

Egate-100

Channelized Ethernet Gateway



Extending Ethernet services over TDM access networks

EtherAccess

- Central site Ethernet over TDM, aggregates Gigabit Ethernet traffic over channelized STM-1/OC-3 or three channelized T3 ports
- Connects up to 63/84 remote LANs over E1/T1 or bonded n x E1/T1 lines, or up to 126 remote LANs over fractional E1 or T1 lines
- Gigabit port protection (Link Aggregation 802.3ad), dual STM-1/OC-3 ports enabling 1+1 protection and dual power supply ensuring higher service uptime
- Provides QoS by utilizing four priority queues per VLAN Priority (802.1p), DSCP, or IP precedence
- Transports Ethernet services transparently in point-to-point and point-to-multipoint topologies by utilizing VLAN tagging, stacking, and switching

Egate-100 is a channelized Ethernet gateway for interconnecting packet networks via PDH access and complies with RAD's unique set of EtherAccess™ features. The EtherAccess™ feature set provides services and carrier backhaul applications over low and high-speed SDH/SONET and PDH circuits, from fractional and full E1/T1 or E3/T3 over STM-1/OC-3c or STM-4/OC-12 to Gigabit Ethernet.

Ethernet traffic is aggregated and switched to a single STM-1/OC-3 port, or three channelized T3 ports.

Traffic arrives over E1/T1 lines at the STM-1/OC-3c or T3 ports, and is transferred to the packet-switched network via the unit's Gigabit Ethernet ports.



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Egate-100 features the following aggregation capabilities (depending on the configuration):

- Up to 60 remote LANs over bonded $n \times E1$ or $n \times T1$ lines
- Up to 63 or 84 remote LANs over E1 or T1 circuits
- Up to 126 remote LANs over fractional E1 or T1 circuits.

The feature set replaces current high-priced solutions, such as channelized STM-1/OC-3 routers or multibox solutions based on converter racks and switches. Together with service scalability, small footprint, and low power consumption, equipment costs are significantly reduced and network operation is simplified.

Typically deployed at a central location (see figure below), Egate-100 aggregates user Ethernet traffic received from remote devices (such as RAD's RICi, FCD, ASMi or third-party devices), thus completing a full access solution from the service provider central site to the customer premises.

Typical applications include:

- IP DSLAM and IP base station traffic backhauling
- WiMAX BTS traffic backhauling
- Ethernet private line/LAN services
- Backhauling of network management traffic
- Aggregation of Ethernet traffic over PDH wireless links.

BRIDGE

Egate-100 acts as a bridge in an SDH/SONET environment, enabling service providers to achieve a seamless interconnection between customers using the TDM network and customers using the packet network, maintaining the same service level attributes.

VLAN tagging and double tagging (Q-in-Q) allows adding a provider's VLAN to enable transparent LAN services in parallel to user VLAN settings.

