IP•Tube UNO E1



E1 Circuit Extension Over IP



• Exploits Efficiency of Ethernet • ROI Measured in Weeks

E1 Voice and Data Over IP

The **IP•Tube UNO E1** encapsulates full and fractional E1 circuits into IP packets. E1 Over IP connections provide for the interconnection of PBXs, Cellular equipment and Telecom Switches via LANs, WANs, MANs, IP Satellite, xDSL, Cable and Wireless Ethernet.

Transparent Interconnect

The **IP•Tube UNO E1's** transparent operation maintains the proprietary signaling required to support PBX features such as call conferences, call forwarding, caller ID and SS7. Legacy phone equipment investment is preserved.

Signaling Support

PRI ISDN, SS7, ESF, D4, SLC-96, Proprietary out of band, and robbed bit signaling are supported. Transparent support for Data, Modem or Fax. Voice quality is not compromised.

The **IP•Tube UNO E1** ships with one E1 interface and one 10/100 BaseT Ethernet Interface. Optional integrated 4 port QOS/VLAN/Rate Limiting Layer-2 Ethernet switch is available.

The Ethernet Switch Option provides transparent LAN bridging, user data bandwidth and access control through rate limiting and port-based VLAN filtering and tagging.

E1 Over IP Ethernet Benefits

- Transparent leased and private line services over less expensive IP and Ethernet networks
- Protects investment in traditional telephony and TDM equipment.
- Disaster recovery for E1 circuits with 1+1 and 1:1 redundancy.
- Operating expenses are minimized by leveraging the efficiencies and ubiquity of IP, Ethernet and MPLS
- Ethernet, IP and MPLS infrastructures are inexpensive, fast to provision and scalable.
- Easy installation with IP-based management and carrier grade diagnostics.



The **IP•Tube UNO E1** 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 packet-switched infrastructure. The following organizations incur significant recurring monthly costs for rigid-bandwidth leased lines used only for the interconnection of PBXs and Telecom switches.

- Multi-Site Enterprises
- Education Districts
- National, State and Local Government
- Health Care Service Providers
- Banking & Financial Services Institutions
- Cellular Service Providers
- Universities
- Defense & Defence Contractors
- 911 Emergency Networks
- Municipalities

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E1 PRIVATE LINE SERVICES OVER IP

LANs

The most compelling option for the interconnection of E1 based systems is when it can be accomplished over a Local Area Network. The deployment of Fiber based LANS such 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 Multi-Site Corporations. The **IP•Tube UNO E1-C** with lossless data compression, detects idle and redundant data within each voice circuit resulting in as much as 40 to 1 bandwidth savings.

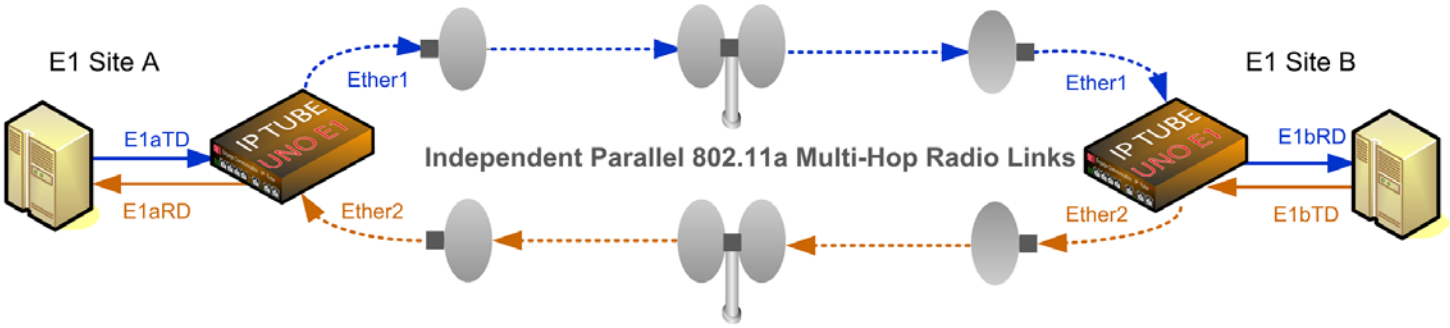
Wireless Ethernet

The IPTube has proven itself around the world as an effective method for using Commercial Off the Shelf Wireless Ethernet Bridges to interconnect E1 circuits .

