TELECOM NETWORKS

Wireline Data Access and Transport Systems

6th Edition

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Telecom Networks
Wireline Data Access and Transport Systems

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Telecom Networks

Wireline Data Access and Transport Systems

TE's Wireline Service Delivery Products help you deliver high quality Ethernet and TDM in business services applications over Copper or Fiber. Whether you are building a new network, expanding an existing network, or increasing the manageability and reliability of a network already in place, TE has what you need. Our T1 Service Delivery and Campus products emphasize leading technology for maximum uptime, reliability, remote management and monitoring, with the flexibility to take advantage of any of your legacy installed base. This focus on technology, quality, and manageability reduces your cost of ownership while delivering the highest quality services.

Learn More About Wireline Solutions

Within this catalog you'll find product and ordering information for the most popular Wireline solutions. Because we continually enhance our product portfolio and our specifications, we encourage you to visit our website or contact a TE representative to keep pace with the latest innovations.

T1 Service Delivery Solutions

HiGain CO Shelves, Test Shelves and Cards, and Management

HiGain® Managed Shelf

HiGain® Management Unit

The HiGain Managed Shelf (HMS) houses up to 28 HDSLx line units and one HiGain Management Unit (HMU). Both connectors and wire-wrap pins are provided for connecting to the DSX-1 and HDSLX spans. Each shelf provides power and alarm connections with backplane communications between the management unit slot and the line card slots. This allows full local and remote management and performance monitoring via serial, x.25 or Ethernet.

The HiGain Management Unit (HMU) allows local and remote management and performance monitoring via serial, X.25, or Ethernet as well as providing alarm contacts.

Ordering Information

Description	Catalog Number
HiGain Central Office Shelves	
HiGain managed shelf, 23-inch CO shelf, 3192 mechanics, 28 slots	HMS-317 L2
HiGain managed shelf, 19-inch CO shelf, 3192 mechanics, 22 slots	HMS-318 L3
HiGain CO shelf, horizontal, 19/23-inch 3192 mechanics, 3 slots, separate GND and FGND	HHS-319
HiGain CO shelf, horizontal, 19/23-inch 200/400 mechanics, 3 slots	HUS-340
HiGain Test Shelves and Cards	
HiGain CO test set, two slots, AC/DC, with AC power supply	HCS-402 L3A
HiGain carrying case for HCS-402 test set	HCC-462 L1
HiGain shelf adapter, 3190 to 220 (402) mechanics	HSA-319 L1
HiGain shelf adapter, DDM+ (388) to 220 (402) mechanics	HSA-388 L1
HiGain remote test set, two slot, 210 mini-bantam jacks	HRT-442 L2
HiGain 400 mechanics power supply, 115 VAC to -48 VDC	HPS-448 L1
HiGain test card, 3190 CO mechanics	HTC-319 L1
HiGain test card, 200/400 remote mechanics	HTC-400 L1
HiGain test card, 239 doubler mechanics	HTC-239-L1
HiGain cut-through card, 3190 CO mechanics	HCC-319 L2
HiGain Management	
HiGain Management Unit	HMU-319-L81
HiGain retrofit management shelf, 19"/23" holds one or two HMU-319 that can manage existing unmanaged HiGain shelves of all types	HRM-238-L2
HiGain HDSLX Central Office (3192 Mechanics) Line Unit Modules (Please see next page)	

T1 Service Delivery Solutions

HiGain HDSLx CO Line Units, Repeaters/Doublers, and Remote Units

HiGain® HDSLX Modules

TE has developed advanced unique features to ensure maximum circuit uptime including LoopShield LS™, LoopShield 2 LS2™, LoopShield 3 LS3™, Enhanced AC Immunity, and Cable-Safe technologies.

TE T1 transport products provide the most cost-efficient solutions for service providers to grow T1/E1 business services using legacy HDSL, or latest generation HDSL2, and/or HDSL4 technology. Multiple industry standard mechanic line units allow use in existing deployed legacy shelves as well as in TE's advanced manageable shelves.

All of TE's HiGain Central Office Line Units are remotely manageable when used with a HiGain Management Unit (HMU) in a managed or retrofit managed shelf.

