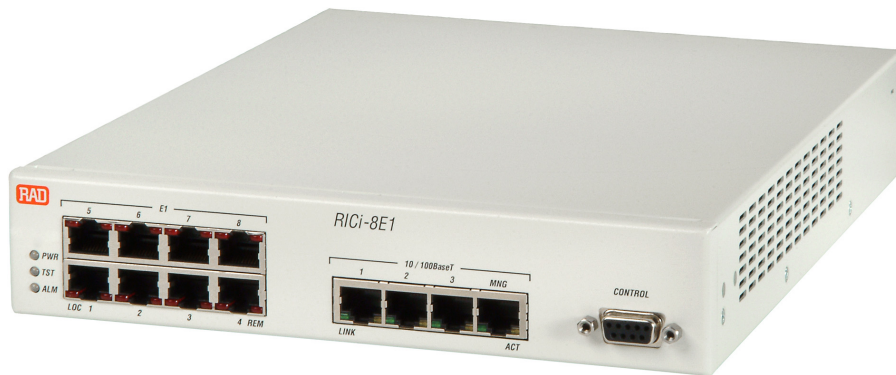


RICi-4E1, RICi-4T1, RICi-8E1, RICi-8T1



Fast Ethernet over Multiple E1/T1 Lines Network Termination Units



FEATURES

- Connect Fast Ethernet LANs over up to four or eight bonded E1 or T1 circuits
- Bond four or eight E1 or T1 ports utilizing Multi-Link PPP (ML-PPP bridge mode) bridging the bandwidth gap between E1/T1 and E3/T3
- Up to 50 ms differential delay compensation
- Four 10/100BaseT ports
- Enable transparent forwarding of Ethernet user traffic and provides secure management, via VLAN stacking and striping
- Transparent MAC forwarding
- Configurable Maximum Transmit Unit (MTU) for the delay versus throughput control
- Inband and out-of-band management access via:
 - ASCII terminal
 - Web browser
 - Telnet
 - SNMP, including RADview-Lite
- Four levels of QoS, based on four VLAN priority queues as per 802.1p or DSCP
- Monitoring and diagnostic tools on TDM and Ethernet ports for quick fault isolation
- Fault propagation of E1 or T1 error conditions to Ethernet port
- Interoperable with RAD's Egate-100 edge gateway

DESCRIPTION

- RIC-4E1, RIC-4T1, RIC-8E1 and RIC-8T1 are Network Termination Units (NTU) connecting Fast Ethernet LANs over four or eight bonded E1 or T1 circuits. They enable service providers to supply transparent Ethernet services. The devices can also be used for transparent connection of corporate LANs over existing E1 or T1 lines.
- Up to four or eight E1 or T1 lines are bonded together using Multi-Link PPP (ML-PPP) creating a large virtual pipe.
- The devices can be used in a point-to-point application or in a hub-and-spoke topology, operating opposite the Egate-100 gateway. Typical applications include:
 - Ethernet private Line/LAN services
 - IP DSLAM, cellular IP and WiMAX base station backhauling
 - Interoffice or enterprise LAN connection.
- VLAN tagging, stacking and striping option at ingress and egress enables transporting user traffic transparently, keeping all the user VLAN settings intact. In addition, the management traffic may be tagged with a different VLAN, fully separating user traffic from management data.
- The 802.1p and DSCP priority scheme enables users to define four different QoS levels, according to the application requirements, providing high priority to real time applications such as voice and video.

RICi-4E1, RICi-4T1, RICi-8E1, RICi-8T1

Fast Ethernet over Multiple E1/T1 Lines Network Termination Units

- 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.
- The devices support inband management (SNMP, Telnet, Web) via the Fast Ethernet user ports. Management traffic and user Ethernet traffic are transported together on the same Ethernet flow, separated by different VLANs, ensuring high traffic security. One of the 10/100BaseT ports can be configured as an out-of-band management port. Local management is supported via an ASCII terminal.
- Frame fragmentation allows the user to control the Maximum Transmit Unit (MTU) size. Different MTU sizes are used to achieve optimal throughput versus delay combination, according to the application requirements.
 - In a non-fragmented mode the maximum single E1 or T1 line throughput is 1.95 Mbps or 1.49 Mbps, respectively
 - In a fragmented mode (250-byte frames) the maximum single E1 or T1 line throughput is 1.822 Mbps or 1.397 Mbps, respectively.

