IP•Tube CEP GT1

T1 Over IP for Voice and Data

T1 Circuit Extension Over IP
- ROI Measured in Weeks
- Exploits Efficiency of IP/Ethernet
- Supports Legacy Switches/PBX
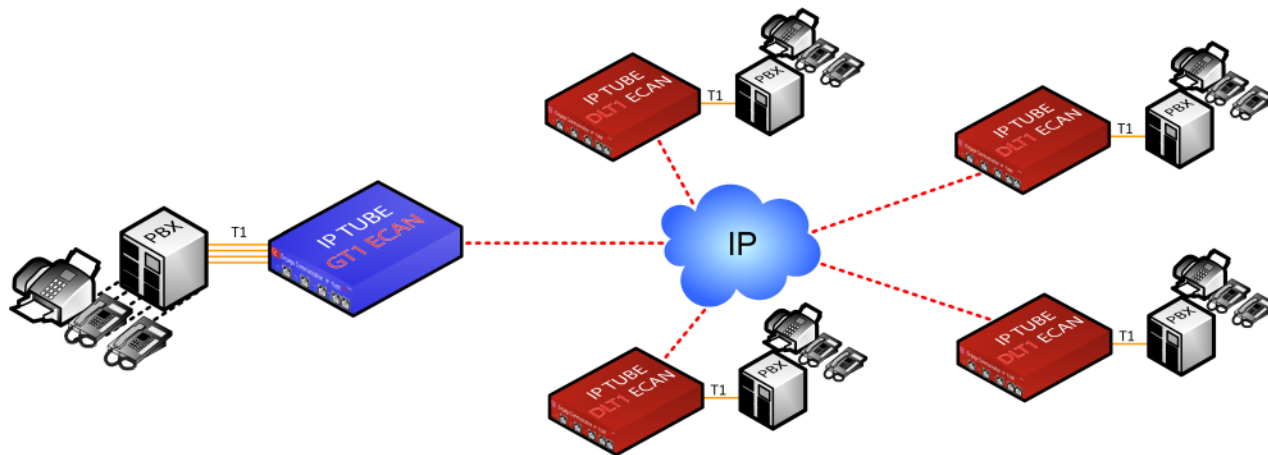- Straightforward Configuration

T1 Voice & Data Over IP

The **IP•Tube CEP GT1** encapsulates full and fractional T1 and TDM circuits, along with their framing and signaling bits, into IP packets. The **IP•Tube CEP GT1's** T1 Over IP, T1 Over Ethernet connection provides for the transparent interconnection of **PBXs**, **T1 Channel Banks**, **Telecom Switches** and T1 based communication systems via LANs, WANs, MANs, Satellite and Wireless Ethernet.

Transparent Interconnect

The **IP•Tube CEP GT1's** transparent operation maintains the proprietary signaling required to support PBX features such as call conferencing, call forwarding, caller ID and SS7. Legacy phone equipment investment is preserved. Transparent support for Modem, Fax, or Data circuits. Voice quality is not compromised.

Enable One to Four T1 interfaces

The **IP•Tube CEP GT1** is available with one to four T1 interfaces and three 10/100 BaseT Full/ Half Duplex Ethernet Interfaces. The T1 interfaces have configurations that provide for independent protocol, compression, packet sizing, buffering, clocking, framing, coding and channel settings. Enable additional T1 Ports as needs expand using a software-based license key.

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T1 PRIVATE LINE SERVICES OVER IP

Multi-Site Enterprises, Cellular Service Providers, Education Districts, Universities, National, State and Local Government, and Municipalities incur significant recurring monthly costs for rigid-bandwidth leased lines used only for the interconnection of PBXs and Telecom switches.

The **IP•Tube CEP GT1** provides organizations with the ability to interconnect their existing phone systems over flexible bandwidth lines that are used to carry data, voice, and video. The Voice Only Leased Line Toll charges assessed by long distance and local carriers are eliminated or dramatically reduced by transporting voice traffic across:

LANs

The most compelling option for the interconnection of T1 based systems is when it can be accomplished over a Local Area Network. The deployment of Fiber based LANS such as FDDI and Gigabit Ethernet, provides organizations with high performance and high quality bandwidth that is especially well suited for the interconnection of PBXs and Switches.

WANs

Wide Area Networks that have sufficient bandwidth and Quality of Service provisioning result in very significant cost savings especially for Multinational Corporations. The **IP•Tube CEP GT1-C** with lossless data compression, detects idle and redundant data within each voice circuit resulting in a 56 to 1 bandwidth savings.

