

Optimux-108, Optimux-106

Fiber Multiplexer for 4E1/4T1 and Ethernet or Serial Data



- Four E1 or T1 channels and Fast Ethernet link multiplexed over a fiber optic link
- Various fiber interfaces: multimode, single-mode (up to 120 km), and/or single-mode over single fiber, using SFP optical modules
- Automatic link backup with optional hot-swappable second main link
- Power redundancy with optional second wide-range power supply
- Management via ASCII terminal, dedicated Ethernet port, SNMP management station, or a Web-based remote access terminal



The Optimux-108 and Optimux-106 multiplexers combine four E1 or T1 channels and an optional Ethernet link over a fiber optic uplink.

A pair of Optimux units provides a simple and low-cost solution for connectivity over distances of up to 120 km (74.5 miles).

For transmission reliability, an optional modular second link provides automatic backup upon link failure. An optional second power supply provides power redundancy for failsafe operation.

Each of the four signals of the tributary interface is transmitted independently, so that each channel can be set to a different clock source.

MARKET SEGMENTS AND APPLICATIONS

Typical users of the Optimux-108/106 fiber multiplexers for 4E1/4T1 and Ethernet or serial data include transportation and utility companies, government and universities, Internet Service Providers (ISPs), and carriers extending data and voice from SDH networks or backhauling cellular traffic. *Figure 1* and *Figure 2* illustrate Optimux-108/106 in typical applications.

INTEROPERABILITY

Optimux-108/106 operates with OP-108C/106C modules of LRS-102 and Megaplex-4100 access nodes.

UPLINK AND TRIBUTARIES

Optimux-108/106 supports a variety of built-in optical uplink interfaces including:

- 1310 nm LED for multimode fiber
- 1310/1550 nm laser diode or long haul laser diode for extended range over single-mode fiber
- Single fiber (SF1, SF2 options) using a 1310 nm and 1550 nm laser diode transmitter with WDM technology, which enables the laser to transmit the signal at a different wavelength than the receive signal
- Single fiber (SF3 option) using SC/APC (Angle-Polished Connector) technology, with a 1310 nm laser diode for single wavelength operation
- Single fiber (SF4, SF5 options) using a 1310 nm and 1550 nm long haul laser diode transmitter with WDM technology.



Optimux-108, Optimux-106

Fiber Multiplexer for 4E1/4T1 and Ethernet or Serial Data

Optimux-108 can be ordered with balanced or unbalanced E1 tributary interfaces. Optimux-106 has balanced T1 tributary interfaces.

Optimux-108/106 can be ordered with an additional Ethernet user port (VLAN transparent), or with a V.35 interface in place of the Ethernet user port.

RESILIENCY

Two independent power supplies can be installed to Optimux-106/108 for redundancy.

In the uplink redundancy option, Optimux-108/106 supports fully automatic switching between the main and the backup link.

TIMING AND SYNCHRONIZATION

The uplink interface features only internal timing mode. The clock of each E1 channel is independent for each channel and transferred transparently.

The V.35 interface supports internal, external, and loopback timing modes.

MANAGEMENT AND SECURITY

Optimux-108/106 can be configured and monitored locally using an ASCII terminal connected to the control port or remotely via the Ethernet management port using:

- RADview running in a Windows or Unix environment
- Web-based remote access terminal
- Telnet.

To enhance security, a password to control access to the Optimux-108/106 management functions can be specified.

In addition, the security of the site can be enhanced by limiting remote management to specific management terminals or nodes.

MONITORING AND DIAGNOSTICS

To facilitate system diagnostics, Optimux-108/106 features LED status indicators, alarms generation and recognition, and dry contact closure upon link failure.

Optimux-108/106 features comprehensive test and diagnostics capabilities that include local and remote loopbacks on the uplink interface and on each E1/T1 tributary link. A local loopback can also be activated on the optional V.35 user port.

