RIC-LC

Ethernet Converter for Bonded PDH Circuits

- Delivery of Ethernet traffic over up to 16 bonded E1 ports using Ethernet over NG-PDH protocols
- VLAN tagging and stacking for full separation of Ethernet user traffic from management data
- Monitoring and diagnostic tools for quick fault isolation on TDM and Ethernet ports
- TDM-to-Ethernet fault propagation
- Extensive management capabilities including local and remote (inband and out-of-band) options

RIC-LC is a Fast Ethernet over E1 converter that provides simple, efficient and cost-effective Fast Ethernet connectivity over one, four, eight or sixteen bonded E1 circuits. The device enables service providers to supply high-capacity Ethernet services to remote locations and transparently connect corporate LANs over existing E1 links.

RIC-LC supports standard Next Generation Ethernet over PDH protocols including GFP ITU-T G.8040, VCAT ITU-T G.7043 and LCAS ITU-T G.7042. These protocols allow service providers to dynamically allocate bandwidth to their customers by mere changing the number of links bonded to the virtual group, without stopping the service.

HARDWARE OPTIONS
RIC-LC is provided with two hardware options:

- RIC-LC with 1-16 E1 ports and an internal power supply
- RIC-LC with a single-E1 port and an external power supply.

INTEROPERABILITY
The device can be used in a point-to-point application or in a hub-and-spoke topology, operating with RAD's Egate-100, Egate-2000 and RICi-16 or third-party gateways.

MARKET SEGMENTS AND APPLICATIONS
RIC-LC targets cost-sensitive applications for carriers, mobile operators and service providers, such as transparent inter-LAN connectivity, Ethernet private lines, as well as IP DSLAM, WiMAX base station and cellular backhaul.

ETHERNET

VLAN tagging and stacking
VLAN tagging and stacking at ingress and egress enable transporting user traffic transparently, keeping all the user VLAN settings intact. Management traffic and user Ethernet traffic are sent together on the same Ethernet flow and can be separated by different VLANs, thus ensuring high traffic security.

Quality of Service (QoS)
RIC-LC supports VLAN-aware and VLAN unaware bridging, as well as VLAN stacking (Q-in-Q). It maps Ethernet frames into four priority queues based on user port, VLAN priority (802.1p) or DSCP marking, to enable differentiation between various user applications. It uses both strict priority and WFQ (weighted fair queuing), as well as per port rate limitation.

Internal Bridge
The internal bridge can be configured to filter or transparent mode. In filter mode, the bridge learns MAC addresses and filters local traffic accordingly. In transparent mode it forwards the received packets, ignoring the MAC addresses.

RESILIENCY

Fault Propagation
If a failure is detected on the E1 port, the fault propagation mechanism deactivates the Fast Ethernet links, enabling routers and switches on both ends of the link to reroute the traffic.

MANAGEMENT AND SECURITY
RIC-LC can be managed locally via an ASCII terminal connected to RS-232.

Remote inband management is performed via the E1 ports using Telnet, Web browser or RADview, RAD's SNMP-based management system that ensure safe and secure access control.

Out-of-band management is performed via one of the user Ethernet ports.

MONITORING AND DIAGNOSTICS
RIC-LC diagnostic capabilities include:

- Ping test for checking IP connectivity
- User-activated diagnostic loopback tests on VCG or individual E1 generated using management software or rear-panel DIP switch.