Interconnection of E1 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.

The use of parallel Wireless Ethernet links minimizes the latency and Radio's packet processing requirement.
Note: Parallel Application requires Ethernet Switch Option.



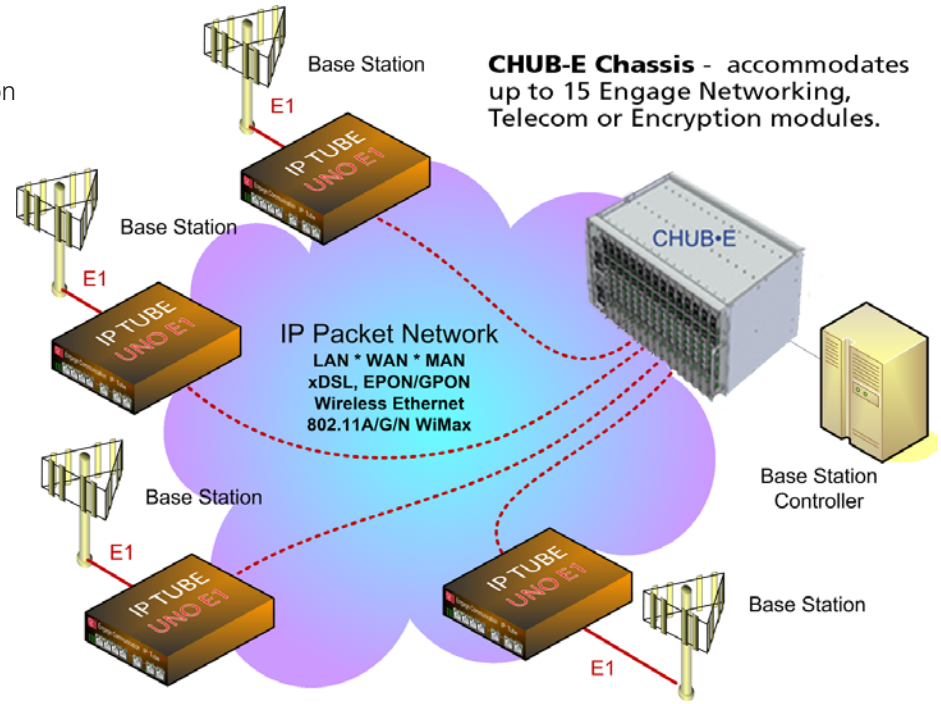
CELLULAR BASE STATION BACKHAUL

IP Cellular Backhaul

IP•Tube UNO E1s 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.

Note: The Ethernet Switch Option has the sophistication to support Ethernet Native Base Station applications with QOS and rate limiting.



IP•Tube UNO E1 Standard Features

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 UNO E1** 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.

Dynamic Host Configuration Protocol - DHCP

The **IP•Tube UNO E1** can be configured to obtain its Internet Protocol network parameters: IP Address, Subnet Mask, Default Gateway, DNS; from a local DHCP server.

Domain Name Addressing

IP•Tube UNO E1 can be configured to use a Domain Name for the remote IP•Tube in place of a fixed IP address. Supports mobile multi service provider installations with ease.

Dynamic DNS

IP•Tubes can be configured to register their IP address with Dynamic Domain Name Servers for discovery by the IPTube at the other end of the E1 circuit. DDNS support combined with DHCP make installations Name-based which is very easy to setup and maintain when compared to Static IP addressing.

Secure Socket Shell - SSH

Engage's Secure Socket Shell, which is based upon industry proven Open SSH and FIPS 140 approved Open SSL version 2.0, provides secure encrypted communications between SSH clients such as OpenSSH, SecureCRT, and PuTTY and the IPTube's Command Line Interface.

