



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
- Straight Forward Configuration

T1 Voice & Data Over IP

The **IPTube•QT1** encapsulates full and fractional T1 and TDM circuits, along with their framing and signaling bits, into IP packets. The IPTube•QT1's T1 Over IP, T1 Over Ethernet connection provides for the transparent interconnection of PBXs, Telecom Switches and T1 based communication systems via LANs, WANs, MANs, Satellite and Wireless Ethernet.

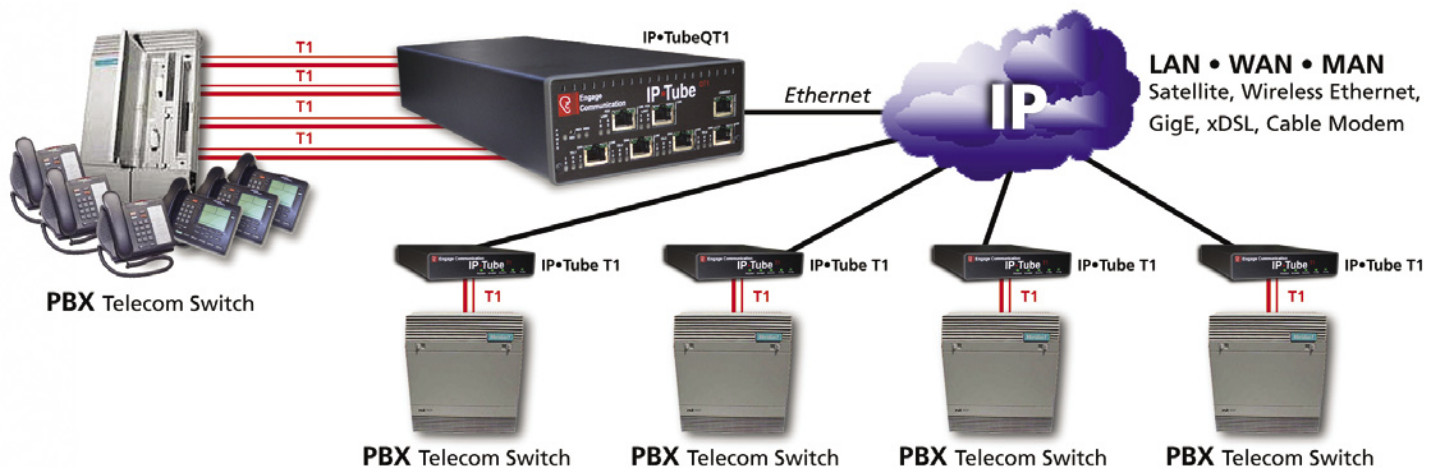
Transparent Interconnect

The **IPTube•QT1'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 **IPTube•QT1** is available with one to four T1 interfaces and a 10/100 BaseT Full/ Half Duplex Ethernet Interface. 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. The protocols supported are IPTube, CESoIP, and HDLCoIP.



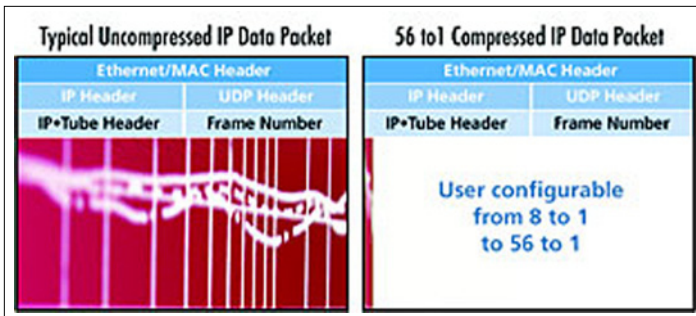
T1 Private Lines over Ethernet

Businesses, Education Districts, Universities, National, State and Local Government, incur significant recurring monthly costs for rigid-bandwidth leased lines used only for the interconnection of PBXs and Telecom switches.

The **IPTube•QT1** provides enterprises 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 over data networks.

