

Optimux-1032, Optimux-1025

Fiber Optic Multiplexer for 16 E1/T1 and Gigabit Ethernet



- Multiplexes up to 16 E1/T1 with up to 3x10/100/1000 user Ethernet traffic over a proprietary 1000 Mbps fiber optic uplink
- Range extension of up to 120 km (74.5 miles)
- Fiber optic real-time Digital Diagnostic and Monitoring (DDM)
- Managed using RADview or RAD command line interface (CLI)
- Redundant hot-swappable uplink interfaces and power supplies



The Optimux product line is a part of RAD's Multiservice Access Platform and First Mile solutions. These solutions combines extensive support for legacy services with future-proof Ethernet capabilities to address the challenges faced by utilities, transportation networks, carriers, and mobile operators in migrating to next-generation networks and services with flexibility, efficiency and carrier-class reliability.

Optimux-1032 and Optimux-1025 provide a simple, flexible, and cost-effective point-to-point solution for transporting combined E1/T1 and Ethernet traffic over a fiber link, to distances of up to 120 km (74.5 miles).

The single-box solution for TDM and Ethernet offers a pay-as-you-grow model by supporting initial deployments of partial capacity with license-based upgrades when needed.

Optimux-1032/1025 includes two fiber optic uplinks (one main and one backup), three User Ethernet ports (one activated by default) and 16 E1 or T1 tributary ports (4 activated by default).

Each product features four licenses:

- TDM – additional 4, 8 or 12 TDM ports for a total of 16 TDM ports
- ETH – two additional GbE User ports for a total of three 10/100/1000 interfaces.

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MARKET SEGMENTS AND APPLICATIONS

Cellular Backhauling

Figure 1 demonstrates a mobile backhauling application where 2G/3G and WiMax services are transmitted transparently from rural locations to a central site over fiber. In such applications Optimux acts as a fiber extension reaching up to 120 km, eliminating the need for massive fiber deployments to rural areas.

Service Extension

Optimux-1025/1032 provides a solution to carriers and service providers, employing both TDM and PSN infrastructures and wishing to extend services in a single chassis solution. A carrier point-to-point application is shown in Figure 2.

Multiservice Sharing

Inter-branch connectivity for multiservice sharing of voice and data for university campuses, health care organizations, financial institutions, government offices can be established with Optimux-1025/1032. Such an enterprise application is shown in Figure 3.

Various interfaces (based on SFP transceivers) are available for both the active and the backup uplinks (see Table 1 and Ordering):

- 850 nm short haul VCSEL over multimode fiber for very short range applications
- 1310 nm short or long-haul laser and 1550 nm long-haul laser interfaces for extended range over single-mode fiber
- Single-fiber interface using WDM technology with a different wavelength of receive and transmit signals (1310 nm and 1490 nm, 1490 nm and 1570 nm).

RESILIENCY

Upon link failure, the unit automatically switches to an optional second uplink as a backup. Optimux-1032/1025 supports revertive and non-revertive protection modes.

TECHNOLOGY

Uplink Interfaces

Optimux-1032/1025 features a 1000 Mbps fiber optic uplink with bandwidth shared between Ethernet traffic and up to 16 TDM channels.

E1/T1 Interfaces

Optimux-1032/1025 multiplexes 16 E1/T1 channels. The E1 interfaces comply with the ITU-T G.823 and the T1 interfaces comply with the ITU-T G.824 for jitter requirements. Line coding is HDB3 for E1 and B8ZS or AMI for T1. A pair of LEDs monitors loss-of-signal and AIS on each E1/T1 receive line. By default, 4 TDM interfaces are activated, the remaining 12 ports can be activated via a software key.

