

MD4000

LOCAL LOOP EXTENSION

Benefit

- Modem SHDSL : 2 and 4 wires, full duplex
- Complies with G.SHDSL, G.HS, UIT-T G.991-2, ETSI 101 524
- 2 wire rate adaptation : Nx64 Kbps up to 2.3 Mbps
- 4 wire rate adaptation : Nx128 Kbps up to 4.6 Mbps
- Connection on multi-pair cables supporting multiple services such as voice / ADSL / SHDSL
- Choice of terminal interface : RS530, X21, V35, V24/V28, Ethernet, E1, T1, 4xBRI (RNIS So), E1/T1 and Ethernet multiplexer, Combo E1/T1/Ethernet/RS530-X21-V35-V28
- Conversion of E1/T1-G704 to RS530/X21/V35/V28 data interface
- E1 and T1 combo interface, long / short Haul
- Ethernet bridge, 10/100 BaseT
- Transport of 4xBRI, ISDN So interfaces, Basic Rate Interface
- Available 2 or 4 wires repeater
- Desktop enclosure or card for 19" chassis
- Choice of power supply: mains, 48 Vdc, 12-36 Vdc
- Manageable unit through TCP-IP, Telnet, SNMP
- Graphical MS Windows™ management software for configuration and operation
- Alarm relay on option
- 19" chassis with centralized management : TCP-IP, Telnet, FTP, SNMP

HIGH SPEED MULTI RATE MODEM

MD-4000 is a new generation of modems for the local loop extension, the transport of legacy telecom interfaces (RS530/X21/V35/V28, E1/T1, RNIS BRI), and the transport of Ethernet local area network. MD-4000 embeds the more recent G.SHDSL technologies that have been approved by ITU and ETSI for multi-rate digital transmission over the copper local loop. The G.SHDSL mode allows data transmission on multi pair cables which can carry other services such as voice or ADSL.

MD-4000 is available in two and four wires models to provide higher rates up to 4.6 Mbps. The transmission can even be extended thanks to repeaters.



MD-4000 performs a rate adaptation in step of Nx64 Kbps as to ensure the best possible compromise between required bandwidth and DSL link distance. On a 0.4 mm (AWG.26) gauge cable, MD-4000 thus provides a 2.048 Mbps connection over 4.2 km, or 192 Kbps up to 7.4 km. MD-4000 offers high performances in most line conditions and ensure a stable line quality thanks to a user controlled quality margin.

MD-4000 shows a large choice of terminal interfaces which address most requirements of local loop extension and interconnection of professional premises. MD-4030 embeds a multiple protocol synchronous data interface that the user can set for X21, V35, RS530 or V24-28 from a software parameter. MD-40ET provides a G703/G704 interface that the user can set in E1 - 2.048 Mbps or T1 - 1.544 Mbps mode. MD-40FT is an Ethernet bridge over SHDSL. MD-40EX is an integrated product which one of the three embedded interfaces, i.e. RS530/V25/X21/V28, E1/T1 or Ethernet bridge, can be activated by the user depending on his requirement on installation

site. This product optimizes logistics, maintenance and inventory management for large and complex networks.

MD-404B transports one to four ISDN BRI interfaces over a SHDSL link. It can the deport four So buses of a PBX to a remote office that may be several km away.



Last by not least, MD-40MX is an integrated access unit that ensures the transport of both an E1/T1 interface and an Ethernet interface. It behaves like a voice and data multiplexer for E1/T1/ISDN PRI PBX and Ethernet LAN interconnection.

MD-4000 is offered with a complete choice of options that makes it suitable for any application and environmental requirements. It can come as a desktop enclosure with a choice of main or 12-36 / 36-72 DC power supply. MD-4000 also fits in a 19" chassis with a centralized SNMP management, that can be shared with other CXR telecom cards such as G704 interface converters, fiber optic modems, voice frequency modems, other SDH access cards, etc.

MD-4000 is highly manageable thanks to its Ethernet interface and its TCP-IP protocols, Telnet, SNMP. It is easy to integrate in an SNMP network management system till the subscriber end point product. An alarm relay is available as an option of the MD-4000, that activates in case of power failure or of loss of synchronization. MD-4000 firmware can be upgraded when the user requirements change or when new features are available, thanks to its internal Flash Eprom memories.

