

# Vmux-210

## Analog Voice Trunking Gateway



Compressing up to 30 analog (FXS) voice ports and transmitting them over a serial, fractional E1/T1, or a 10/100BaseT uplink

**TDMoIP**  
Driven®

- Unique TDMoIP multiplexing, together with various voice compression algorithms, provides up to 16:1 compression for effective bandwidth utilization
- Fully transparent to signaling and telephony features
- Additional Ethernet port for user LAN connectivity, with voice/data prioritization
- Ideal for satellite applications – fully compatible with VSAT equipment
- Compact 1U-high platform, compatible with 19" racks

Vmux-210 is a customer-located device that complements RAD's Vmux systems (Vmux-2100, Vmux-210, Vmux-110). It fulfills the need for remote voice trunking gateway for both IP and leased line TDM networks, providing LAN and compressed voice services for a corporate application that requires a large number of analog lines.

The voice interface includes 24 or 30 FXS analog ports, which connect to POTS or faxes.

Vmux-210 compresses the voice traffic and transports it over a serial link, E1/T1 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.

A second 10/100BaseT port is provided for connecting a user Ethernet LAN to the unit. Together with the Vmux-210 integral Ethernet switch, this allows integrating the user LAN traffic with the compressed voice over a single uplink (IP, serial or fractional E1/T1) to the network.

**RAD**

data communications

The Access Company

# Vmux-210

## Analog Voice Trunking Gateway

The following security protocols are provided by Vmux-210 to ensure client-server communication privacy and correct user authentication:

- RADIUS (client authentication only)
- SSH for Secure Shell communication session.

To transfer voice as well as 10/100 Mbps Ethernet data over a serial uplink with a small bandwidth (such as for satellite applications), the ingress data rate on both Ethernet ports can be limited to one of several values between 128 kbps and 8 Mbps.

Vmux-210 provides +12/16 kHz pulse metering and polarity reversal for call center applications.

Vmux-210 is a compact, 1U high, 19-inch wide unit that can be mounted in standard 19-inch 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-210 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-210 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.

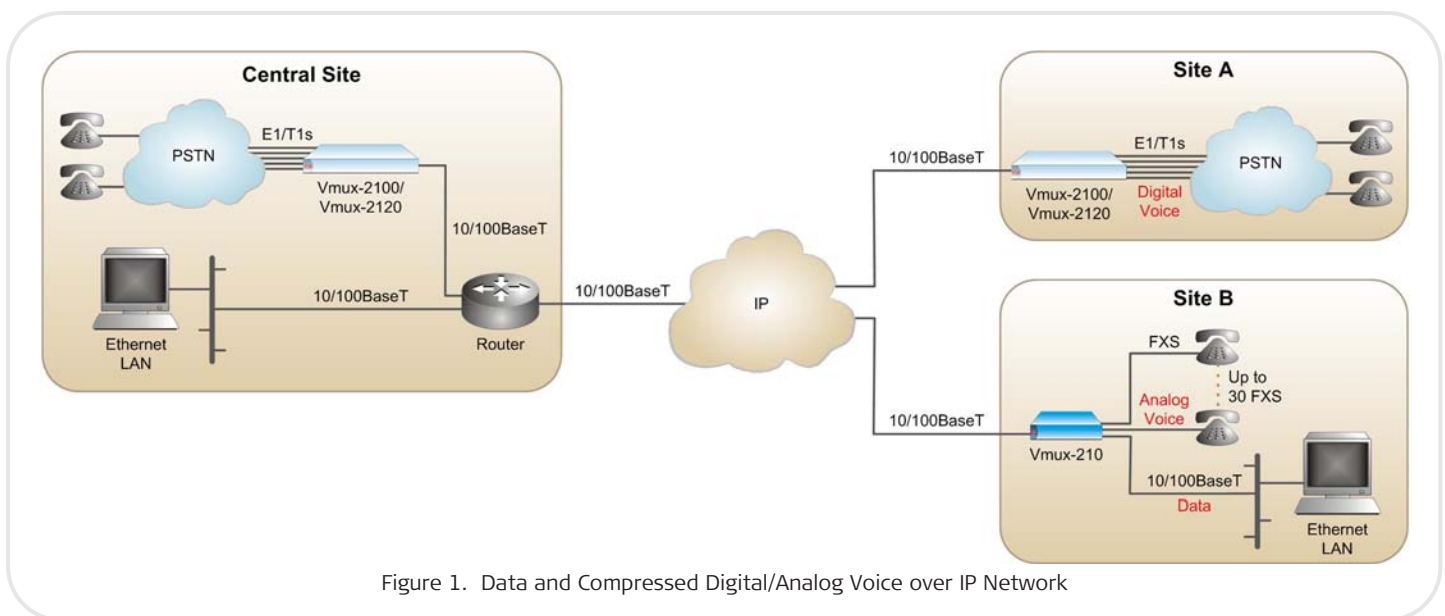


Figure 1. Data and Compressed Digital/Analog Voice over IP Network

## 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 802.1D&Q.

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

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-210 IP traffic for delay-sensitive applications.

