

# MiRiCi-E1T1

Intelligent Miniature Ethernet to E1/T1 Remote Bridge



Connecting Fast or Gigabit Ethernet LANs over framed E1 or framed/unframed T1 links

- E1/T1 connectivity to any Ethernet device with SFP MSA-compatible socket
- Full duplex, E1/T1 wire-speed packet forwarding
- GFP, RAD HDLC and cHDLC encapsulation
- VLAN support according to 802.1p, including VLAN stacking (Q-in-Q) capabilities, allowing traffic separation and prioritization
- Fault propagation to LAN link
- Inband and out-of-band management for configuration, monitoring and diagnostics
- I<sup>2</sup>C management interface for simple management integration with host devices

MiRiCi-E1T1 forwards Fast or Gigabit Ethernet packets to a TDM-based WAN at full duplex wire-speed, fully utilizing the expensive E1 or T1 TDM bandwidth.

The TDM interface type (E1 or T1) is user-configurable.

The unit supports the following frame sizes, including VLAN-tagged frames:

- 64–2016 bytes for Fast Ethernet
- 64–10000 bytes for Gigabit Ethernet.

LAN traffic is transparently directed, thus preserving the user LAN settings.

All parameters are software-configurable including transmit timing sources and data formats.

## MANAGEMENT

The unit can be monitored, configured, and tested using the following ports and applications:

- Out-of-band via the I<sup>2</sup>C channel (off the SFP edge connector)
- Inband via the Ethernet port using a Web browser.

To facilitate integration of a new device into an IP network, if no IP address has been manually configured, MiRiCi-E1T1

automatically requests one from the DHCP server upon booting.

MiRiCi-E1T1 sends SNMP traps for up to eight management stations.

Application software can be downloaded to MiRiCi-E1/T1 via the central server, using TFTP.

## LOS AND FAULT PROPAGATION

The LAN link is deactivated and the link status LED turns off if one of the following user defined alarms is issued and fault propagation is enabled:

- LOS (Loss of signal)
- FDL (Facility Data Link)
- LOF (Loss of Frame)
- AIS (Alarm indication signal)
- RDI (Remote defect indication).

In addition, the above-listed error conditions are propagated towards the host by sending an electrical signal via the LOS pin on the MSA edge connector. The LOS LED turns ON, visually indicating the LOS condition.



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### ENCAPSULATION

MiRiCi-E1T1 employs the GFP, RAD HDLC and cHDLC WAN encapsulation protocols.

### FLOW CONTROL

A flow control mechanism is activated when LAN traffic exceeds the WAN link (E1, T1) capacity and the watermarks of the internal frame buffer. Pause packets are transmitted to the LAN port, halting LAN traffic until the buffer is emptied to below the watermark limit.

### QUALITY OF SERVICE (QoS)

MiRiCi-E1T1 facilitates differentiated services on the same link according to Ethernet or IP marking. Classification is based on VLAN (802.1p) or Differentiated Services Code Point (DSCP) priority, while classification results are mapped to transmit priority queues. Priority queues can be defined to be Strict Priority or Weighted Round Robin (WRR).

### DIAGNOSTICS AND LOOP DETECTION

Remote (RLB) and local loopbacks (LLB) are used for physical layer troubleshooting.

MiRiCi-E1T1 detects loops on the LAN side or WAN side by transmitting special loop detection frames.

If a loop is detected on the LAN side, a loop detection alarm is sent.

If a loop is detected on the WAN side, the unit blocks the traffic, and only then a loop detection alarm is sent.

The unit also performs Bit Error Rate (BERT) diagnostic tests. MiRiCi-E1T1 generates and detects pseudo-random patterns and repetitive patterns from 1 to 32 bits in length.

### ETHERNET OAM

MiRiCi-E1T1 provides single segment (link) OAM based on 802.3ah, including discovery, continuity check, and remote fault indication.

### CLOCK OPTIONS

MiRiCi-E1T1 uses Tx clock sources for the internal and receive clocks. Standard statistics for 15 minute time intervals are collected.

