

MD 2000

Key features

- Automatic rate/distance adjustment up to 2.3 Mbps
- Full duplex transmission over a single twisted pair
- High noise immunity allowing different types of traffic into the same cable bundle
- Choice of different interfaces V24/V28/V11/V35, G703/704 Ethernet 10baseT with full bridging capability

Optional built-in 8 port Ethernet hub (desk-top only)

- Rackmount and free standing
- Compatible with CXR universal shelves and management system
- Alarm relay

Benefits

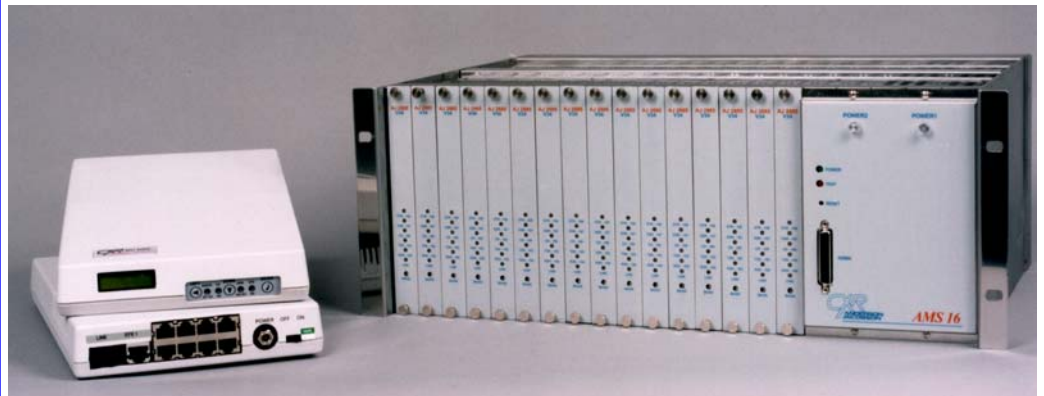
- Fast and easy deployment
- Increased transmission distance via speed adjustment
- Doubles the capacity of existing copper plant
- No need for external interface converters
- Perfect solution for LAN bridging. All in one box
- Cost and space saving by using empty slots in existing CXR managed shelves
- No new management system to learn

MULTI-RATE HIGH SPEED MODEMS

The MD 2000 series is a new addition to the existing broad range of CXR Anderson Jacobson's transmission and network access products. Based on the new state of the art Multi-rate Symmetrical Digital Subscriber Line technology (MSDSL), the MD 2000 maximizes transmission performance over single-pair copper lines at speed up to 2.3 Mbps while providing easy provisioning through an auto-

24 AWG copper lines.

The MD 2000 is available both as a stand-alone unit and as a rack-mountable card to be used inside the CXR universal managed shelf where it can be co-located with other members of the CXR's transmission product family (VF modems, ISDN terminal adapters, ISDN digital modems etc..). Existing shelves



matic rate/distance adjustment mechanism. Unlike first generation of single-rate technologies, MSDSL allows the transmission of data over longer distances by adjusting automatically or manually the transmission speed. It is also much more tolerant to other types of traffic that may exist on the same cable bundle. The MD 2000 greatly reduces the cost, complexity and time required to provision E1 and FE1 circuits. At E1 speed the MD 2000 can symmetrically transmit data over a distance exceeding 3,6 kilometers on

can then be used to their full capacity by reducing the required floor space while minimizing capital expenditure.

The MD 2000 can be factory equipped with a variety of DTE interfaces including V24/V28/V11/V35, G703/G704 and 10baseT Ethernet will full bridging capabilities. As an option the standalone version can also come with a built-in Ethernet 8 port Hub

It also has a variety of options including internal or external AC or DC power supply, flash eprom for software down loading etc.

APPLICATIONS

The MD 2000 can be used in a wide variety of point to point applications. For example in campus, hospitals, Universities, military bases or industrial complexes where copper land lines already exist, the MD 2000 can be used to network PABX's, interconnect LAN's or

extend E1/FE1 access into the customer premises just to name a few.

In a carrier or ISP like situation the MD 2000 can be used to provision E1/FE1 access lines or to access network service infrastructure.

