

Gmux-2000

Hub-Site Pseudowire and Voice Trunking Gateway



Scalable, carrier-class,
multiservice
pseudowire gateway
converging TDM
services over PSNs

TDM Driven[®]

- High capacity modular pseudowire gateway, transporting TDM traffic over packet-switched networks in a 6U, 19" enclosure
- Built on pseudowire technology, implementing the IETF, MFA Forum and ITU-T standards for Pseudowire Emulation Edge-to-Edge (PWE3)
- Transport of up to seven fully populated STM-1 or OC-3 streams via dual-port modules, of up to seven channelized T3 links, or of up to 196 E1 or T1 streams received via seven 28-port external E1/T1 interface modules
- Central solution for Vmux voice trunking gateways, compressing up to 112 E1/T1 streams over E1, T1, STM-1, OC-3 or Gigabit Ethernet
- Full redundancy of the GbE/2 and STM-1/OC-3 links and modules, clocks, control and power supply modules; N+1 redundancy for voice compression and E1/T1 PW modules

RAD

data communications
The Access Company

Gmux-2000

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Gmux-2000 is a modular pseudowire gateway that extends the TDM traffic (originating from legacy circuit-switched networks) over packet-switched networks (PSNs). This is achieved by converting TDM data streams coming from the TDM ports into packets transported over the PSN. Gmux-2000 features the following ports:

- TDM ports: Up to seven protected channelized STM-1/OC-3 interfaces, or up to seven channelized T3s, or up to 196 external E1/T1s
- PSN port: GbE interface via SFPs.

MARKET SEGMENTS AND APPLICATIONS

Gmux-2000 provides carriers with a migration path to packet switched networks, while enabling them to continue delivering revenue-generating legacy services. It is also an ideal solution for alternative carriers wishing to add leased line services to their Layer-2 portfolio, as well as for enterprises and organizations seeking ways to lower their IT expenses on PSTN connectivity and branch-to-branch communications. Other applications include cellular backhaul over packet transport.

INTEROPERABILITY

Gmux-2000 is designed as a central solution for RAD's pseudowire products, operating with all members of the IPmux product line, Vmux and Megaplex ML-IP.

TDM PSEUDOWIRE

TDM pseudowire modules encapsulate TDM traffic flows for transmission over a packet network via the GbE network module. Several versions of the pseudowire module are available:

- E1/T1 modules with 28 external E1 or T1 interfaces for applications where individual E1/T1 ports are needed to interface with TDM devices
- E1/T1 circuit emulation server modules used together with the STM-1/OC-3 modules. Each E1/T1 PW server module is used to extract 21 E1 or 28 T1 internal channels coming from the channelized STM-1/OC-3 module and convert them to TDM pseudowire traffic flows.
- T3 PW module including a channelized T3 external interface, which carries 28 T1 data streams. A fully equipped Gmux-2000 supports up to 7 channelized T3 modules (196 internal T1 data streams).
- Channelized STM-1/OC-3 PW modules performing SDH/SONET multiplexing/demultiplexing of channelized STM-1/OC-3 trunks into separate, internal E1/T1 circuits. Up to 63 E1 or 84 T1 internal channels are mapped into VC-12 or VT-1.5 streams to or from the channelized STM-1/OC-3 interface.

Pseudowire traffic can be backed up at the pseudowire connection level, by setting a different path for the primary and secondary PW bundles. Both bundles can be routed to the same or different destinations and operate in the 1+1 mode.

ETHERNET

The Gigabit Ethernet module serves for packet network connection. The module is equipped with a pair of redundant, replaceable SFP-based FO or electrical interfaces or with a pair of UTP interfaces.

The GbE interface operation complies with IEEE 802.3, 802.1Q and 802.1p requirements.

Forwarding

Operating as a level-3/4 switch, the GbE/2 module routes the packets coming from the PSN to the I/O and system modules. The routing is performed at wire speed, minimizing delays on the packet bus.

OAM

The gateway uses the end-to-end Ethernet layer OAM protocol for proactive connectivity monitoring, fault verification, and fault isolation, according to the IEEE 802.1ag and ITU-T Y.1731 requirements.

VOICE COMPRESSION

VCA-E1/T1 modules are universal voice compression modules with E1/T1 voice ports used for voice trunking. Each VCA-E1/12/16 or VCA-T1/12/16 module transmits up to 12 or 16 E1/T1 data streams over two E1/T1 links or aggregates them into an STM-1/OC-3 trunk or a GbE link.

When used without STM-1/OC-3 modules, Gmux-2000 accommodates seven VCA modules. Chassis with one or two STM-1/OC-3 modules accommodate six or five VCA-E1-T1/12 or VCA-E1-T1/16 modules, respectively. The modules employ TDMoIP multiplexing and G.723.1 and G.729 Annex A voice compression algorithms.

