

T3 T1 E3 E1 Datacom – mTOP™ Test Platforms

mTOP™ Rack and Probe are Supported



mTOP™ Rack can be Stacked with Multiple T1 E1/T3 E3 Devices



T3 T1 E3 E1 Software Selectable



Supports Channelization of Captured E1 Signals into 42 or 32 Independent E1 Channels



Supports Channelization of Captured T1 Signals into 56 Independent T1 Channels



Supports ISDN, SS7, CAS and Other Channelized Protocols



Direct Access to All or User-defined 2 x 28 T1s, 2 x 21, 2 x 16 E1s per Port Analysis



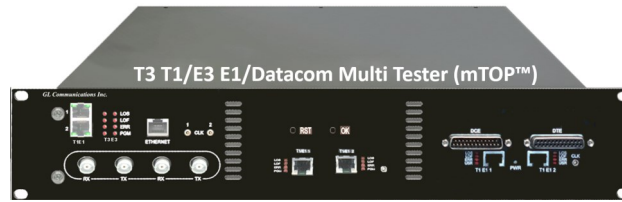
Supports BERT, Capture and Playback Applications



Supports Analysis of Various Signal Types - Voice, Digits, Tones, Fax, Modem, and Raw Data



Monitors Data Communication Line Status



2U mTOP™ with T3 E3, T1 E1, and Datacom Units



mTOP™ Probe with T1 E1 Unit



2U mTOP™ with 6x T3 E3 USB units

Overview

GL offers multi-interface (TDM Optical and Packet/IP) test solution in two variants - mTOP™ 1U/2U rack enclosure and mTOP™ Probe unit.

- The **mTOP™ 1U/2U rack enclosure** can be stacked with multiple T3 T1, E3 E1, and Datacom USB units to provide high density form factor solution. Provides space efficiency, but also account for easier scalability and reduced licensing cost per port.
- The **mTOP™ Probe** variant is an all-in-one self-contained test instrument, which includes single T3 T1 E3 E1 and Datacom USB unit along with necessary PC interface in a single box. The comprehensive mTOP™ Probe is designed for easier portability and convenient for drive testing.

T3 T1 E3 E1 – mTOP™ Rackmount Systems, supports 6 T3s (6 * 672 DS0s) or 6 E3s (6 * 480 DS0s). Multiple rack units can be stacked together for greater scalability. A T3 (DS3) consists of a total of 28 T1s, or 672 full duplex voice channel. Similarly, an E3 consists of a total of 16 E1s, or 480 full duplex voice channels.

A customized 2U rack tProbe™-T1 E1 / Datacom-Analog and T3 E3 units shown above serve the purpose of handling multiple communications lines and test complex functionalities.

For more details, visit <https://www.gl.com/test-high-speed-wan-services-t3-e3-ds3-line.html>.

Main Features

- Analysis/Emulation of T3 (44.736 Mbps) and E3 (34.368 Mbps)
- Analysis/Emulation of ATM, PPP, HDLC, and Frame Relay signalling
- Record / Playback of entire T3 or E3
- Monitoring & generating alarms, and error insertion
- Analysis of all 28 T1s (1.544 Mbps each) per T3 port, or 16 E1s (2.048 Mbps each) per E3 port in Channelized mode
- Analysis of Fractional T1s and E1s, N x T1s or N x E1s
- Analysis of any combination of DS0s (64 kbps each) within the T1s or E1s (for example, each T3 port has 28 x 24 = 670 DS0s for T1 or 21 x 32 = 672 DS0s for E1) with additional applications, such as record-only, one can even record traffic at DS0 levels
- Monitor the T1/E1 line conditions such as frame errors, violations, alarms, frequency, power level, and clock (or frame/bit) slips
- Comprehensive Analysis / Emulation of Voice, Data, Fax, Protocol, Analog, and Digital signals, including Echo and Voice Quality testing
- Supports Datacom interfaces - V.35, X.21, RS-232C, RS-449, RS-485, EIA-530 and EIA-530A
- Flexibility in running multi-interface test from within a single mTOP™ equipment
- mTOP™ probe solution for easier portability and convenient field testing.



GL Communications Inc.

