

# 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

- 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 larger modular Vmux-2100 system. 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 12, 15, 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<sup>®</sup> 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 or serial) to the network.

**TDMoIP**  
Driven<sup>®</sup>

**RAD**

data communications

Innovative Access Solutions

# Vmux-210

## Analog Voice Trunking Gateway

An integrated router supports IP routing, Firewall, NAT, DHCP Server/Relay and static routing. The IP routing can be performed between the LAN network, LAN user, and E1/T1/serial ports.

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<sup>®</sup> 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.

### 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<sup>®</sup> 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 is provided for 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.

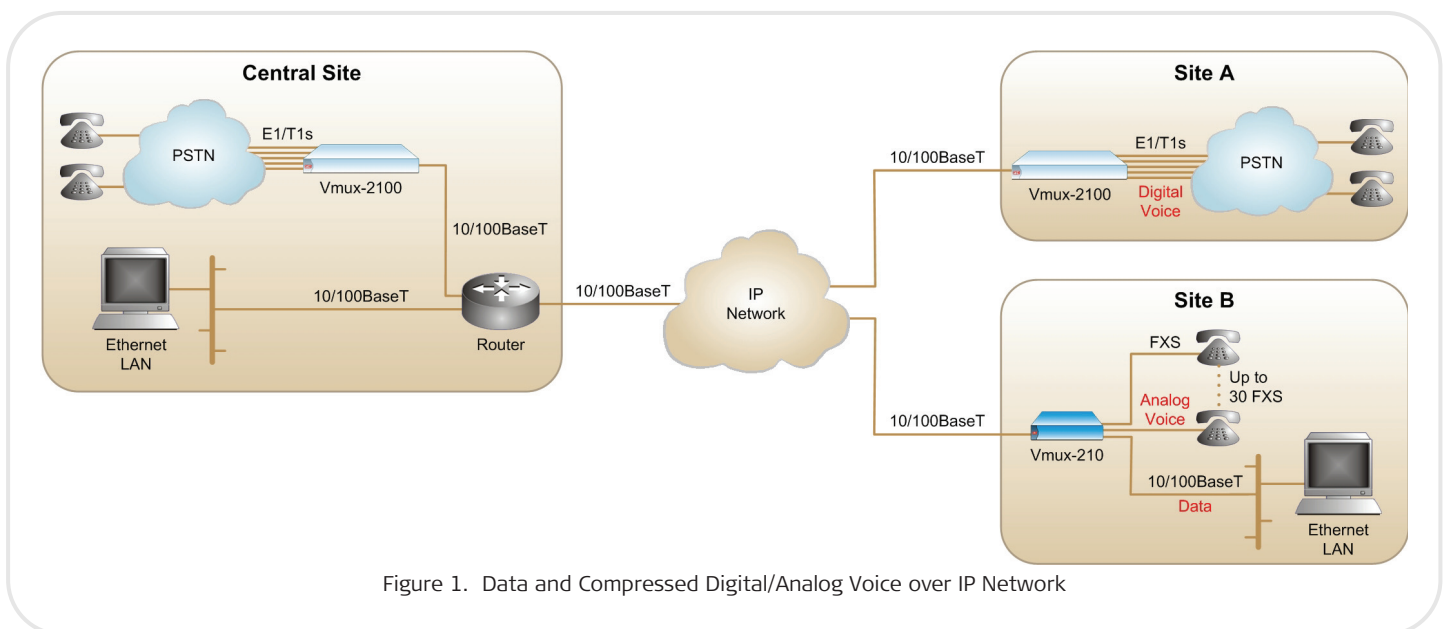


Figure 1. Data and Compressed Digital/Analog Voice over IP Network

## Specifications

Vmux-210 provides two 10/100BaseT Ethernet ports (one network and one user), one E1/T1 port and one n x 64 kbps serial link.