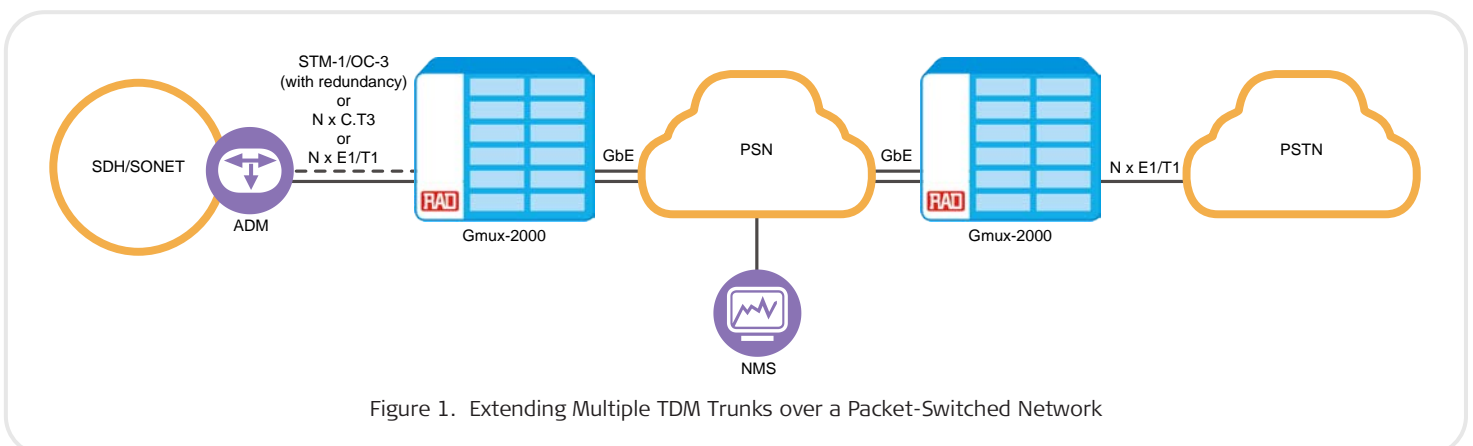


Figure 1. Extending Multiple TDM Trunks over a Packet-Switched Network

RESILIENCY

Gmux-2000's modular architecture provides redundancy at different levels without a single point of failure.

Service module redundancy is available for:

- Hot standby control modules to ensure continuity of the system control and timing functions
- Power supply modules with 2+1 redundancy
- Intelligent fan unit with eight independently controlled fans.

PSN and I/O module redundancy is supported by:

- PSN modules with 802.3ad-based link aggregation, dual homing and module redundancy modes
- Voice compression and pseudowire server modules with 1:N redundancy, by adding a standby module to a group of N modules that carry the traffic
- STM-1/OC-3 modules with module redundancy or 1+1 line redundancy for 50 ms restoration of service in case of line faults.

TIMING AND SYNCHRONIZATION

Gmux-2000 features flexible clock management using external and internal timing signals coming from:

- External station clock source
- SDH/SONET clock (8 kHz)

- 2.048/1.544 MHz clock, recovered from an external E1/T1 port, an internal E1/T1 port, or a generated PW flow.

Each clock signal type is received on two different lines, one designated as main source and the other as fallback.

Two station clock ports are located on each control module.

MANAGEMENT AND SECURITY

The chassis can be managed using different ports and applications:

- Local, out-of-band management via a terminal connected to the RS-232 port, using CLI
- Remote, out-of-band management via the dedicated 10/100BaseT port
- Remote, inband management via the GbE/2 interface. Remote management is performed using Telnet or RADview-SC/TDMoIP, RAD's SNMP-based NMS.

The following security protocols are provided by Gmux-2000 to ensure client-server communication privacy and correct user authentication:

- RADIUS (client authentication only)
- SSH for Secure Shell Telnet session
- SNMPv3.

Specifications

INTERFACES

STM-1/OC-3, channelized T3, E1/T1, GbE

Note: See separate data sheets for module details and ordering information.

MANAGEMENT

Management Options

Supervision terminal
Telnet/SSH
RADview-SC/TDMoIP, RADview-EMS (basic shelf view), or other SNMP-based NMS

Ethernet Management Port

10/100BaseT

Control Port

Type: RS-232 (V.24) asynchronous DCE
Data rate: 0.3–115.2 kbps
Connector: 9-pin, D-type, female

DIAGNOSTICS

Alarm Relay

Major and minor alarm indication by floating change over dry contacts
Maximum 60 VDC/30 VAC across open contacts
Maximum 1 ADC through closed contacts
Maximum load switching capacity: 60W
One active-low input, RS-232 levels

