero, Error
Power	AC DC	100 — 240VAC Adapter 19VDC
Environment	Temperature Humidity	0 — 50°C (Operating); -20 — 65°C (Storage) 0 — 90% non condensing
Power Consumption	TBA	
Dimensions(WxDxH)	220mm x 65mm x 275mm	
Weight	1.6Kg	
Compliance	TBA	
MTBF	TBA	

Specifications - Datcom 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 = 1~32)
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, 2 ⁹ -1 (511), 2 ¹¹ -1 (2047), 2 ¹⁵ -1 ITU standard, 2 ¹⁵ -1 non-standard(inverted), 2 ²⁰ -1 ITU standard, 2 ²⁰ -1 non-standard(inverted), QRSS, 2 ²³ -1 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
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, 10 ³ , 10 ⁴ , 10 ⁵ , 10 ⁶ , or 10 ⁷
Flow Control
DCE permitted to transmit on RTS signal or not DTE permitted to transmit on CTS signal or not

Specifications - G.703 E1/T1 BERT

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

BERT Display Format

Normal ITU-M.2100 (option)
ITU G.821

BERT Transmit Error Rate

Force Single Error: Logic (Bit), Frame, CRC, and BPV (Bipolar Violation)

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 (SESER)

G.826 background block error ratio (BBER)

LOF (Loss of Frame) Events

COFA (Change of Frame Alignment) Events

Severely Errored Frame Count

Ordering Info

HCT 7000

A Master unit include a backlight LCD, switch keyboard, interface lead indicator LEDs, internal rechargeable battery, AC power adapter (90-260VAC), sturdy carry case

Hardware Options

E1 Interface Module
E1 Logic, Frame, CRC, BPV, E-bit BERT, G.821/826 BERT, M.2100 BERT.
Two BNC ports, the standard accessories are two BNC to BNC 75 ohm cables

Optional Adaptor Cables for E1 I/F
DB15/RF-45 adapt
CAB-DB15BANF2-E1
CAB-DB15BANM2-E1
CAB-BANMIPM-E1
CAB-BAN3PSM-E1

Datacom Interface Module
Two HD26 ports supporting RS-232, V.35, RS-530/RS-449, X.21 interface. The

Optional Adaptor Cables for Datacom I/F
CAB-HD26DB25M(F)-232-1
CAB-HD26DB25M(F)-530-1
CAB-HD26DB25M(F)-449-1
CAB-HD26DB25M(F)-X21-1
CAB-HD26DB25M(F)-V35-1

Software Options

Frame Relay Suite
Frame Relay Emulation & Monito, PING and LMI setup

SS#7 F/W
E1/T1 CCS SS#7 Protocol Analysis
Firmware Pack

ISDN F/W
T1 CCS ISDN-D Channel Protocol Analysis
Firmware

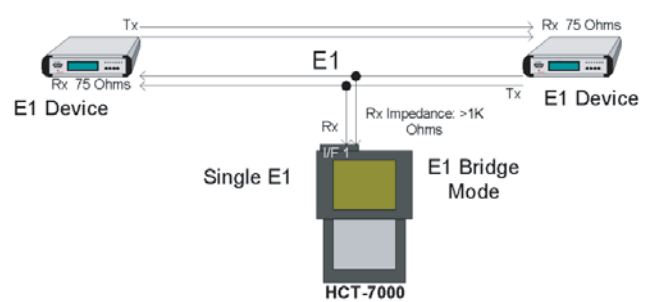
V5 F/W
E1 CCS V5.1/V5.2 Protocol Analysis

Application

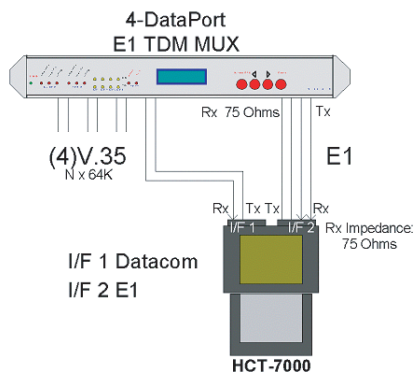
E1 Terminal Mode



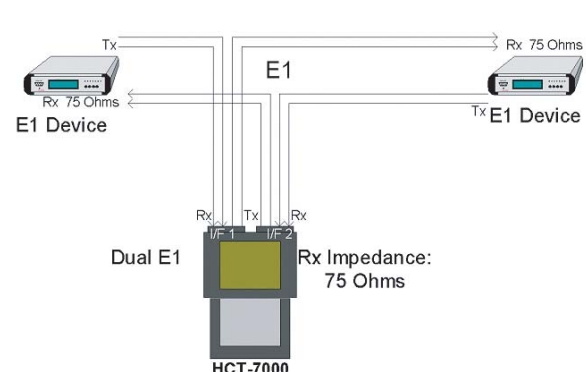
E1 Bridge Mode



MUX feature - E1 BERT & Datacom BERT



E1 Dual Port - Drop and Insert BERT Test



Bert & Protocol Analyzers HCT-6000/ 6000A



Bert and Datacom Protocol tester

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 2M BERT.

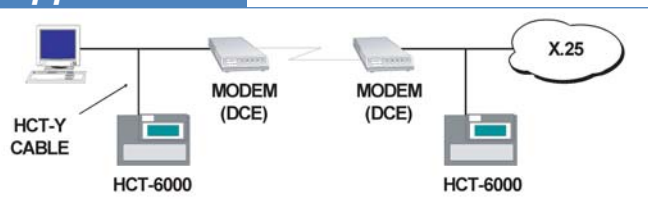
Features

- 128K BERT (Low Speed)
- 2M BERT (High Speed)
- ASYNC terminal emulation
- Auto Configuration and Scan
- File Management
- Frame Relay Analysis
- Menu driven setup
- On-Line Monitor
- Remote Control
- Self Tests and Diagnostics
- System Reset Function
- Up/Down Load

Specifications

Basic Interfaces	RS-232C/(V.24), RS-449(V.36), RS-530, X.21,V.35, Centronics Printer port, Remote control port (RS-232 async)	
Protocols	ASYNC, SYNC(BSC), HDLC, SDLC, X.25, DDCMP	
Optional	Frame Relay, SNA, PPP, SLIP	
Data Rate	ASYNC	50 — 115,200bps
	SYNC	150 — 128,000bps
Data Code	ASCII, EBCDIC, HEX, IPARS, RANSCODE, EBCD	
Data Length	ASYNC	5,6,7, or 8 bits
	SYNC	8 bits
Parity Bit	ASYNC	None, Odd, Even
Stop Bits	ASYNC	1, 1 1/2, 2
Display Modes	Data only	Full Duplex/ Half Duplex
	Data and Lead	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 or DCE	
BERT Patterns	63, 511, 2047, FOX (ASCII), SPACE, MARK, ALT	
BERT Speed	2Mbps (N x 56, N x 64) 128Kbps (HCT6000A)	
LEDs	Leads	TD, RD, RTS, CTS, DSR, DTR, DCD, TC, RC, XTC (both SPACE and MARK)
	Interface	RS-232, V.35, RS-530/449, X.21
	External power	External adapter in use, Sync Loss & Battery low
	I/F power	DC9V out RS-232 I/F pin 9 is on
Power	AC	100 — 240VAC Adapter
	DC	12VDC
Environment	Temperature	0 — 50°C (Operating); -20 — 65°C (Storage)
	Humidity	0 — 90% non condensing
	Power Consumption	TBA
Dimensions(WxDxH)	173mm x 237mm 37mm	
Weight	1.1Kg	
Compliance	TBA	
MTBF	TBA	

Application



Ordering Info

HCT 6000	A Master unit includes a backlight LCD, pushbutton switch keyboard, internal rechargeable battery, AC power adapter (100~240VAC), soft shell carry case
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Hardware Options

There is one remote control port (RS-232 async) and one printer port (Centronics)

The standard cable accessories include one remote control cable DB9M to DB9F+DB25F and one printer cable DB15M to C36M

Software Options

Optional software packages: Frame Relay, PPP/SLIP, SNA ROM, G.826, M.2100

E1/ T1/ Datacom BERT HCT-BERT/H



E1/ T1/ Datacom Bit Error Rate tester

The HCT-BERT/H Bit Error Rate tester is a compact, notebook sized E1/T1 PCM measuring instrument designed for field use in analysis and maintenance of E1 (2.048Mbps) or T1 (1.544Mbps) lines. The HCT/BERT-H performs framed, unframed, signaling analysis, drop and insert Nx64Kbps, or nx56Kbps data into any time slot. The HCT-BERT/H series analyzer also provides a variety of E1 or T1 line statuses, transmission performance testing (BERT) and monitoring. On the E1 or T1 line, the HCT-BERT/H series product may be used as a generator or receiver.

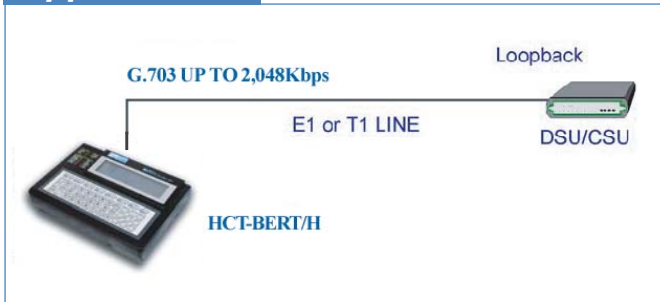
Features

- Internal Memory storage of test result. / Direct display on LCD screen
- Loop Back Code Setting and Detection: IN Band, Out Band and ITU-T V.54 BERT Histogram Analysis
- Portable for field use
- Results Report
- Round Trip Delay Measurement
- Signaling Display: Display all channels of ABCD bits
- Supports CRC, and BPV performance analysis and generator
- User Programmable Pattern Setting: There are three 32 bit programmable patterns, which can be inserted onto the E1/T1 line and drop for analysis
- Upgradeable for advanced features
- DS0 Control Loop Codes (optional): TIP, LSC, LBE, FEV
- Print out via Parallel Printer port / Print out via RS-232 Series Port (option)

Specifications

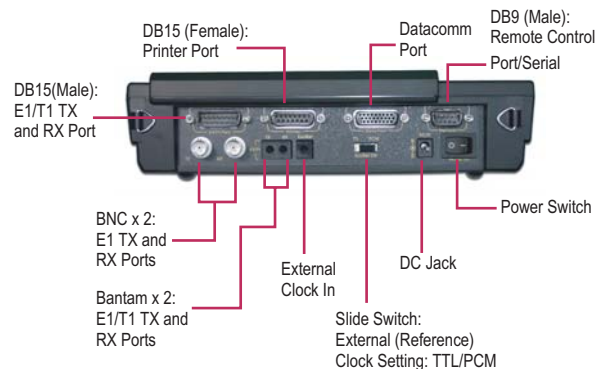
Standard	ITU Q.921,Q.931	
Timeslot	Setting	Available, bypassed, or idle timeslot, Drop and Insert N x 64k data onto E1/T1 line
	Mapping Data	Analyze any channel data of two frames
LCD display	32 Characters x 8 Lines, Text/ Graphic mode	
Power	AC	100 — 240VAC Adapter
	DC	12VDC
Environment	Temperature	0 — 50°C (Operating); -20 — 65°C (Storage)
	Humidity	0 — 90% non condensing
Power Consumption	TBA	
Dimensions(WxDxH)	220mm x 65mm x 275mm	
Weight	1.6Kg	
Compliance	TBA	
MTBF	TBA	