### FLEXIBILITY

MiRiCi-E1T1 operates opposite the following devices using GFP, RAD HDLC and cHDLC encapsulation:

- RAD's Egate-20, Egate-100 (central Ethernet gateway)
- RAD's RiCi-16, RiCi-E1 and RiCi-T1
- Third-party devices that support GFP, RAD HDLC and cHDLC encapsulation.

### SFP ENCLOSURE

Housed in a Small Form Factor Pluggable (SFP) package, MiRiCi-E1T1 complies with the Multi-Source Agreement (MSA).

Running on power derived from the host device, it requires no additional power supply.

MiRiCi-E1T1 is hot swappable and features a special release mechanism for easy extraction from the SFP socket.

### SFP CONFIGURATION ADAPTER

An optional configuration adapter module, SFP-CA, is available for configuring MiRiCi-E1T1 by connecting it to a PC via a USB port.

The configuration adapter is used for preliminary configuration, such as assigning an IP address for first use or specifying the operation mode. It is also used to download software to the MiRiCi-E1T1 units.

### POSSIBLE APPLICATIONS

MiRiCi-E1T1 can be used in the following application:

- Transparent LAN services over leased lines
- Remote branch connectivity over E1/T1 lines
- Connecting LANs over E1/T1 radio links or in campus applications.