MD-40ET : E1/T1, G703-G704 INTERFACE

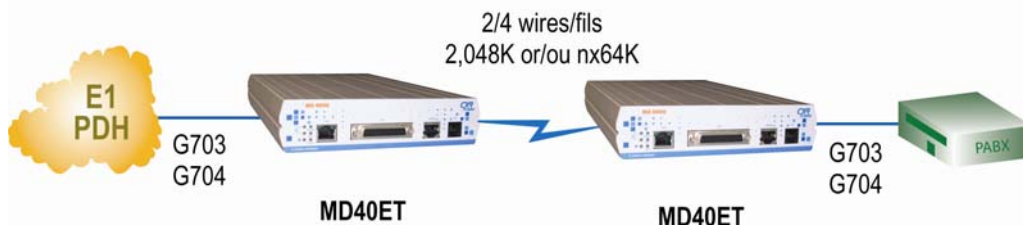
MD-40ET carries an E1 or T1 link over one or two copper pair lines and over distances definitely higher than those reached in G703 (1.6 km at a maximum). It then simplifies engineering rules for deploying G703-G704 networks and connecting subscriber premises through an E1/T1 (2.048 / 1.544 Mbps) interface.

MD-40ET is aimed at transporting G703-G704 interface for any application : interconnection of PBX or ISDN Primary Access, connection of G703/G704 subscriber, interconnection of mobile BSC/MSC stations, extending PDH networks, etc...

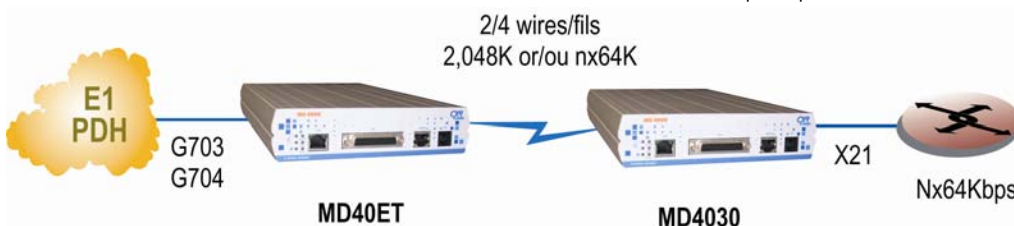
The user can configure the E1/T1 interface in all details through a software user interface : clocking, CRC, sensitivity (long / short haul), T1 Line Build Out, impedance (75/100/120 Ohms – RJ45 / BNC sockets). MD-40ET is an E1/T1 combo product : this simplifies logistics for international applications that have operations in America (T1) and in other countries (E1).

MD-40ET runs an Nx64 Kbps mode to transport required part only of the G704 timeslots and then reduce the bandwidth of the SHDSL link. This feature provides an increased line distance when the number of selected timeslots decreases. The G704 frame is fully rebuilt at the remote end of the link all with synchronization and CRC control.

MD-40ET can be managed from its console port, but also through its Ethernet port and its TCP-IP protocols, Telnet and SNMP. It can then be part of a global network management system based on TCP-IP protocols. MD-40ET performs local analog and remote digital test loops as per V54 standard.



MD-40ET can operate in conjunction with the MD-4030 to perform as a G704 to X21/V35/V28 interface converter function embedded in the SHDLS modem. A couple of MD-40ET and MD-4030 provide an Nx64 Kbps digital leased line to a subscriber from a PDH – G704 network.

