

Optimux-45, Optimux-45L

Multiplexers for 21E1/28T1 over Fiber or T3



Any Traffic over Fiber



- Up to 28 T1 or 21 E1 channels multiplexed into a single 45 Mbps data stream
- Combination of T1 and E1 channels
- Transmission over coax or fiber optic cable
- Range up to 110 km (68 miles)
- Ring and chain configurations (Optimux-45 only)

The Optimux-45 and Optimux-45L fiber optic multiplexers provide a simple, flexible and cost-effective solution for transporting multiple E1 and T1 signals at distances of up to 110 km (68 miles).

The multiplexers integrate up to 21 E1, 28 T1 or combination of E1 and T1 channels, over a single 45 Mbps data stream.

This provides an easily configurable solution, flexible enough to meet the specific requirements of a broad range of applications.



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Each of the E1/T1 channels is independent and can use a different clock.

The units are interoperable with RAD's FOM-T3 and FOMi-T3 devices.

Optimux-45 and Optimux-45L conform to ITU G.703, G.747, G.823, G.824, ANSI T1.107, T1.404, RFC3895, RFC3896 standards.

UPLINK

Two Optimux-45/45L units can be connected using WDM (Wavelength Division Multiplexing) or bidirectional technology over a single fiber (SF) link, thus reducing fiber cable costs by 50%.

The following optical interfaces are available for the fiber main link:

- 850 nm VCSEL for multimode fiber
- 1310 nm LED for multimode fiber
- 1310 and 1550 nm laser for extended range over single mode fiber
- 1310 and 1550 nm laser for single fiber WDM operation
- 1310 nm laser for single fiber/single wavelength operation.

TRIBUTARY CHANNELS

Optimux-45 and Optimux-45L are available with either balanced or unbalanced tributary ports.

Optimux-45 is available with 4, 8, 12, or 28 RJ-45 connectors or with 21 mini-BNC connectors.

Optimux-45L is provided with two 64-pin Telco connectors for balanced or unbalanced tributary ports.

NETWORK TOPOLOGY (OPTIMUX-45 ONLY)

Optimux-45 supports chain and ring configurations, facilitating several E1 or T1 services at each node.

In ring topology (see *Figure 2, Figure 4*), Optimux-45 provides a full path protection mechanism that enables the nodes to maintain all communication services, even in the event of a link failure.

Special partially equipped versions are available for ring and chain applications with different number of tributary channels (see *Table 1* for detail).

Ring or chain configuration is performed using RADview network management system.

MANAGEMENT

Optimux-45/45L can be configured and monitored locally using an ASCII terminal connected to the control port or remotely via the Ethernet management port using:

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

Inband management of a remote Optimux-45/45L unit is performed via the fiber optic/coax uplink.

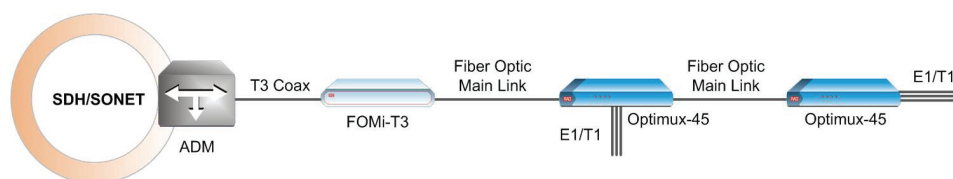


Figure 1. Daisy Chain Application (Optimux-45 only)

DIAGNOSTICS

To facilitate system diagnostics, Optimux-45/45L features LED status indicators, AIS alarm generation, alarm dry contacts interface, and diagnostic loopbacks on the E1/T1 and T3 links.