Application



Ordering Info

HCT-BERT/H E1/T1 Datacom BERT Analyzer



Bert & Protocol Analyzers BTM10



PCM Analyzers

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 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

- BERT Histogram Analysis
- Color LCD display 32 Characters x 8 Lines, Text / Graphic mode
- Portable for field use
- Print out via Parallel Printer port
- Rechargeable Battery with battery low indicator
- Results Report: Internal Memory storage of test result:
Direct display on LCD screen
Print out via Parallel Printer port
Print out via Parallel Printer port
- Upgradeable for advanced features
- Loop Back Code Setting and Detection:
IN Band and Out Band
- Pulse Wave Analyzer (optional):
ITU G.703(E1), ANSI T1.403(T1) & ITU G.703(T1)
- DS0 Control Loop Codes (optional):
TIP, LSC, LBE, FEV
- VF Noise Measurement (optional):
C-Message Weighting, P-Weighting

Specifications

General Specifications		
Power	AC	100 — 240VAC Adapter
	DC	12VDC
Environment	Temperature	0 — 50°C (Operating); -20 — 65°C (Storage)
	Humidity	0 — 95% non condensing
Power Consumption	10W	
Dimensions(WxDxH)	235mm x 173mm x 54mm	
Weight	1.6Kg	
Compliance	TBA	
MTBF	TBA	

Functions

E1 BERT Analysis	E1/T1 frame, 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
VF Noise Measurement	C-Message Weighting, P-Weighting
Pulse Shape	E1/T1 pulse shape mask
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
Examine Analysis	Off-line analysis of BERT performance
External Drop & insert User Programmable	Acts as a Fractional E1 or T1 converter 32 bit Programmable patterns which can be inserted onto the E1/T1 line and drop for analysis
Pattern Setting	Available, bypassed, 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	Multiframe Sa bits setup and monitor.(E1 only)
File Management	Ten configuration and result memory locations can be stored and recall by user
ISDN Analysis	Digital Subscriber Signaling System No.1 (DSS 1)-Monitoring ISDN D-Channel Signaling information (ITU Q.921,Q.931)
V5.1/V5.2 Analysis	Monitoring V5 Signaling information

Specifications - E1

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	
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 — -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 — 1000Hz
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 CoaxialPair 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	Internal Timing: 2.048MHz ± 3ppm	
	Internal Timing + 50ppm offset (30ppm factory option)	
	Internal Timing - 50ppm offset (30ppm factory option)	
	Recovery from RX Timing (Loop Timing)	
	External Timing Data Port Timing	
E1/CEPT Frame Structure	Unframed	
	FAS (PCM31)/ FAS+CRC4 (PCM31 with CRC)	
	FAS+CAS (PCM30)/ FAS+CRC4+CAS (PCM30 with CRC)	
Line Build Out	0dB, -7.5dB, -15dB, -22.5dB (Accuracy: ±1dB)	

Specifications - T1

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)	
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 ± 5% resistive Receive Sensitivity: up to -30dBdsx
	Receive Timing Range	1.544MHz ± 4000Hz
Transmitter Interface of T1/DS1		
Bit Rate	1544K bit/s ± 3ppm	
Line Code	B8ZS/ AMI	
Pulse characteristics	Meets ITU G.703	
Pluse 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	Internal Timing: 1.544MHz ± 3ppm	
	Internal Timing +50ppm offset (30ppm factory option)	
	Internal Timing -50ppm offset (30ppm factory option)	
	Recovery from RX Timing (Loop Timing)	
	External Timing Data Port Timing	
T1/DS1 Frame Structure	ESF/ ESF+CRC6/ D4(SF)/ SLC-96/ T1DM/ Unframed	
Line Build Out	0dB, -7.5dB, -15dB, -22.5dB (Accuracy: ±1dB)	

Fiber Series

Access Series

XDSL Series

IP Networking

5 Testers

Interface Converter

Datacom Accessories

Network Management

Specifications - G.703 E1/T1 BERT

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

BERT Display Format

Normal ITU-M.2100 (option)

ITU G.821

BERT Transmit Error Rate

Force Single Error: Logic (Bit), Frame, CRC, and BPV (Bipolar Violation)

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 - 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 = 1~32)

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), 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).

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, 10³, 10⁴, 10⁵, 10⁶, or 10⁷

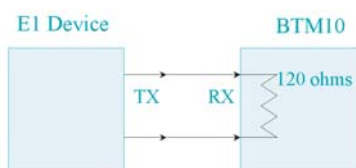
Flow Control

DCE permitted to transmit on RTS signal or not

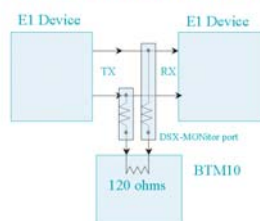
DTE permitted to transmit on CTS signal or not

Application

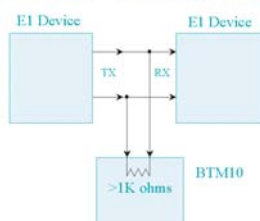
Receiver in Terminal Mode



Receiver in Monitor Mode



Receiver in Bridge Mode



Ordering Info

BTM10-E1	E1 PCM Multi-Tester with Full Features
BTM10A-E1	E1 PCM Multi-Tester without Pulse Shape Feature
BTM10B-E1	E1 PCM Multi-Tester without Datacom Feature
BTM10C-E1	E1 PCM Multi-Tester without Pulse Shape and Datacom Feature

E1/ T1/ Datacom BERT LCT-300/ LCT-400

LAN Cable Tester

The LCT300/ 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.



Features

- Automatic power shut down feature for extended battery life
- Auto scan pin assignment
- Battery low indicator
- Can review the captured pin assignment and failure status
- Easy to read cable status and verify cable continuity; open, short, and mismatches
- Easy to read LCD display, with 2 line by 12 characters with LCD back light
- Hand-held and easy to operate
- 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

Features - extra on LCT-400

- Easy to identify RJ-45 and BNC cable types against preset wiring schemes
- 10Base-2

Application



Specifications

Connectors	RJ-45	
Control keys	ENTER, MODE, ESC	
Power	DC	9VDC
Environment	Temperature	5 — 45°C (Operating); -20 — 65°C (Storage)
	Humidity	0 — 90% non condensing
Dimensions(WxDxH)	65mm x 154mm x 35mm	
Weight	300g	
MTBF	TBA	

Cable & Recognized Wiring Schemes

Tests for shielded and non-shielded cable types
Unshielded Twisted Pair (UTP 100ohm category 3, 4 & 5)
Foil shielded Twisted Pair (FTP 100ohm and 120ohm Category 3)
Shielded Twisted Pair (STP 150ohm type 1 & 6)
10Base-T, 100Base-TX and 100Base -T4
TP-PMDEIA/ TIA-568A/B
Token Ring
USOC
10Base/ HUB (AT&T 258A)
Plus user defined

Ordering Info

LCT-300 BK	Basic unit with Back Light and (1) terminators
LCT-400 BK	LCT-300 plus (2) RJ-45 to BNC adapters
LCT-T/X-R	X=ID of terminator (1 - 8)

Plug & play OTDR OTDR-30A

Optical Time Domain Reflectometer



CTC Union's OTDR-30A (Optical Time Domain Reflectometer) is an 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 and backlight design makes testing work more comfortable and convenient, whether during daylight or at night. As a fault locating and analyzing tool, CTC Union's OTDR 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 with Window(r) 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 will become an indispensable tool that all network builders and maintenance personnel of optic fiber networks should have in their tool kit. With portability in mind, 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

Application

- Splicing loss detection
- Fiber attenuation measurement
- Acceptance testing
- Fiber break locating
- Fiber length measurement
- Fiber identification

Specifications

Dynamic Range	24/ 24dB	
Wavelength	1310/ 1550 ±20nm	
Fiber Type	Single Mode	
Optical Connection	Single Port	
Emitter Type	LD	
Connector Type	FC/ PC	
Selectable Range	1.3, 2.5, 5, 10, 20, 40, 80, 120km	
Selectable pulse width	30ns, 100ns, 275ns, 1s, 2.5s	
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	NiMH charable battery	13.8 VDC/ 1.2A
Environment	Temperature	-10 — 50°C (Operating); -20 — 65°C (Storage)
	Humidity	0 — 95% non condensing
Power Consumption	17W	
Dimensions(WxDxH)	196mm x 100mm x 60mm	
Weight	870g	
Compliance	CF, FCC	
MTBF	TBA	

Ordering Info

OTDR-30A	OTDR, dual wav elength, single mode Instrument (including rechargeable battery), PC Analysis software program, USB drivers and user manual disk, Data transfer cables, AC adapter, Protective cover, Carrying case, Certificate of calibration
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OPM Series

OPM-100/ OPM-250



Optical Power Meter

The CTC Union OPM-100/ 250 optical power meters are compact, lightweight and easy-to-use testing instruments for optical fiber network, with unique characteristics of quick testing. Widely favored for their quality, value, reliability, accuracy and safety. The pocket-size OPM series can support accurate testing of single mode and multimode optical fiber systems, with features of large LCD display, damp and shock proof design and dual-way powering system. The internal microprocessor and linear amplifier technology ensure the long-time accuracy.

There are two models in CTC Union OPM family, which are OPM-100/ 250. The wavelength range of OPM series covers from 633nm to 1625, and the measurement power range is from -70dBm to +27dBm. OPM-250 has a large memory capacity of 3200 records and can transfer the measurement data to a PC for editing and printing.

