

Egate-100

Gigabit Ethernet over TDM Aggregation Gateway



- Central site Ethernet over TDM aggregates Gigabit Ethernet traffic over channelized STM-1/OC-3 or three channelized T3 Ports
- Combining data streams from multiple remote sites of varying link capacities and encapsulation technologies
- Gigabit port protection, STM-1/OC-3 redundancy, and dual power supply ensuring higher service uptime
- Priority and queuing schemes allowing differentiated services on the same link
- Transporting Ethernet services transparently.

Extending Ethernet
services over TDM
access networks

EtherAccess

Egate-100 is a Gigabit Ethernet over TDM aggregation gateway that interconnects packet networks via PDH access. The device features next-generation Ethernet over PDH encapsulation and bonding capabilities, including standard protocol generic framing procedure (GFP, G-8040), virtual concatenation (VCAT G.7043), and link capacity adjustment scheme (LCAS G.7042).

RAD's unique set of EtherAccess™ features provides services and support 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 to Gigabit Ethernet.



RAD

data communications
The Access Company

Egate-100

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Enable traffic management using Ethernet flows

MEF COMPLIANCE

Egate-100 is certified by the Metro Ethernet Forum (MEF) for MEF 9 Ethernet Private Line (EPL) service.

TRAFFIC AGGREGATION

Egate-100 is an Ethernet traffic aggregator and Layer-2 switch. Ethernet traffic over E1/T1 lines over STM-1/OC-3c or T3 links is aggregated and transferred to the packet-switched network via the unit's Gigabit Ethernet ports.

The device provides the following aggregations (depending on the configuration):

- Up to 42 remote LANs over bonded $n \times$ E1/T1 lines for GFP-VCAT and 60 remote LANs for MLPPP
- Up to 63/84 remote LANs over E1/T1 circuits
- Up to 126 remote LANs over fractional E1/T1 circuits.

The unit replaces current high-priced solutions, such as channelized STM-1/OC-3 routers or multi-box solutions based on converter racks and switches.

Due to its service scalability, small footprint and low power consumption, Egate-100 significantly reduces equipment costs and simplifies network operation.

LINK REDUNDANCY

Aggregating traffic from many remote sites, Egate-100 increases the reliability of service and ensures continued operation.

The device supports:

- Gigabit Ethernet port redundancy, based on standard link aggregation protocol 802.3ad
- 1+1 (MSP/APS) protection on the dual STM-1/OC3 ports.

