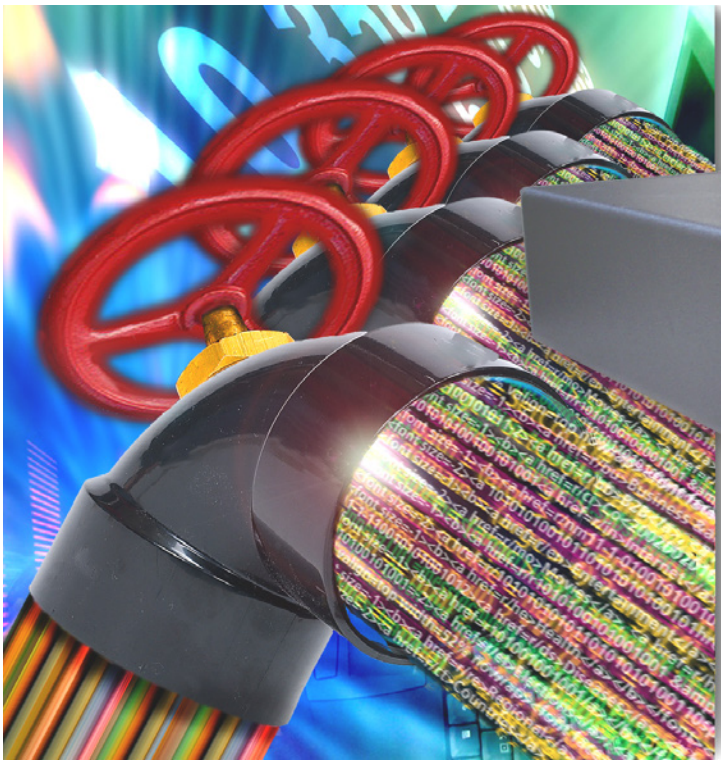
Engage Communication

IP•Tube QT1



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

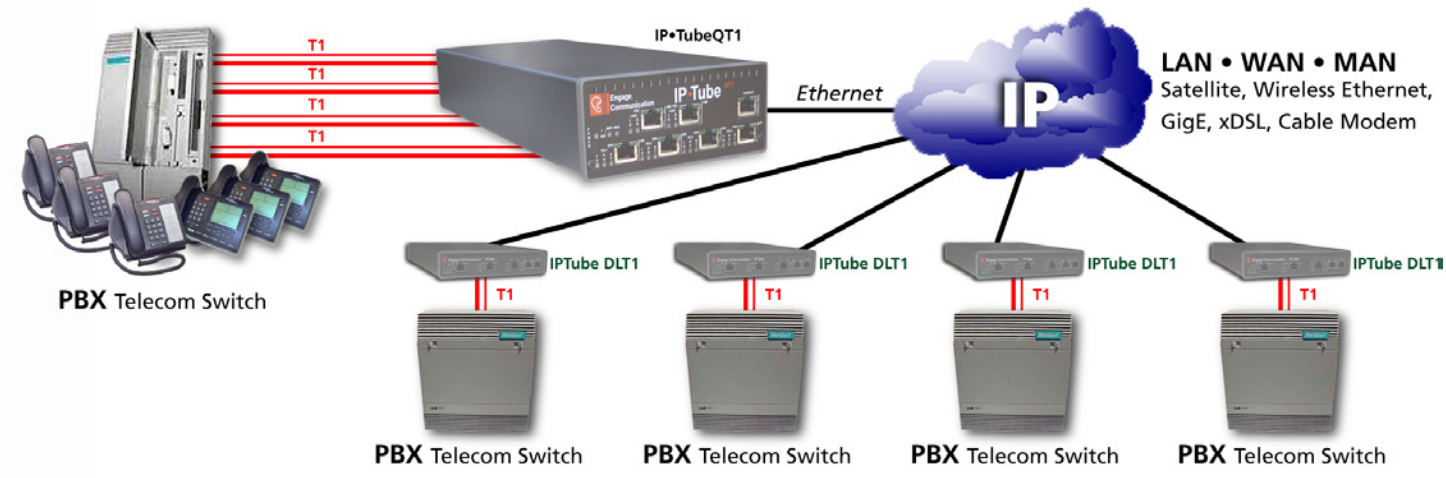
The **IPTube•QT1** encapsulates full and fractional T1 and TDM circuits, along with their framing and signaling bits, into IP packets. The IPTube•QT1's T1 Over IP, T1 Over Ethernet connection provides for the transparent interconnection of PBXs, Telecom Switches and T1 based communication systems via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



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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 QT1** 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

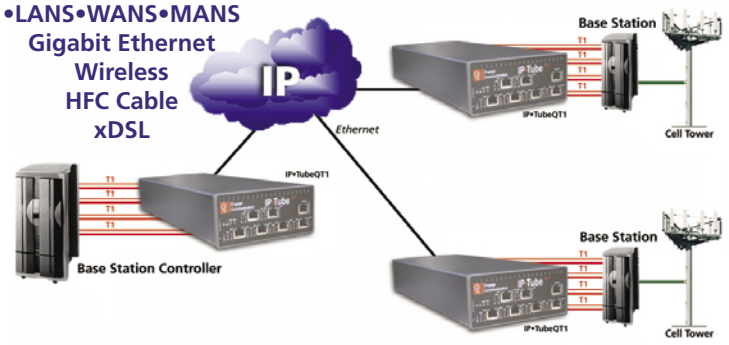
Wide Area Networks that have sufficient bandwidth and Quality of Service provisioning result in very significant cost savings especially for Multinational Corporations. The **IP•Tube QT1-C** with lossless data compression, detects idle and redundant data within each voice circuit resulting in a 56 to 1 bandwidth savings.