Loop Detection

E1 loops are immediately detected when they occur, avoiding the resulting Ethernet loops and Ethernet storms. The unit automatically recovers when the TDM loop clears.
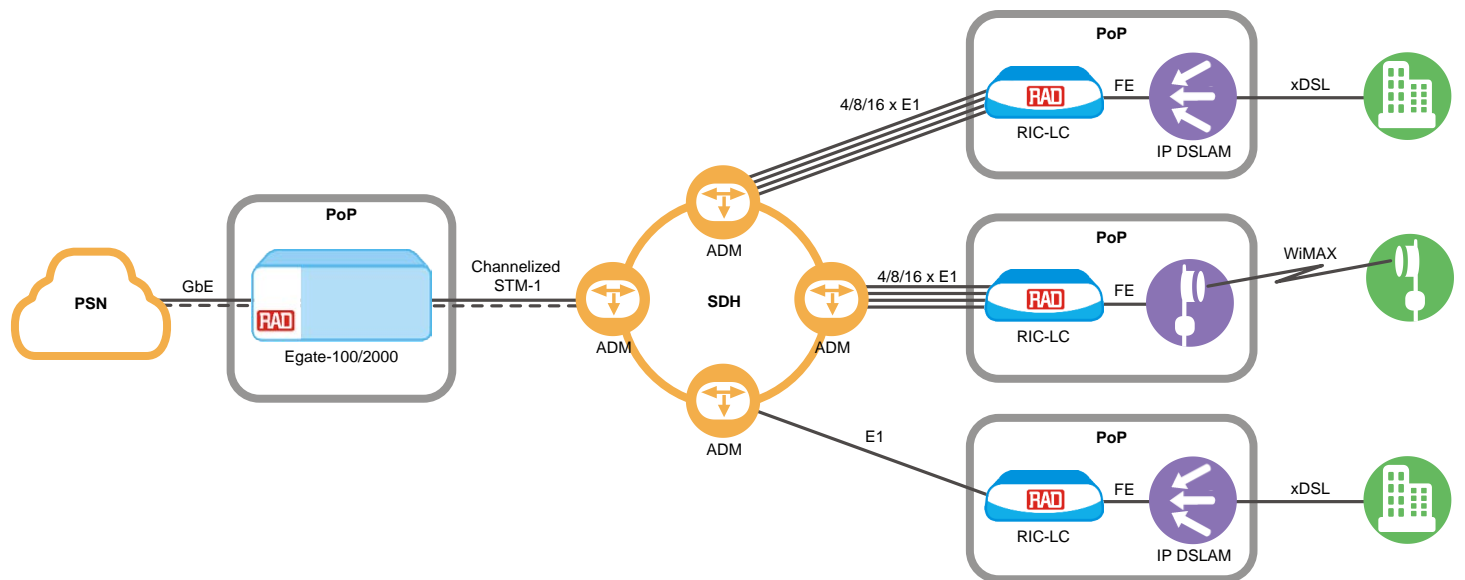
Applications
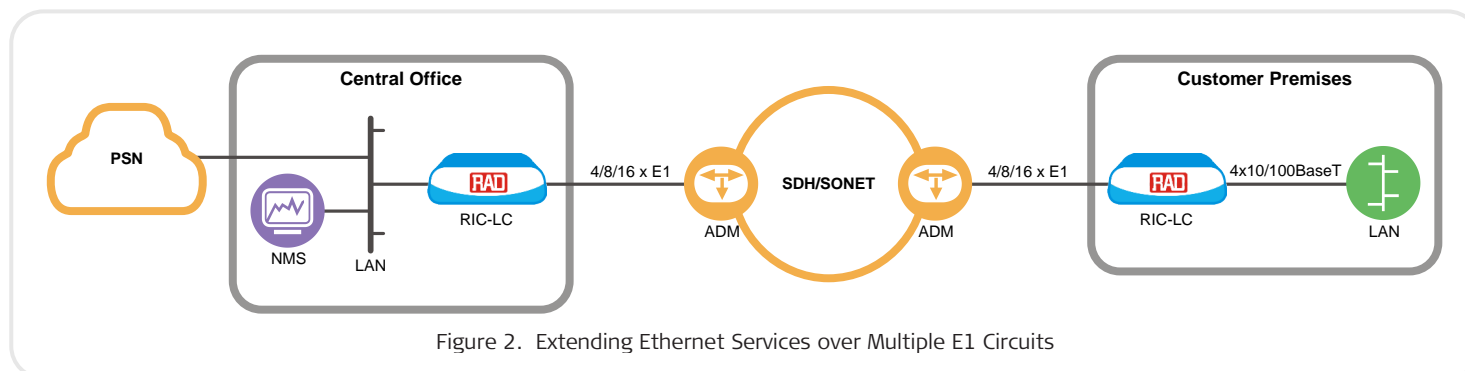