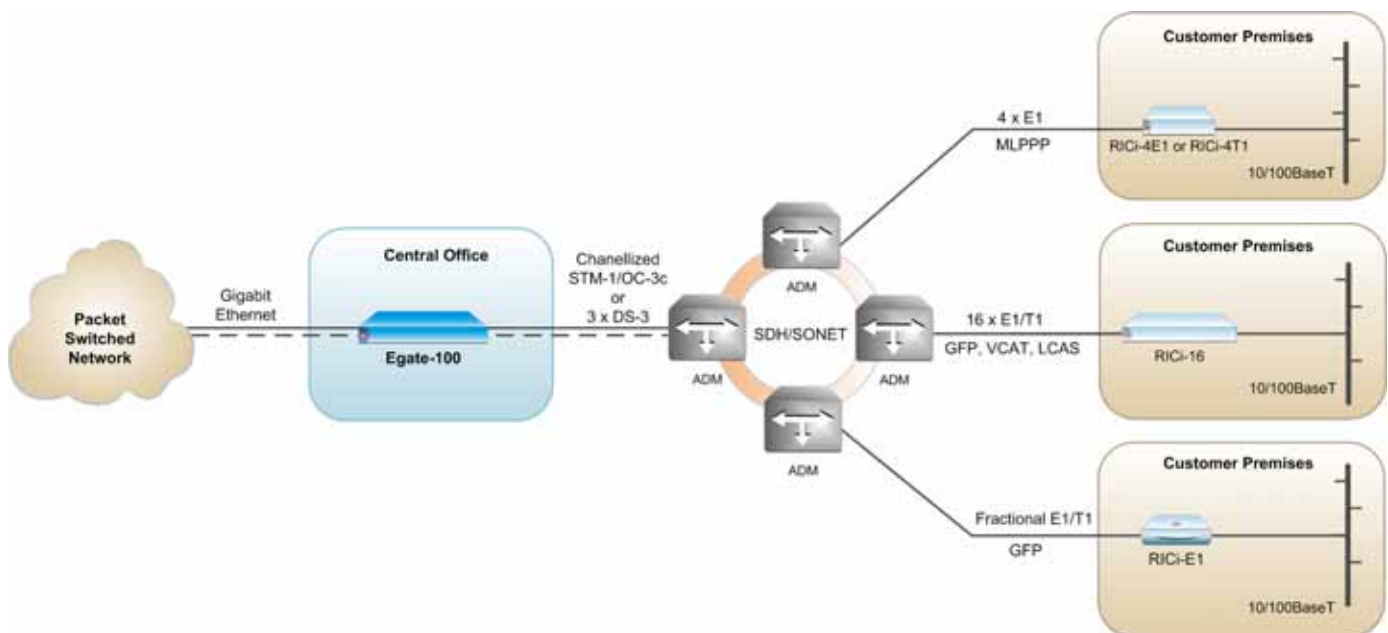


Figure 1. Aggregating Ethernet Traffic over E1/T1 Lines

BRIDGE

Egate-100 acts as a bridge in an SDH/SONET environment, enabling service providers to achieve 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.

The split horizon mechanism prevents 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, with secure separation between user traffic and management traffic.

Achieving seamless interconnection between TDM and packet networks

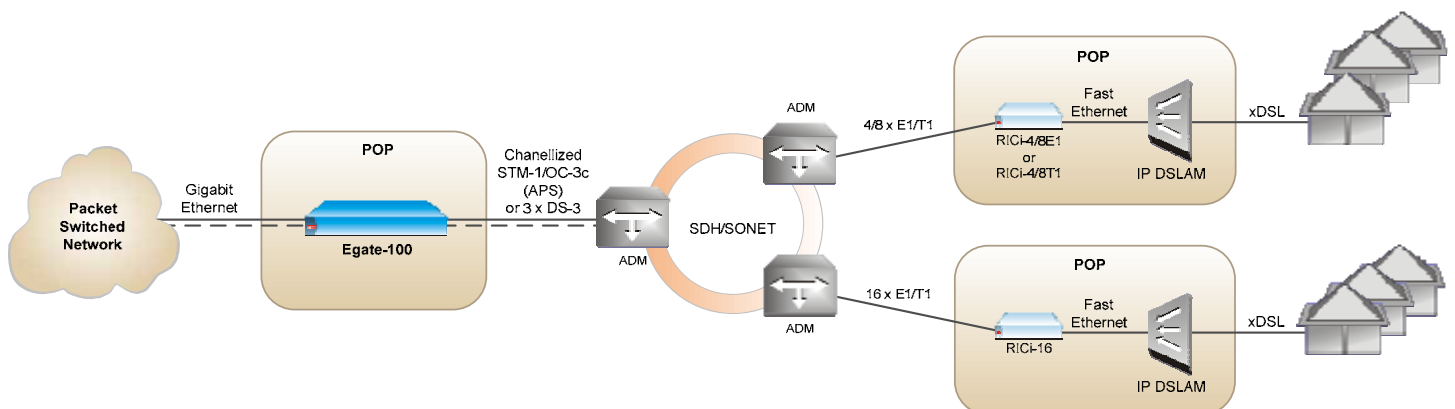


Figure 2. IP DSLAM Backhauling

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Providing traffic flow classification and policing enable differentiated services and enforce SLA

FLOW CLASSIFICATION AND POLICING

Egate-100 provides traffic flow classification and policing for network ingress traffic. This enables operators to differentiate services using classification methods, police the traffic and enforce SLA per service.

Incoming traffic from the Gigabit Ethernet port is classified and mapped to Ethernet flows using a variety of classification methods, such as CE VLAN-ID, VLAN priority, DSCP and IP-precedence.

Policers can be applied per flow and operate according to the dual bucket mechanism (CIR + CBS + EIR + EBS).

QUALITY OF SERVICE

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 to four strict or WFQ priority queues at the logical egress port.

Rate limitation can also be applied per bridge port to shape the outgoing traffic. Different service rates can be provided with TDM-based fractional E1/T1, $n \times E1/T1$ granularity.

TYPICAL APPLICATIONS

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

Other 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.

