



## Megaplex-4100

### Next Generation Multiservice Access Node

RAD's Megaplex-4100 multiservice access node, a high-capacity, carrier-class multiservice concentrator, provides multiple TDM and next-generation services over fiber or copper over PDH/SDH/SONET or packet-switched networks (PSN) for large enterprises, including utilities, transportation and campuses. It is an STM-1/OC-3 add/drop multiplexer that transports Ethernet and traditional (TDM) traffic over SDH/SONET networks. When bandwidth granularity of the Ethernet channel is configured to  $n \times VC-12/VC-3$  or  $n \times 1.5/STS-1$ , Megaplex-4100 utilizes the SDH/SONET infrastructure for cost-effective TDM and Ethernet connectivity. Megaplex-4100 offers a connection for packet-based Ethernet traffic via its GbE or Fast Ethernet links.

Accommodating up to 10 I/O modules, Megaplex-4100 is a flexible and scalable node offering a variety of user services, including E1, T1, IDSL, SHDSL, Fast Ethernet, Gigabit Ethernet, STM-1/OC-3,  $n \times 64$  kbps high speed data, sub-DS0 low speed data, digital voice, analog voice, and ISDN.

The ability to handle a broad range of data and voice services and various network technologies in a single compact managed node makes Megaplex-4100 a versatile and cost-effective next-generation multiservice access node.

A powerful internal cross-connect matrix of up to 5120 DS0 per chassis (from DS0 or sub-DS0 to STM-1/OC-3 level) can cross-connect traffic directly from any tributary channel to any other channel.

These capabilities enable Megaplex-4100 to function as a service differentiation point at the central site, handing off traditional voice/data and advanced Ethernet services to the respective networks (see *Figure 1*).

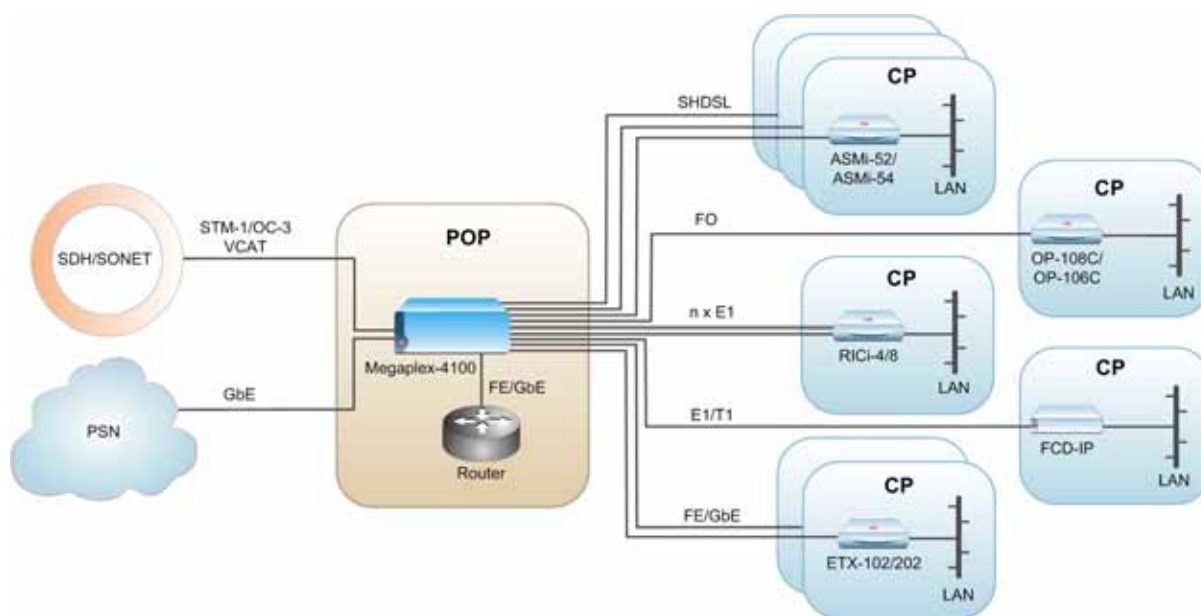


Figure 1. Megaplex-4100 as an Ethernet over Copper, Fiber or DSL Aggregator

At the remote point-of-presence (POP) or customer premises, Megaplex-4100 may also be deployed to effectively fan out multiple voice and data services.

Located at the carrier POP, Megaplex-4100 can extend user services in the Last Mile over E1, T1, ISDN, or SHDSL/SHDSL.bis lines, copper or fiber, by working with dedicated customer-located equipment such as RAD's FCD, ASMi, Optimux, RIC-E1/8E1 or DXC.