Features

- Absolute power measurement units in dBm or μ W
- Auto off function conserving battery life
- Damp, dust and shock proof design
- Direct loss measurement units in dB
- Dual-way powering system including a 9V battery and an optional power adapter
- Fast response, no warm up
- Interchangeable fiber-optic adapters (choice of FC, SC or ST)
- Measure six wavelengths through a single connector
- PC software available for testing data collection and report generation (only available for OPM-250)
- Pocket-size, large easy to read LCD display, easy to use
- Low-Battery indication

Specifications

Calibrated Wavelength	OPM-100	850, 1300, 1310, 1550nm
	OPM-250	850, 980, 1300, 1310, 1480, 1550, 1625nm
Measure Range	OPM-100	-70 — +10dNm
	OPM-250	-50 — +27dNm
Functions	OPM-100	W/ μ W/ dBm, auto-zeroing
	OPM-250	W/ μ W/ dBm/ dB (REF), auto-zeroing, data hold (When operated by RS-232x), etc
Data Storage	OPM-100	N/A
	OPM-250	3200 records
Data Interface	OPM-100	N/A
	OPM-250	RS-232
Detector Type	InGaAs	
Range of Use	Single/ Multiple mode fiber	
Accuracy	\pm 0.25dB (5%) @25°C & -10dBm	
Resolution	0.01dB	
Connector	FC/ PC (Interchangeable SC, ST)	
Auto Shut Off	Five Minutes after last key has been depressed	
Power	9V Alkaline battery	(450mAh)/ optical 9V AC adapter
Environment	Temperature	0 — 50°C (Operating); -20 — 60°C (Storage)
	Humidity	0 — 95% non condensing
Power Consumption	4W	
Dimensions(WxDxH)	145mm x 75mm x 25mm	
Weight	300g	
Compliance	CE, FCC	
MTBF	TBA	

Ordering Info

OPM-100	Optical Power Meter
OPM-250	Optical Power Meter with PC software
Standard Accessories	Instrument, 9V alkaline battery, Data upload software installation disk, Data transfer cable, AC adapter(optional), Latex protective cover(or optional holster), Carrying case(optional), Warranty card, CE certificate, Certificate of calibration, User's manual.

6. Interface Converters



Interface Converters Selection Table

C/Compact

RS-232 Based IP				
Network Type	Product Name	Description	Product Type	Page
RS-232	V35IP	RS-232 to V.35	C	6-3
RS-232	449IP	RS-232 to RS-449	C	6-3
RS-232	X21IP	RS-232 to X.21	C	6-3
RS-232	V35IP-CAB	RS-232 to V.35 Cable	C	6-4
V.35 Base IP				
Network Type	Product Name	Description	Product Type	Page
V.35	V35/530IP	V.35 to RS-530	C	6-5
V.35	V35/449IP	V.35 to RS-449	C	6-5
V.35	V35/X21IP	V.35 to X.21	C	6-5
RS-232 to RS-485				
Network Type	Product Name	Description	Product Type	Page
V.35	IC485-3	RS-232 to RS-435	C	6-6
4ch RD-232 to TTL/CMOS				
Network Type	Product Name	Description	Product Type	Page
RS-232	ic232TTL	DB9F-RS-232 to DB9M-TTL/CMOS	C	6-7
RS-232 to RS-442/485				
Network Type	Product Name	Description	Product Type	Page
RS-232	IC485IP-1F	Async RS-232, DB25 male to RS422/ RS-485, 4 screw terminal	C	6-8
RS-232	IC485IP-1M	Async RS-232, DB25 female to RS422/ RS-485, 4 screw terminal	C	6-8
RS-232	IC485IP-2	Async RS-232, DB25 female to RS422/ RS-485, RJ-45	C	6-8
V35 to RS-485				
Network Type	Product Name	Description	Product Type	Page
V.35	V35/485-1	V.35 to RS-485	C	6-9
RS-232 Short Haul Modem				
Network Type	Product Name	Description	Product Type	Page
RS-232	IC232IP-SM/M	Async RS-232 Short Haul Modem, RJ-45 connector	C	6-10
RS-232	IC232IP-SM/F	Async RS-232 Short Haul Modem, RJ-45 connector	C	6-10
RS-232	IC232IP-2M	Async RS-232 Short Haul Modem, 4-screw connector,DB25M	C	6-10
RS-232	IC232IP-2F	Async RS-232 Short Haul Modem, 4-screw connector,DB25F	C	6-10
RS-232 Current Loop				
Network Type	Product Name	Description	Product Type	Page
RS-232	icCL-2/M	RS-232, Current loop converter	C	6-11
RS-232	icCIL-2F	RS-232, Current loop converter	C	6-11
Async to Sync Converter				
Network Type	Product Name	Description	Product Type	Page
RS-232	icAS/IP	RS-232, Async to Sync modem	C	6-12

Fiber Series

Access Series

XDSL Series

IP Networking

Testers

6 Interface Converters

Datacom Accessories

Network Management

RS-232 Interface Powered V35IP/ 449IP/ X21IP/ 530IP



RS-232 to V.35/ RS-449/ X.21/ RS-530 Interface Converter

The RS232 IP family of interface converters allows full bi-directional synchronous conversion between RS-232C (V.24) and V.35, X.21 or RS-449/530 hardware. These converters all work WITHOUT an EXTERNAL POWER SUPPLY. The RS232 IP interface converters are designed for synchronous RS-232 operation at data rates up to and including 128kbps. They may also be applied to asynchronous RS-232 using only TD & RD signals, while ignoring TC, RC, and XTC timing signals. Asynchronous RS-232 requires three times greater data throughput on the synchronous side's V.35, X.21 or RS-449/530 interface.

The physical connections for all RS232 IP family converters are DB25 female connectors. The RS-232 side supports direct connection to the DB25 connector with standard pin-out, while an adapter cable is required on the V.35, X.21 or RS-449/530 side to provide the proper interface connection. The V35IP model's interface does not require balanced signals for the handshaking signals and therefore cannot be adapted for X.21, RS-449 or RS-530 use. However, the 449IP or X21IP models may be interchanged as long as the correct adapter cable is applied.

Features

- DCE/DTE: Switch settable
- Power Source: Interface powered. No external DC power adapter is required for the "IP" converter family. However, an external adapter (DC9V@600mA) may be used if the application of the unit is in a poor communication environment.

Specifications

Data Rate	Up to 2Mbps	
Connectors	V.35 side -V.35 cable adapter,X.21, RS-449/530 side -DB25F (Requires adapter cable)	
LEDs	Signal status, DCE/DTE mode, Power	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	< 5W	
Dimensions(WxDxH)	80mm x 140mm x 25 mm	
Weight	150g	
Compliance	RS-232, RS-449, RS-530- EIA; V35, X.21-ITU-T	
MTBF	TBA	

Ordering Info

RS-232 <—> V.35	
V35IP-M	RS-232 to V.35 Interface Converter, interface powered, with DB25M to MB34M adapter cable
V35IP-F	RS-232 to V.35 Interface Converter, interface powered, with DB25M to MB34F adapter cable.
RS-232 <—> RS-449	
449IP-M	RS-232 to RS-449 Interface Converter, interface powered, with DB25M to DB37M adapter cable
449IP-F	RS-232 to RS-449 Interface Converter, interface powered, with DB25M to DB37F adapter cable
RS-232 <—> X.21	
X21IP-M	RS-232 to X.21 Interface Converter, interface powered, with DB25M to DB15M adapter cable
X21IP-F	RS-232 to X.21 Interface Converter, interface powered, with DB25M to DB15F adapter cable

RS-232 Interface Powered V35IP-CAB

RS-232 to V.35 IP-Cable

The Cable Type family of interface converters allows full conversion between RS-232 and V.35 hardware. The interface converter is very easy to implement. When signal power of the RS-232 interface side is enough, the power indicator will light. No external DC power adapter is required in this case. The RS-232 DB25 PIN#9 external power is required only if application of the unit is in a poor communication environment.



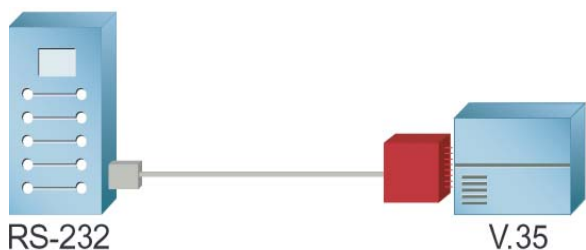
Features

- **V35IP-CAB/DCE**
RS-232DTE <—> V35CAB/DCE <—> V.35DCE
- **V35IP-CAB/DTE**
RS-232DCE <—> V35CAB/DTE <—> V.35DTE

Specifications

Baud Rate	Up to 128kbps	
Power	DC power acceptable (RS-232 DB25 PIN #9)	
Power Source	RS-232 Interface powered and external	
LEDs	TD, RD	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	< 5W	
Length	3m	
Dimensions(WxDxH)	75mm x 53mm x 22 mm	
Weight	500g	

Application



Ordering Info

PV35CAB/DCE Type	
V35Ip-CAB/DCE-MF	V35/MB34-M to RS232/DB25F
V35Ip-CAB/DCE-MM	V35/MB34-M to RS232/DB25M
V35Ip-CAB/DCE-FF	V35/MB34-F to RS232/DB25F
V35Ip-CAB/DCE-FM	V35/MB34-F to RS232/DB25M

V35CAB/DTE Type	
V35Ip-CAB/DTE-MM	V35/MB34-M to RS232/DB25M
V35Ip-CAB/DTE-MF	V35/MB34-M to RS232/DB25F
V35Ip-CAB/DTE-FM	V35/MB34-F to RS232/DB25M
V35Ip-CAB/DTE-FF	V35/MB34-F to RS232/DB25F

V.35 Interface Powered

V35/530IP, V35/449IP, V35/X21IP



V.35 to RS-530/ RS-449/ X.21 Interface Converter

The V35IP family of interface converters allows full bi-directional synchronous conversion between V.35 and X.21 or RS-449/530 hardware. These converters all work WITHOUT an EXTERNAL POWER SUPPLY. The V35IP interface converters are designed for synchronous V.35 operation at data rates up to and including 128kbps. They may also be applied to asynchronous V.35 using only TD & RD signals, while ignoring TC, RC, and XTC timing signals. Asynchronous V.35 requires three times greater data throughput on the synchronous side's X.21 or RS-449/530 interface.

The physical connections for all V35IP family converters are DB25 female connectors and V.35 adapter cable. The V.35 side requires the supplied DB25 to MB34 adapter cable to connect directly to V.35 equipment.

Adapter cables are also required for connection to X.21 and RS-449 equipment. RS-530 equipment may be directly connected to the V35IP converter.



Features

- DCE/DTE: Switch settable
- Power Source: Interface powered. No external DC power adapter is required for the "IP" converter family. However, an external adapter (DC9V@600mA) may be used if the application of the unit is in a poor communication environment.