Figure 1. IP DSLAM and WiMAX Backhauling over PDH/SDH

Figure 2. Extending Ethernet Services over Multiple E1 Circuits

Specifications

CAPACITY

Number of VCGs
1

E1 INTERFACE

Number of Ports
1, 4, 8 or 16

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

Data Rate
2.048 Mbps, framed

Line Code
HDB3

Line Impedance
120Ω, balanced

75Ω, unbalanced

System Clock
Internal or loopback timing

Connector
RJ-45, balanced

BNC, unbalanced (1-, 4- or 8-port options; 16-port units are supplied with RJ-45 to BNC adapter cable)

ETHERNET INTERFACE

Number of Ports
4

Port Combinations
4 built-in electrical
2 built-in electrical + 2 fiber optic (SFP)

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

*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.*

Type
10/100 Mbps, full/half duplex

Connector
RJ-45 for electrical (100BaseTx)
LC (SFP-based) for optical (100BaseFx)

Max Frame Size
2036 bytes

Compliance
Relevant sections of IEEE 802.3, 802.3u and 802.1p&q

INTERNAL BRIDGE

Operation Mode
VLAN-aware, VLAN-unaware

MAC Table Size
1024

Filtering and Forwarding
Transparent or filtered

Port-Based VLAN
Untagged, tagged

Number of VLANs
64

VLAN Range
1–4094

L2CP Handling
Transparent

TERMINAL CONTROL PORT

Type
RS-232C/V.24 (DCE asynchronous)

Data Rate
115.2 kbps

Connector
Mini USB, female

DIAGNOSTICS

Loopbacks
VCG, E1

Connectivity Test
Ping

GENERAL

Indicators
PWR (green) – Power status
TST (orange) - Self-test status
ALM (red) – Alarm status

Note: TST and ALM LEDs are available only in the enclosure with internal power supply

Power
Internal wide-range power supply:
AC/DC: 100 to 240 VAC or 48 to 60 VDC

External power supply:
AC: 100 to 240 VAC
DC: 48 to 60 VDC

Power Consumption
AC: 6W
DC: 5W

Physical
Enclosure with internal power supply:
Height: 43.7 mm (1.7 in)
Width: 220 mm (8.6 in)
Depth: 170 mm (6.7 in)
Weight: 0.5 kg (1.1 lb)

Enclosure with external power supply:
Height: 43.5 mm (1.71 in)
Width: 210.3 mm (8.28 in)
Depth: 136 mm (5.35 in)
Weight: 0.6 kg (1.2 lb)

Environment
Temperature: 0 to 50°C (32 to 122°F)
Humidity: Up to 90%, non–condensing

Ordering

RECOMMENDED CONFIGURATIONS

RIC-LC/E1/4UTP
Single E1 and 4×10/100BaseT UTP ports

RIC-LC/4E1/4UTP
4×E1 ports and 4×10/100BaseT UTP ports

RIC-LC/8E1/4UTP
8×E1 ports and 4×10/100BaseT UTP ports

RIC-LC/16E1/4UTP
16×E1 ports and 4×10/100BaseT UTP ports

RIC-LC/ACEX/E1/1UTP
Single E1 and 1×10/100BaseT UTP port, external AC power supply

RIC-LC/ACEX/E1/4UTP
Single E1 and 4×10/100BaseT UTP port, external AC power supply

RIC-LC/DCEX/E1/4UTP
Single E1 and 4×10/100BaseT UTP port, external DC power supply

SPECIAL CONFIGURATIONS

Please contact your local RAD partner for additional configuration options

SUPPLIED ACCESSORIES

AC power cord

CBL-MUSB-DB9F
Mini USB control port cable

OPTIONAL ACCESSORIES

DC connection kit

RM-33-2
Hardware kit for mounting one or two units in a 19-inch rack

RM-47
Hardware kit for mounting one or two units of RIC-LC/E1 in a 19-inch rack

CBL-RJ45/2BNC/E1
RJ-45 to BNC adapter cable (if a 16-E1 port unit with unbalanced interfaces is ordered)

RAD