Megaplex-4100 eliminates the need for two separate units (ADM and multiplexer) for private networks where voice, Ethernet and data services are required (see *Figure 2*).

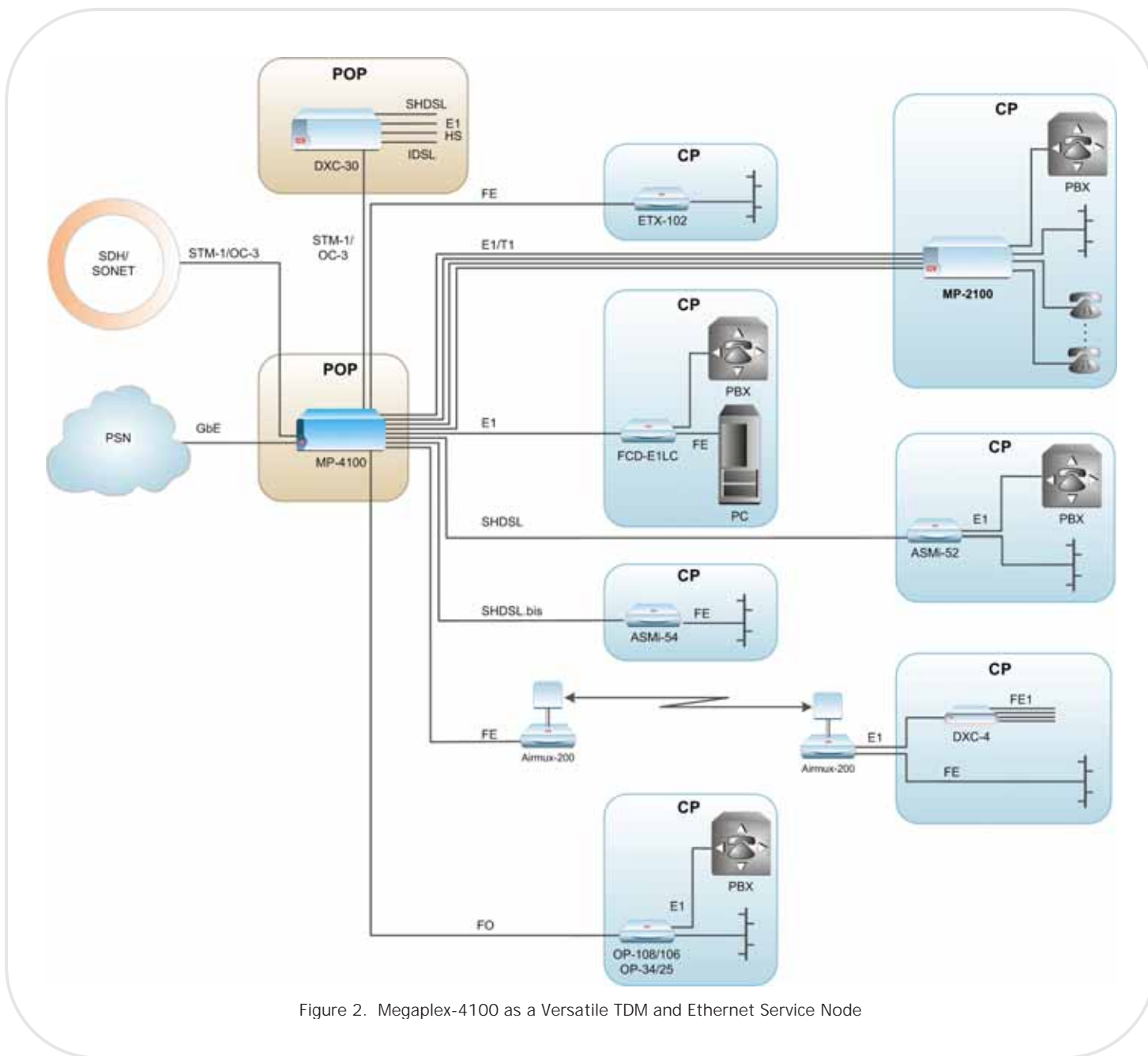


Figure 2. Megaplex-4100 as a Versatile TDM and Ethernet Service Node

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On top of the SDH/SONET ADM capabilities, Megaplex-4100 can form E1, T1 or SHDSL protection rings. It can also bridge between several rings.

