BLACK BOX®
NETWORK SERVICES

G.SHDSL Network Extender

G.SHDSL Modem

Key Features

- G.SHDSL (single pair or dual pair)
- Easy software exchange with Flash Loader
- No Single Point of Failure
- Single and Dual units available
- Multi-service
- E1 and n x64 (X.21, V35, V36) Interfaces
- Ethernet user interface
- Both bridge and router functionality
- NAT functionality
- DHCP Server
- Regenerator available
- Easy remote configuration via Telnet
- VT100 and SNMP management options
- Subrack, Minirack or Standalone
- High Quality, High Performance

The CityLink Series of Symmetrical DSL Modems

The CityLink series is a wide range of DSL modems targeted to meet both typical carrier applications and access network needs. CityLink brings total flexibility. Depending on country or PTT requirements as well as technology preference, different line coding options G.SHDSL (TC-PAM), CAP or 2B1Q can be selected on the same unit. In addition, any of the CityLink modem series can be delivered in three form-factors designed to meet CO, campus and SOHO needs (either a sub rack plug-in card version for the universal 19" 6U CityLink subrack, mini rack version 19" 1U for direct installation into a 19" rack or stand-alone version for desk top use).

The CityLink G.SHDSL New Generation Modems – Technology

CityLink PAM New Generation modem is based on the latest DSL line technology - TC-PAM.

TC-PAM was designed to provide both superior distance and full electro-magnetic spectral compatibility with other DSL services running in one cable.

TC-PAM is the basis of ANSI HDSL2 as well as ETSI SDSL standards. It is the first international ITU G.SHDSL standard for symmetric 1-pair high-speed data transmission over existing copper. An additional advantage of this technology is the interoperability between several manufacturers of transmission devices. These new generation modems combine some special features for high availability even in harsh environments, such as wetting current and the choice of the extended temperature range of most components. The possibility of having separate receive and transmit paths, the availability of multi-service units and repeater options cover nearly all applications. All units have their own on-board microprocessors, DC/DC power converters, and clock recovery circuits, resulting in extremely high overall system reliability. The new Flash Loader running under Windows 95/98/NT allows a very easy software update in the field through the serial interface (monitor), without removing the unit.

Faster and easier internet Access and LAN-to-LAN Interconnection

CityLink ethernet modems are desi-gned to meet your real-world IP needs. Two typical applications are:

- Easy and cost-effective SOHO connection to the Internet. A built-in router and Four-Port Ethernet switch makes a CityLink Ethernet modem simple and quick to install. Customers will appreciate not having an additional external router. It can be also used in central offices, particularly for small and medium size POPs.
- LAN-to-LAN bridging over a few kilometers-long copper pair is simple with CityLink Ethernet modem's transparent bridge functionality.

Used as CPE devices, CityLink modems are alreadyinteroperable with existing G.SHDSL and CityLink Ethernet modems support the ATM over DSL protocol. It gives you the freedom to control QoS (Quality of Service) of all traffic types such as file transfer, videoconferencing and database accesses. Built-in router

software saves both money and space. NAT (Network Address Translation) functionality allows a whole LAN to connect to the Internet using a single IP address. A DHCP server automatically assigns IP addresses to all workstations on the LAN. Your system administrator will be impressed with the flexible management options. A simple and easy-to-use command menu is accessible via local serial port, Telnet, SNMP or WEB interfaces. Password protection guaranties network security.

The CityLink Ethernet Modems – Line Coding Options

CityLink Ethernet modems have two different line-coding options – G.SHDSL (TC-PAM) and MDSL (2B1Q). G.SHDSL is based on the latest DSL line technology - TC-PAM. TC-PAM was designed to provide both superior distance and full electro-magnetic spectral compatibility with other DSL services running in one cable. It is the first international ITU G.SHDSL standard for symmetric 1-pair high-speed data transmission over existing copper. An additional advantage of this technology is the interoperability between several manufacturers of transmission devices. Alternatively the MDSL (2B1Q) line code option is available for applications where cost is a major decision factor. MDSL is "de facto" in use by many of the DSLAM market leaders.

Specifications — Multiservice

Interfaces

xDSL Line Interface

Specification — ITU-T G.SHDSL Rec G.991.2
Line Code — TC-PAM
Impedance — 135 Ω
Transmit Power — 13.5 dBm @ 135 Ω
Number of Pairs — 1
Bit Rate — 192 to 2064 kbps
Connector Type — RJ-45, 8 pin
Overvoltage Protection —ITU-T Rec. K.20/K.21
Wetting Current — 2-4 mA @ 60 V