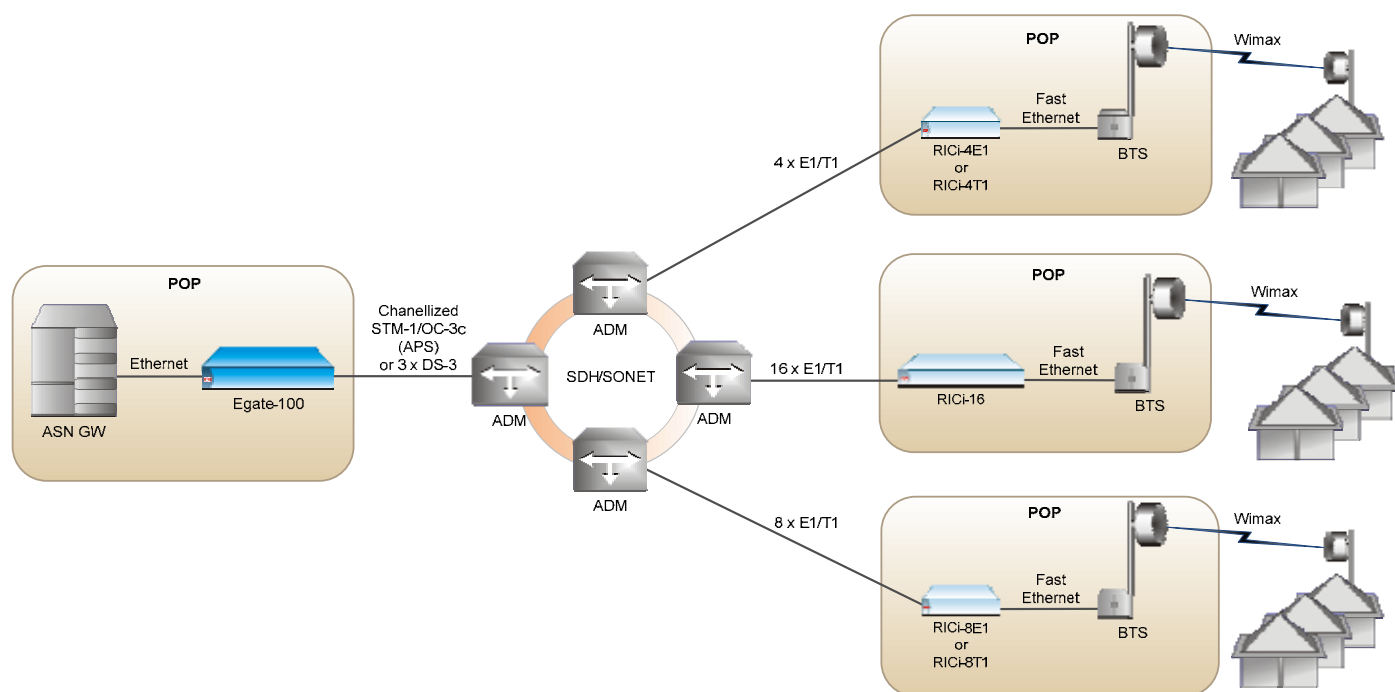


Figure 3. WiMAX BTS Traffic Backhauling

DIAGNOSTICS AND STATISTICS

Comprehensive diagnostic and performance monitoring capabilities include:

- Ping test for checking IP connectivity
- PRBS Test over E1 or T1 lines
- Statistics and alarms for the physical Ethernet interfaces, SDH/SONET ports, bridge ports, and logical layer.

System logs are forwarded to the network according to predefined criteria.

ETHERNET OAM

Egate-100 provides single segment (link) OAM based on 802.3-2005 (formerly 802.3ah), including discovery, continuity check, and remote fault indication. OAM is supported over the PDH logical links.

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 unit can be managed using various ports and applications:

- Local management via an ASCII terminal connected to the RS-232 port
- Out-of-band management via a dedicated Fast Ethernet port
- Remote inband management via one of the Gigabit Ethernet ports using Telnet, Web browser, or RADview, RAD's SNMP-based EMS.

A dedicated VLAN can be used to secure the management traffic and separate it from user traffic.

SIMPLE NETWORK TIME PROTOCOL

Simple Network Time Protocol (SNTP) is used to synchronize to an accurate time from an NTP server at user selectable intervals.

SECURITY

The following security mechanisms are provided:

- Access control for SNMPv3, Telnet, and Web-based management interface for 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 user authentication.