Ordering Information

Description	Catalog Number
HiGain HDSLx Central Office Line Unit Modules	
HDSL2, 3192 mechanics line unit LoopShield 2	H2TU-C-319-L72
HDSL2, 220 mechanics line unit LoopShield 2	H2TU-C-231-L72
HDSL2, DDM + mechanics line unit LoopShield 2	H2TU-C-388-L72
HDSL2, 200 mechanics line unit	H2TU-C-202-L7G
HDSL, LiteSpan mechanics line unit	HLU-200-L3A
HDSL2, LiteSpan mechanics line unit, LoopShield	H2TU-C-200-L71
HDSL4, 3192 mechanics line unit LoopShield 3	H4TU-C-319-L53
HDSL4, 220 mechanics line unit LoopShield 3	H4TU-C-231-L53
HDSL4, DDM + mechanics line unit LoopShield 3	H4TU-C-388-L53
HDSL4, 3192 mechanics line unit, Enhanced AC Immunity (EACI)	H4TU-C-319-L5AC
HDSL4, 220 mechanics line unit, Enhanced AC Immunity (EACI)	H4TU-C-231-L5AC
HDSL4, DDM + mechanics line unit, Enhanced AC Immunity (EACI)	H4TU-C-388-L5AC
HiGain HDSLx Repeater/Doubler Modules	
HDSL, 200 mechanics doubler unit	HDU-409-L2A
HDSL4, 239 mechanics doubler unit LoopShield 3	H4D-409-L20
HDSL4, Single-Shot™ enclosure with doubler (H4D-409 L20)	SPX-HRXP0B7
HiGain HDSLx Remote Unit Modules	
HDSL, 200 mechanics remote, line/local powered	HRU-402 L1
HDSL2, 200 mechanics remote, line/local powered, LoopShield 2	H2TU-R-402-L72
HDSL4, 200 mechanics remote, LoopShield 3	H4TU-R-402-L53
HDSL4, 3192 mechanics remote, line/local powered	H4TU-R-319-L5A1

T1 Service Delivery Solutions

ThinMux™ Multiplexer

TE's ThinMux™ product family helps carriers build today's access networks that can easily adapt to meet tomorrow's needs. The ThinMux product provides a single platform for multiple standards (DS3, T1/E1) while allowing common stocking of MUX cards used with legacy Wideband 3190 systems.

Ordering Information

Description	Catalog Number
ThinMux - Chassis	
ThinMux chassis enclosure	ACE-COM-L2
Wideband/ThinMux - Multiplexer Cards	
DS3 Mux card	HXU-360-L2
ThinMux - Replacements and Accessories	
Fan board replacement module	ACE-FAN
Replacement filter kit	ACE-FIL

T1 Indoor Remote Enclosures

HiGain® Remote Enclosures and Accessories

HiGain® Remote Enclosures

TE is a leader in the design and development of electronics enclosures that support multiple broadband applications. When infrastructure for technology is installed, expanded and modernized, it must be protected. TE's enclosures and shelves protect sensitive electronics and ensure reliable operation for a variety of outdoor and indoor installations. They also support a variety of mechanics for central office, outside plant, and customer premises locations. The superior quality and design of TE enclosures provide an optimal thermal environment for increased density and easy installation for many different applications and conditions.

Ordering Information

Description	Catalog Number
Indoor Enclosures	
Remote, Single Slot, 200/400 Mechanics, DB15/RJ48C, wall mount	HRE-420 L4
Remote, Dual Slot, 200/400 Mechanics, DB15/RJ48C, wall mount	HRE-422 L4
Remote, Three Slot, 200/400 Mechanics, Wire Wrap, rack mount	HUS-340
Remote, Four Slots, 200 Mechanics, DB15/RJ48C, wall/desk mount	HRE-204 L3A
Remote, Six Slots, 200 Mechanics, RJ48C, PS wall/desk mount	HRE-206 L1
Remote, Twelve Slots, 200/400 Mechanics, WireWrap/50pin AMP, wall/desk/rack mount	HRE-425
Indoor Enclosures Accessories	
Wallmount hinge for HRE-204	HRE-204-HMB
HiGain 400 Mechanics Power Supply, 115 VAC to -48 VDC	HPS-448 L1
HiGain Test Card, 200/400 Mechanics	HTC-400 L1
Cable assembly for HRE-425, 12 port, RJ48C to 50pin Amp	CHRE-425-RJ48C
Cable assembly for HRE-425, 12 port, RJ48X to 50pin Amp	CHRE-425-RJ48X

T1 Outdoor Doubler and Remote Enclosures

Radiator and EnCaser® 819

Radiator
8-16 slot

EnCaser® 819
24-slot

Single/Dual Slot
Remote Doubler Enclosure

TE's outdoor enclosures protect sensitive electronics and ensure reliable operation for a variety of above and below ground applications. TE's outdoor enclosures protect sensitive electronics and ensure reliable operation for a variety of above and below ground applications. They also support a variety of mechanics (239, double-wide 239 and 200/400) for central office, outside plant, and customer premises locations.