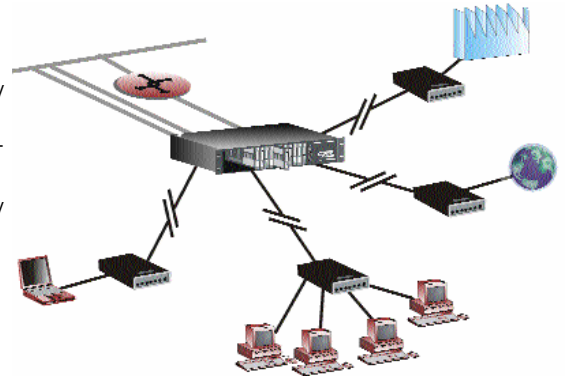
In cellular phone network the MD 2000 can be used to link the base stations to the switch-

PRODUCT DESCRIPTION

The MD 2000 is a multi-rate 2 Mbps full duplex high speed modem operating over a single twisted pair. Built around the new DSL technology called MSDSL, it is intended to provide easy access to broadband services like the Internet, video-on-demand, distance learning or video conferencing. It could also be used for the transport of ISDN BRI/PRI or full and fractional E1 data services. This modem will allow Telecom operators to take advantage of the large installed base of copper twisted pairs which has been deployed over the years all around the world. This modem is also intended to be used on private copper wire infrastructures which very often exist on Universities, Hospitals, Military bases, Power plants, communities and Industrial complexes, for networking purposes.

The key innovation in the MSDSL technology is that unlike the first generation HDSL technology, the line transmission speed can be manually or automatically adjusted to provide the optimum performance for a given copper pair. With the MD 2000 the line speed can be adjusted from 128 Kbps to 2.3 Mbps in increments of 64 Kbps. This adjustment can be done automatically or manually. When the autorate feature is used, the central site unit will synchronizes with the remote unit starting at the highest possible speed and then adjust the speed down until the two modem synchronize. At E1 speed (2.048 kbps), the MD 2000 provides a reach exceeding 3,6 kilometers over a single pair of 24 AWG, the lower the speed the longer the distance.

The MD 2000 can be factory equipped with a choice of different DTE interfaces: V24/V28/V11/V35, G703/704, Ethernet 10baseT with full bridging capabilities and even a built-in 8 port hub in the standalone version. In the rackmount version the MD 2000 card can be housed in the CXR universal 16 slot chassis where it can be mixed with other CXR transmission cards such as the analog VModem cards or the ISDN Quad terminal adapter card. Existing and partially



occupied chassis can then be used to their full capacity saving money and floor space. When the chassis is equipped with a management card, the MD 2000 like any other card in the chassis, can be configured from the management console or via SNMP if the optional proxy agent is added. Alarm reporting and statistic generation are also provided when the management card is installed. For the large central site installations up to 16 chassis can be daisy chained together to form a complete managed node. For the smaller installations a 4 slots chassis is available.

MSDSL is the second generation of DSL technology. It provides better flexibility, better performance and is much more easier to deployed than the first generation

EASY CONFIGURATION AND DIAGNOSTICS

The MD 2000 is easy to configure and operate. In small point to point installations the modem can be configured via the console port using simple commands or menu driven and a VT100 terminal emulation. To facilitate the configuration process the standalone version can also be equipped with an optional 2x16 character LCD display with three associated keys. Remote configuration is also possible using one of the modem as a master unit and the other one as a slave unit. For large installations where numerous modems

have to be installed and mounted in chassis, the management card is highly recommended as it simplifies the configuration process and provide additional features such as alarm reporting and statistic generation.

When troubleshooting is required the MD 2000 provides an easy to use set of tools to rapidly determine the faulty part of the installation. Local and remote loops can be activated together with a built-in pattern generator to measure the bit error rate.

PERFORMANCES

Rate on line kbps	144	272	400	528	784	1040	1552	2064	2320	4640
Rate at DTE kbps	64,128	192,256	320,384	448,512	576 to 768	832 to 1024	1088 to 1536	1600 to 2048	2112 to 2304	4640
Time slots	2	4	6	8	12	16	24	32	36	NA
Distance										
26AWG (0.4mm)	7	6.8	6.5	6.18	5.27	4.95	4.2	3.9	3.7	2.4
24AWG (0.5mm)	10.5	10.2	9.7	9.3	7.9	7.4	6.3	5.8	5.6	3.5
19AWG (0.9mm)	13.3	12.9	12.3	11.7	10.0	9.4	7.9	7.4	7.0	4.5

The performances of the MD 2000 can simply be expressed in terms of maximum achievable transmission speed for a given distance or conversely in terms of maximum distance for a given transmission speed, as illustrated in the above table. This performance however depends on the type of wire used and also the level of noise to which the transmission medium is exposed (line impairments). The type of wire being used (gauge) is very often a given unless a better pair can be found. The higher the diameter of the wires the longer the distance for a given speed. As a rule of thumb,

at a line speed of 2.048 kbps, the maximum range can be calculated by simply taking one kilometer per tenth of millimeter (5 kilometers for a 0.5 mm wire or 24 AWG). Given the fact most of the time the copper pair used for the transmission is part of a cable bundle, the major source of noise will come from the adjacent pairs which may or may not be used to transport the same or a different type of traffic (ISDN, voice etc..). The result is very complex but the MSDSL technology used by the MD 2000 is one of the most robust technologies for noise immunity and as a consequence provides the best performance.

