

Fibre Channel
Gigabit Ethernet



3000

Configuration Guide & Data Sheet

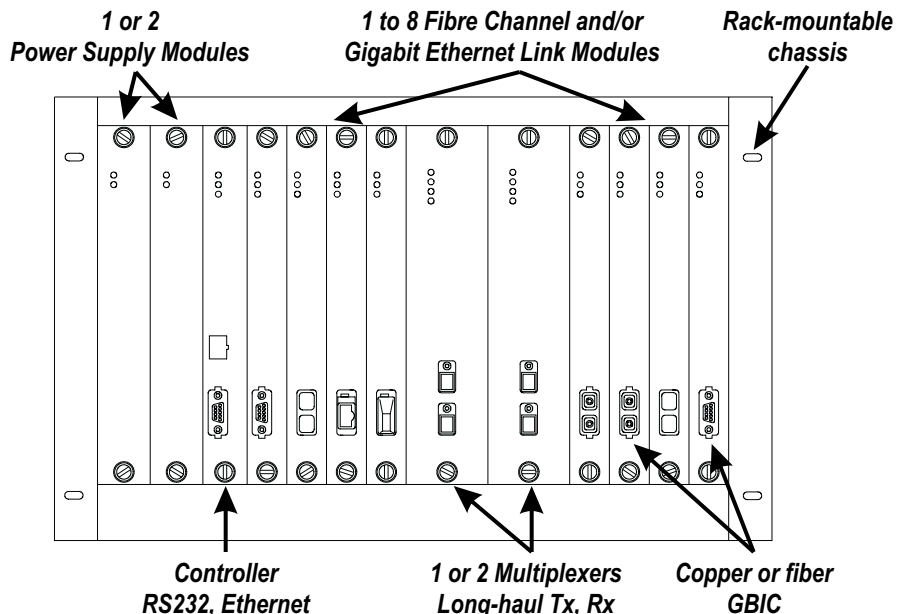
- Up to 50 km between ring nodes with 3R regeneration
- Operates in a ring configuration over a single strand of fiber
- Up to 16 digital channels per system on a fiber optic ring
- Complete performance and error reporting statistics on a per port basis
- Flexible digital channel add/drop configuration via SNMP, Telnet, or Web network management

Opticity™ 3000 is a WDM optical networking platform allowing service providers and enterprises to build backbone transport architectures for Gigabit Ethernet and Fibre Channel. Finisar designed Opticity for deployment in metro area networks over dark fiber rings. This results in a system that is economical to deploy and easy to provision and operate. Opticity is a carrier-level architecture that has no single point of failure and is designed for continuous 24 x 7 service.

The modular architecture of Opticity provides for ease of installation and simple in-service maintenance and future upgrades.

The Opticity 3000 chassis has slots for two Power Supply Modules, eight Link Modules and two Multiplexer Modules. The Link Modules are protocol-specific for Fibre Channel or Gigabit Ethernet local services. The Link Modules have a GBIC interface for copper or fiber optic connections. The Multiplexer Module combines the backplane signals from the Link Modules to the long-haul fiber optic cable.

The diagram below shows the components of Opticity 3000.



The table below indicates the number of each component that can be installed in the chassis.

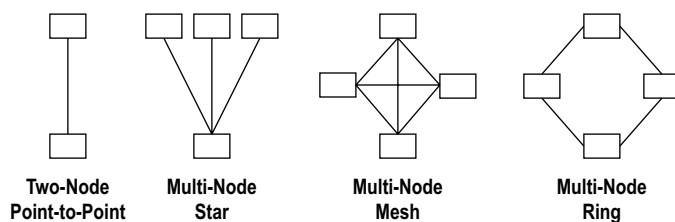
<i>Component</i>	<i>Minimum</i>	<i>Maximum</i>	
Power Supply Module	1	2	Second power supply is a hot stand-by.
Controller Module	1	1	Provides network management access for configuration management, status monitoring.
Link Module	1	8	Fibre Channel and/or Gigabit Ethernet ports to the local services.
Multiplexer Module	1	2	Each Multiplexer Module supports either four or eight local service digital channels.

Each Link Module provides a Fibre Channel or Gigabit Ethernet local service connection that is multiplexed onto the long-haul fiber by the Multiplexer Module. Fibre Channel and Gigabit Ethernet Link Modules can be installed in the same chassis. Each local service connection at the Link Module is assigned to a digital channel of a Multiplexer Module (1 or 2) via network management software. You can hot-insert Link Modules while in operation to add more local services without the need for installing more long-haul fiber if there are available digital channels.