The EnCaser and Radiator products are thermally enhanced designs that allow full deployment of HDSL, HDSL4, or G.SHDSL doublers.

The Encaser and Radiator cables are fully shielded and armored for maximum protection and have integrated Kevlar ripcords for splicing ease during installation.

Ordering Information

Description	Catalog Number
Outdoor Enclosure	
Remote Doubler Enclosure, Single/Dual Slot, 239 mechanics, above ground, 30′ Gel Stub Sealed window allows external viewing of HDSL HDU-409, HDSL4 H4D-409-L20, and G.SHDSL WDU-940 L1 LED status.	**HRE-602 L1
HDSL4 Single-Shot™ Enclosure with integrated doubler (H4D-409-L20)	SPX-HRXP0B7
Radiator, 8 slot, 239 mechanics, below ground, 30′ Air Core Stub	*RAD-BA30-8
Radiator, 8 slot, 239 mechanics, above ground, 30′ Gel Core Stub	*RAD-AG30-8T
Radiator, 16 slot, 239 mechanics, below ground, 30′ Air Core Stub	*RAD-BA30-16
Radiator, 16 slot, 239 mechanics, above ground, 30′ Gel Core Stub	*RAD-AG30-16T
EnCaser® 819, 24 slot, 239 mechanics, below ground, 30′ Air Core Stub	*ENC-819-CA3P-PA3
EnCaser® 819, 24 slot, 239 mechanics, above ground, 30′ Gel Core Stub	*ENC-819-CG3P-VA3
Remote/Doubler, One slot, 200/400 mechanics, Gel Stub	HRE-450 L2B
Remote/Doubler, One slot, 200/400 mechanics, No Stub	HRE-450 L4B
Universal Test Card, fits any standard T1-239 mechanics repeater slot	HTC-239-L1

* Enhanced thermal characteristics allow full population of HDSL and HDSL4 doublers
**For HDSL, HDSL4 or G.SHDSL doubler use only, not for T1 repeater use

T1 Outdoor Doubler and Remote Enclosures

Radiator and EnCaser® 819 Accessories and Replacement Items

Radiator
8-16 slot

EnCaser® 819
24-slot

TE's outdoor enclosures protect sensitive electronics and ensure reliable operation for a variety of above and below ground applications. These accessories and replacement items are used for a variety of installations and field maintenance.

Ordering Information

Description	Catalog Number
Outdoor Enclosure Accessories and Replacement Items	
Ground Wire, 6AWG, 10' Long	SPX-HRXC-GW-10
Universal Test Card, fits any standard T1-239 mechanics repeater slot	*HTC-239-L1
Encaser Pole Mounting Hardware Kit, optional	ENC-819A11
Encaser/Radiator Gas Tube Insertion-Removal Tool, Recommended	ENC-819A16
Encaser/Radiator Gas Tubes, qty 4, replacement	ENC-819A21
Encaser Bottom Gasket Kit, replacement	ENC-819-ABOT-GSK
Encaser Lid Gasket Kit, replacement	ENC-819-ALID-GSK
Encaser Lid Hardware, replacement	ENC-819-ALID-HDW
Encaser Lid Kit for Slots 1-12, replacement	ENC-819-LK-1-12
Encaser Lid Kit for Slots 13-24, replacement	ENC-819-LK-13-24
Radiator Tilt Bracket	**RAD-TLT1
Radiator/Encaser Desiccant Kit	RAD-DESI-AC
Radiator O-Ring Kit, replacement	RAD-ORA1
Radiator V-Band Kit, replacement (Includes VBand, T-handle, T-head bolt that T-handle goes into, and U-plate for locking it.)	RAD-VBA1
Radiator Lid Kit, replacement (Lid, O-Ring, V-Band Kit)	RAD-LIDKIT1
Radiator Valve Manifold Kit, replacement (Pressure relief valve, Fill valve, Manifold, O-ring)	RAD-VMAN1

*included with all Encasers and Radiators
**included on above ground Radiators already as the "T" on the end of the catalog number

LAN Extension Solutions

Campus-RS™: HDSL Star Chassis System and Desktop Units

Campus-RS Desktop Point to Point or Remote Unit CARS-51-3W

Campus-RS Star Chassis for Aggregating Multiple HDSL Connections, CACNS700-03-3

The Campus-RS™ Star Chassis system provides a central site platform with up to 14 SDSL one pair or two pairs connections. It interoperates with any combination of Campus-RS desktop remotes or other Campus-RS Star platforms to provide support for a variety of voice, video and data applications such as LAN extension, video conferencing, and PBX extensions in a private enterprise network.

