Omnitron Systems

Product Catalog

Network Interface Devices, Multiplexers and Media Converters for Carrier Ethernet, Mobile Backhaul and Enterprise Networks

2017

Omnitron Systems

About Omnitron Systems

With over twenty-five years in business, Omnitron Systems designs and manufactures Network Interface Devices, media converters and multiplexers that are deployed in LAN and WAN networks worldwide.

- Service Provider and Cable MSO fiber networks
- Enterprise LAN and WAN networks
- Wireless, Small Cell and Mobile Backhaul networks
- Security Surveillance networks
- Utility Smart Grid networks
- Cloud and Data Center networks
- Federal Government and Military networks
- State, County and Municipal networks
- Education and Campus networks

Omnitron's high-reliability fiber connectivity products are used by network operators to extend distances, expand capacity and deliver the next generation of business services and mobile backhaul.

Quality Statement

Omnitron Systems is committed to providing quality products and services that continually meet and exceed customer expectations.

Omnitron customers rely on the highest quality products to rapidly and cost-effectively deploy fiber networks. This quality is backed up with a lifetime warranty on most products and free 24/7/365 technical support.

Omnitron's fiber connectivity products comply with rigorous quality standards, including NEBS Level 3, FCC and UL certifications. This quality is achieved and improved through Omnitron's high-standard quality control policies and procedures. Omnitron implements and maintains documented procedures for contract review and for the coordination of related manufacturing and customer support activities.

All Omnitron products for shipment to the European Union are in compliance with the Reduction of Hazardous Substances (RoHS), and Waste Electrical and Electronic Equipment (WEEE).

Omnitron products are made in the USA and compliant to TAA (19 U.S.C. & 2501-2581) and JITC.

Standards Compliance

Omnitron is dedicated to compliance with ITU, IEEE, RFC and MEF network industry standards. Comprehensive standards compliance ensures full feature functionality and multi-vendor interoperability in complex network environments.

Omnitron Systems

Customer Service

Omnitron's highly-trained account managers and engineering support staff understand network technology and have the experience to provide solutions that are effective, practical and economical. Professional and courteous administrative support is also available to expedite processes and procedures.

Awards and Recognition

- Metro Ethernet Forum Outstanding Contributor Award and multiple Awards of Recognition
- Raytheon Integrated Defense Systems (IDS) Supplier Excellence Award for Quality, Performance and On-time Delivery
- Lockheed Martin Platinum Vendor Reliability rating (Perfect Score of 100)
- Broadband Properties magazine ranking as Top 100 Innovative Companies

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CARRIER ETHERNET MEF 9/14/21 Certified Compliant

NEBS CERTIFIED LEVEL 3

INDUSTRIAL Temperature

24/7 TECH SUPPORT LIFETIME WARRANTY On Most Products

MADE IN THE USA TAA Compliant

CE 2.0 MEF CERTIFIED

FC CE UL

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iConverter **XGT+**

W

Click on blue product name text to visit the product web pages for more information.

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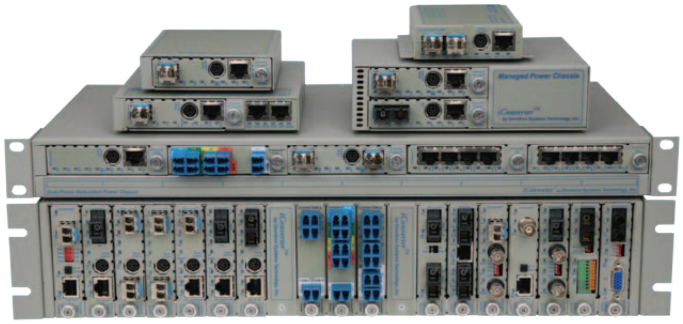
Look for this icon to find Omnitron products that are available with industrial temperature ranges.



iConverter® Multi-service Platform

The iConverter Multi-Service Platform consists of managed media converters, Network Interface Devices (NIDs), CWDM Multiplexers and T1/E1 Multiplexers. This modular system provides fiber connectivity in Service Provider, Enterprise and Government networks.

iConverter modules and chassis create a true multi-service platform that transports a variety of network protocols over fiber infrastructure and equipment. Flexible and easily scalable, iConverter modules are hot-swappable and can be mounted in a 19-Module, 5-Module, 2-Module or 1-Module powered chassis. Multi-module chassis feature redundant and hot-swappable power supplies.

The iConverter Multi-Service Platform can be managed with NetOutlook® Standard Edition SNMP Management Software. iConverter NIDs can be managed with NetOutlook Carrier Edition SNMP Management Software, and large scale NID deployments can be managed with NetOutlook EMS (Element Management System).

iConverter equipment is Carrier Ethernet 2.0, MEF 9, MEF 14, MEF 21, NEBS Level 3, UL and CE certified. Modules and chassis support a standard commercial temperature range of 0 to +50°C. Models are also available supporting a wide temperature range (-40 to +60°C) or an industrial temperature range (-40 to +75°C).

Visit www.omnitron-systems.com for detailed specifications, application examples, white papers and the latest information on new products.

Technologies Supported:

10M, 100M, Gigabit and 10 Gigabit Ethernet
T1(DS1)/E1, T3(DS3)/E3
OC-3, OC-12, OC-48, OC-192
STM-1, STM-4, STM-16, STM-64
1/2/4/8/10 Fibre Channel
CPRI up to 6.144 Gbps
Serial RS-232/422/485 and X21
Standard and D/CWDM SFP/SFP+/XFPs
Power over Ethernet

Module Types:

Copper RJ-45 to Fiber
Fiber to Fiber
Coax to Fiber
4-Port Copper Switch
T1/E1 Multiplexer
CWDM Multiplexer
CWDM Transponder

24/7 TECH SUPPORT LIFETIME WARRANTY On Most Products

NEBS CERTIFIED LEVEL 3

CARRIER ETHERNET MEF 9/14/21 Certified Compliant

Temperature HARDENED

Service Provider Access Networks

To support Carrier-Grade Ethernet services with end-to-end Service OAM, iConverter Network Interface Devices feature:

- IEEE 802.3ah Link OAM monitoring and troubleshooting
- IEEE 802.1ag Fault Detection and Management
- ITU-T Y.1731 Performance Monitoring
- CE-VLAN to Provider VLAN (Q-in-Q) mapping to enable service multiplexing
- Zero-Touch Provisioning allows for easy and automated installs
- Granular Rate Limiting using Committed Information Rate (CIR) and Committed Burst Size (CBS)
- Granular Rate Limiting per port, per service and per CoS
- Hierarchical Rate Limiting for efficient bandwidth utilization
- IGMP snooping per RFC 4541
- DEMARC Auto-Configuration (DAC) for DPoE Networks
- ITU-T Y.1564 Ethernet Service Activation Testing
- IETF RFC 2544 Service Testing with built-in test-head
- RFC 5357 Two-Way Active Measurement Protocol (TWAMP)
- IEEE 802.1ab Link Layer Discovery Protocol (LLDP)
- ITU-T G.8031 Linear Protection Switching and ITU-T G.8032 Ethernet Ring Protection Switching with sub-50ms failover
- LACP/LAG Protection
- ITU-T G.8262 Synchronous Ethernet (Sync-E)
- IEEE 1588v2 Boundary Clock, Slave Clock and Transparent Clock
- RADIUS, TACACS+ and 802.1x
- Access Control List
- Syslog
- Jumbo Frames up to 10,240 bytes

Next-Generation Enterprise Networks

iConverter media converters and multiplexers provide advanced fiber connectivity for Enterprise LAN and WAN networks. iConverter media converters support managed copper to fiber, multimode fiber to single-mode fiber, or dual fiber to single-fiber conversion applications.

iConverter modules and chassis are used for point-to-point fiber connectivity, or to distribute high-density fiber links from the Network Core to standalone or compact, multi-module configurations at the Network Edge.

To support Next-Generation networks, iConverter media converters feature:

- Pluggable transceivers for standard and CWDM wavelengths (available in SFP, SFP+ and XFP)
- Quality of Service (QoS) Prioritization
- VLAN Mapping
- Port VLAN and Port Access Controls
- Auto Negotiation
- Bandwidth Control
- Jumbo Frames up to 10,240 bytes

iConverter Multi-Service Platform

Network Interface Devices

iConverter Ethernet Network Interface Devices (NIDs) are MEF Carrier Ethernet 2.0 certified to provide intelligent demarcation and aggregation with state-of-the-art provisioning, performance monitoring, protection and fault detection capabilities. iConverter NIDs provide 100Mbps, Gigabit and 10G demarcation for Ethernet business services, cloud services, cell tower and small cell mobile backhaul delivered across one or more operator networks.

T1/E1 Multiplexers

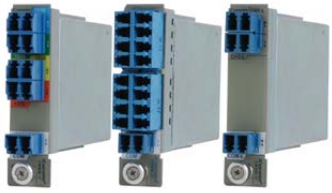
iConverter T1/E1 Multiplexers transport up to sixteen independent T1/E1 circuits and 10/100/100 Ethernet from copper links onto a fiber link, CWDM wavelength or Ethernet Virtual Connection (EVC). Designed for mobile backhaul, building-to-building PBX connectivity, and demarcation extension, iConverter T1/E1 multiplexers are available in modular or fixed chassis configurations with redundant power supplies.

Media Converters and Transponders

iConverter Managed Media Converters provide seamless integration of copper and fiber, and different fiber types. iConverter media converter modules support a wide variety of protocols and data rates to create a reliable and cost-effective network. iConverter media converters support pluggable transceivers for flexible connectivity solutions for standard, CWDM and DWDM wavelengths.

Ethernet Switch Modules

iConverter 10/100 and 10/100/1000 switch modules are managed four-port Ethernet switches that can be installed in a variety of chassis configurations with backplane connectivity to other iConverter modules.



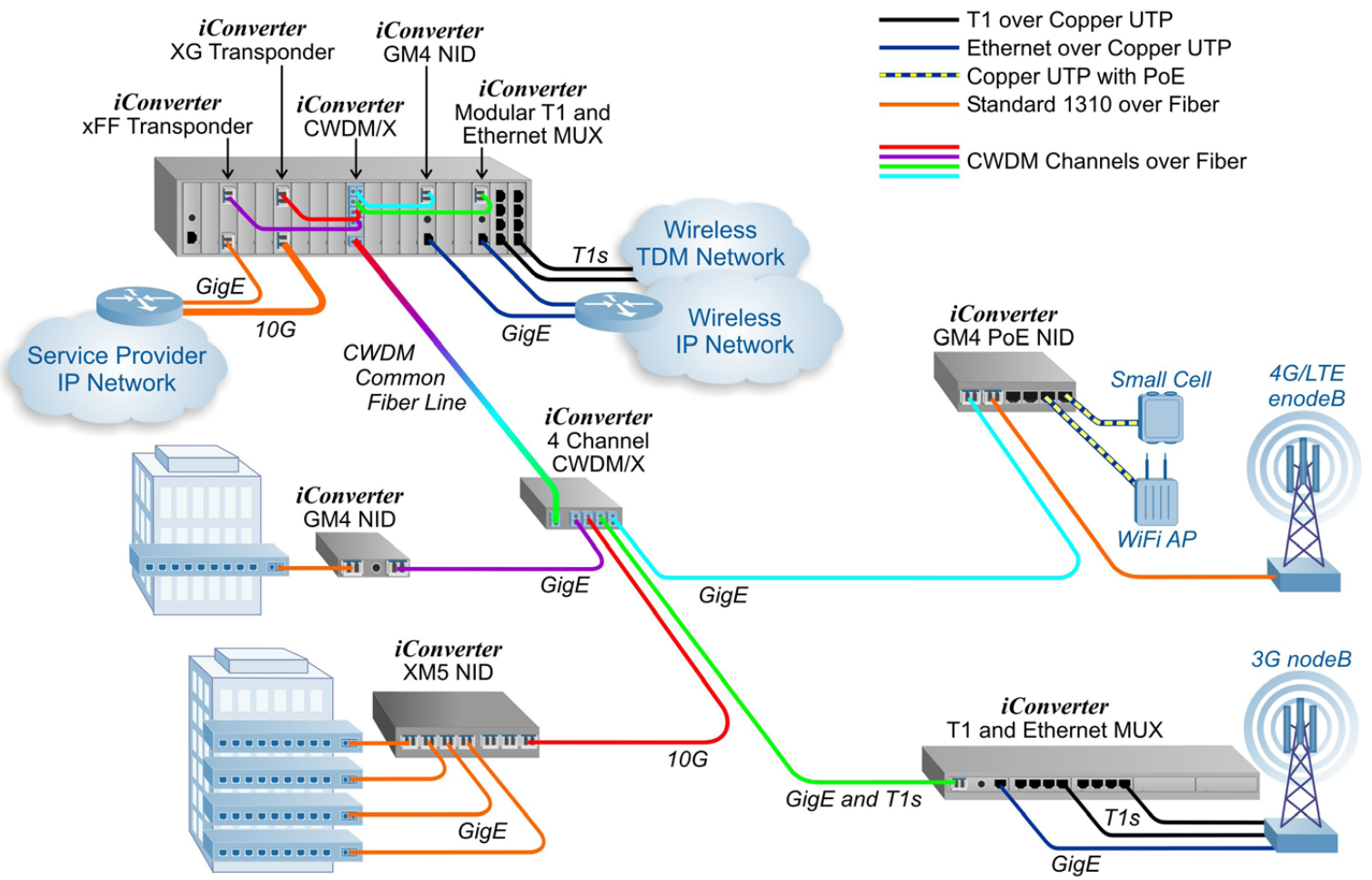
CWDM Multiplexers

iConverter CWDM Multiplexers and Add+Drop Multiplexers are passive devices that increase the capacity of existing fiber infrastructure by multiplexing up to sixteen independent wavelengths over fiber. Each wavelength can transport up to 10G, and each fiber pair can transport up to 160G. The modular iConverter CWDM MUX products utilize a small and scalable plug-in form factor and can be installed in any iConverter chassis, achieving the highest port densities in the industry.

Management Systems

The iConverter management system provides the ability to remotely monitor network performance, configure hardware parameters and perform fault detection. The iConverter Multi-Service Platform can be managed with NetOutlook® SNMP Network Management Software. iConverter GM3 NIDs and GM4 NIDs can be managed with NetOutlook EMS Element Management System.

iConverter Service Provider Access Network



In this application diagram, the iConverter Multi-Service Platform enables multiple services to be transported over a CWDM fiber access network.

At the top of the diagram, Carrier Ethernet 2.0 business services and mobile backhaul circuits (TDM and Ethernet) are multiplexed over a CWDM Common Fiber Line at an aggregation hub location. Multiple Ethernet Virtual Connections (EVCs) from a Service Provider IP network are transported to the hub location over fiber strands with standard wavelengths. The standard wavelengths are converted to CWDM wavelengths with an xFF Transponder and an XG 10G Transponder, and then connected to a 4-Channel CWDM/X Multiplexer module with CWDM fiber patch cables.

Ethernet EVCs from a Wireless IP network, and T1 mobile backhaul circuits from a Wireless TDM network are connected to the hub location over copper UTP cabling. A GM4 NID chassis plug-in module provides demarcation for multiple mobile backhaul EVCs. The Modular T1 and Ethernet Multiplexer modules transport Gigabit Ethernet and sixteen T1 circuits over an EVC. The GM4 NID and T1 MUX modules have CWDM SFPs, and convert the copper to CWDM wavelengths for connectivity to the CWDM/X MUX module with CWDM fiber patch cables.

The 4-Channel CWDM/X multiplexes all four wavelengths (channels) over a CWDM Common Fiber Link. Each wavelength transports multiple Ethernet EVCs, that can transport Ethernet and T1 circuits. iConverter CWDM Multiplexers can transport up to 16 CWDM wavelengths, with up to 10G per wavelength.

At the remote end of the CWDM Common Fiber Line, a 4-Channel CWDM/X module installed in a Passive 1-Module Chassis de-multiplexes the four wavelengths, and CWDM fiber access links connect to equipment at different locations.

On the lower left side of the diagram, Carrier Ethernet business services are transported over CWDM fiber access links. A standalone GM4 NID provides Gigabit service demarcation, and an XM5 NID provides 10G service demarcation and aggregation of Gigabit EVCs delivered to multiple tenants in the building.

On the right side of the diagram, mobile backhaul EVCs are transported over CWDM fiber access links. An iConverter GM4 PoE NID provides demarcation and timing synchronization for three EVCs that are connected to a 4G/LTE enodeB cell tower, a small cell and a Wi-Fi access point. The cell tower is connected via standard wavelength fiber, and the small cell and the Wi-Fi access point are connected with UTP copper cabling. The GM4 PoE NID provides up to 60W Power over Ethernet to power the small cell and the Wi-Fi access point. The T1s from the Wireless TDM network are transported over the CWDM access network, and connected to a fixed configuration T1 and Ethernet MUX that provides copper T1 and Gigabit Ethernet connectivity to the 3G nodeB cell tower.

Related Application Diagrams

Carrier Ethernet Business Services.....Page 22
Carrier Ethernet Mobile Services.....Page 23
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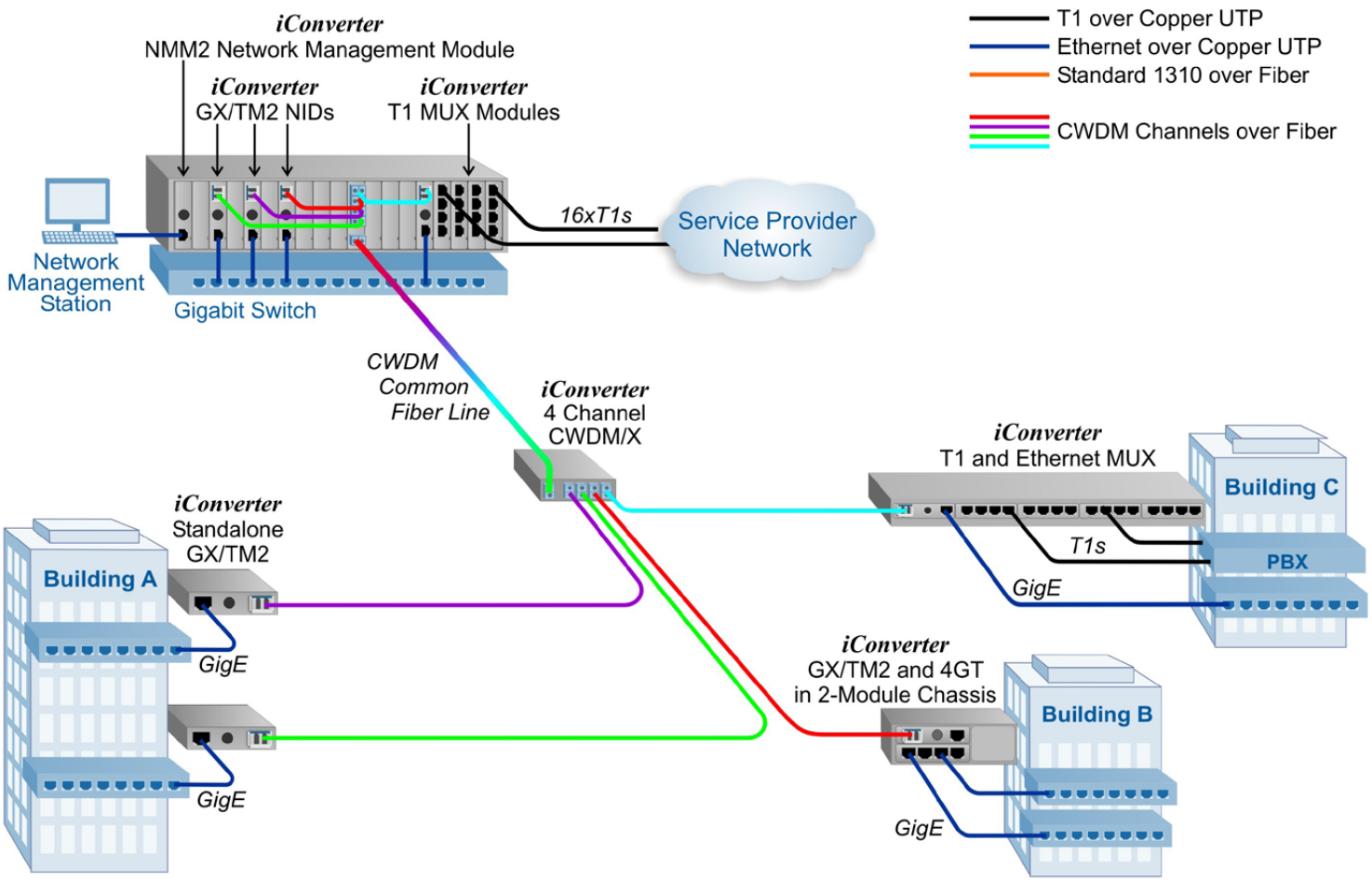
iConverter Enterprise Fiber Network



In this campus network application diagram, the iConverter Multi-Service Platform enables multiple services to be transported over CWDM with connectivity to copper equipment in different buildings.

At the network core location in the top left of the diagram, an iConverter 19-Module Chassis is deployed with GX/TM2 NID plug-in modules, and a Modular T1 and Ethernet Multiplexer. An iConverter NMM2 Network Management Module installed with the GX/TM2 NIDs enables remote configuration, end-to-end network performance monitoring and fault detection.

The GX/TM2 NID plug-in modules with CWDM SFP transceivers convert copper UTP links from a core switch to CWDM fiber patch cables that connect to a 4-Channel CWDM/X Multiplexer module. The GX/TM2 modules provide copper-to-fiber media conversion with integrated management, and support the IEEE 802.3ah Ethernet in the First Mile standard to provide carrier-grade link fault management and monitoring. The GX/TM2 also supports VLAN stacking and Quality of Service for voice, video and data over Ethernet.

A Service Provider has handed off sixteen T1 circuits via UTP cabling at the demarcation point at the network core that are extended to a PBX in another building. A Modular T1 and Ethernet Multiplexer in the 19-Module Chassis transports the T1s and Gigabit Ethernet over fiber, and provides wavelength connectivity to the 4-Channel CWDM/X MUX using a CWDM SFP transceiver.

The 4-Channel CWDM/X MUX transports all four wavelengths (channels) over a Common Fiber Line. Three wavelengths transport Gigabit Ethernet, and the fourth transports Gigabit Ethernet and sixteen T1 circuits. iConverter CWDM Multiplexers can transport up to 16 CWDM wavelengths, with up to 10G per wavelength.

At the opposite end of the CWDM Common Fiber Line, a 4-Channel CWDM/X MUX module installed in a Passive 1-Module Chassis de-multiplexes the four wavelengths, and CWDM fiber access links connect to equipment at different buildings in the campus network. The equipment at each building has a CWDM SFP that matches the wavelength coming from the CWDM/X MUX.

At Building A, two fiber links are connected to standalone GX/TM2 NIDs that provide media conversion, and managed connectivity to Ethernet switches on different floors in the building.

At Building B, a fiber link connects to a GX/TM2 installed in an 2-Module Chassis with a 4GT 4-port switch module. This compact chassis configuration functions as a managed switch with a fiber uplink and five managed 10/100/1000 UTP ports that connect via copper to department switches.

At Building C, a fiber link connects to a fixed configuration T1 and Ethernet MUX that provides connectivity for sixteen copper T1s to a PBX, and copper Gigabit Ethernet connectivity to an Ethernet Switch.

Related Application Diagrams

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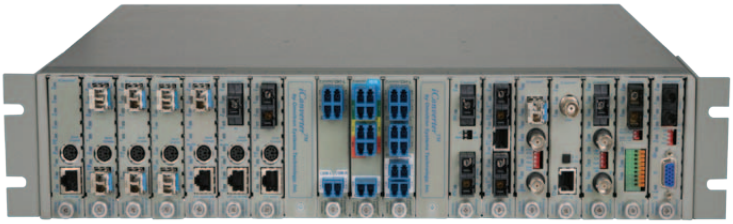
Managed Ethernet Campus LAN Network.....Page 25
T1 Demarcation Extension / Riser Management .....Page 29
CWDM Add and Drop Network.....Page 32

iConverter Chassis and Mounting Options

iConverter modules can be installed in a 19-Module (2U) or 5-Module (1U) rack-mountable chassis with any combination of redundant AC, 24VDC or 48VDC power supplies, providing a scalable solution that is space-efficient and cost-effective. iConverter 1-Module and 2-Module compact chassis feature a variety of AC, DC, and PoE power options.

The chassis and modules are managed with an NMM2 Network Management Module or NID plug-in module installed in the chassis.

- Scalable design provides a cost-effective upgrade path as network configurations change and grow
- Redundant, hot-swappable power supplies provide load -sharing for cooler operating temperature and extended lifetimes
- Wide temperature range of -40 to 60ºC, and extended temperature ranges of -40 to 75ºC are also available
- Ethernet backplanes provide connectivity to adjacent modules for network expansion
- Cable Management Trays are available for 19-Module and 5-Module Chassis to organize high-density fiber configurations
- NEBS Level 3, UL and CE Compliant



iConverter 19-Module Managed Chassis

The 2U (3.5 inch) high 19-Module Managed Chassis can be mounted in a 19 or 23-inch rack, and features three redundant, load-sharing power supplies. Universal AC, 24VDC and 48VDC powering options are available. In addition to handling the power and management data for each iConverter module, the 19-Module Chassis backplane allows sharing of Ethernet data between the individual modules. The 19-Module Managed Chassis provides high-density fiber distribution for the iConverter Multi-Service Platform and is ideal for deployments where reliability is critical and space is limited.

A Cable Management Kit is available for the iConverter 19 and 5 Module Chassis and is capable of routing dozens of fiber and copper cables. The Kit includes two extended mounting brackets and a hinged cable management tray with cable clips.