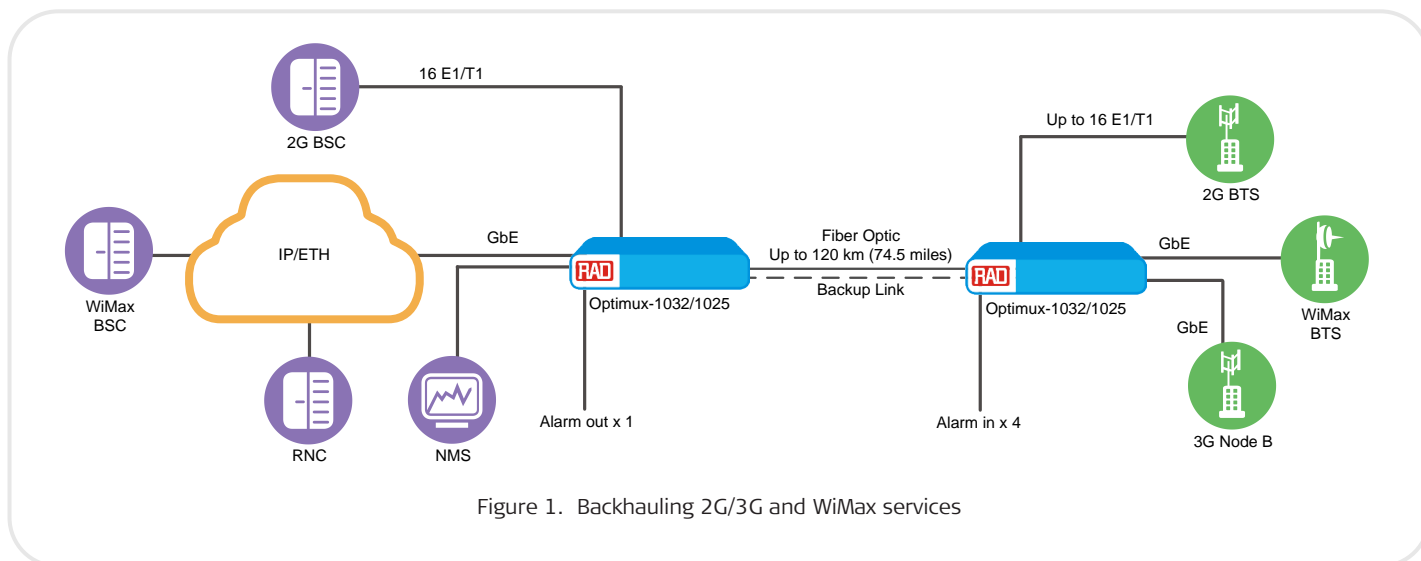


Figure 1. Backhauling 2G/3G and WiMax services

Ethernet USER Interfaces

Optimux-1032/1025 features 10/100/1000 Ethernet ports enabling up to 1000-Mbps Ethernet connection. It can be supplied with one or three 10/100/1000BaseT copper or 1000BaseX Fiber Ethernet ports with SerDes interface. When three ports are ordered, only one of them is activated by default. The second and third ports are activated via a software key.

The USER-ETH interfaces comply with the ITU-T G.802.3 requirements.

Timing

The Optimux devices transmit each E1/T1 channel separately so that the clock of each E1/T1 channel is independent. The devices support internal timing mode, which means that the uplink transmit clock is sourced from internal local oscillator.

MONITORING AND DIAGNOSTICS

Optimux features comprehensive test and diagnostic capabilities that include local and remote loopbacks on each E1/T1 port.

On the fiber optic interfaces the Optimux supports digital diagnostic monitoring (DDM) functions according to the SFF-8472 standard.

This feature enables the end user to monitor real-time parameters of the SFP, such as optical output and input power, temperature, laser bias current, and transceiver supply voltage.

To ease system diagnostics, Optimux features LED status indicators and AIS alarm generation and recognition. The devices also feature an optional output alarm port with dry relay contacts for major and minor alarms and an input alarm port that supports up to 4 input alarms.

MANAGEMENT AND SECURITY

Optimux-1032/1025 can be managed using the following tools:

- Local RS-232 terminal
- Telnet server
- RADview-EMS.

Optimux features RAD's Command Line Interface (CLI) and RADview-EMS to ease configuration and management.

In addition, the product incorporates security features including Secure Shell (SSH), SNMPv3 and RADIUS.