Ordering Information

Description	Catalog Number
Campus-RS Star Chassis System	
14 slot, 19" Star Chassis. Includes one CAPS-720-3 110-240VAC power supply with US power cord. A second power supply for redundancy is optional	*CACNS700-03-3
Campus Management Unit for Star Chassis, One recomended for each chassis	CACMU-819-51
Blank panel slot filler kit, 14 blank panels, optional	CABP-014
Replacement Campus Star Chasis fan kit, four fans	CASTARFAN3
110-240VAC power supply for CACNS700-03 chassis. Used for replacement or optional second power supply for redundancy. Includes US power cord	CAPS-720-3
Replacement US power cord	PC-US
Campus-RS Star Line Units	
Line units for use in CACNS700-3 Star Chassis	CACLURS-02
Campus-RS Point to Point Desktop/Remote Site Access Devices	
SDSL rate selectable (64kbps to 4.096 Mbps) Desktop Unit with 110-240VAC internal power supply and US power cord, used in pairs for point to point applications or as a remote for Campus-RS Star chassis applications	**CARS-51-3W
Two slot 19" Rack Mount Enclosure for holding two CARS-51-3W desktop units	CACEN602
Four slot 19" Rack Mount Enclosure for holding four CARS-51-3W desktop units	CACEN604
DB9M to RJ45F Console Adapter, Optional	ECA-802 L1
DB15M to RJ45 HDSL Adapter, Optional	ECA-806 L1
Campus Network Interface Modules (Please see next page)	

* Requires Campus Star Line Units and Network Interface Modules (see next page)
**Requires Campus Network Interface Modules (see next page)

Campus-RS Rate-Selectable SDSL Systems

Featuring a flexible, rate-selectable design, the Campus-RS family of products seamlessly accommodates a wide range of network interfaces and access speeds. Network interface modules let you pick the interface you need for each link in your CACNS700-03-3 Star Chassis or CARS-51-3W desktop. CAFLEX Network Interface Modules add more flexibility by providing up to three independant interfaces by choosing the cables needed for your application. The result is an innovative system that delivers high performance and cost savings by supporting a wide range of applications through a single platform solution.

Ordering Information

Description	Catalog Number
Network Interface Modules for CACNS700-03 Star Chassis and CARS-51-3W Desktop Units	
DSX-1, with CSU/DSU	CADSX1
G.703/75 Ohm (E1 rate only)	CAG703-75
G.703/120 Ohm (E1 rate only)	CAG705-120
Ethernet (10/100Base-T) 2 wire / 4 wire with IPv4, IPv6, and VLAN support	CAREX3
RS449 (n x 56/64kbps)	CARS-449
RS530 (n x 56/64kbps)	CARS-530
RS530A (n x 56/64kbps)	CARS-530A
V.35 (n x 56/64kbps)	CAV35
X.21/V.11 (n x 56/64kbps)	CAX21
CAFLEX Network Interface Module for CACNS700-03 Star Chassis and CARS-51-3W Desktop Units	
Flexible multiport fractional T1 delivery system. Provides three independant ports. One DSX-1 port and two serial ports of V.35, RS530 or RS449 mapped to any combination of 24 DS0s. *Cables are not included. One or two cables should be ordered. (See list of cables at bottom of page)	*CAFLEX
Cables for CAFLEX Network Interface Module	
12″ High-density (HD) to V.35 female adapter cable for CAFLEX interface card	CACHD-35
12″ High-density (HD) to RS-530 female adapter cable for CAFLEX interface card	CACHD-53

Megabit Modem MM702G2-003

TE's Megabit Modem product offer groups or individual users secure, high-speed connectivity to today's growing array of remote resources. Whether accessing the Internet, connecting remote network sites, or telecommuting, TE has the right modem for your application and budget.

Ordering Information

Description	Catalog Number
Megabit Modems Point-to-Point or DSLAM Applications	
G.SHDSL modem supports 4-wire G.SHDSL at speeds up to 4.6 Mbps as well as 2-wire at speeds up to 2.3 Mbps (2 pair/1 pair copper). Operates point-to-point or with DSLAM. US power supply and power cord included.	MM702G2-003
Replacement US power supply and power cord	MM70X-003

Ethernet, E1, and Serial Data Access and Transport Solutions

WorldDSL™ – Single/Dual-Pair G.SHDSL

TE's WorldDSL G.SHDSL modems are designed for copper cable-based Ethernet access needs of national and Global markets. Ideal for both telco and enterprise networks, WorldDSL products are capable of up to 5.696 Mpbs per pair (11.392 Mbps total) for true Ethernet access. WorldDSL products conform to international standards to ensure compatibility, performance and safety within your network environment.