Configuration	AC/60W	Hi-Flow AC/120W	24VDC/66W	48VDC/66W	Hi-Flow 48VDC/120W
1 Power Supply	8200-1	8201-1	8206-1	8205-1	8207-1
2 Power Supplies	8200-2	8201-2	8206-2	8205-2	8207-2
3 Power Supplies	8200-3	8201-3	8206-3	8205-3	8207-3
Spare Power Supply	8200-9	8201-9	8206-9	8205-9	8207-9
23” Rack Mount Kit	8091-2				
19” Cable Mgt. Kit	8095-1				
23” Cable Mgt. Kit	8095-2				
Blank Module Panel	8090-0				

Modules not included with chassis. Consult data sheet or Omnitron for additional configurations. Dying Gasp functionality requires installation of a management module that supports Dying Gasp. For wide temperature chassis (-40 to +60°C), add a “W” to the end of the part number. Contact Omnitron for extended temperature chassis (-40 to 75°C). Hi-Flow power supplies (120W) cannot be installed in the same chassis with other types of power supplies.

iConverter 19-Module Compact Passive Chassis

The 19-Module Compact Chassis provides an innovative approach to increase the number of CWDM channels in a 2U (3.5 inch) high rack space. The short chassis design allows two chassis to be connected back-to-back supporting up to 38 CWDM modules. This configuration provides up to 684 connectors or up to 608 simplex channels or 304 duplex channels. See the CWDM Multiplexers for more information.

Model	Description
8210-1	Single, Front-Loading Chassis with two 19” Rack Mount Brackets
8210-2	Dual Front and Rear Loading Chassis Kit with four 19” Rack Mount Brackets and two Coupling Brackets
8097-2	Coupling Brackets (set of 2) to connect Dual Chassis
8090-0	Blank Module Panel

Modules not included with chassis. See the 19-Module Managed Chassis ordering table for additional accessories, including the Cable Management Kit.

iConverter 5-Module Managed Chassis

The 1U (1.75 inch) high iConverter 5-Module Managed Chassis can be mounted in a 19 or 23-inch rack and features dual hot-swappable, load-sharing power supplies. Universal AC, 24VDC or 48VDC powering options are available. Management of the chassis and modules is achieved with a management module (iConverter NMM2 or NID plug-in module) installed in the chassis. The 5-Module chassis features an Ethernet backplane for connectivity between installed iConverter modules, and is a compact and reliable chassis for Point of Presence, Campus LAN and Wide Area Network applications.

Configuration	AC/33W	Hi-Flow AC/66W	24VDC/33W	48VDC/33W	Hi-Flow 48VDC/66W
1 Power Supply	8220-1	8221-1	8226-1	8225-1	8227-1
2 Power Supplies	8220-2	8221-2	8226-2	8225-2	8227-2
Spare Power Supply	8220-9	8221-9	8226-9	8225-9	8227-9
23” Rack Mount Kit	8092-2				
19” Cable Mgt. Tray	8096-1				
23” Cable Mgt. Tray	8096-2				
Blank Module Panel	8090-0				

Modules not included with chassis. Consult data sheet or Omnitron for additional configurations. Dying Gasp functionality requires installation of a management module that supports Dying Gasp. For wide temperature chassis (-40 to +60°C), add a “W” to the end of the part number. Contact Omnitron for extended temperature chassis (-40 to 75°C). Hi-Flow power supplies (120W) cannot be installed in the same chassis with other types of power supplies.

iConverter 2-Module Managed Chassis

The iConverter 2-Module Managed Chassis features a single universal AC or DC internal power supply and an Ethernet backplane for connectivity between modules. The 2-Module Chassis can function as a managed switch with an iConverter NID module installed in the chassis, and supports a variety of configurations for delivering multiple ports from a fiber uplink.

Configuration	AC/8.5W	AC/16.5W	Hi-Flow AC/16.5W	DC/6.6W	DC/16.5W	Hi-Flow DC/16.5W
2-Module Chassis	8230-0	8231-0	-	8235-0	8236-0	-
Chassis with Dying Gasp	8230-1	8231-1	8232-1	8235-1	8236-1	8238-1
Wall Mounting Hardware Kit	8249-0					

Modules not included with chassis. Consult data sheet or Omnitron for additional configurations. Dying Gasp functionality requires installation of a management module that supports Dying Gasp. For wide temperature chassis (-40 to +60°C), add a "W" to the end of the part number. Contact Omnitron for extended temperature chassis (-40 to 75°C).

iConverter 1-Module Redundant Power Chassis with PoE/PD

The 1-Module Redundant Power Chassis with PoE features redundant DC or DC/PoE power with load sharing. Two optional 10/100BASE-T RJ-45 ports connect to the installed module via the Ethernet backplane, and support auto-negotiation, Full/Half-Duplex and auto-crossover. LEDs provide power status, UTP data rate and link activity.

- Supports 9-24VDC (terminal or barrel) or 24-60VDC (terminal)
- PoE Powered Device (PD) via optional Ethernet port
- Four optional contact closure alarm sensors

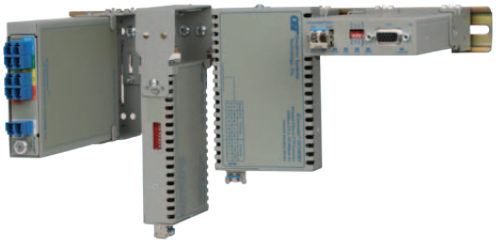
Model	Contact Closures	UTP Ports	Redundant Power	AC Power Supply
8245-111	-	-	(2) 9-24VDC Barrel	(2) US
8245-112	-	-	(2) 9-24VDC Barrel	(2) Universal
8247-220	X	-	(2) 9-24VDC Terminal	-
8248-111	X	X	(2) 9-24VDC Barrel	(2) US
8248-112	X	X	(2) 9-24VDC Barrel	(2) Universal
8248-220	X	X	(2) 9-24VDC Terminal	-
8248-312	X	X	9-24VDC Barrel + 24-60VDC Terminal	(1) Universal
8248-320	X	X	9-24VDC Terminal + 24-60VDC Terminal	-
8248-512	X	X	PoE + 9-24VDC Barrel	(1) Universal
8248-520	X	X	PoE + 9-24VDC Terminal	-

Module not included with chassis. Consult data sheet or Omnitron for additional configurations. Dying Gasp functionality requires installation of a management module that supports Dying Gasp. For wide temperature chassis (-40 to +60°C), add a "W" to the end of the part number. Contact Omnitron for extended temperature chassis (-40 to 75°C).

iConverter 1-Module Chassis & DIN Rail Options

The 1 inch high iConverter 1-Module Chassis is tabletop or wall-mountable and features an external AC/DC power adapter or terminal connector. It is a modular and flexible solution for Fiber-to-the-Premises or Fiber-to-the-Desk applications. Models are available with Dying Gasp functionality.

A 1-Module Passive chassis is available for CWDM applications (chassis not shown).



DIN-Rail Brackets provide industrial mounting for iConverter standalone modules and the 1-Module Chassis, and supports four different mounting orientations.

Configuration	No PS	US AC	UNIV AC	48VDC
1-Module Passive Chassis	8244-0	-	-	-
1-Module Chassis (3.3W)	-	8240-1	8240-2	-
1-Module Chassis w/ Dying Gasp (5W)	-	8241-1	8241-2	-
Hi-Power 1-Module Chassis (8.3W)	-	8242-1	8242-2	8242-9
Hi-Power 1-Module Chassis w/ Dying Gasp (8.3W)	-	8243-1	8243-2	8243-9
Wall Mounting Hardware Kit	8249-0			
DIN Rail Mounting Bracket	8250-0			
DIN Rail Mounting Clip	8251-0			

Modules not included with chassis.

iConverter 1U Rack-Mount Shelf

The 1U 19" rack mount shelf accommodates iConverter standalone media converters, iConverter 1-Module chassis, iConverter 2-Module chassis, OmniConverter™ media converters, FlexSwitch™ and iConverter GM4 5-Port, GM4 PoE/HPoE and XM5 Network Interface Devices.

Model	Description
8260-0	1U Rack-Mount Shelf

Modules not included with rack-mount shelf.

INDUSTRIAL
Temperature

iConverter NMM2

Network Management Module

The iConverter NMM2 provides comprehensive remote monitoring, configuration and alarm notification functions for all iConverter managed media converters and Network Interface Devices (NIDs). Installed in any slot of an iConverter chassis, the NMM2 manages all other modules and power supplies installed in the chassis through a management backplane. Additionally, all remote NIDs linked to the managed iConverter chassis may be managed by the installed NMM2 through a secure IP-less OAM channel.

Through the 10/100 RJ-45 Ethernet port, the NMM2 can be remotely accessed via SNMP v1/2c/3, TELNET and FTP protocols. The serial console port can provide local access and configuration from a PC or modem. An intuitive Command Line Interface (CLI) can be accessed either via the serial port or TELNET.

Management is accessed via Omnitron's NetOutlook SNMP-Based Network Management Software, or third party SNMP management software. The NMM2 provides comprehensive provisioning support for iConverter modules, including port settings, VLANs and rate limiting.

The NMM2 manages remote NIDs connected to the managed chassis via an IP-less OAM channel. Using a single IP address, an NMM2 installed in a 19-Module chassis can manage up to 18 local plug-in modules and 18 remote NIDs.

- Provides management via SNMP, TELNET or FTP
- Managed via Omnitron's NetOutlook SNMP Network Management Software, or third-party SNMP management software
- In-band management via the chassis Ethernet backplane port or out-of-band via the front-panel RJ-45 Ethernet port
- Built-in management VLAN support prioritizes and isolates management traffic from user traffic
- Enables Remote OAM (Secure IP-less or 802.3ah) for iConverter NID modules
- Firmware upgrades via serial port or FTP
- Supports Dying Gasp and a variety of other traps
- Supports wide temperature (-40 to 60°C) and industrial temperature (-40 to 75°C) ranges

Model	Description
8000N-0	Network Management Module (NMM2)
8081-3	NMM2 Serial Cable (DB-9, 3 ft.)

For wide temperature (-40 to 60°C), add a "W" to the end of the model number. For extended temperature (-40 to 75°C), add a "Z" to end of the model number.

Management of Media Converter Modules

Management for iConverter media converters and multiplexers is enabled by installing an iConverter NMM2 Network Management Module or plug-in Network Interface Device (NID) module in the chassis. iConverter NIDs feature integrated management functions for service provisioning and Operation, Administration and Maintenance (OAM).

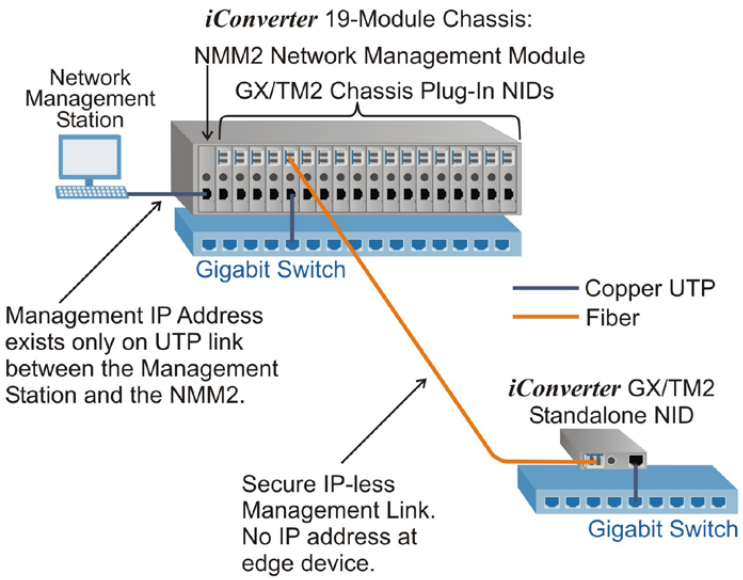
Management functions can be accessed locally through the serial console port, or remotely through IP-based management protocols, including SNMP v1/2c/3, TELNET, SSH, TFTP and FTP. Management VLAN provides protection for IP-based protocols by isolating the management data from user data.

NMM2	10/100M2	10/100
Management Only	Management and Media Conversion	Media Conversion Only
		
Provides management for other modules installed in the same chassis	Provides management for itself and other media converters installed in the same chassis	Unmanaged media converter that is managed with an NMM2 or NID installed in the same chassis

IP-Less Secure Management

When an iConverter NMM2 is deployed in a 19-Module Chassis with an M2 Class NID, the Network Management Station can monitor the remote NID via a secure, IP-less management channel established between the two NIDs.

The IP-less management channel is encrypted, and the M2 NID at the edge is a securely managed demarcation point because IP management traffic and the IP address of the Management Station is not accessible from the edge device.



NetOutlook® Management Software and EMS

NetOutlook provides remote management of iConverter media converters, Network Interface Devices (NIDs), T1/E1 and CWDM Multiplexers. NetOutlook has an intuitive Graphical User Interface (GUI) that provides the ability to remotely monitor network performance, configure hardware parameters, provision services, generate performance reports and perform advanced fault detection.

NetOutlook Software	Standard Edition	Carrier Ethernet Edition	Element Management System
Markets	• Enterprise • Government • Utility Smart Grid	• Service Provider • Government • Utility Smart Grid	• Service Provider • Utility Smart Grid
Functions	• 802.3ah Link OAM • Configuration • Fault Alarms/Traps	• Service OAM • G.8031 and G.8032 • Service Testing	• FCAPS • Service OAM • Geographic Mapping
Products Supported	• Media Converters • NMM2* • M2 NIDs* • CWDM Multiplexers • T1/E1 Multiplexers • Chassis	• SFP NID and microNID • GM3 and GM4 NIDs • XM5 NIDs and Aggregation Devices	• Up to 10,000 GM3 and GM4 NIDs
Architecture	• Standalone application	• Standalone application	• Server/Client

*Hardware requirement for management of modules and chassis

NetOutlook is used by Service Providers, Enterprises and Governments to leverage the full capabilities of the iConverter Multi-Service Platform:

- Lowers operating costs with remote configuration and provisioning which reduces technician trips to equipment
- Improves network reliability with performance monitoring, fault detection and isolation tools
- Increases end user/subscriber satisfaction with comprehensive performance monitoring

Omnitron's iConverter Multi-Service Platform can be managed with NetOutlook Standard Edition SNMP Management Software.

iConverter SFP-NID, microNID, GM3, GM4 and XM5 NIDs can be managed with NetOutlook Carrier Edition SNMP Management Software, and large scale NID deployments can be managed with the NetOutlook EMS (Element Management System).

NetOutlook® SNMP Management Software

NetOutlook Network Management Software is a robust network management application for securely accessing the iConverter Multi-Service Platform. NetOutlook provides remote configuration, performance monitoring, fault detection and troubleshooting for iConverter media converters, NIDs, T1/E1 and CWDM Multiplexers. NetOutlook manages an iConverter chassis and modules by accessing the Network Management Module (NMM2), or NID module installed in the chassis.

Management access can be protected by SNMPv3 encryption and authentication. Using Omnitron's secure IP-Less remote management channel, NetOutlook users can access a large number of chassis and NIDs through a centrally located system with a single IP address. Remote chassis and NIDs managed by an IP-less channel do not need to have an IP address that can be exposed to unauthorized access.

- Intuitive Graphical User Interface (GUI) provides configuration, monitoring and reporting of iConverter modules and chassis
- Real-time trap notification provides network status to identify specific network problems and their locations
- Supports SNMPv1, SNMPv2c and SNMPv3
- IP-less management with IEEE 802.3ah and Omnitron's Secure OAM management channels
- Comprehensive Port MIB statistics in graphical format and 802.3ah performance monitoring
- Reporting of optical performance statistics for SFP transceivers equipped on iConverter modules
- SNMP Device Discovery utility that automatically detects iConverter chassis and modules on the network

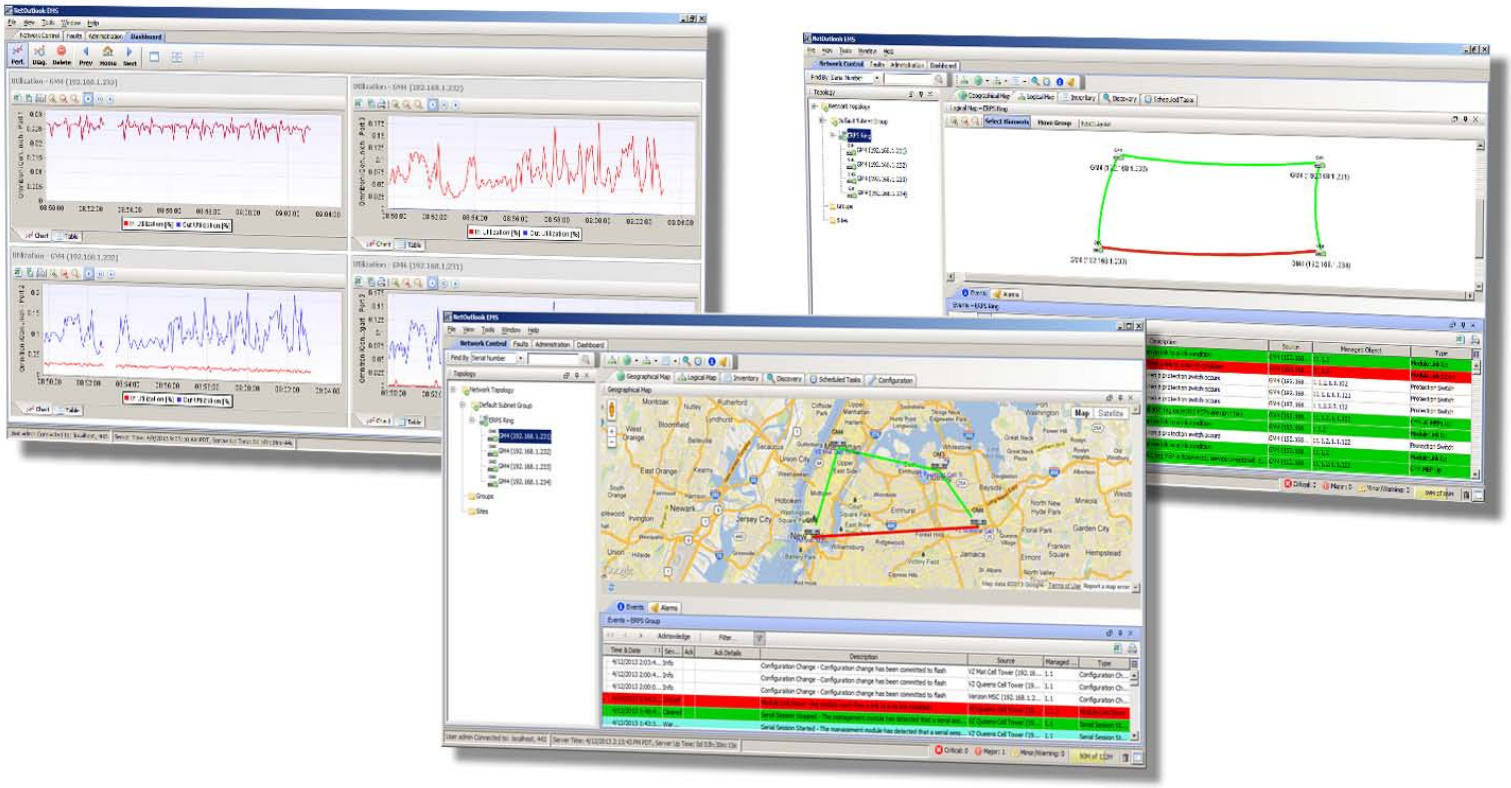
NetOutlook® Carrier Ethernet Edition

NetOutlook Carrier Ethernet Edition manages, provisions and monitors Ethernet Virtual Connections (EVCs) for Carrier Ethernet mobile backhaul and business services. NetOutlook Carrier Ethernet Edition supports all the functions of the Standard edition, and adds the ability to manage and remotely provision iConverter Network Interface Devices.

- RFC 2544 and ITU-T Y.1564 Service Testing
- Zero-Touch Provisioning
- IEEE 802.1ag Connectivity Fault Management
- ITU-T Y.1731 Performance Monitoring
- ITU-T G.8031 and G.8032 Protection Switching

Model	Description
8100-0	NetOutlook Standard Edition (single User License)
8100P-0	NetOutlook Carrier Ethernet Edition (single User License)

Supports Microsoft Windows 2000/2003/XP/Windows7/8/10



NetOutlook® EMS

NetOutlook EMS is an intuitive and easy-to-use Element Management System that simplifies management of iConverter Network Interface Devices (NIDs). NetOutlook EMS improves reliability, scalability and availability of complex networks with a single management interface.

Service Providers can streamline Carrier Ethernet 2.0 business services and mobile backhaul deployments throughout the entire lifecycle of provisioning, service management, performance monitoring and fault restoration.

- Comprehensive FCAPS compliance
- Scalable up to 100,000 elements
- Real-Time event monitoring and configuration
- Fault and Alarm management
- Comprehensive Reports and Charts for Performance metrics, events and alarms
- Bulk operation and task scheduling with filtering capability
- High-availability with server application redundancy
- Database backup and disaster recovery
- Automatic discovery and topology updates
- Automatic link discovery with color-coded status display
- Logical and Geographical network mapping
- Easy to integrate with northbound OSS and BSS systems
- Client Access through web browser or Java applet

NetOutlook EMS provides centralized management for SFP-NID, microNID, GM3, GM4 and XM5 NIDs.

NetOutlook EMS conforms to the TMN layered model, providing standard based interoperability with Network Management Systems. The system is Java-based and offers cross-platform support for multiple operating systems.

NetOutlook EMS features automated back up and system error logs. In case of disaster recovery, the system continues to operate uninterrupted with server application redundancy.

Initial Software Installation and Node Licenses	
8110S-100	NetOutlook EMS Software with 100 Node License ♦
8110S-500	NetOutlook EMS Software with 500 Node License ♦
8110S-1K	NetOutlook EMS Software with 1,000 Node License ♦
8110S-10K	NetOutlook EMS Software with 10,000 Node License ♦
8110S-100K	NetOutlook EMS Software with 100,000 Node License ♦
Node License Upgrades	
8110U-100	NetOutlook EMS 100 Node License ♦
8110U-500	NetOutlook EMS 500 Node License ♦
8110U-1K	NetOutlook EMS 1,000 Node License ♦
8110U-10K	NetOutlook EMS 10,000 Node License ♦
8110U-100K	NetOutlook EMS 100,000 Node License ♦
Annual Service Contracts	
8110M-100	Annual Service and Maintenance for up to 100 Nodes
8110M-500	Annual Service and Maintenance for up to 500 Nodes
8110M-1K	Annual Service and Maintenance for up to 1000 Nodes
8110M-10K	Annual Service and Maintenance for up to 10,000 Nodes
8110M-100K	Annual Service and Maintenance for up to 100,000 Nodes

♦ Includes 1 year service and maintenance.

NetOutlook® EMS

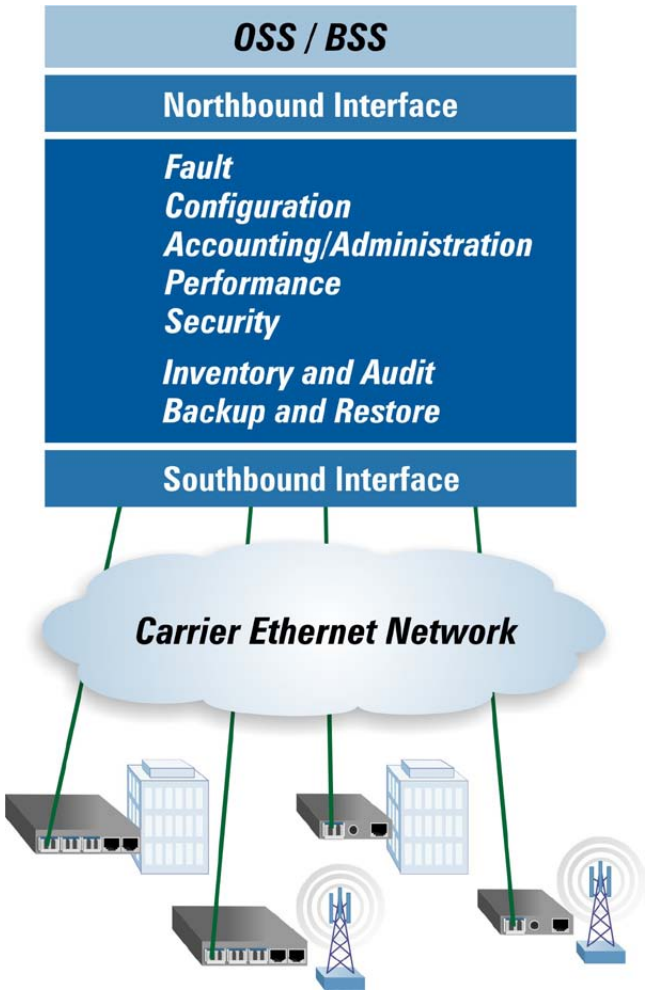
The Challenge

Complex networks with thousands of devices/elements that are delivering Carrier Ethernet 2.0 business services and mobile backhaul over large geographic areas present a variety of management challenges. These challenges include complex and time consuming service activation processes, collecting and presenting performance monitoring data and fault management. In addition, there can be interoperability issues between multiple software systems, and widespread power outages and natural disasters can take down entire networks for days, even weeks.

The Solution

NetOutlook EMS streamlines the entire Carrier Ethernet 2.0 service lifecycle of provisioning, testing, SLA assurance and fault management for business services and mobile backhaul deployments.

