IPmux-1

TDMoIP Gateway

FEATURES

- IPmux-1 is a TDMoIP gateway enabling E1/T1 circuit extension over IP networks
- Supports synchronous TDM-based services over IP and Ethernet networks
- Simple configuration for a single E1 or T1 port over an Ethernet uplink
- Supports CAS signaling and is totally transparent to all other signaling protocols running over E1 or T1
- Extends either a framed (full or fractional) or an unframed E1 or T1 circuit
- 10/100BaseT uplink to the network
- QoS support:
  - Labeling IP level priority (ToS)
  - VLAN tagging and priority labeling according to IEEE 802.1(p&q)
- Low processing delay (under 3 msec)
- Enables synchronous clock distribution across IP-based networks
- Compensates for packet delay variation up to 300 msec
- Management interfaces: TELNET, TFTP and XMODEM with enhanced management tools and features
- Compact, 1U high, enclosure

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DESCRIPTION

- IPmux-1 provides a compact, minimal configuration solution for transporting E1/T1 services over IP and Ethernet based networks. IPmux-1 takes data streams from its E1/T1 port and converts them to packets for transmission over the network. The addressing scheme of these packets is IP. These packets are transmitted via the IPmux-1 10/100BaseT network port to the network. A second IPmux-1 at the remote location converts the IP packets back to TDM traffic.
- IPmux-1 is a standard IP device, supporting ICMP (ping), ARP, next hop and default gateway capabilities.

PERFORMANCE

- IPmux-1 can achieve end-to-end processing delay as low as 3 msec, using high-performance buffering and forwarding techniques.
- IP packet size is configurable. Greater packet length results in greater processing delay, yet smaller bandwidth overhead.
- An enhanced buffering mechanism compensates for packet delay variation (jitter) of up to 300 msec in the network.

APPLICATIONS

QoS SUPPORT

- IPmux-1 supports VLAN tagging and priority labeling according to 802.1(p&q)
- The user can configure the ToS (Type of Service) of the outgoing IP frames. This allows an en-route layer-3 router or switch, which supports ToS (or Diffserv), to give higher priority to IPmux-1 traffic for delay-sensitive applications.
- Assigned, IANA registered UDP socket number for TDMoIP simplifies flow classification through switches and routers.

TIMING

- IPmux-1 maintains synchronization between TDM devices by deploying advanced clock distribution mechanisms. The clocking options are:
  - **Internal** – The master clock source for the TDM circuit is provided by the IPmux-1 internal clock oscillator
  - **Loopback** – The transmit clock is derived from the E1/T1 port's receive clock.
  - **Adaptive** – Clock is recovered from the Ethernet network interface.

FRAMING

- Two types of service are offered:
  - **Unframed** – IPmux-1 extends full E1/T1 circuits transparently across the IP network, regardless of framing structure
  - **Structured** – IPmux-1 can be configured for fractional E1/T1 services over IP networks. CAS can be enabled.

ETHERNET PORT

- A standard 10/100BaseT half/full duplex port with auto-negotiation support provides the uplink to the network. If auto-negotiation is disabled, IPmux-1 capabilities can be configured to any of the following:
  - 100BaseT – full duplex
  - 100BaseT – half duplex
  - 10BaseT – full duplex
  - 10BaseT – half duplex.

E1 OR T1 PORT

- One standard E1 or T1 port provides connectivity to any standard E1 or T1 device.
- Integral LTU/CSU can be enabled for line protection and long haul applications.
- Alarm detection and insertion are supported together with error statistics. SES/UAS statistics, LOS/AIS physical layer alarms and remote loop/local loop test modes are all supported. Standard E1 or T1 alarms are supported end to end.