SNMP

The **IP•Tube UNO E1** is able to be fully managed with SNMP via standard and private MIBs. Large scale deployments of IPTubes with centralized management have made SNMP support a priority. SNMP Traps for error events enable proactive service fault isolation.

IP•Tube UNO E1 Optional Features

Ethernet Switch OPTION - SWITCH

The **IP•Tube UNO E1** is available with a four port 10/100 Ethernet QoS switch integrating a high-performance switching fabric with four priority queues. Advanced features include 802.1p/IPv4/IPv6 traffic classification, full IEEE 802.1Q VLAN, RMON, SNMP, Port Monitoring and Layer 2 firewall.

QoS determined by destination MAC address, port ID, IEEE 802.1p and multimedia traffic tags, IPv4 Type of Service (TOS), and Differentiated Services (DiffServ).

Rate Limiter

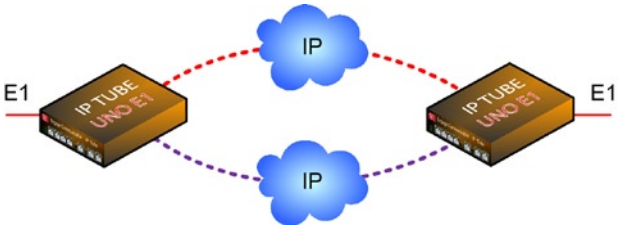
The Ethernet switch Ingress and/or Egress Rate Limiter option enables the reservation of the bandwidth for time-sensitive E1 Over IP real time connections.

Required for applications where the LAN traffic can exceed the WAN bandwidth required by the E1 over IP/Ethernet application. The data rate limit range is 128 kilobits to 64 Megabits in binary increments.

Protector OPTION -PRO

The protector option utilizes the Ethernet Switch port ETH1 as a redundant path for the interconnection of the IP encapsulated E1 data.

The PRO Option is configured to Always-On, or with Switch-Over criteria.



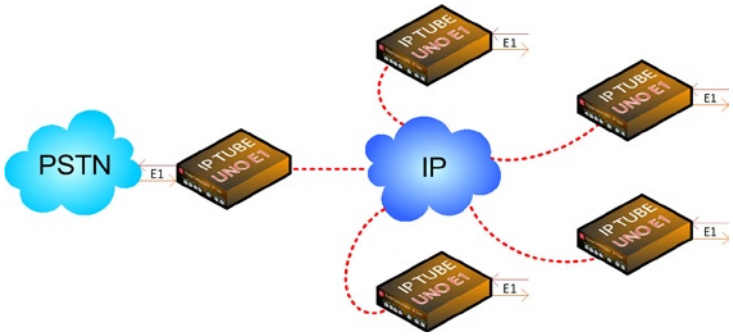
Alternator OPTION -ALT

The Alternator option alternatively sends the IP packetized E1 frames on two Ethernet interfaces, balanacing the load.

The Alternator option enables fractional and full E1 circuits to be split over two IP WAN connections such as ADSL.

DS0 Timeslot Multiplexor OPTION - MUX

The **IP•Tube UNO E1-MUX** maps DSOs from a central site to as many as 24 remote locations via an IP/Ethernet connection. Get maximum use of expensive DS1 interfaces on PBX, Channel equipment and datacom gear. Also provides Virtual DACS Over IP capability. Mesh DS0s one-to-many or many-to-many.



Lossless Data Compression OPTION -C

The **IP•Tube UNO E1-C** continuously detects idle and redundant data within each E1 Voice circuit resulting in as much as a 56 to 1 bandwidth savings. TDM over IP WAN bandwidth is not consumed by silent or redundant samples.

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IP•Tube UNO E1

Technical Specifications

LAN Network Interface:
- One 10/100BaseT Full/Half Ethernet (2nd LAN requires Switch)
- Auto negotiation or Configured Speed and Duplex

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

1 to 4 Duplicate Packet Transmission:
- Resilient performance through a lossy interconnect.