NetOutlook EMS provides automated and scalable management with Fault, Configuration, Accounting/Administration, Performance and Security (FCAPS) functionality for networks with up to 10,000 NIDs.



FCAPS

Fault Management

NetOutlook EMS supports advanced alarm management by detecting faults, failures and threshold crossing events in real-time. Alarms can be filtered, labeled, sorted for rapid fault isolation, and exported for additional processes. Alarms can be forwarded to other applications, such as email, for processing through the northbound interface. NetOutlook EMS provides fault isolation with IEEE 802.1ag Loopback and Linktrace.

Configuration Management

Management and provisioning is centralized with an intuitive Graphical User Interface that visually displays all iConverter NIDs on the network. NetOutlook EMS provides complete configuration capabilities of service parameters, traffic management, SLA assurance and security. Bulk provisioning and configuration tasks can be scheduled or performed in real time. ITU-T Y.1564 and RFC 2544 Service Activation Testing can be performed remotely with NetOutlook EMS for rapid service activation.

Accounting, Administration and Inventory

Newly installed NIDs are automatically detected and added to the inventory for management and provisioning. NetOutlook EMS provides a complete infobase of the discovered iConverter NIDs in a tree view as well as geo-located map view. Both the tree and map views facilitate informed troubleshooting with color-coded link status of all the NIDs. Inventory can be filtered, sorted and queried with manual or automatic grouping of devices. NetOutlook EMS also supports discovery of third-party equipment.

Performance Monitoring

NetOutlook EMS supports real-time monitoring and historical reporting of SLA-impacting Key Performance Indicators (KPI). Performance statistics are available at user-specified intervals and can be plotted in graphical form displayed within the NetOutlook EMS dashboard for analysis. Performance data can be analyzed and exported for reporting to third-party applications.

Security

Northbound and Southbound interfaces of NetOutlook EMS provide full-session authentication and encryption via secure protocols, including SSH, HTTPS and SNMPv3. Access privilege profiles can be assigned and customized for each user. User activities are logged by an audit trail mechanism for future inspection.

BSS/OSS Integration

Designed to be a standalone management system or part of management suite, NetOutlook EMS supports standard Northbound Interfaces (NBI) for cross application integration with existing Billing Support Systems (BSS), Operational Support Systems (OSS) and umbrella applications.

Resiliency and Backup/Restore

NID configuration settings can be backed up and restored on demand or at user-defined periodic intervals.

High-availability is achieved with both server-level and database-level redundancy.

Overview and Comparison of iConverter Network Interface Devices

iConverter Network Interface Devices (NIDs) provide Carrier Ethernet demarcation for wholesale and retail Ethernet business services, 4G/LTE mobile backhaul, small cells, carrier Wi-Fi, and cloud services.

iConverter NIDs are compact demarcation devices that support advanced Performance Monitoring, Service Activation Testing, Fault Management, timing and synchronization, and protection.

SDN+NFV Ready Demarcation – iConverter NIDs are integrated into service orchestration platforms with SDN+NFV ecosystem partners.

Automated Service Creation – Zero-Touch Provisioning and Service Activation Testing enable rapid service turn-up.

Guaranteed Performance and Uptime – iConverter NIDs support performance monitoring across Layer 2, 3 and 4 networks with advanced fault management and service protection.

Simplify Inventory – Deploy the same iConverter GM4 or XM5 NID in a variety of access networks (active or passive) and for different service types to simplify equipment inventory.

Tiered NIDs Match Cost to Revenue – Omnitron provides a tiered product offering to align features and costs with the different types of Ethernet services.

- **Carrier Ethernet 2.0 NIDs** provide advanced demarcation for wholesale and retail services with comprehensive service assurance
- **Service OAM NIDs** provide demarcation for Carrier Ethernet services with Operations Administration and Maintenance (OAM) for performance SLAs
- **Link OAM NIDs** provide cost-effective demarcation for internet access and best effort Ethernet and internet access services

Carrier Ethernet 2.0 NIDs

iConverter MEF CE 2.0 Certified NIDs provide demarcation with Multiple Classes of Service (Multi-CoS), Manageability and Interconnect. These services reflect major new capabilities of E-Line, E-LAN, E-Tree and E-Access services. These state-of-the-art NIDs enable new services and reduce operating costs with automated service provisioning and testing.

iConverter GM4 and XM5 CE 2.0 NIDs support the latest Service OAM standards for performance monitoring and fault management, and provide protection switching for service assurance.

CE 2.0 MEF CERTIFIED

iConverter GM4 NIDs

iConverter GM4 NIDs deliver advanced Carrier Ethernet 2.0 services, and are the most compact NIDs available with the lowest power consumption. They are available in 2 and 3 port standalone units and chassis plug-in modules, and 5-port standalone models with a variety of port configurations.

iConverter GM4 PoE NIDs

iConverter GM4 PoE NIDs deliver advanced Carrier Ethernet 2.0 services and provide integrated Power over Ethernet (PoE) at the demarcation. GM4 PoE NIDs support all the functions of the GM4 NIDs, and add 802.3af PoE (15.4W), 802.3at PoE+ (30W), and up to 60W on each RJ-45 port for small cell and WiFi applications.

iConverter XM5 and XM5 Aggregation NIDs

iConverter XM5 NIDs provide advanced 10G demarcation and aggregation for Carrier Ethernet 2.0 services. The XM5 NIDs feature three 10G SFP+ or XFP ports and up to four Gigabit/100Mbps SFP or RJ-45 10/100/1000 ports.

The iConverter XM5-1G is a multi-port Gigabit NID that features a combination of Gigabit SFP ports and 10/100/1000 RJ-45 ports for UNI or NNI deployments (not shown).

The XM5 Aggregation and Demarcation Devices feature two 10G SFP+ or XFP ports, twelve Gigabit/100Mbps SFP ports, and two 10/100/1000 RJ-45 ports.

Service OAM NIDs

iConverter GM3 NIDs

iConverter GM3 NIDs provide MEF 9, 14 and 21 certified demarcation for Ethernet services delivered across one or more operator networks. IEEE 802.1ag and ITU-T Y.1731 Service OAM provides the fault detection and performance monitoring necessary to ensure proper enforcement and compliance to SLAs. The GM3 NIDs support Zero-Touch Provisioning (ZTP), color-aware rate limiting and Class of Service differentiation and prioritization.

iConverter SFP-NID™

The iConverter SFP-NID is a Small Form Pluggable (SFP) Gigabit optical NID that enables Service Providers to deliver low-latency, SLA-guaranteed Business Ethernet, 4G/LTE macro cell and small cell backhaul services. The SFP-NID can be installed directly into a switch, router or small cell, and saves Capital Expenditures (CAPEX) by eliminating the need for a standalone demarcation device. It also reduces Operating Expenditures (OPEX) by decreasing power consumption, space, installation and maintenance costs.

Related Applications

Service Provider Access Network (GM4/GM4 PoE).....Page 6
Carrier Ethernet Business Services (GM4).....Page 22
Mobile Services (GM4/mircoNID/SFP-NID).....Page 23
Managed Ethernet Campus LAN (M2 NIDs).....Page 25

iConverter microNID™

The iConverter microNID is a low-latency, compact and cost-effective NID that provides service activation testing, fault and performance monitoring. The two-port microNID enables Service Providers to deliver premium services with Service Level Agreements where cost, space and power consumption are constraints. Cable MSOs can deliver value-added commercial Ethernet services and wireless backhaul over their existing DOCSIS networks with guaranteed Quality of Service.

Link OAM NIDs

iConverter M2 NIDs

The iConverter M2 Class NIDs provide Ethernet E-Line service demarcation for services that do not require SLA performance assurance. These cost-effective NIDs support 802.3ah Link OAM with fault detection for Ethernet in the First Mile (EFM) access links. The M2 NIDs provide MEF 9, 14 and 21 certified Ethernet service demarcation in telecom networks, and mission-critical managed fiber links in enterprise, government and utility networks.

M2 Class NIDs are available in 2-Port standalone units and chassis plug-in modules that support copper-to-fiber and fiber-to-fiber demarcation for 10/100 and 10/100/1000 services.

PORT INTERFACES

	M2 Class	GM3	SFP-NID	microNID	GM4	GM4 5-Port	GM4 PoE	XM5-1G	XM5	XM5 Aggr.
Number of ports	2	2 or 3	1	2	2 or 3	5	Up to 5	8	7	16
10/100/1000BASE-T Copper	✓	✓		100/1000	✓	Up to 4		Up to 8	Up to 4	2
10/100/1000BASE-T Copper PoE/PoE+/60W							Up to 4			
1000BASE-X Fixed Fiber	✓	✓			✓					
Fiber SFP (100Mbps or 1000Mbps)	✓	✓	1000M	✓	✓	Up to 5	Up to 2	Up to 8	Up to 4	12
Copper SFP (10/100/1000Mbps)	✓	✓			✓	Up to 5	Up to 2	Up to 8	Up to 4	Up to 12
Fiber XFP or SFP+ (10G or 1000Mbps)									3*	2*
Chassis Plug-In Modules	✓	✓			✓					

*The 10G SFP+ ports also support 1000Mbps Fiber SFPs and 1000Mbps Copper SFPs.
Please consult Omnitron for other configurations.

iConverter NID Features Comparison Chart

		M2 Class	GM3	SFP-NID	microNID	GM4	GM4 5-Port	GM4 PoE	XM5 and XM5-1G	XM5 Aggr.
MEF Compliance	Carrier Ethernet 2.0 Certified					✓	✓	✓	✓	✓
	MEF 9, 14 and 21	✓	✓			✓	✓	✓	✓	✓
Traffic Management	IEEE 802.1Q VLAN Tagging	✓	✓			✓	✓	✓	✓	✓
	IEEE 802.1ad Q-in-Q VLAN Tagging	✓	✓			✓	✓	✓	✓	✓
	64k Granular Rate Limiting	✓	✓			✓	✓	✓	✓	✓
	Hierarchical rate limiting with two-level policing		✓			✓	✓	✓	✓	✓
	CIR/EIR and CBS/EBS Policing and Shaping		✓			✓	✓	✓	✓	✓
	per Port		✓			✓	✓	✓	✓	✓
	per EVC		✓			✓	✓	✓	✓	✓
	per Class of Service		✓			✓	✓	✓	✓	✓
	per MAC Addr, IP Addr, ToS, DiffServe		✓			✓	✓	✓	✓	✓
	Port Mirroring		✓			✓	✓	✓	✓	✓
	IEEE 802.1p CoS Priority		✓			✓	✓	✓	✓	✓
	L2CP Policy Management		✓	✓	✓	✓	✓	✓	✓	✓
	RFC 4541 IGMP Snooping					✓	✓	✓	✓	✓
Timing and Synchronization	IEEE 1588v2 Transparent Clock					✓	✓	✓	✓	✓
	IEEE 1588v2 Slave Clock								✓	✓
	IEEE 1588v2 Boundary Clock								✓	✓
	Synchronous Ethernet					✓	✓	✓	✓	✓
Service OAM	IEEE 802.3ah Link OAM	✓	✓	✓	✓	✓	✓	✓	✓	✓
	IEEE 802.1ag Service OAM		✓	✓	✓	✓	✓	✓	✓	✓
	ITU-T-Y.1731 Performance Monitoring		✓	✓	✓	✓	✓	✓	✓	✓
	TWAMP IP SLA Performance Monitoring			✓	✓	✓	✓	✓	✓	✓
	Syslog								✓	✓
	Trap Hosts; up to 8	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MIB Statistics (RMON)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Service Activation Testing	IETF RFC 2544 with built-in Test-head			✓	✓	✓	✓	✓	✓	✓
	Third-party in-band loopback support			✓	✓	✓	✓	✓	✓	✓
	ITU-T-Y.1564 Service Testing (built-in Test-head)			✓	✓	✓	✓	✓	✓	✓
	Per port and per flow loopback			✓	✓	✓	✓	✓	✓	✓
	with MAC (Layer 2) swap			✓	✓	✓	✓	✓	✓	✓
	with IP (Layer 3) swap			✓	✓	✓	✓	✓	✓	✓
Protection and Redundancy	Port Redundancy (Primary and Backup Link)		✓			✓	✓	✓	✓	✓
	LAG with LACP (1:1 and 1+1)					✓	✓	✓	✓	✓
	ITU-T-G.8031 Ethernet Linear Protection					✓	✓	✓	✓	✓
	ITU-T-G.8032 Ethernet Ring Protection					✓	✓	✓	✓	✓
	IEEE 802.1w Rapid Spanning Tree Protocol		✓			✓	✓	✓	✓	✓
Automatic Provisioning	Zero-Touch Provisioning (DHCP/TFTP)		✓			✓	✓	✓	✓	✓
	DPoE DEMARC Auto Configuration algorithm					✓	✓	✓		
Security and Authentication	TACACS+					✓	✓	✓	✓	✓
	RADIUS					✓	✓	✓	✓	✓
	802.1x					✓	✓	✓	✓	✓
	Access Control Lists					✓	✓	✓	✓	✓
Power	Redundant AC/DC Power Inputs						✓		✓	✓

SDN, EMS and Management

		M2 Class	GM3	SFP-NID	microNID	GM4	GM4 5-Port	GM4 PoE	XM5 and XM5-1G	XM5 Aggr.
Management Interfaces and Protocols	Serial Console Interface	✓	✓		✓	✓	✓	✓	✓	✓
	Dedicated Ethernet Mgt. Interface								✓	✓
	Telnet	✓	✓	✓	✓	✓	✓	✓	✓	✓
	SSH					✓	✓	✓	✓	✓
	SNMP v1/v2c/v3	✓	✓	✓	✓	✓	✓	✓	✓	✓
Omnitron EMS and SNMP Management Software	NetOutlook Element Mgt. System		✓	✓	✓	✓	✓	✓	✓	✓
	NetOutlook Carrier Edition Software		✓	✓	✓	✓	✓	✓	✓	✓
	NetOutlook Management Software	✓	✓	✓	✓	✓	✓	✓	✓	✓
SDN+NFV	Ciena Blue Planet Integration		✓			✓	✓	✓		
Monitoring Portals and Software	OcularIP Portal Integration		✓			✓	✓	✓		
	SolarWinds Integration	✓	✓			✓	✓	✓		

SERVICE TYPES

Bronze - Best Effort Ethernet Services

- Internet Access and Small Business
- Basic Management and Fault Detection

Silver - SLA Assured Services

- Carrier Ethernet Business Services and Mobile Backhaul
- Fault Management and Performance Monitoring

Gold - Carrier Ethernet 2.0 Services

- Advanced SLA assured services per Class of Service
- Rapid service turn up and testing

Platinum - Protected Carrier Ethernet 2.0 Services

- Advanced CE 2.0 Services
- Service protection with guaranteed uptime

		M2 Class	GM3	SFP-NID	microNID	GM4	GM4 5-Port	GM4 PoE	XM5 and XM5-1G	XM5 Aggr.
		Bronze	Silver			Gold and Platinum				
MEF Defined Services	E-Line	✓	✓	✓	✓	✓	✓	✓	✓	✓
	E-LAN		✓	✓	✓	✓	✓	✓	✓	✓
	E-Tree and E-Access		✓			✓	✓	✓	✓	✓
	Carrier Ethernet 2.0 (all 8 Service Types[1])					✓	✓	✓	✓	✓
Flow Types	EVC	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Multiplexed EVC		✓	✓	✓	✓	✓	✓	✓	✓
	CE 2.0 Class of Service					✓	✓	✓	✓	✓
Types of Services	Business Services	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Cloud (Data Center) Services		✓	✓	✓	✓	✓	✓	✓	✓
	Low-Latency Financial Services			✓	✓	✓	✓	✓	✓	✓
	4G/LTE Mobile Backhaul		✓	✓	✓	✓	✓	✓	✓	✓
	Small Cell			✓	✓	✓	✓	✓	✓	✓
	Wholesale Ethernet		✓	✓	✓	✓	✓	✓	✓	✓
	Direct Internet Access	✓								
Service Assurance	Best Effort Services (No SLA)	✓								
	SLA Assured Services		✓	✓	✓	✓	✓	✓	✓	✓
	Port Failover Protection		✓			✓	✓	✓	✓	✓
	EVC Protection Switching					✓	✓	✓	✓	✓

[1] E-Line, E-LAN, E-Tree and E-Access, plus Multiplexed versions of each service for total of 8 MEF Defined Services

iConverter XM5 Aggregation and Demarcation NID

The iConverter XM5 Aggregation and Demarcation Device provides high-density demarcation for Carrier Ethernet 2.0 services.

The XM5 Aggregation Demarcation and Device features two 10G SFP+ or XFP ports, twelve Gigabit SFP ports, and two 10/100/1000 RJ-45 ports for aggregation of wholesale Ethernet, 4G/LTE mobile backhaul, business and cloud services. The XM5 can be deployed as a node on a 10G ring with Gigabit aggregation ports, or as a demarcation NID on a 10G access link with aggregation UNI ports for multiple tenants or cell towers.

Featuring high port density in a compact 1U rack mount chassis, the XM5 Aggregation Demarcation Device can be deployed indoors or outdoors in an all-weather enclosure. All data ports, timing I/O, and power inputs are front-loading for easy access.

- MEF Carrier Ethernet 2.0 Certified Compliant
- Two 10 Gigabit Ports: 10GBASE-R fiber XFP or SFP+, and 10G ports also support Gigabit SFPs
- Twelve 1 Gigabit Ports: 1000BASE-X/100BASE-X fiber SFP
- Two 10/100/1000BASE-T RJ-45 copper ports
- Available with redundant, hot-swappable DC power inputs
- Front-loading power supplies
- Commercial (0 to 50ºC), wide (-40º to 60ºC) and industrial (-40º to 75ºC) temperature ranges

XM5 Aggregation and Demarcation NID					
Dual 10G SFP+ Ports	Dual 10G XFP Ports	IEEE 1588 Boundary and Slave Clock	IEEE 1588 Clock I/O Connector	G.8262 SyncE	Alarm Relay Contact
9620-C2	9621-C2	-	-	-	-
9624-C2	9625-C2	x	-	-	-
9626-C2	9627-C2	x	-	-	x
9630-C2	9631-C2	x	x	-	x
9632-C2	9633-C2	x	-	x	-
9634-C2	9635-C2	x	-	x	x
9638-C2	9639-C2	x	x	x	x

Order Fiber or Copper SFPs separately. See SFP ordering information on pages 66 and 67.

All models support IEEE 1588 Transparent Clock Mode.

For Universal AC Power Supply, add "B" to the model number: 9620-C2-**B**
For 20-60VDC Isolated 3-Pin Terminal Connector, add "C" to the model number: 9620-C2-**C**

For Single Power Input, add a "1" to the model number: 9620-C2-B**1**
For Redundant DC Power Inputs, add a "2" to the model number: 9620-C2-C**2** (not available with Universal AC Power Supply)

For wide temperature (-40 to 60°C), add a "W" to the end of the model number: 9620-C2-B1**W**
For industrial temperature (-40 to 75°C), add a "Z" to the end of the model number: 9620-C2-C1**Z**

XM5 Aggregation Demarcation Devices and XM5 NIDs can be deployed to deliver a variety of 10G and gigabit services, and they simplify operations by reducing the need to inventory multiple NID models. Gigabit SFPs can be installed in the 10G ports, and 100Mbps SFPs can be installed in the Gigabit SFP aggregation ports to provide a seamless upgrade path to future high-bandwidth services.

iConverter XM5 10G NIDs

The iConverter XM5 Demarcation and Mini-Aggregation NID is a 10G Network Interface Device that provides service demarcation and aggregation for Carrier Ethernet 2.0 services.

The XM5 features three 10G SFP+ or XFP ports and four SFP or RJ-45 Gigabit ports for UNI or NNI deployments to deliver wholesale Ethernet, 4G/LTE mobile backhaul, business and cloud services.

- MEF Carrier Ethernet 2.0 Certified Compliant
- Three 10 Gigabit Ports: 10GBASE-R fiber XFP or SFP+, and 10G ports also support Gigabit SFPs
- Four 1000BASE-X or 100BASE-X SFP Ports
- Four 10/100/1000BASE-T RJ-45 copper ports
- Available with redundant, hot-swappable AC or DC power inputs
- Commercial (0 to 50ºC), wide (-40º to 60ºC) and industrial (-40º to 75ºC) temperature ranges

XM5 NID						
Three 10G SFP+ Ports	Three 10G XFP Ports	Four Gigabit Ports	IEEE 1588 Boundary and Slave Clock	IEEE 1588 Clock I/O Connector	G.8262 SyncE	Alarm Relay Contact
9600-04	9601-04	RJ-45	-	-	-	-
9600-40	9601-40	SFP	-	-	-	-
9604-04	9605-04	RJ-45	x	-	-	-
9604-40	9605-40	SFP	x	-	-	-
9606-04	9607-04	RJ-45	x	-	-	x
9606-40	9607-40	SFP	x	-	-	x
9610-04	9611-04	RJ-45	x	x	-	x
9610-40	9611-40	SFP	x	x	-	x
9612-04	9613-04	RJ-45	x	-	x	-
9612-40	9613-40	SFP	x	-	x	-
9614-04	9615-04	RJ-45	x	-	x	x
9614-40	9615-40	SFP	x	-	x	x
9618-04	9619-04	RJ-45	x	x	x	x
9618-40	9619-40	SFP	x	x	x	x

Order Fiber or Copper SFPs separately. See SFP ordering information on pages 66 and 67.

All models support IEEE 1588 Transparent Clock Mode.

For Universal AC Power Supply, add "B" to the model number: 9600-04-**B**
For 20-60VDC Isolated 3-Pin Terminal Connector, add "C" to the model number: 9600-04-**C**

For Single Power Input, add a "1" to the model number: 9600-04-B**1**
For Redundant Power Inputs, add a "2" to the model number: 9600-04-B**2**

For wide temperature (-40 to 60°C), add a "W" to the end of the model number: 9600-04-B1**W**
For industrial temperature (-40 to 75°C), add a "Z" to the end of the model number: 9600-04-B1**Z**

Up to two XM5 NIDs can be mounted on the 1U high (1.75") Rack Mount Shelf that provides multiple grounding points and convenient locations for cable ties to organize and secure cabling.

Model Number	Description
8261-0	1U 19" Rack Mount Shelf for XM5 NIDs
8261-2	1U 23" Rack Mount Shelf for XM5 NIDs

iConverter XM5-1G NIDs

The iConverter XM5-1G is a multi-port Gigabit Network Interface Device (NID) that provides service demarcation and aggregation for Carrier Ethernet 2.0 services.

The XM5-1G features a combination of Gigabit SFP ports and 10/100/1000 RJ-45 ports for UNI or NNI deployments to deliver wholesale Ethernet, 4G/LTE mobile backhaul, business and cloud services.

- MEF Carrier Ethernet 2.0 Certified Compliant
- Supports multiple combinations of SFP transceivers and 10/100/1000 RJ-45 ports
- Supports Gigabit and Fast Ethernet SFP transceivers
- Available with redundant, hot-swappable AC or DC power inputs
- Commercial (0 to 50ºC), wide (-40º to 60ºC) and industrial (-40º to 75ºC) temperature ranges

XM5-1G NID				
Model #	**IEEE 1588 Boundary and Slave Clock**	**IEEE 1588 Clock I/O Connector**	**G.8262 SyncE**	**Alarm Relay Contact**
96xx-00	-	-	-	-
96xx-10	-	-	-	x
96xx-02	x	-	-	-
96xx-12	x	-	-	x
96xx-03	x	x	-	-
96xx-13	x	-	x	x
96xx-06	x	-	x	-
96xx-16	x	-	x	x
96xx-07	x	x	x	-
96xx-17	x	x	x	x

Order Fiber or Copper SFPs separately. See SFP ordering information on pages 66 and 67.

For 8 SFP ports, use the base model number: 9640.
For 4 SFP ports and 4 10/100/1000 RJ-45 ports, use the base model number: 9641.
For 2 SFP ports and 6 10/100/1000 RJ-45 ports, use the base model number: 9642.
For 8 10/100/1000 RJ-45 ports, use the base model number: 9643.

For Universal AC Power Supply, add :B: to the model number: 9640-00-**B**
For 20-60VDC Isolated 3-Pin Terminal Connector, add "C" to the model number: 9640-00-**C**

For Single Power Input, add a "1" to the model number: 9640-00-B**1**
For Redundant Power Inputs, add a "2" to the model number: 9640-00-B**2**

For wide temperature (-40 to 60°C), add a "W" to the end of the model number: 9640-00-B1**W**
For industrial temperature (-40 to 75°C), add a "Z" to the end of the model number: 9640-00-C1**Z**

Up to two XM5 NIDs can be mounted on the 1U high (1.75") Rack Mount Shelf that provides multiple grounding points and convenient locations for cable ties to organize and secure cabling.

iConverter GM4 Carrier Ethernet 2.0 NIDs

iConverter GM4 NIDs provide Carrier Ethernet 2.0 certified demarcation to enable rapid service deployments, SLA assurances, comprehensive fault management and service protection. These advanced capabilities reduce operating costs, provide faster return on investment (ROI) and improve customer satisfaction.