The modular, distributed architecture of the Megaplex-4100 chassis enables redundancy at different levels of the network and provides a resilient system with no single point of failure. Each combined common logic and cross-connect matrix module (CL.1) provides STM-1/OC-3 links with automatic switchover between the two links within 50 msec for 1+1 protection against network or cable failure.

Figure 3 shows Megaplex-4100 in a 155-Mbps private network ring application providing multiple user services with access and differentiation of services between Internet, PSTN and SDH/SONET networks.

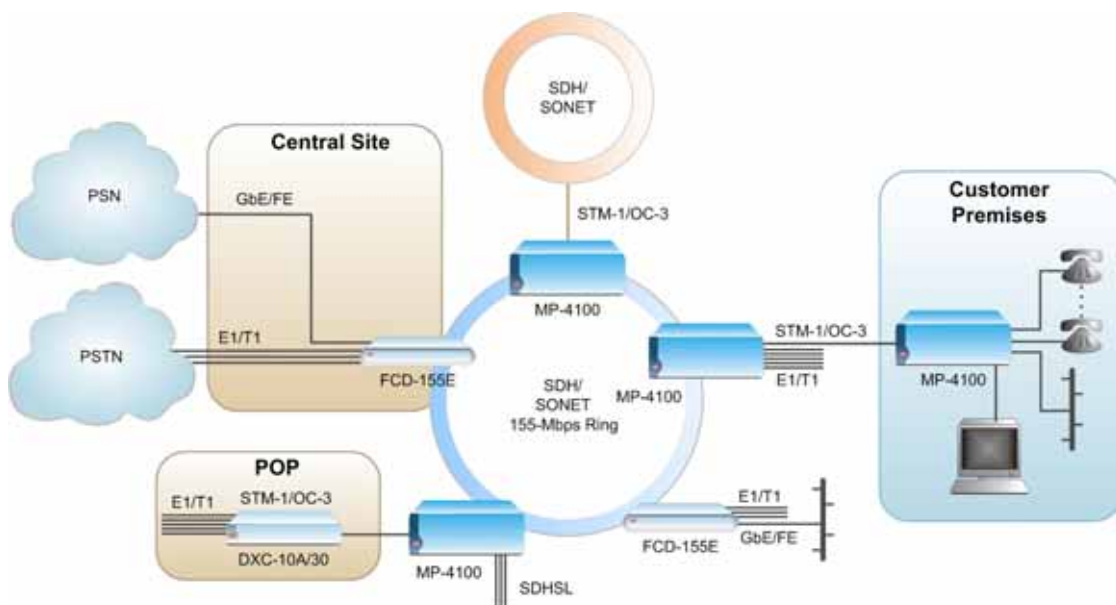


Figure 3. Single Node for Campus Ring and TDM Multiservice Solutions

## CHASSIS

Megaplex-4100 is available as a 4U-high chassis providing slots for up to 2 common logic and 10 I/O modules.

## COMMON LOGIC

The Common Logic (CL.1) module controls the Megaplex's operation and is the interface for its configuration and management. It stores the application software and up to 10 configuration databases (depending on complexity) for multiple independent configurations. CL.1 also stores all system event information. Flash EPROM for software download is provided, allowing switching between database configuration files.

CL.1 performs digital cross-connect at the DS0 level with a capacity of up to 160 × 32 DS0 between I/O cards. Up to 63 E1/84 T1 links can be aggregated from any I/O module on a DS0 level toward the STM-1/OC-3 link.

CL.1 provides Ethernet flow-based switching between I/O modules, GbE and SONET/SDH.

The CL.1 cross-connect matrix routes voice and data channels between all I/O modules installed in the chassis. The non-blocking full cross-connect enables flexible timeslot assignment and efficient utilization of E1/T1 bandwidth, and facilitates drop&insert and bypass applications.

The non-blocking (4/1/0) cross-connection can be established between any two links.

For direct connection to an SDH/SONET network, CL.1 features two standard network ports with a software-configurable STM-1/OC-3 interface. The dual ports on the CL.1 module can be used either for operation in parallel or for redundancy.

For direct connection to the packet-based networks, CL.1 has two SFP-based GbE ports. Also available is the copper GbE interface with autonegotiation speed detection capabilities.

## PROTECTION

Hardware redundancy is provided through an optional redundant power supply and CL modules, with switchover to the backup CL links occurring within 50 msec of a detected failure. Eight-port E1/T1 and SHDSL links can also be configured for redundancy and can be hot-swapped, allowing continuous service provisioning.

The redundant CL.1 modules can be used either for operation in parallel or for redundancy.

Megaplex-4100 supports standard SDH/SONET ring topology, TDM traffic protected by path protection (SNCP) and Ethernet protected by LCAS.