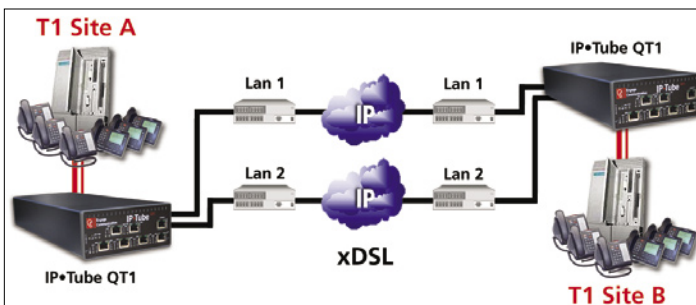
Lossless Data Compression

The **IPTube•QT1•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 **IPTube•QT1•C** models.



Alternator Load Balancing Option

The **IP•Tube QT1A** 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 Lossless Data Compression option can be combined with the Alternator option to minimize the bandwidth required from the alternative paths. The cost of interconnecting T1 communication systems across packetized xDSL is a fraction of long distance leased T1 circuit costs.



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 Telecom Switches.

WANs

Wide Area Networks that have sufficient bandwidth and Quality of Service provisioning result in a very significant cost savings especially for Multinational Corporations. The **IPTube•QT1•C**, a model with lossless data compression that detects idle and redundant data within each voice circuit resulting in a 56 to 1 bandwidth savings. WAN bandwidth is not consumed by silence or redundant samples.

Wireless Ethernet

Connecting phone systems across a wireless Ethernet connection has a return on investment that is measured in weeks. Eliminating the wired connection for the T1 based communication equipment is made possible with the **IPTube's** T1 Over Ethernet capability.

IP Ethernet Service Providers

Companies, that are able to provide IP Ethernet access networks generate new revenue by offering traditional T1 leased line and private line services, such as:

Cable Operators

Cable operators connect traditional T1 leased line and private line services over their hybrid fiber coax (HFC) cable networks.

Metropolitan Area Networks

Metropolitan carriers with IP or Ethernet access networks deliver traditional leased line and private line services.

Utilities

Utilities generate new revenue by offering traditional T1 leased line and private line services over their fiber or power line networks.