### NETWORK INTERFACE – ETHERNET

#### 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).*

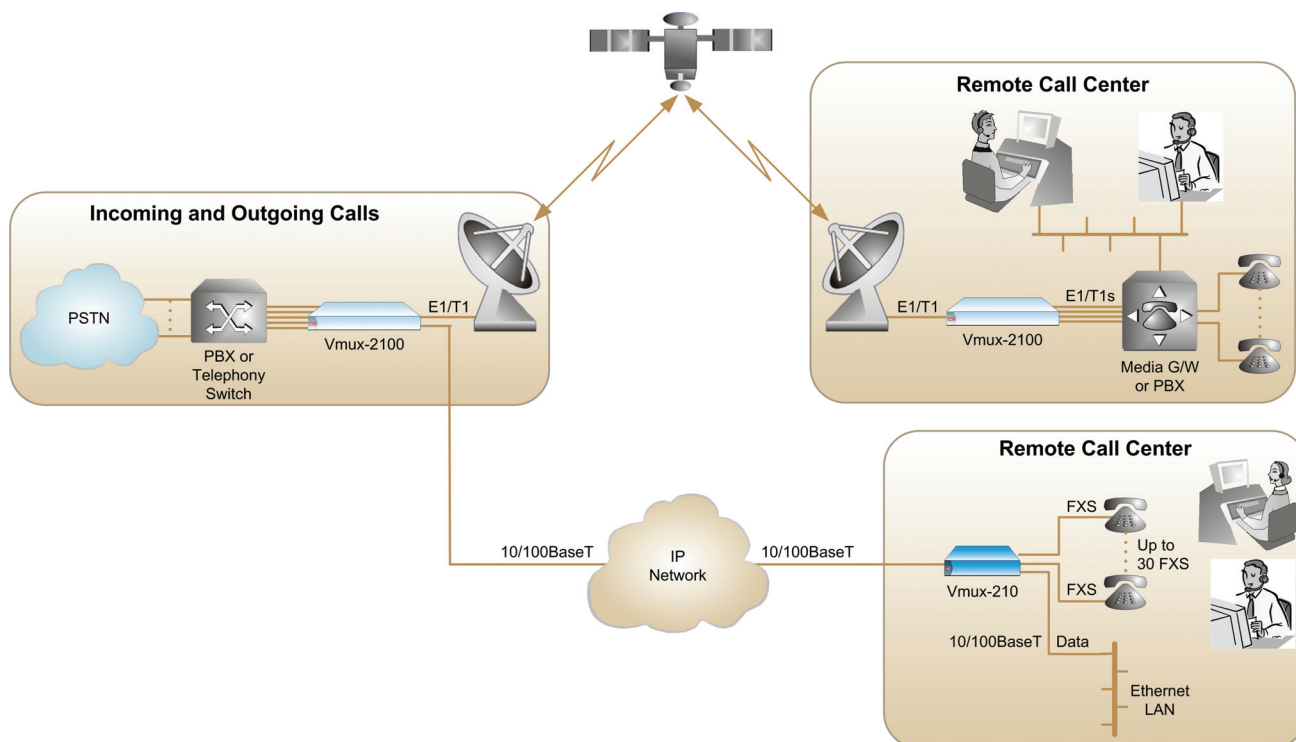


Figure 2. Data and Compressed Digital/Analog Voice for Call Center Application

**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&amp;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***Note: The specifications are identical to those of  
the Network Ethernet port.***VOICE PORTS***Note: Vmux-210 is available with a choice of 12,  
15, 24, or 30 FXS analog voice ports.***Number of Ports**

According to ordering: 12, 15, 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 msec 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**Analog Parameters**ITU-T standards: G.712, 2-wire for voice  
and signaling  
Nominal level: 0 dBm  
Nominal impedance: 600 $\Omega$   
Return loss (300 to 3400 Hz): better than  
20 dB

Frequency response (Ref: 1020 Hz):

- 300 to 3000 Hz:  $\pm 0.5$  dB
- 250 to 3400 Hz:  $\pm 1.1$  dB

Level adjustment, soft selectable:

- TX: +5 dBm to -4 dBm
- RX: +5 dBm to -10 dBm
- Steps: 1 dB ( $\pm 0.1$  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 dBnc)

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  $\pm 10\%$ 

Ringer:

- Voltage: 50 VRMS ( $\pm 10\%$ ),  
overload protected
- Frequency: 25 Hz ( $\pm 10\%$ )
- Cadence: 1 sec ON/3 sec OFF (default),  
user-configurable

**Connectors**12/15/24-port versions: Telco-50  
proprietary connector30-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

# Vmux-210

## Analog Voice Trunking Gateway

### 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): Blinks 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

12FXS: AC: 40.0 VA

DC: 44.0W

15FXS: AC: 41.6 VA

DC: 45.6W

24FXS: AC: 56.0 VA

DC: 61.0W

30FXS: AC: 63.0 VA

DC: 69.0W

### Environment

Temperature:

Operating: 0 to 50°C (32 to 122°F)

Storage: -20 to 70°C (-4 to 158°F)

Humidity: Up to 90%, non-condensing

Table 1. Vmux/Gmux Family Comparison

Feature	Vmux-2100	Vmux-110	Vmux-210	Gmux-2000
Maximum compression ratio	16:1	16:1	16:1	16:1
Maximum number of compressed voice channels	496	30	30	3,472
Voice Interface	E1/T1	E1/T1/FXS/FXO/E&M	FXS	E1/STM-1
Network Interface	E1/T1, Serial, Fast Ethernet	E1/T1, Serial, Fast Ethernet	E1/T1, Serial, Fast Ethernet	E1, STM-1, GBE
Modularity	✓			✓
Signaling	Any	Any	CAS only	Any
Fax/Modem/DTMF Relay	✓	✓	✓	✓
Management	ASCII terminal, Telnet, Web*, RADview-SC/Vmux	ASCII terminal, Telnet, Web, RADview-SC/Vmux	ASCII terminal, Telnet, Web, RADview-SC/Vmux	ASCII terminal, Telnet, Web, RADview-SC/Vmux*

\* - Unavailable yet

## Vmux-210

## Analog Voice Trunking Gateway

## Ordering

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

Analog Voice Trunking Gateway

**Legend:**

- \* Power supply type:
    - AC** single 100 to 240 VAC
    - DC** single -36 to -72 VDC
  - & Uplink type:
    - E1** E1 uplink
    - T1** T1 uplink
  - \$ Number of FXS channels supported by analog voice port:
    - 12FXS** up to 12
    - 15FXS** up to 15
    - 24FXS** up to 24
    - 30FXS** up to 30
  - % 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
- 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 (with AC power supply only)

DC adapter plug (with DC power supply only)

**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

**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

**International Headquarters**

24 Raoul Wallenberg Street  
 Tel Aviv 69719, Israel  
 Tel. 972-3-6458181  
 Fax 972-3-6498250, 6474436  
 E-mail market@rad.com

**North America Headquarters**

900 Corporate Drive  
 Mahwah, NJ 07430, USA  
 Tel. 201-5291100  
 Toll free 1-800-4447234  
 Fax 201-5295777  
 E-mail market@radusa.com

**www.rad.com****data communications**

Innovative Access Solutions