- MEF Carrier Ethernet 2.0 Certified Compliant
- Smallest full-function NID available with the lowest power consumption
- Available with 2, 3 and 5-Ports
- ITU-T Y.1564 and RFC 2544 Ethernet Service Testing
- IEEE 802.1ag and ITU-T Y.1731 Service OAM
- Commercial (0 to 50ºC), wide (-40º to 60ºC) and industrial (-40 to 75°C) temperature ranges

2-Port and 3-Port GM4 NIDs							
Ports			**Fiber**	**Distance**	**Wavelength (nm)**	**Connector Type**	
P1	**P2**	**P3**				**ST**	**SC**
FF	RJ-45	-	MM/DF	220/550m	850	8920R-0	8922R-0
FF	RJ-45	-	SM/DF	12km	1310	8921R-1	8923R-1
FF	RJ-45	-	SM/DF	34km	1310	-	8923R-2
FF	RJ-45	-	SM/DF	80km	1550	-	8923R-3
FF	RJ-45	-	SM/DF	110km	1550	-	8923R-4
FF	RJ-45	-	SM/DF	140km	1550	-	8923R-5
FF	RJ-45	-	SM/SF	20km	1310/1550	-	8930R-1
FF	RJ-45	-	SM/SF	20km	1550/1310	-	8931R-1
FF	RJ-45	-	SM/SF	40km	1310/1550	-	8930R-2
FF	RJ-45	-	SM/SF	40km	1550/1310	-	8931R-2
SFP	RJ-45	-	8939R-0*				
SFP	RJ-45	RJ-45	8970R-0*				
RJ-45	RJ-45	RJ-45	8974R-0				
SFP	SFP	RJ-45	8975R-0*				
RJ-45	RJ-45	-	8989R-0				
SFP	SFP	-	8999R-0*				

5-Port GM4 NIDs						
Ports					**Power Supply Input**	
P1	**P2**	**P3**	**P4**	**P5**	**Single**	**Dual**
SFP	RJ-45	RJ-45	RJ-45	RJ-45	8991R-14	8992R-14
SFP	SFP	RJ-45	RJ-45	RJ-45	8991R-23	8992R-23
SFP	SFP	SFP	SFP	RJ-45	8991R-41	8992R-41
SFP	SFP	SFP	SFP	SFP	8991R-50	8992R-50

* Order Fiber or Copper SFPs separately. See SFP ordering information on pages 66 and 67.

To order a standalone model, add a suffix to the model number as follows:
- A: Tabletop with US AC to DC Power Supply Adapter (GM4 only)
- B: Tabletop with Universal AC to DC Power Supply Adapter (GM4 only)
- C: Tabletop with 2-Pin DC Terminal Connector (GM4 only)
- D: Wall-mount with US AC to DC Power Supply Adapter (GM4 and GM4 5-Port)
- E: Wall-mount with Universal AC to DC Power Supply Adapter (GM4 and GM4 5-Port)
- F: Wall-mount with 2-Pin DC Terminal Connector (GM4 and GM4 5-Port)
  GM4 5-Port has a 3-Pin DC Terminal Connector

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.
For industrial temperature (-40 to 75°C), add a "Z" to the end of the model number.

iConverter GM4-PoE+ and GM4-HPoE NIDs

The iConverter GM4 PoE Network Interface Devices (NID) deliver advanced Carrier Ethernet 2.0 services and provide integrated Power over Ethernet (PoE) at the demarcation. GM4 PoE NIDs function as PoE Power Sourcing Equipment in small cell (metro cell) and WiFi applications, where the radio equipment can be powered through the Ethernet UTP cables. By integrating Carrier Ethernet demarcation and PoE functions into a single device, Service Providers can easily deploy WiFi hot spots and small cells almost anywhere, reduce equipment costs and overall power consumption. This integrated PoE NID speeds time to market, and reduces technical risks.

The GM4 PoE NIDs are available in two PoE power levels. GM4-PoE+ models support 802.3af PoE (15.4W) and 802.3at PoE+ (34.2W) on each RJ-45 port. The GM4-HPoE models provide up to 60W of power to access points for hot spot and metro cell applications. The GM4-HPoE NIDs are backward compatible with 802.3af and 802.3at Powered Devices.

The standalone GM4-PoE+ and GM4-HPoE are available in 2, 4 and 5 port models. They are DC powered with a terminal connector, or available with an external AC/DC power adapter. Built-in mounting brackets provide table-top and wall-mounting capability, and can also be rack-mounted using the 1RU 19" rack-mounting shelf.

- Supports all the Carrier Ethernet features of the GM4 NIDs
- Smallest full-function NIDs available with up to 60W PoE
- Multiple port configurations
  - 1 or 2 SFP Fiber Ports
  - 1 to 4 RJ-45 PoE 10/100/1000 Ports
- Power over Ethernet sourcing of 802.3af (15.4W), 802.3at (34.2W) and up to 60W
- Commercial (0 to 50ºC), wide (-40º to 60ºC) and industrial (-40 to 75°C) temperature ranges

Port Configurations		GM4-PoE+	GM4-HPoE	
Number of Fiber Ports	Number of RJ-45 PoE Ports	PoE, PoE+	PoE, PoE+, 60W PoE (Full power per RJ-45 port)	PoE, PoE+, 60W PoE (120W shared on all RJ-45 ports)
1	1	8991S-11-x	8991T-11-x	-
1	4	8991S-14-x*	8991T-14-x**	8991L-14-x
2	2	8991S-22-x	8991T-22-x	-
2	3	8991S-23-x*	8991T-23-x**	8991L-23-x

Order Fiber or Copper SFPs separately. See SFP ordering information on pages 66 and 67.

POWER OPTIONS (-x)
-D: External US AC Power Supply
-E: External Universal AC Power Supply
-F: 3-Pin DC Terminal Connector

*AC to DC power supply operates only in commercial temperature range.
** Available in future release

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.
For industrial temperature (-40 to 75°C), add a "Z" to the end of the model number.

Contact Omnitron for other fiber options and more information on extended temperature range models.

iConverter GM3 NIDs

iConverter GM3 Service OAM NIDs meet the demands for scalable Ethernet service delivery across one or more operator networks, and provide advanced fault detection and performance monitoring OAM features. Meeting MEF, IEEE, ITU and industry requirements for Ethernet User to Network Interface (UNI), the GM3 terminates Carrier Ethernet services over Fast or Gigabit Ethernet access networks.

The GM3 NIDs support tiered revenue-generating services according to Service Level Agreements (SLA) based on data rate, Class of Service prioritization and service differentiation. Ethernet OAM provides the fault detection and performance monitoring necessary to ensure proper SLA enforcement and compliance.

- Supports IEEE 802.1ag and ITU-T Y.1731 Service OAM
- Supports IEEE 802.3ah Link OAM
- Remote management through TELNET, SNMP v1/v2c/v3
- IEEE 802.1ad Provider VLAN and Q-in-Q tag stacking for E-Line and E-LAN service multiplexing
- Granular Rate Limiting using Committed Information Rate (CIR) and Committed Burst Size (CBS)
- Commercial (0 to 50ºC), wide (-40º to 60ºC) and industrial (-40 to 75°C) temperature ranges

Ports			Fiber	Distance	Wavelength (nm)	Connector Type	
P1	P2	P3				ST	SC
FF	RJ-45	-	MM/DF	220/550m	850	8920P-0	8922P-0
FF	RJ-45	-	SM/DF	12km	1310	8921P-1	8923P-1
FF	RJ-45	-	SM/DF	34km	1310	-	8923P-2
FF	RJ-45	-	SM/DF	80km	1550	-	8923P-3
FF	RJ-45	-	SM/DF	110km	1550	-	8923P-4
FF	RJ-45	-	SM/DF	140km	1550	-	8923P-5
FF	RJ-45	-	SM/SF	20km	1310/1550	-	8930P-1*
FF	RJ-45	-	SM/SF	20km	1550/1310	-	8931P-1*
FF	RJ-45	-	SM/SF	40km	1310/1550	-	8930P-2*
FF	RJ-45	-	SM/SF	40km	1550/1310	-	8931P-2*
SFP	RJ-45	-	8939P-0**				
RJ-45	RJ-45	SFP	8970P-0**				
RJ-45	RJ-45	RJ-45	8974P-0				
SFP	SFP	RJ-45	8975P-0**				
SFP	SFP	SFP	8979P-0**				
RJ-45	RJ-45	-	8989P-0				
SFP	SFP	-	8999P-0**				

FF = Fixed Fiber, SFP = Small Form Pluggable. * Single-fiber converters must be used in pairs.
** Order Fiber or Copper SFPs separately. See SFP ordering information on pages 66 and 67.

To order a standalone model, add a suffix to the model number as follows:
- A: Tabletop with US AC to DC Power Supply Adapter (supports DIN-rail Bracket)
- B: Tabletop with Universal AC to DC Power Supply Adapter (supports DIN-rail Bracket)
- C: Tabletop with DC Power Terminal Connector (supports DIN-rail Bracket)
- D: Wall-mount with US AC to DC Power Supply Adapter
- E: Wall-mount with Universal AC to DC Power Supply Adapter
- F: Wall-mount with 2-Pin DC Terminal Connector

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.
For industrial temperature (-40 to 75°C), add a "Z" to the end of the model number.

Contact Omnitron for other fiber options.

iConverter SFP-NID™

The iConverter SFP-NID is a Gigabit Small Form Pluggable (SFP) Network Interface Device that can be installed directly into an existing network switch, router or metro/small cell, adding advanced performance monitoring and service activation testing capabilities.

The SFP-NID enables Service Providers to effortlessly deploy SLA-guaranteed Business Ethernet services, 4G/LTE macro cell and metro/small cell backhaul. Because the SFP NID minimizes Operating Expenditures by decreasing power consumption, space, installation and maintenance costs.

- 1310nm, 1000BASE-X Gigabit Ethernet SFP NID transceiver
- Low latency cut-through flow processing
- IEEE 802.1ag End-to-End Fault Management (FM)
- ITU-T Y.1731 Performance Monitoring (PM)
- RFC 5357 TWAMP Reflector
- RFC 2544 Ethernet Service Testing
- ITU-T Y.1564 Ethernet Service Activation Testing (SAT)
- Remote management via TELNET, SNMPv1/v2c/v3 or Omnitron's NetOutlook Network Management software
- -40º to 85ºC operating case temperature

Model Number	Description
7207N-1	1000BASE-LX 1310nm / SM / 10km
7207N-2	1000BASE-EX 1310nm / SM / 34km

Model Number	Lamda (nm)	Min Tx Power (dBm)	Max Tx Power (dBm)	Min Rx Power (dBm)	Max Rx Power (dBm)	Att. (dB)	Link Budget (dB)
7207N-1	1310	-9.5	-3	-21	-3	-	11.5
7207N-2	1310	-5	-0	-24	-3	3	19

Related Application Diagrams

Carrier Ethernet Business Services.....Page 22
Carrier Ethernet Mobile Backhaul.....Page 23

INDUSTRIAL Temperature

iConverter microNID™

The iConverter microNID is a low-latency, compact and cost-effective NID that provides service activation testing, fault and performance monitoring. The two-port microNID enables Service Providers to deliver premium services with Service Level Agreements where cost, space and power consumption are constraints. Cable MSOs can deliver value-added commercial Ethernet services and wireless backhaul over their existing DOCSIS networks with guaranteed Quality of Service.

- Low-latency cut-through flow processing
- IEEE 802.1ag End-to-End Fault Management (FM)
- ITU-T Y.1731 Performance Monitoring (PM)
- RFC 5357 TWAMP Reflector
- RFC 2544 Ethernet Service Testing
- ITU-T Y.1564 Ethernet Service Activation Testing (SAT)
- Supports 100Mbps and Gigabit SFP transceivers
- Remote management via TELNET, SNMPv1/v2c/v3 or Omnitron's NetOutlook Network Management software
- Commercial (0 to 50ºC), wide (-40º to 60ºC) and industrial (-40 to 75°C) temperature ranges

Model	Number of SFP Ports	Number of RJ-45 Ports
5000-02-x	-	2
5000-11-x	1	1
5000-20-x	2	-

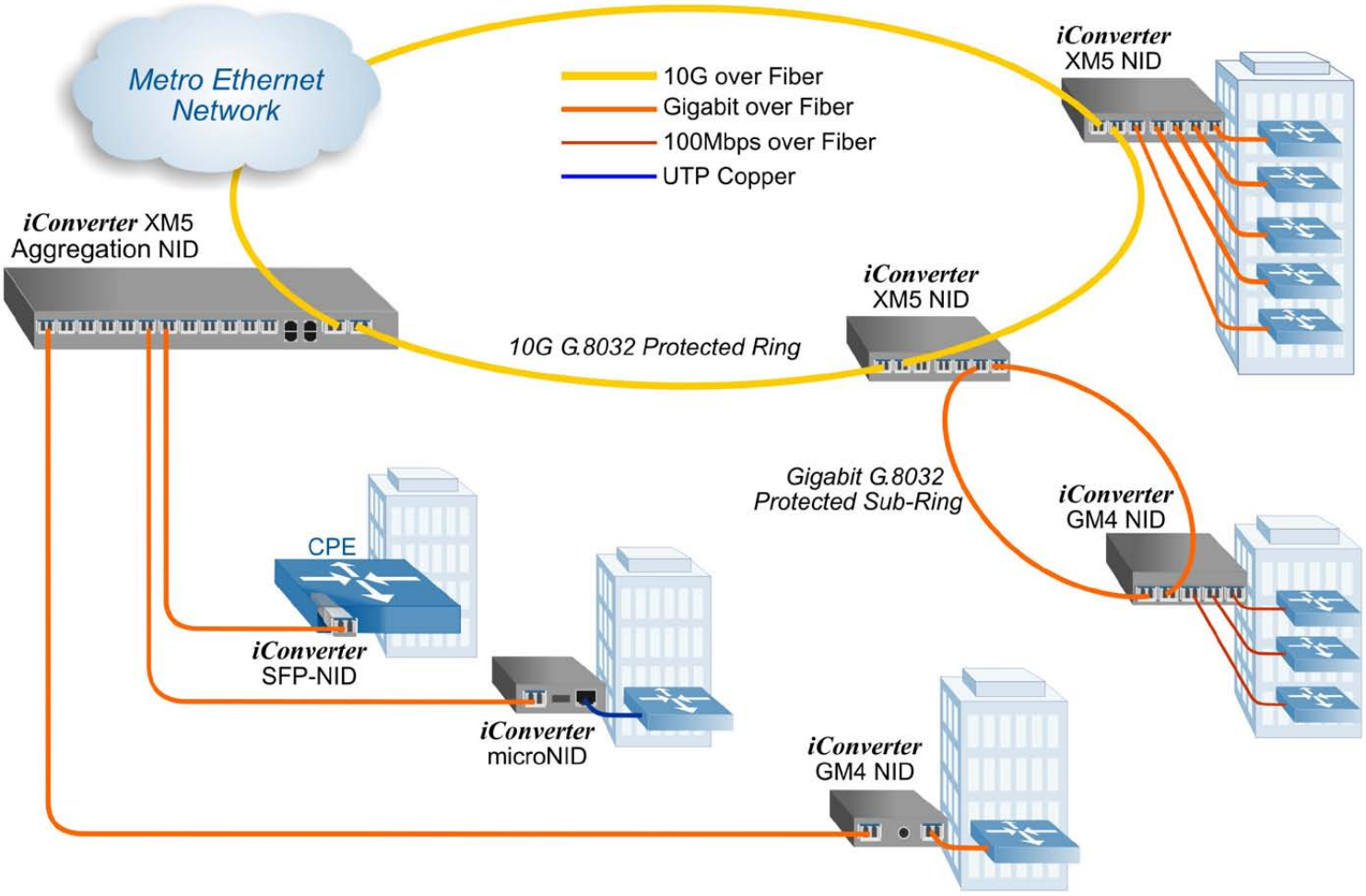
Order Fiber or Copper SFPs separately. See SFP ordering information on pages 66 and 67.

POWER OPTIONS (-x)
-D: External US AC Power Supply
-E: External Universal AC Power Supply
-F: 2-Pin DC Terminal Connector
-N: PD and External US AC Power Supply
-P: PD and External Universal AC Power Supply
-R: PD and 2-Pin DC Terminal Connector

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.
For industrial temperature (-40 to 75°C), add a "Z" to the end of the model number.

Contact Omnitron for other fiber options and more information on extended temperature range models.

GM4 NID Carrier Ethernet Business Services Application



This application diagram shows how iConverter Network Interface Devices can be deployed throughout a Service Provider's metro and access networks to deliver Carrier Ethernet business services. iConverter NIDs are compact demarcation devices that support advanced Performance Monitoring, Service Activation Testing, Fault Management, and service protection. iConverter Carrier Ethernet 2.0 NIDs support Multiple Classes of Service (Multi-CoS), and enable the delivery of E-Line, E-LAN, E-Tree and E-Access services.

iConverter GM4 and XM5 NIDs are Carrier Ethernet 2.0 Certified to deliver services that support Multiple Classes of Service (Multi-CoS), Manageability and Interconnect.

On the left side of the diagram, a Carrier Ethernet 2.0 certified compliant XM5 Aggregation Demarcation Device is installed at a hub location on a 10G Metro Ethernet fiber ring. The XM5 Aggregation Demarcation Device supports G.8032 Ethernet Ring Protection Services (ERPS) for service protection with sub-50ms failover, and provides aggregation for multiple Gigabit Ethernet fiber access links.

The fiber access links from the Gigabit ports on the XM5 Aggregation Demarcation Device are distributed to three subscriber locations.

At the first location, an iConverter SFP-NID is installed into the Customer Premises Equipment (a switch or router), and saves Capital Expenditures by eliminating the need for a standalone demarcation device. It also reduces Operating Expenditures by decreasing power consumption, space, installation and maintenance costs.

The SFP-NID Features real time OAM Performance Monitoring and Fault Management functionality and enables low-cost monitoring of Carrier Ethernet functionality, operation and performance.

At the second location, an iConverter microNID provides cost-effective SLA monitoring capability in a compact standalone device, and provides a copper port that connects to the CPE.

Color-aware traffic management and policing for both subscribers is performed by the XM5 Aggregation Demarcation Device at the hub location at the head end of the access links.

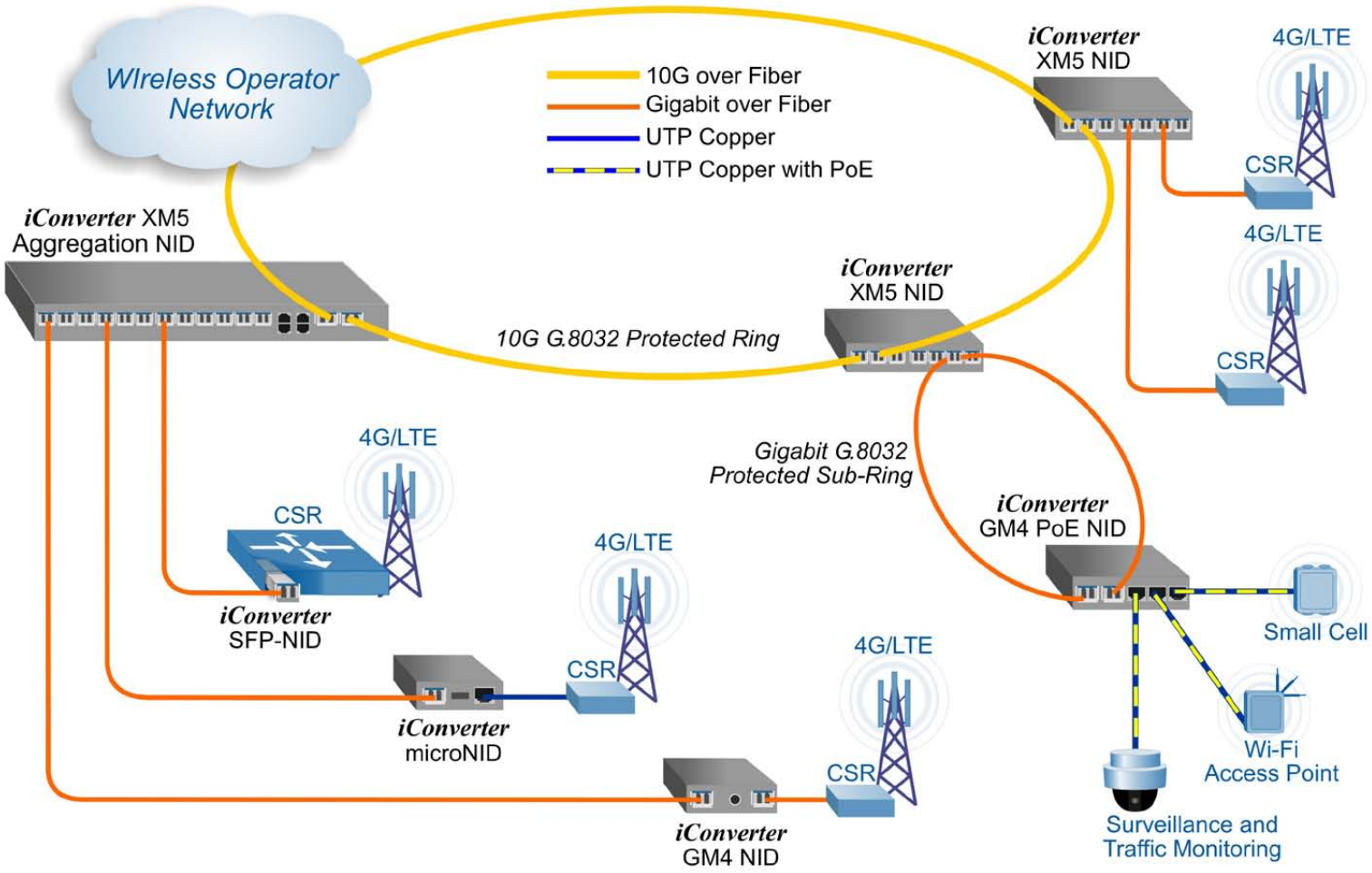
At the third location, a 2-port GM4 NID provides Carrier Ethernet 2.0 certified demarcation for CE 2.0 gold services with color-aware traffic management at the customer premises.

On the other side of the 10G ring, an iConverter XM5 NID provides demarcation for G.8032 protected Platinum CE 2.0 services at a multiple tenant building with five User-to-Network Interface (UNIs) for Gigabit fiber connectivity to subscribers in the building.

Another XM5 NID is installed at a hub location on the 10G ring, and provides demarcation for a Gigabit G.8032 protected sub-ring.

A 5-port GM4 NID installed on the Gigabit sub-ring provides demarcation for G.8032 protected Platinum CE 2.0 services at a multiple tenant building with three UNIs for 100Mbps fiber connectivity to subscribers in the building.

NID Mobile Services Application



In this Carrier Ethernet mobile network application, iConverter Network Interface Devices (NIDs) are deployed throughout Ethernet Mobile Backhaul and Radio Access Networks (RAN).

iConverter NIDs are compact and temperature hardened demarcation devices that support Performance Monitoring, Service Activation Testing, Fault Management, and service protection. iConverter Carrier Ethernet 2.0 NIDs support Multiple Classes of Service (Multi-CoS) with advanced service assurance, and ITU-T G.8262 Sync-E and IEEE 1588v2 to provide mobile backhaul timing synchronization.

On the left side of the diagram, a Carrier Ethernet 2.0 certified compliant XM5 Aggregation Demarcation Device is installed at a hub location on a Wireless Operator's 10G fiber ring. The XM5 Aggregation Demarcation Device supports G.8032 Ethernet Ring Protection Services (ERPS) for service protection with sub-50ms failover, and provides aggregation for multiple Gigabit Ethernet fiber access links.

The fiber access links from the Gigabit ports on the XM5 Aggregation Demarcation Device are distributed to multiple macro cell towers.

At the first macro cell tower, an iConverter SFP-NID is installed into the Cell Site Router (CSR), and saves Capital Expenditures by eliminating the need for a standalone demarcation device. It also reduces Operating Expenditures by decreasing power consumption, space, installation and maintenance costs.

The SFP-NID features real time OAM Performance Monitoring, Fault Management, and timing synchronization functionality, and enables low-cost monitoring of Carrier Ethernet performance.

At the second location, an iConverter microNID provides cost-effective SLA monitoring capability in a compact standalone device, and provides a copper port that connects to the CSR.

Color-aware traffic management and policing for both backhaul circuits is performed by the XM5 Aggregation Demarcation Device.

At the third location, a 2-port GM4 NID provides Carrier Ethernet 2.0 certified demarcation with Service OAM, timing synchronization and color-aware traffic management at the macro cell tower.

On the other side of the 10G ring, an iConverter XM5 NID provides demarcation for G.8032 protected backhaul services with up to five User-to-Network Interface (UNIs) for Gigabit fiber connectivity to macro cell towers.

Another XM5 NID is installed at a hub location on the 10G ring, and provides demarcation for a Gigabit G.8032 protected sub-ring.

A GM4 PoE NID installed on the Gigabit sub-ring provides demarcation for G.8032 protected backhaul circuits. The GM4 PoE NID is installed near available AC or DC sources, and provides up to 60W PoE from each RJ-45 port on the NID to power small cells, Wi-Fi Access Points and IP cameras. GM4 PoE NIDs reduce equipment costs because they eliminate the need for mid-span PoE power injectors.

iConverter M2 Network Interface Devices

iConverter M2 Network Interface Devices (NIDs) are intelligent media converters with integrated IP-based and IP-less (Secure OAM or 802.3ah) management that support advanced networking features.

The M2 NIDs provide MEF 9, 14, and 21 certified Ethernet service demarcation in Telecom networks, and mission-critical Ethernet fiber links in Enterprise and Utility networks. The carrier-grade M2 NIDs support 802.3ah Link OAM performance monitoring and fault detection. They are available as plug-in modules, or as standalone wall-mounted or tabletop units with optional DIN-rail mount. The iConverter standalone NID provides a managed demarcation point, and the plug-in module can manage a chassis of modules or be managed as a regular converter by another management module.