Table 1 describes total WAN throughput for 4- and 8-link units.

- The devices compensate for a differential delay of up to 50 ms between traffic received on different circuits.

SPECIFICATIONS

E1 INTERFACE

- **Number of Ports**
4 or 8
- **Compliance**
G.703
- **Data Rate**
2.048 Mbps
- **Line Code**
HDB3, AMI
- **Framing**
Unframed
- **Line Impedance**
 - 120Ω, balanced
 - 75Ω, balanced
- **System Clock**
Internal or loopback timing
- **Connector**
 - RJ-45, balanced
 - Two BNC, unbalanced (via adapter cable)

T1 INTERFACE

- **Number of Ports**
4 or 8
- **Compliance**
T1.403
- **Data Rate**
1.544 Mbps
- **Line Code**
B8ZS, AMI
- **Framing**
Framed
- **Line Impedance**
100Ω, balanced
- **System Clock**
Internal or loopback timing
- **Connector**
RJ-45

APPLICATIONS

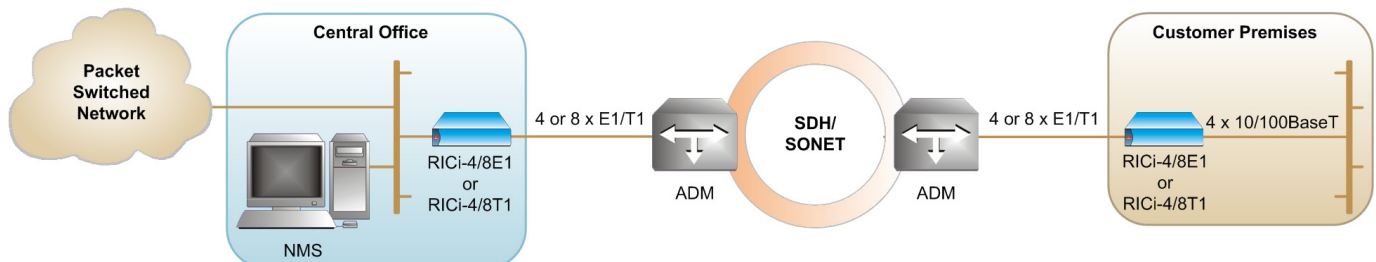


Figure 1. RICi-4E1/T1 or RICi-8E1/T1 Extend Ethernet Services over Multiple E1/T1 Circuits, Operating opposite each other

RICi-4E1, RICi-4T1, RICi-8E1, RICi-8T1

Fast Ethernet over Multiple E1/T1 Lines Network Termination Units

WAN PROTOCOL

- **Type**
PPP, ML-PPP (BCP)
- **MTU Size**
80–1540 bytes, user-configurable
- **Delay Compensation**
Up to 50 ms

Table 1. Total WAN Throughput

Mode	4 E1	8 E1	4 T1	8 T1
	[Mbps]			
Non-fragmented	7.8	15.6	5.9	11.9
Fragmented (250-byte frames)	7.2	14.5	5.5	11.1

ETHERNET INTERFACE

- **Number of Ports**
4
- **Type**
10/100 Mbps, autonegotiation, full/half duplex, flow control
- **Max Frame Size**
1536
- **Compliance**
Conforms to the relevant sections of IEEE 802.3 and 802.3u
- **Connector**
RJ-45

INTERNAL BRIDGE

- **LAN Table**
Up to 2,048 MAC addresses (learned)
- **Operation Mode**
VLAN-aware, VLAN-unaware
- **Filtering and Forwarding**
Transparent or filtered

TERMINAL CONTROL PORT

- **Type**
RS-232/V.24 (DCE asynchronous)
- **Data Rate**
9.6, 19.2, 115.2 kbps
- **Connector**
9-pin, D-type, female

GENERAL

- **Diagnostics**
Local and remote loopbacks on E1 and T1 interfaces
- **Indicators**
PWR (green) – Power status
TST (green) – Self test status
ALM (red) – Alarm status
- **Power**
AC: 100 to 240 VAC ($\pm 10\%$),
50 to 60 Hz
DC: -48 VDC ($\pm 10\%$)
- **Power Consumption**
9W