E1/Fractional E1 Specifications:
- One Port 120 ohm Model (75 Ohm w adapter)
- G.704 framed CRC4 or FAS and G.703 Unframed
- Coding - HDB3 or AMI • Supports DS0 assignments from 1 to 31
- Not Contiguous Configuration x-y,z Supported
- Comprehensive Clocking:
  - **Internal** – the master clock source for the TDM circuit is provided by an internal clock oscillator
  - **Network/Loopback** – the transmit clock is derived from the E1 port receive clock
  - **Adaptive** – the clock is recovered from the Ethernet network interface

E1 Over IP Protocol:
- Assured Delivery Protocol
- TDM Over IP
- Circuit Extension Services Over IP - CESOIP
- HDLC Over IP - HDLCOIP
- Frames Per Packet Configured 8 to 40
- Extremely low processing delay under 2 milliseconds
- Low Latency Mode: 500 microseconds 4 E1 frames
- Max Payload Mode: 5 millisecond 40 E1 frames
- Configured jitter buffer to compensate for packet delay variance from 1.5 to 595 milliseconds

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

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 40 to 1

Quality of Service Support:
- IANA Registered UDP Port 3175 • IP Type of Service (TOS) CLI configured
- Diffserv configuration of TDMOverIP header
- VLAN tagging and priority labeling according to 802.1p&Q
- E1 Over IP frames are tagged with a dedicated VLAN ID.

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 TBR12, TBR13

Management:
- Remote config., monitoring, & reset • Secure Socket Shell - SSH Diffie-Hellman Group1/14 key exchange and strong integrity checking via MAC SHA1/SHA1-96 with Cipher AES-128 and 3DES and DSS and OpenSSH public key format
- Telnet support with Edit and Paste Template Files
- Console Port for Out of Band Management
- SNMP support (MIB I, MIB II, Engage proprietary) with configured traps

Environmental:
- Temperature: 0–50°C (32–122°F). • Optional Extended Temp ranges avail.
- Humidity: Up to 90% non-condensing

Rear Panel/Power:
- 10-30 VDC, 1.0A. • Screw Locking Connector • Power 7 Watts
- Universal Adapter 100/240 VAC 50/60 Hz
- Optional -48V 0.25 Amp • Hot Standby

Physical:
- Dimensions: Length 6" / 15.24 cm; Width 4" (10.16 cm); Height 1.50" (3.81 cm) • Weight 2 Pounds (1 kilogram)

Ethernet Switch OPTION:
- Out of band management interface with independent IP configuration
- 802.1Q VLAN support with Filtering for up to 64 VLANs
- Support both port-based membership or 802.1Q VLAN-based VLANs
- 2,048 MAC address entries with automatic learning and aging

Diagnostics:
- Telco Diagnostics: Local Loop, Remote Loop, Loop Up/Down NIU and CSU Codes. Enables isolation of connectivity faults to local, network or remote equipment
- Physical layer alarms for LOS, AIS, LOF
- Comprehensive statistics: LAN and IP layer network statistics: such as packet loss and packets arriving late, out of sequence, underruns, overruns CRC, and delay variation (jitter).

How to Order – IP•Tube UNO E1

Part No.	Description	Notes
100-2048-01	IP•Tube UNO E1, (1 Port)	Base Model has one E1 Interface
100-2048-C1	IP•Tube UNO E1 with E1 Compression	w/Lossless Data Compression Option
Base Options		Specify as suffix
-ROHS	ROHS compliant materials and processes	Restriction of Hazardous Substances no PB
-MUX	E1 Multiplexor and DACS	Groom 2 to 24 remote locations Over IP
-SWITCH	4 Port QOS/VLAN/Rate Limiter 10/100 Ethernet Switch	QOS and VLAN tagging Reserve E1 Over IP Bandwidth w Rate Limiter
-PRO	Protector Option	Fault Tolerant Network Interconnect Requires Ethernet Switch Option
-ALT	Alternator Load Balancing Option	Load Balancing Inverse Mux Requires Ethernet Switch Option
Power Options		Specify as suffix
-DCMOD	Power Module 10/30 VDC ADAPTER	Ships with Universal Adapter 100/240 50/60
-N48VDC	Power Supply Module Negative 48 Volt DC	Isolated Negative 48 Volt Power

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