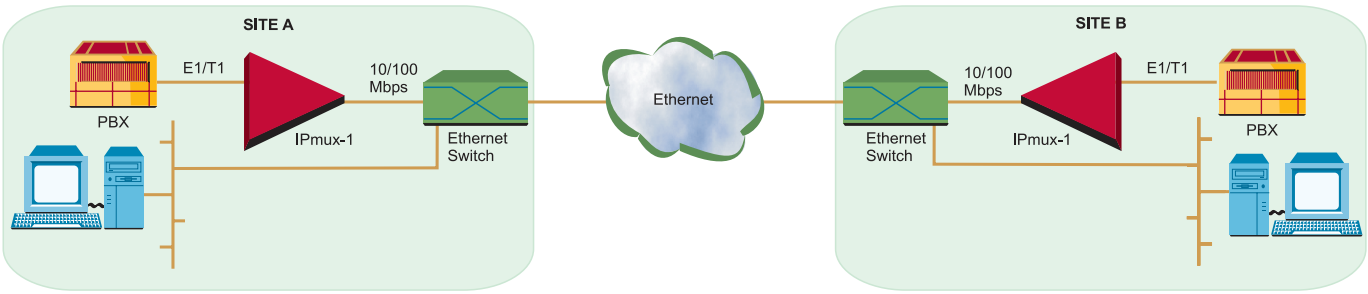

Figure 1. Multiplexing Voice and Data over an Ethernet Port

POWER SUPPLY

- IPmux-1 is available with either an AC or a DC power supply. The AC power supply supports 100 to 240 VAC, and the DC power supply supports -36 to -72 VDC.

DIAGNOSTICS & MANAGEMENT

- IPmux-1 supports remote loop and local loop testing. End-to-end alarm generation and end-to-end AIS indication are also provided. When a local E1 or T1 port receives an AIS, it is passed to the remote port via the Ethernet/IP network. If a local Ethernet port is not connected, an AIS indication will be generated both in the local and the remote devices.
- On the E1 or T1 port, SES and UAS statistics are collected in 15-minute intervals and are stored for 24 hours (96 intervals). E1 or T1 physical layer alarms (LOS, AIS, LOF, LCV) are also supported.
- IPmux-1 performs an internal built-in test (BIT) after power up. The results of the test are visible via the local terminal.
- IPmux-1 monitors LAN and IP layer network condition statistics such as packet loss and packet delay variation (jitter). The events are stored in log files.
- Software download is supported via the local terminal using XMODEM or remotely using TFTP. After downloading a new software version, IPmux-1 automatically saves the previous version in non-volatile memory for backup purposes. Similarly, copies of the configuration file may be downloaded and uploaded to a remote workstation for backup and restore purposes.
- IPmux-1 can be configured and monitored locally via an ASCII terminal, or remotely via Telnet.