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T3/E3 Specifications

<p>Output Amplitude 800mV ± 50mV</p> <p>Input Impedance 75 Ohms unbalanced (BNC)</p> <p>Line Code B3ZS (T3), HDB3 (E3)</p> <p>Terminate Input Level 0.09Vp – 0.85Vp</p> <p>Monitor Input Level 0.025Vp – 0.08Vp</p>	<p>T3 (DS3) / E3 Payloads Framed T3 (DS3) / E3 Data, Unframed T3 (DS3) / E3, Idle, AIS</p> <p>Unframed E3 Payload Raw Data from File, BERT Patterns</p> <p>Channel Structure T1, E1 (DS1) (ITU-T G.747)</p> <p>BERT Patterns QRSS, 2⁶-1, 2⁹-1, 2¹¹-1, 2¹⁵-1, 2²⁰-1, 2²³-1, User Defined upto 32-bits, other static patterns</p> <p>T1 (DS1) Payload Inserted T1, AIS, Loopback, BERT Patterns (future)</p> <p>E1 Payload Inserted E1, AIS, Loopback, BERT Patterns (future)</p> <p>Loopbacks Complete T3 (DS3) / E3 Signal, Selected T1s/E1s from incoming T3 (DS3) / E3</p>
<p>Clock Source</p> <p>Internal ± 1 PPM @25C [± 4.5 ppm (includes ageing, stability)]</p> <p>Recovered Clock recovered from receiver</p> <p>External TTL Level signal High Speed (T3 (DS3) / E3 Rate) Low Speed (2KHz, 8KHz, 2MHz, 1.5MHz) Recovered from Inserted T1 or E1</p>	<p>T3(DS3)/E3 Receiver</p> <p>T3 (DS3) Framing Format M13 (ANSI T1-107 – 1995), C-bit (ANSI T1-107 – 1990), Unframed, Structured (Channelized), and Unstructured (Unchannelized)</p> <p>E3 Framing Format E13, Unframed, Structured (Channelized), and Unstructured (Unchannelized)</p> <p>Channel Structure T1 (DS1) /E1 (ITU-T G.747)</p> <p>Framed T3 (DS3) / E3 Unstructured Payload Raw Data Captured to File, ATM Analysis (only for T3), HDLC Frames Analysis, BERT Patterns Measurement</p> <p>Framed T3 (DS3) / E3 Structured Payload Raw Data Captured to File, BERT Patterns Measurement, Drop Selected T1(s) / E1(s)</p>
<p>T3 (DS3) / E3 Transmitter</p> <p>T3 (DS3) / E3 Payloads Framed T3 (DS3) / E3 Data, Unframed T3 (DS3) / E3, Idle, AIS</p> <p>T3 Framing Modes Unframed M13 (ANSI T1-107 – 1995) Structured (Channelized), and Unstructured (Unchannelized) C-bit (ANSI T1-107 – 1990) - Structured (Channelized), and Unstructured (Unchannelized)</p> <p>Unchannelized T3 supports subrate and scrambling formats for Digital Link, ADC/Kentrox, Larscom, Adtran, and Verilink data service units (DSUs)</p>	<p>T1 E1 Transmit / Receiver</p> <p>Bit error rate testing (BERT) pattern generation and detection per channel</p> <p>Transmit Tone, Transmit Gaussian Noise, Transmit Multiframe</p> <p>Transmit Signalling Bits, and Rx-to-Tx loopback</p>
<p>E3 Framing Modes Unframed, E13 (for E3) - Structured (Channelized), and Unstructured (Unchannelized)</p> <p>Framed T3 (DS3) / E3 Unstructured Payload Raw Data from File, ATM Cells (only for T3), HDLC Frames, BERT Patterns</p>	<p>Compliance G.703 Physical/Electrical Characteristics GR-499-CORE Physical/Electrical Characteristics G.821 Bert Analysis G.742 Multiplexing G.751 Multiplexing</p>