MSDSL modems can be used in a wide variety of applications where a high bandwidth is required using existing copper lines

A CHOICE OF CUSTOMER INTERFACES

To satisfy the diversity of applications, the MD 2000 can be factory equipped with a range of standard DTE interfaces:

The V.11/28/35 interface can be used to connect equipment like routers, video conferencing systems or multiplexers. The interface uses a DB25 connector and comes with the proper adaptation cable.

The G703/704 interface can be used to connect equipment such as E1 multiplexers or PABX's.

The Ethernet 10baseT interface can be used to interconnect a local LAN to a remote LAN with full bridging capabilities.

The standalone version only has an optional built-in 8 port hub allowing Ethernet workstations to be connected remotely to a central LAN via a high speed link eliminating the need for standalone bridges and Hub's.

It should be noted the fact the local and remote modems do not have to be equipped with the same type of interface providing interface conversion without additional de-

DESK-TOP VERSION

The standalone version of the MD 2000 is available in a number of different configurations depending on the application. In an office like context where cost is of up-most importance a low cost version is available with an external power-supply, a plastic case and no LCD display. If requirements are more stringent the MD 2000 can be equipped with a wide tolerance integral power-supply a metallic case and the LCD display. For central office use the MD is also available with an integral 48 volts DC power supply.



MSDSL Modems

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PRODUCT SPECIFICATIONS

MSDSL line

- Signal format: CAP/QAM
- Transmit signal power: 13 dBm
- Connector : RJ11

Customer interface (factory option)

Choice of different physical interfaces:

- V.24, V.11, V.35 via DB25 connector with adaptation cables—Data rate software selectable
- G703/G704 RJ45 8-pin connector 120 Ohms—Data clear channel G703 2048kbps or framed G704 n x 64 with selectable offset
- Ethernet 10baseT learning bridge—connector RJ45 - IEEE 802-3 compatible - Learning up to 10,000 MAC addresses - Filtering rate 15,000 pps—Forwarding rate 15,000 pps (buffer of 255 Frames)
- Ethernet 10baseT Hub (standalone version only) 8 ports - RJ45 connectors

Configuration interface (standalone)

- Control port: V24/V28 - 8 bits without parity - up to 38.4 kbps - VT100 compatible - AT commands or menu driven
- LCD display (optional) - 2x16 characters with three associated keys - Menu driven
- Remote configuration via central site or local modem without service interruption
- 24 hours data transmission statistics
- Easy to install with 4 built-in NTU and LTU configurations

MD20E1 (previous reference: MD2703).

Front panel (standalone)

- With optional LCD - LED's for DTR, CD, Data and Test. Key's for Left, Down and Enter
- Without LCD - LED's for Power, DTR, CD, CTS, Data, Test - Three position switch LAL, Normal, RDL

Rack-mount card

- Front panel same as standalone without LCD
- 16 cards per chassis
- Can be mixed in any order with other CXR cards (modems, ISDN etc..)

Management

- Via universal chassis and CF1/CF2 controller card
- Alarm reporting and statistics
- Optional SNMP agent (to be announced)

Alarm relay

- Audio connector, NO/NC, carrier & power loss

Power supply

- Standalone: 96 to 240 volts AC internal or 230 VAC external - 12, 24 or 48 volts DC internal
- Universal chassis: 110/240 volts AC 24 or 48 volts DC - Optional redundant power supply with full load sharing

Physical

- Standalone: 29 cm deep, 17 cm wide, 3,5 cm high

Operating temperature

- to 50 degree C

Optional high and tropical temperature

ABOUT CXR

A subsidiary of **Microtel International**, **CXR-SA**, formerly **Anderson Jacobson-SA**, is a well known International manufacturer of telecommunication and data-communication products and systems. The company specializes in transmission and network access products but is also active in the domain of transmission testing through its LEA Division.

The company offers a complete range of professional grade products and services which are marketed worldwide through a network a National and International distributors. The company also manufactures and markets its products in the United States and

the United Kingdom through Microtel's affiliated companies and subsidiaries.

CXR is an ISO 9001 certified company.

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