

# 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-EMS, or RAD command line interface (CLI)
- Redundant hot-swappable uplink interfaces and power supplies

Plug-and-play fiber  
multiplexer for 16  
TDM links and Gigabit  
Ethernet services

The Optimux product line is part of RAD's Access+ portfolio for Multiservice Access Platform and First Mile solutions. The portfolio 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.



data communications

The Access Company

# Optimux-1032, Optimux-1025

## Fiber Optic Multiplexer for 16 E1/T1 and Gigabit Ethernet

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.

### TYPICAL 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.

#### UPLINK INTERFACES

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

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).

#### LINK PROTECTION

- 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.

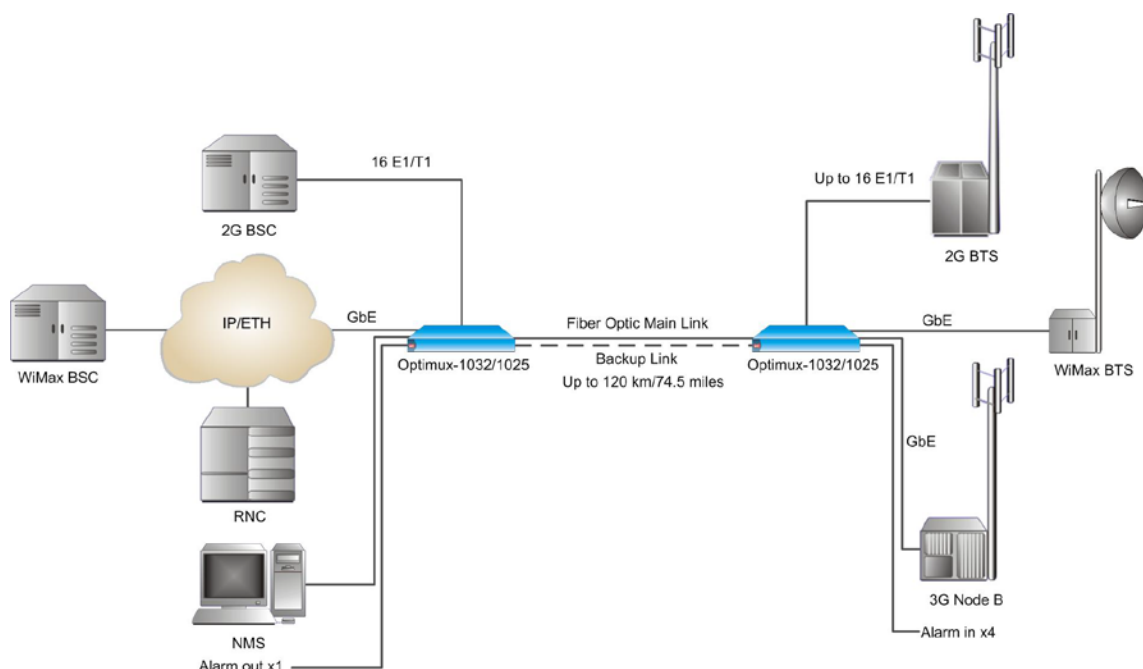


Figure 1. Backhauling 2G/3G and WiMax services

## 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.

## 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.

## 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

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.

## PHYSICAL

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.