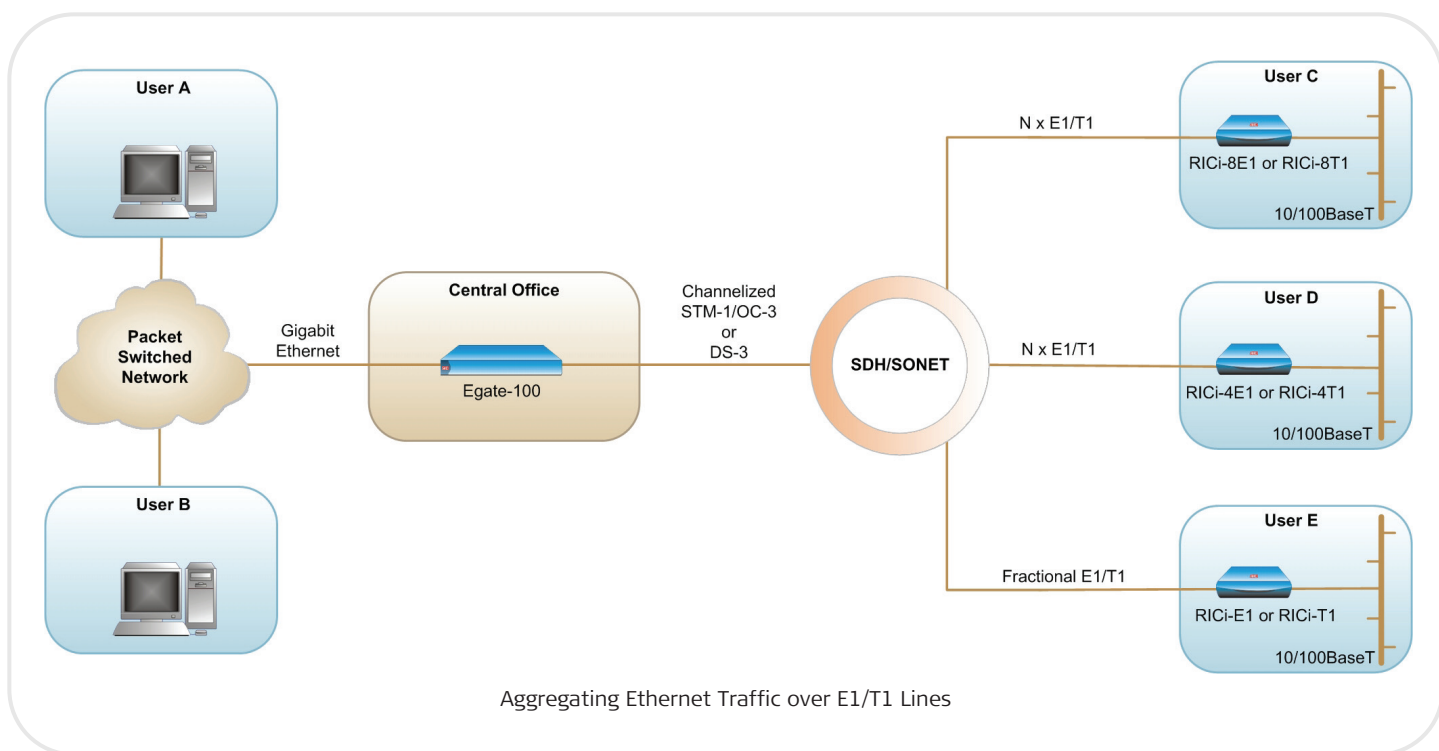
In order to facilitate IP DSLAM backhauling, the split horizon mechanism is supported, thus preventing network congestion and Ethernet loops by

preventing traffic from being switched between local bridge ports.

S-TAG per 802.1ad for VLAN tagged frames, as well as proprietary Ethertype values, are supported.

In VLAN-aware mode (IVL), frames are forwarded according to VLAN tags and MAC address. This allows defining different user traffic domains in order to create point-to-point (E-Line) or point-to-multipoint (E-LAN) topologies. A VLAN tunnel can be created for separating management and user traffic.

In a typical service provisioning structure, Egate-100 links between users connected to a packet-switched network and users connected to a TDM network. Virtual channels are established between the far-end users by tagging separate user traffic channels with VLANs. These virtual channels enable transparent forwarding of all user traffic. In addition, all devices are managed over a separate dedicated VLAN, which enables secure separation between user traffic and management traffic.



QUALITY OF SERVICE (QOS)

Egate-100 facilitates differentiated services on the same link according to Ethernet or IP marking. Classification is based on VLAN Priority (802.1p), IP precedence, or DSCP, while the traffic is forwarded by four strict priority queues. Different service rates can be provided with TDM-based fractional E1/T1, $n \times$ E1/T1 granularity.

PROTOCOLS

GFP (G.8040, G.7041/Y1303) with or without VCAT overhead, RAD proprietary HDLC compatible with RAD products, or PPP for encapsulating Ethernet traffic over E1/T1 circuits and MLPPP (multi-link PPP) for bonded $n \times$ E1/T1 services are utilized.

- Up to 60 MLPPP groups for E1 lines or T1 lines
- Up to eight E1 or T1 lines per bundle
- Up to 16 ms delay compensation for traffic arriving from different circuits
- Max Transmit Unit is configurable in the range of 64 to 1024 bytes, enabling user control of delay and throughput parameters
- LCP (including MLPPP extension for LCP) and BCP control protocols per RFC 1661, RFC 1990, and RFC 3518.

DIAGNOSTICS AND STATISTICS

Comprehensive diagnostic and performance monitoring capabilities include:

- Ping test for checking IP connectivity
- BER testing over E1 or T1 lines
- Statistics and alarms for the physical Ethernet interfaces and the bridge ports, as well as statistics for the logical layer.

LOOP DETECTION

E1/T1 loops are immediately detected when they occur and the bridge port is closed to avoid Ethernet loops. Once the E1/T1 loops are released, normal operation resumes.

MANAGEMENT

The following ports and applications can be used:

- Local out-of-band management via an ASCII terminal connected to the RS-232 port
- Remote inband management via the Gigabit Ethernet port, performed using Telnet, Web browser or RADview-Lite, RAD's SNMP-based EMS
- Remote out-of band management via one of the GbE ports, separating the user and management traffic physically and logically (VLAN).