Each WorldDSL modem is software configurable as a central office or remote, so any two units can be used for a point-to-point circuit. These modems can be deployed back-to-back or in a central office or an enterprise data-center based chassis. The modems are part of a fully managed system, interfacing with a VT100 compatible terminal or a PC. The units can be managed via their local craft port or a central management card installed in a CO shelf. TE's StarGazer, Windows or UNIX-based SNMP management software can be used to provision the system, collect alarm and performance data, and conduct diagnostic tests locally or from a remote management station. In any of these modes, the remote unit can be programmed and managed through the CO, minimizing travel to the outdoor or remote customer site.

The WorldDSL chassis is fully connectorized for a management card. The WorldDSL management card may be installed, enabling the entire shelf to be managed locally or remotely through a dial-up modem or Ethernet LAN. The management card is equipped with six Form C dry contact relays which are software driven to indicate critical, major and minor alarms. Alarms may be generated by any G.SHDSL modem or by the management card.

Ordering Information

Description	Catalog Number
Managed Chassis	
19", 16-slot, manageable, rear-mounted connectors, WorldDSL Chassis	EMS-830 L2
19", 16-slot, manageable, front-mounted connectors, WorldDSL Chassis	EMS-832 L2

Line Cards

WorldDSL G.SHDSL line cards can be used in managed central office (CO) chassis or single slot enclosures. All of the G.SHDSL cards are universal and can be used as either STU-C central office units or STU-R remote units that can be line or locally powered. The "GL" versions have the added feature of being able to line power a doubler and a remote.

Ordering Information

Description	Catalog Number
G.SHDSL Single/Dual-Pair STU-C/STU-R Line Cards with Line Powering, Local Powered	
Ethernet+E1+Serial (10/100BASE-T, G.703/704, V.35, V.36, RS-530, and X.21)	WD924GL-1B-01
G.SHDSL Single/Dual-Pair STU-D Doubler, Line Powered	
Use with HRE-602 L1 or Radiator enclosures	WDU-940-L1
G.SHDSL Single/Dual-Pair STU-C/STU-R Line Cards, Line or Local Powered	
Ethernet+E1+Serial (10/100BASE-T, G.703/704, V.35, V.36, RS-530, and X.21)	WD924GN-1B-01

Management Cards

The EMU-830 L6 is an Exchange Office Management Unit (EMU) that installs in a WorldDSL Exchange Office Management Shelf (EMS). EMUs provide a single point interface for local or remote ASCII access and as the Simple Network Management Protocol (SNMP) agent for WorldDSL's graphical user interface (GUI) StarGazer management software.

Ordering Information

Description	Catalog Number
Management Unit	EMU-830 L6

TE's WorldDSL family of products includes a single slot remote enclosure that can accept any WorldDSL line card. This enclosure allows the line card to be AC or DC locally powered, or remotely line powered and can be used at central office, remote cabinet, or customer premise locations. This enclosure can be used over wide temperature (-40ºC to 85º C) when DC or line/span powered.

Ordering Information

Description	Catalog Number
Single-slot, AC, DC, or line powered	ERE-811 L5
North American standard power cord (required for AC option)	PC-US

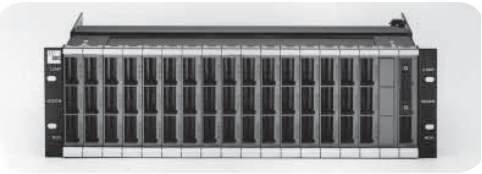
ECA-80x Connector Adapters

TE offers a line of connector adapters to provide needed data port connectors as well as offering conversion of the method of attaching G.SHDSL lines to the ERE-811 enclosure.

Ordering Information

Description	Catalog Number
DB25M to M34F V.35 adapter	ECA-800 L1
DB9M to RJ45F xDSL adapter	ECA-802 L1
DB9M to screw terminals xDSL adapter	ECA-804 L1
DB15M to RJ45 120 Ω E1 Adapter	ECA-806 L1

Uninterrupted data network communications depend upon your ability to independently and immediately restore function to a failed component or to substitute or reroute communication paths. TE's PatchMate™ data management and access products provide a convenient, organized method of digital communications line monitoring and reconfiguration.



PatchMate Preconfigured Chassis Assemblies, Chassis, Modules, and

PatchMate Products

For total control over the network, you need the ability to perform independent and immediate circuit restoration upon failure or reroute a communications path. PatchMate Digital Patching provides convenient, organized line monitoring, access, test and reconfiguration capability for multiconductor digital interfaces.

For ordering information, view product literature piece on PatchMate Data Management and Access Products at www.TE.com.

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