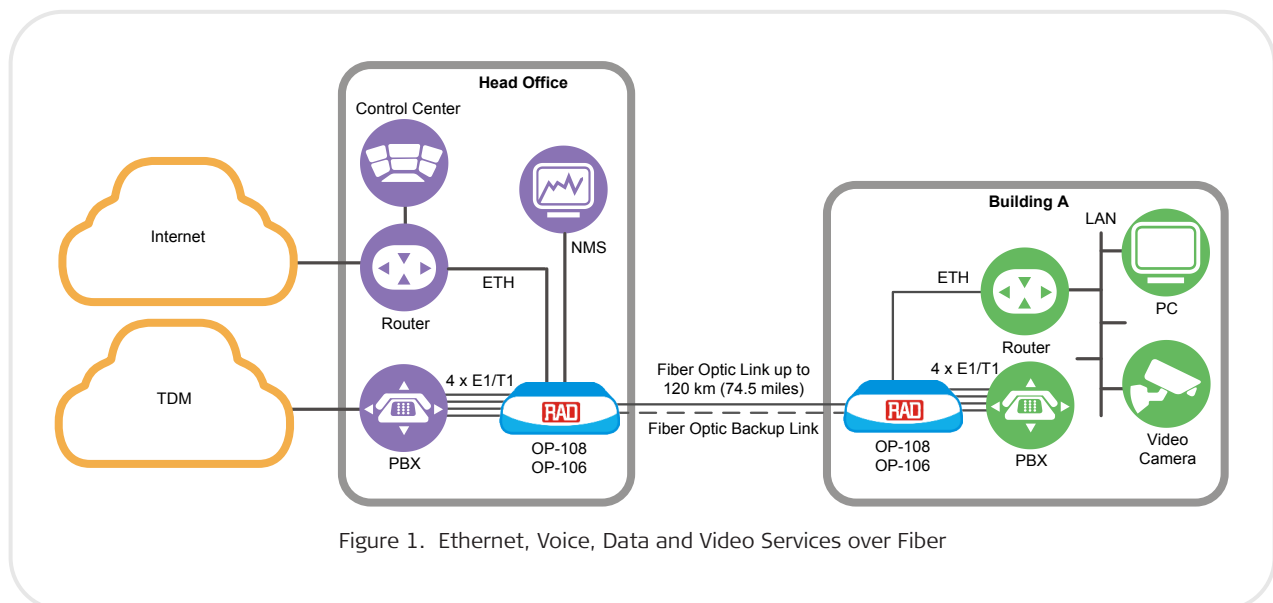


Figure 1. Ethernet, Voice, Data and Video Services over Fiber

Specifications

FIBER OPTIC INTERFACES

Characteristics

See *Table 1*

Compliance

G.955, G.742 (Optimux-108 without Ethernet ports)

E1/T1 USER INTERFACES

Number of Ports

4

Line Rate

E1: 2048 kbps

T1: 1544 kbps

Line Coding

E1: HDB3

T1: B8ZS

Impedance

E1 balanced, 120Ω

T1 balanced, 100Ω

E1 unbalanced, 75Ω

Jitter

ITU-T Rec. G.823

Connectors

Optimux-108

E1 balanced: RJ-45

E1 unbalanced: a pair of BNC

Optimux-106

RJ-45

Compliance

G.703, G.823 (E1), G.824 (T1)