ARCHITECTURE

Optimux-1025 is a compact, 1U-high unit.

Optimux-1032 is available in:

- 1U-high enclosure with balanced E1 interface and RJ-45 connectors
- 2U-high enclosure with unbalanced E1 interface and BNC or IEC-169/13 connectors.

All the units can be mounted in a 19-inch, ETSI or 23-inch racks.

EXTENDED TEMPERATURE

An extended temperature option is available supporting a temperature range of -20° to 65°C (-4° to 149°F). This option is equipped with additional fans and must be used with H SFP versions only.

POWER

The units can be ordered with an AC power source (90 to 260 VAC), a DC power source (-40 to -72 VDC) or a wide-range power source (90 to 260 VAC and 40 to 375 VDC). The wide-range power source is available only with ordering options featuring a single USER-ETH interface (1NULL or 1UTP).

A second power supply can be ordered for power redundancy.

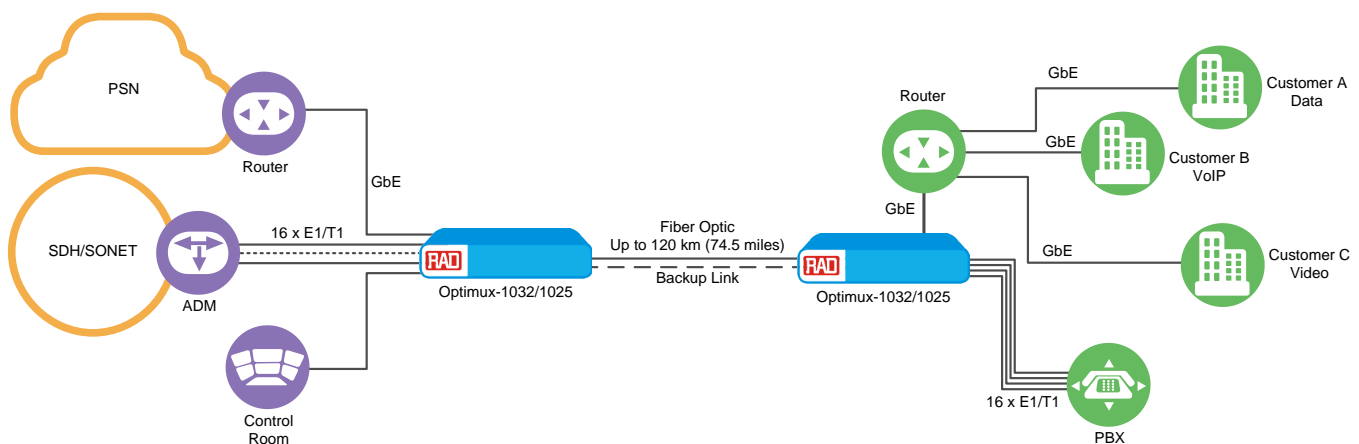


Figure 2. Carriers TDM and PSN Service Extension

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Specifications

NETWORK INTERFACES

Data Rate

1000 Mbps (proprietary, including TDM services)

Interface

See Table 1

Note: 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.

Connectors

SFP socket with standard MSA connector

E1/T1 INTERFACE

Number of Ports

16 (By default 4 ports are activated. The remaining 12 ports can be activated with license software)

Data Rate

E1: 2048 kbps
T1: 1544 kbps

Impedance

E1 balanced: 120Ω
E1 unbalanced: 75Ω
T1 balanced: 100Ω

Connectors

E1 balanced: RJ-45 (1U option)
E1 unbalanced: BNC or IEC-169/13 (2U option)
T1 balanced: RJ-45

USER ETHERNET INTERFACES

Type

Copper: 10/100/1000BaseT
Fiber: 1000BaseX with SerDes interface

Connectors

Copper: RJ-45
Fiber: SFP socket with standard MSA connector

Fiber Interface

See Table 1

Note: 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.