CELLULAR BASE STATION BACKHAUL

IP Cellular Backhaul

IP•Tube CEP GT1s provide transparent interconnection of Base Stations, Base Station Controllers and Mobile Switching Centers over IP Ethernet packet-switched networks.

Cellular service providers save substantially by converting to a packet switch network. The Lossless Data compression option, which is especially well suited to Cellular communication links, minimizes the bandwidth required to interconnect.
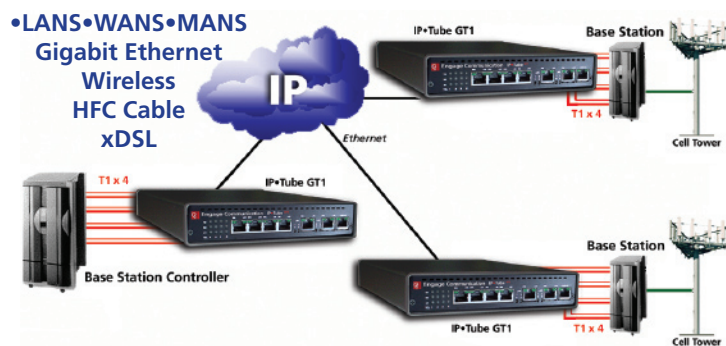
T1 Over Broadband Networks

Broadband Service Providers

Provide IP Ethernet access networks that generate revenue by transporting T1 leased lines.

Metropolitan Area Networks

Carriers are refocusing investment on the access portion of their network. Ethernet is the access protocol of choice.

MSO Cable Operators

Cable operators connect traditional T1 leased line services over their hybrid fiber coax (HFC) cable networks. MSOs are deploying Gigabit Ethernet backbone based service offerings

Utilities

Utilities generate new revenue by offering traditional T1 leased line over their fiber or power line networks. The IPTube's Assured Delivery Protocol makes it possible to reliably connect Cellular Base Stations over Broadband over Power Lines.

Competitive Local Exchange Carriers

Competitive Local Exchange Carriers are able to offer a very economical alternative by back hauling a customer's phone systems over their Broadband connection.

T1 Over Wireless Ethernet

Wireless Ethernet

The IPTube has proven itself around the world as an effective method for using Commercial Off the Shelf Wireless Ethernet Bridges to interconnect T1 circuits with a return on investment that is measured in weeks.

Interconnection of T1 based data communication systems over wireless as a primary or back up connection is a major application.

The IPTube's Assured Delivery Protocol has the sophistication required for solid performance across a wide range of wireless connections.
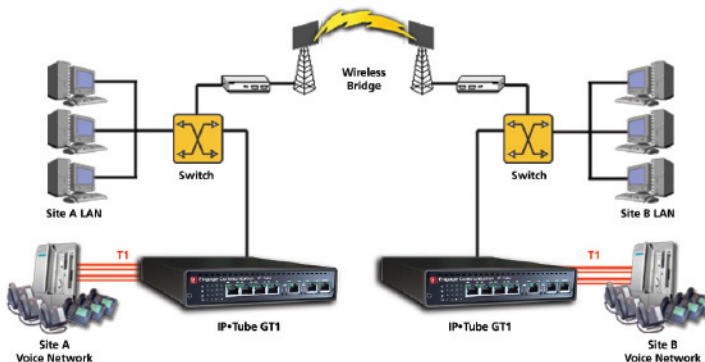
IP•Tube CEP GT1 Standard Features

Three LAN Interfaces
All **IP•Tube CEP GT1** models ship with three 10/100BaseT Ethernet LAN ports. The Ethernet interfaces provide for:

- Management interface on MLAN
- The Dual LAN Data Plane ports can be configured for:
  - Connections over 2 Asymmetrical bandwidth links
  - Protector Option for Redundant Packet Paths with Constant or Switch Over Criteria

Assured Delivery Protocol
In order to assure high quality communications over links with intermittent or noisy performance, such as Wireless or Broadband over Power Line, the **IP•Tube CEP GT1** employs Engage's robust Assured Delivery Protocol with the following benefits:

- Packet out of sequence detection and re-sequencing
- Duplicate skipping,
- Lost packet retransmission with configured delay.