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T3/E3 Specifications

Supported Protocols

T3 (DS3) / E3 Payloads	Framed T3 (DS3) / E3 Data, Unframed T3 (DS3) / E3, Idle, AIS
Channelized Protocols	High-Level Data Link Control (HDLC) Point-to-Point Protocol (PPP), RFC 1662, Multilink PPP (MLPPP), RFC 1990 Frame Relay, RFC 1490 Multilink support over Frame Relay (FRF.12) and MLPPP ATM IMA GSM, TRAU, GPRS, UMTS over ATM SS7, ISDN, CAS, SS1, SSM V5.x, DCME, FDL (T1 Interface only)

UnChannelized Protocols (Unstructured)	PPP, ATM, Frame Relay
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Miscellaneous

T3 (DS3) / E3 Line Rate Offset	± 50 PPM in 1 ppm Steps
Level Measurement	Supported
Frequency Measurement	± 1 PPM
T3 (DS3) Error Add	Payload Bit, Frame Errors, P-bit, C-bit, EXZ (for T3);
E3 Error Add	Frame Errors, Code Violation (CV) Error, EXZ, Payload Bit
T3 (DS3) Alarm Generation	LOS, AIS, RAI (X-bit), Idle, FEAC Codes (Loopback and alarm/status codes)
T3 (DS3) Alarm Monitoring	LOS, LOF, AIS, Idle, RAI (X-bit), EXZ
E3 Alarm Generation	LOS, OOF, RAI (X-bit);

Miscellaneous (Continued)

E3 Alarm Monitoring	LOS, LOF, AIS, RAI (X-bit), EXZ
T3 (DS3) FEAC Codes	Alarm status codes, loopback codes with channel indicator for T1
LED Indicators	LOS, LOF, ERR, PGM
Mechanical	
Power Supply	100-240V, 5A, 50/60Hz
Operating temperature	0° C to 40° C
Storage temperature	10° C to 70° C
Relative humidity	10 % min, 90 % max, non-condensing

Functional Specifications

- DS3/E3 multiplexing from T1/E1
- DS3/E3 Playback and Capture
- DS3/E3 Protocol Analysis
- DS3/E3 Bert Analysis
- Sending DS3/DS1 SNMP Traps to Network Operation Center (NOC)



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tProbe™ Specifications

Basic Software

VF Options

- Speaker
- Drop and Insert
- VF In / Out TS settings

Monitoring Options

- Monitor T1/E1 Line
- Byte Values & Binary Byte Values
- Signaling bits, Power Level, DC Offset, & Frequency
- Multi-frames, and Real-time Multi-frames
- T1/E1 Data as Real-time Bitmap
- Time-slot Window
- ASCII Timeslot Display
- Oscilloscope & Power Spectral
- Active Voice Level

Intrusive Testing

- Bit Error Rate Test
- Enhanced Bit Error Rate
- ATM BERT
- Transmit Tone
- Transmit Gaussian Noise
- Transmit Multiframe
- Transmit Signaling Bits
- Precision Delay Measurement
- Rx-to-Tx Loop back
- Error Insertion

Windows Client / Server

- w/ Remote access to T1/E1 server using Clients - C++, TCL, C#
- Dual VF Tx/Rx

Optional Software

Protocol Analysis

- ISDN, HDLC, SS7, CAS, GSM, GPRS, UMTS, GR303,
- Frame Relay, ATM, PPP, TRAU, CDMA, DCME, T1,
- E1 Maintenance Data Link (SaHDLC and SSM), SS1
- Facility Data Link, V5.x, Fax, Modem

Protocol Emulation

- ISDN, SS7, ISUP Conformance Scripts, GSM Abis,
- GSM A, MAP, CAP, INAP, MLPPP, CAS
- TRAU, SS1, Multi-link Frame Relay Emulation
- Inverse Multiplexing over ATM

WCS Modules

- Tx/Rx files, digits, Protocol Emulation
- Multi-channel BERT,
- DSP operations, Dynamic DSP capability
- FAX Emulation over T1/E1 and Analog Lines

Record / Playback Files—Manual, Automated

Capture, Analysis, & Emulation - DTMF / MF / MFCR2, Digits, Tones, Voice, Fax, Modem, Raw Data

Voice Band Analysis Software

Call Data Records

Multi-Channel BERT

Jitter Generation, Jitter Measurement, & Pulse Mask

Protocol Identifier, Traffic Classifier

Echo Cancellation Testing / Compliance -Manual, Semi-automated, & Automated –G.168, G.160, G.169