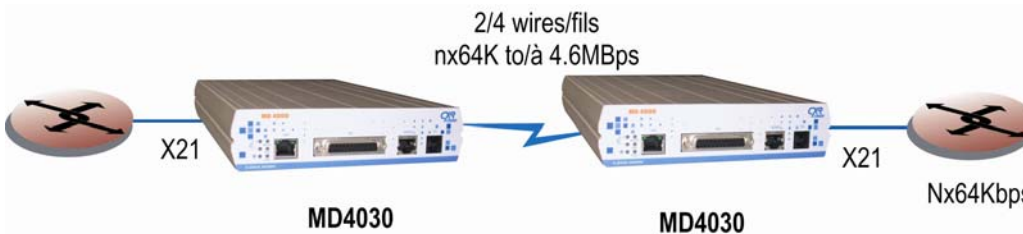


MD-4030, MULTI PROTOCOL RS530 / V35 / X21 / V24-V28 INTERFACE

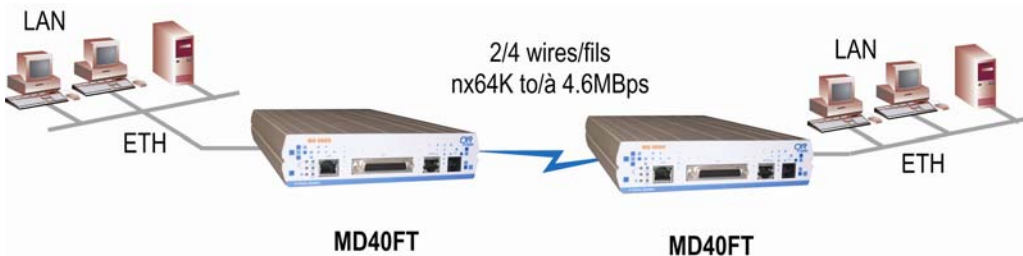
MD-4030 transports synchronous data with Nx64 Kbps rates from 64 to 2,312 Kbps in two wire mode or up to 4.6 Mbps in 4 wire mode.

MD-4030 connects to any type of data terminal equipment such as routers, switch, multiplexer, Frame Relay access devices, video coder, codec, etc... The user can set the interface in either V35, X21, RS530 or V24-V28 through a software parameter. An adaptation cable is provided to convert from RS530 – DB25 to V35 – M35 or X21 – DB15 terminals.

MD-4030 can be managed from its console port, but also through its Ethernet port and its TCP-IP protocols, Telnet and SNMP. MD-4030 performs local analog and remote digital test loops as per V54 standard.



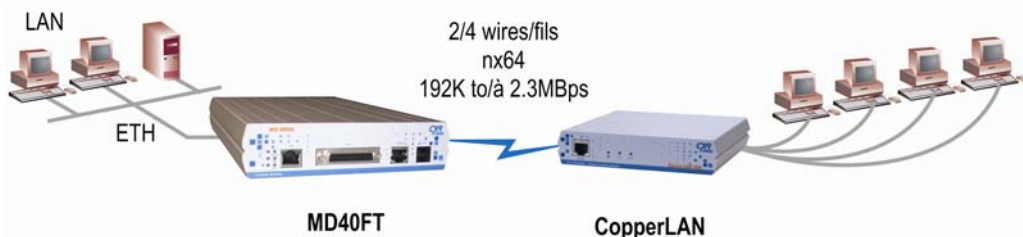
MD-40FT : ETHERNET BRIDGE OVER SHDSL LINK



MD-40FT interconnects Ethernet networks with full transparency to higher level protocols. It is an Ethernet bridge very easy to install and operate since it does not require any protocol configuration.

MD-40FT is a filtering bridge that optimizes the traffic in transporting only Ethernet frames whose destination address belongs to the remote network.

MD-40FT provides Nx64 Kbps rates up to 2.3 Mbps in two wire mode, or up to 4.6 Mbps in four wire mode. It can be manage via TCP-IP protocols locally or from the remote network in the Ethernet data flow.



MD-40FT operates with other Ethernet / SHDSL products of the CXR Anderson Jacobson range, and especially with the CopperLan-SW unit which offers remote locations an embedded 4 port switch to directly connect several terminals, printers, etc.

MD-404B : 4 ISDN So BRI INTERFACE

MD-404B supports four ISDN Basic Rate Interfaces that can be set in Network (NT) or Terminal (TE) mode. It transports the So interfaces and connects remote ISDN terminals far of their network termination or PBX over a long distance that would not be supported by the ISDN So bus.

All four interfaces could then be transported over 6 km on a 2 wire 0.4 mm line.