CELLULAR BASE STATION BACKHAUL

IP Cellular Backhaul

IP•Tube QT1s 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.

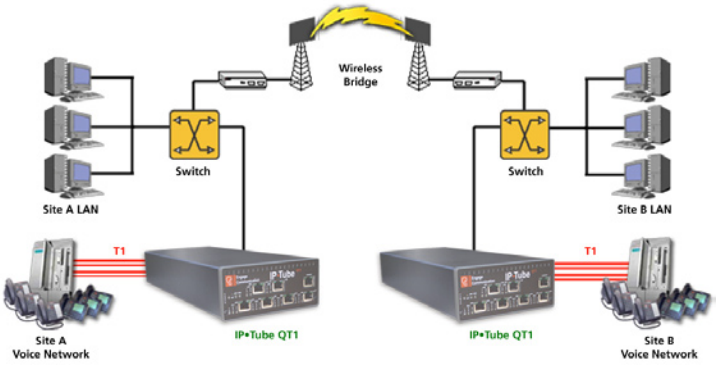
T1 Over Wireless Ethernet

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.



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IP•Tube QT1 Standard Features

Dual LAN Interfaces

All **IP•Tube QT1** models ship with dual 10/100BaseT Ethernet LAN ports. The dual Ethernet interfaces provide for:

- Management interface on LAN port 2 when LAN port 1 is connected to a VPN tunnel
- The LAN ports can be configured to support connections over 2 Asymmetrical bandwidth links
- Alternator Option for load balanced SDSL interconnects
- Protector Option for Redundant Packet Path connections 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 QT1** 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.

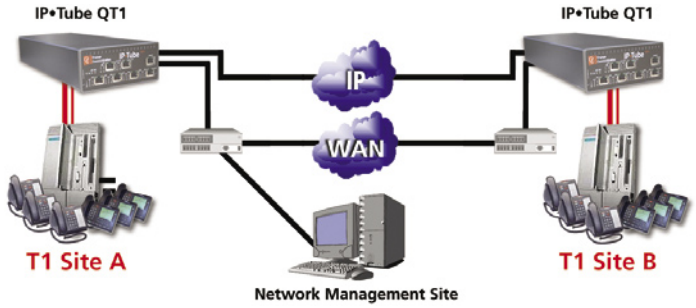
Service Quality Packet Prioritizing

The **IP•Tube 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.

Virtual Private Network Support

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 second Ethernet interface provides a management port. Each LAN interface features independent IP network configurations.



Full T1 Connection Across Two ADSL Lines

The **IP•Tube QT1's** two Ethernet interfaces are able utilize two ADSL Ethernet Modems, that have opposite high speed direction, to transport a T1's symmetrical bandwidth

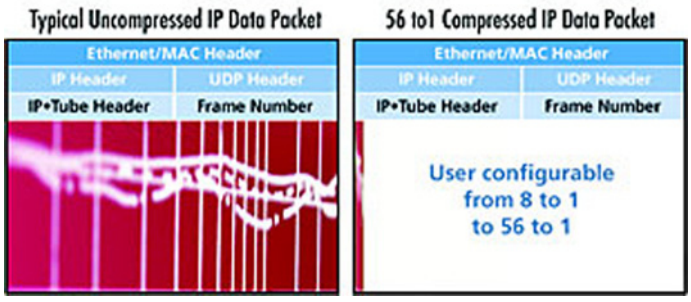
Management Interface

Management of the **IP•Tube QT1** 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 QT1 Optional Features

Lossless Data Compression OPTION -C

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.

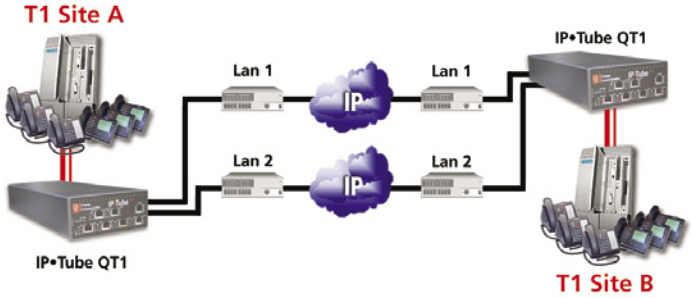


TDM over IP WAN bandwidth is not consumed by silent or redundant circuits. Note: Compression only supported with **IPTube•QT1•C** models.

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 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 cost of interconnecting T1 communication systems across packetized xDSL is a fraction of long distance leased T1 circuit costs.

IP•Tube QT1

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**.

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.

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
• Auto negotiation or Configured Speed and Duplex

LAN Network Protocols Supported:
• IP, TCP, UDP, ICMP, Assured Delivery Protocol

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 Configured 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

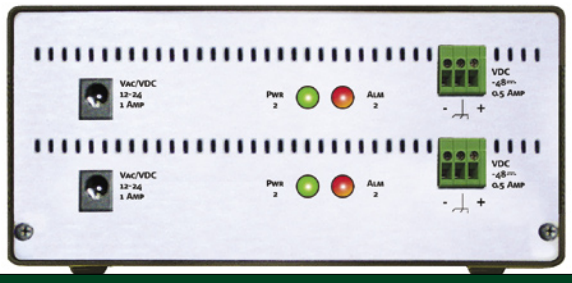
TFTP Online Upgrade Capable (FLASH ROMs)
• IPTube is fully operational during upgrade

Quality of Service Support:
• IP Type of Service (TOS) CLI configured • 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



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
-PRO	Protector Option	Fault Tolerant Network Interconnect
-ALT	Alternator Load Balancing Option	Load Balancing Inverse Mux
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
Rack Mount Option		Specify as suffix
-RACKMNT	19" Wide Rack Mount Brackets	Enclosure Nut Serts Installed

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