- Remote management through TELNET, SNMP v1/2c/3 and IP-less 802.3ah OAM extensions
- 802.3ah Link OAM Fault Detection and Performance Monitoring
- 802.1Q Tag C-VLAN and 802.1ad Provider S-VLAN with Q-in-Q for terminating Ethernet Virtual Circuits
- 802.1p Quality of Service (QoS) prioritization
- Port Rate Limiting, Port Access Control and MIB statistics
- Fixed fiber connectors for dual or single-fiber
- Small Form Pluggable (SFP) fiber transceivers for standard and CWDM wavelengths
- 2,048 byte (Fast Ethernet modules) and 10,240 byte (Gigabit modules) Jumbo Frames
- Granular 64Kbps Rate Limiting
- L2CP Policy Control
- Commercial (0 to 50ºC), wide (-40º to 60ºC) and industrial (-40º to 75ºC) temperature ranges

Fiber to Fiber Ethernet NIDs

2FXM2 100BASE-X to 100BASE-X NIDs

2GXM2 1000BASE-X to 1000BASE-X NIDs

The 100Mbps 2FXM2 and the Gigabit 2GXM2 are fiber to fiber Ethernet demarcation NIDs.

Description	Model
2FXM2 100Mbps Fiber to Fiber NID	8959N-0*
2GXM2 Gigabit Fiber to Fiber NID	8999N-0*

* Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order a standalone model, add a suffix to the model number as follows:
- A: Tabletop with US AC to DC Power Supply Adapter (supports DIN-rail Bracket)
- B: Tabletop with Universal AC to DC Power Supply Adapter (supports DIN-rail Bracket)
- C: Tabletop with 2-Pin DC Terminal Connector (supports DIN-rail Bracket)
- D: Wall-mount with US AC to DC Power Supply Adapter
- E: Wall-mount with Universal AC to DC Power Supply Adapter
- F: Wall-mount with 2-Pin DC Terminal Connector

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.
For industrial temperature (-40 to 75°C), add a "Z" to the end of the model number.

Contact Omnitron for other fiber options.

Copper to Fiber Ethernet NIDs

10/100M2 10/100BASE-TX to 100BASE-X NIDs

GX/TM2 10/100/1000BASE-T to 1000BASE-X NIDs

The 10/100Mbps 10/100M2 and the 10/100/1000Mbps GX/TM2 are copper to fiber Ethernet demarcation NIDs.

Fiber	Distance	Wavelength (nm)	Connector Type		
			ST	SC	LC
***iConverter* 10/100M2**					
SFP	8919N-0**				
MM	5km	1310	8900N-0	8902N-0	8906N-0
SM	30km	1310	8901N-1	8903N-1	8907N-1
SM	60km	1310	8901N-2	8903N-2	8907N-2
SM	120km	1550	-	8903N-3	8907N-3
SM/SF	20km	1310/1550	-	8910N-1*	-
SM/SF	20km	1550/1310	-	8911N-1*	-
SM/SF	40km	1310/1550	-	8910N-2*	-
SM/SF	40km	1550/1310	-	8911N-2*	-
***iConverter* GX/TM2**					
SFP	8939N-0**				
MM	220/500m	850	8920N-0	8922N-0	8926N-0
MM	2km	1310	-	8922N-6	-
SM	12km	1310	8921N-1	8923N-1	8927N-1
SM	34km	1310	-	8923N-2	8927N-2
SM	80km	1550	-	8923N-3	8927N-3
SM	110km	1550	-	8923N-4	8927N-4
SM	140km	1550	-	8923N-5	8927N-5
SM/SF	20km	1310/1550	-	8930N-1*	-
SM/SF	20km	1550/1310	-	8931N-1*	-
SM/SF	40km	1310/1550	-	8930N-2*	-
SM/SF	40km	1550/1310	-	8931N-2*	-
SM/SF	20km	1310/1490	-	8932N-1*	-
SM/SF	20km	1490/1310	-	8933N-1*	-

* Single-fiber converters must be used in pairs.
** Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order a standalone model, add a suffix to the model number as follows:
- A: Tabletop with US AC to DC Power Supply Adapter (supports DIN-rail Bracket)
- B: Tabletop with Universal AC to DC Power Supply Adapter (supports DIN-rail Bracket)
- C: Tabletop with 2-Pin DC Terminal Connector (supports DIN-rail Bracket)
- D: Wall-mount with US AC to DC Power Supply Adapter
- E: Wall-mount with Universal AC to DC Power Supply Adapter
- F: Wall-mount with 2-Pin DC Terminal Connector

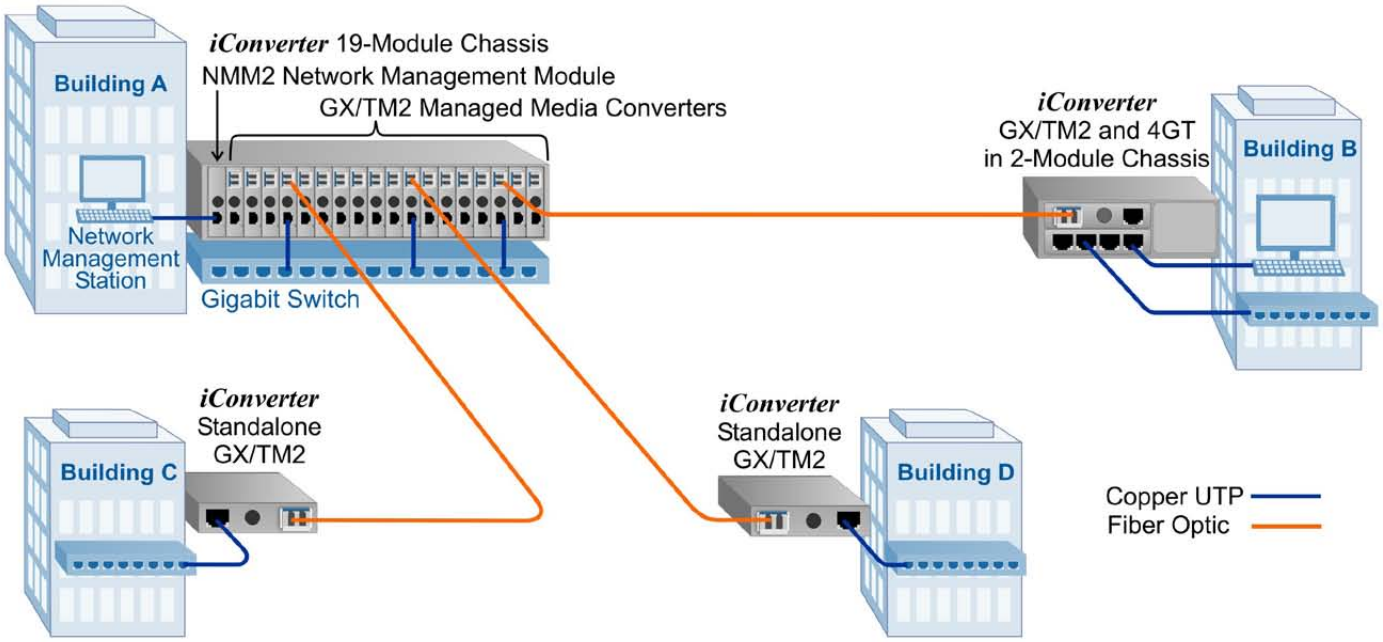
For wide temperature (-40 to 60°C), add a "W" to the end of the model number.
For industrial temperature model (-40 to 75°C), add a "Z" to the end of the model number.

Contact Omnitron for other fiber options.

M2 NID Application Examples

Multi-Service Enterprise Fiber Network.....Page 7
Managed Ethernet Campus LAN.....Page 25

Managed Ethernet Campus LAN Application



This application example illustrates how the iConverter Multi-Service Platform enables the delivery of gigabit Ethernet in a managed campus fiber network.

At Building A in the upper left, three copper UTP links from a core switch are converted to three fiber links with GX/TM2 plug-in NID modules installed in a 19-Module Chassis. The GX/TM2 modules provide media conversion and feature integrated management and support the IEEE 802.3ah Ethernet in the First Mile standard to provide carrier-grade link fault management and monitoring. The GX/TM2 also supports VLAN stacking and Quality of Service for voice/video/data over Ethernet.

An NMM2 Network Management Module is also installed in the chassis and is connected to a Network Management Station (NMS). The iConverter network management system provides comprehensive trouble-shooting, performance monitoring and remote hardware configuration of the network. The NMM2 improves network security by providing IP-less management of the network, with only one IP address at the network core managing up to 18 remote IP-less NIDs at the network edge.

The fiber links from Building A run to other buildings, where the fiber at each location is converted back to copper and distributed to end users at different departments.

At Building B, a 1000Mbps fiber link connects to a GX/TM2 installed in an 2-Module Chassis with a 4GT 4-port switch module. This compact chassis configuration functions as a managed switch with a fiber uplink and five managed 10/100/1000 UTP ports that connect to multiple workstations and/or department switches.

At Buildings C and D, the fiber links are connected to standalone iConverter GX/TM2 NIDs that provide media conversion and connectivity to Ethernet switches in the buildings.

Note that 10/100M2 NIDs and 4Tx VT switch modules can be used for 10/100 network deployments.

iConverter T1/E1 and Ethernet Multiplexers

iConverter T1/E1 MUX products multiplex up to sixteen independent T1/E1 circuits and Ethernet from copper links onto a fiber link or CWDM wavelength. Designed for mobile backhaul and T1/E1 demarcation extension, iConverter T1/E1 multiplexers are available in modular or fixed chassis configurations with 4, 8, 12 or 16 T1/E1 ports.

iConverter T1/E1 Multiplexers feature SFP transceivers that support a variety of distances and wavelengths. Pluggable transceivers that support CWDM wavelengths enable connectivity to iConverter CWDM multiplexer modules.

The fixed configuration iConverter T1/E1 multiplexers are available in managed and unmanaged models, and operate as bookend devices with one MUX at each end of a dark fiber or CWDM fiber link.

iConverter Modular T1/E1 multiplexers can transport up to sixteen T1/E1 circuits over a Carrier Ethernet Virtual Connection (EVC). across a switched network cloud when used with a GM3 NID or GM4 NID fiber transport module.

Related Applications

2G to 3G to 4G/LTE Mobile Backhaul Migration.....Page 28
Building to Building PBX Connectivity.....Page 29
Multiple T1s and Ethernet Riser Management.....Page 29

Managed and Unmanaged 4-Port T1/E1 Multiplexers

The iConverter 4xT1/E1/M Managed MUX and 4xT1/E1 Unmanaged MUX transport up to four T1/E1 copper circuits and Ethernet onto a fiber optic link or CWDM wavelength. The fixed-configuration 4xT1/E1 MUXes operate in a back-to-back configuration, with one multiplexer at each end of the fiber link.

The four copper ports support RJ-48 connectors for balanced T1/E1 applications. An optional adapter cable is available to convert to BNC interfaces for unbalanced E1 transport applications.

The 4xT1/E1 MUXes are available with AC or DC power. The AC models accept AC power input ranging from 100VAC to 240VAC, 50/60Hz, and the DC models accept 18VDC to 60VDC.

- Supports multimode, single-mode dual fiber and single-mode single-fiber in standard and CWDM wavelengths
- Small Form Pluggable (SFP) transceivers or fixed fiber connectors
- Configurable alarm relay contacts for audio/visual fault notification
- AMI, B8ZS and HDB3 line codes
- Local and remote loopback, and circuit test modes
- Alarm relay and LEDs provide fault notification for loss of power, LOS and AIS
- Supports wide temperature range (-40 to 60°C)

4xT1/E1 MUX/M Managed Multiplexer

- 10/100/1000 UTP Ethernet multiplexed with up to four independent T1 or E1 circuits
- Managed via local serial port, TELNET or SNMP v1/2c/3

Fiber	Distance	Wavelength (nm)	Connector Type		
			ST	SC	SFP
SFP	-	-	-	-	8839N-0**
MM	220/550m	850	8820N-0	8822N-0	-
SM	12km	1310	8821N-1	8823N-1	-
SM	34km	1310	-	8823N-2	-
SM	80km	1310	-	8823N-3	-
SM	110km	1550	-	8823N-4	-
SM	140km	1550	-	8823N-5	-
SM/SF	20km	1310/1550	-	8830N-1*	-
SM/SF	20km	1550/1310	-	8831N-1*	-
SM/SF	40km	1310/1550	-	8830N-2*	-
SM/SF	40km	1550/1310	-	8831N-2*	-
9140-3		Adapter Cable RJ-48 to BNC 3 meters			

* Single-Fiber MUXes have the Tx and Rx reversed at each end. For example, the 8830N-1 must be ordered with the 8831N-1.

** Order Gigabit SFP separately. See SFP ordering information on 66 and 67.

To order AC power, add a "B" to the model number - 88xxN-x-**B**
To order DC power, add a "C" to the model number - 88xxN-x-**C**

To order wide temperature (-40 to 60°C), add a "W" to the end of the model number - 88xxN-x-x**W**

Example: 8820N-0-BW = MM-DF, 220m, 850nm, ST, AC power, wide temperature
Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.

4xT1/E1 MUX Unmanaged Multiplexer

- Optional 10/100 UTP Ethernet multiplexed with up to four independent T1 or E1 circuits
- Cost-effective, unmanaged T1/E1 Multiplexer

Fiber	Distance	Wavelength (nm)	Connector Type			
			ST	SC	LC	SFP
SFP	-	-	-	-	-	8839-0**
MM	5km	1310	8820-0	8822-0	8826-0	-
SM	30km	1310	8821-1	8823-1	8827-1	-
SM	60km	1310	-	8823-2	8827-2	-
SM	120km	1550	-	8823-3	8827-3	-
SM/SF	20km	1310/1550	-	8830-1*	-	-
SM/SF	20km	1550/1310	-	8831-1*	-	-
SM/SF	40km	1310/1550	-	8830-2*	-	-
SM/SF	40km	1550/1310	-	8831-2*	-	-
9140-3		Adapter Cable RJ-48 to BNC 3 meters				

* Single-Fiber MUXes have the Tx and Rx reversed at each end. For example, the 8830-1 must be ordered with the 8831-1.

** Order Fast Ethernet SFP separately. See SFP ordering information on pages 66 and 67.

To order an optional 10/100 Ethernet port, add a "U" to the model number - 88xx**U**-x-x
To order AC power, add a "B" to the model number - 88xx-x-**B**
To order DC power, add a "C" to the model number - 88xx-x-**C**

To order wide temperature (-40 to 60°C), add a "W" to the end of the model number - 88xx-x-xW

Example: 8820U-5-BW = MM-DF, 2km, 850nm, ST, 10/100 Ethernet port, AC power, wide temperature

Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.

INDUSTRIAL Temperature

iConverter T1/E1 MUX/M

16-Port T1/E1 Fixed-Configuration Multiplexers

The iConverter T1/E1 MUX multiplexes up to sixteen T1s or E1s and one 10/100/1000 Ethernet over a fiber link or CWDM wavelength.

The T1/E1 MUXes operate in a back-to-back configuration, with one multiplexer at each end of the fiber transport link. The T1/E1 copper interfaces are available in 4, 8, 12 or 16 RJ-48 port configurations.

- Small Form Pluggable (SFP) transceivers or fixed fiber connectors
- Supports multimode, single-mode dual fiber and single-mode single-fiber in standard and CWDM wavelengths
- Managed via SNMP, TELNET or serial port
- Configurable alarm relay contacts for audio/visual fault notification
- Supports local and remote loopback modes
- Supports wide temperature range (-40 to 60°C)

Fiber	Distance	Wavelength (nm)	Connector Type		
			ST	SC	SFP
SFP	-	-	-	-	2439-0**
MM	220/550m	850	2420-0	2422-0	-
SM	12km	1310	2421-1	2423-1	-
SM	34km	1310	-	2423-2	-
SM	80km	1550	-	2423-3	-
SM	110km	1550	-	2423-4	-
SM	140km	1550	-	2423-5	-
SM/SF	20km	1310/1550	-	2430-1*	-
SM/SF	20km	1550/1310	-	2431-1*	-
SM/SF	40km	1310/1550	-	2430-2*	-
SM/SF	40km	1550/1310	-	2431-2*	-
9140-3		Adapter Cable RJ-48 to BNC 3 meters			

To order the number of T1/E1 ports in the chassis, add a number from the list below to the part number as shown: 24xx-x-**Yz**	To order AC or DC power supplies, add a number from the list below to the end of the part number as shown: 24xx-x-y**Z**
1 - 4 ports total 2 - 8 ports total 3 - 12 ports total 4 - 16 ports total	1 - One AC Power Supply 2 - Two AC Power Supplies 3 - One 48VDC Power Supply 4 - Two 48VDC Power Supplies 5 - One 24VDC Power Supply 6 - Two 24VDC Power Supplies

* Single-Fiber MUXes Tx and Rx are reversed at each end. For example the 2430-1 must be ordered with the 2431-1

** Order Gigabit SFP separately. See SFP ordering information on pages 66 and 67.

For wide temperature (-40 to 60°C), add a "W" to the end of the model number - 24xx-x-yz**W**

Example: 2421-1-46W = SM, 12km, 1310nm, Four 4-Port MUX Modules (16 ports total), Two 24VDC Power Supplies, wide temperature.

Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.

iConverter Modular T1/E1 Multiplexer

Modular T1/E1 Multiplexer Solution

The Modular iConverter T1/E1 Multiplexer is comprised of a Fiber Transport module and 4xT1/E1 4-port multiplexer modules installed in a 2, 5 or 19-Module Chassis. Each Fiber Transport module can support up to four 4xT1/E1 MUX modules for up to sixteen T1/E1 circuits per fiber transport link. Ethernet traffic can also be multiplexed with the T1/E1 traffic through a 10/100/1000 RJ-45 port.

There are three Fiber Transport modules available: the iConverter TM3, the iConverter GM3 NID plug-in module and the iConverter GM4 NID plug-in module. The TM3 supports Ethernet Link OAM with IEEE 802.3ah (similar to an M2 NID). The GM3 and GM4 NID modules support Carrier Ethernet Service OAM with IEEE 802.1ag Connectivity Fault Management and ITU-T Y.1731 Performance Monitoring.

Monitoring, configuration and remote testing are accessed through the serial console port, IP-based SNMP or IP-less OAM channels.

- 24 hour T1/E1 statistic logging
- Supports remotely-initiated T1 loop-up commands
- Managed via SNMP, TELNET or serial port
- Optional external clock I/O port
- Supports wide temperature (-40 to 60°C) and industrial temperature (-40 to 75°C) ranges

iConverter TM3 Transport Module					
Fiber	Distance	Wavelength (nm)	Connector Type		
			ST	SC	SFP
SFP	-	-	-	-	2439-0-T**
SFP x2	-	-	-	-	2499-0-T**
MM	220/550m	850	2420-0-T	2422-0-T	-
SM	12km	1310	2421-1-T	2423-1-T	-
SM	34km	1310	2421-2-T	2423-2-T	-
SM	80km	1550	-	2423-3-T	-
SM	110km	1550	-	2423-4-T	-
SM	140km	1550	-	2423-5-T	-
SM/SF	20km	1310/1550	-	2430-1-T*	-
SM/SF	20km	1550/1310	-	2431-1-T*	-
SM/SF	40km	1310/1550	-	2430-2-T*	-
SM/SF	40km	1550/1310	-	2431-2-T*	-

* Single-Fiber modules must be ordered in pairs.
** Order Gigabit SFP separately. See SFP ordering information on pages 66 and 67.

To order a GM3 NID or GM4 chassis plug-in module, see page 19 and 20.

To order a wide temperature (-40 to 60°C) TM3 module, add a "W" to the end of the model number.
To order an industrial temperature (-40 to 75°C) TM3 module, add a "Z" to the end of the model number.

iConverter 4xT1/E1 MUX Module		
Number of Ports	Four T1/E1 RJ-45	Four T1/E1 RJ-45 with Clock I/O
Model Number	8485-4	8486-4

To order a wide temperature (-40 to 60°C) 4xT1/E1 module, add a "W" to the end of the model number.
To order an industrial temperature (-40 to 75°C) 4xT1/E1 module, add a "Z" to the end of the model number.

2G to 3G to 4G/LTE Mobile Backhaul Migration Application

These application examples show how iConverter T1/E1 Multiplexers and Network Interface Devices enable a seamless transition from TDM to Ethernet services over the three phases in the migration from legacy 2G to 3G to 4G/LTE mobile backhaul.

A wireless operator is providing connectivity from a BSC/RNC to a cell tower via a fiber access network for a wireless carrier. Over time, the services evolve from multiple T1s (2G), to T1s and Ethernet (3G), to Carrier Ethernet (4G/LTE). Note that T1s and Ethernet over dark fiber are illustrated, but they can be transported over a packet switched network cloud with the T1s and/or Ethernet transported over an Ethernet Virtual Connection (EVC).

2G – Multiple T1/E1 Circuits

Multiple T1 circuits are transported over a fiber Radio Access Network (RAN) fiber link. At the BSC/RNC, groups of T1/E1 MUX modules are installed in a 19-Module Chassis. Each group of modules transports up to 16 T1 circuits over the fiber link using a GM4 NID as a fiber transport module. At the cell tower, a corresponding group of modules are installed in a 5-Module Chassis that connects the T1 circuits to the 2G BTS cell tower. Both chassis conserve rack space and feature redundant AC or DC power supplies.

3G – Multiple T1/E1 Circuits and Ethernet

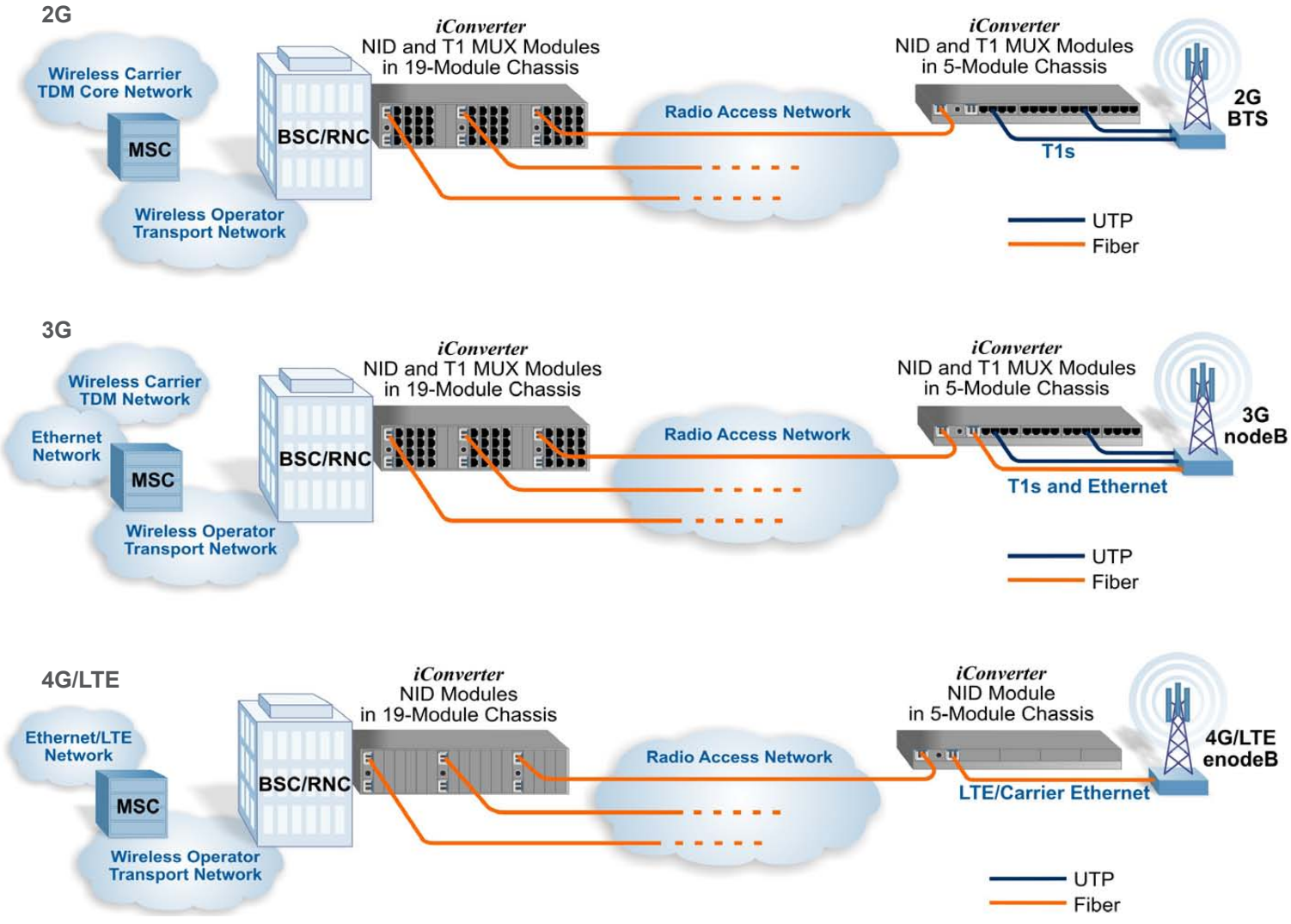
Multiple T1 circuits and Ethernet are transported via an EVC over a RAN. The same chassis configurations are used at the BSC/RNC, and the 3G nodeB cell tower.

The iConverter GM4 NID module is now configured to transport Gigabit Carrier Ethernet with the T1 circuits.