Physical

Height: 43.7 mm (1.7 in) (1U)
Width: 21.5 cm (8.5 in)
Depth: 30.0 cm (11.8 in)
Weight: 2.2 kg (4.7 lb)

Environment

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

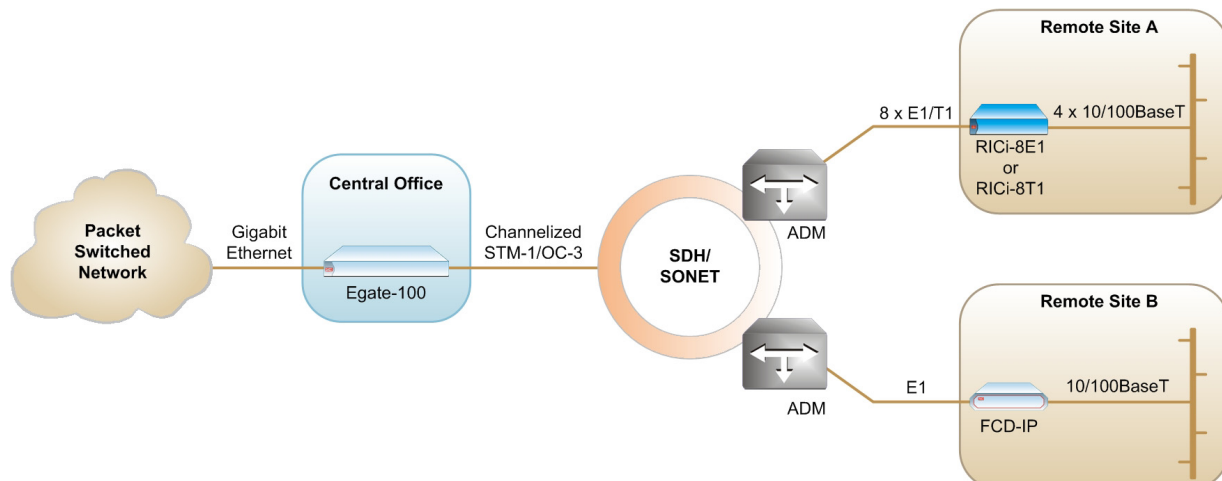


Figure 2. RICi-8E1/T1 Extend Ethernet Services over Multiple E1/T1 Circuits, Operating opposite Egate-100

RICi-4E1, RICi-4T1, RICi-8E1, RICi-8T1

Fast Ethernet over Multiple E1/T1 Lines Network Termination Units

ORDERING

RICi-8E1/*/&

Fast Ethernet over eight E1s network termination unit

RICi-8T1/*

Fast Ethernet over eight T1s network termination unit

RICi-4E1/*/&

Fast Ethernet over four E1s network termination unit

RICi-4T1/*

Fast Ethernet over four T1s network termination unit

- * Specify power supply type:
AC for 100–240 VAC
48 for -48 VDC

- & Specify E1 interface type:
U for unbalanced E1 interface

Note: E1 unbalanced option is supported via an adapter cable (CBL-RJ45/2BNC/E1, see Supplied Accessories).

SUPPLIED ACCESSORIES

Power cord

AC/DC adapter (if a DC option is ordered)

CBL-RJ45/2BNC/E1

RJ-45 to BNC adapter cable (if an unbalanced E1 interface is ordered)

OPTIONAL ACCESSORIES

RM-35/@

Hardware kit for mounting one or two units in a 19" rack

@ Specify rack mounting kit type:

- P1** for mounting one unit
P2 for mounting two units

CBL-DB9F-DB9M-STR

Control port cable



data communications

www.rad.com

- **International Headquarters**
24 Raoul Wallenberg Street
Tel Aviv 69719, Israel
Tel: 972-3-6458181
Fax: 972-3-6498250
Email: market@rad.com
- **North America Headquarters**
900 Corporate Drive
Mahwah, NJ 07430, USA
Tel: (201) 529-1100
Toll free: 1-800 444-7234
Fax: (201) 529-5777
Email: market@radusa.com

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