ETHERNET USER INTERFACE

Type

10/100BaseT

Connector

Shielded RJ-45

Throughput

Optimux-108: 100 Mbps

Optimux-106: 75 Mbps

Max. Frame Size

1536 bytes

SERIAL USER INTERFACE

Type

V.35 DCE

Connector

Smart Serial

Throughput

2.048 Mbps

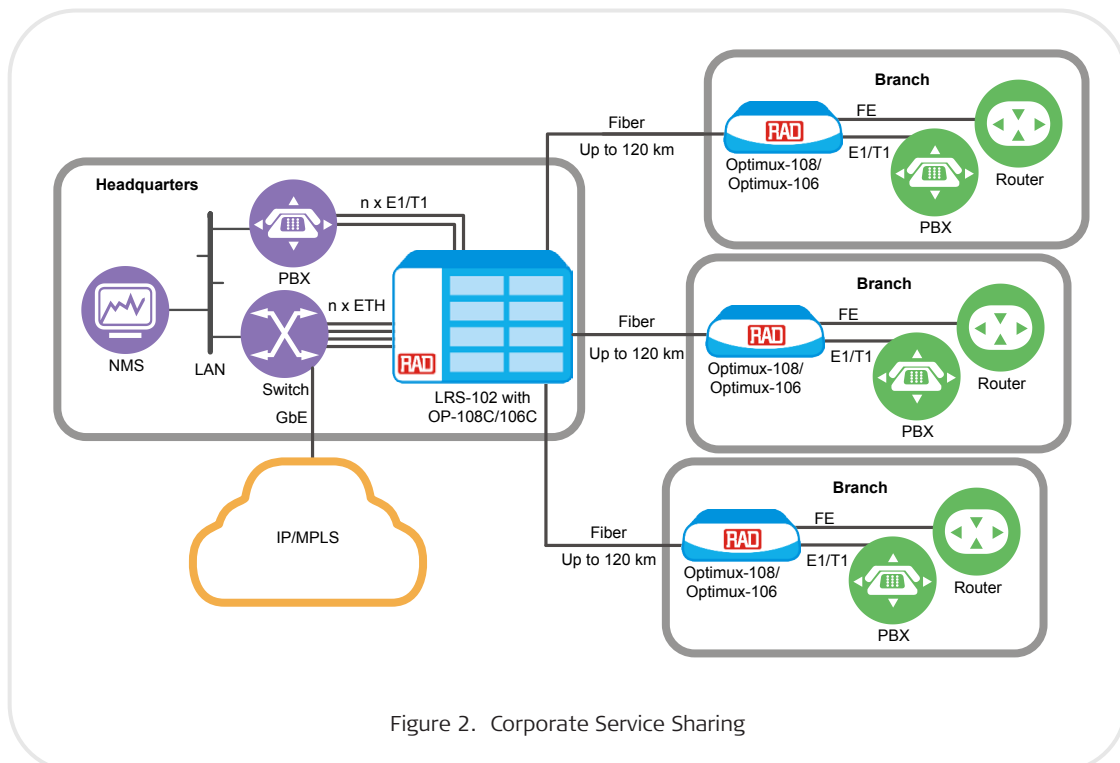


Figure 2. Corporate Service Sharing

Optimux-108, Optimux-106

Fiber Multiplexer for 4E1/4T1 and Ethernet or Serial Data

Table 1. Standalone Fiber Optic Interface Characteristics

Wavelength [nm]	Fiber Type [μm]	Transmitter Type	Output Power		Receiver Sensitivity w/o USER ETH port [dBm]	Receiver Sensitivity with USER ETH port [dBm]	Typical Max. Range w/o USER ETH port		Typical Max. Range with USER ETH port		Connector Type	Extended Temperature Version
			Max [dBm]	Min [dBm]			[km]	[miles]	[km]	[miles]		
1310	9/125 single mode	Laser	-8	-15	-34	-28	47	29.2	20	12.4	ST, SC, FC/PC	Yes
1310	62.5/125 multimode	LED	-14	-20	-32	-30	7	4.3	2	1.2	ST, SC	No
1550	9/125 single mode	Laser	-8	-15	-34	-28	76	47.2	20	12.4	ST, SC, FC/PC	Yes
1310	9/125 single mode	Laser (long haul)	0	-5	-34	-34	72	44.7	40	24.8	ST, SC, FC/PC	Yes
1550	9/125 single mode	Laser (long haul)	0	-5	-34	-34	120	74.5	80	49.7	ST, SC, FC/PC	Yes
Tx 1310 Rx 1550	9/125 single mode	Laser WDM (SF1)	-8	-15	-34	-28	47	29.2	20	12.4	SC	No
Tx 1550 Rx 1310	9/125 single mode	Laser WDM (SF2)	-8	-15	-34	-28	47	29.2	20	12.4	SC	No
1310	9/125 single mode	Laser (SF3)	-8	-15	-27	-27	20	12.4	20	12.4	SC/APC only	No
Tx 1310 Rx 1550	9/125 single mode	Laser WDM (long haul SF4)	0	-5	-36	-34	76	47.2	40	24.8	SC	Yes
Tx 1550 Rx 1310	9/125 single mode	Laser WDM (long haul SF5)	0	-5	-36	-34	76	47.2	40	24.8	SC	Yes

Note: Typical ranges are calculated according to attenuation of 0.4 dB/km for 1310 nm single mode fiber and 0.25 dB/km for 1550 nm single mode fiber.

