Vmux-110

Voice Trunking Gateway

TDMoIP Driven™

FEATURES

- Integrates voice and data over packet networks
- Connects one E1/T1 digital voice or four analog voice ports over a serial or 10/100BaseT uplink
- Second Ethernet port for user LAN connectivity
- Features Vmux family TDMoIP multiplexing
- Employs voice compression techniques G.711, G.723.1 and G.729A
- Dynamic bandwidth allocation using Voice Activity Detection and silence suppression
- G.168 echo cancellation of up to 16 msec per channel
- Group III Fax relay at rates of 4.8 to 14.4 kbps
- Transparent modem relay for all common rates and standards
- Priority mechanism for voice traffic
- QoS support:
  - Labeling IP level priority (ToS)
  - VLAN tagging and priority labeling according to IEEE 802.1p&q
- HDLC channel compression
- DTMF/MFR2/MFC signal detection, generation and relay
- Signaling supported:
  - Transparent CAS, including R2 and E&M
  - Transparent CCS, including ISDN, QSIG and SS7
- Management via user terminal, secured SNMP and Telnet
- Enhanced local and remote diagnostic tools
- Compact 1U-high platform, compatible with 19" racks

DESCRIPTION

- Vmux-110 is a customer-located device that complements the larger modular Vmux-2100 system, fulfilling the need for a low capacity remote voice trunking gateway for both IP and leased line TDM networks. Vmux-110 is available with either an E1 or T1 port for digital voice channels, or four FXS ports for analog POTS.
- Vmux-110 compresses the voice traffic and transports it over either a serial TDM link, or a 10/100BaseT IP link. The device employs G.723.1, G.729 Annex A and G.711 compression algorithms together with RAD's unique TDMoIP multiplexing, including transparent CAS and CCS signaling.
- A second 10/100BaseT port is provided for connecting a user Ethernet LAN to the unit. Together with Vmux-110's integral Ethernet switch, this allows integrating the user LAN traffic with the compressed voice, over a single uplink (IP or serial) to the network.
- Voice Activity Detection (VAD) and silence suppression allow Vmux units to dynamically allocate bandwidth for voice traffic. This results in very efficient bandwidth usage, leaving more bandwidth for data transport.
- By preventing packets from being sent when no voice activity is detected, the VAD mechanism conserves bandwidth. The improved bandwidth utilization enables Vmux-110 to support a higher number of channels than is possible by using conventional voice compression methods alone. By performing TDMoIP multiplexing and grouping the

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timeslots of G.723.1 compressed voice together into bundles with a common IP address, actual link bandwidth used can be reduced to as low as 4 kbps per channel (a reduction of 16:1).

- CAS and CCS signaling are transparently transmitted end-to-end. Vmux-110 transmits HDLC-based CCS signaling protocols such as SS7, ISDN and QSIG as HDLC over IP. HDLC frames are removed, and any signal payload is sent in an IP packet. For ISDN and QSIG protocols, this results in significant bandwidth savings.
- For deployment optimization, Vmux-110 with E1 or T1 voice ports can be ordered to compress 6, 12, 18, 24 (for full T1 trunk) or 30 timeslots (for full E1 trunk). Each timeslot carries a single digital voice channel.
- Vmux-110 is a compact, 1U high, half 19" wide unit that can be mounted in standard 19" racks.

PRIORITY MECHANISM

- Vmux-110 includes an internal mechanism for identifying and providing priority for packets containing voice, over those containing other LAN traffic. This ensures that voice packets are not delayed and a high voice service quality is maintained.

QoS SUPPORT

- The IP uplink complies with all relevant Ethernet LAN standards, such as IEEE 802.3 and 802.3u. It provides reliable, high Quality of Service (QoS), by optional VLAN tagging and priority labeling according to IEEE 802.1p&q.
- The user can configure the Type of Service (ToS) of the outgoing IP packets. This allows an en-route Layer 3 router or switch, which supports ToS (or Diffserv), to give higher priority to Vmux-110's IP traffic for delay-sensitive applications.
- Assigned, IANA-registered UDP socket number for TDMoIP simplifies flow classification through switches and routers.