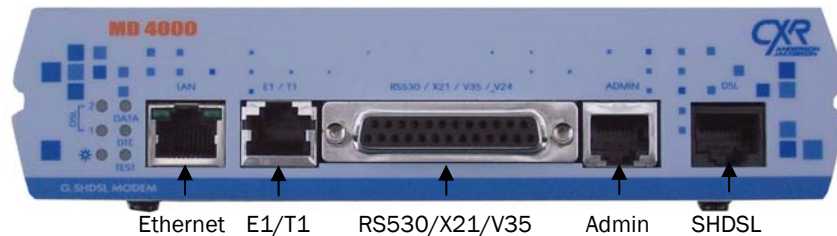
MD-404B transports the D and both B channels in full transparency and controls locally the So level 1 activation process. The clock is usually extracted from a BRI interface at the network or PBX side, and it is re-generated at the remote end. The first BRI interface provides a power feeding for an ISDN terminal that requires up to 1 W power. MD-404B can be managed from its console port, but also through its Ethernet port and its TCP-IP protocols, Telnet and SNMP.



MD-40EX : E1/T1, RS530/V35/X21/V28 AND ETHERNET COMBO UNIT

MD-40EX is an 'everything-in-one-box' solution that embeds all three terminal interfaces, Ethernet, E1/T1 (G703/G704) and RS530

(X21/V35/V28) in a single product that the user can set for the required mode of operation on time of installation. In maintaining a very attractive ownership cost, MD-40EX simplifies logistics of multiple site projects, and avoids complicated inventory management of products and interfaces during all phases of deployment and maintenance of the network. The E1/T1, Ethernet and RS530/V35/X21/V28 interfaces have the same features as the single port models, except the E1 interface which is provided on an RJ45 socket only.

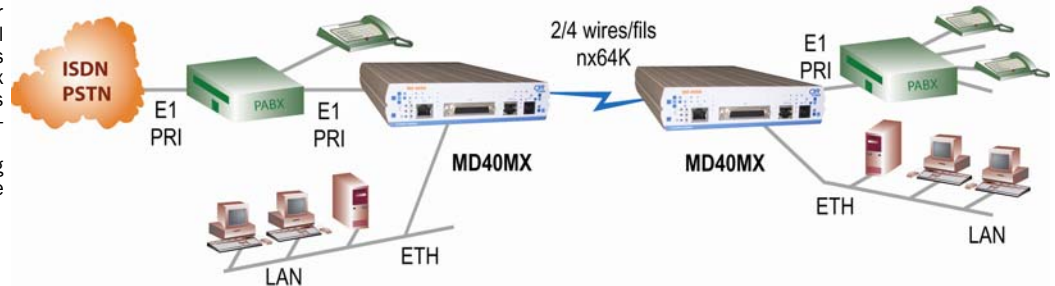


MD-40EX can be managed from its console port, but also through its Ethernet port and its TCP-IP protocols, Telnet and SNMP.

MD-40MX, E1/T1 AND ETHERNET MULTIPLEXER

MD-40MX is an E1/T1 and Ethernet multiplexer over a 2 or 4 wire SHDSL line. It connects voice (E1/T1, ISDN PRI, PBX) and data (Ethernet LAN) through a single SHDSL line over one or two copper twisted pairs such as a classical telephone line. MD-40MX embeds a G704 timeslot assigner matrix which allocates 64 Kbps timeslots to either E1/T1 and Ethernet interfaces in 64 Kbps steps. MD-40MX performs local analog and remote digital test loops at the E1/T1 interface.

MD-40MX can be managed from its console port, but also through its Ethernet port and its TCP-IP protocols, Telnet and SNMP.



OPTIMIZED TRANSMISSION

The TC-PAM G.SHDSL modulation gives the MD-4000 high transmission performances compared with other SDSL technologies:

- Power spectrum density which limits crosstalk and allows transmission on multiple pair cables,
- Adapted line rate in step of Nx64 Kbps to offer the maximum distance according to the required rate,
- Compliance with international standards : ITU-T G.SHDSL, G.HS, G.991.2, ETSI 101 524,
- Two and four wire modes providing a line rate up to 4.6 Mbps,
- Automatic connection at the higher speed that the line can tolerate,
- Possible line extension though 2 or 4 wire repeater
- SHDSL super frame and EOC channel for out of band management and V54 test loop control.