- Measure Loop Delay/ERL
- Delay Attenuate Timeslots
- Digital Echo Canceller Simulator
- Audio Processing Utility (APU)

Signaling Transitions Recording

Real-time Strip Chart

Real-time Multichannel Audio Bridge

Multiplex / Demultiplex Software

Network Surveillance, Voice Quality Testing



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tProbe™ Specifications

Physical Interface

Ethernet Connector	(1) RJ-45 10/100 Ethernet Jack
T1/E1 Connectors	(2) RJ-48c Jacks
Audio Connectors	(4) 3.5 mm Balanced (Stereo) or Unbalanced (Mono) Audio Jacks (TX & RX)
External Clock Connector	(1) MCX Coaxial Jack
External Power Connector	(1) Coaxial DC Power Jack (mates with 5.5mm x 2.1mm coaxial plug)

External Power Requirements

Power Adapter Requirements +5V @ 2A Max Power to the Center Ring

T1/E1 Line Interface

Framing Formats	Unframed, D4 (T1) , ESF(T1), ESF(J1), CAS (E1), FAS(E1), CRC4 Hardware Compliant: SLC96, T1ESF ZBTSI
Line Code format	AMI, B8ZS (T1) or HDB3 (E1)
Internal Clock Specification	Standard: +/- 3ppm Optional: +/- 1ppm
Output Clock Source	Internal (+/- 1 ppm or 3 ppm), Recovered, External Clock
T1 Output Level	T1: 3.0V Base to Peak Selectable 0-655Ft Pulse Equalization Setting; Tx Capability - DSX-1 Outputs (to 655 feet)
E1 Output Level	E1: 3.0V ± 0.3V Base to Peak
Input Level	75 mV to 6V base to peak or -30 dBsx to -6 dBsx
Line Built Out Selections	0dB, -7.5dB, -15dB, -22.5dB – for T1 only
Loopback	Normal (Outward and Inward) Cross-Port Transmit Loopback Cross-Port Through Loopback

Transmit

T1/E1 Interface Hardware Compliance	ANSI: T1.403.1995, T1.231-1993, T1.408 AT&T: TR54016, TR62411 ITU: G.703, G.704, G.706, G.736, G.775, G.823, G.932, I.431, O.151, Q.161 ITU-T: Recommendation I.432-03/93 B-ISDN User-Network Interface-Physical Layer Spec ETSI: ETS 300 011, ETS 300 166, ETS 300 233, CTR12, CRT4 Japanese: JTG.703, JTI.431, JJ-20.11 (CMI Coding Only)
BERT Pattern Generation	Pseudorandom patterns: (63) 2 ⁶ -1, (511) 2 ⁹ -1, (2047) 2 ¹¹ -1, (32767) 2 ¹⁵ -1, (1048575) 2 ²⁰ -1, (8388607) 2 ²³ -1, QRSS. Hardware Compliant: T1 In-Band Loop Code Generation and Detection Fixed patterns: All Ones, All Zeros, 1:1, 1:7, 3 in 24, User Defined 24- Bits Hardware Compliant: User pattern of up to 32 bits in length
Alarm Insertion	Blue, Yellow, Remote, Distant Multiframe Hardware Compliant: Bit 7 Zero Suppression D4 Yellow: 1 in 5 bit of frame 12 AIS-CI Code, ESF-RAI CI Code Receive Carrier Loss: 0's for 2047 or 255 bits (For E1 only)
Error Insertion	BPV, Bit Error, Frame Error, CRC Errors, Burst Frames, Fixed Error Rate, Random Error Rate, auto logic from 10 ⁻² to 10 ⁻⁹ for selectable 56K or 64Kps channels.
Drop and Insert	Any contiguous set of digital timeslots and/or audio input
Facility Data Link	T1 ESF Mode: Transmit/Receive Messages, Bit-Oriented Messages, and Files.
Zero Suppression	B7 Stuffing, Transparent, & B8ZS (T1)
Signaling Frequency Offset	Robbed-Bit or Clear Channel T1: +/- 615Hz E1: +/- 615Hz