Optional 1+1 link protection mechanism (unidirectional MSP/APS) is also available.

## Megaplex-4100

### Next Generation Multiservice Access Node

#### SDH/SONET INTERFACE

The STM-1/OC-3 interfaces are user-configurable and provide a high-quality and high-availability link, as well as performance monitoring of the traffic path.

The STM-1/OC-3 link is supplied with an SFP socket (see *Ordering*). 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 user can define the following SDH/SONET clock sources:

- Internal
- Recovered from the STM-1/OC-3 interface, including automatic selection based on SSM (Synchronization Status Messaging)
- Derived from the TDM subsystem.

#### GIGABIT ETHERNET INTERFACE

One or two optional Gigabit Ethernet ports connect each LAN port to eight virtual groups per CL.1 and groom Ethernet traffic from I/O modules to the GbE interface. Maximum frame length is 1.6 kB.

Ethernet traffic generated by CPE devices is transferred over TDM E1, T1 or SHDSL circuits, or comes directly from connected Fast Ethernet ports. These Ethernet ports can be either copper or fiber optic, optionally marked by double tagging and groomed to GbE ports on the CL.1 module, or towards SDH/SONET ports by using VCAT (VCG).

Ethernet traffic is mapped into SDH/SONET containers using VCAT and encapsulated with Generic Framing Procedure (ITU-T G.7041, ANSI T1-105.02, framed mode).

Each user's Ethernet traffic can be mapped into SDH/SONET via any of the following virtual containers:

- Up to 63 × VC-12, or 84 × VT-1.5
- 3 × VC-3/STS-1
- 1 × VC-4.

Ethernet traffic can be switched to different bundles of virtually concatenated VCs (up to 8 bundles per CL.1 module) according to a predefined group.

Link Capacity Adjustment Scheme (LCAS) is supported in compliance with the G.7042 standard, to maintain the Ethernet flow in case of path failure or asymmetric VC/VT assignment.

#### TDM SERVICES

TDM traffic is mapped into SDH/SONET VC-12/VC-11/VC-3 or SONET VT1.5/STS-1 containers that can be placed anywhere within the STM-1/OC-3 bandwidth.

Multiple system TDM timing options are available:

- Internal crystal oscillator clock
- Clock received from any SONET/SDH or PDH link (loopback)
- Clock received from any PDH tributary inside SONET/SDH
- Clock derived from the receive clock of a user port, internal DS1 port or pseudowire (Rx timing mode)
- External station (master) clock.

Up to 10 primary clock sources can be set as fallback in the event of failure. If all the primary clock sources fail, up to 10 secondary clock sources can be set as fallback.

The SSM-based clock source selection mechanism assures the best quality timing for the system.

#### TDM E1/T1 MODULES

The Megaplex TDM E1/T1 modules allow direct connection to a wide range of services, eliminating the need for external equipment. Multiple active links can operate in each chassis. Additional modules can also be installed for link protection in various redundancy modes (parallel TX, Y-cable or E1/T1 ring).

When a CL.1 module with the STM-1/OC-3 interface is installed in the chassis, the TDM modules allow mapping of E1/T1 links to the SONET/SDH network with DS0 granularity.

The M8E1/M16E1 and M8T1/M16T1 TDM modules connect Megaplex-4100 to up to 8/16 E1/T1 lines and to Ethernet links via 10/100BaseT ports with 3 SFP or UTP connectors. Up to 10 modules can be installed in a single chassis, providing Megaplex-4100 with up to 160 full E1/T1 non-blocking DS0 cross-connect capacity.

The tributary E1/T1 streams are locked to the nodal timing.

#### PSEUDOWIRE CAPABILITIES

Megaplex-4100 equipped with the MPW-1 module provides legacy services over packet-switched networks (PSN). The MPW-1 module converts the data stream from other modules in the MP-4100 chassis (E1/T1, SHDSL, data or voice ports) delivered by the Megaplex backplane via MPW-1's internal DS1 ports into IP or MPLS packets for transmission over Ethernet, IP or MPLS networks.

The M8SL module employs Single-pair High speed Digital Subscriber Line (SHDSL) technology, as standardized by ITU-T Rec. G.991.2. SHDSL modules offer a cost-effective solution for delivering digital data to customer premises over the existing copper cables of the distribution network while eliminating the need for repeaters. M8SL modules connect Megaplex-4100 to up to 8 SHDSL links and to Ethernet links via 10/100BaseT ports with 3 SFP or UTP connectors.