MANAGEMENT**Authentication**

- Password
- Manager list

Control Port

Interface: RS-232 DCE asynchronous
Rate: 9.6, 19.2, 38.4, 57.6, 115.2 kbps
Connector: Mini-USB 5

Ethernet Management Port

Type: 10/100BaseT
Connector: shielded RJ-45
Max. Frame Size: 1536 bytes

TIMING**Uplink**

Internal timing mode

E1 Channel

Transparent, independent for each channel

V.35 Interface

Internal
External
Loopback timing

RESILIENCY

Power supply redundancy
Uplink redundancy

DIAGNOSTICS**Alarms**

Alarm buffer

Alarm Relay

Normally-closed/normally-open contacts
for major and minor alarm indication
Connector: RJ-45
Contact rating: maximum 0.5A (at 30 VDC
or 30 VAC) through closed contacts

Events

Event log

Optimux-108, Optimux-106

Fiber Multiplexer for 4E1/4T1 and Ethernet or Serial Data

GENERAL

Environment

Temperature: 0° to 55°C (32° to 131°F)

Extended temperature range (metal enclosure only): -20° to 65°C (-4° to 149°F)

Note: The extended temperature range for Optimux-108 with V.35 interface is 10° to 60°C (14° to 140°F)

Note: The storage temperature range for OP-108/B/R/ETH/SC/13LH/H/D is -40° to 60°C (-40° to 140°F)

Humidity: Up to 90%, non-condensing

Indicators

Front Panel:

PWR

- On (green): both power supplies OK
- On (red): power supply A fault
- On (yellow): power supply B fault
- Off: Both power supplies fault or no power

LOS/AIS – LINK A/B

- On (red): Sync/Signal Loss on Link A/B
- On (yellow): AIS detected (products without Ethernet port only)
- Off: normal operation

LOS/AIS – CH1 to CH4

- On (red): Signal Loss on channel
- On (yellow): AIS received on channel
- Off: normal operation

Rear Panel:

Sig Link A/B (on the fiber optic module)

- On (green): signal exists on Link A/B
- Off: no signal on Link A/B

LINK/ACT

- On (yellow): link is up
- Off: link is down
- Blinking: frames are transmitted

100

- On (green): 100 Mbps mode
- Off: 10 Mbps mode

Physical

Plastic enclosure:

- Height: 4.37 cm (1.7 in)
- Width: 21.7 cm (8.5 in)
- Depth: 17.0 cm (6.7 in)
- Weight: 0.5 kg (1.1 lb)

Metal enclosure:

- Height: 4.37 cm (1.7 in)
- Width: 21.5 cm (8.4 in)
- Depth: 15.3 cm (6.0 in)
- Weight: 0.7 kg (1.5 lb)

Power

Wide range power supply

- AC: 100 to 240 VAC
 - DC: -48 VDC (-40 to -125 VDC)
- 24 VDC power supply
- 24 VDC (20 to 36 VDC)