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tProbe™ – Specification

Receive

Input Impedance	100 ohms for Terminate and Monitor (T1) 120 ohms for Terminate and Monitor (E1) > 1K ohms for Bridge
Terminations	Terminate, Monitor, Bridge
T1 Input Frequency	1.544MHz +/- 20 KHz
E1 Input Frequency	2.048Mhz +/- 20 KHz
Frequency Measurement	+/- 1ppm
Error Detection	Frame Error, CRC Error, BPV Error, Logic Error, Frame Alignment Error Hardware Compliant: * 10 or 24 bits for sync time * 2/4, 2/5, or 2/6 frame bit in error frame select * Frame error bit corruption for 1 or 3 frame bits * E-Bit Error * Line Code Violation
Alarm Detection	T1 - D4 Yellow Alarm, ESF Yellow Alarm Yellow Alarm (B2 Suppressed-2nd MSB) Yellow Alarm (S-Bit) Yellow Alarm (00FF in FDL) Blue Alarm (Framed or Unframed All Ones) E1 - Remote Alarm Distant Multi-Frame Alarm Signaling All Ones Unframed All Ones Hardware Compliant: J1 Yellow Alarm
Intrinsic Jitter	Meets Jitter Tolerance: Meets AT&T TR 62411 (Dec. 90) ITU-T G.823 Jitter Transfer: Meets AT&T TR 62411 (Dec. 90)
Input Range	T1: Terminate, 0 to 36dB (Long Haul), DSX Monitor, Bridge Hardware Compliant: Terminate, 0 to 15dB (Limited Long Haul), DSX Monitor 20 dB, 26 dB, 32 dB E1: Terminate, 0 to 43dB (Long Haul), DSX Monitor, Bridge Hardware Compliant: Terminate, 0 to 13 dB (Short Haul), DSX Monitor 20 dB, 26 dB, 32 dB

Display and Logging

BERT	Bit Errors, Bit Error Rate, Error Seconds, Error Free Seconds, %EFS, Severely Error Seconds, % SES, Degraded Minutes, %Dmin, Loss Pattern Sync Count, Loss of Sync Seconds, Available Seconds, %Available Seconds, Unavailable Seconds, Bipolar Violations, BPV Rate, BPV Seconds, BPV Free Seconds, Frame Errors, FE Rate, FE Seconds, FE Free Seconds, with Detailed logging into disk file.
Alarms	Resync In Progress, Loss of Signal, Blue Alarm, Change of Frame Alignment, Bipolar Violation, Frame Error, Carrier Loss, Yellow Alarm, Out of Frame Events Counter, Error Super frame Counter, Bipolar Violations, Remote Alarm, Distant Multiframe Alarm, Signaling All Ones, CAS Multiframe Error, CRC4 Error.



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tProbe™ Datacom-Specification

Physical Interface

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T1/E1 Connectors	(2) RJ-48c Jacks
Audio Connectors	(4) 3.5 mm Balanced (Stereo) or Unbalanced (Mono) Audio Jacks (TX & RX)
External Clock Connector	(1) MCX Coaxial Jack
External Power Connector	(1) Coaxial DC Power Jack (mates with 5.5mm x 2.1mm coaxial plug)

External Power Requirements

Power Adapter +5V @ 2A Max Power to the Center Ring Requirements

Monitoring Options

- Monitoring Datacom option
- Multi-frames
- Real-time Multi-frames

Intrusive Testing

- Bit Error Rate Test
- Enhanced Bit Error Rate
- Precision Delay Measurement
- Rx-to-Tx Loop back
- Error Insertion

Optional Software

Protocol Analysis

- HDLC, PPP

Record / Playback Files—Manual, Automated

Supported Line interfaces

- V.35, X.21, RS-232C, RS-449, RS-485, EIA-530 and EIA-530A

Emulation Mode

- DTE or DCE emulation mode

tProbe™ Datacom-Specification (Cont.)

Encoding Options

- Sync, Async
- NRZ, FM0, FM1 and Differential Manchester encoding schemes
 - Manchester IEEE BER from 75 b/s to 115.2Kbps
 - Manchester GE Thomas BER from 75 b/s to 115.2Kbps
 - Differential Manchester BER from 75 b/s to 115.2Kbps
 - Manchester FM0 and FM1 BER from 75 b/s to 115.2Kbps
 - NRZI BER from 0.5Mbps to 10Mbps

mTOP™ Probe T1E1 Datacom Specifications



Figure: mTOP™ T1 E1 Datacom Probe Tester (Front Panel)

Space Requirements

- Length: 10.4 in.
- Height: 3 in.
- Width: 8.4 in.