REDUNDANCY

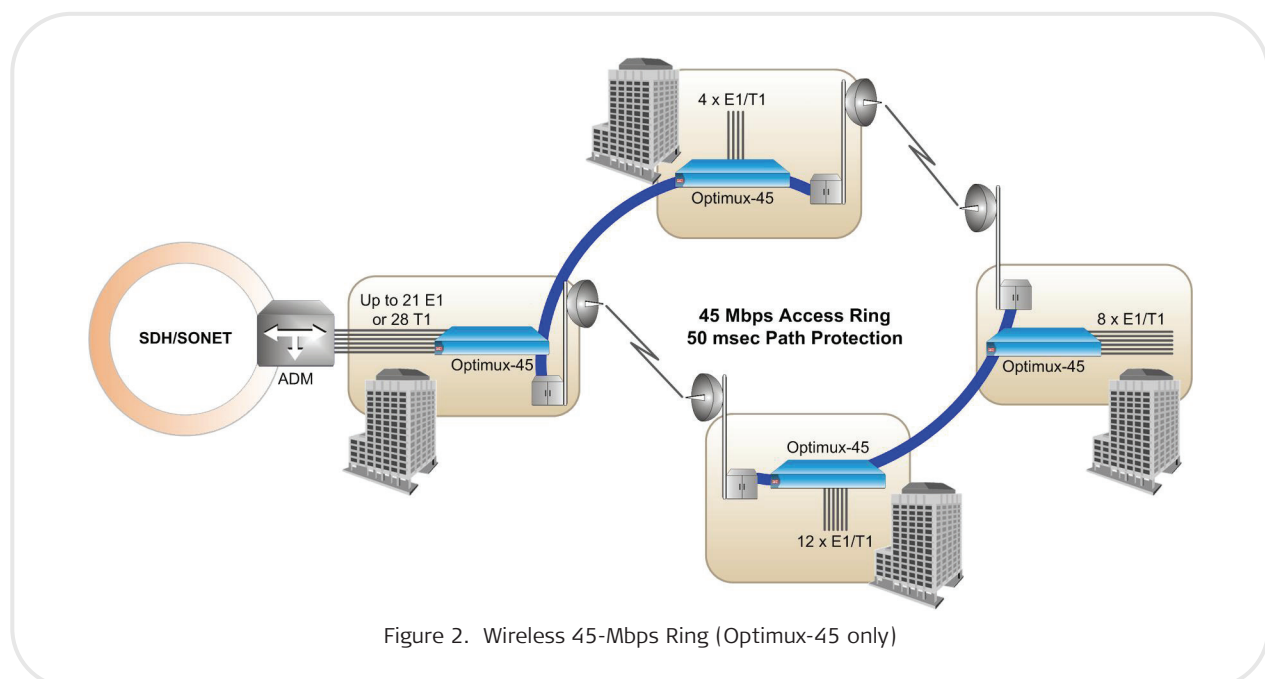
When required, critical hardware components can be backed up. This ensures that any single point of failure will not disrupt the entire system. An optional hot-swappable second main link provides backup, using automatic switchover upon link failure. An optional second power supply provides power redundancy for fail-safe operation.

PHYSICAL

Optimux-45 and Optimux-45L are available as compact 1U-high units that can be mounted in a 19-inch (ANSI) or ETSI rack.