Specifications

Data Rate	Up to 2Mbps	
Connectors	V.35 side -V.35 cable adapter,X.21, RS-449/530 side -DB25F (Requires adapter cable)	
LEDs	PWR, Signal status, DCE/DTE mode	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	< 5W	
Dimensions(WxDxH)	80mm x 140mm x 25 mm	
Weight	150g	

Ordering Info

V.35 ↔ RS-530	
V35/530IP-M	V.35 to RS-530 Interface Converter, interface powered
V35/530IP-F	V.35 to RS-530 Interface Converter, interface powered, with DB25M to MB34F adapter cable
V.35 ↔ RS-449	
V35/449IP-M	V.35 to RS-449 Interface Converter, interface powered, with DB25M to DB37M adapter cable
V35/449IP-F	V35/449IP-F V.35 to RS-449 Interface Converter, interface powered, with DB25M to DB37F adapter cable
V.35 ↔ X.21	
V35/X21IP-M	V.35 to X.21 Interface Converter, interface powered, with DB25M to DB15M adapter cable
V35/X21IP-F	V.35 to X.21 Interface Converter, interface powered, with DB25M to DB15F adapter cable

V.35 Interface Powered IC485-3

RS-232 to RS-485 Interface Converter



The ic485-3 Interface Converter provides conversion between RS-232 interface and RS-485 standard interface. The RS-232 interface connection is via the unit's DB-25F female D-Type connector, while the RS-485 side's connection is via a five screw terminal block. The ic485-3 converter's circuitry provides a high degree of electrical isolation between the RS-232 and RS-485 sides. The RS-232 side may operate as DTE or DCE, has provisions for establishing hardware flow control, and has LEDs to indicate data transmission and reception. The RS-485 side may operate in either two wire half duplex or four wire half or full duplex and also has LED's to indicate data transmission and reception.

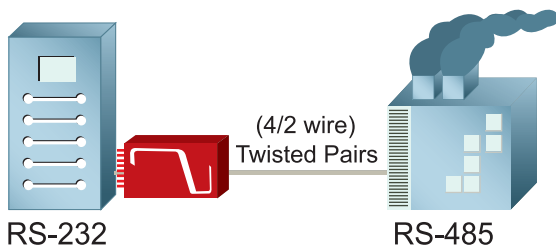
Features

- RS-485; 2 or 4 wire, Half or Full Duplex
- 2500V Isolation minimum
- DTE/DCE selectable
- Easy to configure
- Electrical Isolation: 2500V minimum
- External DC power required
- RS-232 handshaking; DTR/DSR, RTS/CTS, or Auto
- 2500V Isolation minimum

Specifications

Data Rate	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K or 115.2K	
Connectors	RS-232 DB-25F; RS-485 5-screw terminals block	
LEDs	TX/ RX on both side and TD/RD on RS-232 side	
Power	9VDC	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	< 6W	
Dimensions(WxDxH)	80mm x 140mm x 25 mm	
Weight	180g	

Application



Ordering Info

RS-232 <—> RS-485	
ic485-3	RS232/DB25F-RS422/485; 5 screw terminals [DC Power required], Isolation, Auto. Flow control

Converts RS-232 to TTL/ CMOS IC232TTL



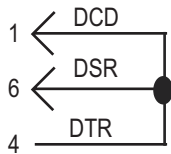
DB9F-RS-232 to DB9M-TTL/CMOS Interface Converter

The ic232TTL converts RS-232 to TTL/CMOS compatible level. Two channels are used to convert from RS-232 to 0/+5 VDC signals, and two channels are used to convert from 0/+5 VDC signals to RS-232. This converter supports TD, RD, RTS, and CTS. The RS-232 side is a DB9 female connector. The TTL/CMOS side is a DB9 male connector. This unit is powered from the RS-232 data and handshake lines whether the lines are high or low. This unit may work at baud rates up to 128 kbps and is powered by the signals on pins 7(RTS), 4(DTR), and 3(TD) of the RS-232 interface.

The handshaking lines may be in either a high or low condition, but must be present to power the converter. It is important that TTL/CMOS logic, and only TTL/CMOS logic (0 to +5 VDC) be used for the TTL/CMOS side of the converter. The maximum sinking current for one TTL/CMOS output is 3.2 mA. The maximum source current for one TTL/CMOS is 1 mA. Signal levels are inverted by the converter.

Pin Assignment

DB9F: RS-232		DB9M: TTL/ CMOS
Pin	Function	Pin
5	GND	5
3(Input)	TD	3(Output)
2(Output)	RD	2(Input)
7(Input)	RTS	7(Output)
8(Output)	CTS	8(Input)



Specifications

Electronic Specifications	
TTL/ CMOS Input	RS-232 Output
Low (<+0.8V)	+5V minimum, +9V typical
High (>+2V)	-5V minimum, -9V typical
TRS-232 Input	TTL/ CMOS Output
Low (<+0.8V) & (>-15V)	+3.5V minimum, +4.6V typical
High (>+2.8V) & <+15V)	+0.4V minimum, +0.1V typical

Dimensions(WxDxH)	31mm x 60mm x 15mm
Weight	20g

Ordering Info

ic232TTL	Async RS-232 (DB9 female) to TTL/CMOS (DB9 male), no power required
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Converts RS-232 to RS-422/ RS-485 IC485IP-1F, IC485IP-1M, IC485IP-2

RS-232 to RS-422/ RS-485 Interface Converter

The ic485IP interface converters allow full conversion between RS-232 and RS-485 hardware. The IP series converters work WITHOUT an EXTERNAL POWER SUPPLY. All the units are very easy to implement. Simply connect the appropriate interface cable and select the DCE/DTE type required with the Function Switches.



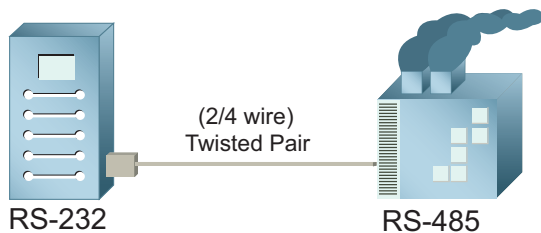
Features

- Baud Rate: Up to 128Kbps
- DCE/ DTE device setting selectable
- RTS/ CTS control Full/Half duplex
- Simulation/ Monitor selectable.

Specifications

Connectors	ic485IP-1M	RS-232 side DB25M; RS-485 side 4 screw terminal
	ic485IP-2	RS-232 side DB25F; RS-485 side 4 screw terminal
	ic485IP-1F	RS-232 side DB25F; RS-485 side 4 screw terminal
LEDs	TD/ RD/ External DC power	
Power	Interface powered, External 9VDC/ 300mA power acceptable	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	< 5W	
Dimensions(WxDxH)	ic485IP-1M	76mm x 54mm x 20 mm
	ic485IP-2	56mm x 53mm x 20 mm
	ic485IP-1F	76mm x 54mm x 20 mm
Weight	ic485IP-1M	60g
	ic485IP-2	60g
	ic485IP-1F	47g

Application



Ordering Info

ic485IP-1F	Async RS-232, DB 25 female to RS-422/485, 4-screw terminal
ic485IP-1M	Async RS-232, DB25 male to RS-422/485, 4-screw terminal
ic485IP-2	Async RS-232, DB25 female to RS-422/485, RJ-45 connector

Converts V.35 to RS-485

V35/485-1

V.35 to RS-485 Interface Converter

The V35/485-1 Interface Converter provides conversion between V.35 and RS-485 standard interfaces. The V.35 interface connection is via a supplied adapter cable and the unit's DB-25F female D-Type connector, while the RS-485 side's connection is via a five screw terminal block. The V35/485-1 converter's circuitry provides a high degree of electrical isolation between the V.35 and RS-485 sides. The V.35 side may operate as DTE or DCE, has provisions for establishing hardware flow control, and has LEDs to indicate data transmission and reception. The RS-485 side may operate in either two wire half duplex or four wire half full duplex.



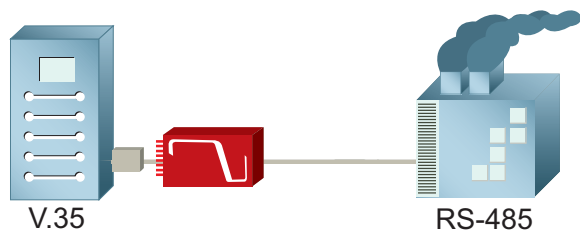
Features

- RS-485; 2 or 4 wire, Half or Full Duplex
- V.35 handshaking; DTR/DSR, RTS/CTS, or Auto
- 2500V Isolation minimum
- DTE/DCE selectable
- Easy to configure
- External DC power required

Specifications

Data Rate	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K or 115.2K	
Connectors	V.35 DB-25F plus adapter cable; RS-485 5-screw terminal block	
LEDs	TX/RX on both side and TD/RD on RS-232 side	
Power	External 9VDC/ 300mA Adapter	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	< 6W	
Dimensions(WxDxH)	140mm x 80mm x 25 mm	
Weight	150g	

Application



Ordering Info

V35/485-1	V35-RS422/485; 5 screw terminal [DC Power required], Isolation, Auto. Flow control w/V.35 cable, Adapter
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RS-232 Short Haul Modem

IC232IP-SM/M, IC232IP-SM/F, IC232IP-2M, IC232IP-2F

Async RS-232 to RJ-45 or 4-screw Terminal Block

The ic232IP, asynchronous, Short Haul Modem, overcomes the limited distances of the RS-232 standard by converting DCE/DTE equipment to full duplex 2 twisted pair wire (Category 3 or better). The ic232IP-SM operates up to 10 Km depending on the wire gauge and data rate.

IC232IP-SM/F



IC232IP-2F



IC232IP-2M



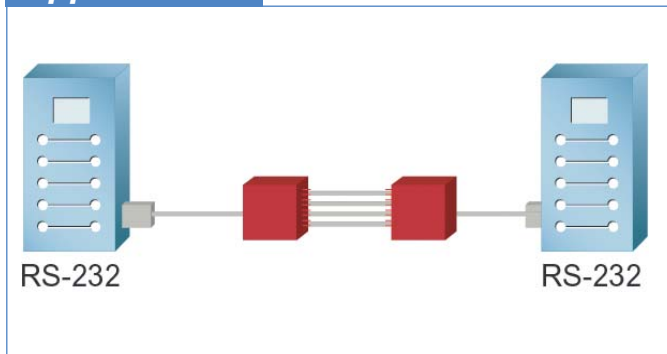
Features

- Baud Rate: Up to 128Kbps
- DCE/DTE switchable
- Simulation only

Specifications

Connectors	ic232IP-SM/M	Async RS-232 side: DB25F; Modem side: RJ45
	ic232IP-SM/F	Async RS-232 side: DB25F; Modem side: RJ45
	ic232IP-2F	Async RS-232 side: DB25F; Modem side: 4-screw termination with Ground pin
	ic232IP-2M	Async RS-232 side: DB25M; Modem side: 4-screw termination with Ground pin
LEDs	TD, RD	
Power	Interface powered	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	< 5W	
Dimensions(WxDxH)	ic232IP-SM/M	56mm x 53mm x 20 mm
	ic232IP-SM/F	56mm x 53mm x 20 mm
	ic232IP-2F	77mm x 55mm x 20 mm
	ic232IP-2M	76mm x 54mm x 20 mm
Weight	ic232IP-SM/M	45g
	ic232IP-SM/F	45g
	ic232IP-2F	57g
	ic232IP-2M	55g