IP Cellular Back Haul

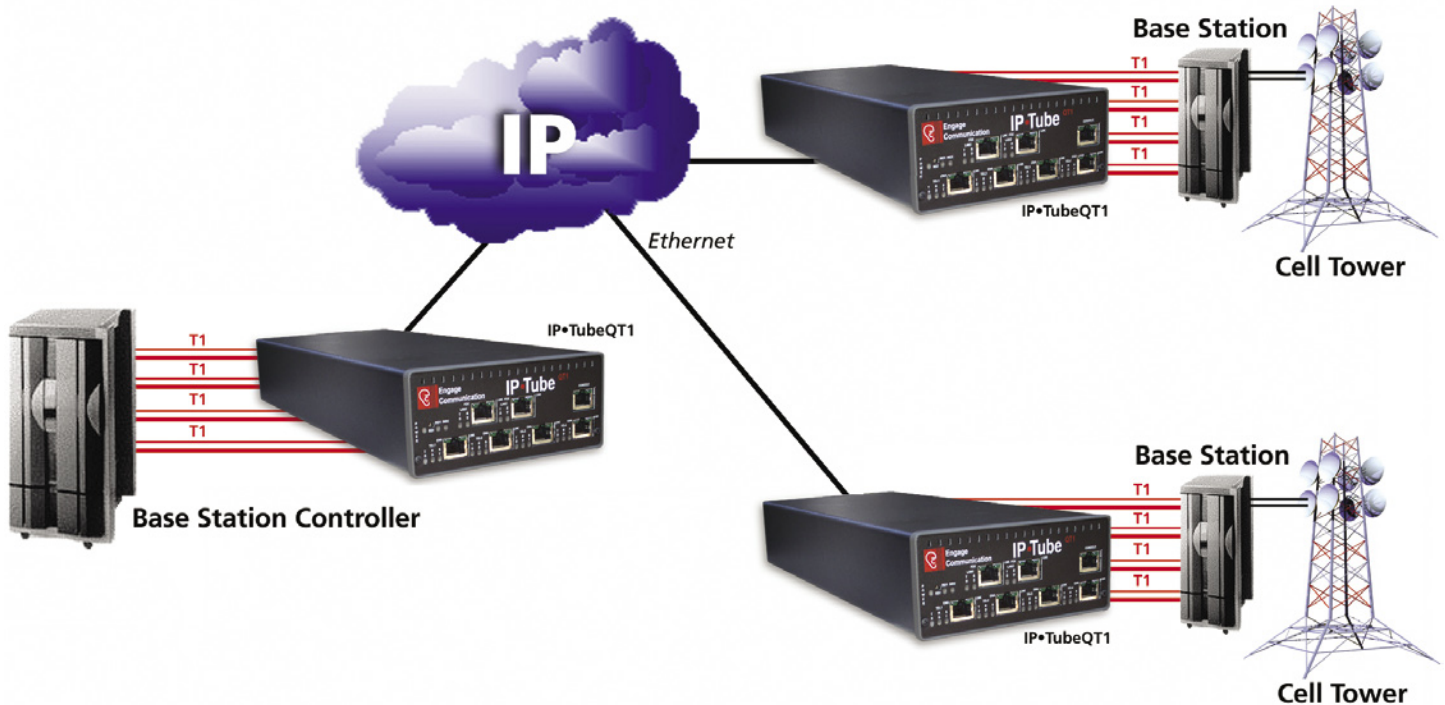
IPTube•QT1s are used to provide transparent interconnection of the base stations (BTSs), base station controllers (BSCs) and mobile switching centers (MSCs) over IP Ethernet packet-switched networks. Supported access media include fiber, coax and fixed wireless. Cellular phone service providers are able to save substantially by converting to a packet switch network from circuit TDM lease lines. The IPTube•QT1 has the Duplicate packets transmission and reception feature that provides for resilient performance through a lossy interconnect.

Incumbent Carriers

Telcos reduce costs by delivering profitable leased and private line services over their flexible Ethernet infrastructures.

Service Quality Packet Prioritizing

The **IP•Tube QT1** uses the Type of Service byte in the IP packets to prioritize the encapsulated T1 frames. The setting of the TOS byte can be used to ensure that the real time TDM data from the **IP•Tube QT1** is ensured high priority.



CLEC PBX Back Haul

The **IPTube•QT1** provides CLECs with a way to back haul T1 DS0s from a customer's phone systems over their Internet connection. The back hauled DS0s are connected to the CLECs phone switch for connection to the Public Switched Telephone Networks.

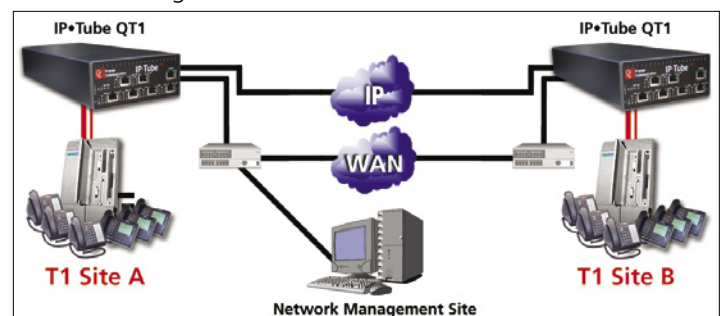
Competitive Local Exchange Carriers are able to provide customers with a very economical alternative to the local Phone Company since the Local Loop charges for each phone line are consolidated.

International Toll Bypass

The **IPTube•QT1's** most dramatic cost savings is when it is used for the international interconnections of TDM based telecommunication equipment. The **IPTube-QE1** is interoperable with the European TDM standard E1.

VPN Network Management

Interconnecting the **IP•Tube QT1** through a Virtual Private Network with sufficient real time committed information rate ensures that the required quality of service is provisioned. The **IP•Tube QT1's** second Ethernet interface provides a management port when the first Ethernet interface is connected to a VPN. Each Ethernet LAN interface features independent IP network configurations.