4G/LTE – Carrier Ethernet

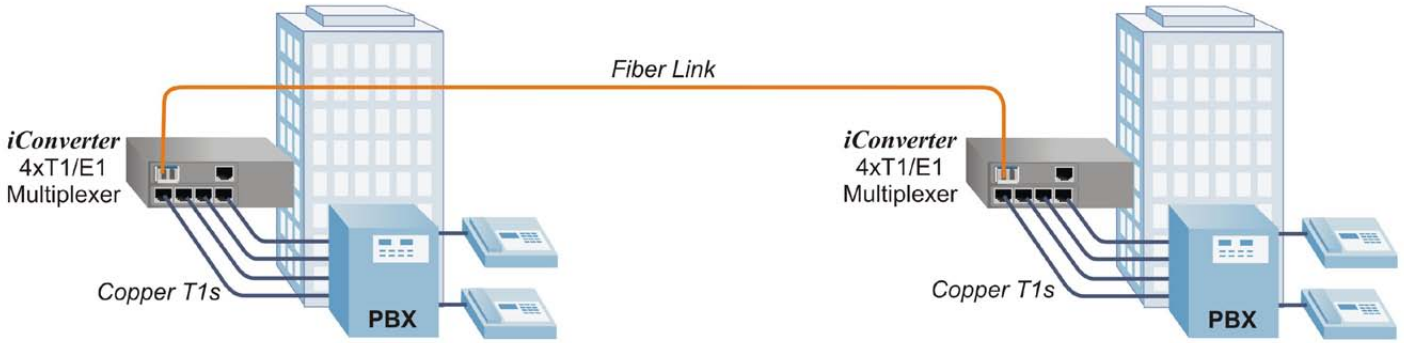
4G/LTE IP packets are transported via an EVC over a RAN. The T1/E1 MUX modules are decommissioned from both chassis, and GM4 NIDs are used to transport Gigabit Carrier Ethernet.

The GM4 NID has all the traffic management and Service OAM capabilities required for LTE, including Y.1564 Service Activation Testing, Y.1731 performance monitoring, 802.3ag fault management and Sync-E. At the cell tower, a corresponding GM4 NID module is installed in a 5-Module chassis, which connects the Carrier Ethernet (via UTP or fiber) to the 4G/LTE enodeB cell tower. The slots in each of the chassis that were occupied by the T1/E1 MUX modules can now be replaced with other modules, such as NIDs and CWDM multiplexers to deliver high-bandwidth services with advanced Quality of Service to the wireless subscribers.



Building to Building PBX Connectivity Application

In this application, four T1s are extended between two PBXs in different buildings using an unmanaged iConverter 4xT1/E1 MUX at each end of the fiber link. The native T1 copper from the PBX is connected to the RJ-45 ports on the T1 MUX, and transported over fiber to the MUX at the other end. Multimode or single-mode fiber can be used, and fiber links can be extended up to 120km using single-mode fiber. A managed 4xT1/E1 MUX/M can be deployed for SNMP v1/V2c/v3 management through an Ethernet RJ-45 port.



Multiple T1s Riser Management Application

In this riser management demarcation extension application, multiple T1 circuits and Gigabit Ethernet from a Service Provider are delivered to the demarcation point in the basement of a hi-rise building. The Service Provider is handing off service from a Metro or SONET network.

Note that this application can also be located in a large, single-story building or a business park complex.

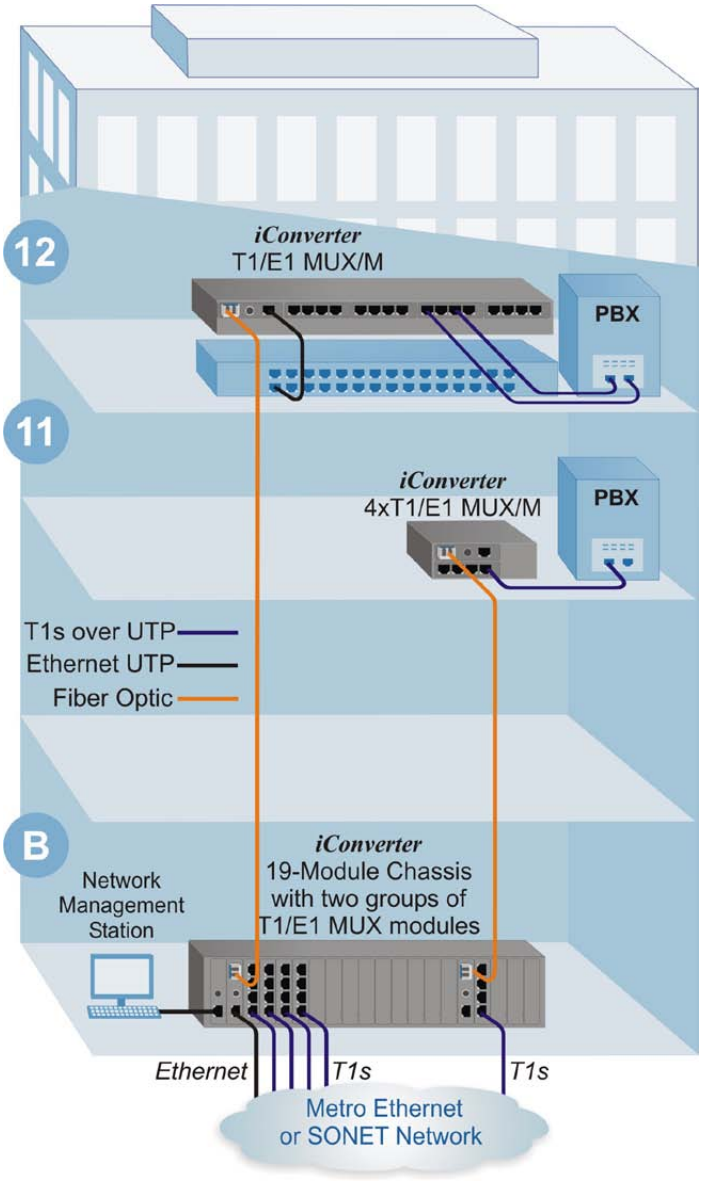
The T1s and Ethernet are handed off at the Service Provider demarcation with UTP copper cables for each T1 (blue cables in the application diagram) and Ethernet (black cables). iConverter Modular T1/E1 Multiplexers are installed in a 19-Module Chassis at the demarcation point in the basement. The Modular T1/E1 Multiplexer is a flexible and scalable solution comprised of a Fiber Transport module, and one or more 4xT1/E1 MUX modules installed the chassis.

Multiple groups of Modular T1/E1 Multiplexers are installed in the chassis, with the copper T1s connected to the RJ-45 ports in the 4xT1/E1 MUX modules, and the Ethernet to the RJ-45 port on the Fiber Transport Module. All of the T1s and Ethernet are transported via the fiber port on the Fiber Transport Module.

An NMM2 Network Management Module is also installed in the chassis to enable SNMP v1/v2c/v3 or TELNET management of the T1 Multiplexers. The T1 Multiplexers are deployed as bookends, with the same module configuration (and number of ports) at each end of the fiber link.

On the 11th floor, four T1 circuits are transported over the fiber link to the tenant office, where a fixed configuration 4xT1/E1 MUX/M converts the T1s back to native copper RJ-45 interfaces that are connected with UTP cables to a PBX.

On the 12th floor, up to sixteen T1 circuits are transported over the fiber link to the tenant office. The fiber is connected to a fixed configuration T1/E1 MUX/M that converts the T1s back to copper that connects to a PBX. Gigabit Ethernet is also transported over the fiber and converted to copper that connects to an Ethernet switch with a UTP cable.



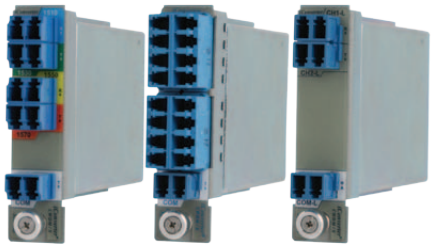
iConverter CWDM Multiplexers

iConverter Coarse Wave Division Multiplexing (CWDM) Multiplexer/Demultiplexer modules support ITU-T G694.2 wavelengths between 1270nm to 1610nm in 20nm increments.

iConverter CWDM modules are protocol and rate transparent allowing different services up to 10Gbps each to be transported across the same fiber link. They provide a reliable and cost-effective solution for increasing bandwidth capacity over existing fiber infrastructure in Service Provider, Municipal, Utility and Enterprise networks.

The passive iConverter CWDM modules utilize a small and scalable plug-in form factor, and can be installed in any iConverter chassis achieving some of the highest port densities in the industry. They can be installed in a 1-Module Passive Chassis for unmanaged applications, or in multi-module chassis with a management module. The modules are designed to be integrated with other iConverter media converters and transponders to provide a true Multi-Service Platform capable of delivering 10, 100, Gigabit and 10 Gigabit Ethernet, Serial, TDM, SONET and other services across a CWDM common link. They are passive devices that can be installed in a powered chassis for managed applications.

- Protocol and rate transparent for applications up to 10Gbps
- Highly compact form factor
- Seamless integration with other iConverter SFP media converters and chassis for Multi-Service Platforms
- Minimal and uniform optical loss for easy network planning
- Industry standard LC connectors
- One (1) Year Warranty and Free 24/7 Technical Support
- Supports wide temperature range (-40 to 60°C)



iConverter CWDM/X

CWDM Multiplexer/Demultiplexer Modules for Dual Fiber

The passive iConverter CWDM/X Multiplexer/Demultiplexer modules are available in 4 and 8-Channel (wavelength) models, supporting a variety of wavelength combinations and port configurations.

The CWDM/X features an optional Expansion Port that enables cascading two MUX/DEMUX modules, doubling the channel capacity on the common dual fiber link. For example, two 4-Channel modules can be cascaded to create an 8-Channel fiber common link.

The CWDM/X also features an optional 1310nm Pass Band Port that allocates 1260nm to 1360nm for legacy 1310nm networks. CWDM channels in the range of 1470nm to 1610nm can be overlaid on the same fiber pair as the existing 1310nm network.

Module Type	Model Number	Channel Port ITU Center Wavelength (nm)	# of Chassis Slots	1310 Pass Band Port[1]	Expansion Port[2]
CWDM/X 4-Channel	8860-0	1471, 1491, 1591, 1611	1	No	No
	8860-1	1471, 1491, 1591, 1611	1	Yes	No
	8860-2	1471, 1491, 1591, 1611	1	Yes	Yes
	8860-3	1471, 1491, 1591, 1611	1	No	Yes
	8861-0	1511, 1531, 1551, 1571	1	No	No
	8861-1	1511, 1531, 1551, 1571	1	Yes	No
CWDM/X 8-Channel	8862-0	1271, 1291, 1311, 1331, 1351, 1371, 1431, 1451	1	No	No
	8863-0	1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611	1	No	No
	8863-1	1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611	2	Yes	No

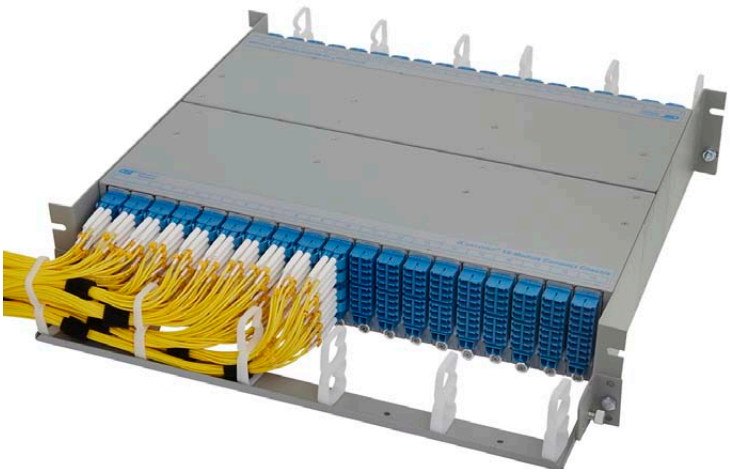
[1] 1310 Pass Band port supports 1310 +/- 50nm. Use with legacy 1310 device.
[2] EXP port supports 1511nm to 1571nm. Use with 8861-0 or legacy 1550 device.
For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

Contact Omnitron for monitoring options and customized CWDM models.

iConverter 19-Module Compact Chassis

The iConverter 19-Module Compact Chassis is designed for passive iConverter CWDM modules that do not require power, and provides an innovative approach to increase the density of CWDM channels in a 2U (3.5 inch) high rack space. The short chassis design allows two chassis to be connected back-to-back supporting up to 38 CWDM modules. This configuration provides up to 608 simplex channels or 304 duplex channels.

The 19-Module Compact Chassis can be deployed with the Cable Management Kit (ordered separately) as shown in the photo on the right.



iConverter Band-Splitters

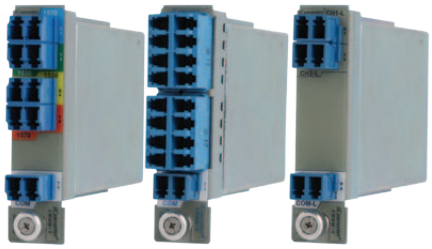
Band-Splitters and Lower/Upper Band OADMs for Dual Fiber

The iConverter Band-Splitter module combines and separates the upper CWDM Channels (1471nm to 1611nm) and the lower CWDM Channels (1271nm to 1451nm). Two 8-Channel MUX/DEMUX modules can be cascaded to create a 16-Channel fiber common link using the CWDM/X Band-Splitter.

The iConverter Lower Band OADM adds and drops the lower band (1271nm to 1451nm) on both directions of the CWDM fiber link. The iConverter Upper Band OADM adds and drops the upper band (1471nm to 1611nm) on both directions of the CWDM fiber link.

Module Type	Model Number	Channel Port ITU Center Wavelength (nm)
CWDM/X Band-Splitter	8865-0	Low Band Port: 1271 - 1451 High Band Port: 1471 - 1611 Common Port: 1271 - 1611
CWDM/X Dual Band-Splitter	8865-2	Low Band Port: 1271 - 1451 High Band Port: 1471 - 1611 Common Port: 1271 - 1611
Lower Band OADM	8867-1	Low Band Port: 1271 - 1451 Common Port: 1271 - 1611
Upper Band OADM	8867-2	High Band Port: 1471 - 1611 Common Port: 1271 - 1611

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.



iConverter Multimode CWDM/X MUX/DEMUX

CWDM Multiplexer/Demultiplexer Modules for Dual Fiber

The iConverter Multimode CWDM/X 4 and 8 Channel Coarse Wave Division Multiplexing (CWDM) Multiplexer and Demultiplexer plug-in modules facilitate significant increase in the capacity of existing OM1 multimode fiber networks.

iConverter Multimode CWDM/X multiplexers are protocol and rate transparent, allowing Ethernet, Fibre Channel, SDH/SONET, and other services up to 10Gbps each to be transported across the same fiber link. The modules support ITU-T G.694.2 standard CWDM wavelengths between 1270nm to 1610nm in 20nm increments.

Module Type	Model Number	Channel Port ITU Center Wavelength (nm)
CWDM/X OM1 Multimode 4-Channel	8861-901	1271, 1291, 1311, 1331
	8861-900	1511, 1531, 1551, 1571
CWDM/X OM1 Multimode 8-Channel	8863-901	1271, 1291, 1311, 1331, 1351, 1371, 1431, 1451
	8863-900	1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611

Contact Omnitron for customized CWDM models.

iConverter CWDM/AD

CWDM Add/Drop Multiplexer Modules for Dual Fiber

iConverter CWDM/AD modules are Optical Add/Drop Multiplexers (OADM) that add (multiplex) and drop (demultiplex) selected channels on one or both directions of a duplex CWDM fiber link. iConverter CWDM/AD modules enable adding new access points anywhere on a CWDM network, without impacting the remaining channels traversing the network.

1-Channel CWDM/AD (ITU Center wavelength in nm)

Model Type	Model Number	Channel Port ITU Center Wavelength Tx/Rx (nm)
1-Channel Lower Band A/D	8867-xx	xx = 27 (1271), 29 (1291), 31 (1311), 35 (1351), 37 (1371), 39 (1391), 41 (1411), 43 (1431), 45 (1451) Common port: 1261 - 1621
1-Channel Upper Band A/D	8867-xx	xx = 47 (1471), 49 (1491), 51 (1511), 53 (1531), 55 (1551), 57 (1571), 59 (1591), 61 (1611) Common port: 1261 - 1621

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

2-Channel CWDM/AD (ITU Center wavelength in nm)

Model Type	Model Number	Channel Port ITU Center Wavelength Tx/Rx (nm)
2-Channel Lower Band A/D	8868-xy	x = 0 (1271), 1 (1311), 2 (1351), 3 (1391), 4 (1431) y = 0 (1291), 1 (1331), 2 (1371), 3 (1411), 4 (1451) Common port = 1261 to 1621
2-Channel Upper Band A/D	8869-xy	x = 0 (1471), 1 (1491), 2 (1511), 3 (1531), 4 (1551), 5 (1571), 6 (1591) y = 0 (1491), 1 (1511), 2 (1531), 3 (1551), 4 (1571), 5 (1591), 6 (1611) Common port = 1261 to 1621

NOTES: When using with 1310nm legacy SDH/SONET, wavelengths between 1261nm to 1361nm should not be used.

For 2-Channel A/D, the x and y values must be the same.

See data sheet for upper and lower band common port ordering information.

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

Contact Omnitron for custom CWDM modules.

Related Applications

Service Provider CWDM Access Network .....Page 6
CWDM Enterprise Campus .....Page 7
Mobile Backhaul Migration.....Page 28

iConverter Single-Fiber CWDM/X

iConverter Single-Fiber CWDM/X modules are available in 2, 4 and 5-Channel models, supporting a variety of wavelength combinations.

Model Type	Model Number	Channel Port ITU Center Wavelength Tx/Rx (nm)
CWDM/X SF 2-Channels	8870-0	1471/1491, 1511/1531
	8871-0	1491/1471, 1531/1511
	8872-0	1551/1571, 1591/1611
	8873-0	1571/1551, 1611/1591
CWDM/X SF 4-Channels	8874-0	1271/1291, 1311/1331, 1351/1371, 1431/1451
	8875-0	1291/1271, 1331/1311, 1371/1351, 1451/1431
	8876-0	1471/1491, 1511/1531, 1551/1571, 1591/1611
	8877-0	1491/1471, 1531/1511, 1571/1551, 1611/1591
CWDM/X SF 5-Channels	8880-1	1431/1451, 1471/1491, 1511/1531, 1551/1571, 1591/1611 and 1310 Pass Band
	8880-2	1431/1451, 1471/1491, 1511/1531, 1551/1571, 1591/1611, 1310 Pass Band and OTDR

2 and 4 Channel single-fiber CWDM/X models must be used in pairs.

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

iConverter Single-Fiber CWDM/AD

iConverter 1-Channel Single-Fiber CWDM/AD modules add and drop one channel on one or both directions of a CWDM single-fiber link.

1-Channel CWDM/AD (ITU Center Wavelength in nm)

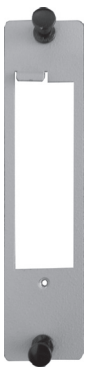
Model Type	Model Number	Channel Port ITU Center Wavelength Tx/Rx (nm)
1-Channel Lower Band A/D	8878-xx	xx = 27 (1271/1291), 31 (1311/1331), 35 (1351/1371), 39 (1391/1411), 43 (1431/1451) Common port: 1271 - 1451nm
1-Channel Upper Band A/D	8878-xx	xx = 47 (1471/1491), 51 (1511/1531), 55 (1551/1571), 59 (1591/1611) Common port: 1471 - 1611nm

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

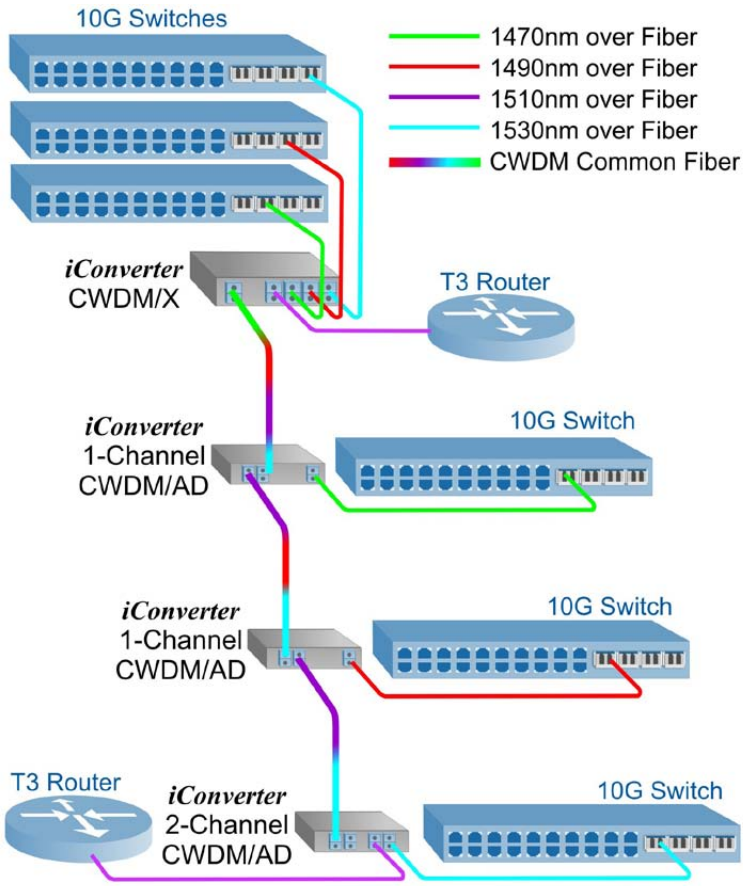
Contact Omnitron for custom CWDM modules.

iConverter LGX® Adapter

The iConverter LGX Adapter (Model number 8099-0) provides an easy and cost-effective method to adapt passive iConverter CWDM Multiplexer modules to an existing LGX chassis installation.



Enterprise CWDM Add+Drop Application



In this application diagram, four CWDM data channels (wavelengths 1470, 1490, 1590 and 1610) are multiplexed onto a CWDM Common Fiber Line, and the wavelengths are dropped off at different locations.

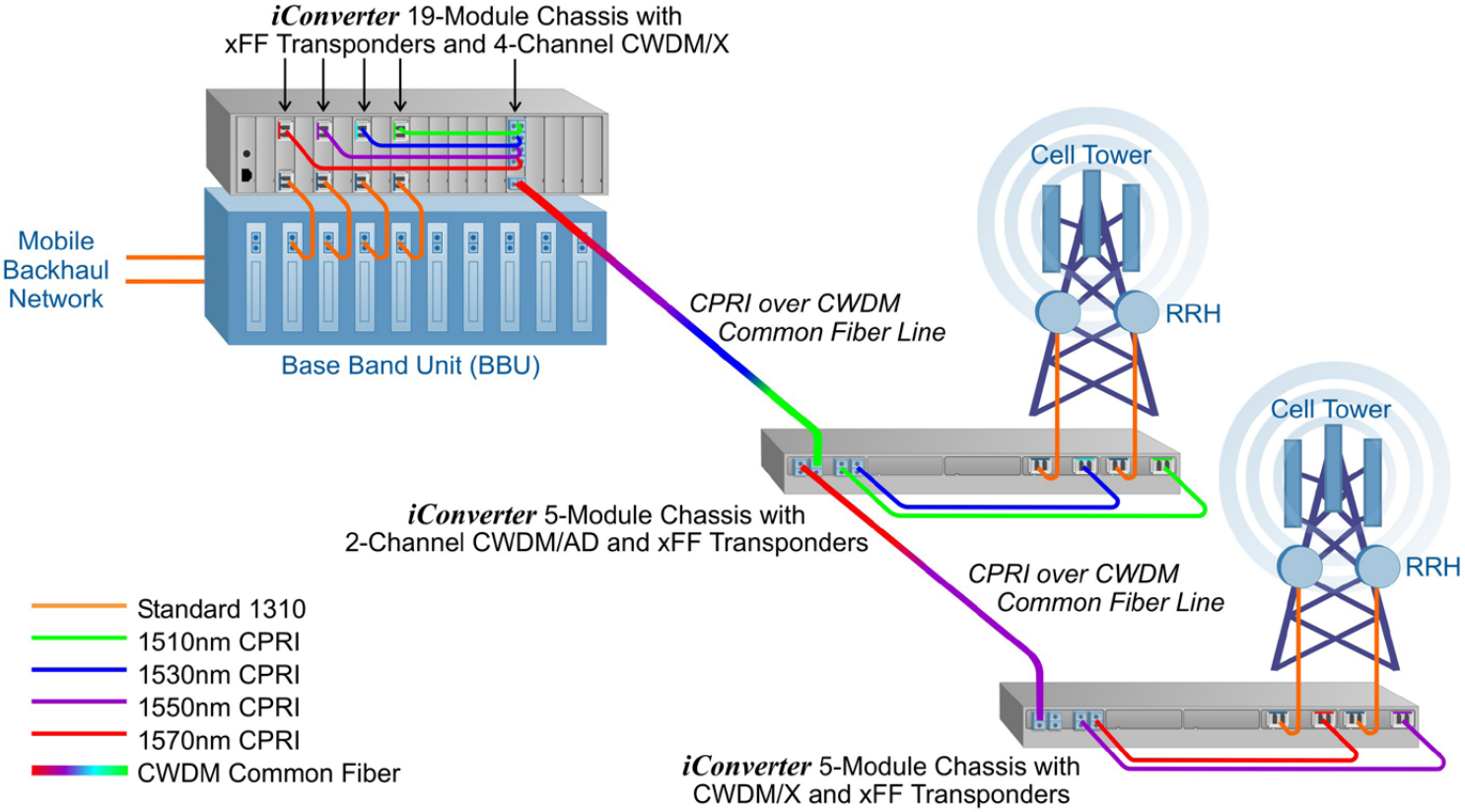
An iConverter CWDM/X 4-Channel MUX/DEMUX module is used to multiplex three 10G Ethernet data channels and one T3 data channel onto a CWDM Common Fiber Link. The T3 router and the 10G switches have CWDM SFPs that enable connectivity with CWDM wavelengths specific to the channel ports on the CWDM/X MUX.

iConverter 1-Channel CWDM/AD Optical Add/Drop Multiplexer (OADM) modules are used to drop off the 1470 and 1490 wavelengths from the CWDM Common Fiber Line, and connect to 10G switches.