The MD-4000 design focused on offering optimum performances in most line conditions. Typical performances are described here after :

| Rate pair 1 | Rate pairs 2 | Reach km 0.4 mm | Reach km 0.6 mm | Reach km 0.9 mm |
|-------------|--------------|--------------------|--------------------|--------------------|
| 192 Kbps | 384 Kbps | 7.5 | 9.9 | 17.2 |
| 512 Kbps | 1024 Kbps | 6.1 | 8.1 | 14 |
| 1024 Kbps | 2048 Kbps | 4.9 | 6.5 | 11.2 |
| 1536 Kbps | 3072 Kbps | 4.4 | 5.9 | 10.2 |
| 2048 Kbps | 4096 Kbps | 4.1 | 5.5 | 9.5 |
| 2304 Kbps | 4608 Kbps | 4 | 5.3 | 9.1 |

Modem G.SHDSL



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OPERATION AND MANAGEMENT

Operators and network manager constraints were considered in the design of the MD-4000 to provide efficient installation, operation and supervision of the product.

MD-4000 is well suited for any integration environment thanks to its compact stand alone enclosure or its card mounted in 19" chassis, and to a large choice of mains and DC power supplies.

The MD-40EX version provides all WAN interfaces in a single product which mostly simplifies the management of installation inventory and maintenance stocks for these applications which require different interfaces such as E1/T1/G703/G704, RS530/V35/X21/V28 and Ethernet.

MD-4000 can be controlled from its local console port with user friendly and intuitive menus. Operation is very easy and most applications only need to set up a modem in CO mode and the remote one in CPE mode to get a convenient connection. MD-4000 comes with a graphical software for MS-Windows™ host that gives the user an even more easy interface to operate the product in a few clicks.

MD-4000 can be managed through its TCP-IP, Telnet and SNMP protocols at its Ethernet interface. This Ethernet port is available on all versions of the MD-4000 range of modems. This TELNET/SNMP management makes the MD-4000 well integrated in a network management system.

SECURITY

Not only performances and cost effectiveness, but also security and safety of operation were considered during the MD-4000 design.

Its configuration is protected by a set of passwords with operator and supervisor levels.

An alarm relay is available as an option. It is activated in case of loss of power supply or in case of a loss of line synchronization for a period longer than a user defined timeout.

MD-4000 embeds a power supervision and watch dog circuit that ensures a proper restart of the unit in any case of severe perturbation and avoids user corrective action.

TECHNICAL CHARACTERISTICS

SHDSL line

- 1 or 2 twisted pairs with metallic continuity
- G.SHDSL, G.HS, G.991.2, ETS 101 524
- Coding TC-PAM 16
- Power spectrum density : Annex A, B, B-ANFP
- Socket: RJ45
- Transmit power: +13.5 dBm
- Rates in 2 wire mode: 64 Kbps to 2.32 Mbps, Nx64
- Rates in 4 wire mode: 128 Kbps to 4.608 Mbps, Nx128
- Training in 22 sec at 2.32 Mbps

E1 Interface—MD-40ET, MD-40EX, MD-40MX

- G703 clear channel or G704 framed
- G703 : HDB3, 2.048 Mbps +/- 50 ppm
- G704 : 1 to 31 Timeslots , PCM30, PCM30C, PCM31, PCM31C
- CRC4 control
- Clock : internal, external E1, remote
- Phase jitter : G.823
- Receiver sensitivity : long haul / short haul, -43 / -12 dBm
- Extraction of 1 to 32 contiguous 64Kbps TS, starting at a configurable TS
- Impedance : 75 Ohms asymmetrical and 120 Ohms symmetrical
- Sockets : RJ45 and BNC (RJ45 only on MD-40EX)
- Insulation : 1,500 V

T1 Interface—MD-40ET, MD-40EX, MD-40MX

- ANSI T1.403
- Coding : AMI, B8ZS
- Rate : 1.544 Mbs +/- 50 ppm
- G704 : 1 to 24 timeslots at 64 Kbps
- Framing : D4, ESF
- CRC6 control
- Clock: internal, external T1, remote
- Phase jitter : G.823
- Receiver sensitivity : long haul / short haul, -36 / -13 dBm
- Line Build Out : DS-1 and CSU
- Extraction of 1 to 24 contiguous 64 Kbps TS, starting at a configurable TS
- Impedance : 100 Ohms symmetrical
- Socket : RJ45
- Insulation : 1,500 V