Pay-As-You-Grow Field Upgrades

The **IPTube•QT1s** are designed for Pay-As-You-Grow growth from 1 T1 thru 4 T1s per **IPTube•QT1**. Customers can elect to economize initial network installations, buy purchasing their **IPTube•QT1** with a single active T1 port. As the network grows enable additional T1 Ports via a software-based license key.

Field Upgrade benefits are extended to our Industry-Best **Lossless Data Compression**. Just as T1 ports are field upgrade able, so is **Lossless Data Compression**. At any time, each T1

port on the **IPTube•QT1** can be upgraded to Lossless Data Compression with a simple software-based license key installation. If upon installation, you determine that your **IPTube•QT1s** are best deployed with Lossless Data Compression, your still in business with the per port field upgrade!

Rack Mount Kit

The IP-Tube family is ready for your most demanding central office or data center environments. With the Rack Mount Kit IP-Tube products are easily installed in 19" racks. Easy access to both front and rear facilitates technician maintenance.

Technical Specifications

LAN Network Interface:

- Two 10/100BaseT Full/Half Ethernet
- Autonegotiation or Configurable Speed and Duplex

LAN Network Protocols Supported:

- IP, TCP, UDP, ICMP

1 to 4 Duplicate Packet Transmission:

- Resilient performance through a lossy interconnect.

T1/Fractional T1 Specifications:

- One to Four Port Models • Connects directly to T1 or 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 • HDLC Over IP
- Frames Per Packet Configurable 8 to 56
- Low Latency Mode: 1 millisecond 8 T1 frames
- Max Payload Mode: 5 millisecond 56 T1 frames

Lossless Data Compression Option:

- Detects idle and redundant data within each Voice Circuit (DS0)
- 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

TFTP Online Upgrade Capable (FLASH ROMs)

- IPTube is fully operational during upgrade

Quality of Service Support:

- IP Type of Service (TOS) CLI configurable • IANA Registered UDP Port 3175

Regulatory:

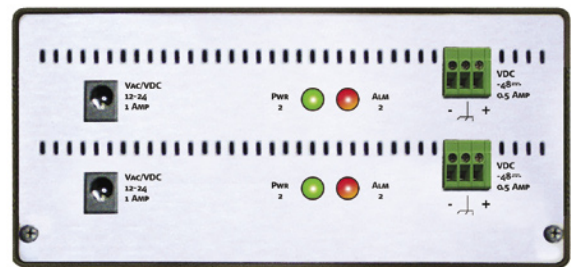
- CE • Safety -IEC60950 • EMC - CFR 47 Part 15 Sub Part B:2002, EN55022: 1994+A1&A2, EN55024, ICES-003 1997, CISPR 22 Level A • Telecom Part68

Management:

- Telnet support with Edit and Paste Template Files
- Console Port for Out of Band Management
- SNMP support (MIB I, MIB II) • Remote config., monitoring, & reset

Rear Panel/Power:

- 12-26 VAC/VDC, 1.0A. International Adapters Available
- Optional -48V 0.25 Amp • Hot Standby with 2nd Power Module
- Dimensions: 14" (L) x 5.5" (W) x 2.50" (H)



How to Order — IP•Tube QT1

Part No.	Description	Notes
046-1544-0x	IP•Tube QT1, xT1 (x=1 - 4 Ports)	Base Model Specify # of T1 Ports Enabled
U46-1544-0x	IP•Tube QT1 T1 Port Upgrade	Enable Additional T1 Ports (up to 4)
047-1544-Cx	IP•Tube QT1-w/xT1 Compression	w/Lossless Data Compression Option
U47-1544-Cx	IP•Tube QT1-Compression Upgrade	Enable Lossless Compression T1 (up to 4)
Base Option		Specify as suffix
-ALT	IP•Tube QT1-Alternator Load Balancing	Enable Alternator Load Balancing
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 Standby Configuration	Specify an additional Power Module Suffix
Rack Mount Option		
-RACKMNT	19" Wide Rack Mount Brackets	Enclosure Nut Serts Installed