Power Consumption

Wide range power supply

- AC: 25 VA max
 - DC (-48 VDC): 9W max
- 24 VDC power supply
- 9W max

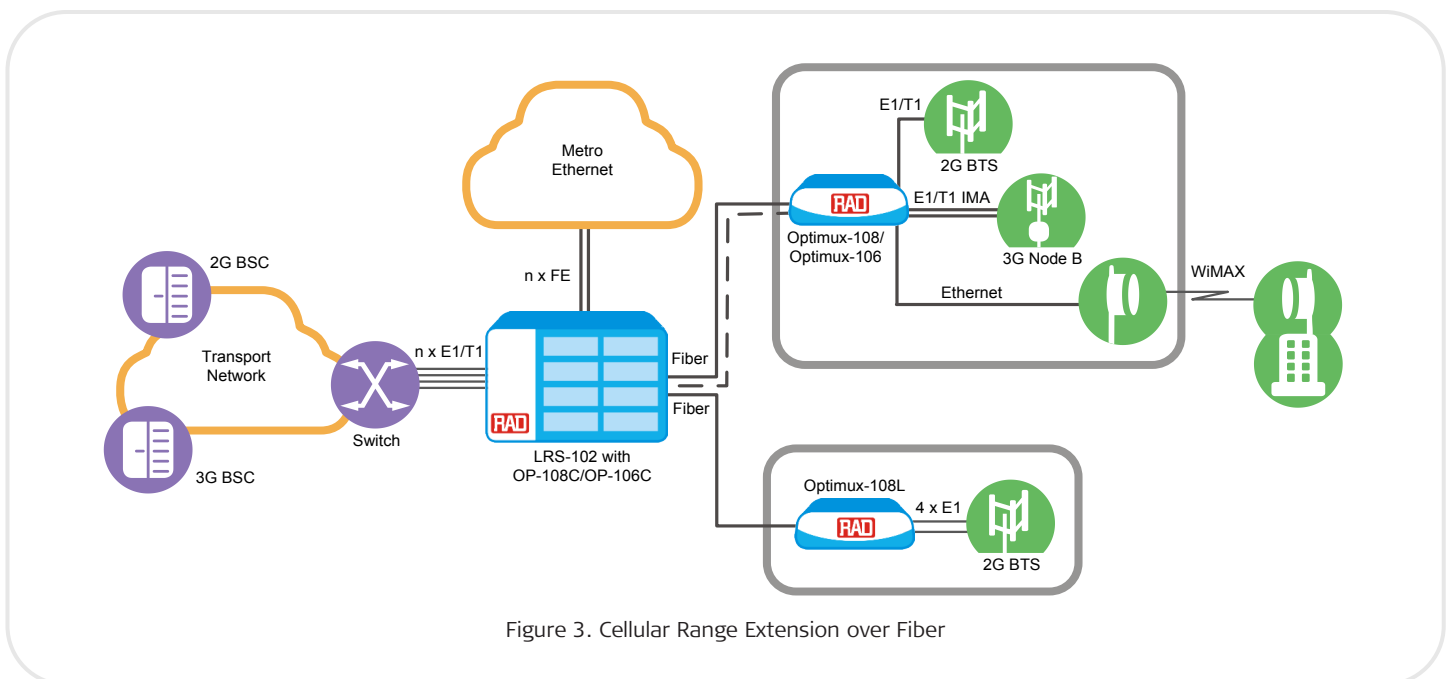


Figure 3. Cellular Range Extension over Fiber

Optimux-108, Optimux-106

Fiber Multiplexer for 4E1/4T1 and Ethernet or Serial Data

Ordering

RECOMMENDED CONFIGURATIONS

OP-108/B/ETH/FC/13L

Fiber multiplexer for 4E1 and Ethernet data, balanced E1 interface, 10/100BaseT Ethernet interface, FC connector, Tx/Rx 1310 nm single mode laser

OP-108/U/FC/13L

Fiber multiplexer for 4E1 data, unbalanced E1 interface, FC connector, Tx/Rx 1310 nm single mode laser

OP-108/U/ETH/FC/13L/ME

Fiber multiplexer for 4E1 and Ethernet data, unbalanced E1 interface, 10/100BaseT Ethernet interface, FC connector, Tx/Rx 1310 nm single mode laser, metal enclosure

OP-108/B/ETH/SC/SF1

Fiber multiplexer for 4E1 and Ethernet data, balanced E1 interface, 10/100BaseT Ethernet interface, SC connector, Tx 1310 nm WDM laser, Rx 1550 nm, single fiber

OP-108/B/ETH/SC/SF2

Fiber multiplexer for 4E1 and Ethernet data, balanced E1 interface, 10/100BaseT Ethernet interface, SC connector, Tx 1550 nm WDM laser, Rx 1310 nm, single fiber

OP-106/ETH/ST/13L

Fiber multiplexer for 4T1 and Ethernet data, balanced T1 interface, 10/100BaseT Ethernet interface, ST connector, Tx/Rx 1310 nm single mode laser

OP-106/SC/13L

Fiber multiplexer for 4T1 data, balanced T1 interface, SC connector, Tx/Rx 1310 nm single mode laser

OP-106/SC/SF3

Fiber multiplexer for 4T1 data, balanced T1 interface, SC connector, Tx/Rx 1310 nm single mode laser, single fiber

OP-106/ETH/SC/13L

Fiber multiplexer for 4T1 and Ethernet data, balanced T1 interface, 10/100BaseT Ethernet interface, SC connector, Tx/Rx 1310 nm single mode laser

OP-106/R/SC/13L

Fiber multiplexer for 4T1 data, redundant power supply, balanced T1 interface, SC connector, Tx/Rx 1310 nm single mode laser

SPECIAL CONFIGURATIONS

Please contact your local RAD partner for additional configuration options.