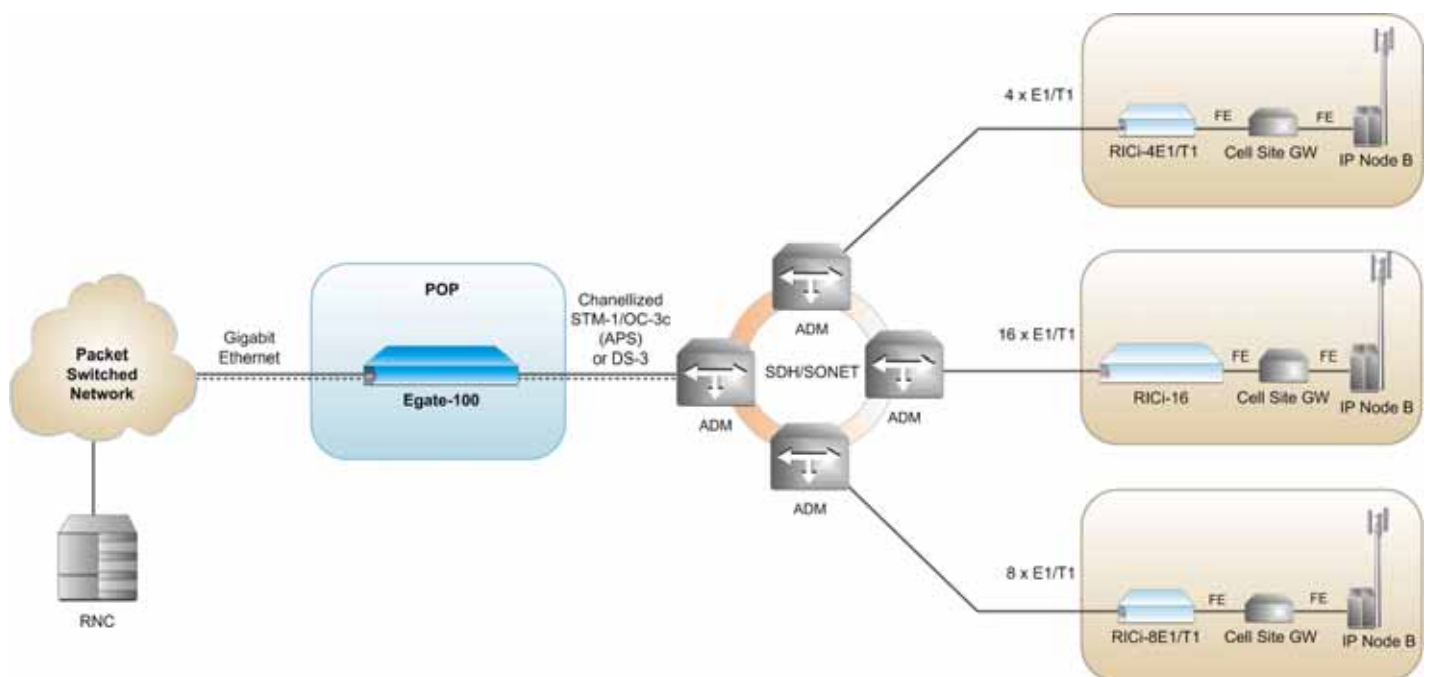


Figure 4. IP Node B Backhauling

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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

APS

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

SFP Transceivers

For full details, see the SFP Transceivers
data sheet at www.rad.com

Connector

SFP slot (for transceivers, see *Ordering*)

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
C-Bit parity

Line Interface

75Ω coax up to 100m (328 ft)

GIGABIT ETHERNET INTERFACE

Number of Ports

2

Interface Type

1000BaseSx, 1000BaseLx, or
10/100/1000BaseT

Compliance

Relevant sections of IEEE 802.3

Data Rate

Optical: 1000 Mbps
Electrical: 10/100/1000 Mbps

Max Frame Size

1600 bytes

Gigabit Ethernet Redundancy

Link aggregation according to
IEEE 802.3ad

SFP Transceivers

For full details, see the SFP Transceivers
data sheet at www.rad.com

Connector

Optical :
SFP slot
(for transceivers, see *Ordering*)
Electrical : RJ-45

Electrical Cable Type

Cat. 5

ENCAPSULATION PROTOCOLS

GFP (ITU-T G.8040, G.7041/Y.1303)
VCAT (ITU-T G.7043)
LCAS (ITU-T G.7042)
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

Operation Mode

VLAN-aware, VLAN-unaware learning
bridge

Number of VLANs

Up to 1024

Compliance

Relevant sections of 802.1Q

LAN Table

Up to 64,000 MAC addresses (learned)

MANAGEMENT PORTS

Out-of-Band Ethernet Management Port

Interface: 10/100BaseT
Connector: RJ-45

Control Port

Interface: V.24/RS-232 DCE
Connector: 9-pin D-type, female (DB-9)
Data rate: 9.6, 19.2, 38.4, 57.6 or
115.2 kbps

GENERAL

Indicators

POWER:

On (green): Power supply performing properly

Off (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

Power

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

DC: 48/60 VDC nominal (40–72 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 SDH/SONET, NEBS 3 compliance is optional.

