

# 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 channel over an Ethernet uplink
- Totally transparent to all 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 802.1D
- Low processing delay (under 3 msec)
- Enables synchronous clock distribution across IP-based networks
- Compensates for packet delay variation up to 300 ms
- Management interfaces: SNMP, TELNET, TFTP and XMODEM with enhanced management tools and features
- Compact, 1U high, enclosure

# IPmux-1

## TDMoIP Gateway

### 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 link to the network. A second IPmux-1 at the remote location converts the IP packets back to TDM traffic.

### 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 allows absorption of up to 300 msec packet delay variation in the network.
- IPmux-1 supports VLAN tagging and priority labeling according to 802.1D

- 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, to give higher priority to IPmux-1 traffic for delay-sensitive applications.
- 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.
- IPmux-1 is a standard IP device, supporting ICMP (ping), ARP, next hop and default gateway capabilities.
- 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** – Timing is derived from the E1 or T1 channel
  - **Adaptive** – Clock is recovered from the Ethernet network interface.

- Assigned, AINA registered UDP socket number for TDMoIP simplifies flow classification through switches and routers.

### ETHERNET PORT

- A standard 10/100BaseT half/full duplex port with auto-negotiation support provides the uplink to the network. The auto-negotiation mode can be enabled/disabled. If enabled, the capabilities advertised 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 user device. Long haul/short haul is supported for E1 or T1 input signals. 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.

### APPLICATIONS

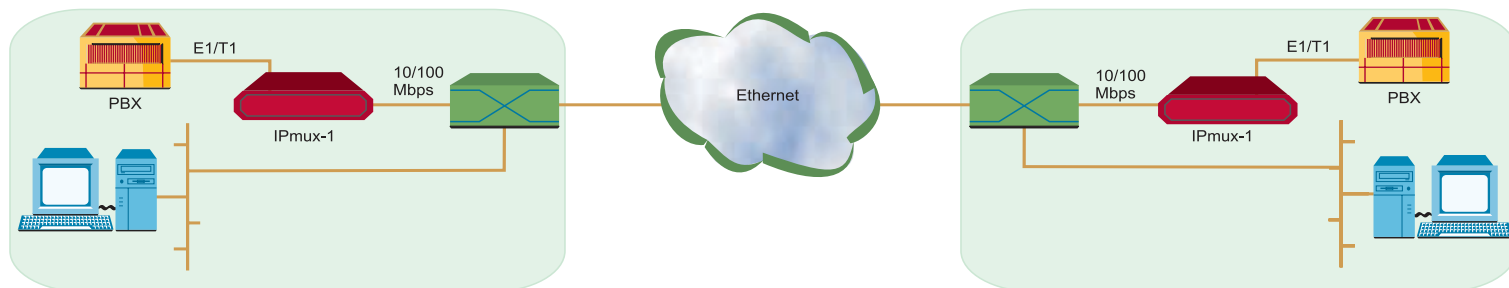


Figure 1. Multiplexing Voice and Data over an Ethernet Link

### POWER SUPPLY

- IPmux-1 is available with either an AC or a DC power supply. The AC power supply accepts 100 to 240 VAC, and the DC power supply accepts -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. In the event that 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 channel, 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.
- Software download is supported via the local terminal using XMODEM or remotely using TFTP. After downloading a new version of software, 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.
- IPmux-1 performs an internal built-in test (BIT) after power up. The results of the test are visible via the local terminal.
- RADview-HPOV, RAD's SNMP-based network management system, provides a user-friendly graphical display that allows monitoring and configuring of multiple IPmux-1 devices. Fault isolation, statistics and events gathering are also available. RADview-HPOV can store a complete predefined IPmux-1 configuration to shorten and simplify field installation.