The remaining wavelengths continue to the last location on the CWDM Common Fiber Line, where a 2-Channel CWDM/AD drops off the 1590 wavelength to the 10G switch and the 1610 wavelength to the T3 router.

Note that the highest wavelengths with the lowest attenuation are used to reach the farthest locations along the CWDM Common Fiber Line.

Mobile Network Operator CPRI Fronthaul CWDM Application



Power and equipment space are expensive resources at cell sites, so Mobile Network Operators (MNOs) are reducing these ongoing expenditures by migrating from expensive, high-power base stations at cell towers to Centralized Radio Access Networks.

In the Centralized RAN architecture, Base Band Processing Units (BBU) are deployed at a consolidated location like a Central Office or BBU hotel. The BBUs are connected to the Remote Radio Head (RRH) at the cell towers with fiber, and this link is commonly referred to as fronthaul. The fronthaul from the BBU Hotel to the RRH uses a such as Common Public Radio Interface (CPRI). The RRH is collocated with the antenna at the top of the cell tower.

The challenge for MNOs is transporting multiple CPRI channels for different wireless carriers and services to multiple cell towers over the fronthaul fiber links. The RAN and the fronthaul networks may be owned by a Mobile Network Operator, but they typically lease fiber or purchase services from an Access Operator for fronthaul access to cell towers.

This application shows how to daisy chain four CPRI channels over fiber fronthaul links to two different cell towers. At the top of the diagram, the MNO's BBU has line cards that support standard 1310 wavelengths, which are converted to CWDM wavelengths for connectivity to Access Operator's CWDM equipment using iConverter xFF transponders installed in a 19-Module Chassis. Standard wavelength SFPs and CWDM SFPs are installed in each of the xFF transponders to convert the wavelengths (channels). The CWDM SFPs support specific wavelengths to enable connectivity to the matching channel ports on the iConverter CWDM/X Multiplexer with fiber patch cables (shown in different colors to represent the CWDM wavelengths).

The iConverter CWDM/X multiplexes the wavelengths that transport the four CPRI channels over the CWDM Common Fiber Line (fronthaul).

At the first cell tower, a 5-Module Chassis with xFF Transponders and a two-channel CWDM/AD Add+Drop Multiplexer is deployed. The CWDM/AD Add+Drop Multiplexer filters out the 1510nm and the 1530nm CWDM channels to connect the CPRI data to the Remote Radio Heads in the cell tower. Fiber patch cables (shown in light blue and green to represent the CWDM wavelengths) connect the channel ports on the iConverter CWDM/AD multiplexer to xFF Transponders that convert the CWDM wavelengths back to standard 1310. The 1310 fiber connects to the two Remote Radio Heads on the cell tower.

The 1550nm and 1570nm CWDM channels pass through the Add+Drop MUX and travel over the CWDM Common Line to the second cell tower.

At the second cell tower, another 5-Module Chassis with a two-channel CWDM/AD Add+Drop Multiplexer and xFF Transponders is deployed. The CWDM/AD Add+Drop Multiplexer filters out the 1550nm and the 1570nm CWDM channels to connect the CPRI data to the Remote Radio Heads in the cell tower.

iConverter CWDM Multiplexers and Add+Drop Multiplexers provide a simple, reliable and cost effective method to expand the fiber capacity of existing fiber fronthaul links. iConverter xFF Transponders enable connectivity between BBU equipment and CWDM Multiplexers. These modular products can be installed in a variety of iConverter chassis for flexible and scalable CPRI fronthaul deployments.

iConverter Ethernet Media Converter Features Comparison

Module Name	Model Number	Data Rates				Ports				Form Factor		Port Features								Link Modes (Fault Propagation)			Page Number
		10 Mbps	100 Mbps	1000 Mbps	10 Gbps	# Fiber	SFP/SFP+/XFP	# Copper	Backplane (Mbps)	Standalone Unit	Chassis Plug-In Module	Port Access Control	Port VLAN	Tag VLAN	Provider VLAN (Q-in-Q)	QoS/Prioritization	Maximum Packet Size	Rate Limiting	MIB Statistics	LP & RFD	SFD	ASY	
NMM2	8000N	✓	✓					1	10/100		✓												10
XGT+	8589N				✓	1	✓***	1		✓	✓						UNL						35
XG	8599				✓	2	✓**			✓	✓						UNL			✓	✓	✓	35
XG+	8599N				✓	2	✓***			✓	✓						UNL			✓	✓	✓	35
10GXT	8580	✓	✓	✓	✓	1	✓	1		✓							10,056						36
xFF	8699	Up to 8.5 Gbps				2	✓			✓	✓						UNL			✓			36
GX/T2	8520N	✓	✓	✓		1	✓	1	1000	✓	✓	✓	✓	✓	✓	✓	10,240	✓*	✓	✓	✓		37
2GXT	8484	✓	✓	✓		2	✓	2	1000	✓	✓	✓	✓	✓	✓	✓	10,240	✓*	✓	✓		✓	37
Gx AN	8500N			✓		1	✓	1		✓	✓						UNL			✓	✓		38
GX/X	8542			✓		2			10/100		✓	✓	✓	✓		✓	1,536		✓	✓	✓		38
GX/F	8562		✓	✓		2			10/100		✓	✓	✓	✓		✓	1,536		✓	✓	✓		38
1000FF	8642			✓		2				✓	✓						UNL						40
10/100	8380	✓	✓			1		1	10/100		✓						1,536			✓			41
100Fx/Tx	8360		✓			1		1			✓						UNL			✓			41
2Fx	8440		✓			2			10/100		✓	✓	✓	✓	✓	✓	1,536	✓	✓	✓	✓		40
100FF	8620	✓	✓			2				✓	✓						UNL						40
10FL/T	8300	✓				1		1			✓						UNL			✓			41
10T/2	8340	✓						2	10		✓												41
4GT	8482	✓	✓	✓				4	10/100/1000	✓	✓	✓	✓	✓	✓	✓	10,240	✓*	✓				42
4Tx	8480	✓	✓					4	10/100		✓	✓	✓				1,536		✓				42
4TxVT	8481	✓	✓					4	10/100		✓	✓	✓	✓	✓	✓	1,536	✓	✓				42
Tx/2Fx	8420		✓			2		1			✓						UNL			✓	✓		42
Tx/2Tx	8400		✓					3			✓						UNL			✓	✓		42

The media converters listed in this table can be managed by installing an iConverter NMM2 Network Management Module or M2 Network Interface Device (NID) in the same chassis with the media converter modules.

Legend
UNL Unlimited frame packet size
* Enhanced Rate Limiting in 64k increments
** Supports Copper pluggable transceivers
*** Supports High-Power (level 4) and tunable wavelength transceivers. Also supports Copper pluggable transceivers.

Link Modes:
LP Link Propagation
RFD Remote Fault Detection
SFD Symmetrical Fault Detection
ASY Asymmetrical Link Propagation

INDUSTRIAL Temperature

iConverter XG and XG+

10 Gigabit Converter/Transponder Modules

The iConverter XG and XG+ are 10 Gigabit, protocol-transparent media converters with two pluggable transceiver ports. They are available as compact, unmanaged standalone units, or as managed chassis plug-in modules. The XG and XG+ can be used as fiber mode converters, SFP+ to XFP adapters, WDM transponders or fiber repeaters supporting the three Rs (regeneration, retiming and reshaping). Built-in loopback functions, on-board status LEDs and link fault propagation modes facilitate easy setup and quick troubleshooting.

- Supports 100% traffic throughput with no packet size limits
- Protocol transparent from 9.95Gbps to 11.32Gbps*
- Ultra low latency
- Supports Omnitron and third-party 10G pluggable transceivers
  - XFP to XFP
  - SFP+ to XFP
  - SFP+ to SFP+
- Compatible with SFP+ copper direct attach cable (Twinax)
- Supports fiber transceiver digital diagnostics reporting and alarms
- Built-in loopback mode for verification and troubleshooting
- The XG+ supports wide temperature (-40 to 60°C) and the XG supports wide and industrial temperature (-40 to 75°C) ranges
- The iConverter XG+ supports the features of the XG, and adds:
  - Support for MSA power level 4 XFP transceivers
  - Provides management of wavelength tunable XFP transceivers, compliant with MSA SFF-8477 and INF- 8077i, when used with NMM2 Network Management Module or a NID

Port 1	Port 2	XG	XG+
SFP+	SFP+	8599-00	-
SFP+	XFP	8599-01	8599N-01
XFP	XFP	8599-11	8599N-11

*Model 8599-11 is protocol transparent from 9.95Gbps to 11.32Gbps. Models 8599-00 and 8599-01 are protocol transparent from 9.95Gbps to 10.7Gbps.

Order SFPs separately. See SFP ordering information on pages 66 and 67.

To specify standalone module type and power options, add a suffix to the model number:
- A: Tabletop with US AC to DC Power Supply Adapter (supports DIN-rail Bracket)
- B: Tabletop with Universal AC to DC Power Supply Adapter (supports DIN-rail Bracket)
- C: Tabletop with 2-Pin DC Terminal Connector (supports DIN-rail Bracket)
- D: Wall-mount with US AC to DC Power Supply Adapter
- E: Wall-mount with Universal AC to DC Power Supply Adapter
- F: Wall-mount with 2-Pin DC Terminal Connector

For wide temperature (-40 to 60°C) XG or XG+ model, add a "W" to the end of the model number.
To order an industrial temperature (-40 to 75°C) XG module, add a "Z" to the end of the model number.

Accessories	
7499-DC-1	10 Gigabit SFP+ Direct Attach Cable (Twinax) 1 meters
7499-DC-3	10 Gigabit SFP+ Direct Attach Cable (Twinax) 3 meters

iConverter XGT+

10 Gigabit Media Converter Modules

The iConverter XGT+ is a 10 Gigabit Ethernet media converter with one 10GBASE-T RJ-45 port and one pluggable transceiver port that provides copper-to-fiber media conversion. Copper-to-fiber conversion is achieved with XFP or SFP+ fiber transceivers. The iConverter XGT+ is available as a compact, unmanaged standalone unit, or as a managed plug-in module.

The XGT+ converts short-reach cabling to multimode fiber, single-mode fiber or CAT-6A cabling (up to 100 meters) to extend distances to servers, switches and patch panels. For CAT-6A cabling links less than 30 meters, the XGT+ supports 10GBASE-T Short Reach mode, also known as Power Saving or Low-Power mode. In this mode, the device conserves energy by reducing power and cooling requirements per IEEE 802.3az Energy Efficient Ethernet (EEE).

The iConverter XGT+ also supports WDM transceivers, including high-power (power level 4) XFP transceivers and the latest generation of wavelength tunable DWDM XFP transceivers.

- Copper-to-Fiber interfaces: RJ-45 to XFP and RJ-45 to SFP+
- IEEE 802.3an Compliant
- Supports CWDM and DWDM XFP and SFP+ transceivers
- Supports MSA power level 4 XFP transceivers
- Supports up to 100m on CAT-6A and CAT-7
- Omnitron transceivers support XFP and SFP+ digital diagnostics reporting via LEDs or management module
- Provides management of wavelength tunable XFP transceivers, compliant with MSA SFF-8477 and INF- 8077i, when used with the NMM2 Network Management Module or a NID

Port 1	Port 2	Model #
SFP+	RJ-45	8589N-0
XFP	RJ-45	8589N-1

Order SFPs separately. See SFP ordering information on pages 66 and 67.

To specify standalone module type and power options, add a suffix to the model number:
- D: Standalone with mounting brackets and external US AC/DC Power Adapter
- E: Standalone with mounting brackets and external Universal AC/DC Power Adapter
- F: Standalone with mounting brackets and 2-Pin DC Terminal Connector

Example 8589N-0-D = XGT+, SFP+/RJ-45, Standalone with mounting brackets and external US AC/DC Power Adapter

See the Accessories table at left for Direct Attach Cables.

10G Application Examples

10G DWDM Data Center Application.....Page 32

INDUSTRIAL Temperature

iConverter 10GXT

10/100/1000BASE-T to 1G/10G Fiber Media Converter

The iConverter 10GXT is a 10/100/1000BASE-T copper to 1000BASE-X or 10GBASE-R fiber media converter, and is available as a compact, unmanaged standalone unit. The iConverter 10GXT supports jumbo frames up to 10,056 bytes.

The 10GXT is used to convert 10/100/1000 copper to Gigabit Ethernet fiber or 10 Gigabit Ethernet fiber. The 10GXT supports 1000BASE-X or 10GBASE-R Small Form Pluggable (SFP/SFP+) transceivers or 10GBASE-X XFP transceivers.

- Multi-rate 10/100/1000 copper to 1000/10G Ethernet Media Converter
- Conforms to 10BASE-T, 100BASE-TX, 1000BASE-T, 1000BASE-X and 10GBASE-R specifications
- Supports dual fiber and single-fiber 10GBASE-R XFP transceivers or 1000BASE-X or 10GBASE-R SFP/SFP+ transceivers for standard or CWDM wavelengths
- RJ-45 port supports 10/100/1000 and Half/Full-Duplex auto-negotiation and MDI/MDIX auto-crossover
- Supports wide (-40 to 60°C) and industrial (-40 to 75°C) temperature ranges

Port 1	Port 2	Port 1	Port 2	Module Type
RJ-45	SFP+	RJ-45	XFP	
8580-0-A		8580-1-A		Standalone with External US AC Power Adapter
8580-0-B		8580-1-B		Standalone with External Universal AC Power Adapter
8580-0-C		8580-1-C		Standalone with 2-Pin DC Terminal Power
8580-0-D		8580-1-D		Standalone with integrated mounting brackets and External US AC Power Adapter
8580-0-E		8580-1-E		Standalone with integrated mounting brackets and External Universal AC Power Adapter
8580-0-F		8580-1-F		Standalone with integrated mounting brackets and 2-Pin DC Terminal Power
8580-0-G		8580-1-G		Standalone with No Power Adapter
8580-0-H		8580-1-H		Standalone with integrated mounting brackets and No Power Adapter

Order SFPs separately. See SFP ordering information on pages 66 and 67.

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.
To order an industrial temperature (-40 to 75°C), add a "Z" to the end of the model number.

INDUSTRIAL Temperature

iConverter xFF

SFP to SFP Media Converter/Transponder Modules

The iConverter xFF is a protocol-transparent, SFP to SFP media converter that provides reliable and cost-effective conversion between different optical wavelengths, multimode and single-mode fiber, and dual and single-fiber networks.

- SFP to SFP fiber converter and wavelength transponder
- Supports data rates of 1Mbps to 8.5 Gbps
- Supports Fast and Gigabit Ethernet, OC-3 (STM-1), OC-12 (STM-4), OC-48 (STM-16),1/2/4/8 Gigabit Fibre Channel and CPRI
- Wavelength conversion for CWDM and DWDM applications
- Supports wide (-40 to 60°C) and industrial (-4- to 75°C) temperature range

Port 1	Port 2	Model #
SFP	SFP	8699-0

Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order an unmanaged standalone unit, add a suffix to the model number as follows:

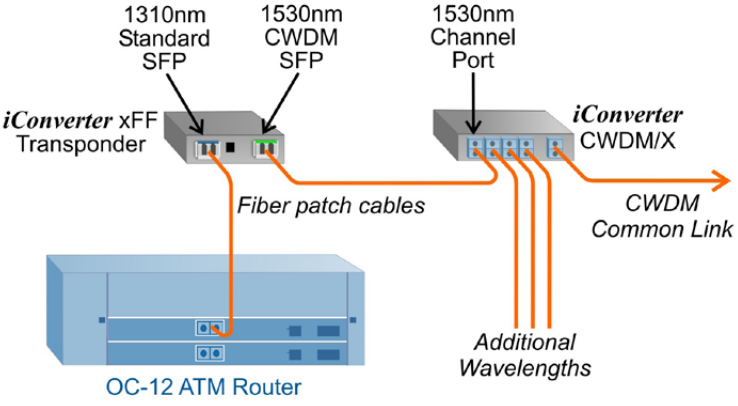
-D: Wall-Mount with External US AC Power Supply
-E: Wall-Mount with External Universal AC Power Supply
-F: Wall-Mount with 2-Pin DC Terminal Power

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.
To order an industrial temperature (-40 to 75°C), add a "Z" to the end of the model number.

xFF CWDM Transponder Application

Fiber optic communications equipment with fixed fiber interfaces and standard wavelengths (850nm, 1310nm, 1550nm) can be connected to CWDM Multiplexers using the iConverter xFF transponder.

The following example shows an OC-12 circuit from an ATM router with fixed fiber SC connectors and standard 1310nm wavelength. The iConverter xFF converts the standard wavelength to a CWDM wavelength with a 1310nm standard wavelength SFP transceiver and a 1530nm CWDM SFP transceiver.



iConverter GX/T2

10/100/1000 Ethernet RJ-45 to Fiber Converter Modules

The iConverter GX/T2 is a 10/100/1000BASE-T RJ-45 copper to 1000BASE-X Gigabit fiber media converters that support advanced networking features. The GX/T2 supports SFP transceivers, and is available in an unmanaged standalone unit.

- 100BASE-FX or 1000BASE-X SFP transceivers for standard or CWDM wavelengths
- 10,240 byte jumbo frames
- IEEE 802.1Q VLAN with Q-in-Q and IEEE 802.1p QoS
- Bandwidth control (rate limiting) with 64Kb increments
- Port Access Control and reporting of MIB Statistics
- Multimode (MM), single-mode (SM) and single-fiber (SF)
- Manual or auto-negotiation for Pause and Full/Half-Duplex
- Advanced Fault Propagation modes for quick fault detection
- Ethernet backplane ports for expansion to adjacent modules
- Supports wide temperature range (-40 to 60°C)

Fiber	Distance	Wavelength (nm)	Connector Type			
			ST	SC	LC	SFP
SFP	-	-	-	-	-	8539N-0**
MM	220/550m	850	8520N-0	8522N-0	8526N-0	-
MM	2km	1310		8522N-6	-	-
SM	12km	1310	8521N-1	8523N-1	8527N-1	-
SM	34km	1310	-	8523N-2	8527N-2	-
SM	80km	1550	-	8523N-3	8527N-3	-
SM	110km	1550	-	8523N-4	-	-
SM	140km	1550	-	8523N-5	-	-
MM/SF	550m	1310/1550	-	8530N-0*	-	-
MM/SF	550m	1550/1310	-	8531N-0*	-	-
SM/SF	20km	1310/1550	-	8530N-1*	-	-
SM/SF	20km	1550/1310	-	8531N-1*	-	-
SM/SF	40km	1310/1550	-	8530N-2*	-	-
SM/SF	40km	1550/1310	-	8531N-2*	-	-

* Single-fiber converters must be used in pairs.

** Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order an unmanaged GX/T2 standalone unit, add a suffix to the model number:
- A: Tabletop with US AC to DC Power Supply Adapter (supports DIN-rail Bracket)
- B: Tabletop with Universal AC to DC Power Supply Adapter (supports DIN-rail Bracket)
- C: Tabletop with 2-Pin DC Terminal Connector (supports DIN-rail Bracket)
- D: Standalone with integrated mounting brackets and External US AC Power Supply
- E: Standalone with integrated mounting brackets and External Universal AC Power Supply
- F: Standalone with integrated mounting brackets and 2-Pin DC Terminal Connector

Example 8521N-1-DW = GX/T2 SM/12km/1310/ST, Standalone unit with integrated mounting brackets and External US AC Power Supply, wide temperature.

For wide temperature (-40 to 60°C), add a "W" to the end of the model number: 8250N-0**W**.

Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.

iConverter 2GXT

10/100/1000 to 100/1000 Fiber 2-Channel Media Converter

The 2GXT is a dual-channel media converter and four-port switch with two 10/100/1000BASE-T RJ-45 ports and two Small Form Pluggable (SFP) ports. The dual SFP fiber ports can be configured to provide 1:1 uplink protection with less than 50ms switchover when the 2GXT is deployed as a four-port switch.

The 2GXT supports both 100BASE-X and 1000BASE-X SFPs to provide flexible connectivity to Fast Ethernet or Gigabit networks, and simplifies inventory management in large Enterprise and Telecom networks with multiple data rates. The SFPs also enable adaptability to different fiber types and distances, and support Coarse Wave Division Multiplexing (CWDM) to increase the capacity of fiber infrastructure.

- Supports four distinct operating modes:
  - Dual copper to fiber media converter
  - Four-port Gigabit Ethernet switch
  - Switch with 1:1 Uplink Protection, revertive
  - Switch with 1:1 Uplink Protection, non-revertive
- Automatic data rate detection of installed SFP transceivers
- Fiber redundancy with less than 50ms switching
- Plug-and-Play MDI/MDI-X RJ-45 ports
- Supports auto-negotiation on all ports
- Jumbo frame support 10,240 bytes
- User-selectable link fault detection modes facilitate quick fault detection, isolation and reporting
- Supports QoS, Port Access Control and MIB statistics
- VLAN with 802.1ad Q-in-Q for Carrier and Enterprise Ethernet Deployments
- Bandwidth control (rate limiting) in 64Kb increments
- 1000Mbps Ethernet backplane ports for expansion to adjacent modules
- Supports wide (-40 to 60°C) and industrial (-40 to 75°C) temperature ranges

Model Number	Description
8484-4	2GXT chassis plug-in module
8484-4-D	2GXT wall-mount with US wall-plug AC power supply
8484-4-E	2GXT wall-mount with Universal AC power supply
8484-4-F	2GXT wall-mount with 2-Pin DC terminal connector

Order SFPs separately. See SFP ordering information on pages 66 and 67.

For wide temperature (-40 to 60°C), add a "W" to the end of the model number: 8484-4-D**W**
To order an industrial temperature (-40 to 75°C), add a "Z" to the end of the model number: 8484-4-D**Z**

iConverter Gx AN

Gigabit Ethernet RJ-45 to Fiber Converter Modules

The iConverter Gx AN provides 1000BASE-T RJ-45 copper to 1000BASE-X Gigabit fiber conversion, and is available as an unmanaged standalone unit, or as a managed chassis plug-in module. The Gx AN supports auto-negotiation on both ports, and a variety of link fault detection modes for easy fault detection and isolation.

- Multimode (MM), single-mode (SM) and single-fiber (SF)
- ST, SC and LC fiber connectors
- SFP transceivers for standard and CWDM wavelengths
- User configurable pause and Full/Half-Duplex capabilities for the RJ-45 port
- Fiber port manual or auto-negotiation
- Advanced Fault Detection modes for quick fault detection, isolation and reporting
- Supports wide temperature range (-40 to 60°C)

Fiber	Distance	Wavelength (nm)	Connector Type			
			ST	SC	LC	SFP
SFP	-	-	-	-	-	8519N-0**
MM	220/550m	850	8500N-0	8502N-0	8506N-0	-
MM	2km	1310	-	8502N-6	-	-
SM	12km	1310	8501N-1	8503N-1	8507N-1	-
SM	34km	1310	-	8503N-2	8507N-2	-
SM	80km	1550	-	8503N-3	8507N-3	-
SM	110km	1550	-	8503N-4	8507N-4	-
SM	140km	1550	-	8503N-5	8507N-5	-
MM/SF	550m	1310/1550	-	8510N-0*	-	-
MM/SF	550m	1550/1310	-	8511N-0*	-	-
SM/SF	20km	1310/1550	-	8510N-1*	-	-
SM/SF	20km	1550/1310	-	8511N-1*	-	-
SM/SF	40km	1310/1550	-	8510N-2*	-	-
SM-SF	40km	1550/1310	-	8511N-2*	-	-

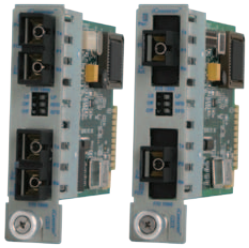
*Single-fiber converters must be used in pairs.
** Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order a standalone Gx AN model, add a suffix to the model number as follows:
- A: Tabletop with US AC to DC Power Supply Adapter (supports DIN-rail Bracket)
- B: Tabletop with Universal AC to DC Power Supply Adapter (supports DIN-rail Bracket)
- C: Tabletop with 2-Pin DC Terminal Connector (supports DIN-rail Bracket)
- D: Wall-mount with US AC to DC Power Supply Adapter
- E: Wall-mount with Universal AC to DC Power Supply Adapter
- F: Wall-mount with 2-Pin DC Terminal Connector

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

Example 8502N-0-AW = MM, 220m/550m, 850nm, SC, Tabletop with US AC Power Supply, wide temperature.

Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.



iConverter GX/X and GX/F

Gigabit Fiber Switch/Converters and Gigabit to Fast Ethernet Switch/Converters

The iConverter GX/X is a Gigabit to Gigabit Ethernet fiber to fiber converter, and the iConverter GX/F is a Gigabit to Fast Ethernet bridging fiber to fiber converter. They provide single-mode to multimode and dual fiber to single-fiber conversion, and perform regeneration, retiming and reshaping of the fiber optic signal.