## VLAN TABLE

Vmux-210 includes a VLAN table, containing up to 64 entries. Each entry defines the egress and tagging policies for packets with a specific VLAN ID, on each port. Packets with a particular VLAN ID can be blocked.

## MANAGEMENT

All Vmux-210 operating parameters are configured using simple, menu-based software. For upgrades or backup, software upload and download can be performed via TFTP.

Vmux-210 can be configured and monitored via a local ASCII terminal, Telnet, or Web client. A DB-9 control port provides local terminal connection for monitoring and control.

For system security, Vmux-210 offers four different user levels: Monitor, Technician, Operator and Administrator. Up to 20 different usernames with passwords can be defined.

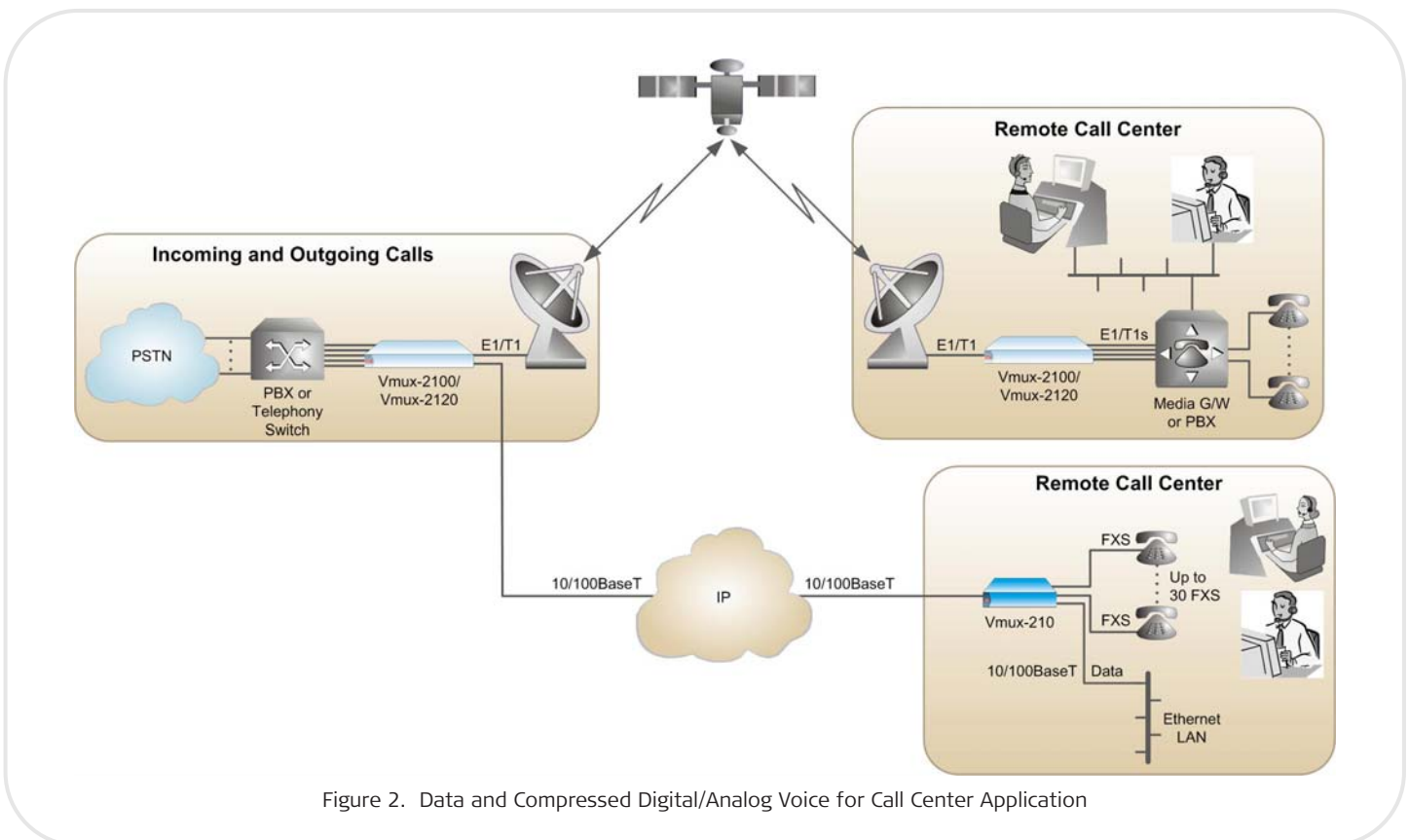


Figure 2. Data and Compressed Digital/Analog Voice for Call Center Application

### Specifications

#### NETWORK INTERFACE – ETHERNET

**Number of Ports**

One

**Standards**

IEEE 802.3, 802.3u, Ethernet, 802.1D&Q

**Data Rate**

10 or 100 Mbps, half duplex or full duplex, auto-negotiation

**Ingress Data Rate Limit**

Can be independently set for each Ethernet port: 128 kbps, 256 kbps, 512 kbps, 1 Mbps, 2 Mbps, 4 Mbps, 8 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

**Copper UTP Interface**

Range: up to 100m on UTP Cat.5 cable  
Connector: RJ-45 (per port)

#### NETWORK INTERFACE – E1

**Nominal Data Rate**

2.048 Mbps

**Standards**

ITU-T Rec. G.703, G.704, G.706, G.732, G.823

**Framing**

G.732N, 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:  $\pm 3V$  ( $\pm 10\%$ )

**Timing**

Internal or loopback

**Jitter Performance**

Per ITU-T G.823

**Line Type**

Balanced: 4-wire, 120 $\Omega$

**Connector**

RJ-45 for balanced interface

**Note:** *CBL-RJ45/2BNC/E1 adapter cable is available for converting the balanced E1 port RJ-45 connector into a pair of BNC connectors for unbalanced coax interface (see Ordering).*

#### NETWORK INTERFACE – T1

**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

**Receive Signal Level**

With CSU: 0 to -36 dB  
Without CSU: 0 to -15 dB

