Megaplex-4

M8E1, M8T1

8-Port E1 and T1 Modules

- Up to 8 E1 or T1 interfaces with built-in LTU (E1) or CSU (T1)
- Up to 3 10/100BaseT Ethernet ports, copper or fiber
- E1 interface compliant with ITU-T Rec. G.703, G.704 and G.732
- T1 interface compatible with ANSI requirements
- Multiple clock source selection
- IEEE-1613 compliant options

The M8E1/M8T1 modules connect Megaplex-4 to up to 8 E1 or T1 lines. Up to 10 modules can be installed in a single chassis, providing Megaplex-4 with up to 80 E1/T1 ports.

In addition to providing E1/T1 interfaces for Megaplex-4 units, M8E1, M8T1 modules provide packet-based Fast Ethernet services.

The M8E1/M8T1 modules have two types of external ports:

- Eight independently configurable E1/T1 external ports for E1/T1 services
- Three 10/100 Mbps Ethernet ports, for packet-based services.

TDM SERVICES

The E1 interface is compatible with all carrier-provided E1 services, meeting the requirements of ITU-T Rec. G.703, G.704 and G.732. It supports both 2 (G732N) and 16 (G732S) frames per multiframe formats, as well as unframed mode. CRC-4 and E bit are also supported, complying with G.704 recommendations. Zero suppression over the line is HDB3. The E1 interface is equipped with an integral user-enabled LTU, ensuring ranges of up to 2 km (1.2 miles).

The T1 interface is compatible with ANSI requirements. Both D4 and ESF framing formats are supported. Zero suppression is selectable for Transparent, B7ZS, or B8ZS. The T1 interface is equipped with an integral user-enabled CSU, ensuring ranges of up to 1.6 km (1 mile).

M8E1/M8T1 modules recover the timing of each received E1/T1 stream, and can thus also provide timing reference signals derived from a selected E1/T1 stream for the nodal Megaplex-4 timing subsystem. M8E1/M8T1 transmit timing can be locked to the Megaplex-4 nodal timing. M8E1 supports Nokia Dynanet proprietary clock distribution (PDH Sync) and can be integrated into Nokia-RAD environment.

ETHERNET SERVICES

The Ethernet services are provided by an internal Layer-2 Ethernet switch that complies with IEEE 802.3/Ethernet V.2 standards, and supports VLAN. The total Ethernet traffic per module (from 1, 2 or 3 ports) is up to 100 Mbps.

The 3-port 10/100BaseT interface includes a built-in flow classification engine that performs single or double VLAN tagging according to IEEE 802.1Q and 802.1p. The interface features autonegotiation for plug-and-play Ethernet connectivity and complies with IEEE 802.3/Ethernet V.2 standards.

The external Ethernet ports can be ordered with two types of interfaces:

- 10/100BaseTx interfaces terminated in RJ-45 connectors
- Sockets for SFP Fast Ethernet transceivers. RAD offers several types of SFPs with optical interfaces, for meeting a wide range of operational requirements (SFPs with copper interfaces are also available).

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.

The Ethernet switch switches traffic between the module's Ethernet ports and the CL module Ethernet traffic subsystem (for connection via the CL GbE ports to a packet-switched network, or for transmission through the SDH network via virtually concatenated groups (VCGs)), and between the module's Ethernet ports and bundles.

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M8E1, M8T1
8-Port E1 and T1 Modules

The processing and switching of Ethernet traffic over TDM (E1/T1) links is configured by means of *bundles*. Two types of bundles can be defined:

- Bundles using HDLC as the Layer-2 protocol. An HDLC bundle is always defined on a single E1/T1 port, and its bandwidth depends on the port framing mode:

  - In framed mode, the user can configure the assigned bandwidth by specifying the timeslots included in the bundle. In this case, each port supports up to four HDLC bundles. Up to 32 bundles can be configured per M8E1, M8T1 module.

  - In unframed mode (M8E1 only), the full E1 port bandwidth is automatically assigned to the HDLC bundle.

- For M8E1 module only: bundles using MLPPP (multilink point-to-point protocol) as the Layer-2 protocol. In this case, two or more E1 ports (all using the same unframed mode) are logically bonded together as a single serial port. The number of E1 ports bonded together can be up to the maximum supported by the module, i.e., 8 ports. At any time, only one MLPPP bundle can be active on the module.