MANAGEMENT

- All Vmux-110 operating parameters are configured using a simple, menu-based software. For upgrades or backup, software upload and download can be performed via TFTP.
- Vmux-110 can be configured and monitored via a local ASCII terminal, Telnet, or via RADview, RAD's Network Management system. An RJ-45 Control port is provided for local terminal connection for monitoring and control.
- For system security, Vmux-110 provides four different levels for users: Monitor, Technician, Operator and Administrator. Up to 20 different usernames with passwords can be defined.

APPLICATIONS

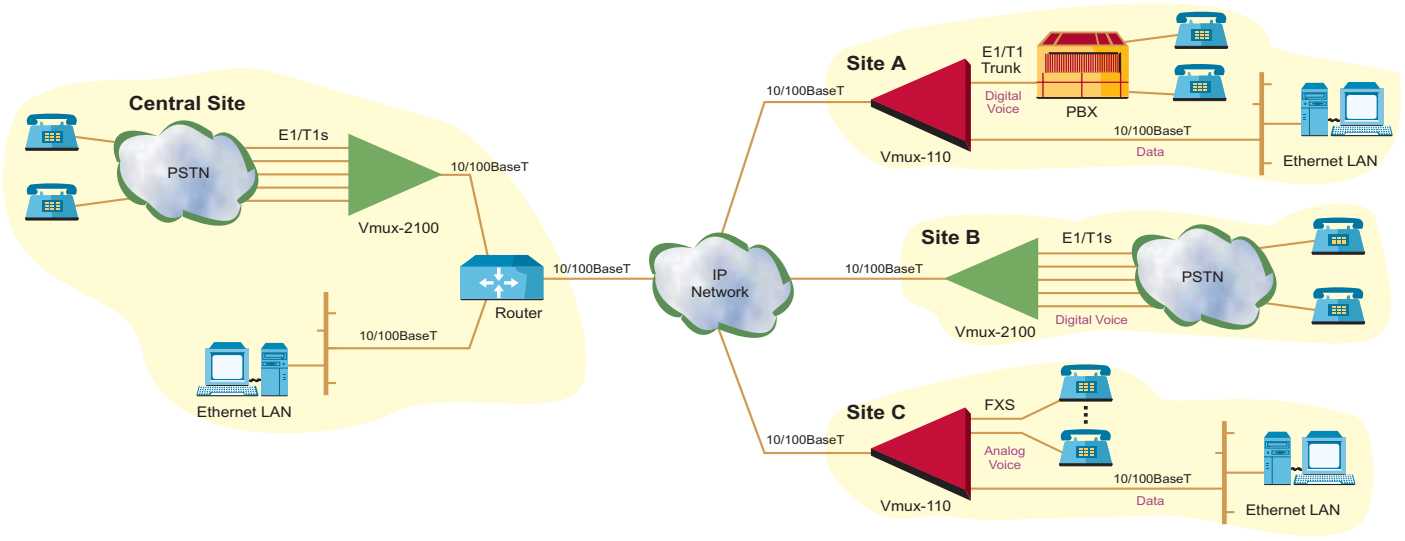

Figure 1. Data and Compressed Digital/Analog Voice over IP Network

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SPECIFICATIONS

NETWORK PORTS

Vmux-110 provides two 10/100BaseT Ethernet ports and one n x 64 kbps serial link.

Ethernet Ports

- **Standards**
  IEEE802.3, 802.3u, Ethernet, 802.1p&q
- **Data Rate**
  10 or 100 Mbps, half duplex or full duplex, auto-negotiate
- **Statistics**
  According to RFC 1643, or RFC 2665:
  - Received frames:
    Correct Frames, Correct Octets, Alignment Errors, FCS Errors.
  - Transmitted frames:
    Correct Frames, Correct Octets, Single Collision, Multiple Collision, Deferred Transmission, Late Collision, Carrier Sense Error
- **Copper UTP Interface**
  Range: up to 100m on UTP Cat.5 cable
  Connector: RJ-45 (per port)

Serial Link

- **Data Rate**
  n x 64 kbps, up to 2048 kbps
- **Interface**
  Selectable for RS-530, V.35 or X.21
- **Connector**
  DB-25, female
  (For V.35 or X.21 interface, an adaptor cable is required – see *Ordering*)
- **Clock Modes**
  - DCE: Vmux-110 provides clock to connected equipment
  - DTE: Vmux-110 accepts clock from connected equipment (requires adaptor cable)

VOICE PORTS

Vmux-110 is available with choice of single E1 or T1 voice port, or 4 x FXS analog voice ports.