E1 Line Interface

Specification — ETS 300 166, ITU-T Rec G.703, G.704
Number of Interfaces — 1 or 2
Line Code — HDB3
Impedance — 120 Ω (75 Ω on demand)
Jitter — ITU-T Rec G.823
ETSI TS 101 135
Bit Rate — 2048 kbit/s ± 50 ppm
Connector Type NTU — DB15 male (120 Ω)
(two BNC 75 Ω on demand)
Connector Type LTU — either DB15 male (120 Ω)
(four BNC 75 Ω on demand)
ESD Protection — 8 kV (Air discharge)

V.35 DCE User Interface

Specification — ITU-T Rec V.35
Number of Interfaces — 1
Connector Type — DB25 female

X.21 DCE User Interface

Specification — ITU-T Rec X.21
Number of Interfaces — 1
Connector Type — DB25 female

Monitor Interface

Specification — EIA-232 / V.28
Data Rate — 9600 baud, asynchronous
Protocol — 8 bit, no parity, 1 stop bit no linefeed with carriage return XON/XOFF enabled
Signal Level — V.28 on DB9 female connector
Connector Type — DB9 female connector

Power Supply

Specification — ETSI ETS 300 132-2
Plug-in — 2 x 40V/60VDC over backpanel (redundant)
Tabletop/Mini Rack — 1 x 40V/60VDC over Molex type safety approved Connector

Environmental

Climatic Conditions

Storage — ETS 300 019-1-1 Class 1.2 (-25 °C … +55 °C)
Transportation — ETS 300 019-1-2 Class 2.3 (-40 °C … +70 °C)
Operation — ETS 300 019-1-3 Class 3.2 (-5 °C … +45 °C)
Safety / EMC — According to EN60950 / EN 55022 , Class B
Physical Dimensions — 19" Plug-in unit: H262 mm (6 HE), W30 mm PCB dimensions:H233.35 mm, L: 220 mm

Specifications — Ethernet

G.SHDSL

Line code — TC-PAM, 1 pair

WAN —

- Data rate: 72 - 2312 Kbps
- Rate adaptive step: 16Kbps
- Line impendance: 135 Ω
- Test Standard: ANSI T1E1.4/94-006; ETSI ETR 152
- Connection Loops: One Pair (2-wire)
- Connector: RJ-11

LAN —

- 4-Port Switch
- 10/100BASE-T
- RJ45

Indicators —

- PWR: Green LED, indicate power in operation
- ALM: Red LED, Data error or operation faulty status
- LINK: Green LED, indicate LAN data link status
- ACT: Green LED, Transmitting / Receiving Data
- SYNCH: Green LED, indicate G.SHDSL data link status

OAM&P — Local: RS-232 Craft Port or Ethernet port
- Remote: SNMP, Telnet via SDSL

Environment —

- Temperature: -30° - +75° C
- Humidity: 5% ~ 95% non-condensing

Physical Dimensions — (WxDxH)
StandAlone: 220 x 170 x 40 mm, 0.5kg
Mini Rack: 483 x 230 x 43.5 mm, 3kg
Rack Card: 233 x 220 x 30 mm, 1kg

Electrical —
Standalone
AC Adapter: Input: 230VAC, 50/60Hz
Output: 12VDC, 1 A
Mini Rack:
Either 230VAC or -48VDC
Rack Card:
Either 230VAC or -48VDC via shelf

Safety — UL & CE, EMC/EMI, FCC

Surge — Meet IEC 1000-4-5 class 2

Reliability — MTBF > 210'240 Hours

Software Specifications

ATM —

- ATM over SHDSL, AAL5
- Cell format - ITU-T Rec. I.361
- Support UBR, CBR & VBR-nrt

Bridging —

- Transparent Bridging (IEEE 802.1D)
- RFC 1483
- Spanning Tree Protocol (IEEE 802.1D)
- Supporting bridge filter function
- Supporting PPPoE filter function

Routing —

- IP: UDP, TCP, ICMP
- Comply to RFC791 for IP and RFC826 for ARP
- PAT (Port Address Translation), Comply with RFC1631
- TCP/IP RIP1, RIP2 Compatible
- Static Routing
- PPP over ATM: PPP over PVCs, LCP, IPCP & BCP, Security: PAP (RFC1334, RFC1994), CHAP
- RFC1483 routing: RFC1483, multi-protocol over AAL5
- IPoA: ARP (RFC1577), Signaling (RFC1755)
- NAT (Network Address Translation)
- DHCP (Dynamic Host Control Protocol)

Management —

- SNMP MIB II
- TFTP
- Telnet
- VT 100
- HTTP

PERFORMANCE TEST RESULTS
G.SHDSL (Diameter 0.4mm)

Rate Kpbs	SQ at Reach	Reach km
72	16	9.18
136	18	7.87
200	25	6.68
264	25	6.55
392	27	5.91
520	27	5.70
776	29	4.85
1032	28	4.97
1160	27	4.6
1544	26	4.42
2056	25	3.75
2312	25	3.51