Network Design

Define the Interconnections

There are several design alternatives in building metropolitan fiber networks. The first decision is to determine the logical interconnections that are needed to connect your remote sites. This may consist of one or more Fibre Channel links for storage services, and one or more Gigabit Ethernet links for network services. Determine how many gigabit channels of each type will be required to interconnect the various sites to accommodate the anticipated traffic loads. Any of the example configurations shown below can be accommodated through the flexibility of the Opticity architecture. Multi-node is three or more sites.



Logical Interconnections

Opticity 3000 today supports up to 16 service connections. Each of these service connections is an independent end-to-end link, terminated on each end by a Link Module. In today's networking environment it is

critical to provide for sufficient bandwidth between each backbone network element so that network bottlenecks do not choke system performance.

Network Design

Physical Implementation

The Opticity architecture allows cost-effective physical implementations of these desired service maps. The most cost-effective solution for connecting multiple sites is a ring topology, since fiber costs are shared and therefore minimized. Rings also provide added reliability since there are two paths between each pair of locations; a cut in the fiber does not drop any service connection in a ring network. In the simplest case of two nodes, a ring devolves into a point-to-point connection, and Opticity also supports this case.

Opticity can transmit and receive over a single strand of fiber. This allows an Opticity installation to operate on half the fibers required in most other applications. Each Opticity multiplexer module supports 3R regeneration. Each Opticity system on the ring can be separated by up to 50 km.

The Opticity architecture assigns each end-to-end service connection to a digital channel on the ring. Each service connection has pre-defined fail-over channel so that in the event of a system fault, service can be automatically restored. All primary and fail-over channels are assigned via network management software.

Each Opticity chassis can support one or two Multiplexer Modules. Each Multiplexer Module supports up to eight digital channels. Two Multiplexer Modules can be installed in the chassis to support up to 16 digital channels. Each Multiplexer Module can offer any of its digital channels to any of the eight Link Modules (configured via network management). A second Multiplexer Module can be installed to provide redundant long-haul fibers. Redundant long-haul fibers are often divergently routed, i.e., different paths or

Modular Optical Link Extender and Multiplexer

conduits. Note that the extra Multiplexer Module is not just on stand-by, i.e., it carries traffic and allows the overall system to have more digital channels. In the event of a long-haul fiber cut or a Multiplexer Module failure, the remaining Multiplexer Module can be configured to support all of the traffic on the network.

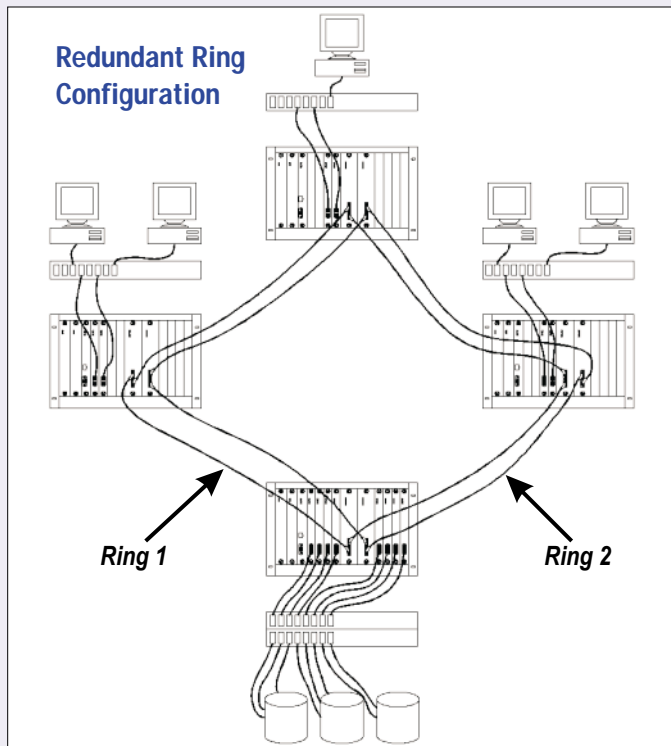
Dark fiber is required for an Opticity installation. Dark fiber is a term used to describe a fiber that is currently carrying no traffic. Service providers such as phone companies and ISPs often have their own dark fiber facilities. Enterprises can install dark fiber on a campus or lease it from a service provider.

When each chassis on the Opticity ring only has one Multiplexer Module, *only a single fiber* is required between each adjacent chassis to implement the ring. Data is sent bi-directionally over this single fiber. A single Multiplexer Module, single fiber ring configuration can survive a fiber cut (other direction remains in operation) or a single laser diode failure in the Multiplexer Module (other laser diodes in Multiplexer Module remain in operation). A second fiber ring is required when the second Multiplexer Module is added to some of the chassis in the network (to get more channels and/or establish redundancy).