Application



Ordering Info

ic232IP-SM/M	Async RS-232 Short Haul Modem, RJ-45 connector
ic232IP-SM/F	Async RS-232 Short Haul Modem, RJ-45 connector
ic232IP-2M	Async RS-232 Short Haul Modem, 4-screw connector, DB25M
ic232IP-2F	Async RS-232 Short Haul Modem, 4-screw connector, DB25F

RS-232 Current Loop

RS-232 Current Loop icCL-2/M & icCL-2/F

RS-232 Current Loop Converter

The icCL's interface converters allow full conversion between RS-232 and current loop hardware. The series converters work without an External power supply. All the units are very easy to implement. Simply connect the appropriate interface cable and select the DCE/DTE type required with the function switches.

icCL-2/M



ucCL-2/F



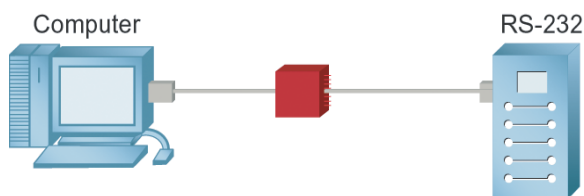
Features

- Full duplex , 19.2Kbps to 4000ft
- Baud Rate is up to 128Kbps
- Current Loop: 4-screw terminal
- DCE/DTE switchable
- 20/60mA selectable

Specifications

Connectors	icCL-2/M	RS-232 side/ -DB25F
	icCL-2/F	RS-232 side/ -DB25F
LEDs	TD, RD	
Power	External 9VDC, 300mA power required	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	<6W	
Dimensions(WxDxH)	ic232IP-SM/F	76mm x 54mm x 20mm
	ic232IP-2F	76mm x 54mm x 20mm
Weight	ic232IP-SM/F	60g
	ic232IP-2F	60g

Application



Ordering Info

icCL-2/ M	RS-232 current loop, DB25 male, 4-screw terminator, DC power require, with adapter
icCL-2/ F	RS-232 current loop, DB25 female, 4-screw terminator, DC power require, with adapter

Asynchronous to Synchronous icAS/IP

Async to Sync Interface Converter

The icAS/IP, interface converter allows full conversion between a computer / terminal RS-232 asynchronous port and a synchronous modem. The icAS/IP conforms to the ITU-T V.22 standard and accommodates the difference in frequency between the asynchronous port and synchronous modem. This unit derives its baud rate automatically from the transmit clock of the modem and operates at data rates from 300 to 19200bps.



Features

- Automatically adjusts baud rate
- Fully transparent to signals
- Functions set by DIP switch

Ordering Info

icAS/IP	Asyn/Sync converter ; V.22 protocol, with Sync RS232 cable & adapter
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Specifications

Connectors	ASync side-DB25F SYNC side-DB25M sync cable	
LEDs	Connection , PWR	
Power	9VDC	
Environment	Temperature	0 — 50°C (Operating); 20 — 70°C (Storage)
	Humidity	5% — 90% non-condensing
Power Consumption	< 6W	
Dimensions(WxDxH)	53mm x 73mm x 20mm	
Weight	150g	

DTMF to Pulse Dialing

DTMF

DTMF to Pulse Dialing Converter



The DTMF to PULSE Dialing Converter is an electronic device used to convert the DTMF tones from telephone, modem, or fax equipment to standard telephone pulses. Connecting the device is very easy. Simply connect between the tone source device and the phone line.

Ordering Info

DTMF	DTMF to Pulse dial converter
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Serial to Parallel

SXP200/ 2000

Serial to Parallel Converter



In some situations, the interface conversion between a PC's RS-232 serial port and a standard centronics printer is necessary and urgent for the user. You can now overcome this problem with the SXP-200 or SXP-2000. The SXP-2000 has the same function as the SXP200 with an additional 2MB memory buffer.

Ordering Info

SXP-200	Serial to parallel converter
SXP-2000	Serial to parallel converter with 2Mb buffer

7. Datacom Accessories



Datacom Accessories Selection Table

A/Accessories

Fiber Accessories				
Network Type	Product Name	Description	Product Type	Page
Fiber Cable	Fiber Patch cords	Fiber Optic Patch Cord	A	7-3
Fiber Connectors	Fiber Attenuator	Fiber Attenuator	A	7-3
Fiber Transceiver	Fiber Transceiver-GBIC	GBIC Fiber Transceiver modules	A	7-4
Fiber Transceiver	Fiber Transceiver-SFP	SFP Fiber Transceiver Modules	A	7-4
Network Cable				
Network Type	Product Name	Description	Product Type	Page
Network Cable	Cisco Cable	Cisco Equipment	A	7-5
Adapter	Adapter	Cisco Equipment	A	7-5
Changer	Gender Changer	Cisco Equipment	A	7-5
Balun				
Network Type	Product Name	Description	Product Type	Page
Balun	Balun-P	75 120 ohms	A	7-6
Balun	Balun-B1/B2	75 120 ohms	A	7-6
Balun	BLN3010	G.703 Mini Balun	A	7-6
Balun	BLN4010	G.703 Mini Balun	A	7-6
Surge Protector				
Network Type	Product Name	Description	Product Type	Page
Surge Protector	SP-SE-R01-4	RJ45 to RJ45 Ethernet Surge Portector	A	7-7
Surge Protector	SP-SE-R08-8	RJ45 to RJ45 Ethernet Surge Portector	A	7-7
Surge Protector	SP-RE-R16-8	RJ45 to RJ45 Ethernet Surge Portector	A	7-7
Surge Protector	SP-RE-R24-8	RJ45 to RJ45 Ethernet Surge Portector	A	7-7
Surge Protector	SP-SE-B01	BNC to BNC E1 75 Surge Protector	A	7-8
Surge Protector	TSP-10	Telephone Surge Protector	A	7-8

Fiber Series

Access Series

XDSL Series

IP Networking

Testers

Interface Converter

7 Datacom Accessories

Network Management

Fiber Accessories

Fiber Patch cords & Pigtail

Cables

Fiber Patch cable & Pigtail are ultra reliable devices featuring low insertion loss and back reflection. The Fiber Patch cable & Pigtail come with your choice of simplex or duplex cable configurations, and various types of pigtail and connector terminations to meet your requirements.



Features

- Various connector type available
- Low back reflection loss
- PC ferrule with 20mm radius fast polishing
- Applications include CATV, Fiber optic sensors, Local area network, Testing instruments, and Telecommunications

Specifications

Mode type	single mode	multi mode
Typical Insertion Loss	0.15dB	0.3dB
Typical Return Loss	-50	—
Operating Temperature	-40 — 75	
Storage Temperature	-55 — 85	

Ordering Info

XX	X/-	X	X	X	XM
Connector Type (1) ----- (2)	Ferrule Type	Fiber Mode	Offering mode	Fiber type	Cable length
FC ----- FC	P: PC	S: SM	S: Simplex	5: 50/125um	please
SC ----- SC	S: SPC	M: MM	D: Duplex	6: 62.5/125um	specify
ST ----- ST	V: VPC			9: 9/125um	in meter
LC -----LC	A: APC				
DT ---Pigtail					
MJ -----MT-RJ					

Fiber Accessories

Fiber Mode Attenuator

Attenuator



CTC Union offers 1~20 dB and standard attenuation values at 3, 5, 10, 15 and 20 dB, advantaging economy scale for mass productive supply and custom-made attenuation value meeting your specific requirement , supported by our technical team to obtain the best synergy .

Features

- Low back reflection
- High power endurance
- Precise control of attenuation range
- Easy installation
- Environmentally stable
- Customer design specification
- Readily panel mountable

Specifications

Mode Type	SM, MM
Operating Wavelength (nm)	1310 or 1550
Bandwidth, nm	±40
Attenuation Accuracy	1 — 5dB (±1.0)
(typical, including connector)	6 — 10dB (±1.5)
	11 — 15dB (±2.0)
	16 — 20dB (±2.0)
Back Reflection, dB	<= -40 (convex polishing), <= -60 (Angled type)
Operating Temperature	-40 — 75
Storage Temperature	-50 — 85
Connector Type	ST, SC , FC

Ordering Info

FA-I	X-	PC	X	XX-	X
I-In Line Type	Mode Type	Polishing Type	Fiber Type	Attenuation Value	Wavelength
I-In Line	S: SM	PC	S: SC	1 — 25db	3: 1310nm
	M: MM	SPC	F: FC		5: 1550nm
		VPC	T: ST		

GBIC Transceiver

SFP Transceiver



GBIC Transceiver



SFP Transceiver

Fiber Transceiver

GBIC/ SFP Transceivers are high performance, cost effective modules for serial optical data communications applications specified for a single mode at 1.25/2.5Gbps. They operate with +3.3V/5V power supplies and are intended for single mode or multi-mode fiber, operating at a nominal wavelength of 1310(850) nm. Each GBIC/ SFP Transceiver consists of a transmitter optical subassembly, a receiver optical subassembly and an electrical subassembly. GBIC/ SFP Transceivers are duplex SC/ LC transceiver designed for use in Gigabit Ethernet and to provide an IEEE-802.3z compliant link for 1.25/2.5Gbps short reach applications.

Features

- Eye Safety
- High speed backplane interconnects
- PECL differential input & output logic levels
- Small Form Factor Pluggable MSA compliant
- Switched backbones
- Uncooled MQW structure laser

Specifications

Standard	IEEE-802.3z, EN60825-1, SDH & SONET, Gigabit Ethernet (1000Base-SX), ANSI specifications for Fiber	
	single mode	1310nm FP-LD
	multi-mode	850nm VCSEL
Data PECL different input	1.25G module	300 — 1860mV
	2.5G module	400 — 1660 mV
Lead soldering	260°C	
Data Rate	155Mbps, 622Mbps & 2.5Gbps, NRZ	
Power	3.3V	
Environment	Temperature	-20 — 70°C (Operating); -40 — 85°C (Storage)
	Humidity	20 — 80% non condensing (Operating); 10 — 90% (Storage)
Dimensions(WxDxH)	GBIC	33.5 x 57 x 12 mm
	SFP	14 x 55 x 13.5 mm
Weight	GBIC	50g
	SFP	20g
Compliance	CE, FCC part 16	

Ordering Info

XX	X-	X	XXX-	XXX
Connector Type	Fiber Type	Speed Type	Connectivity Distance	Wave length
GB: GBIC	S: SM	9: 2.5G	000: 2km/ 550m	S85: SX850
SF: SFP	M: MM	7: 1.25G	010: 10km	L31: LX1310
		5: 155M	040: 40km	Z55: ZX1550
			080: 80km	WA: T13/ R15
			120: 120km	WB: T15/ R13
				CXX: CWDM

Network Cable

Cisco Cable

Network Cables



HD26 Series



LEH200 Series



LEH60 Series



CAB-OCT-Asyn/ Modem

Bay Network, 3COM, Intel, Nortel Cables and other customized cable are all offered. Please inquire.