RS530 / X21 / V35 / V24-V28 Interface MD-4030, MD-40EX

- RS530, V35, X21, V24/V28 user configurable
- Socket : DB25 as per RS530
- Rates on 1 pair : Nx64 from 64 Kbps to 2.304 Mbps
- Rates on 2 pairs: Nx128 de 384 Kbps to

- 4.608 Mbps
- Rates in V24-V28 : 64, 128, 192 Kbps
- Clock : internal, external, remote
- Synchronous mode
- Adaptation cables for V35 and X21 interfaces

Ethernet Interface—MD-40FT, MD-40EX, MD-40MX

- Ethernet 802.3u, 10/100 BaseTx
- Automatic rate 10 / 100 Mbps
- Automatic MDI/MDIX
- Socket RJ45
- Filtering bridge 802.3
- MAC address memory : 10,000
- Ethernet frame buffer : 400 frames

4 BRI Interface—MD-404B

- 4 ISDN So Basic Rate Interfaces : 2B+D
- ISDN Level 1 control : ETS 300 021, I.430
- Transparent to level 2 and higher
- Sockets : RJ45 x 4
- TE and NT modes through dip switches
- 100 Ohms termination impedance through dip switches
- SHDSL bandwidth : 3x64 Kbps per BRI
- Clock : extracted from a BRI or remote
- Power feeding of the first BRI : 1W

EX Interface, combo E1/T1, RS530 et Ethernet MD-40EX

- Activation by the user of an interface among E1, or T1, or S530/X21/V35/V28, or Ethernet
- Interfaces E1, T1, RS530/X21/V35/V28, Ethernet as per previous characteristics

MX Interface, E1/T1 and Ethernet multiplexer

- E1/T1 interface : as per previous characteristics
- Ethernet bridge : as per previous characteristics
- 2 wire mode bandwidth: Nx64 Kbps, N from 1 to 36
- 4 wire mode bandwidth: Nx128 Kbps, N from 3 to 36
- Allocation of N timeslots for the E1/T1 interface
- Allocation of the remaining timeslots for the Ethernet interface
- Clock : internal, remote, external E1/T1

Management

- Console port : RJ45, 19.2 Kbps, 8N1, VT100, intuitive and auto documented menus
- Ethernet port : telnet, snmp, ftp for firmware upgrade
- Intuitive, user friendly menus for easy and fast set up

- Remote control through Ethernet traffic or out of band EOC channel
- Test loop as per V54, except Ethernet interface
- Transmission statistics and interface status

AMS Chassis Management

- Management card for the AMS chassis
- Features : configuration, interface status, transmission statistics, V54 test, alarm monitoring
- Interfaces : console port, embedded modem, 10BaseTx Ethernet port
- Protocols : Telnet, SNMP

Indicators

- Power
- CD1 : synchronized on SHDSL pair 1
- CD2 : synchronized on SHDSL pair 2
- DTE : terminal activation
- Data : TX and RX activity
- Test indicator

General Characteristics

- Size : DxWxH : 287 x 175 x 41 mm
- Weight : 1.25 kg
- Hygrometry : 10 to 90 % non condensing
- Operating temperature : -10 to +50 °C
- Stocking temperature : -20 to +60 °C
- Desing to comply with EN-60950, EN55022, EN-55017
- Mains power supply: 110-230 Vac, 50-60 Hz
- DC power supply : 36-56 Vdc, 12-36 Vdc in option
- Power : 12 W max

Product Reference—MD-4XY-Z

X : SHDSL interface

- 2 : 2 wires
- 4 : 2/4 wires

YY : terminal interface

- 30 : RS530, V35, X21, V24/V28
- 11 : X21 with adaptation cable
- 35 : V35 with adaptation cable
- ET : E1/T1, G703/G704
- FT : 10/100 BaseTx Ethernet bridge
- 4B : 4 ISDN So BRI interfaces
- MX : E1/T1 and Ethernet multiplexer
- EX : combo RS530/X21/V35/V28 or E1 or T1 or Ethernet

Z : Equipment

- I : standalone, 110-230 Vac mains power supply
- C : standalone, 48 Vdc power converter, 12-36 in option
- R : card for the AMS chassis