**Transmit Signal Level**

With CSU: 0, -7.5, -15, or -22.5 dB  
Without CSU:  $\pm 2.7V$  ( $\pm 10\%$ ) at 0-655 ft

**Jitter Performance**

Per AT&T TR-62411

**Line Type**

Balanced 4-wire, 100 $\Omega$

**NETWORK INTERFACE – SERIAL****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 adapter cable is required (see *Ordering*))

**Clock Modes**

DCE: Vmux-210 provides clock to connected equipment

DTE: Vmux-210 accepts clock from connected equipment (requires adapter cable)

**USER ETHERNET PORT**

The specifications are identical to those of the Network Ethernet port.

**VOICE PORTS**

*Note: Vmux-210 is available with 24 or 30 FXS analog voice ports.*

**Number of Ports**

According to ordering: 24 or 30

**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 ms per channel as per G.168

**Fax Relay**

Group III: 4.8, 9.6, 14.4 kbps

**Modem Relay**

V.22/V.22 bis

V.32/V.32 bis

V.34 up to 21.6 kbps

**Voice Band Data**

Transparent support for modems and faxes

**Signaling Support**

Transparent CAS

**MF Signaling Support**

DTMF detection, generation and relay

**Reverse Polarity Generation**

Determined by CAS bits

**Pulse Metering Generation**

Determined by CAS bits

**Caller ID Relay**

According to U.S. (Bellcore type 1) or European (V.23) standards, user selectable

# Vmux-210

## Analog Voice Trunking Gateway

### Analog Parameters

ITU-T standards: G.712, 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 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 dBmrc)  
Pulse Metering Frequency: 12 kHz, 16 kHz

### Signaling

EIA RS-464 loop start  
On-hook/Off-hook Threshold:

- 3V to 38V between Tip and Ring at Off-hook state
- Higher than 36V 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

24-port version: Telco-50 proprietary connector  
30-port version: Telco-64 proprietary connector

### CONTROL PORT

#### Interface

RS-232/V.24 (DCE)

#### Data Rate

9.6, 19.2, 38.4, 57.6, or 115.2 kbps

#### Connector

DB-9

### INDICATORS

#### General

PWR (green): On when power is on  
TST (green): On when test is performed  
ALM (red): On when alarm is present in the system

