MiRICi-E1T1

Intelligent Miniature Ethernet to E1/T1 Remote Bridge

- 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
- I2C management interface for simple management integration with host devices

System on an SFP

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.

MARKET SEGMENTS AND 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

INTEROPERABILITY

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.

ETHERNET OVER PDH

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).

OAM

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

TIMING AND SYNCHRONIZATION

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

MANAGEMENT AND SECURITY

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

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

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

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.

RAD data communications
The Access Company

MiRICi-E1T1

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OPERATION AND MAINTENANCE

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

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.

MONITORING AND DIAGNOSTICS

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.

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

Loop Detection
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.

BERT
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.

Application

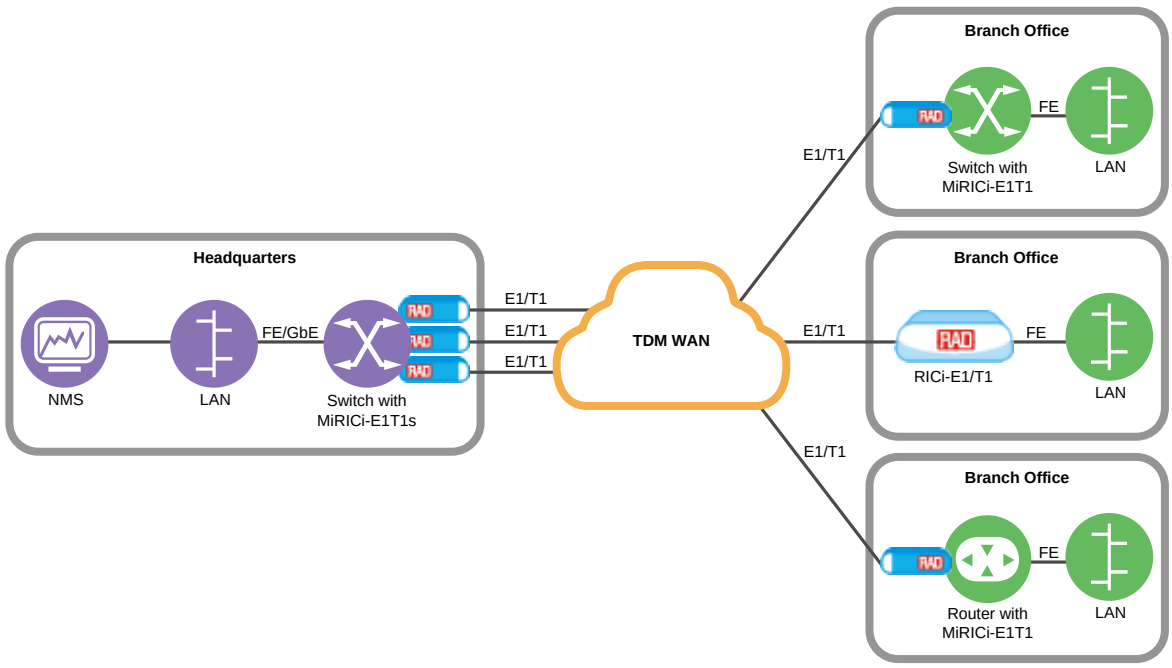

Figure 1. Transparent LAN Services over Leased Lines

Specifications

TDM INTERFACE

Number of Ports
1, configurable as E1 or T1

Encapsulation
GFP (G.8040, G.7041/Y.1303)
RAD HDLC
cHDLC

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
120W, balanced

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

Connector
RJ-45

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
100W, balanced

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

Connector
RJ-45

ETHERNET 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)

GENERAL

Indicators
LINK (green): Ethernet link status (MiRICi-E1T1/FE)

LINK/ACT (green): Ethernet link and activity status (MiRICi-E1T1/GbE)

LOS (red) – E1/T1 loss of signal

Power
3.3V with 1.25W dissipation

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)

MiRICi-E1T1/FE with temperature-hardened enclosure:
-40 – 85°C (–40 to 185°F)

Humidity: Up to 90%, non–condensing

Physical
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)

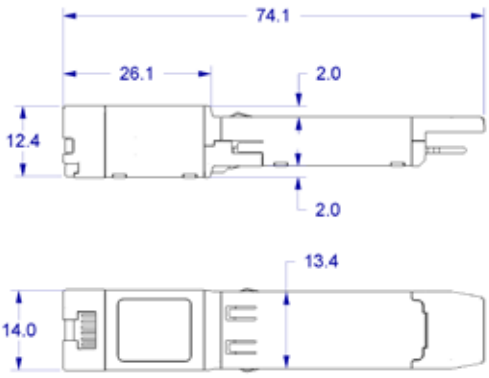

Figure 3. Physical Dimensions

Figure 2. SFP-CA Module

Data Sheet

MiRICi-E1T1

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Ordering

RECOMMENDED CONFIGURATIONS

MIRICI-E1T1/FE
Intelligent miniature Ethernet to E1/T1 remote bridge, Fast Ethernet SFP port

MIRICI-E1T1/GE
Intelligent miniature Ethernet to E1/T1 remote bridge, Gigabit Ethernet SFP port

SPECIAL CONFIGURATIONS

MIRICI-E1T1/FE/H
Intelligent miniature Ethernet to E1/T1 remote bridge, Fast Ethernet SFP port, temperature-hardened enclosure

Note: *MiRICi-E1T1 units with GbE interface are not available with temperature-hardened enclosure.*

OPTIONAL ACCESSORIES

SFP-CA
Configuration adapter for connecting MiRICi-E1T1 to a PC

Table 1. MiRICi Family Product Comparison

Feature	MiRICi-E3/T3 (Ver. 3.0)	MiRICi-E1/T1 (Ver. 3.0)
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

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