- **Compression Algorithms**
  G.723.1 (5.3 or 6.4 kbps), G.729 A (8 kbps), G.711 (a-law or μ-law)
- **Silence Suppression**
  G.723.1 A, G.729B
- **Echo Cancellation**
  16 msec per channel as per G.168
- **Fax Relay**
  Group III: 4.8, 9.6, 14.4 kbps
- **Voice Band Data**
  Transparent support for modems
- **Signaling Support**
  - Transparent CAS, including R2 and E&M
  - Transparent CCS, including ISDN, QSIG and SS7
- **MF Signaling Support**
  DTMF, MFR2, MFC detection, generation and relay

E1 Digital Voice Port

- **Number of Channels Supported**
  According to ordering:
  Up to 6, 12, 18, 24 or 30
- **Nominal Data Rate**
  2.048 Mbps
- **Standards**
  ITU-T Rec. G.703, G.704, G.706, G.732, G.823
- **Framing**
  G.732N or G.732S, with or without CRC-4
- **Line Code**
  HDB3
- **Receive Signal Level**
  With LTU: 0 to -43 dB
  Without LTU: 0 to -12 dB
- **Transmit Signal Level**
  Balanced: ±3V (±10%)
- **Timing**
  Internal or loopback
- **Jitter Performance**
  Per ITU-T G.823
- **Line Type**
  Balanced: 4-wire, 120Ω
  Unbalanced: Coax, 75Ω
- **Connectors**
  Balanced: RJ-45
  Unbalanced: pair of BNC

T1 Digital Voice Port

- **Number of Channels Supported**
  According to ordering:
  Up to 6, 12, 18 or 24
- **Nominal Data Rate**
  1.544 Mbps
- **Standards**
  ANSI T1.403, AT&T TR-62411, ITU-T Rec. G.703
- **Framing**
  SF, ESF
- **Line Code**
  AMI
- **Zero Suppression**
  B8ZS
- **Timing**
  Internal or loopback

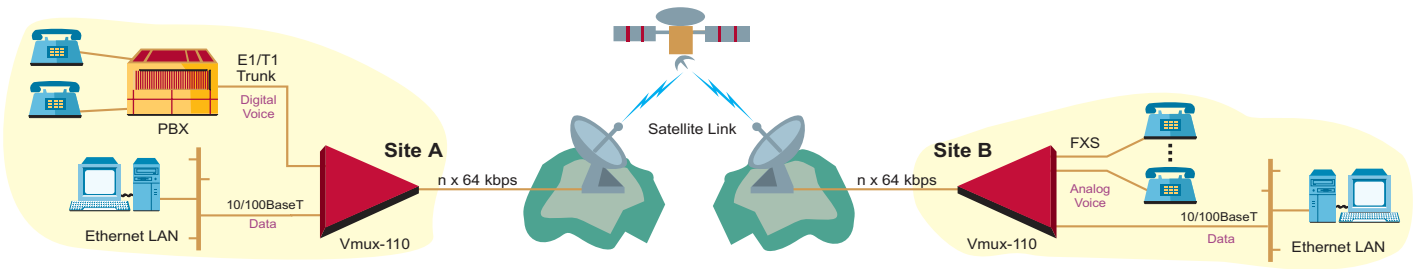

Figure 2. Data and Compressed Digital/Analog Voice over Satellite Link

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- **Receive Signal Level**
  With CSU: 0 to -36 dB
  Without CSU: 0 to -30 dB
- **Transmit Signal Level**
  With CSU: 0, -7.5, -15, or -22.5dB
  Without CSU: ±2.7V (±10%) at 0-655 ft
- **Jitter Performance**
  Per AT&T TR-62411
- **Line Type**
  Balanced 4-wire, 100Ω
- **Connector**
  RJ-45