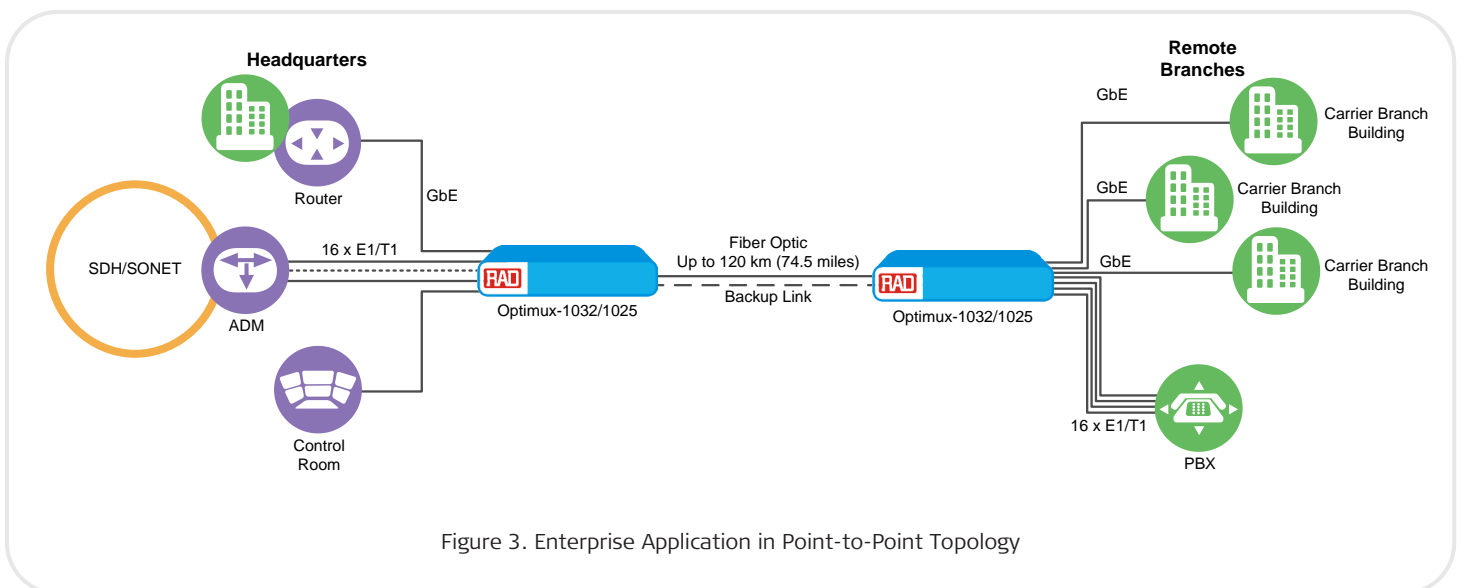


Figure 3. Enterprise Application in Point-to-Point Topology

CONTROL PORT**Type**

RS-232 DCE, asynchronous

Data Rate

9.6, 19.2, 115.2 kbps

Connector

9-pin D-type, female

OUTPUT ALARM PORT**Type**

Dry relay contacts for major and minor alarms

Connector

9-pin D-type, female

INPUT ALARM PORT**Number of Alarms**

4

Connector

15-pin D-type, female

Auxiliary Power

12 VDC +/- 10%
0.15 Amp max

INDICATORS**Power**

Off – Not powered
On (green) – Normal operation
On (red) – Power malfunction or not powered (when two power supplies are installed)

System

TST (yellow) – On: Diagnostic loop is performed or powering up
FLT (red) – Powering up

LINK A/B (per port)

SYNC LOSS (red) –
On: Signal loss detected on uplink
Blinking (LINK A only): Protection mode is non-revertive, LINK A is in standby
SIG (green) – Optical signal detected on uplink

USER-ETH Port

LINK/ACT (yellow) –
On: LAN link is up
Blinking: LAN traffic transfer
1000 (green) –
On: 1000 Mbps operation
Off (only for copper port): 10 or 100 Mbps operation

Note: Fiber USER-ETH port supports only 1000 Mbps.