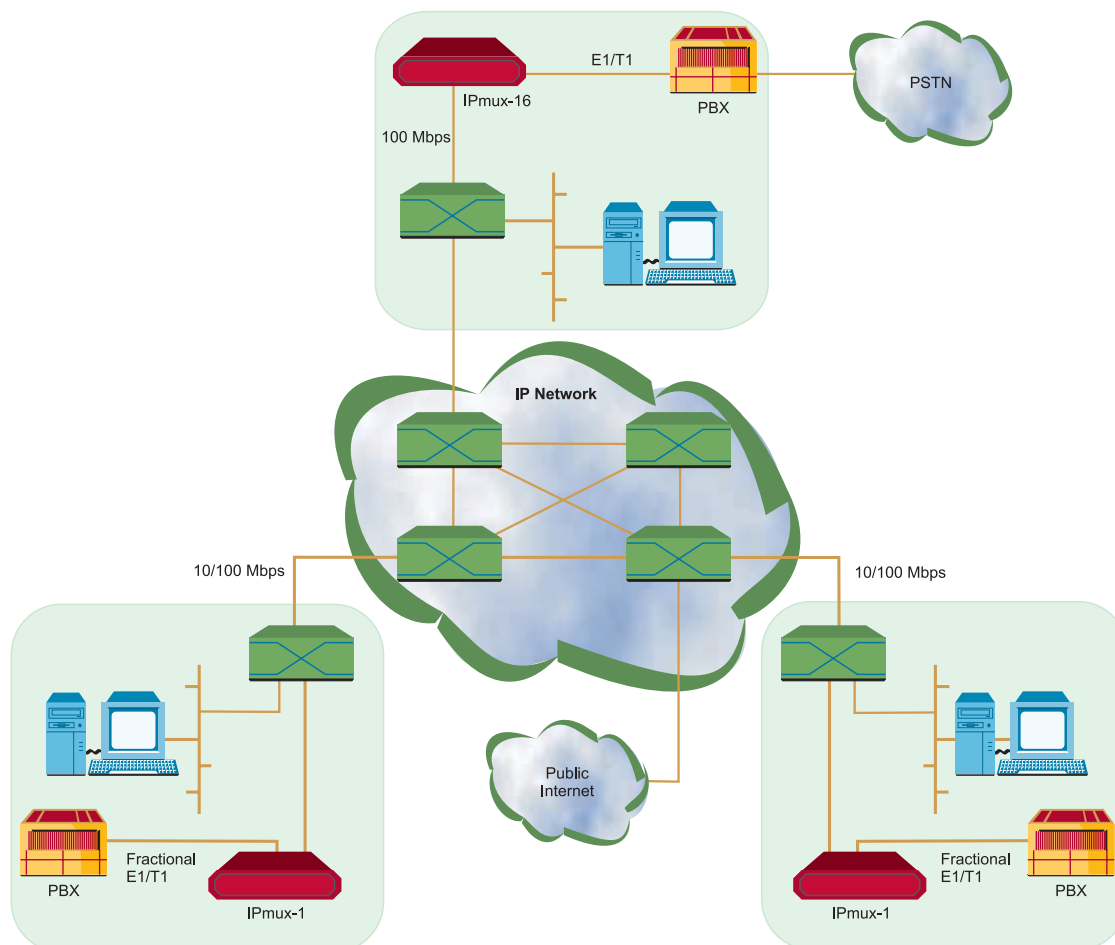


Figure 2. IP Network Application

# 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:  $\pm 3V \pm 10\%$   
Unbalanced:  $\pm 2.3V \pm 10\%$
- **Connector**  
Balanced, RJ-45, 8-pin,  
Unbalanced TBNC 75 $\Omega$  (an  
external adapter cable from  
TBNC to BNC is required)
- **Line Impedance**  
Balanced 120 $\Omega$   
Unbalanced 75 $\Omega$
- **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**  
 $\pm 2.75V \pm 10\%$  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**  
100 $\Omega$ , 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 -48 VDC
- + Specify supported service:  
**E1** for E1 signal, with RJ-45  
connector  
**E1CX** for E1 signal, with tiny BNC  
connectors  
**T1** for T1 signal, with RJ-45  
connector
- & Specify Ethernet network port:  
**UTP** for 10/100BaseT port with  
RJ-45 connector

**RAD**

data communications

<http://www.rad.com>

- **Corporate Headquarters**  
12 Hanechoshet Street  
Tel Aviv 69710, Israel  
Tel: (972) 3-6458181  
Fax: (972) 3-6498250, 6474436  
Email: rad@rad.co.il
- **U.S. Main Office**  
900 Corporate Drive  
Mahwah, NJ 07430  
Tel: (201) 529-1100  
Fax: (201) 529-5777  
Email: market@radusa.com

114-100-08/00