SUPPLIED ACCESSORIES

AC power cord
DC adapter plug

CBL-RJ45-DB9/F

Alarm port cable

CBL-AMP-M34

Cable to connect the Optimux-108 Smart Serial interface connector to the M34 connector of the user equipment

OPTIONAL ACCESSORIES

CBL-AMP-DB25-ISO2110

Cable to connect the Optimux-108 Smart Serial interface connector to the user equipment DB-25 connector with ISO 2110 pinout

CBL-AMP-DB25-TLBS

Cable to connect the Optimux-108 Smart Serial interface connector to the user equipment DB-25 connector with Telebras pinout

RM-33-2

Hardware kit for mounting one or two plastic units in a 19-inch rack

RM-35/@

Hardware kit for mounting one or two metal units in a 19-inch rack

Legend

@ Rack mount kit (Default=both kits):

- P1 Mounting one unit
- P2 Mounting two units

WM-35-TYPE4

Hardware kit for mounting 8.5-inch units in metal enclosure on a wall

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Your Network's Edge

Optimux-108L

Fiber Multiplexer for 4E1 and Ethernet



- Four E1 channels and Fast Ethernet link multiplexed over a fiber optic link
- Various fiber interfaces: multimode, single-mode (up to 120 km), and/or single-mode over single fiber
- Management via dedicated Ethernet port, SNMP management station, Telnet or Web Server
- Transparent clocking

The Optimux-108L multiplexer combines four E1 channels and an optional Ethernet link over a fiber optic uplink.

A pair of Optimux-108L units provides a simple and cost-effective solution for connectivity over distances of up to 120 km (74.5 miles).

Optimux-108L is available in two versions. The default is a fully-managed unit with the management Ethernet port. Optimux-108L can also be ordered with basic management capabilities (Optimux-108L/BM). The latter unit is equipped with DIP switches.

Optimux-108L is a compact standalone unit, available in a plastic or metal enclosure. The optional rack-mount adapter kits enable installation of one or two (side-by-side) units in a 19-inch rack.

MARKET SEGMENTS AND APPLICATIONS

Optimux-108L transparently extends TDM and Ethernet services over fiber links.

Optimux-108L serves mobile operators for 2G/Wimax backhauling over fiber (see *Figure 1*).

Carriers and service providers can use Optimux-108L for TDM and ETH aggregation to PDH/SDH/SONET with clear migration to IP networks over fiber.

Enterprises, utility and transportation companies can use Optimux-108L for TDM and ETH services in P2P/Star topologies over dark fiber.



OPTICAL INTERFACES

Optimux-108L features a variety of built-in optical uplink interfaces including:

- 1310 nm LED for multimode fiber
- 1310/1550 nm laser diode or long haul laser diode for extended range over single-mode fiber
- Single fiber (SF1, SF2, SF4, SF5 options) using a 1310 nm and 1550 nm laser diode transmitter with WDM technology, which enables the laser to transmit the signal at a different wavelength than the receive signal
- Single fiber (SF3 option) using SC/APC (Angle-Polished Connector) technology, with a 1310 nm laser diode for single wavelength operation.



Optimux-108L

Fiber Multiplexer for 4E1 and Ethernet

TDM

Optimux-108L has four balanced or four unbalanced E1 tributary channels.

Each of the four signals of the tributary interface is transmitted independently, ensuring that each channel can be set to a different clock source.

MANAGEMENT AND SECURITY

A fully-managed Optimux-108L can be configured and managed remotely or locally via the Ethernet management port using:

- SNMPv1 management station
- Web Server
- Telnet.

An Optimux-108L/BM can be managed remotely using one of the following:

- Remote OP-108C card in an LRS-102 or Megaplex-4100 chassis
- Fully-managed Optimux-108L unit
- Optimux-108 unit.

MONITORING AND DIAGNOSTICS

Optimux-108L features comprehensive test and diagnostic capabilities that include local and remote loopbacks on the uplink interface and on each E1 tributary channel. The loopbacks can also be generated via the corresponding LRS-102/OP-108C or MP-4100/OP-108C card or Optimux-108 units.