### I/O MODULES

Table 1 lists the I/O modules available for Megaplex-4100 (see enclosed data sheets for detailed specifications).

### MANAGEMENT

Configuration and monitoring can be performed via an ASCII terminal, Web, Telnet or RADview.

Remote units can be managed in the following ways:

- Out-of-band, using the 10/100 Ethernet management port. This simple and efficient method takes advantage of IP bandwidth on demand, while saving link bandwidth for user traffic
- Inband, using the IP/PPP over DCC, via the STM-1/OC-3 links
- Inband, using the IP/PPP over a dedicated timeslot in any E1/T1 or SHDSL link

- Network management station running RADview, RAD's SNMP element management application.

### DIAGNOSTICS

Comprehensive diagnostic capabilities include:

- Local and remote loopbacks per link and per DSO
- Real-time alarms to alert the user of fault conditions
- SDH/SONET link monitoring.

### ALARMS

All alarms, including state and frequency of occurrence, are stored in the CL.1 alarm status buffer. The last 256 alarms are kept in a separate alarm history buffer.

Alarm status can be automatically read online by the management system from any node. User-set alarm masking, filtering and inversion, as well as 5-level prioritization are also supported.

Table 1. Megaplex-4100 I/O Modules

Module	Description
ASMi-54C	SHDSL.bis module with 2 Ethernet ports
HS-6N, HS-12N	6- or 12-port n x 64 kbps high speed module
HS-703	4-channel Codirectional data module
HSF-2	2-port fiber optic teleprotection interface module
HS-RN	4-port sub-DSO low speed module
HS-S	4-channel ISDN "S"-interface module
HSU-6, HSU-12	6- or 12-port IDSL modules
LS-6N, LS-12	6- or 12-port low speed modules
M16E1, M16T1	16-port E1 or T1 modules
M8E1, M8T1	8-port E1 or T1 modules with 3 Ethernet ports
M8SL	8-port SHDSL E1 module with 3 Ethernet ports
MPW-1	TDM pseudowire access gateway with 3 Ethernet ports
OP-108C, OP-106C	Dual 4 x E1/T1 and Ethernet multiplexer modules
OP-34C, OP-25C	16 x E1/T1 and Ethernet multiplexer modules
Ringer-2100R	DC power supply module for DC feed and up to 32 voice channel ring voltages
VC-4/4A/8/8A/16	4/8/16-port FXS/FXO/E&M PCM and ADPCM analog voice modules
VC-4/OMNI	4-port PCM omnibus voice module

**Note:** For specific HW/SW versions of Megaplex-210x modules supported by the

# Megaplex-4100

## Next Generation Multiservice Access Node

### Specifications

#### STM-1/OC-3 MAIN LINK

**Number of Ports**

2 per CL.1 module (4 per chassis)

**Bit Rate**

155.52 Mbps ±20 ppm

**Timing**

Internal clock

Recovered from the STM-1/OC-3 interface

External clock from TDM interfaces

**Compliance**

SDH: ITU-T G.957, G.783, G.798

SONET: GR-253-core

**Framing**

SDH: ITU-T G.707, G.708, G.709

SONET: GR-253-core

**Protection**

1+1 unidirectional APS (G.842)

**Line Code**

NRZ

**Connectors**

SFP-based

**SFP Interface Specifications**

See *Table 2*

**Note:** For detailed specifications of the SFP transceivers, see the *SFP Transceivers data sheet*.

#### GBE INTERFACE

**Number of Ports**

2 per CL.1 module (4 per chassis)

**Data Rate**

10/100/1000 Mbps

Autonegotiation (copper interface only)

**Connectors (per port)**

RJ-45, shielded

SFP socket (for SFP transceivers,

see *Ordering*)

#### CONTROL PORT

**Interface**

RS-232/V.24 (DCE)