SBC Specifications

- Intel Core NUC i3 or optional i7 equivalent, Windows® 10 64-bit Pro Operating System
- USB 2.0 or 3.0 ports, 12V/3A Power Supply
- 256GB Hard drive, 8G Memory (Min)
- Two HDMI ports (Optional VGA to HDMI interface)

Datacom Interface

- Dual DB25 Connectors Support:
 - DTE/DCE
 - RS-232/V.28
 - X.21/V.11
 - RS-449/V.36 /V.10/V.11
 - EIA-530/V.10/V.11
 - EIA-530A/V.10/V.11
 - V.35/V.28.



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mTOP™ Probe Specifications



Figure: mTOP™ T3 E3 Probe (Front Panel)

Space Requirements

- Length: 10.4 in.
- Height: 3 in.
- Width: 8.4 in.

SBC Specifications

- Intel Core NUC i3 or optional i7 equivalent, Windows® 10 64-bit Pro Operating System
- USB 2.0 or 3.0 ports, 12V/3A Power Supply
- 256GB Hard drive, 8G Memory (Min)
- Two HDMI ports (Optional VGA to HDMI interface)

USB T3 E3 Interfaces

- DS3/E3 750 BNC (Tx, Rx) Ports
- DS1/E1 RJ-48-c (Tx, Rx) for Drop/Insert
- MCX External Clock Ports
- USB 2.0 Connected to a USB HUB
- Internally powered by Power Supply
- 1000 Mbps Ethernet Port

Buyer's Guide

Order information of T3 T1 E3 E1 Multi Tester

[TE3001](#) – Dual T3 E3 / T1 E1 Hardware USB Base Unit

[MT001](#) - mTOP™ 1U Rack Mount Enclosure w/SBC (Intel i3 Core)

[MT001E](#) - mTOP™ 1U Rack Mount Enclosure w/SBC (Intel i7 Core)

[MT002](#) - mTOP™ 1U Rack Mount Enclosure w/o SBC

[MT003](#) - mTOP™ 2U Rack Mount Enclosure w/SBC

[MT004](#) - mTOP™ 2U Rack Mount Enclosure w/o SBC

[MT005](#) - mTOP™ Probe (Portable Stand-alone unit) (Intel NUC i3 Core)

[MT005E](#) - mTOP™ Probe (Portable Stand-alone unit) (Intel NUC i7 Core)

[PTE001](#) – tProbe™ T1 E1 Base Unit

For more details on product list, refer to [T1 E1 product list](#)

Order information of 6 x T3 E3 System

[TE3005](#) – Rack Enclosure for T3/E3 System – up to 6 T3/E3s.

2U - 19" Rack Enclosure, Power Supply, Fans, 4 Port USB Hub, Cables and Accessories, Accommodates three (3) Dual T3/E3 USB Units.

SA005z – 19" 1U Rack Mount PC w/o Monitor, but with Keyboard, Mouse, Xeon 8 GB, 500 GB

For more details on product list, refer to [T3 E3 product list](#)

mTOP™ Rack Specifications



Figure: mTOP™ Rackmount T3 T1 E3 E1

Space Requirements

- Height: stacked 2U Rack unit [Total space—2U]
- Length: 16 Inches
- Width: 19 Inches

Embedded PC Specifications

- Intel Core i3 or optional i7 equivalent , Win10 Pro OS 64 bit
- USB 2.0 or 3.0 ports, ATX Power Supply
- Min 240 GB SSD, 8GB RAM
- Two HDMI ports (Optional VGA to HDMI interface)

USB T3 E3 Interfaces

- DS3/E3 750 BNC (Tx, Rx) Ports
- DS1/E1 RJ-48-c (Tx, Rx) for Drop/Insert
- MCX External Clock Ports
- USB 2.0 Connected to a USB HUB
- Internally powered by Power Supply
- 1000 Mbps Ethernet Port



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