Management Ethernet Port

LINK/ACT (yellow) –
On: LAN link is up
Blinking: LAN traffic transfer
100 (green) –
On: 100 Mbps operation
Off: 10 Mbps operation

E1/T1 Interface (per port)

SYNC LOSS (red) – Signal loss detected on E1/T1 link
AIS (yellow) – AIS detected on E1/T1 link

COMPLIANCE

OP-1032: ITU G.703, G.823, G.955, IEEE 802.3

OP-1025: ITU G.703, G.824, G.955, IEEE 802.3

TIMING

Uplink: internal
E1/T1 port: transferred transparently, independent for each channel

GENERAL**Power**

AC power supply: (90 to 260 VAC)
DC power supply (-40 to -72 VDC)

Wide-range power supply (90 to 260 VAC and 40 to 375 VDC). This power supply is available only with ordering options featuring a single USER-ETH interface (1NULL or 1UTP).

Power Consumption

AC power supply: 58 VA max
DC power supply: 23W max

Physical

1U-high
Height: 4.4 cm (1.8 in)
Width: 44 cm (17 in)
Depth: 24 cm (9 in)
Weight: 3.4 kg (7.5 lb)

2U-high (Optimux-1032 only)

Height: 8.8 cm (3.5 in)
Width: 44 cm (17 in)
Depth: 24 cm (9 in)
Weight: 4.0 kg (8.8 lb)

Environment

Temperature:
0°–45°C (32°–113°F) with regular SFP transceivers

0°–55°C (32°–131°F) with H SFP transceivers (see *Table 1*)

-20°–65°C (-4°–149°F) with Extended Temperature option and H SFP transceivers

Humidity: Up to 90%, non-condensing

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Table 1. Uplink Interface Options

Module Name (Ordering Option)	Wavelength, Fiber Type		Transmitter Type	Input Power [dBm]		Output Power [dBm]		Typical Max. Range	
	[nm]	[μ m]		[min]	[max]	[min]	[max]	[km]	[miles]
SFP-5	850, 50/125 multimode		VCSEL	-17	0	-9.5	0	0.55	0.3
SFP-5H	850, 50/125 multimode		VCSEL	-17	0	-9.5	0	0.55	0.3
SFP-5D	850, 50/125 multimode		VCSEL	-17	0	-9.5	0	0.55	0.3
SFP-5DH	850, 50/125 multimode		VCSEL	-17	0	-9.5	0	0.55	0.3
SFP-6	1310, 9/125 single mode		Laser	-20	-3	-9.5	-3	10	6.2
SFP-6H	1310, 9/125 single mode		Laser	-20	-3	-9.5	-3	10	6.2
SFP-6D	1310, 9/125 single mode		Laser	-20	-3	-9.5	-3	10	6.2
SFP-6DH	1310, 9/125 single mode		Laser	-20	-3	-9.5	-3	10	6.2
SFP-7DH	1550, 9/125 single mode		Laser	-22	-3	0	+5	80	49.7
SFP-8H	1310, 9/125 single mode		Laser	-21	-3	-4	+4	40	24.8
SFP-8DH	1310, 9/125 single mode		Laser	-21	-3	-4	+4	40	24.8
SFP-17A	Tx - 1310/Rx - 1490, 9/125 single mode (single fiber)		Laser (WDM)	-20	-3	-9	-3	10	6.2
SFP-17B	Tx - 1490/Rx - 1310, 9/125 single mode (single fiber)		Laser (WDM)	-20	-3	-9	-3	10	6.2
SFP-17AD	Tx - 1310/Rx - 1490, 9/125 single mode (single fiber)		Laser (WDM)	-20	-3	-9	-3	10	6.2
SFP-17BD	Tx - 1490/Rx - 1310, 9/125 single mode (single fiber)		Laser (WDM)	-20	-3	-9	-3	10	6.2
SFP-20EDH	1550, 9/125 single mode		Laser	-30	-8	0	+5	120	74.5
SFP-22A	Tx - 1490/Rx - 1570, 9/125 single mode (single fiber)		Laser (WDM)	-24	-3	0	+5	80	49.7
SFP-22B	Tx - 1570/Rx - 1490, 9/125 single mode (single fiber)		Laser (WDM)	-24	-3	0	+5	80	49.7
SFP-23A	Tx - 1310/Rx - 1550, 9/125 single mode (single fiber)		Laser (WDM)	-24	-3	-5	0	40	24.8
SFP-23B	Tx - 1550/Rx - 1310, 9/125 single mode (single fiber)		Laser (WDM)	-24	-3	-5	0	40	24.8
SFP-23AED	Tx - 1310/Rx - 1550, 9/125 single mode (single fiber)		Laser (WDM)	-24	-3	-5	0	40	24.8
SFP-23BED	Tx - 1550/Rx - 1310, 9/125 single mode (single fiber)		Laser (WDM)	-24	-3	-5	0	40	24.8