Ordering Info

Model Name	Description
LFH60 connector Series	
CAB-X21FC	LFH60-X21/DB15 DCE;3m
CAB-X21MT	LFH60-X21/DB15 DTE;3m
CAB-232FC	LFH60-232/DB25 DCE;3m
CAB-232MT	LFH60-232/DB25 DTE;3m
CAB-V35FC	LFH60-V35/MB34 DCE;3m
CAB-V35MT	LFH60-V35/MB34 DTE;3m
CAB-449FC	LFH60-449/DB37 DCE;3m
CAB-449MT	LFH60-449/DB37 DTE;3m
CAB-530MT	LFH60-530/DB25 DTE;3m
CAB-530FC	LFH60-530/DB25 DCE;3m
CAB-2X21FC	LFH60-Two X21/DB15 DCE ,3m
CAB-2X21MT	LFH60-Two X21/DB15 DTE ,3m
CAB-2V35FC	LFH60- Two V35/MB34 DCE ,3m
CAB-2V35MT	LFH60- Two V35/MB34 DTE ,3m
HP26 SS series	
CAB-SS-232FC	HP26-232/DB25 DCE;3m
CAB-SS-232MT	HP26-232/DB25 DTE;3m
CAB-SS-449FC	HP26-449/DB37 DCE;3m
CAB-SS-449MT	HP26-449/DB37 DTE;3m
CAB-SS-530FC	HP26-530/DB25 DCE;3m
CAB-SS-530MT	HP26-530/DB25 DTE;3m
CAB-SS-X21FC	HP26-X21/DB15 DCE;3m
CAB-SS-X21MT	HP26-X21/DB15 DTE;3m
CAB-SS-V35FC	HP26-V35/MB34 DCE;3m
CAB-SS-V35MT	HP26-V35/MB34 DTE;3m
CAB-SS-SS	

Model Name	Description
LFH200 connector series	
CAB-OCT-V35FC	LFH200- 8xV35 DCE;1.8m
CAB-OCT-V35MT	LFH200- 8xV35 DTE;1.8m
CAB-OCT-X21FC	LFH200- 8xX21 DCE;1.8m
CAB-OCT-X21MT	LFH200- 8xX21 DTE;1.8m
CAB-OCT-232FC	LFH200- 8x232 DCE;1.8m
CAB-OCT-232MT	LFH200- 8x232 DTE;1.8m
CAB-OCT-449FC	LFH200- 8x449 DCE;1.8m
CAB-OCT-449MT	LFH200- 8x449 DTE;1.8m
CAB-OCT-530FC	LFH200- 8x530 DCE;1.8m
CAB-OCT-530MT	LFH200- 8x530 DTE;1.8m
HD50 connector series	
CAB-NPV35TV2	HD50 V35- 3M
CAB-NP232T	HD50 DB25M- 3M
CAB-NPV35CV2/FC	HD50 V35
CAB-NPV35CV2/MT	HD50 V35
CAB-OCT-ASYNC	DB68- RJ45x8 ;Cable with shield w/o Gender changer; Length: 1.5 meters
CAB-OCT-MODEM	DB68- RJ45x8 ;Cable with shield w/8 x DB25 /RJ45 Gender changer; 1.5 meters

Network Cable

Adaptor & Gender Changer

Adaptor & Changer



Gender Changer



V.35/M to DB25/F



RS-232 Standard
DB25/M to DB/9F

All kinds of adapan be produced (customer-design), if customer provides the following information.

- Connector Type
- Pin Assignment

Ordering Info

Gender Changer	Male-Male
	Female-Female

RS-232 Standard	DB25/M to DB/9F
	DB25/F to D39F
	DB25/F to DB9M
	DB25/M to DB9M
V.35 Adapter	V.35/M to DB25/F

Balun-P Balun-B1/ B2

Coax to Twisted Pair

The E1 Balun is a media adapter for E1 networks which allows unbalanced 75 ohm coaxial interface equipment to operate over 120 ohm balanced two twisted pairs (4-wire), or vice versa.



Balun-B2/S & Balun-B2/S-2



Balun-B1

Balun-P/S &
Balun-P/S-2

BLN3010 BLN4010

G.703 Mini Balun

The mini Balun is ideal for applications where size and space are restricted due to small dimensions or high density. They provide a full shielded terminator which is intended for panel or cable mounting, come with a variety of coaxial interfaces and IDC twisted pair termination which allows installation without special tools. The mini Balun supports E1 to E3 (2-34 Mbps) speeds. Conversion to twisted pair cabling enables the use of high density IDC modules in Digital Distribution Frames (DDF) thus decreasing wiring densities more than 5 times.



BLN3010



BLN4010

Features

- Conversion 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

Features

- Body parts plated min. 5uNi
- Contacts plated min. 1.25uNi & min. 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 (2 x BNC)	
Balanced interface	120 ohm; impedance (1 x RJ-45)	
Dimensions(WxDxH)	Balun-B2/S & Balun-B2/S-2	4.4cm x 5.4cm x 2.5cm
	Balun-B1	2.2cm x 5.6cm x 2.1cm
	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	

Specifications

Dimensions (WxDxH)	1.7cm x 1.6cm x 4.8cm
Weight	15g

Ordering Info

BLN3010	75 ohm to 120 ohm Balun 1.6/5.6 Jack/IDC
BLN4010	75 ohm to 120 ohm Balun BNC Bulkhead Jack/IDC

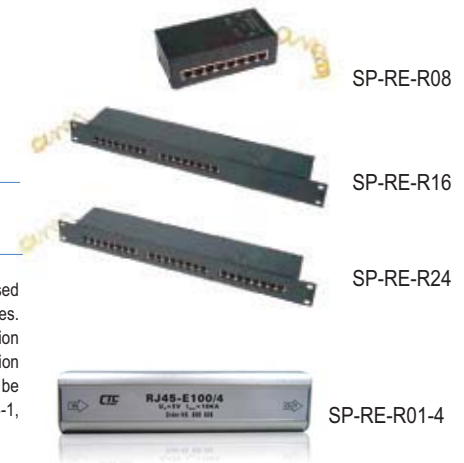
Ordering Info

Balun-P/S & Balun-P/S-2	120 ohm 2-twisted pair on RJ-45 to 2-75 ohm BNC, male (Pigtails)
Balun-B1	120 ohm 1-twisted pair on RJ-45 to 1-75 ohm BNC, male
Balun-B2/S & Balun-B2/S-2	120 ohm 2-twisted pair on RJ-45 to 2-75 ohm BNC, female

SP-SE-R01-4, SP-SE-R08-8 SP-RE-R16-8, SP-RE-R24-8

Ethernet Surge Protectors

The RJ45 type 10/100Base-T data line protection devices are designed for basic and fine protection of information-based systems from surges as caused by atmospheric discharges (lightning) or by capacitive or inductive interferences. Incoming surges are limited by transzorb diodes. Powerful gas diverters are used for grounding the fine protection devices. Decoupling of the protection module is ensured by the line path between the basic and the fine protection device. The path must have a minimum length of 5 m. The protection modules are directly used on the device to be protected, i.e. at the transition point from the lightning zone 1 to 3 according to Class 2+3, Category C2/IEC 61644-1, draft 98.



Features

- Data line protection : RJ45 10/100Base-T Ethernet
- Fast energy absorption when over-voltages occur
- Compactness
- Low series resistance and minimal capacitance values to preserve the data information

Specifications

Lighting discharge current per path	SP-SE-R01-4	In: 0.5KA; Imax: 10KA
	SP-SE-R08-8	In: 0.25KA; Imax: 5KA
	SP-SE-R16-8	
	SP-SE-R24-8	
Protected Cores	SP-SE-R01-4	1, 2, 3, 6
	SP-SE-R08-8	
	SP-SE-R16-8	1 — 8 pins
	SP-SE-R24-8	
Attenuation in dB	3dB at 100MHz, 10MHz = 0.3dB	
TA	< 10ns	
Series Capacity	40 PF	
Dimensions(WxDxH)	SP-SE-R01-4	55mm x 85mm x 24mm
	SP-SE-R08-8	143mm x 73mm x 44mm
	SP-SE-R16-8	
	SP-SE-R24-8	480mm x 73mm x 44mm
Weight	SP-SE-R01-4	75g
	SP-SE-R08-8	435g
	SP-SE-R16-8	1.38kg
	SP-SE-R24-8	1.38kg
Compliance	IEC 61644-1, draft 98	

Ordering Info

SP-SE-R01-4	Standalone Type Ethernet 10/100Base-T, RJ45 1 Port Ethernet Surge Protector
SP-SE-R08-8	Standalone Type Ethernet 10/100Base-T, RJ45 8 Ports Ethernet Surge Protector
SP-RE-R16-8	Rack Type Ethernet 10/100Base-T, RJ45 16 Ports Ethernet Surge Protector
SP-RE-R24-8	Rack Type Ethernet 10/100Base-T, RJ45 24 Ports Ethernet Surge Protector

Surge Protector

SP-SE-B01



Coax Surge Protector

The Coax series of data communication line surge protectors will ensure the reliable operation of coaxial based networking equipment running Arc Net, Satellite/cable/Closed circuit TV and most 75ohms Coax communication system.

Surge Protector

TSP-10



Telephone Surge Protector

The TSP-10 is an "in-line" design surge protector that can be installed anywhere in the line between your phone service and device. The TSP-10 is equipped with RJ-11 jacks for easy connection to modular phone systems. Simply connect the phone service to the "LINE" connector side and connect your telephone, fax machine or other device requiring protection into the "PHONE" connector.

Features

- Compact in-line installation
- Low shunt capacitance to reduce signal loss
- Maximized system up-time
- State of the art, avalanche diode technology

Features

- Applications include Computers and computer modems, ADSL modems, Fax machines, telephones and answering machines, Dial-up fire/burglar alarms.
- Controls transient over voltages to a low level to ensure maximum protection for your equipment
- LED indicator flashes for ring indication and lights during device "off-hook" operation
- Meet UL 1449 (2ND Edition)
- Simple installation
- Sturdy ABS housing

Specifications

Type	SP-SE-B01-E1
Connection	BNC
Un	10V
U-max	18V
Discharge current	10KA
Response time	<10ns
Insertion (40MHz)	0.5dB
Dimensions(WxDxH)	38mm x 68mm x 27mm
Weight	70g
Compliance	IEC 61644-1, draft 98

Specifications

Surge current	8 x 20u sec of 500A
DC Sparkover Voltage	160 — 240V
Dimensions(WxDxH)	30mm x 80mm x 27mm
Weight	20g
Compliance	UL 1449 (2nd Edition)

Ordering Info

SP-SE-B01-E1 75 ohm, 1 port Coax cable surge protector

Ordering Info

TSP-10 Telephone Surge Protector

8. Network Management



Network Management Selection Table

M/Management

Network Management				
Network Type	Product Name	Description	Product Type	Page
EMS	EMS	Smart View Management System	M	8-3
NMS	FRM301/401 GUI	Network Management System	M	8-5

Fiber Series

Access Series

XDSL Series

IP Networking

Testers

Datacom
Accessories

Interface
Converter



Network
Management

Management Software

Element Management System (EMS)

EMS objective is to provide four major functions for telecommunication operator:

- 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 to 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 ND via CORBA actions. EMS Server is using SNMP Protocol to monitor and control ND via SET GET and TRAP SNMP actions.

