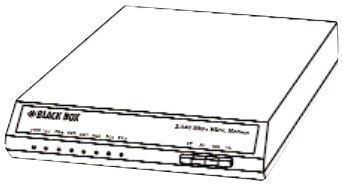
2.048 Mbps HDSL Modem



Maximise the 2.048 Mbps potential of your installed twisted-pair cabling.

Product Features

- Designed to work at 2 Mbit/s without repeaters over up to 7.8 km on standard twisted-pair cables (0.6mm diameter)
- Modular Plug-in DTE interfaces for maximum flexibility and efficient stock management
- 2-pair and 3-pair versions for longer distances
- Fully compliant to ETSI ETR 152
- Embedded channel for extensive management
- Partial fallback supported in case of line problems
- Central site high density card nest for up to 30 modems

Overview

The 2.048 Mbps HDSL Modem (High bit rate Digital Subscriber Line) is a new-generation manageable baseband modem for E1 digital subscriber lines or private copper networks. The 2.048 Mbps HDSL Modem integrates the high performance HDSL technology into a product designed to cover long distances at 2 Mbit/s over unshielded twisted pairs without the need for expensive repeaters or pair selection. Therefore, the 2.048 Mbps HDSL Modem re-enhances the value of the installed copper base to a large extent.

A large set of different plug-in interface boards makes the 2.048 Mbps HDSL Modem ideal for interfacing with almost every application. One can use not only traditional serial interfaces like V.35, V.36, and X.21 (available for both 2 Mbit/s and Nx64 kbit/s operation) but also G.703 (transparent or with G.704 framing) and direct Ethernet 10Base -T connections. All these interface boards can be exchanged in only a few seconds, so flexibility is maximised.

For larger concentration sites, rack-mount versions are mounted in a standard 19" card nest and can offer densities of up to 30 modems per nest. Both 230/115Vac and direct 48Vdc powering can be used.

In addition, the HDSL modems in the network can be managed in an integrated way by an elaborated high-performance integrated management system. An embedded auxiliary channel on the communication link transmits the management information to remote modems rapidly and efficiently.

The integrated management allows one to configure the modem remotely, to query the actual status of the modems, to permanently monitor the performance (real-time and statistical information), to conduct fault analysis, and to report alarms to the operator.

In order to optimise the service on the installed network, Black Box offer a free Windows® based maintenance package. It is a valuable tool for the field engineer as it supports full configuration and troubleshooting.

Typical applications for the 2.048 Mbps HDSL Modem are in carrier environments (high-speed local loop access), railways, campus networks, hospitals and highways. The 2.048 Mbps HDSL Modem is ideally suited for high-speed backbone access, LAN to LAN and PBX to PBX connections, as well as for imaging and other bandwidth-demanding applications.

In the event of line problems, the 2.048 Mbps HDSL Modem can disable the faulty pairs and continue with a reduced bandwidth on the remaining pairs (fractional E1). Furthermore, the 2.048 Mbps HDSL Modem 2p Twin-CV (two modems on one board in a card nest) supports a full and rapid back-up facility to back-up one 2-pair link by means of a continuously available second 2-pair link. The 2.048 Mbps HDSL Modem is available as a desktop unit or as rack-mounted card (each in a 2-pair or 3-pair version).

Specifications

Line interface
- Up to 3 pair + shield (screw connections)
- Impedance : 135 ohm
- Coding :2B1Q conform ETSI ETR 152
- Line speed/pair : 2E1:1168 kbps
- Throughput delay : 300 µ sec
- Transmit level : 13.5 dBm
- G.704 Time Slot prioritization (G.704 Mode)
- Fractional E1 support
- Performance (distance covered noise free)

Wire Diameter (Km)	2-pair version (Km)	3-pair version
0.4	3.6	4.0
0.5	5.0	5.5
0.6	7.1	7.8
0.8	8.9	9.9
1.0	12.5	13.9

Digital interface
- Field exchangeable
- V.35, V.36, X.21 (2Mbps)
- V.35, V.36, X.21 (Nx64 kbps)
- G.703 (G.704 framing possible)
- Ethernet Bridge 10baseT
- RS-530 (with passive adapter cable)
- Different versions; see appropriate leaflets

Management interface
- Desktop versions: 9600 bps asynchronous (subD 9-pin)
- Rack-mount versions (RJ45): Synchronous High speed bus 9600 bps asynchronous (subD 9-pin)

Auxiliary channel interface
- Transparent asynchronous 2400 user data channel

Front panel
- Testloops
  - AL : Analogue Loop
  - RDL : Remote Digital Loop
  - DL : local Digital Loop
  - ET : Integrated Error Test generator

Indications

PWR : Power
TST : Test indicator (circuit 142)
AIS ERR: Alarm Indication Signal (G.704)/
Error Test error indication / Local alarm signaling indication
SQ1-SQ3: Signal quality indication per line pair
TXD : Transmit Data (circuit 103)
RXD : Receive data (circuit 104)

