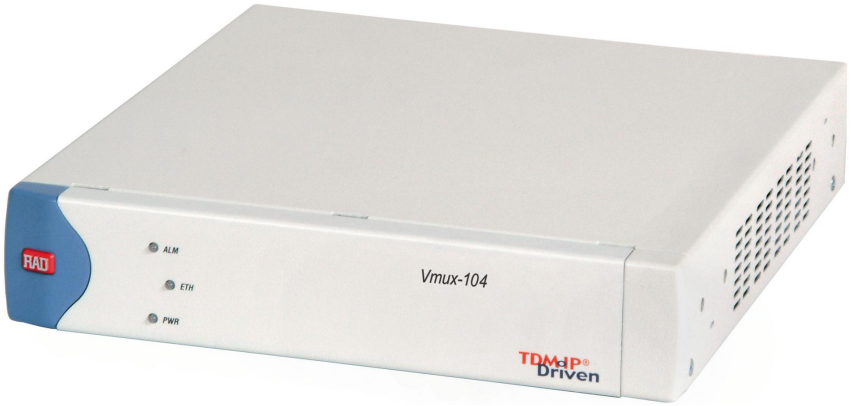
Vmux-104

Voice Trunking Gateway



FEATURES

- Integrates voice and data over packet networks
- Connects four FXS, FXO, or E&M analog voice ports over a 10/100BaseT uplink
- Second Ethernet port for user LAN connectivity
- Uses TDMoIP® multiplexing technology
- Employs voice compression techniques G.711, G.723.1 and G.729A
- Dynamic bandwidth allocation using Voice Activity Detection and silence suppression
- Priority mechanism for voice traffic
- QoS support:
  - Labeling IP level priority (ToS)
  - VLAN tagging and priority labeling according to IEEE 802.1p&Q
- Integral VLAN table containing up to 64 entries
- LAN data rate limiting on Ethernet ports
- G.168 echo cancellation of up to 32 msec per channel
- Group III Fax relay at rates of 4.8 to 14.4 kbps
- Transparent modem for all common rates and standards
- Integrated router supports IP/IPX routing and transparent bridging
- DTMF signal detection, generation and relay
- Management via user terminal, secured SNMP and Telnet
- DHCP client support
- Enhanced local and remote diagnostic tools
- Compact 1U-high platform, compatible with 19" racks

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DESCRIPTION

- Vmux-104 is a customer-located device that complements RAD's larger modular Vmux-2100 system. It fulfills the need for a low capacity remote voice trunking gateway for IP networks. Vmux-104 is available with a choice of four FXS, FXO, or E&M analog voice ports that connect to POTS or faxes.
- Vmux-104 compresses the voice traffic and transports it over 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.
- A second 10/100BaseT port is provided for connecting a user Ethernet LAN to the unit. Together with Vmux-104's integral Ethernet switch, this allows integrating the user LAN traffic with the compressed voice, over a single uplink to the network.

APPLICATIONS

- An integrated router supports IP routing, Firewall, NAT, DHCP Server/Relay and static routing. The IP routing can be performed between the network and the user ports.
- Vmux-104 is a compact, 1U high, 1/2 19" wide unit that can be mounted in standard 19" racks.

IMPROVED BANDWIDTH UTILIZATION

- Voice Activity Detection (VAD) and silence suppression allow Vmux units to dynamically allocate bandwidth for voice traffic. This results in 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-104 to support a higher number of channels than is possible by using conventional voice compression methods alone. By performing TDMoIP® multiplexing and grouping the timeslots of G.723.1 compressed voice into bundles with a common IP address, the actual link bandwidth can be reduced to as low as 4 kbps per channel (a reduction of 16:1).

PRIORITY MECHANISM

- Vmux-104 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-104's IP traffic for delay-sensitive applications.
- Assigned, IANA-registered UDP socket number for TDMoIP® simplifies flow classification through switches and routers.