- Notes:**
1. Typical ranges are calculated according to attenuation of 0.4 dB/km for 1310 nm, 0.25 dB/km for 1550 nm for single mode fiber.
 2. All SFPs have LC connectors.
 3. D SFP versions support DDM, Internal calibration
 4. ED SFP versions support DDM, External calibration
 5. H SFP versions are industrially hardened (-40° C to 85° C)

Ordering

STANDARD CONFIGURATIONS

OP-1032

OP-1032/DCR/8SK/B/3NULL

OP-1032/ACR/A/8SK/U/3UTP

OP-1032/ACR/B/3UTP

OP-1032/ACR/8SK/B/2UTP1NULL/2SK

OP-1032/AC/8SK/B/3UTP/2SK

OP-1025

OP-1025/DC/8SK/3NULL

OP-1025/ACR/8SK/1UTP2NULL/2SK

OP-1025/AC/3UTP/2SK

SPECIAL CONFIGURATIONS

Please contact your local RAD partner for additional configuration options.

Uplink and fiber USER-ETH Interface (SFP)

Table 1 specifies the uplink and fiber USER-ETH interface options. To order uplink interface from RAD, refer to the *SFP Transceivers Data Sheet* at www.rad.com.

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.

Notes:

1. Single-fiber SFPs should always be used opposite the reciprocal single fiber SFP. For example, SFPs-17A should be used opposite SFP-17B.
3. RAD cannot guarantee full compliance to product specifications for units using non-RAD SFPs.
4. Optimux-1032/1025 is supplied with two uplink SFP sockets, the transceivers must be ordered separately.
5. The SFP transceivers for the USER-ETH fiber ports should also be ordered separately.

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SUPPLIED ACCESSORIES

AC power cord (when AC power supply is ordered)

DC connection kit (when DC power supply is ordered)

RM-34

Kit for mounting one 1U-high unit in a 19-inch rack

RM-36

Kit for mounting one 2U-high Optimux-1032 unit in a 19-inch rack

OPTIONAL ACCESSORIES

OP-1032-LIC/C/PA

OP-1025-LIC/C/PA

Software keys for activating TDM or Ethernet user ports

Legend

C Type of license:

E1 E1 TDM Activation (OP-1032)

T1 T1 TDM Activation (OP-1025)

ETH USER-ETH port Activation

PA Number of Ports to Activate:

2SK Additional 2 USER-ETH Port Activation

4SK Additional 4 TDM Port Activation

8SK Additional 8 TDM Port Activation

12SK Additional 12 TDM Port Activation

OP-1032-PS/AC

OP-1025-PS/AC

90-260 VAC power supply modules for adding a redundant power supply to an existing unit or replacing the original power supply module

OP-1032-PS/DC

OP-1025-PS/DC

-40 to -72 VDC (-48 VDC) power supply modules for adding a redundant power supply to an existing unit or replacing the original power supply module

OP-1032-PS

OP-1025-PS

90 to 260 VAC and 40 to 375 VDC wide-range power supply (available only with ordering options featuring a single USER-ETH interface (1NULL or 1UTP).

OP-1032-PS-BP

OP-1025-PS-BP

Blank panels for power supply modules