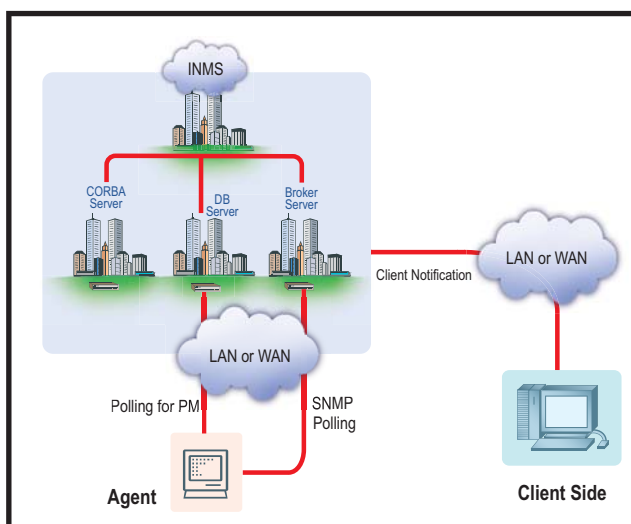
The major tasks include:

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, also providing role access to mentioned above objects

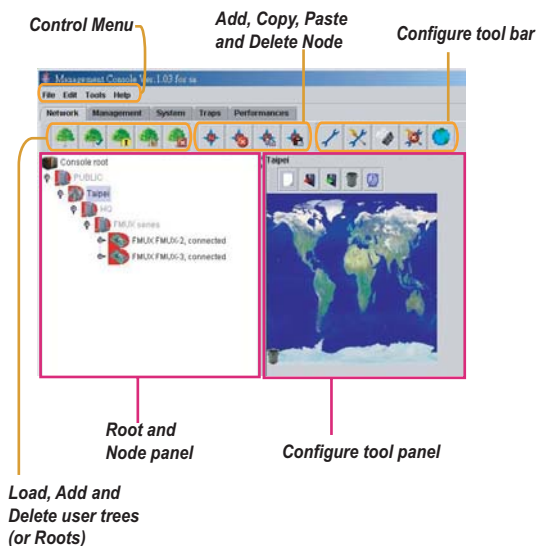
Features

- JAVA based**
 EMS is a pure JAVA project and collects all benefits of this technology including multi platform support, module design, client-server architecture
- Event driven**
 Using events as primary objects for communication minimizes network loading, increases performance and allows including given quantities of ND with predictable CPU and RAM loading depends on this quantity
- Data integrity**
 All data locates 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.
- Database support**
 Support of any SQL server (Oracle, Informix, Microsoft etc.)
 Flexible SQL interface design for server and client optimization by customer
- Standard SNMP and CORBA support**
 Design has no assumption to any CORBA vendor.
 Tested with different Object Request Brokers
- Open architecture**
 Provide API and IDL files for integration with upper layer systems

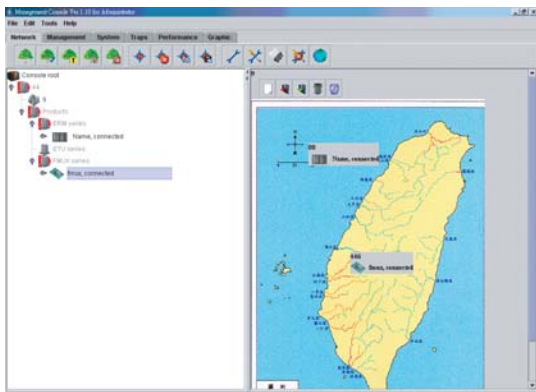
Network Scheme Diagram



- 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 and deliver data and it is responsible for communication of requests.
- Broker server**
 Broker Server collects the information data from the specified SNMP agent and keeps updating it to the SQL server via the JDBC (Java DataBase Connectivity) driver.
- SQL Server**
 SQL Server is the place to store data where the Broker collected from SNMP AGENT agent drivers; the database will store Alarm Trap and all information.
- Workstation-Clients**
 Workstation acts as a client in CORBA architecture, it provides the JAVA applet GUI to monitor and control the agents at far end, also receives the Alarm Trap from the corresponding SNMP AGENT. Multiple workstations are allowed in this field.



System Structure



Getting Map node

User can load map to SQL server, load map from SQL server or delete attached map. Download procedure is very simple. First, select the world.jpg and the world map will be attached on Configure tool panel. Second, Map area may be used to layout any objects from Root and Node panel. Third, Using drag-and-drop put any object to map area. Any label or NE location name may be added to object.

Agent ID	Agent Name	Rack	Status	Source	Meaning
14	FMUX-2	local	(Urgent)	Agent	T1(P)
14	FMUX-2	local	(Urgent)	Agent	Major
14	FMUX-3	local	(Urgent)	Agent	Minor End
14	FMUX-3	remote	(Non-urgent)	Agent	Opt-2
14	FMUX-2	remote	(Urgent)	Agent	Fiber End
13	FMUX-2	local	(Non-urgent)	Agent	Opt-2
13	FMUX-2	local	(Urgent)	Agent	Fiber End
13	FMUX-2	remote	(Urgent)	Agent	T1(P)
13	FMUX-2	remote	(Urgent)	Agent	Major
13	FMUX-2	remote	(Urgent)	Agent	Minor End

Active Alarm List

At System tab you can view all Active Alarm List. 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 categorized Urgent, Non-urgent, Event, Empty (don't show), and all statuses label or NE location name may be added to object.

ID	agent	name	time:stamp_system	body	ack	clear	op_name
436	10	etutai	2005-12-13 16:45:18.9	Line Signal Loss On.	<input type="checkbox"/>	<input type="checkbox"/>	pp
435	10	etutai	2005-12-13 16:45:18.46	Line BPV Error.	<input type="checkbox"/>	<input type="checkbox"/>	pp
434	10	etutai	2005-12-13 16:45:18.4	Line RAI Off.	<input type="checkbox"/>	<input type="checkbox"/>	pp
433	10	etutai	2005-12-13 16:45:18.3	Line Signal Loss Off.	<input type="checkbox"/>	<input type="checkbox"/>	pp
432	10	etutai	2005-12-13 16:44:25.1	Line Signal Loss On.	<input type="checkbox"/>	<input type="checkbox"/>	pp
431	10	etutai	2005-12-13 16:44:24.0	Line BPV Error.	<input type="checkbox"/>	<input type="checkbox"/>	pp
430	10	etutai	2005-12-13 16:44:24.7	Line Signal Loss Off.	<input type="checkbox"/>	<input type="checkbox"/>	pp
429	10	etutai	2005-12-13 16:44:11.87	Line Signal Loss On.	<input type="checkbox"/>	<input type="checkbox"/>	pp
428	10	etutai	2005-12-13 16:44:11.4	Line BPV Error.	<input type="checkbox"/>	<input type="checkbox"/>	pp
427	10	etutai	2005-12-13 16:44:11.4	Line Signal Loss Off.	<input type="checkbox"/>	<input type="checkbox"/>	pp
426	10	etutai	2005-12-13 16:42:26.7	Line Signal Loss On.	<input type="checkbox"/>	<input type="checkbox"/>	pp
425	10	etutai	2005-12-13 16:42:26.33	Line BPV Error.	<input type="checkbox"/>	<input type="checkbox"/>	pp
424	10	etutai	2005-12-13 16:42:26.2	Line Signal Loss Off.	<input type="checkbox"/>	<input type="checkbox"/>	pp
423	10	etutai	2005-12-13 16:41:32.1	Line Signal Loss On.	<input type="checkbox"/>	<input type="checkbox"/>	pp
422	10	etutai	2005-12-13 16:41:31.6	Line BPV Error.	<input type="checkbox"/>	<input type="checkbox"/>	pp
421	10	etutai	2005-12-13 16:41:31.6	Line RAI On.	<input type="checkbox"/>	<input type="checkbox"/>	pp
420	10	etutai	2005-12-13 16:41:31.5	Line Signal Loss Off.	<input type="checkbox"/>	<input type="checkbox"/>	pp
419	10	etutai	2005-12-13 16:40:43.1	Line Signal Loss On.	<input type="checkbox"/>	<input type="checkbox"/>	pp
418	10	etutai	2005-12-13 16:40:42.85	Line BPV Error.	<input type="checkbox"/>	<input type="checkbox"/>	pp
417	10	etutai	2005-12-13 16:40:42.6	Line RAI Off.	<input type="checkbox"/>	<input type="checkbox"/>	pp
416	10	etutai	2005-12-13 16:40:42.54	Line Signal Loss Off.	<input type="checkbox"/>	<input type="checkbox"/>	pp
415	10	etutai	2005-12-13 16:38:23.9	Line Signal Loss On.	<input type="checkbox"/>	<input type="checkbox"/>	pp
414	10	etutai	2005-12-13 16:38:23.47	Line BPV Error.	<input type="checkbox"/>	<input type="checkbox"/>	pp
413	10	etutai	2005-12-13 16:38:23.4	Line Signal Loss Off.	<input type="checkbox"/>	<input type="checkbox"/>	pp

Trap List

Any alarm trap 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.