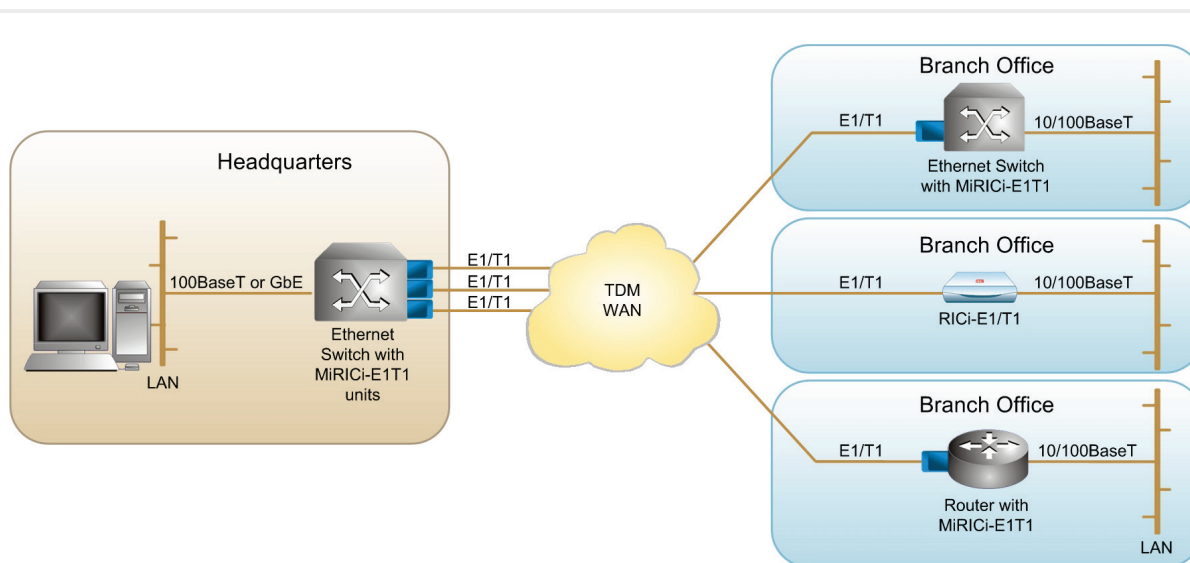


Figure 1. Providing Transparent LAN Services over Leased Lines

## Specifications

### WAN INTERFACE

#### Number of Ports

1, configurable as E1 or T1

#### Tx Clock

Receive or internal clock

#### Connector

RJ-45

### E1 INTERFACE

#### Number of Ports

1

#### Compliance

G.703, G.704, G.775, G.823

#### Data Rate

2.048 Mbps

#### Line Code

HDB3, AMI

#### Framing

Framed (G.732.N, G.732.N CRC), unframed

#### Line Impedance

120Ω, balanced

#### Cable Length (max)

Up to 2500m (8202 ft) for AWG 22 cable

### T1 INTERFACE

#### Number of Ports

1

#### Compliance

G.703, G.775, G.823, T1.107, T1.403

#### Data Rate

1.544 Mbps

#### Line Code

B8ZS, AMI

#### Framing

Framed (ESF, D4), unframed

#### Line Impedance

100Ω, balanced

#### Cable Length (max)

Up to 1829m (6000 ft) for AWG 22 cable

### LAN INTERFACE

#### Type

Fast or Gigabit Ethernet port

#### Compliance

IEEE 802.3

#### Edge Connector

SFP-based, MSA-compliant

#### Frame Size

FE: 64–2016 Bytes

GE: Up to 10 kBytes (jumbo)

### WAN PROTOCOL

#### Encapsulation

GFP (G.8040, G.7041/Y.1303)

RAD HDLC

cHDLC

### GENERAL

#### LED Indicators

MiRiCi-E1T1/FE: LINK (green)

– Ethernet link status

MiRiCi-E1T1/GbE: LINK/ACT (green)

– Ethernet link status and activity

LOS (red) – E1/T1 loss of signal

#### Power

3.3V

#### Power Dissipation

1.25W

#### Environment

Temperature:

MiRiCi-E1T1/FE:

Ambient: –40 to 70°C (–40 to 150°F)

Case: –40 to 78°C (–40 to 172°F)

MiRiCi-E1T1/GE:

Ambient: –40 to 70°C (–40 to 150°F)

Case: –40 to 78°C (–40 to 172°F)

Humidity: Up to 90%, non-condensing

#### Physical Dimensions

Height: 12.4 mm (0.49 in)

Width: 14 mm (0.55 in)

Depth: 74.1 mm (2.92 in)

Weight: 15.0 g (0.5 oz)

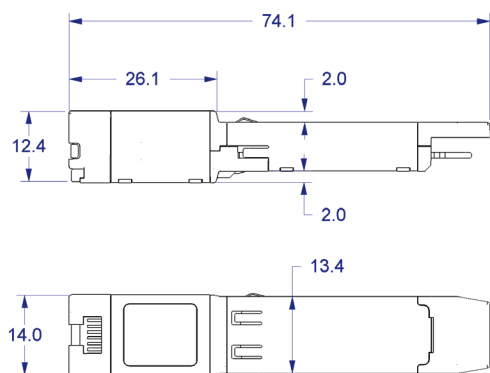


Figure 2. Physical Dimensions



Figure 3. SFP-CA Module

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### Ordering

#### MiRiCi-E1T1/+

##### Legend

- + SFP port:
- FE Fast Ethernet
- GE Gigabit Ethernet

#### OPTIONAL ACCESSORIES

##### SFP-CA

Configuration adapter for connecting MiRiCi-E1T1 to a PC

Table 1. MiRiCi Family Product Comparison

Feature	MiRiCi-E3/T3 (Ver. 2.5)	MiRiCi-E1/T1 (Ver. 2.5)
Protocol type	GFP (G.8040, G.7041/Y.1303) RAD HDLC cHDLC	GFP (G.8040, G.7041/Y.1303) RAD HDLC cHDLC
Framing	G.832, G.751, unframed(E3) C-bit, M23, unframed (T3)	G.732.N, G.732.N CRC, unframed(E1) ESF, D4, unframed (T1)
QoS	VLAN priority (802.1p, strict priority, WRR)	VLAN priority (802.1p, strict priority, WRR)
Loop detection	Yes (LAN or WAN)	Yes (LAN or WAN)
Fault propagation	Yes (LOS, LOF, FEAC, RLOL, AIS, RDI)	Yes (LOS, FDL, LOF, AIS, RDI)
SNMP traps	Yes, up to 8 management stations	Yes, up to 8 management stations

**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

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