FXS Analog Voice Ports

- **Number of Ports**
  4
- **Analog Parameters**
  ITU-T standards: G.713, 2-wire for voice and signaling.
  Nominal level : 0 dBm
  Nominal impedance : 600Ω
  Return loss (300 to 3400 Hz): better than 20 dB
  Frequency response (Ref: 1020 Hz):
  300 to 3000 Hz: ±0.5 dB
  250 to 3400 Hz: ±1.1 dB
  Level adjustment, soft selectable:
  TX: +5 dBm to -10 dBm
  RX: +5 dBm to -10 dBm
  Steps: 2 dB (±0.1 dB), nominal
  Signal to total distortion, G.712, G.713 method 2:
  0 to -30 dBm0: better than 33dB
  +3 to -45 dBm0: better than 22dB
  Idle channel noise: better than -70 dBm0 (+20 dBrnc)
- **Signaling**
  EIA RS-464 Loop-Start
  On-Hook/Off-Hook Threshold:
  - 3V to 24V between TIP and RING at off-hook state
  - Higher than 25V between TIP and RING at on-hook state

  Feed Current:
  24 mA ±10%
  Ringer:
  Voltage: 50 VRMS (±10%), overload protected
  Frequency: 25 Hz (±10%)
  Cadence: 1 sec ON / 3 sec OFF (default), user-configurable
- **Connectors (per port)**
  RJ-11

CONTROL PORT

- **Standards**
  RS-232/V.24 (DCE)
- **Data Rate**
  9.6, 19.2, 38.4, 57.6 or 115.2 kbps
- **Connector**
  RJ-45

GENERAL

- **Diagnostics**
  - Ethernet Ports:
    Performance monitoring, LAN statistics, PING
  - E1/T1 Voice Ports:
    Local and Remote Loops on entire E1/T1
    Tone injection per timeslot towards local side
  - FXS Voice Ports:
    Local and Remote Loops per channel
    Tone injection per channel towards local side
- **Indicators**
  PWR (green) – Indicates when power is on
  ETH (green) – ON when Ethernet line is O.K.
  ALM (red) – Indicates alarm is present in system
- **Physical**
  Height: 4.3 cm/1.7 in
  Width: 21.5 cm/8.5 in
  Depth: 23.7 cm/9.3 in
  Weight: 2.0 kg/4.4 lb
- **Power**
  (*according to ordering*)
  Input:
  AC: 100 to 240 VAC, 50/60 Hz
  48: -36 to -72 VDC
  Consumption:
  4FXS: AC: 13.5W;
  DC: 12.5W
  E1/T1: AC: 10.2W;
  DC: 9.0W
- **Environment**
  Operating temperature:
  0 to 50°C/32 to 122°F
  Storage temperature:
  -20 to 70°C/-4 to 158°F
  Humidity: Up to 90%, non-condensing

ORDERING

VMUX-110/*/+/ETH-UTP
Voice Trunking Gateway

* Specify power supply:
AC for 100 to 240 VAC
48 for -48 (-36 to -72) VDC

\+ Specify voice port type:
E1/~ for E1 digital voice port
T1/~ for T1 digital voice port
4FXS for 4 analog FXS ports

~ Specify number of channels supported by digital voice port:
6 for up to 6 channels
12 for up to 12 channels
18 for up to 18 channels
24 for up to 24 channels
30 for up to 30 channels (E1 only)

CBL-VM110/?
Serial link adaptor cable

? Specify interface and clock mode:
V35/DCE for V.35, DCE mode
V35/DTE for V.35, DTE mode
X21/DCE for X.21, DCE mode
X21/DTE for X.21, DTE mode
530/DTE for RS-530, DTE mode

Note: An adaptor cable is not required for connecting to RS-530 equipment when Vmux-110 operates in DCE clock mode.

RM-35
Hardware for mounting one or two Vmux-110 units in a 19-inch rack

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