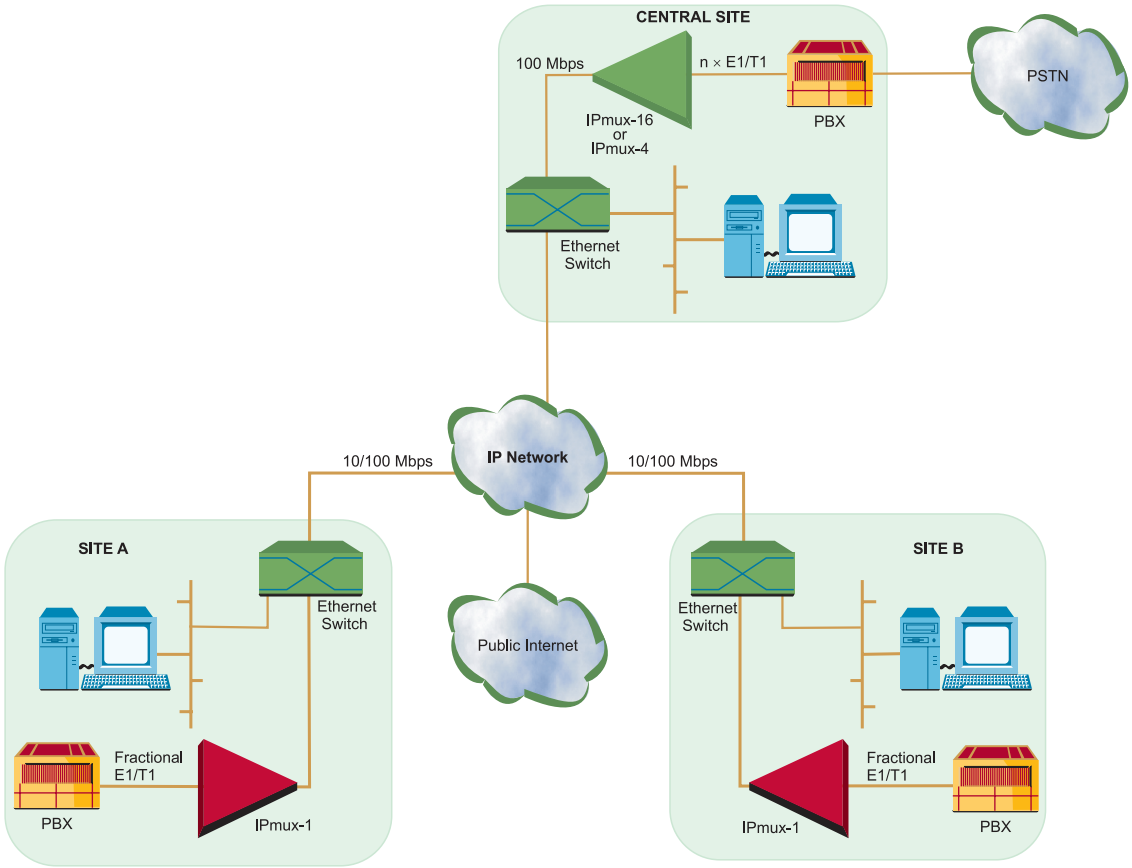

Figure 2. IP Network Application

IPmux-1

TDMoIP Gateway

SPECIFICATIONS

E1 INTERFACE

- **Standards**
  ITU-T Rec. G.703, G.704, G.706, G.732, G.823
- **Framing**
  Unframed, CRC4 MF, CAS MF
- **Data Rate**
  2.048 Mbps
- **Line Code**
  HDB3
- **Receive Level**
  0 to -32 dB with LTU
  0 to -10 dB without LTU
- **Transmit Level**
  Balanced: ±3V ±10%
  Unbalanced: ±2.3V ±10%
- **Connector**
  Balanced: RJ-45, 8-pin
  Unbalanced: pair of mini BNC, 75Ω (adapter cables from mini BNC to BNC are supplied)
- **Line Impedance**
  Balanced: 120Ω
  Unbalanced: 75Ω
- **Jitter Performance**
  Per ITU-T G.823

T1 INTERFACE

- **Standards**
  AT&T TR-62411,
  ITU-T Rec. G.703, G.704,
  ANSI T1.403
- **Data Rate**
  1.544 Mbps
- **Line Code**
  AMI, B8ZS, B7ZS
- **Framing**
  Unframed, SF, ESF
- **Receive Level**
  0 dB to -30 dB
- **Transmit Level**
  ±2.75V ±10% at 0–655 ft with DSU
  0 dB, -7.5 dB, -15 dB, 22.5 dB with CSU
- **Connector**
  RJ-45, 8 pin
- **Line Impedance**
  100Ω, balanced
- **Jitter Performance**
  Per AT&T TR-62411

ETHERNET INTERFACE

- **Standards**
  IEEE802.3, 802.3u
- **Data Rate**
  10 or 100 Mbps, half/full duplex
- **Range**
  Up to 100m on UTP Cat.5
- **Connector**
  RJ-45, 8-pin

CONTROL INTERFACE

- **Interface**
  RS-232/V.24 (DCE)
- **Data Rate**
  9,600; 19,200; 38,400 or 57,600 bps
- **Connector**
  DB-9

GENERAL

- **Power**
  100 to 240 VAC, 47 to 63 Hz, 50W or
  -48 VDC (-36 to -72 VDC)
- **Physical**
  Height 4.4 cm / 1.7 in (1U)
  Width 24.6 cm / 9.7 in
  Depth 21.4 cm / 8.4 in
  Weight 1.22 kg / 2.7 lb
- **Environment**
  Operating temperature
  0 to 45°C / 32 to 110°F
  Humidity
  Up to 90%, non-condensing

ORDERING

IPmux-1/#/+/&
TDMoIP gateway

Specify power supply:
AC for 100 to 240 VAC
DC for -36 to -72 VDC

+ Specify supported service:
E1 for E1 signal, with RJ-45 connector
T1 for T1 signal, with RJ-45 connector
E1CX for E1 signal, with mini BNC connectors

& Specify network port:
UTP for 10/100BaseT port with RJ-45 connector

RM-25
Hardware for mounting one or two units in a 19" rack

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