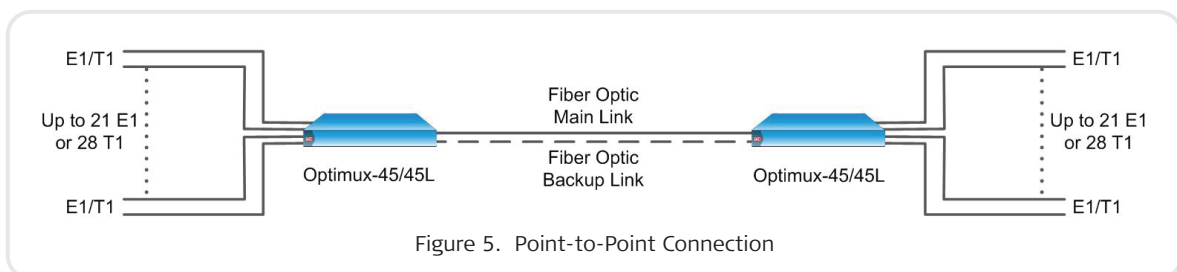
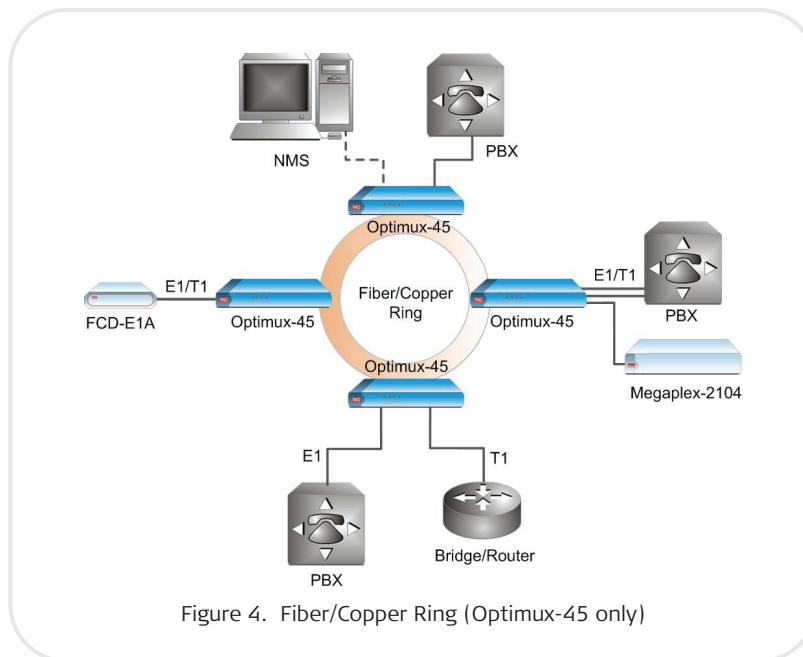
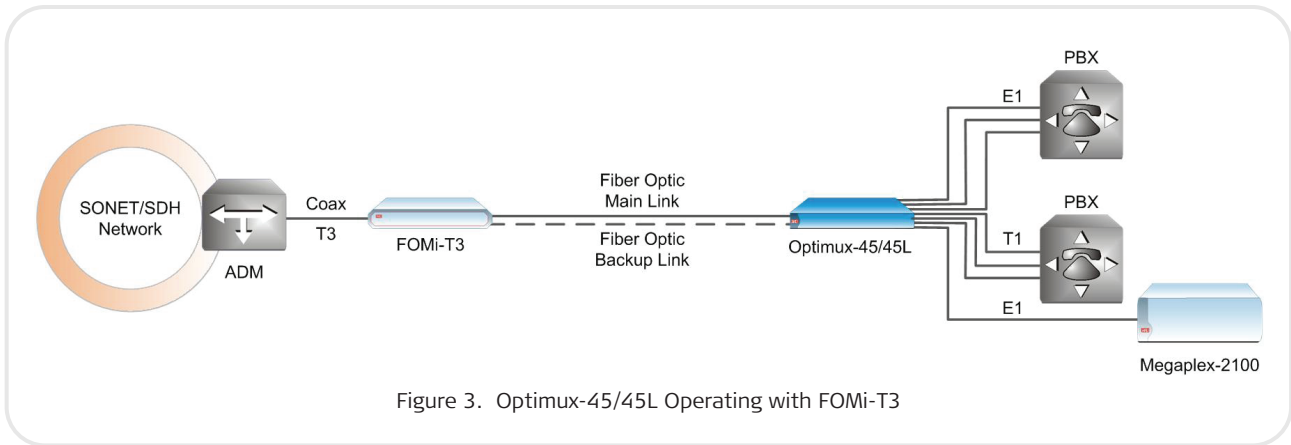
Table 1. Tributary Channel Options (Optimux-45 only)

Ordering Option	No. of T1 Channels	No. of E1 Channels
4X	4	3
8X	8	6
12X	12	9
21X	–	21 (unbalanced)
28X	28	21



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Specifications

UPLINK

Data Rate (T3)

44.736 Mbps

Redundancy

Optional second link

Interface Characteristics

See *Table 2*

Additional Electrical Interface Characteristics

Standards: G.703, G.824

Line Code: B3ZS

Impedance: 75Ω, unbalanced

TRIBUTARY CHANNELS

Interface Type

Balanced or unbalanced
(according to ordering)

Number of Channels

Optimux-45

E1: 3, 6, 9, or 21

T1: 4, 8, 12, or 28

Optimux-45L

E1: 21

T1: 28

Standards

G.703, G.823, G.824

Data Rate

E1: 2.048 Mbps

T1: 1.544 Mbps

Line Code

E1: HDB3 or AMI

T1: B8ZS or AMI

Impedance

E1: 120Ω, balanced

75Ω, unbalanced

T1: 100Ω, balanced

Range

According to ITU-T Rec. G.703

Jitter

E1: According to ITU-T G.823

T1: According to ITU-T Rec. G.824

Connectors

Optimux-45

Balanced: Shielded RJ-45

Unbalanced: Two shielded mini-BNC

Optimux-45L

Two Telco 64-pin for all channels

SUPERVISORY AND MANAGEMENT PORTS

Control Port

Interface: RS-232

Connector: DB-9

Ethernet Port

Interface: 10BaseT

Connector: RJ-45

GENERAL

Alarm Relay

DB-9 connector with dry relay contacts,
for major and minor alarms

Station Clock

Optional external station clock input, using
RJ-45 connector via optional station clock
module

Note: *Station clock is not available for wireless
signal support of Optimux-45 units.*

Diagnostics

LLB – Local Loopback on the E1/T1 layer
and DS3 layer (LLB on DS3 layer not
supported in daisy chain and ring
applications)