Service Quality Packet Prioritizing
The **IP•Tube CEP GT1** uses the Type of Service byte in the IP packets or 802.1p/q mac levels for prioritization of the encapsulated T1 frames.

Virtual Private Network Support
Interconnecting the **IP•Tube CEP GT1s** through a Virtual Private Network with sufficient real time committed information rate ensures quality of service is provisioned.

The MLAN Ethernet interface provides a management port. Each LAN interface features independent IP network configurations.
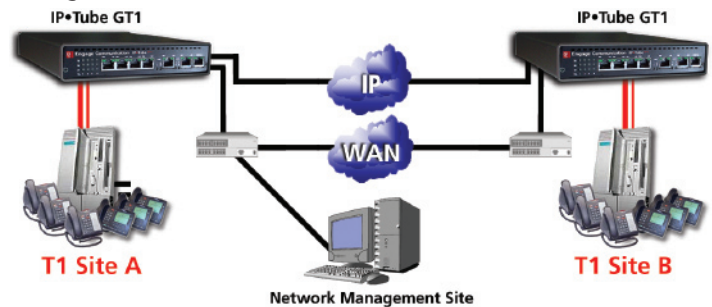
Full T1 Connection Across Two ADSL Lines
The **IP•Tube CEP GT1's** two Ethernet interfaces are able utilize two ADSL Ethernet Modems, that have opposite high speed direction, to transport a T1's symmetrical bandwidth

## Management Interface
Management of the **IP•Tube CEP GT1** is accomplished with a Command Line Interface that is accessed through a Console or Telnet connection. Templates of the most common configuration provide for an Edit and Paste configuration. *SNMP* MIB I and II support, with traps, is a standard feature.

IP•Tube CEP GT1 Optional Features

Lossless Data Compression OPTION -C
The **IP•Tube CEP GT1-C** continuously detects idle/redundant data within each T1 Voice circuit resulting in as much as a 56 to 1 bandwidth savings. The compression works from the lowest latency setting of 8 T1 frames to the highest setting of 56 T1 frames per packet.
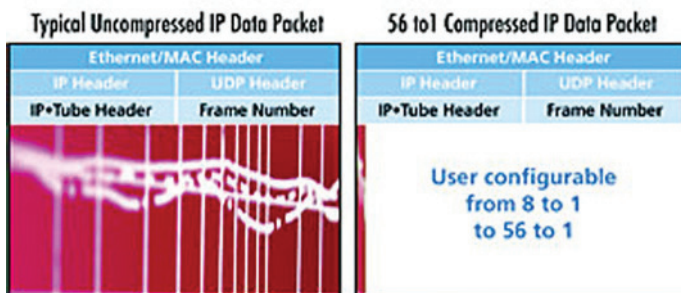

TDM over IP WAN bandwidth is not consumed by silent or redundant circuits. Note: Compression only supported with **IP•Tube CEP GT1-C** models.

The Lossless Data Compression option can be combined with the Alternator option to minimize the bandwidth required from the alternative paths.

Protector OPTION -PRO
The protector option utilizes the second LAN interface as a redundant path for the interconnection of the IP encapsulated T1 data. The extension of the T1 circuit has a fault tolerant link that is configured to always on, or with switch over criteria.
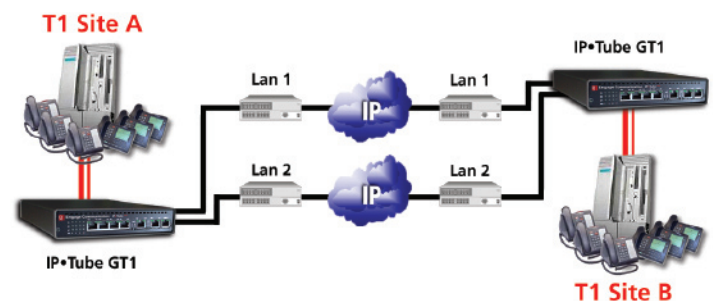
Alternator Option -ALT
The **IP•Tube CEP GT1-ALT** Alternator option alternatively sends the IP packetized T1 frames on LAN 1 and LAN 2. The Alternator option enables fractional and full T1 circuits to be split over two IP WAN connections such as xDSL. The cost of interconnecting T1 communication systems across packetized xDSL is a fraction of long distance leased T1 circuit costs.

IP•Tube CEP Management

IP•Tube CEP isolates management and data plane functionality with the use of two separate processor modules.