Requirement

	Hardware	Software	Operating System
EMS Broker Server	P4 1.6G or higher, 512MB RAM, HD >2GB (free)	JAVA JDK or 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
CORBA Server	PIII 800 or higher, 128MB RAM, HD >1GB (free)	JAVA JDK or JRE. EMS Kit	Windows, Linux, BSD
Workstation-Clients	PIII 800 or higher, 128MB RAM, HD >1GB	JAVA JRE. EMS Kit	Windows, Linux, BSD
All-In-One	P4 2.8G or higher, 1GB RAM, HD >10GB (free)	JAVA JDK or JRE, EMSkit, MS-SQL Server, ODBC Driver	Windows 2000 Pro or Server, Windows 2003 Server, Windows XP

Ordering Info

Model Name	Description
SmartView Platform	
SV-PLF-05	SmartView Platform server with 5 client user admission and 500 agents
SV-PLF-25	SmartView Platform server with 25 client user admission and 500 agents
SV-PLF-50	SmartView Platform server with 50 client user admission and 500 agents
Smart Veiv Optional Management Modules	
SV-FOM	Smart Veiv Management Module for FOM Series FMUX01-A
SV-E1/T1	Smart Veiv Management Module for E1/T1 Series with ERM-MUX-PLUS ERM01 ETU01A
SV-FRM	Smart Veiv Management Module for Fiber Media FRM301 FRM401
SV-WDM	Smart Veiv Management Module for CWDM series Sigma Links 5000 Sigma Links 2000

Fiber Series

Access Series

xDSL Series

IP Networking

Testers

Datacom Accessories

Interface Converter

8 Network Management

Management Software

FRM301/ 401 GUI

Minimal setup, maximum uptime and optimum security are the goals of every network manager. To achieve these goals, network management systems must support various important functions :

1. Fault management - correlates fault management data from all network devices, isolates faults and initiates recovery actions
2. Configuration management
3. Performance management

The management information base (MIB), includes the standard MIB and the enterprise specific MIB, which is defined by product manufacturers for management of their specific equipment. All CTC Union FRM series products provide the option for embedded SNMP agents which allow communication with standard SNMP management software or with our proprietary GUI SNMP manager software. This provides for powerful and efficient network element configuration and monitoring.

CTC Union develops a perfect solution for the above managements. 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

Features

- View which type of cards occupy the chassis slots
- Full Read/ Write capabilities
- Change individual card settings
- Enable/ Disable individual cards or channels
- Monitor power module and fan assembly in the unit
- Alarm detection for each card, power module & fan assembly
- Poll readings
- Cards maintain their configuration even if the Management Module fails
- Fully compliant SNMP interface with Windows® 95/NT/98/2000 GUI (Graphical User Interface)
- Configuration settings up or download to/from management PC
- Link-loss forwarding
- Loop-back test capability
- Get CPE status of remote side
- Pass through QoS & TAG-VLAN frames selectable

```

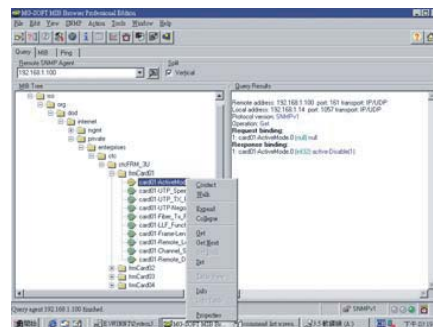
*****
*** CTC UNION TECHNOLOGIES CO., LTD ***
*** FRM-301 NMS Terminal Mode V1.00 ***
*****
Optic Fiber Media Converter Rack Management Main Menu :

0:SNMP card IP setup
1:Slot #1 >> Active << || 9:Slot #9 >> Active <<
2:Slot #2 >> Active << || A:Slot #10 >> Active <<
3:Slot #3 >> Active << || B:Slot #11 >> Active <<
4:Slot #4 >> Active << || C:Slot #12 >> Active <<
5:Slot #5 >> Active << || D:Slot #13 >> Active <<
6:Slot #6 >> Active << || E:Slot #14 >> Empty <<
7:Slot #7 >> Active << || F:Slot #15 >> Active <<
8:Slot #8 >> Active << || G:Slot #16 >> Active <<
H:Set NMS Terminal Mode Password
I:Show Fan Power status

Command Function Key :
'-' : Previous Item | '+' : Next Item
'Enter' : Accept | 'Esc' : Previous menu
'R' : Refresh Status | 'Numeric' : Select Item

##> [Slot #1 ]
    
```

Terminal Mode

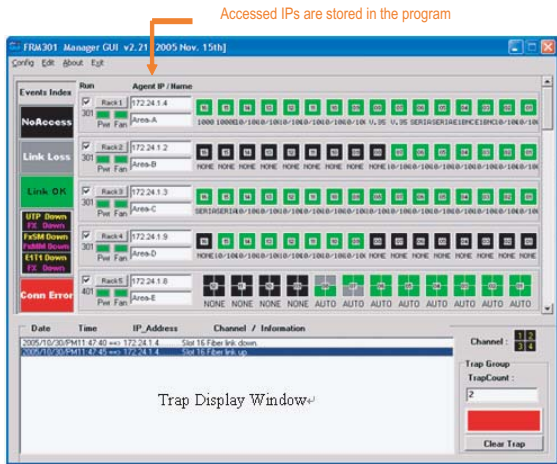


MIB Browser

Ordering Info

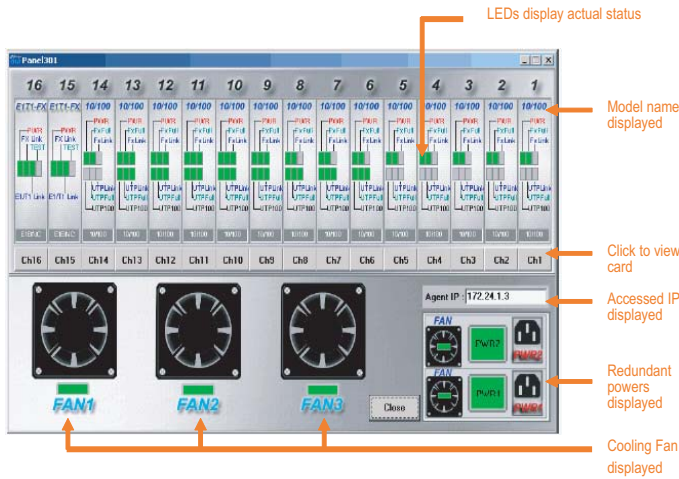
FRM-SNMP-GUI GUI (Graphical User Interface)

Main Screen



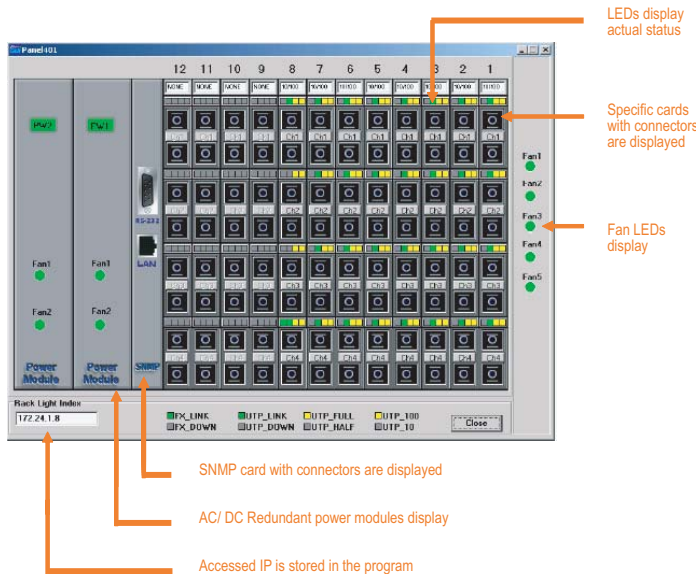
This main screen allows users to enter new or select existing IPs of all agents. When the IP is entered the list of available FRM301/FRM401 chassis are displayed.

FRM301 Rack View Screen



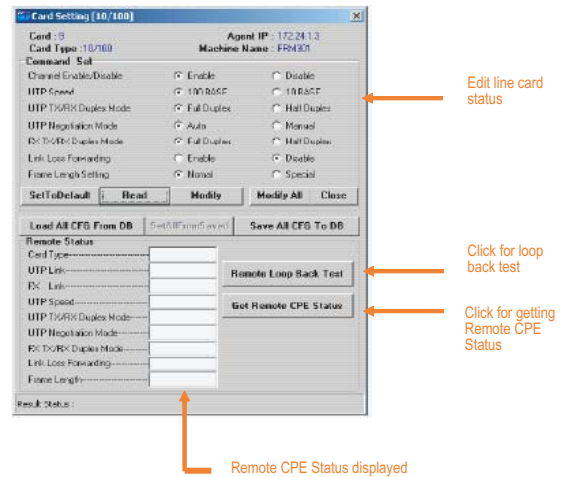
Displays the selected chassis information. Each line card is displayed with LEDs, and status.

FRM401 Rack View Screen



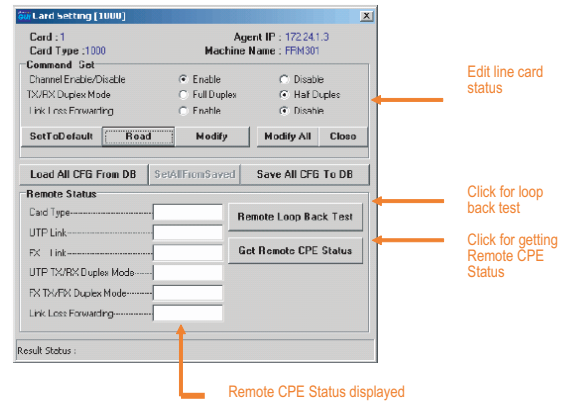
Displays the selected chassis information. Each line card is displayed with LEDs, and status.

Fast Ethernet Line Card Setting



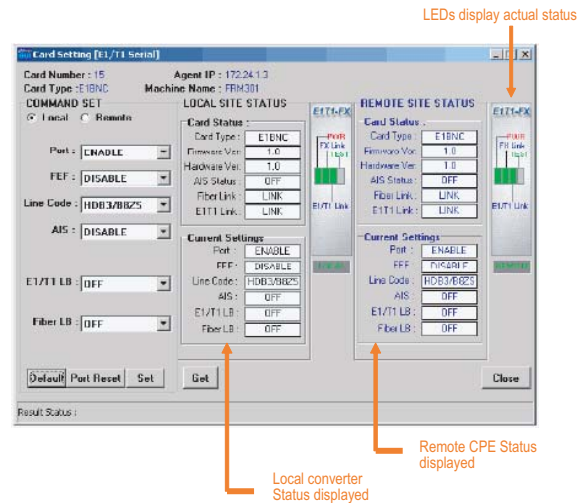
An individual card can be highlighted by clicking on the converter of Chassis screen. A screen is displayed that allows the network administrator to edit the converter's configuration, get the remote unit's status or do loop back functions.

Gigabit Ethernet Line Card Setting



Click the button for a 1000Base line card to view and configure the local line card. Under the GUI, the card's status, Tx/Rx Duplex mode and LLF function may be read or modified.

FRM401 Rack View Screen



If an E1/T1 line card is installed in any slot, the status of the E1/T1 link, port settings and loop back functions may be viewed by clicking the channel button.

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All Solutions for our customers

CTC Union's product portfolio features a broad range of technologies, serving the access requirements of public and private network providers throughout the communications industry. These products maximize use of the access infrastructure to reduce operating expenses, enable fast payback of equipment outlays and accelerate the rollout of broadband as well as legacy services. They also help enterprise users reduce their communications expenses and build affordable private networks that address specific applications and bandwidth requirements.

Network ▶ **C**onversion · ex**T**ension · **C**ommunication

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