MDS920AE-RMDC
(19" Rack chassis) 14 Slot Rack chassis
Monitor — VT100 RS232 DB9F, Telnet RJ45
Electrical — Input 2 x 48VDC
Physical dimensions —
19 inch 6U high/ 3.6kg

MDS920AE-RMAC
(19" Rack chassis) 14 Slot Rack chassis
Monitor — VT100 RS232 DB9F, Telnet RJ45
Electrical — Input 1 x 230 VAC + 1 x 48VDC
Physical dimensions —
19 inch 6U high/ 4.6kg

MDS920AE-RMAC2
(19" Rack chassis) 14 Slot Rack chassis
Monitor — VT100 RS232 DB9F, Telnet RJ45
Electrical — Input 2 x 230VAC
Physical dimensions —
19 inch 6U high/ 5.6kg

PSS48VDC-RMS
(19" Rack PS)
Electrical — Input 1 x 85-264VAC, 47-63 Hz
Output: 48VDC/3.8A (max 180W)
Safety —
Underwriters Laboratories:
UL 60950 Third Edition, UL 2601-1 Second Edition, CB Report per IEC 60950(1999), File E137708: Third Edition including all National Deviations
CB Report per IEC 60601-1(1988) Second Edition A1, A2
UL Recognition: Mark For Canada File E137708
CAN/CSA-C22.2 No. 60950-00
CAN/CSA-C22.2 No. 601-1-M90
TUV: EN 60950/2000
EN 60601-1/A2:1995
CE: Low Voltage Directive
Surge — EN 61000-4-5, ±2 kV Line to Earth, ±1 kV Line to Line
Enviromental Specifications —
Operating Temperature Range 0° C to +70° C
Storage Temperature Range -40° C to +85° C
MTBF — 100,000 Hours min.
Physical dimensions —
19 inch 1U high

PSS48VDC-RM
(19" Rack, dual PS)
Electrical — Input 1 x 85-264VAC, 47-63 Hz
Output: 2 x 48VDC/3.8A (max 180W)
Safety —
Underwriters Laboratories:
UL 60950 Third Edition, UL 2601-1 Second Edition, CB Report per IEC 60950(1999), File E137708: Third Edition including all National Deviations
CB Report per IEC 60601-1(1988) Second Edition A1, A2
UL Recognition: Mark For Canada File E137708
CAN/CSA-C22.2 No. 60950-00
CAN/CSA-C22.2 No. 601-1-M90
TUV: EN 60950/2000
EN 60601-1/A2:1995
CE: Low Voltage Directive
Surge — EN 61000-4-5, ±2 kV Line to Earth, ±1 kV Line to Line
Enviromental Specifications —
Operating Temperature Range 0° C to +70° C
Storage Temperature Range -40° C to +85° C
MTBF — 100,000 Hours min.
Physical dimensions —
19 inch 1U high

Ordering information

ITEM	CODE
DESKTOP	
4 x 10/100BASE-T (Switch)	MDS921AE-10BTS
V.35/X.21/G.703, Nx64k	MDS923AE-V35X21
E1, G.703, 120Ω	MDS921AE-E1
RACK	
Rack 19" 14-Slot, 2 x 48VDC	MDS920AE-RMDC
Rack-Chassis 19", 14-Slot, 1x48VDC +1x230VAC	MDS920AE-RMAC
Rack-Chassis 19", 14-Slot, 2 x 230VAC	MDS920AE-RMAC2
Power Supply 230AC/48DC	PSS48VDC-RMS
Rack Card SNMP Management	MDS920C-SNMP
Rack Card 4 x 10/100BASE-T (Switch)	MDS920C-10BTS
Rack Card V.35/X.21/G.703, Nx64k	MDS923C-V35X21
Rack Card 2 x E1, G.703, 120Ω	MDS920C-2E1
MINI RACK	
V.35/X.21/G.703, Nx64k	MDS922AE-V35X21
E1, G.703, 120Ω	MDS922AE-E1
2 x E1, G.703, 120Ω	MDS922AE-2E1

Ordering information

ITEM	CODE
Cables and Adapters	
DB25M to M34F (V.35) (Adapter)	FA058
DB15F to RJ45 (G.705, 120Ω)	FAS776
V.35 DCE cable DB25M to M34F (Winchester), 1.5m	DCE35-0005
V.35 DTE cable DB25M to M34M (Winchester), 1.5m	DTE35-0005
V.36 DCE cable DB25M to DB37F, 1.5m	DCE36-0005
V.36 DTE cable DB25M to DB37M, 1.5m	DTE36-0005
X.21 DCE cable DB25M to DB15F, 1.5m	DCE21-0005
X.21 DTE cable DB25M to DB15M, 1.5m	DTE21-0005

Black Box Network Services - The world's largest network services company

We are, with 25 years of experience, the world leader in network infrastructure services.

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