Software upgrades and configuration files can be remotely downloaded/uploaded via TFTP.

A dedicated VLAN tunnel is used to secure the management traffic and to separate it from user traffic.

The access to the unit's management software is password-protected, and the unit can be managed by and report to up to 16 different managers simultaneously. This enables viewing the network status and managing the unit from different locations.

LINK REDUNDANCY

Egate-100 aggregates many remote sites. In order to increase the reliability of service, the system features GbE port redundancy, based on the standard link aggregation protocol 802.3ad. The second Gigabit Ethernet link may be assigned as a backup port to take over in case the first one fails, ensuring continued operation. In addition, the dual STM-1/OC3 ports enable 1+1 (MSP/APS) protection, ensuring connectivity in the SDH/SONET interface as well.

SECURITY

The following protocols are available:

- Access control for SNMP, Telnet, and Web based management interfaces enables granting access only to users that appear in the manager list.

- SSL/SSH for Telnet and secure Web access
- RADIUS protocol for password management and authentication.

Specifications

STM-1/OC-3 INTERFACE

Number of Ports

2 (1+1)

Compliance

G.957 S1.1, G.957 L1.1, ANSI T1.646-1995, G. 825 (jitter), G.841 (APS)

Data Rate

155 Mbps

Mapping

E1 over VC12 over STM-1,
T1 over VT1.5 over STS-1 over OC-3

Operation Mode

SDH/SONET

Fiber Optic Interface Types

SFP-based

Note: For detailed information on SFP interface modules, refer to the SFP Transceivers datasheet.

APS

MSP 1+1 optimized (ITU-T G.841 Annex B compliant)

MSP 1+1 unidirectional (ITU-T G.841 compliant)

T3 INTERFACE

Number of Ports

3

Compliance

T1.107, GR-499-CORE

Data Rate

44.736 Mbps

Mapping

28 T1s mapped into T3 (via M13 mux)

Framing

M23 or C-Bit parity

Line Interface

75Ω coax up to 100m (328 ft)

GIGABIT ETHERNET INTERFACE**Number of Ports**

2

Interface Type

1000BaseSx, 1000BaseLx or 1000BaseT

Compliance

Relevant sections of IEEE 802.3

Data Rate

1000BaseT: 10/100/1000 Mbps

1000BaseLx/1000BaseSx: 1000 Mbps

Max Frame Size

1600 bytes

Gigabit Ethernet Redundancy

Link aggregation according to IEEE 802.3ad

Connectors

LC (SFP-based) for optical

RJ-45 for electrical (1000BaseT)

Electrical Cable Type

Cat. 5

ENCAPSULATION PROTOCOLS

GFP (ITU-T G.8040, G.7041/Y.1303)

RAD proprietary HDLC compatible with RAD products

PPP/BCP (RFC 1661, RFC 3518)

MLPPP (BCP) according to: RFC 1661, RFC 1990, RFC 3518

INTERNAL BRIDGE**Number of Ports**

Up to 128

Number of VLANS

Up to 1024

Split Horizon

Prevents local switching between remote units, overriding bridge forwarding rules

Compliance

Relevant sections of 802.1Q

LAN Table

Up to 64,000 MAC addresses (learned, with automatic aging check)

Buffer

3150 frames

Filtering and Forwarding

Up to 253,000 pps

Quality of Service (QoS)

Classification according to VLAN priority (802.1p), DSCP and IP precedence with four strict priority queues for congestion management.

GENERAL**Management**

Out-of-band via dedicated terminal port:

Interface: V.24/RS-232
(DCE asynchronous)Data rate: 9.6, 19.2, 38.4, 57.6,
115.2 kbps

Connector: 9-pin, D-type, female (DB-9).

Inband via Gigabit Ethernet network port.

Syslog

System logs forwarded to the network according to pre-defined criteria

Indicators

Power:

Green: Power supply performing properly

Red: Power supply error or not connected to power

ALM (red):

On: Interface (GbE, SDH/SONET/T3) or system error

Off: No error

ACT (yellow):

Blinking: Ethernet frame received or sent within the last second

Off: No frame received or sent within the last second

STM-1/OC-3 Option

SYNC (green):

On: STM-1 port is synchronized

Off: LOS, LOF

T3 Option

SYNC (green):

On: T3 port is synchronized

Off: LOS

PowerAC: 100 to 240 VAC ($\pm 10\%$), 50–60 Hz

DC: 48 VDC nominal (40.5 to 72 VDC)

Power Consumption

40W max

Physical

Height: 43.7 mm (1.7 in) 1U

Width: 440 mm (17.3 in)