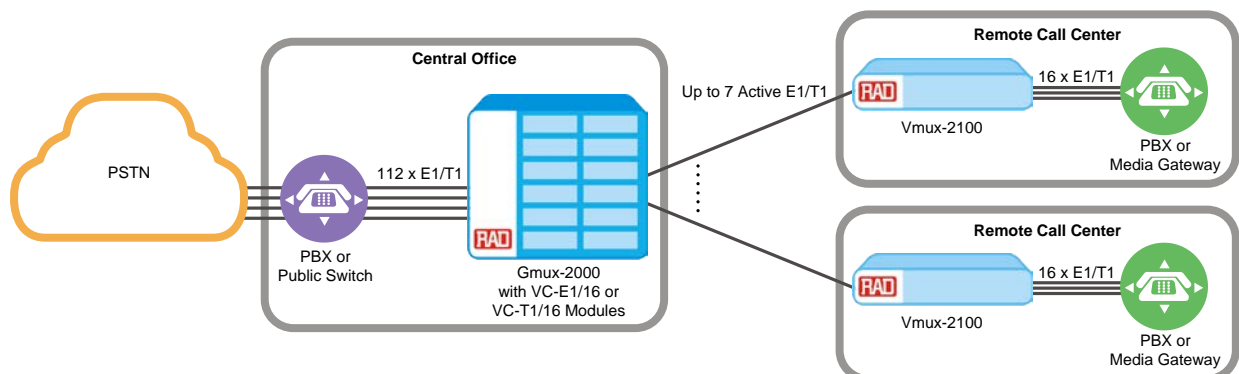


Figure 2. Aggregating Pseudowire Links for Transmission over SDH/SONET Network

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GENERAL

Power

AC: 100 to 240 VAC, 50/60 Hz, via 3 inlets
DC: -48 VDC, via 2 inlets

Power consumption (per power supply):

200W max

300W max for HP AC PS modules

Number PS modules: 3

Physical

Height: 265 mm (10.4 in)

Width: 440 mm (17.3 in)

Depth: 210 mm (8.2 in)

Weight: 12 kg (26.4 lb), max

Environment

Operating temperature: 0-55°C (0-131°F)

Storage temperature: -20 to +70°C
(0 to 150°F)

Humidity: Up to 90%, non-condensing

Ordering

RECOMMENDED CONFIGURATIONS

GMUX-2000%/RM

Gmux-2000 chassis with 1 power inlet module, 2 or 3 power supplies, 1 fan unit

Legend

% Power supply/power inlet:

AC	AC power inlet and 2 AC power supply modules
48	DC power inlet and 2 DC power supply modules
ACR	AC power inlet and 3 AC power supply modules
48R	DC power inlet and 3 DC power supply modules
ACHP	AC power inlet and 2 high-power AC power supply modules
ACHPR	AC power inlet and 3 high-power AC power supply modules

RM Rack:

A	ANSI rack (19 inch)
E	ETSI rack (23 inch)

GMUX-M/@/#

Gmux-2000 service module

Legend

@	Service module:
PI	Power inlet module
PS	Power supply module
CL2	Control and timing module
CL-VMX	Control module for voice compression applications
FANS	Fan module

Note: GMUX-M-GBE-N module is required for managing Gmux-2000 inband over a TDM link.

Power inlet and power supply module:

AC	AC power inlet module and AC power supply module
48	DC power inlet module and DC power supply module

SUPPLIED ACCESSORIES

RM-2000

Hardware kit for mounting one Gmux-2000 chassis into a 19-inch rack (supplied with GMUX-2000%/A option)

RM-2000E

Hardware kit for mounting one Gmux-2000 chassis into an ETSI rack (supplied with GMUX-2000%/E option)

OPTIONAL ACCESSORIES

GMUX-P PANEL-28-PW/^

Patch panel for Gmux-M-E1/T1-PW-28 modules (including cables)

Legend

Interface:

^	BAL	Balanced RJ-45 patch panel
	UNBAL	Unbalanced BNC patch panel

Table 1. I/O Modules

Module	Description
GbE/2	PSN module with two 1000BaseFx or 10/100/1000BaseT ports
E1-PW/28, T1-PW/28	Pseudowire emulation module with 28 E1 or T1 external interfaces
E1-PW-SRV/21, T1-PW-SRV/28	Pseudowire emulation server module with 21 E1 or 28 T1 interfaces. The modules operate in conjunction with STM1 and OC3 modules, respectively.
STM1, OC3	Dual-port STM-1 or OC-3 modules for direct connection to SDH or SONET cores. The modules operate in conjunction with E1-PW-SRV/21 and T1-PW-SRV/28 modules, respectively.
C.STM1, C.OC3	Dual-port channelized STM-1 or OC-3 modules for direct connection to SDH or SONET cores with TDM service emulation over PSN
CT3-PW/1	Pseudowire emulation module with channelized T3 interface
VCA-E1/12/16, VCA-T1/12/16	Universal voice compression modules with 12 or 16 E1/T1 voice ports for voice trunking

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