CEP security features include:
• Administrative policies for adding, removing, disabling and renaming authorized users; limiting user access to assigned commands; and enabling only desired port numbers.

• User authentication directly to the IP•Tube CEP or in conjunction with TACACS+ or RADIUS servers including RSA SecureID support for two factor trusted compliance.

• An SSH command interface encrypting management traffic with powerful 256 bit symmetric keys and NIST based passwords.

• Support of the SNMPv3 protocol for secure connectivity to SNMP element managers.

• In addition, administrative accounting data can be reported to syslog servers with accurate timestamps provided by an NTP source.

Technical Specifications

LAN Network Interface:
• LAN1/LAN2: Two Data Plane 10/100 Base T
• MLAN: Control Plane 10/100 Base T

LAN Network Protocols Supported:
• IP, TCP, UDP, ICMP, Telnet, DHCP, DDNS, SSH
• Assured Delivery Protocol
• DHCP • DNS Address Discovery • Dynamic DNS
• Network Time Protocol - NTP

T1/Fractional T1 Specifications:
• 4 T1 Interfaces • Connects directly to T1 or crossover to a DS1
• Framing - ESF or D4 • Coding - B8ZS or AMI
• Supports DS0 assignments from 1 to 24
• Not Contiguous Configuration x-y,z Supported

T1 Over IP Protocol:
• TDM Over IP
• Circuit Extension Services Over IP - CESOIP
• HDLC Over IP - HDLCOIP
• Frames Per Packet Configured 8 to 56
• Comprehensive Clocking: Internal, Network, Adaptive

Quality of Service Support:
• IP Type of Service (TOS) CLI configured • IANA Registered UDP Port 3175
• 802.1p/q mac level prioritization • Dupllicate Packet Tranmissions

Lossless Data Compression Option:
• Detects idle and redundant data within each DS0
• Configured Silence Detection Range
• Interconnect bandwidth is not consumed by silent or redundant data
• Low Latency 8 to 1 Compression settings from 8 to 1 to 56 to 1

Management:
• Secure Socket Shell - SSH V2 - Session Encryption
• Centralized Authentication, Authorization and Accounting
  - TACACS+, RADIUS, Two Factor Authentication: RSA SecurID
• Syslog with NTP Time Stamping
• Console Port for Out of Band Management
• SNMP V3 Public and Private MIB support with configured traps
• Telco Diagnostics: Local Loop, Remote Loop

Regulatory:
• CE • Safety -IEC60950 • EMC - CFR 47 Part 15 Sub Part B:2002, EN55022:1994+A1&A2, EN55024, ICES-003 1997, CISPR 22 Level A
• Telecom Part 68

Power:
• 10-30 VDC, 1.0A. • Screw Locking Connector
• Universal Adapter 100/240 VAC 50/60 Hz
• Optional -48V 0.25 Amp • Hot Standby

Environmental:
• 0° to 132° F (-10° to 50°C) operating temperature
• Up to 90% operating humidity (non-condensing)
• Optional Extended Temperature Range (-40°C to 70°C)

Dimensions: 9" (L) x 7.3" (W) x 1.50" (H)

How to Order — IP•Tube CEP GT1

Part No.	Description	Notes
CEP-300-1544-0x	IP•Tube CEP GT1, xT1 (x=1 - 4 Ports)	Base Model Specify # of T1 Ports Enabled
CH-CEP-300-1544-04	Chassis Card: IP•Tube CEP GT1 T1	Plugs into CHUB chassis card slot
CEP-302-1544-0x	IP•Tube CEP GT1-w/xT1 Compression	w/Lossless Data Compression Option
CH-CEP-302-1544-04	Chassis Card: IP•Tube CEP GT1 Compression	Plugs into CHUB chassis card slot
Base Options		Specify as Suffix
-ROHS	ROHS compliant materials and processes	Restriction of Hazardous Substances no PB
-PRO	Protector Option	Fault Tolerant Network Interconnect
-RACKMNT	19" Wide Rack Mount Brackets	Enclosure Nut Serts Installed
Power Options		Specify as suffix
-DCMOD	Power Supply Module 12/26 VDC ADP CON	Ships with Universal Adapter 90/240 50/60
-WIREDC	Power Supply Module 12/26 VDC Screw Term	
-N48VDC	Power Supply Module Negative 48 Volt DC	Isolated Negative 48 Volt Power
	Hot Standy Configuration	Specify an additional Power Module Suffix