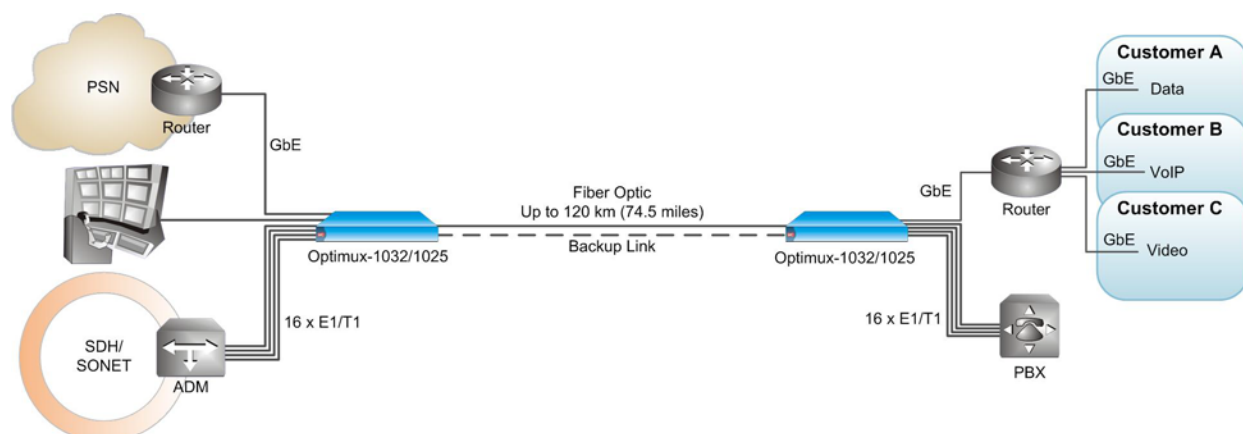


Figure 2. Carriers TDM and PSN Service Extension

# Optimux-1032, Optimux-1025

## Fiber Optic Multiplexer for 16 E1/T1 and Gigabit Ethernet

### Specifications

#### UPLINK INTERFACES (MAIN AND BACKUP)

##### 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.

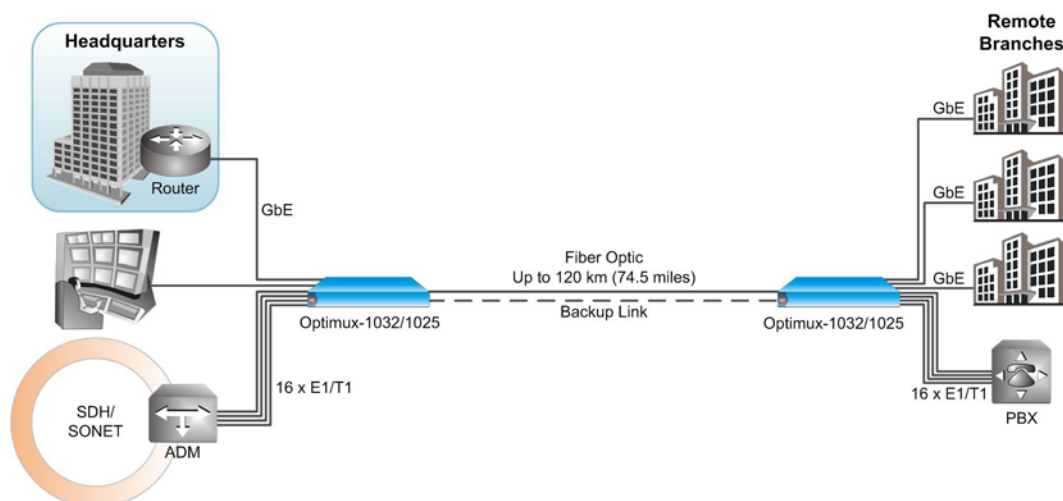


Figure 3. Enterprise Application in Point-to-Point Topology

**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.

**E1/T1 Interface (per port)**

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

**Management Port**

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

**GENERAL****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

**Diagnostics**

Local and remote loopbacks on each E1/T1 port  
Fiber DDM (USER-ETH and Uplink ports)

**Timing**

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

**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]	[μm]		[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
<b>Notes:</b> 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

#### OP-1032/!/A/?/C/PA/+3/EA

Fiber Optic Multiplexer for 16E1 and Gigabit Ethernet

#### OP-1025/!/A/?/PA/+3/EA

Fiber Optic Multiplexer for 16T1 and Gigabit Ethernet

#### Legend

**I** Power supply:

**AC** 90 to 260 VAC power supply

**ACR** Two AC power supplies

**DC** -40 to -72 VDC (-48 VDC) power supply

**DCR** Two DC power supplies

**AD** Combined AC and DC power supplies

**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))

**PSR** Two wide-range power supplies

**A** Alarm ports (Default=no alarm ports):

**A** Input and output alarm ports

- ?** Extended temperature version (Default=no extended temperature support):
  - H** -20°–65°C (-4°–149°F) temperature range support
- C** Optimux-1032 enclosure and E1 connector:
  - B** 1U-high unit, balanced RJ-45 connectors
  - U** 2U-high unit, unbalanced BNC connectors
  - UBR** 2U-high unit with DIP switches to disconnect GND from the Rx signal, unbalanced IEC-169/13 connectors
- PA** TDM Port Activation (Default=4 TDM ports activated):
  - 4SK** Additional 4 Ports
  - 8SK** Additional 8 Ports
  - 12SK** Additional 12 Ports
- +3** Ethernet User Interface:
  - 1UTP2NULL** 1xCopper RJ-45 port, 2xSFP sockets
  - 2UTP1NULL** 2xCopper RJ-45 ports, 1xSFP socket
  - 1NULL** 1xSFP socket
  - 3NULL** 3xSFP sockets
  - 1UTP** 1xCopper RJ-45 port
  - 3UTP** 3xCopper RJ-45 ports
- EA** User Ethernet port activation (Default=single Ethernet port activated):
  - 2SK** Additional 2 ports

### 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](http://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.



# Optimux-1032, Optimux-1025

## Fiber Optic Multiplexer for 16 E1/T1 and Gigabit Ethernet

### 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

#### OP-1025-PS-BP

Blank panels for power supply modules

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	1000	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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