DIAGNOSTICS

Diagnostic capabilities include local and remote loopback on the E1/T1 ports and inband code-activated loopbacks specified in ANSI T1E1.2/93-003 (T1 interface only). Performance statistics for the E1/T1 and Ethernet ports may be obtained and analyzed via the Megaplex management system.

Multiservice Access Aggregation to SDH/SONET and Packet-Switched Networks
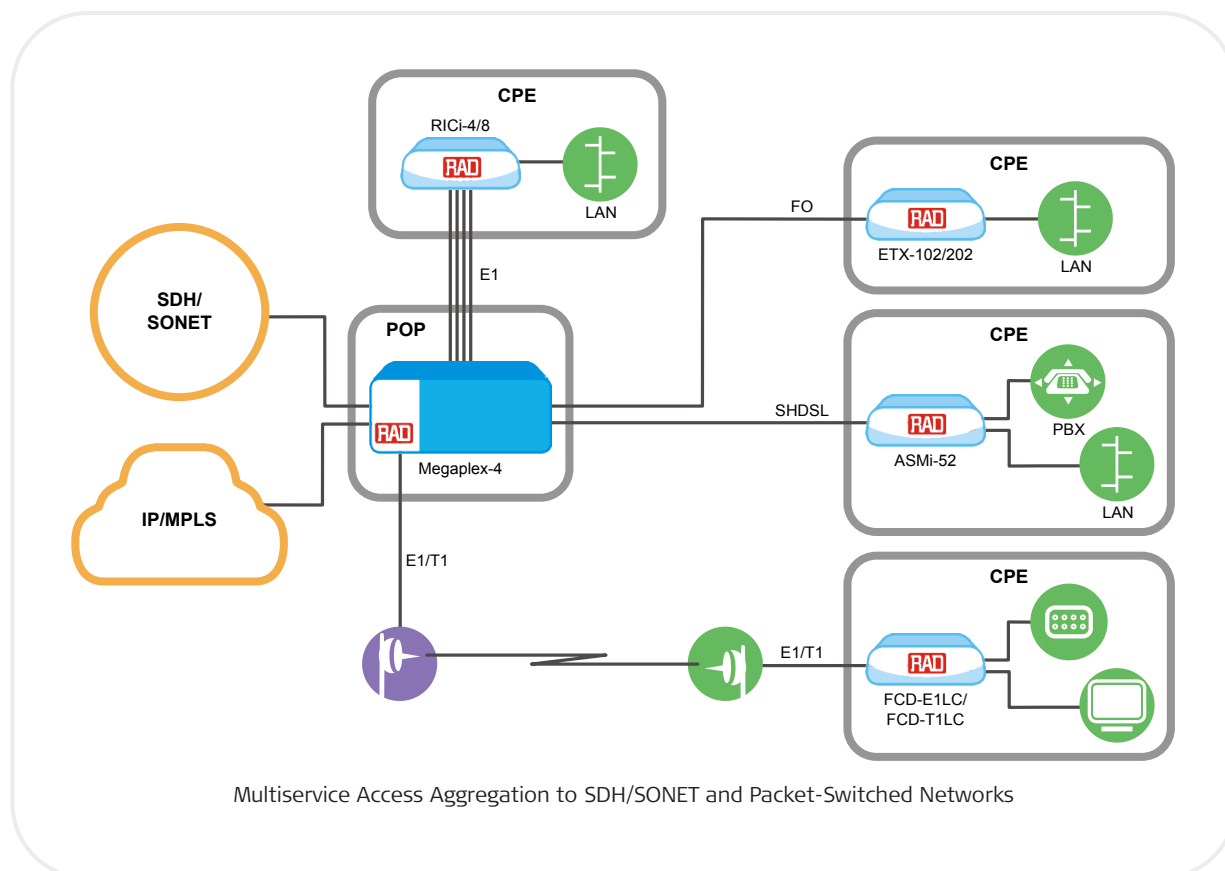
Specifications

E1 INTERFACE

Compliance
ITU-T G.703, G.704, G.706, G.732 (including CRC-4 and E-bit)