RLB – Remote Loopback on the E1/T1
layer and DS3 layer

Monitoring

Built-in monitoring capabilities of each
one of the tributary input channels

Indicators

PWR (green/red) – power is ON (green),
power is faulty (red), power is OFF (no
light)

LINK A/B SYNC LOSS (red) – DS3 signal is
not detected or out of frame in
Link A/B

LINK A/B AIS (yellow) – AIS signal is
detected in Link A/B

MAJOR (red) – major alarm

MINOR (yellow) – minor alarm

TEST (yellow) – unit is in test mode
(Loopback)

FLT (red) – reserved for future use

Power

Number of power supplies: one or two
(power sharing and redundancy)

AC Power Module:

100 to 240 VAC, 50/60 Hz; max. 90VA

(Optimux-45), max. 70 VA (Optimux-45L)

DC Power Module:

-48 VDC (-40 to -72 VDC), max. 30W

24 VDC (±10%), Max. 30W

Physical

Height: 4.4 cm (1.7 in)

Width: 43.8 cm (17 in)

Depth: 24 cm (9.4 in)

Weight: Optimux-45: 4.5 kg (11.3 lb)

Optimux-45L: 3.8 kg (8.4 lb)

Environment

Temperature:

Optimux-45

AC units: 0°–50°C (32°–122°F)

DC units: -22°–65°C (-7.6°–149°F)

Optimux-45L

0–55°C (32–131°F)

Humidity: up to 90%, non-condensing

Optimux-45, Optimux-45L

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Table 2. Uplink Interface Options

Module Name (Ordering Option)	Wavelength	Fiber Type	Transmitter Type	Power Coupled into Fiber [dBm]	Receiver Sensitivity [dBm]	Typical Max. Range		Connector Type
	[nm]	[μm]				[km]	[miles]	
OP-M/CX/45	–	Coax cable	–	–	–	Per ITU-T G.703 Standard		Shielded BNC
OP-M/SC/85L OP-M/FC/85L OP-M/ST/85L	850	62.5/125 multimode	Laser (VCSEL)	-14 to -20	-26	2.0	1.2	SC, FC, ST
OP-M/SC/13M OP-M/ST/13M	1310	62.5/125 multimode	LED	-14 to -20	-31	5.5	3.4	SC, ST
OP-M/SC/13L OP-M/FC/13L OP-M/ST/13L	1310	9/125 single mode	Laser	-8 to -15	-31	38	23.6	SC, FC, ST
OP-M/SC/15L OP-M/FC/15L OP-M/ST/15L	1550	9/125 single mode	Laser	-8 to -15	-31	25	15.5	SC, FC, ST
OP-M/SC/13LH OP-M/FC/13LH OP-M/ST/13LH	1310	9/125 single mode	Laser (long haul)	0 to -5	-34	60	37.2	SC, FC, ST
OP-M/SC/15LH OP-M/FC/15LH OP-M/ST/15LH	1550	9/125 single mode	Laser (long haul)	0 to -5	-34	110	68.4	SC, FC, ST
OP-M/SC/SF1	Tx: 1310 Rx: 1550	9/125 single mode (single fiber)	Laser WDM	-8 to -15	-29	40	24.8	SC
OP-M/SC/SF2	Tx: 1550 Rx: 1310	9/125 single mode (single fiber)	Laser WDM	-8 to -15	-29	40	24.8	SC
OP-M/SC/SF3	Tx/Rx: 1310	9/125 single mode (single fiber)	Laser (SF3)	-8 to -15	-27	20	12.4	SC/APC

Note: The ranges specified above were calculated according to the following typical attenuation rates (with a 3 dB margin):

- 3.5 dB/km for 850 nm multimode
- 0.4 dB/km for 1310 nm single mode
- 0.25 dB/km for 1550 nm single mode

Ordering

STANDARD CONFIGURATIONS

OP-45/B/28X/AC/R/CX

OP-45/B/28X/48/R/SC/13L/D

OP-45/B/28X/AC/R/ST/13L/D

OP-45L/B/AC/R/SC/13L

OP-45L/B/48/R/SC/13L/D

SPECIAL CONFIGURATIONS

OP-45/£/^/~/@/?/#/+/\$/f

Multiplexers for 21E1/28T1 over Fiber or T3

OP-45L/£/~/@/?/#/+/\$

Multiplexers for 21E1/28T1 over Fiber or T3, for P2P Applications

OP-M/#/+

Uplink interface module

Legend

£ Channel interface:

B Balanced E1/T1 interface

U Unbalanced E1 interface

^ Number of user interfaces:

4X 4T1/3E1 balanced

8X 8T1/6E1 balanced

12X 12T1/9E1 balanced

21X 21E1 unbalanced

28X 28T1/21E1 balanced

~ Power supply:

AC 100 to 240 VAC

48 -48 VDC

24 24 VDC

AD 100 to 240 VAC plus redundant
-48 VDC (for Optimux-45 only)

@ Redundant power supply
(Default=single power supply):

R Redundant power supply
(identical to the first power
supply)

? Station clock (Default=no station clock):

STC Station clock

Uplink connector:

CX Electrical interface with coaxial
BNC connectors

ST ST fiber

SC SC fiber


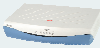





FC FC fiber

Notes:

1. For single fiber connection, only SC type connectors are available. For 1310 nm multimode LED option, only SC and ST type connectors are available.