In conclusion, the Opticity architecture allows the network system designer to define the service interconnections to accomplish the performance goals, while keeping the physical interconnection issues separate.

Power

Each Opticity 3000 chassis supports up to two Power Supply Modules. Each chassis contains both 110-220 VAC and 48 VDC power inputs which may be connected simultaneously to provide a source of uninterrupted power. The chassis accepts receptacles for North America, UK, and Continental Europe. Within each Power Supply Module, the AC input is primary and DC is secondary in case the AC fails. You may choose to add one or two Power Supply Modules to the chassis. The second Power Supply Module can be added to provide redundant power. One Power Supply provides current to the system and the other is stand-by. As with all modules, each Power Supply Module can be added or removed without service interruption (hot swap).



Ordering Information

Part Number	Description
FOT-3028	Opticity™ 3000 Chassis, 2 Power Supply Modules, Management Module
FOT-3311	Opticity™ 3000 Fibre Channel Link Module with 1 port
FOT-3321	Opticity™ 3000 Gigabit Ethernet Link Module with 1 port
FOT-3404	Opticity™ 3000 Multiplexer Module with 4 digital channels
FOT-3408	Opticity™ 3000 Multiplexer Module with 8 digital channels
FOT-3SK1	Power Cord for U.S., Canada
FOT-3SK2	Power Cord for U.K.
FOT-3SK3	Power Cord for Continental Europe

Specifications

Dimensions:

- 19" rack-mountable
- 17.3" W x 13.9" L x 12.25" H
- 7U height chassis
- 9.57" height modules

Weight: 45 lbs.

Fans: Dual, field-replaceable

All modules hot-swappable

Slots (from left to right):

- 1 Power Supply 1
- 2 Power Supply 2
- 3 Controller
- 4 Link 1
- 5 Link 2
- 6 Link 3
- 7 Link 4
- 8 Multiplexer 1
- 9 Multiplexer 2
- 10 Link 5
- 11 Link 6

- 12 Link 7
- 13 Link 8

Operating temperature:
0 to 40°C

Storage temperature:
-10 to 80°C

Certifications:

- FCC Class A
- CISPR Class A
- UL 1950

- CE
- CSA

Physical configurations:

- Point-to-point
- Ring

Specifications, configurations, and availability subject to change without notice.

Power Supply Module

Power consumption:

- 110-240 V_{AC}, 50-60 Hz, 350 W max, 3 amps
- -48 V_{DC}, 7 amps

LEDs:

- Power
- Fault



Controller Module

Admin port: RS-232 DB9 male connector, 9600 baud

Ethernet:

- RJ-45 10BASE-T
- IEEE 802.3

Telnet: Command line interface

SNMP:

- RFC 1157 SNMP v1 protocol
- RFC 1213 MIB II (System, SNMP, Interfaces groups)
- Finisar Enterprise MIB

LEDs:

- System
- Ethernet
- Fault



Link Modules

Data rate:

- Gigabit Ethernet: 1.25 Gb/s
- Fibre Channel: 1.062 Gb/s

Fibre Channel Topologies:

- Point-to-point (N-port)
- Switched fabric (F-port, E-port, N-port)

Class of service: Class 2, 3

Logical GBIC connection options:

- Copper DB9
- Copper HSSDC
- Multi-mode fiber SC
- Single-mode fiber SC

Data integrity check

Digital jitter reduction

LEDs:

- System
- Fault
- Link

Fibre Channel statistics:

- Total SCSI Read and Write Command frames received
- Total SCSI data bytes received and transmitted
- SCSI data throughput
- Invalid words
- Loss of synchronization (LOS)

Gigabit Ethernet statistics:

- Frames transmitted and received
- Mbytes transmitted and received
- CRC errors



Multiplexer Module

Channels:

- FOT-3404: 4 per Module
- FOT-3408: 8 per Module

Wavelengths:

- 1510 nm
- 1530 nm
- 1550 nm
- 1570 nm

Long-haul connector: FC/APC

Cable requirement: 9/125 μm single-mode fiber optic cable, maximum 0.3 dB/km at 1550 nm

Transmit power: -1 dB min

Rx sensitivity: -17 dB min

Maximum long-haul distance:
50 km point-to-point

LEDs:

- System
- Fault
- Link A
- Link B

Laser Safety: Class 1, per FDA/CDRH, IEC 825-1