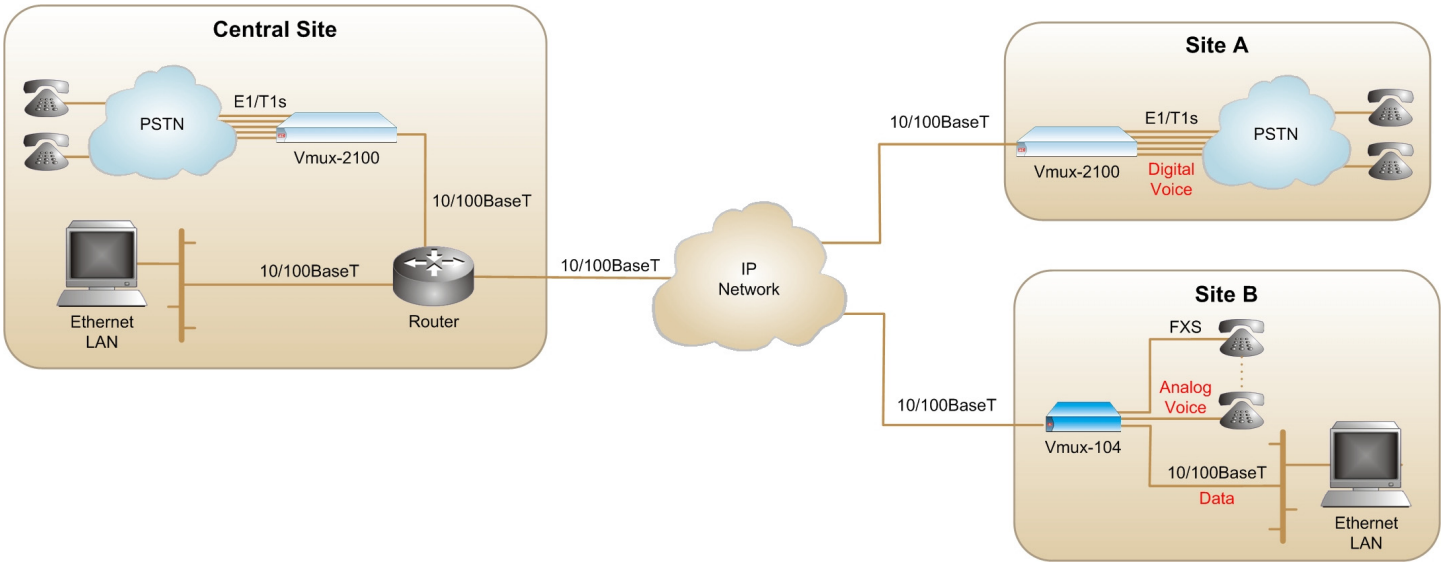

Figure 1. Data and Compressed Analog Voice over an IP Network

VLAN TABLE

- Vmux-104 includes a VLAN table, which contains up to 64 entries. Each entry defines the egress and tagging policies for packets with a specific VLAN ID, for each port. Packets with a particular VLAN ID can be blocked.

MANAGEMENT

- All Vmux-104 operating parameters are configured using a simple, menu-based software. For upgrades or backup, software upload and download can be performed via TFTP.
- Vmux-104 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-104 offers four different users levels: Monitor, Technician, Operator and Administrator. Up to 20 different usernames with passwords can be defined.

SPECIFICATIONS

NETWORK AND USER ETHERNET PORTS

- **Standards**
  IEEE 802.3, 802.3u, Ethernet, 802.1p&Q
- **Data Rate**
  10 or 100 Mbps, half duplex or full duplex, auto-negotiate
- **Ingress Data Rate Limit**
  Can be independently set for each Ethernet port: 128, 256, 512 kbps, 1 or 2 Mbps, or unlimited
- **Statistics**
  According to RFC 3638, or RFC 3635:
  - 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
- **Interface**
  Range: up to 100m on UTP Cat.5 cable
  Connector: RJ-45 (per port)

VOICE PORTS

Vmux-104 is available with a choice of 4 FXS, FXO, or E&M analog voice ports.

- **Compression Algorithms**
  G.723.1 (5.3 or 6.4 kbps), G.729A (8 kbps), G.711
- **Silence Suppression**
  G.723.1A, G.729B
- **Echo Cancellation**
  32 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

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 -4 dBm
  RX: +5 dBm to -10 dBm
  Steps: 1 dB (±0.1 dB), nominal
  Signal to total distortion, G.712, G.713 method 2:
  0 to -30 dBm0: better than 33 dB
  +3 to -45 dBm0: better than 22 dB
  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**
  RJ-12 per channel

FXO 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 -4 dBm
  RX: +2 dBm to -17 dBm
  Steps: 1 dB (±0.1 dB), nominal
  Signal to total distortion, G.712, G.713 method 2:
  0 to -30 dBm0: better than 33 dB
  +3 to -45 dBm0: better than 22 dB
  Idle channel noise: better than -70 dBm0 (+20 dBrnc)

Vmux-104

Voice Trunking Gateway

- **Signaling**
  Signaling methods: EIA RS-464 loop-start
  DC impedance:
  Off-Hook:
  100Ω at 100 mA feed,
  230Ω at 25 mA feed
  On-Hook: above 1 MΩ
  Ring detector:
  Impedance: 20 kΩ @ 20 Hz, 70 VRMS
  Detection: >20 VRMS, 17–25 Hz
  No detection: <5 VRMS
  Dialing: DTMF or pulse
- **Connectors**
  RJ-12 per channel

E&M Analog Voice Ports

- **Number of Ports**
  4
- **Analog Parameters**
  ITU-T standards: G.713, 2-wire or 4-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 -7 dBm
  RX: +2 dBm to -17 dBm
  Steps: 1 dB (±0.5 dB), nominal
  Signal to total distortion, G.712, G.713 method 2:
  0 to -30 dBm0: better than 33 dB
  +3 to -45 dBm0: better than 22 dB
  Idle channel noise: better than -70 dBm0 (+20 dBrnc)
- **Signaling**
  Signaling type (software-selectable):
  EIA RS-464 Types I, II, III, and V (British Telecom SSDC5), software-selectable per four channels
  Signaling voltage: -12 to -60 VDC
  Dial pulse distortion: ±2 msec
- **Connectors**
  RJ-45 per channel

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
  - FXS/FXO/E&M Voice Ports:
    Remote loops per channel
    Tone injection per channel towards local or remote side
- **Indicators**
  PWR (green) – On when power is on
  ETH (green) – On when Ethernet line is O.K.
  ALM (red) – On when alarm is present in the 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 Input**
  AC: 100 to 240 VAC, 50/60 Hz
- **Power Consumption**
  4FXS: 19.0 VA
  4FXO: 9.0 VA
  4E&M: 11.0 VA
- **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-104/+
Voice Trunking Gateway

+ Specify voice port type:
  4FXS for 4 analog FXS ports
  4FXO for 4 analog FXO ports
  4E&M for 4 analog E&M ports

RM-35
Hardware for mounting one or two Vmux-104 units in a 19-inch rack

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