**Connector**

DB-9

**Baud Rate**

9.6, 19.2, 38.4, 57.6, 115.2

#### MANAGEMENT (ETH) PORT

**Interface**

10/100BaseT

**Connector**

RJ-45

#### STATION CLOCK

**Bit Rate**

1.544 Mbps (T1) (AMI)

2.048 Mbps (E1) (AMI)

2.048 MHz squarewave

**Connector**

RJ-45

#### DIAGNOSTICS

**Tests**

Local and remote loopbacks per link

**Alarms**

Time and date stamped

Last 256 alarms stored in RAM on CL

module, readable by management

system or terminal

Current alarms status

**Statistics**

Performance statistics for bundles and

Ethernet ports

SDH/SONET link monitoring

Table 2. SFP Transceivers for STM-1/OC-3 and GbE Interfaces

	Transceiver	Wavelength	Fiber Type	Transmitter Type	Connector Type	Input Power [dBm]		Output Power [dBm]		Typical Max. Range	
		[nm]	[μm]			(min)	(max)	(min)	(max)	[km]	[miles]
STM-1/OC-3 Link	SFP-1	1310	62.5/125 multimode	VCSEL	LC	-30	-14	-20	-14	2	1.2
	SFP-2	1310	9/125 single mode	Laser	LC	-28	-8	-15	-8	15	9.3
	SFP-3	1310	9/125 single mode	Laser	LC	-34	-10	-5	0	40	24.8
	SFP-4	1550	9/125 single mode	Laser	LC	-34	-10	-5	0	80	49.7
	SFP-11	Copper Link		Coaxial cable 75Ω impedance	-	mini-BNC	-	-	-	-	0.135*
GbE Link	SFP-5	850	50/125 multimode	VCSEL	LC	-17	0	-9.5	0	0.55	0.3
	SFP-6	1310	9/125 single mode	Laser	LC	-20	-3	-9.5	-3	10	6.2
	SFP-7	1550	9/125 single mode	Laser	LC	-22	-3	0	+5	80	49.7
	SFP-8D	1310	9/125 single mode	Laser	LC	-21	-3	0	-4	40	24.8

\* Using RG59 B/U.

**INDICATORS**

**Chassis**

**POWER SUPPLY A, B:**

Green (on) – Corresponding PS modules on (if CL module is active)

**SYSTEM TEST**

Yellow (on) – System test in process

**SYSTEM ALARM**

Red (flashing) – Major and/or critical alarm in the system

**CL.1 Module**

**ON LINE**

Green (on) – Master (active) module is active

Yellow (on) – Master (active) module is being tested

Green (flashing slowly) – Standby

Green (flashing rapidly) – Software downloading

Yellow (flashing) – Software decompressing

**ALM**

Red (flashing) – Critical alarm in system, but highest alarm severity is minor or warning

**CLOCK ON**

Green (on) – Station clock port is configured as connected

**CLOCK LOS**

Red (on) – Loss-of-signal condition at the station clock port

**STM-1/OC-3 Interface (per port)**

**ON LINE**

Green (on) –Link is active

Green (flashing) – Link is on standby

Yellow (on) – Test is active

**LOS**

Red (on) – Loss of signal at the corresponding port

**ETH, MNG, GbE Interface (per port)**

**LINK**

Green (on) – Port is connected to an active Ethernet hub or switch

**ACT**

Yellow (on) – Port transmits and/or receives data

**ALARM RELAY PORT**

1 inbound relay (dry contact)

2 outbound relays triggered by any user-selected Megaplex alarm




Operation: normally open, normally closed, using different pins

Connector: 9-pin, D-type, female

**I/O MODULES**

See *Table 1* and separate data sheets for individual modules.

Table 3. Megaplex Chassis Comparison

	MP-2104 (Ver. 12.9) 	MP-2100 (Ver. 12.9) 	MP-4100 (Ver. 2.2) 
<b>Feature</b>			
<b>Functionality</b>	Modular multiservice access multiplexer	Modular multiservice access multiplexer	Modular digital access cross-connect, Ethernet Aggregator and STM-1/OC-3 ADM
<b>Dimensions [cm]</b>	9*44*33	18*44*33	18*44*33
<b>Modularity</b>	Yes	Yes	Yes
<b>I/O slots</b>	5	12	10
<b>Redundancy</b>	Yes	Yes	Yes
<b>Services</b>	LS, HS, Voice, ETH, TDMoIP	LS, HS, Voice, ETH, TDMoIP	LS, HS, Voice, E1/T1, xDSL, STM-1/OC-3, GbE, Fast Ethernet, fiber multiplexing, pseudowire
<b>Capacity</b>	4 x E1/5 x T1	4 x E1/5 x T1	STM-1/OC-3 + 1GbE
<b>Management Interface</b>	RAD proprietary CLI	RAD proprietary CLI	Menu-driven

# Megaplex-4100

## Next Generation Multiservice Access Node

### GENERAL

#### Configuration

Performed by ASCII Terminal or PC, connected to terminal interface or via Telnet

#### Physical

##### Chassis

2 power supply module slots  
2 CL.1 module slots  
10 slots for I/O modules  
Height: 18 cm (7 in) (4U)  
Width: 44 cm (17 in)  
Depth: 33 cm (13 in)  
Weight: 15.3 kg / 33.8 lb max.  
(fully loaded chassis)