Mechanical data
- Desktop versions: H x W x D: 50 x 200 x 350 mm Weight: 2 Kg
- Rack-mount: Versions H x W x D: 235 x 20 x 300 mm Weight: 1 Kg
- Cardnest QN4: H x W x D: 6U x 19" x 350 mm Weight: 6.1 Kg

Environmental Requirements
- Ambient operational temperature : 0º to 40ºC
- Storage temperature : -10ºC to +70ºC
- Maximum altitude : 3000 m
- Relative humidity : 10% to 90% Non-condensing

Power Requirements
- Desktop versions: 230Vac +/- 10% 50-60Hz : 60mA 115Vac +/- 10% 50-60Hz : 12mA 48Vdc (40.5Vdc-57Vdc): 170mA
- Rack-mount versions: 48Vdc (40.5Vdc-57Vdc) :170mA (Twin:240mA)

Bridge Module

- Interface modules for the 2.048 Mbps HDSL Modems offering Ethernet Bridge functionality
- Modular plug-in module for maximum flexibility and efficient Stock Management
- Fully IEEE 802.3 compliant
- Automatic LAN table learning and ageing
- Transparent and Nx64 kbps versions available
- For all stand-alone models and card version models

The 2.048 Mbps HDSL Modems can be equipped with a large set of modular exchangeable interfaces, making it the high-speed interconnection solution for an extremely wide range of applications. A bridge interface module combines the LAN and WAN subsystem in one single device. It automatically learns the MAC addresses on the LAN it is connected to and forwards through the 2.048 Mbps HDSL Modem baseband connection only those frames destined for the other LAN. The Bridge's LAN table can store up to 10000 addresses and features an automatic updating and ageing mechanism. The interface modules are fully compliant with the IEEE 802.3 standard and offer a direct UTP connection for connecting the Local Network. The polarity of the received signal on these interfaces is automatically corrected if reversed, as in the case of a wiring error. The 2.048 Mbps HDSL Modem with a Bridge Module offers the ideal solution for a low cost interconnection between physically dispersed parts of a LAN subnet (e.g. different buildings in a plant, campus networks).

It is also the central solution for the concentration of different LAN networks by high-speed baseband connections. In combination with the 2.048 Mbps HDSL Modems the Bridge module offers a LAN concentration of 30 remote networks in just one Cardnest. A typical application is professional high speed Internet access.

At the customer side one has to install a 2.048 Mbps HDSL Modem with a Bridge interface. At the central site, the 2.048 HDSL modems are also equipped with Bridge interface modules. An Ethernet switch concentrates the different modules and forwards the traffic to the Ethernet backbone.

The Bridge interface exists as a transparent module that uses all the available bandwidth on the communication link for the transmission of the Ethernet packets. On the other hand, it is also available as a Nx64 kbps version, integrating the bridge and the rate conversion functionality on one single interface board. It allows for the selection of the speed of the Ethernet interconnection at any multiple of 64 kbps.

It is possible to combine the Nx64 kbps type of Bridge interface at one side with a G.703 interface (with G.704 framing) at the other side of the link. The Nx64 data stream is mapped into G.704 time slots (fractional E1) and is output on the G.703 interface at the other end of the connection. This time-slot mapping is entirely under operator control, offering the largest possible flexibility for the connection to a G.704 based Digital Access Cross Connect System (DACCS) or a SDH backbone.

A typical application is the high bandwidth LAN to LAN service where the user can ask for a subscription at any multiple of 64 kbps.

Technical Specifications

LAN interface:
- RJ45 Unshielded Twisted Pair (UTP)
- Automatic TP polarity reversal
- Fully IEEE 802.3 compatible

Indications:
- LNK: Indicates the good Link integrity on the UTP interface
- TX: Indicates the LAN is transmitting data
- RX: Indicates the LAN is receiving data
- COL: Indicates the occurrence of a collision on the LAN
- ERR: Indicates an overrun/underrun in the bridge functionality

LAN encapsulation:
- HDLC (16 bit CRC)
- LAN CRC (32 bit)stripping and reconstruction
- Enhanced Tinygram compression on LAN data

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Bridge characteristics:
- 10000 address LAN table
- 256 frame buffering
- Automatic LAN Learning
- Automatic LAN Ageing
- Ageing time-out: 5 min

Technically Speaking cont…

Nx64 kbps functionality (Nx64 kbps model only) :

- Configuration of any multiple of 64 kbps, up to the line speed
- G.704 compatible framing for direct interfacing on central cross connect systems and SDH backbones

Configurable Ethernet interconnection speeds :

	Transparent Bridge	Nx64 kbps Bridge
HS	48,56,64,72,96 112,128,144 kbps	-
SDSL	384, 768, 1152 kbps	Nx64 kbps (Max 1152 kbps)
HDSL	2048 kbps	Nx64 kbps (Max 2048 kbps)

Ordering Information

Item	**Code**
2.048 Mbps HDSL Modem	MDU9658-R2
Interface Modules	
X.21 2.048 Mbps Module	MDU9201
X.21 Nx64 Module	MDU9200
Ethernet Router Module	MDG9467
G.703 Module	MDU9197
Bridge Module	MDU9466
V.35 Module –2.048Mbps	MDU9666