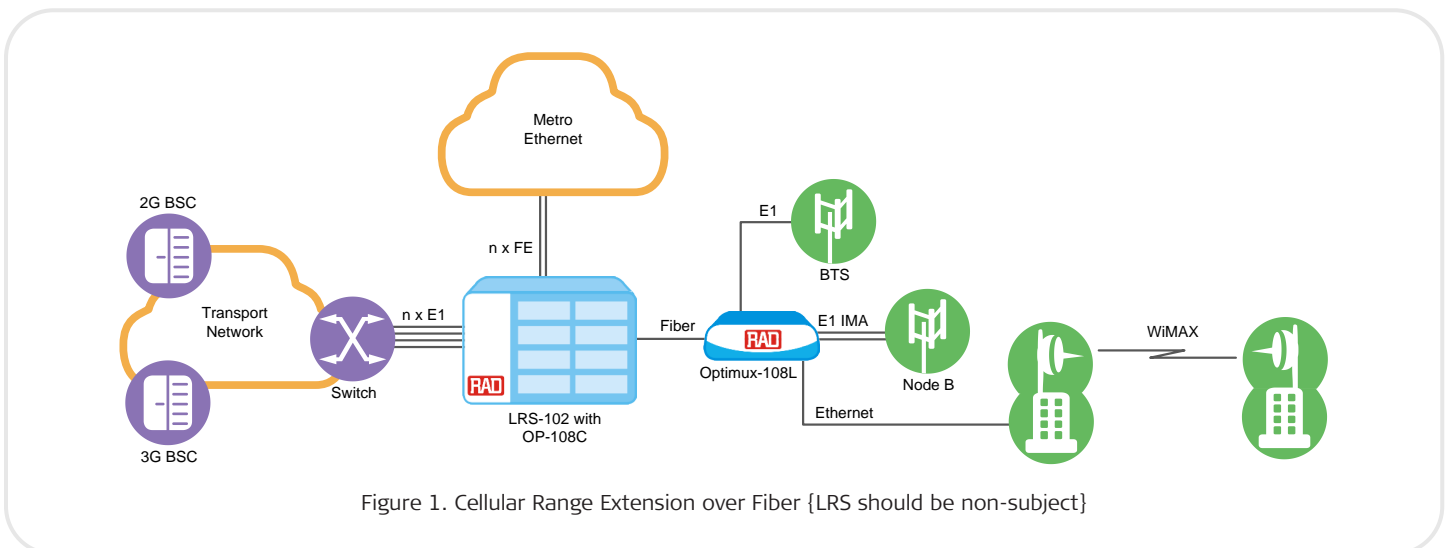
In Optimux-108L/BM, local and remote loopbacks can also be generated using the local DIP switch of the local or remote Optimux-108L unit.

To facilitate system diagnostics, Optimux-108L features LED status indicators, AIS alarm recognition, and LOS alarm recognition on the optical link and on E1 channels 1 to 4.

POWER

Optimux-108L may be ordered with two different power supplies:

- Wide-range AC/DC power supply that can be connected to either an AC power source (100 to 240 VAC), or to a DC power source (-40 VDC to -125 VDC)
- -48 VDC on-board power supply (-40 to -57 VDC).



Specifications

OPTICAL INTERFACE

Number of Ports

One

Type

Fiber

Connectors

ST, SC, FC/PC, SC/PC

Note:

- SF1/SF2/SF4/SF5 options are available with SC connector only
- SF3 option is available with SC/APC connector only.

Compliance

G.955

E1 INTERFACES

Number of Ports

4

Data Rate

2048 kbps

Line Coding

HDB3

Impedance

Balanced: 120Ω

Unbalanced: 75Ω

Compliance

ITU-T Rec. G.703, G.823,

G.742 (Optimux-108L without Ethernet USER port)

Connectors

Balanced: RJ-45

Unbalanced: two BNC

ETHERNET USER INTERFACE

Type

10/100BaseT

Compliance

Ethernet: IEEE 802.3

Connectors

Shielded RJ-45

Throughput

100 Mbps

MANAGEMENT

Ethernet Management Port

Type: 10/100BaseT

Connectors: Shielded RJ-45

TIMING

Uplink: internal

E1 tributary: transferred transparently, independent for each channel

DIAGNOSTICS

Local and remote loopbacks on uplink and on each E1 tributary link

GENERAL

Environment

Operating temperature: 0° to 55°C (32° to 131°F)