Depth: 240 mm (9.4 in)

Weight: Single power supply: 3.5 kg (7.7 lb)

Dual power supply: 4.0 kg (8.8 lb)

NEBS level 3, types 2 and 4 compliant

*Note: By default, the T3 option is NEBS-3 compliant. For STM-1, NEBS-3 compliance is optional.***Environment**

Temperature: 0°–50°C (32°–122°F)

Humidity: Up to 90%, non-condensing

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Egate and RICi Comparison Table

Feature	Egate-100 (Ver. 2.6)	Egate-20 (Ver. 1.1)	RICi-E1, RICi-T1 (Ver. 2.1)	RICi-E3, RICi-T3 (Ver. 1.1)	RICi-16 (Ver. 2.0)	RICi-4E1, RICi-4T1 RICi-8E1, RICi-8T1 (Ver. 1.3)
Protocol Type	<ul style="list-style-type: none"> GFP (G.8040, G.7041/Y.1303) RAD HDLC PPP/BCP (RFC 1661, RFC 3518) MLPPP (BCP) as per RFC 1661, RFC 1990, RFC 3518 	RAD HDLC	<ul style="list-style-type: none"> RAD HDLC HDLC IS GFP (G.8040, G.7041/Y.1303) 	<ul style="list-style-type: none"> RAD HDLC X.86 (LAPS) 	<ul style="list-style-type: none"> GFP (G.8040, G.7041/Y.1303) VCAT (G.7043) LCAS (G.7042) 	MLPPP
MAC Address Table	64000	2048	512	512	1024	2048
QoS	802.1p DSCP IP precedence	802.1p DSCP IP precedence Per port	802.1p IP precedence	802.1p	802.1p DSCP Per port	802.1p DSCP Per port
QoS Mechanism	Strict	Strict	Strict	Strict	Strict	Strict
Hot-Swappable Power Supplies	Yes	No	No	No	No	No
Host VLAN	Yes	Yes	Yes	Yes	Yes	Yes
VLAN Tagging and Stacking	Yes	Yes	Yes	Yes	Yes	Yes

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Ordering

Egate-100-T3/!/+/+/TR

Channelized Ethernet gateway with three T3 ports

Egate-100/!/#/+/+/TR/S

Channelized Ethernet gateway with SFP slots for STM-1/OC-3 interfaces

Legend

! Power supply type:

- AC** Single AC power supply
- ACR** Dual AC power supply
- 48** Single DC power supply
- 48R** Dual DC power supply

TDM interface type:

- SFP1** STM-1, 1310 nm multimode, 2 km (1.2 miles), LC connector
- SFP2** STM-1, 1310 nm single mode, 15 km (9.3 miles), LC connector
- SFP3** STM-1, 1310 nm single mode, 40 km (24.8 miles), LC connector
- 2XSFP1** Two SFP-1 interfaces (see above for specifications)
- 2XSFP2** Two SFP-2 interfaces (see above for specifications)
- 2XSFP3** Two SFP-3 interfaces (see above for specifications)
- NULL** Two empty SFP slots

+ Ethernet port type:

- SFP5** 850 nm multimode, 0.55 km (0.3 miles), LC connector
- SFP6** 1310 nm single mode, 10 km (6.2 miles), LC connector
- SFP7** 1550 nm single mode, 80 km (49.6 miles), LC connector
- SFP8** 1310 nm single mode, 40 km (24.8 miles), LC connector
- UTP** Built-in 10/100/1000BaseT, RJ-45 connector
- NULL** Empty SFP slot

***Note:** It is strongly recommended to order this device with original RAD SFPs installed. This will ensure that prior to shipping, RAD has performed comprehensive functional quality tests on the entire assembled unit, including the SFP devices. RAD cannot guarantee full compliance to product specifications for units using non-RAD SFPs.*

TR Tributary ports:

T3 option

- 1T3** One T3 port (ports 2 and 3 are disabled)
- 3T3** Three T3 ports

STM-1/OC-3 option

- DIS** Activation of 30 E1 and 42 T1 ports
- FULL** Activation of 63 E1 and 84 T1 ports

S NEBS compliancy

- N3** NEBS level 3, type 2 and 4 compliant

SUPPLIED ACCESSORIES

AC power cord

DC connection kit (if a DC-powered unit is ordered)

RM-34

Hardware kit for mounting one Egate-100 unit in a 19-inch rack.

CBL-DB9F-DB9M-STR

Control port cable

OPTIONAL ACCESSORIES

WM-34

Hardware kit for mounting one Egate-100 unit on a wall

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