2: For SF3 single wavelength module only SC (APC) type connectors are available.

Table 2. Optimux Comparison Table

Feature	OP-108L	OP-108/106	OP-134/125	OP-1032/1025	OP-45/45L	OP-1551	OP-1553
							
Uplink	Fiber Optic	Fiber Optic	E3, Fiber Optic	Fiber Optic	T3, Fiber Optic	Copper, STM-1/OC-3	Copper, STM-1/OC-3
Bandwidth (Mbps)	108	108/106	34/25 or 134/125	Proprietary	45	155	155
Number of trunks	4 E1	4 E1/4 T1	16 E1/16 T1	16 E1/16 T1	21 E1/28 T1	21/42/63 E1 28/56/84 T1	3 E3/3 T3
Ethernet support	✓	✓	✓	✓	–	–	–
Special features	Reduced power consumption cost-effective	Redundant, hot-swappable uplinks	Full bandwidth, Ethernet license activation	3xGbE User interfaces	Ring support (Optimux-45)	Full redundancy	Full redundancy
Card version for LRS-102/ MP-4100	Works with OP-108C	✓	Works with OP-34C/OP-25C	–	–	–	–

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- +** Fiber uplink interface:
- 13** 1310 nm, multimode LED
 - 13L** 1310 nm, single mode, laser diode
 - 15L** 1550 nm, single mode, laser diode
 - 13LH** 1310 nm, single mode, long haul laser diode
 - 15LH** 1550 nm, single mode, long haul laser diode
 - 85L** 850 nm, multimode VCSEL
 - SF1** Transmit 1310 nm, receive 1550 nm
 - SF2** Transmit 1550 nm, receive 1310 nm
 - SF3** Single wavelength laser
Transmit 1310 nm, receive 1310 nm

Note: For single-fiber applications, a device with the SF-1 module should always be used opposite the device with the SF-2 module, and vice versa. The SF-3 module can be used on both sides of the link.

- \$** Redundant uplink (Default=no redundancy):
- D** Redundant uplink of the same type as the first
- f** Wireless signal support (Default=no wireless signal support):
- WR** Wireless signal support (not available if STC option is selected)

Notes:

1. In Optimux-45 Optional second main link must be ordered for ring applications.

2. Ring solutions require RADview-EMS element management software, to be ordered separately.

SUPPLIED ACCESSORIES

AC power cord (when AC power supply is ordered)
DC connection kit (when DC power supply is ordered)

CBL-OP-45
Monitoring cable
DB9F-DB9M
Terminal cross adapter

RM-34
Hardware kit for mounting one Optimux-45/45L unit into a 19-inch rack

OPTIONAL ACCESSORIES

CBL-DB9F-DB9M-STR
Terminal straight cable
CBL-TELCO-OPEN/2M
Adaptor cable Telco 64-pin, open ended, 2m long

Note: Two Telco-Open cable sets need to be ordered to support all of the tributary channels.

CBL-TELCO-TELCO/2M
Extension cable for balanced interface, Telco 64-pin to Telco 64-pin, 2m long

CBL-MINIBNC-BNC
Mini-BNC to BNC adapter cable for Optimux-45

OP-A-ADAPTOR-%

Optional patch panel interface adaptors for Optimux-45L to convert Telco connector into channel connectors

Legend

% Patch panel interface:

21BNC-45L Patch panel with 21 BNC unbalanced E1 interfaces, includes one CBL-TELCO-TELCO/UB cable
28RJ Patch panel with 28 balanced E1/T1 RJ-45 interfaces, includes two CBL-TELCO-TELCO/2M cables

CBL-TELCO-TELCO/UB

Extension cable for unbalanced interface for Optimux-45L, Telco 64-pin to Telco 64-pin, 2m long

RM-34/ETSI

Hardware kit for mounting one Optimux-45/45L unit into a 19-inch ETSI rack

WM-34

Hardware kit for mounting one Optimux-45/45L unit on the wall

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