



Encrypted E1 Over IP



- Secure E1 Circuit Extension for Voice, Video and Data

Transparent AES Encryption of E1 Circuits Over Packet Networks

The **Black•Tube E1** provides organizations with the ability to **securely** interconnect PBXs, Cellular Base Stations, Telecom Switches and E1 based communication 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 via LANs, WANs, MANs, Satellite and Wireless Ethernet.

The **Black•Tube E1** encapsulates full and fractional E1 circuits, along with their framing and signaling bits, into **AES** encrypted IP packets. **Encryption** of the packetized E1 protects vital information from eavesdropping, tampering and regulatory compliance violations.

Black•Tube E1s secure the Critical Infrastructure utilized by highly competitive businesses, government operations, banking and finance, telecommunications, emergency services, gas and oil, electric and energy, water, and transportation.

The **Black•Tube E1'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.



Black•Tube E1 Standard Features

Dual LAN Interfaces

All **Black•Tube E1** 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

Management Interface

Management of the **Black•Tube E1** 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** public and private MIB support, with traps, is a standard feature.

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 **Black•Tube 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(s) with configured delay.

Service Quality Packet Prioritizing

The **Black•Tube E1** uses the Type of Service byte in the IP packets or 802.1p/q mac levels for prioritization of the encapsulated E1 frames. QOS is used to ensure that the real time Circuit data from the **Black•Tube E1** is ensured high priority.

Technical Specifications

Encryption Algorithm:

- AES 256-bit
- Fully Automatic key management

LAN Network Interface:

- Two 10/100BaseT Full/Half Ethernet

LAN Network Protocols Supported:

- IP, TCP, UDP, ICMP, Telnet, DHCP, DDNS, SSH

E1 Over IP Protocol:

- TDM Over IP • Circuit Extension Services Over IP • HDLC Over IP

WAN Network Protocols Supported:

- HDLC, SDLC, PPP, Frame Relay

E1/Fractional E1 Specifications:

- G.704 framed CRC4 or FAS and G.703 Unframed
- Coding - HDB3 or AMI

Echo Canceller:

- Voiceband Echo Cancelling according to ITU G.165 and G.168
- u- and A-Law coding according to ITU G.711
- 32 channels with end echo path delay of less than 63.75 ms

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:

- Secure Socket Shell - SSH
- Telnet support with Edit and Paste Template Files
- Console Port for Out of Band Management
- SNMP Public and Private MIB support with configured traps

TFTP Online Upgrade Capable (FLASH ROMs)

- Black•Tube is fully operational during upgrade

Dimensions:

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

Environmental:

- 0° to 132° F (-10° to 50°C) operating temperature
- Up to 90% operating humidity (non-condensing)
- Optional Extended Temperature Range available

Power:

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

Black•Tube E1 Optional Features

Echo Canceller OPTION

The Black•Tube E1-Ecan has an Optional 1-3 port E1 Echo Canceller card that cancels up to 64 milliseconds of Far End echo. The echo canceller meets ITU-T G.164, G.165 and ITU-T G.168 requirements for echo cancellation.

Enable One to Three E1 interfaces

The Black•Tube E1 is available with one to three E1 interfaces and a 10/100 BaseT Full/ Half Duplex Ethernet Interface. The E1 interfaces have configurations that provide for independent protocol, compression, packet sizing, buffering, clocking, framing, coding and channel settings. Enable additional E1 Ports as needs expand using a software-based license key. The protocols supported are BlackTube, Assured Delivery, CESoIP, and HDLCoIP.

E1 Protection Switch OPTION -TPS

The E1 Link Protector provides an automatic backup for E1 circuits with a second E1. The switch over criteria is configured.

E1 Link Protector OPTION -LPT

The E1 Link Protector provides an automatic backup for E1 circuits with E1 Over IP connecting via Wireless Ethernet, Gigabit Ethernet, IP Satellite Services, xDSL,...

Lossless Data Compression

The Black•Tube E1 compression model continuously detects idle/ redundant data within each E1 Voice circuit resulting in as much as a 40 to 1 bandwidth savings. The compression works from the lowest latency setting of 8 E1 frames to the highest setting of 40 E1 frames per packet.

How to Order — Black•Tube E1

Part No.	Description	Notes
747-2048-0x	Black•Tube E1, xE1 (x=1 - 3 Ports)	Base Model Specify # of T1 Ports Enabled
U47-2048-0x	Black•Tube E1 Port Upgrade	Enable Additional E1 Ports (up to 3)
749-2048-0x	Black•Tube E1-w/xE1 Compression	w/Lossless Data Compression Option
U77-2048-Cx	Black•Tube E1-Compression Upgrade	Enable Lossless Compression E1 (up to 3)
Base Option		Specify as suffix
747-ECAN_0x	Echo Canceller Card 1 to 3 E1	Add Echo Cancellation Specify # of E1s
-PRO	Protector Option	Fault Tolerant Network Interconnect
-ALT	Alternator Load Balancing Option	Load Balancing Inverse Mux
Power Options	Specify as suffix	Hot Standby Configuration 2nd Power 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
Rack Mount Option		Specify as suffix