##### CL.1 Module

Height: 17.3cm (6.8 in)  
Width: 4.5 cm (1.8 in)  
Depth: 32.5 cm (12.8 in)  
Max Weight: 630 g (1.3 lb)

#### Power Supply Input

AC: 115 or 230 VAC  
DC: 24 or -48 VDC  
Selectable ground reference or floating ground

#### Output Power (max)

250W

#### Power Consumption (per CL, max)

CL.1: 10W  
CL.1/155: 16W  
CL.1/155GbE: 30W  
CL.1/GbE: 24W

#### Environment

Operating temperature: -10°C to 55°C  
(14°F to 131°F)  
Storage temperature: -20°C to +70°C  
(-4°F to +158°F)  
Humidity: up to 95%, non-condensing

**Note:** Actual operating temperature range is determined by the specific modules installed in the chassis, and might require special ordering options.

If you need -20°C to 55°C (-4°F to 131°F) operating temperature support, contact Technical Services Dept.

## Ordering

### STANDARD CONFIGURATIONS

MP-4100-1/115R/155R/2XSFP2  
MP-4100-1/115R/GBEUTPR  
MP-4100-1/230/155GBESFP/2XSFP2  
MP-4100-1/230R  
MP-4100-1/230R/R  
MP-4100-1/48/155R/2XSFP3  
MP-4100-1/48R/155GBESFPR/4XSFP2/4XSFP6  
MP-4100-1/48R/155GBEUTPR/2XSFP2  
MP-4100-1/48R/155R/2XSFP2  
MP-4100-1/48R/GBEUTP  
MP-4100-1/48R/GBEUTPR  
MP-4100M-CL.1  
MP-4100M-CL.1/155/2XSFP2  
MP-4100M-CL.1/155GBESFP/2XSFP2/2XSFP6  
MP-4100M-CL.1/155GBESFP/2XSFP3/2XSFP6  
MP-4100M-CL.1/155GBEUTP/2XSFP2  
MP-4100M-CL.1/GBEUTP

### SPECIAL CONFIGURATIONS

#### MP-4100-MN

Megaplex-4100 chassis with no PS or CL.1 module

#### MP-4100-1/\*/%/&/^

Megaplex-4100 chassis equipped with PS and CL.1 modules

**Note:** I/O modules are ordered separately (see separate module data sheets for details and ordering information).

#### Legend

\* Power supply modules:

115	Single, 115 VAC
230	Single, 230 VAC
24	Single, +24 VDC
48	Single, -48 VDC
115R	Dual, 115 VAC
230R	Dual, 230 VAC
24R	Dual, +24 VDC
48R	Dual, -48 VDC

% Link option (Default=no links)

155 Single CL.1 module with dual STM-1/OC-3 links, SFP sockets

GBEUTP Single CL.1 module with dual GbE links, UTP connectors

GBESFP Single CL.1 module with dual GbE links, SFP sockets

155GBEUTP Single CL.1 module with STM-1/OC-3 and GbE links; SFP sockets for STM-1/OC-3, UTP connectors for GbE

155GBESFP Single CL.1 module with STM-1/OC-3 and GbE links; SFP sockets for both

<b>R</b>	Two CL.1 modules, no link
<b>155R</b>	Two CL.1 modules, each with dual STM-1/OC-3 links, SFP sockets
<b>GBEUTPR</b>	Two CL.1 modules, each with dual GbE links, UTP connectors
<b>GBESFPR</b>	Two CL.1 modules, each with dual GbE links, SFP sockets
<b>155GBEUTPR</b>	Two CL.1 modules, each with STM-1/OC-3 and GbE links; SFP sockets for STM-1/OC-3, UTP connectors for GbE
<b>155GBESFPR</b>	Two CL.1 modules each with STM-1/OC-3 and GbE links; SFP sockets for both
<b>&amp;</b>	Number and type of <b>SFPa</b> transceivers for STM-1/OC-3 links ( <b>155/155R</b> , <b>155GBEUTP/155GBEUTPR</b> , or <b>155GBESFP/155GBESFPR</b> ordering options):
<b>SFPa</b>	One SFP transceiver
<b>2xSFPa</b>	2 SFPs on a single CL.1 or one SFP on each CL.1
<b>4xSFPa</b>	2 SFPs on each CL.1
<b>a</b>	Type of STM-1/OC-3 receiver
<b>1</b>	STM-1/OC-3, 1310 nm multimode VCSEL, LC connector
<b>2</b>	STM-1/OC-3, 1310 nm single mode laser (S1.1), LC connector
<b>3</b>	STM-1/OC-3, 1310 nm, single mode laser, long haul (L1.1), LC connector
<b>4</b>	STM-1/OC-3, 1550 nm single mode laser, long haul (L1.2), LC connector
<b>11</b>	STM-1/OC-3, electrical interface, mini-BNC coaxial connector