#### Ethernet Network and User Ports

LINK (green): On when the link is active  
ACT (yellow): Blinking during LAN traffic activity

**GENERAL****Diagnostics**

Ethernet port:

- Performance monitoring
- LAN statistics
- Ping

E1/T1 Uplink: Remote loops on entire E1/T1

FXS Voice Port:

- Remote loops per channel
- Tone injection per channel towards local and remote side

**Physical**

Height: 4.3 cm (1.7 in)

Width: 44.0 cm (17.3 in)

Depth: 24.0 cm (9.5 in)

Weight: 3.5 kg (7.7 lb)

**Power***(according to ordering)*

AC: 100 to 240 VAC, 50/60 Hz

DC: -36 to -72 VDC

**Power Consumption**

24FXS: AC: 56.0 VA

DC: 61.0W

30FXS: AC: 63.0 VA

DC: 69.0W

**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

Table 1. Vmux/Gmux Family Comparison

Feature	Vmux-110 (Ver. 4.2)	Vmux-210 (Ver. 1.2)	Vmux-2100 (Ver. 4.1)	Vmux-2120 (Ver. 1.1)	Gmux-2000 (Ver. 3.6)
					
Maximum compression ratio	16:1	16:1	16:1	16:1	16:1
Maximum number of compressed voice channels	30	30	496/384	496/384	3,472
Voice Interface	E1/T1/FXS/FXO/E&M	FXS	E1/T1	E1/T1	E1/T1/STM-1/OC-3
Network Interface	E1/T1, Serial, Fast Ethernet	E1/T1, Serial, Fast Ethernet	E1/T1, Fast Ethernet	E1/T1, Fast Ethernet	E1/T1/STM-1/OC-3, GbE, GbE/2
Signaling	Any	CAS only	Any	Any	Any
Fax/Modem/DTMF Relay	✓	✓	✓	✓	✓
Management	ASCII terminal, Telnet, RADview-SC/Vmux	ASCII terminal, Telnet, RADview-SC/Vmux	ASCII terminal, Telnet, RADview-SC/Vmux	ASCII terminal, Telnet, RADview-SC/Vmux	ASCII terminal, Telnet, Web, RADview-SC/Vmux

## Vmux-210

## Analog Voice Trunking Gateway

## Ordering

## STANDARD CONFIGURATION

Vmux-210/AC/T1/24FXS/NULL/Telco50open

## SPECIAL CONFIGURATIONS

Vmux-210/\*/&amp;/\$/%/#

Analog Voice Trunking Gateway

## Legend:

\* Power supply:

AC single 100 to 240 VAC

DC single -36 to -72 VDC

&amp; Uplink:

E1 E1 uplink

T1 T1 uplink

\$ Number of FXS channels supported by analog voice port:

24FXS up to 24 (for T1 uplink only)

30FXS up to 30 (for E1 uplink only)

% Adapter cable for the serial link:

V35DCE V.35, DCE

V35DTE V.35, DTE

X21DCE X.21, DCE

X21DTE X.21, DTE

530DTE RS-530, DTE

NULL without adapter cable

*Note: An adapter cable is not required for connecting to RS-530 equipment when Vmux-210 operates in DCE clock mode.*

# Telco adapter cable for voice channels:

Telco50open 50-pin Telco connector to open-ended

Telco64open 64-pin Telco connector to open-ended

Telco50-24RJ12 50-pin Telco connector to 24 RJ-12 connectors

Telco64-30RJ12 64-pin Telco connector to 30 RJ-12 connectors

## SUPPLIED ACCESSORIES

AC power cord (when AC power supply is ordered)

DC adapter plug (when DC power supply is ordered)

## RM-34

Hardware kit for mounting one Vmux-210 unit into a 19-inch rack

## OPTIONAL ACCESSORIES

## CBL-RJ45/2BNC/E1

Interface adapter cable for converting the balanced E1 port R-45 connector into a pair of BNC connectors for unbalanced coax interface

## Additional Voice Channel Telco Cables

Telco adapter cables for voice channels:

## CBL-Telco50open

50-pin Telco connector to open-ended

## CBL-Telco64open

64-pin Telco connector to open-ended

## CBL-Telco50-24RJ12

50-pin Telco connector to 24 RJ-12 connectors

## CBL-Telco64-30RJ12

64-pin Telco connector to 30 RJ-12 connectors

## RM-34-23

Hardware kit for mounting one Vmux-210 unit in a 23-inch rack

## RM-34-ETSI

Hardware kit for mounting one Vmux-210 unit in an ETSI rack

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