Framing
2 frames (G732N), or 16 frames (G732S) per multiframe, with or without CRC-4

Unframed

Data Rate (per link)
2.048 Mbps

Line Code
HDB3

Jitter Performance
As per ITU-T G.823

Impedance
Balanced 4-wire: 120Ω
Unbalanced coax: 75Ω

Signal Level
Receive:
 Without LTU: 0 to -10 dBm
 With LTU: 0 to -33 dBm
Transmit:
 Balanced: ±3V (±10%)
 Unbalanced: ±2.37V (±10%)

T1 INTERFACE

Compliance
ANSI T1.107 and T1.403 (inband loopback activation only)

Framing
D4, ESF

Data Rate (per link)
1.544 Mbps

Line Code
Bipolar AMI

Zero Suppression
Transparent, B7ZS, B8ZS

Signal Level
Receive:
 Without CSU: 0 to -10 dBm
 With CSU: 0 to -34 dBm
Transmit:
 Without CSU: ±3V (±10%),
  user adjustable,
  measured at 0 to 655 ft
 With CSU: 0, -7.5, -15, -22 dBm

Jitter Performance
As per AT&T TR-62411

Impedance
Balanced 4-wire: 100Ω

ETHERNET INTERFACE

Number of Ports
3 fiber-optic or 3 UTP

Data Rate
10/100 Mbps (Fast Ethernet)
Autonegotiation

Total Bandwidth per Module
100 Mbps per module

Maximum Frame Size
1600 bytes

Connectors
3 x RJ-45, shielded
3 x SFP socket (for transceivers, see *Ordering*)

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

Indicators (per port)
LINK (green) – LAN link integrity
ACT (yellow) – LAN data activity

DIAGNOSTICS

Loopbacks
User-activated local and remote loopback
 on each port
Local and remote loopbacks per timeslot
T1 interface only:
Network line loopback
Network payload loopback
Network CSU loopback

GENERAL

Dual-color indicator (per E1/T1 link)
Lights in green when the port is
 connected and carries traffic
Flashes in green when the port is
 connected and is the standby port in a
 redundancy pair
Lights in red during local loss of
 synchronization or red alarm
Off when not connected

E1/T1 Line Connector
Single DB-44, female (see *Ordering* for splitter cables available from RAD)

Power Consumption
10.8W

Environment
Operating temperature:
- Regular: -10°C to 55°C (14°F to 131°F)
- IEEE-1613 certified options: -20°C to 55°C (-4°F to 131°F)

Storage temperature: -20°C to +70°C
 (-4°F to +158°F)
Humidity: up to 95%, non-condensing

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Ordering

RECOMMENDED CONFIGURATIONS

MP-4100M-8E1/3XUTP

8-port E1module, 3 UTP Ethernet connectors

MP-4100M-8T1/3XUTP

8-port T1module, 3 UTP Ethernet connectors

SPECIAL CONFIGURATIONS

Please contact your local RAD partner for additional configuration options.

OPTIONAL ACCESSORIES

CBL-G703-8/RJ45

Splitter cable for splitting each 44-pin E1/T1 module connector to 8 E1 or 8 T1 balanced RJ-45 connectors

CBL-G703-8/RJ45/ST

Splitter cable for splitting the 44-pin module connector to 8 E1 or 8 T1 balanced RJ-45 connectors, with station clock connector

CBL-G703-8/RJ45/X

Splitter cross-cable for splitting the 44-pin module connector to 8 E1 or 8 T1 balanced RJ-45 connectors

CBL-G703-8/RJ45/Y

Splitter cable for splitting the 44-pin module connector to 8 E1 or 8 T1 balanced RJ-45 connectors, for providing I/O group protection

CBL-G703-8/COAX

Splitter cable for splitting the 44-pin M8E1 module connector to 8 pairs of unbalanced BNC connectors

CBL-G703-8/OPEN

Open-ended cable with DB-44 connector on the Megaplex side for balanced E1 or T1 applications

Note: *Unless otherwise indicated, all cables are 2m (6.6 ft) in length.*

By default, all E1/T1 cables are 2m (6.6 ft) long. For additional cable lengths available, see RAD catalog.

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