Extended temperature range (metal enclosures only): -20° to 65°C (-4° to 149°F)

Humidity: Up to 90%, non-condensing

Front Panel Indicators

PWR

On (green): power supply is OK

Off: power supply is off or faulty

LOS/AIS LINK

On (red): Sync/signal loss on Uplink

On (yellow): AIS detected (products without user Ethernet port only)

Blinking (yellow): Loop is performed on uplink (Optimux-108L/BM only)

Off: normal operation

LOS/AIS CH1 to CH4

On (red): Signal loss on channel

On (yellow): AIS received on channel

Blinking (yellow): Loop is performed on channel (Optimux-108L/BM only)

Off: normal operation

Rear Panel Indicators

LINK SD

On (green): Optical signal is detected

Off: No optical signal is detected

LINK/ACT (For both MNG and USER

Ethernet ports)

On (yellow): link is up

Off: link is down

Blinking: frames are transmitted

100 (For both MNG and USER Ethernet ports)

On (green): 100 Mbps

Off: 10 Mbps

Physical

Plastic enclosure:

Height: 4.37 cm (1.7 in)

Width: 21.7 cm (8.5 in)

Depth: 17.0 cm (6.7 in)

Weight: 0.5 kg (1.1 lb)

Metal enclosure:

Height: 4.37 cm (1.7 in)

Width: 21.5 cm (8.4 in)

Depth: 15.3 cm (6.0 in)

Weight: 0.7 kg (1.5 lb)

Power

Wide-Range

AC: 100 to 240 VAC

DC: -48 VDC (-40 to -125 VDC)

On-board

-48 VDC (-40 to -57 VDC)

Power Consumption

Fully-managed product:

Wide-range: 18 VA, 6W

On-board -48 VDC: 5W

Optimux-108L/BM:

Wide-range: 11 VA, 2.7W

On-board -48 VDC: 2W

Push Button

SET DEF: returns IP Address, IP Mask and Default gateway parameters to their default values

Optimux-108L

Fiber Multiplexer for 4E1 and Ethernet

Ordering

RECOMMENDED CONFIGURATIONS

OP-108L/B/ETH/SC/13L

Fiber multiplexer for 4E1 and Ethernet, balanced E1 interface

OP-108L/B/ETH/SC/SF1

Fiber multiplexer for 4E1 and Ethernet, balanced E1 interface, 10/100BaseT, SC connector, Tx 1310 nm WDM laser, Rx 1550 nm, single fiber

OP-108L/B/ETH/SC/SF2

Fiber multiplexer for 4E1 and Ethernet, balanced E1 interface, 10/100BaseT, SC connector, Tx 1550 nm WDM laser, Rx 1310 nm, single fiber

OP-108L/B/ETH/SC/SF4

Fiber multiplexer for 4E1 and Ethernet, balanced E1 interface, 10/100BaseT, SC connector, Tx 1310 nm WDM laser, Rx 1550 nm, long-haul

OP-108L/B/ETH/SC/SF5

Fiber multiplexer for 4E1 and Ethernet, balanced E1 interface, 10/100BaseT, SC connector, Tx 1550 nm WDM laser, Rx 1310 nm, long-haul

OP-108L/BM/B/SC/13L

Fiber multiplexer for 4E1 and Ethernet, Basic Management, balanced E1 interface, SC connector, 1310 nm single mode laser

OP-108L/BM/B/ETH/SC/13L

Fiber multiplexer for 4E1 and Ethernet, Basic Management, balanced E1 interface, 10/100BaseT, SC connector, 1310 nm single mode laser

SPECIAL CONFIGURATIONS

Please contact your local RAD partner for additional configuration options.

SUPPLIED ACCESSORIES

AC power cord (when AC power supply is ordered)

DC connection kit (when DC power supply is ordered)

CBL-RJ45/2BNC/E1/X

Adapter cable (if unbalanced E1 interface is ordered)

OPTIONAL ACCESSORIES

RM-33-2

Hardware kit for mounting one or two plastic units into a 19-inch rack

RM-35/P1

Hardware kit for mounting one metal unit in a 19-inch rack

RM-35/P2

Hardware kit for mounting two metal units in a 19-inch rack

WM-35-TYPE4

Hardware kit for wall mounting of 8.5-inch units in metal enclosure

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