Environment

Temperature: 0°–50°C (32°–122°F)

Humidity: Up to 90%, non-condensing

Product Comparison Table

Feature	Egate-20 (Ver. 1.1)	Egate-100 (Ver. 4.0)	RICi-E1, RICi-T1 (Ver. 2.1)	RICi-E3, RICi-T3 (Ver. 1.1)	RICi-16 (Ver. 2.5)	RICi-4E1, RICi-4T1 RICi-8E1, RICi-8T1 (Ver. 2.0)
Protocol Type	RAD HDLC	GFP (G.8040) VCAT (G.7043) LCAS (G.7042) RAD HDLC PPP/BCP MLPPP (BCP)	RAD HDLC HDLC IS GFP (G.8040)	RAD HDLC X.86 (LAPS)	GFPoPDH (G.8040) VCAT (G.7043) LCAS (G.7042)	MLPPP (BCP)
MAC Address Table	2048	64000	512	512	2048	2048
QoS	802.1p DSCP IP precedence Per port	802.1p DSCP IP precedence Per port	802.1p IP precedence	802.1p	802.1p DSCP Per port IP Precedence	802.1p DSCP Per port
QoS Mechanism	Strict	Strict WFQ	Strict	Strict	Strict WFQ	Strict
Hot-Swappable Power Supplies	No	Yes	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

STANDARD CONFIGURATIONS

EGATE-100/ACR/NULL/UTP/UTP/DIS
 EGATE-100/ACR/NULL/UTP/UTP/FULL
 EGATE-100/ACR/NULL/NULL/NULL/DIS
 EGATE-100/ACR/NULL/NULL/NULL/FULL
 EGATE-100/48R/NULL/UTP/UTP/FULL
 EGATE-100/48R/NULL/UTP/NULL/FULL
 EGATE-100/48R/NULL/NULL/NULL/FULL

SPECIAL CONFIGURATIONS

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

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

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

Aggregation gateway with three T3 ports

Legend

! Power supply:

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

TDM interface:

SFP1 Single SFP-1 transceiver:
Fast Ethernet/STM-1,
1310 nm, multimode, LED,
2 km (1.2 mi)
SFP2 Single SFP-2 transceiver:
Fast Ethernet/ STM-1,
1310 nm, single mode, laser,
15 km (9.3 mi)
SFP3 Single SFP-3 transceiver:
Fast Ethernet/ STM-1,
1310 nm, single mode, laser,
40 km (24.8 mi)
2XSFP1 Dual SFP-1 transceivers
2XSFP2 Dual SFP-2 transceivers
2XSFP3 Dual SFP-3 transceivers
NULL Two empty SFP slots

+ Ethernet port:

SFP5 Single SFP-5 transceiver:
Gigabit Ethernet, 850 nm,
multimode, VCSEL, 0.55 km
(0.3 mi)
SFP6 Single SFP-6 transceiver:
Gigabit Ethernet, 1310 nm,
single mode, laser, 10.0 km
(6.2 mi)
SFP7 Single SFP-7 transceiver:
Gigabit Ethernet, 1550 nm,
single mode, laser, 80.0 km
(49.7 mi)
SFP8 Single SFP-8 transceiver:
Gigabit Ethernet, 1310 nm,
single mode, laser, 40.0 km
(24.8 mi)
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 port:

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 (Default=Non NEBS-compliant unit)

N3 NEBS level 3, type 2 and 4 compliant

Note: By default, the T3 option is NEBS-3 compliant. For SDH/SONET, NEBS-3 compliance is optional.

SUPPLIED ACCESSORIES

AC power cord
 DC connection kit (if a DC powered unit is ordered)

CBL-DB9F-DB9M-STR

Control port cable

OPTIONAL ACCESSORIES

WM-34

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

RM-34

Hardware kit for mounting one Egate-100 unit in a 19-inch 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@rad.com

www.rad.com

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