Number and type of **SFPb** transceivers for GbE links (**GBESFP/GBESFPR** or **155GBESFP/155GBESFPR** ordering options):

<b>SFPb</b>	One SFP transceiver
<b>2xSFPb</b>	2 SFPs on a single CL.1 or one SFP on each CL.1
<b>4xSFPb</b>	2 SFPs on each CL.1
<b>b</b>	Type of GbE receiver
<b>5</b>	GbE, 850 nm multimode VCSEL
<b>6</b>	GbE, 1310 nm single mode laser (LX-SM)
<b>7</b>	GbE, 1550 nm single mode laser, long haul LX-H (ZX)
<b>8D</b>	GbE, 1310 nm single mode laser, long haul (LX-H)

**Notes:**

- For the complete list of SFPs, refer to the SFP Transceivers data sheet.
- It is compulsory to order Megaplex-4100 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 Megaplex-4100 units using non-RAD SFPs.

**MP-4100M-PS/~**

Power supply module

**Legend**

~ Power supply modules:

<b>115</b>	Single, 115 VAC
<b>230</b>	Single, 230 VAC
<b>24</b>	Single, +24 VDC
<b>48</b>	Single, -48 VDC

# Megaplex-4100

## Next Generation Multiservice Access Node

### MP-4100M-CL.1/#/\$/@

CL.1 module with cross-connect and 10/100BaseT management port

#### Legend

- # Link option (Default=no links)
- 155** Single CL module with dual STM-1/OC-3 links, SFP sockets
- GBEUTP** Single CL module with dual GbE links, UTP connectors
- GBESFP** Single CL module with dual GbE links, SFP sockets
- 155GBEUTP** Single CL module with STM-1/OC-3 and GbE links; SFP sockets for STM-1/OC-3, UTP connectors for GbE
- 155GBESFP** Single CL module with STM-1/OC-3 and GbE links; SFP sockets for both
- \$ Number and type of SFP transceivers for STM-1/OC-3 links (**155**, **155GBEUTP**, or **155GBESFP** ordering options):
- SFPa** One SFP transceiver
- 2xSFPa** 2 SFPs on a single CL.1
- @ Number and type of SFP transceivers for GbE links (**GBESFP** or **155GBESFP** ordering options):
- SFPb** One SFP transceiver
- 2xSFPb** 2 SFPs on a single CL.1

#### Notes:

- The list of SFP transceivers (SFPa, SFPb) for ordering with CL.1 is the same as for ordering the Chassis package (see above).
- Unlike the SFPs listed under Optional Accessories below, the ordering string for transceivers coming with the Chassis/CL.1 does not include a hyphen. For example, to order an SFP-1 transceiver on a CL.1 module you should specify SFP1 and not SFP-1, as when ordering optional transceivers.

### SUPPLIED ACCESSORIES

#### RM-MP-MX-23/19

Hardware kit for mounting one MP-4100 unit into both 19-inch and 23-inch racks

#### MP-2100-RM-ETSI/19

Hardware kit for mounting one MP-4100 unit into an ETSI rack (fits also 19-inch rack)

#### CBL-DB9F-DB9M-STR

Standard DB-9 to DB-9 control port cable

### OPTIONAL ACCESSORIES

#### SFP Transceivers for the STM-1/OC-3 Link

- SFP-1** STM-1/OC-3, 1310 nm multimode VCSEL, LC connector
- SFP-2** STM-1/OC-3, 1310 nm single mode laser (S1.1), LC connector
- SFP-3** STM-1/OC-3, 1310 nm, single mode laser, long haul (L1.1), LC connector
- SFP-4** STM-1/OC-3, 1550 nm single mode laser, long haul (L1.2), LC connector
- SFP-11** STM-1/OC-3, electrical interface, mini-BNC coaxial connector

#### SFP Transceivers for the GbE Link

- SFP-5** GbE, 850 nm multimode VCSEL
- SFP-6** GbE, 1310 nm single mode laser (LX-SM)
- SFP-7** GbE, 1550 nm single mode laser, long haul LX-H (ZX)
- SFP-8D** GbE, 1310 nm single mode laser, long haul (LX-H)

#### CBL-SP-9/SH

Dual DB-9 to single DB-9 control port cable

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