- Supports IEEE 802.1Q VLAN and 802.1p QoS standards
- Ethernet backplane ports for expansion to adjacent modules
- Supports wide temperature range (-40 to 60°C)

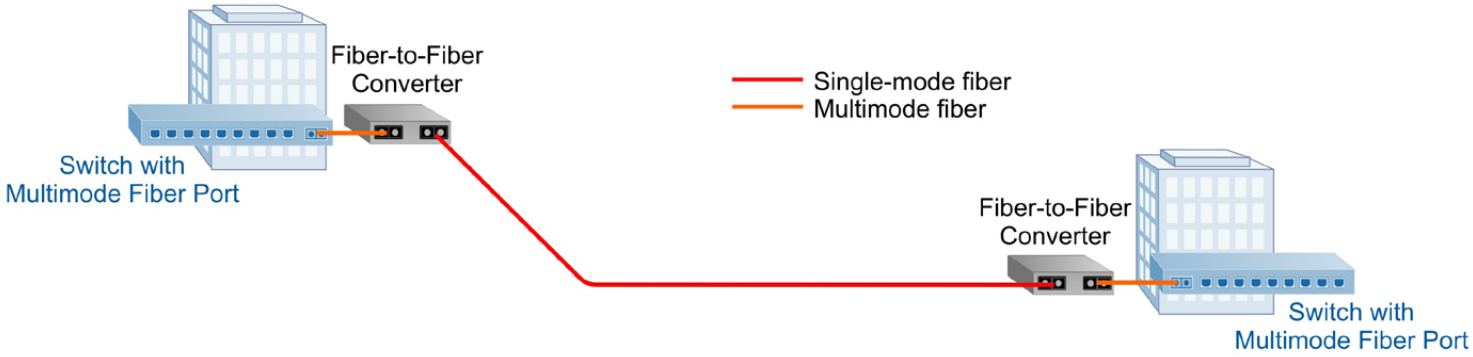
Fiber Port 1/Port 2	Distance Port 1/Port 2	Wavelength (nm) Port 1/Port 2	Connector Type	
			SC	LC
***iConverter* GX/X**				
MM/MM	550m/550m	850/850	8542-00	-
SM/MM	12km/550m	1310/850	8543-10	-
SM/SM	12km/12km	1310/1310	8543-11	8547-11
SM/SM	34km/34km	1310/1310	8543-22	8547-22
SM/SM	80km/80km	1550/1550	8543-33	8547-33
SM-SF/SM-SF	20km/20km	13,15/13,15	8554-11*	-
SM-SF/SM-SF	20km/20km	15,13/15,13	8557-11*	-
***iConverter* GX/F**				
MM/MM	550m/5km	850/1310	8562-00	-
MM/SM	550m/30km	850/1310	8562-01	-
MM/SM	550m/60km	850/1310	8562-02	-
MM/SM	550m/120km	850/1550	8562-03	-
SM/MM	12km/5km	1310/1310	8563-10	-
SM/SM	12km/30km	1310/1310	8563-11	8567-11
SM/SM	12km/60km	1310/1310	8563-12	8567-12
SM/SM	12km/120km	1310/1550	8563-13	8567-13
MM/SM-SF	550m/20km	850/13,15	8562-05*	-
MM/SM-SF	550m/20km	850/15,13	8562-07*	-
MM/SM-SF	550m/40km	850/13,15	8562-06*	-
MM/SM-SF	550m/40km	850/15,13	8562-08*	-
SM/SM-SF	12km/20km	1310/13,15	8563-15*	-
SM/SM-SF	12km/20km	1310/15,13	8563-17*	-
SM/SM-SF	12km/40km	1310/13,15	8563-16*	-
SM/SM-SF	12km/40km	1310/15,13	8563-18*	-

* Single-fiber converters must be used in pairs with opposite Tx and Rx.

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.

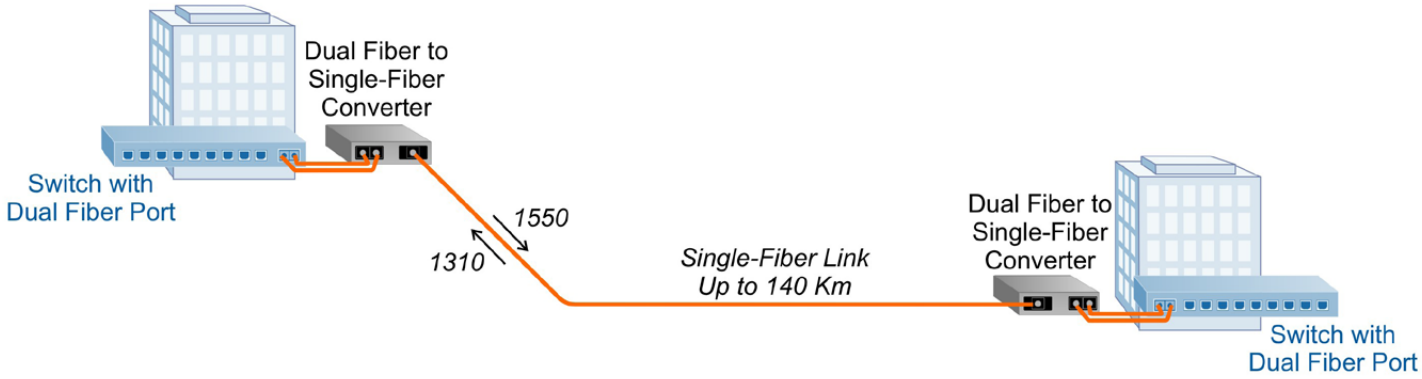
Multimode to Single-Mode Application



Networks often require conversion from multimode (MM) to single-mode (SM) fiber, which supports longer distances than MM fiber. Fiber-to-fiber media converters can extend a MM network across SM fiber with distances up to 140km for Fast Ethernet (100Mbps) and 80km for Gigabit Ethernet (1000Mbps) and 10 Gigabit.

In this application, two Ethernet switches equipped with MM fiber ports are connected utilizing a pair of fiber-to-fiber converters which convert the MM fiber to SM and enable network connectivity across the distance between the switches.

Dual Fiber to Single-Fiber Application



Networks may require conversion between dual and single-fiber, depending on the type of equipment and the fiber installed in the facility. Single-fiber is single-mode and operates with bi-directional wavelengths, often referred to as BIDI. Typically BIDI single-fiber uses 1310nm and 1550nm wavelengths over the same fiber strand in opposite directions.

In this application, two dual fiber switches are connected via single-fiber. Since BIDI single-fiber uses two separate wavelengths over the same fiber strand, the transmit (Tx) at one end of the fiber link matches the receive (Rx) at the other end, and vice versa.

Fiber to Fiber Media Converters

Omnitron fiber to fiber media converters and transponders provide multimode to single-mode, and dual to single-fiber conversion.

iConverter 100FF and 1000FF

Fast and Gigabit Ethernet Fiber to Fiber Converter Modules

The iConverter 100FF and 1000FF multimode to single-mode fiber converter modules extend network distances and connect dissimilar fiber network cabling. Modules support Fast Ethernet and Gigabit Ethernet.

- Converts multimode (MM) to single-mode (SM) dual fiber and dual fiber to single-fiber (SF)
- Supports wide temperature range (-40 to 60°C)

Fiber Port 1/Port 2	Distance Port 1/Port 2	Wavelength (nm) Port 1/Port 2	Connector Type	
			ST	SC
***iConverter* 100FF**				
MM/SM	2km/30km	850/1310	-	8622-61
MM/SM	5km/30km	1310/1310	8620-1	8622-1
MM/SM	5km/60km	1310/1310	8620-2	8622-2
MM/SM	5km/120km	1310/1550	-	8622-3
MM/SM-SF*	5km/20km	1310/1310-1550	8630-1**	8634-1**
MM/SM-SF*	5km/20km	1310/1550-1310	8631-1**	8635-1**
MM/SM-SF*	5km/40km	1310/1310-1550	8630-2**	8634-2**
MM/SM-SF*	5km/40km	1310/1550-1310	8631-2**	8635-2**
SM/SM-SF*	30km/20km	1310/1310-1550	8632-1**	8636-1**
SM/SM-SF*	30km/20km	1310/1550-1310	8633-1**	8637-1**
SM/SM-SF*	30km/40km	1310/1310-1550	8632-2**	8636-2**
SM/SM-SF*	30km/40km	1310/1550-1310	8633-2**	8637-2**
***iConverter* 1000FF**				
MM/SM	550m/12km	850/1310	-	8642-1
MM/SM	550m/34km	850/1310	-	8642-2
MM/SM	550m/80km	850/1550	-	8642-3
SM/SM	12km/34km	1310/1310	-	8643-2
SM/SM	12km/80km	1310/1550	-	8643-3
MM/SM-SF*	550m/20km	850/1310-1550	-	8650-1**
MM/SM-SF*	550m/20km	850/1550-1310	-	8651-1**
SM/SM-SF*	12km/20km	1310/1310-1550	-	8652-1**
SM/SM-SF*	12km/20km	1310/1550-1310	-	8653-1**
SM/SM-SF*	12km/40km	1310/1310-1550	-	8652-2**
SM/SM-SF*	12km/40km	1310/1550-1310	-	8653-2**

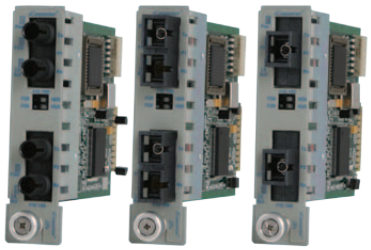
* All single-fiber ports are SC connectors.
** Single-fiber converters must be used in pairs with opposite Tx and Rx.

To order an unmanaged standalone model, add a suffix to the model number as follows:
-D: Wall-Mount with External US AC Power Supply Adapter
-E: Wall-Mount with External Universal AC Power Supply Adapter
-F: Wall-Mount with 2-Pin DC Terminal Connector

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

Example: 8620-1-DW = MM/SM, 5km/30km, 1310, ST Connector, Wall-Mount External US AC Power Supply, wide temperature.

Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.



iConverter 2Fx

Two-Port Fast Ethernet Fiber Converter/Repeater Modules

The iConverter 2Fx is a two-port, 100BASE-FX to 100BASE-FX managed optical switch module that operates as a fiber to fiber repeater and converter. It performs regeneration, retiming and reshaping of the Ethernet signals. The 2Fx features Ethernet backplane ports for connectivity to adjacent modules, enabling scalable, multi-module configurations such as redundant rings or fiber distribution switches.

- Supports IEEE 802.1Q VLAN with Q-in-Q and IEEE 802.1p QoS prioritization standards
- Individual Port Bandwidth and Port Access Controls
- Reporting of MIB Statistics
- Multimode (MM), single-mode (SM) and single-fiber (SF)
- ST, SC and LC fiber connectors
- Advanced Fault Detection modes for quick fault detection, isolation and reporting
- Ethernet backplane ports for connectivity to adjacent modules
- Supports wide temperature range (-40 to 60°C)

Fiber Port 1/Port 2	Distance Port 1/Port 2	Wavelength (nm) Port 1/Port 2	Connector Type		
			ST	SC	LC
MM/MM	5km	1310/1310	8440-0	8442-0	8446-0
SM/SM	30km	1310/1310	8441-1	8443-1	8447-1
SM/SM	60km	1310/1310	8441-2	8443-2	8447-2
SM/SM	120km	1550/1550	-	8443-3	8447-3
SM-SF/SM-SF	20km	13-15/13-15	-	8450-1*	-
SM-SF/SM-SF	20km	15-13/15-13	-	8451-1*	-
SM-SF/SM-SF	40km	13-15/13-15	-	8450-2*	-
SM-SF/SM-SF	40km	15-13/15-13	-	8451-2*	-

* Single-fiber converters must be used in pairs with opposite Tx and Rx.
For wide temperature (-40 to 60°C), add a "W" to the end of the model number.
Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.

Related Applications

Multimode to Single-Mode Conversion.....Page 39
Dual Fiber to Single-Fiber Conversion.....Page 39

iConverter 10/100

10/100 Ethernet RJ-45 to Fiber Converter Modules

The iConverter 10/100 converts 10/100Mbps RJ-45 copper to 100BASE-FX fiber.

- Multimode (MM), single-mode (SM) and single-fiber (SF)
- Advanced Fault Detection modes for quick fault detection, isolation and reporting
- Ethernet backplane ports for expansion to adjacent modules
- Supports wide temperature range (-40 to 60°C)

Fiber	Distance	Wavelength (nm)	Connector Type		
			ST	SC	LC
MM	5km	1310	8380-0	8382-0	8386-0
SM	30km	1310	8381-1	8383-1	8387-1
SM	60km	1310	8381-2	8383-2	8387-2
SM	120km	1550	-	8383-3	8387-3
MM/SF	5km	1310/1550	-	8390-0*	-
MM/SF	5km	1550/1310	-	8391-0*	-
SM/SF	20km	1310/1550	-	8390-1*	-
SM/SF	20km	1550/1310	-	8391-1*	-
SM/SF	40km	1310/1550	-	8390-2*	-
SM/SF	40km	1550/1310	-	8391-2*	-
SM/SF	60km	1310/1550	-	8390-3*	-
SM/SF	60km	1550/1310	-	8391-3*	-

*Single-Fiber converters must be used in pairs.

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.

Related Applications

Ethernet Point to Point Application.....Page 52

iConverter 100Fx/Tx, 10FL/T and 10T/2

100Mbps and 10Mbps Ethernet Converter Modules

The iConverter 100Fx/Tx provides 100BASE-TX RJ-45 copper to 100BASE-FX fiber conversion with auto-negotiation for Full and Half-Duplex modes. It supports Link Segmentation, Link Propagation and Remote Fault Detection modes, and features a crossover switch. The 100Fx/Tx supports wide temperature (-40 to 60°C) and extended temperature (-40 to 75°C) ranges.

The iConverter 10FL/T is a 10BASE-FL fiber to 10BASE-T RJ-45 media converter that supports Full/Half-Duplex and auto-crossover. It features Remote Fault Detection, Link Segmentation and Link Propagation modes.

The iConverter 10T/2 is a 10BASE-T RJ-45 to 10BASE-2 coax media converter that supports 50 ohm coax to a distance of 185m, and up to 30 workstations. It features Ethernet backplane ports for expansion to adjacent modules. The 10T/2 supports wide temperature (-40 to 60°C).

Fiber	Distance	Wavelength (nm)	Connector Type		
			ST	SC	LC
***iConverter* 100Fx/Tx**					
MM	5km	1310	8360-0	8362-0	8366-0
SM	30km	1310	8361-1	8363-1	8367-1
SM	60km	1310	8361-2	8363-2	8367-2
SM	120km	1550	-	8363-3	8367-3
MM/SF	5km	1310/1550	-	8370-0*	-
MM/SF	5km	1550/1310	-	8371-0*	-
SM/SF	20km	1310/1550	-	8370-1*	-
SM/SF	20km	1550/1310	-	8371-1*	-
SM/SF	40km	1310/1550	-	8370-2*	-
SM/SF	40km	1550/1310	-	8371-2*	-
SM/SF	60km	1310/1550	-	8370-3*	-
SM/SF	60km	1550/1310	-	8371-3*	-
***iConverter* 10FL/T**					
MM	2km	850	8300-0	8302-0	-
MM	5km	1310	8300-1	-	-
SM	30km	1310	8301-1	8303-1	8307-1
SM	60km	1310	8301-2	8303-2	8307-2
SM	120km	1550	-	8303-3	8307-3
SM/SF	20km	1310/1550	-	8310-1*	-
SM/SF	20km	1550/1310	-	8311-1*	-
SM/SF	40km	1310/1550	-	8310-2*	-
SM/SF	40km	1550/1310	-	8311-2*	-
***iConverter* 10T/2**					
8340-0		100m UTP and 185m coax			

*Single-Fiber converters must be used in pairs.

For wide temperature (-40 to 60°C) 100Fx/Tx and 10T/2, add a "W" to the end of the model number.
For extended temperature (-40 to 75°C) 100Fx/Tx, add a "Z" to the end of the model number.

Contact Omnitron for other fiber options and extended temperature (-40 to 75°C) models.

iConverter 4Tx, 4Tx VT and 4GT

4-Port Ethernet Switch Modules

The iConverter 4Tx, 4Tx VT and 4GT are compact, 4-port RJ-45 Ethernet switches. The 4Tx and 4Tx VT support 10/100BASE-T with 1,536 bytes maximum frame size, and the 4GT supports 10/100/1000BASE-T with 10,240 bytes maximum frame size. They provide plug-and-play capability with auto-negotiation and auto-crossover features that eliminate the need for manual port configuration and crossover cables. The chassis plug-in modules feature backplane ports for connectivity to adjacent modules in the chassis. When used in a 2 or 5-Module Chassis with an iConverter NID module, the switch modules provide a remotely managed, multi-port demarcation switch.

The 4Tx and 4Tx VT can be used as unmanaged standalone switches in a 1-Module iConverter chassis. The 4GT is available as an unmanaged standalone unit with wall-mounting brackets.

The 4Tx, 4Tx VT and 4GT feature Port VLAN, Port Access Control and reporting of MIB Statistics. The 4Tx VT and 4GT plug-in modules extend these capabilities with advanced switch features.

4Tx

- 10/100BASE-T 4-Port RJ-45 switch module
- Supports Port VLAN
- Port Access Control for enhanced security
- Reporting of MIB Statistics
- Supports wide temperature (-40 to 60°C) and industrial temperature (-40 to 75°C) ranges

4Tx VT and 4GT

- VLAN with 802.1ad Q-in-Q for Carrier Ethernet deployments
- Quality of Service and traffic prioritization
- Bandwidth rate-limiting
- The 4Tx VT supports wide temperature (-40 to 60°C) and industrial temperature (-40 to 75°C) ranges
- The 4GT supports wide temperature (-40 to 60°C)

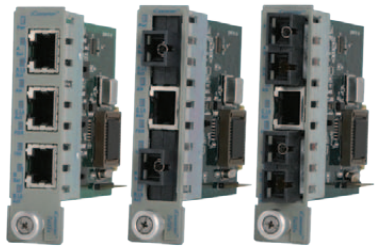
Module	Ports	Distance	Model Number
iConverter 4Tx	Four 10/100BASE-T RJ-45	100m	8480-4
iConverter 4TxVT	Four 10/100BASE-T RJ-45	100m	8481-4
iConverter 4GT	Four 10/100/1000BASE-T RJ-45	100m	8482-4

To order an unmanaged standalone 4GT, add a suffix to the model number as follows:
-D: Wall-Mount with External US AC Power Supply Adapter
-E: Wall-Mount with External Universal AC Power Supply Adapter
-F: Wall-Mount with 2-Pin DC Terminal Connector

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.
For industrial temperature 4Tx or 4Tx VT, add a "Z" to end of the model number.

Related Application

Managed Ethernet Campus LAN.....Page 25



iConverter Tx/2Fx and Tx/2Tx

Fast Ethernet RJ-45 to Redundant Fiber and

Fast Ethernet RJ-45 to Redundant RJ-45 Converter Modules

The iConverter Fast Ethernet redundant link modules convert a single copper cable to redundant copper or redundant fiber links, and are designed for resilient networks that require link redundancy.

- 100 microseconds hot fail-over backup
- User-selectable or auto-negotiation for Full/Half-Duplex
- Link Segmentation, Link Propagation and Remote Fault Detection modes
- Crossover switch for easy installation
- Supports wide temperature range (-40 to 60°C)

Fiber/RJ-45	Distance	Wavelength (nm)	Connector Type			
			ST	SC	LC	RJ-45
***iConverter* Tx/2Fx**						
MM	5km	1310	8420-0	8422-0	8426-0	-
SM	30km	1310	8421-1	8423-1	8427-1	-
SM	60km	1310	8421-2	8423-2	8427-2	-
SM	120km	1550	-	8423-3	8427-3	-
SM/SF	20km	1310/1550	-	8430-1*	-	-
SM/SF	20km	1550/1310	-	8431-1*	-	-
SM/SF	40km	1310/1550	-	8430-2*	-	-
SM/SF	40km	1550/1310	-	8431-2*	-	-
SM/SF	60km	1310/1550	-	8430-3*	-	-
SM/SF	60km	1550/1310	-	8431-3*	-	-
***iConverter* Tx/2Tx**						
RJ-45	100m	N/A	-	-	-	8400-0

*Single-Fiber converters must be used in pairs.

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.

iConverter X21

Serial X.21 to Fiber Converter Modules

The iConverter X21 serial to fiber media converter supports X.21 and RS-530 applications, and features several configuration modes to enable connections with a wide variety of X.21 and RS-530 devices. The X21 can auto-detect and configure itself to match the baud rate of the connected device up to 8.192Mbps.

- X.21 and RS-530[1] serial to fiber media converter
- Auto-configuration of baud rates
- DCE-sourced or terminal clock modes
- Supports serial data rates up to 8.192Mbps
- Supports different serial interface genders
- Features local loopback for easy testing of fiber and serial interfaces
- Available as a managed plug-in module and unmanaged standalone unit
- Small Form Pluggable (SFP) transceivers for standard or CWDM wavelengths
- ST, SC and LC fixed-fiber connectors
- Supports wide temperature range (-40 to 60°C)

Fiber	Distance	Wavelength (nm)	Connector Type			
			ST	SC	LC	SFP
SFP	-	-	-	-	-	8859-0**
MM	5km	1310	8840-0	8842-0	8846-0	-
SM	30km	1310	8841-1	8843-1	8847-1	-
SM	60km	1310	8841-2	8843-2	8847-2	-
SM	120km	1550	-	8843-3	8847-3	-
SM/SF	20km	1310/1550	-	8850-1*	-	-
SM/SF	20km	1550/1310	-	8851-1*	-	-
SM/SF	40km	1310/1550	-	8850-2*	-	-
SM/SF	40km	1550/1310	-	8851-2*	-	-

[1] Supports RS-530 DCE and DTE co-directional timing, Tx and Rx data, and two control lines.

* Single-fiber converters must be used in pairs.
** Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order an unmanaged standalone model, add a suffix to the model number as follows:
- A: Tabletop with US AC Power Supply Adapter (supports DIN-rail Bracket)
- B: Tabletop with Universal AC Power Supply Adapter (supports DIN-rail Bracket)
- C: Tabletop with 2-Pin DC Terminal Connector (supports DIN-rail Bracket)
- D: Wall-mount with US AC Power Supply Adapter
- E: Wall-mount with Universal AC Power Supply Adapter
- F: Wall-mount with 2-Pin DC Terminal Connector

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.

Example: 8840-0-AW = MM, 5km, 1310, ST, tabletop with US AC Power Supply Adapter, wide temperature.

iConverter RS232 and RS422/485

Serial RS232 & RS422/485 to Fiber Converter Modules

The iConverter RS232 and iConverter RS422/485 are serial to fiber converters that extend serial protocol over fiber. They provide easy connection to serial devices with a full complement of control signaling lines and DIP-switch selection for DTE or DCE connections. The serial port interface is available with a DB-9 connector or a terminal block connector for field wiring.

- The RS232 provides automatic baud rate detection
- The RS422/485 provides automatic Full-Duplex baud rate detection in Point-to-Point operation
- The RS422/485 supports point-to-multipoint operation in Half-Duplex and Full-Duplex at baud rates up to 921,600 baud
- Both the RS232 and RS422/485 feature a remote fiber loopback switch for easy testing of fiber link, even during serial transmission

Fiber	Distance	Wavelength (nm)	Connector Type		
			ST	SC	LC
***iConverter* RS232**					
MM	5km	1310	8760-0	8762-0	8766-0
SM	30km	1310	8761-1	8763-1	8767-1
SM	60km	1310	8761-2	8763-2	8767-2
SM	120km	1550	-	8763-3	8767-3
SM/SF	20km	1310/1550	-	8770-1*	-
SM/SF	20km	1550/1310	-	8771-1*	-
SM/SF	40km	1310/1550	-	8770-2*	-
SM/SF	40km	1550/1310	-	8771-2*	-
***iConverter* RS422/485**					
MM	5km	1310	8780-0	8782-0	8786-0
SM	30km	1310	8781-1	8783-1	8787-1
SM	60km	1310	8781-2	8783-2	8787-2
SM	120km	1550	-	8783-3	8787-3
SM/SF	20km	1310/1550	-	8790-1*	-
SM/SF	20km	1550/1310	-	8791-1*	-
SM/SF	40km	1310/1550	-	8790-2*	-
SM/SF	40km	1550/1310	-	8791-2*	-

* Single-Fiber converters must be used in pairs.

For modules with terminal block serial ports, add a "T" before the dash "-" in the model number. Examples: 8760**T**-0, 8780**T**-0.

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.

Related Application

RS-232 Over Fiber Application.....Page 53

iConverter OC3FF and OC12FF

Multimode to Single-mode Converter Modules

The iConverter OC3FF and OC12FF multimode to single-mode fiber converter modules extend network distances and connect dissimilar fiber cabling. Modules are available to support OC3/STM-1 and OC12/STM-4 technologies.

- Converts multimode (MM) to single-mode (SM) dual fiber and dual fiber to single-fiber (SF)
- Supports wide temperature range (-40 to 60°C)

Fiber Port 1/Port 2	Distance Port 1/Port2	Wavelength (nm) Port 1/Port2	Connector Type	
			ST	SC
***iConverter* OC3FF**				
MM/SM	5km/30km	1310/1310	8660-1	8661-1
MM/SM	5km/60km	1310/1310	8660-2	8661-2
MM/SM	5km/120km	1310/1550	-	8661-3
MM/SM-SF	5km/20km	1310/13-15	8670-1*	8674-1*
MM/SM-SF	5km/20km	1310/15-13	8671-1*	8675-1*
MM/SM-SF	5km/40km	1310/13-15	8670-2*	8674-2*
MM/SM-SF	5km/40km	1310/15-13	8671-2*	8675-2*
SM/SM-SF	30km/20km	1310/13-15	8672-1*	8676-1*
SM/SM-SF	30km/20km	1310/15-13	8673-1*	8677-1*
SM/SM-SF	30km/40km	1310/13-15	8672-2*	8676-2*
SM/SM-SF	30km/40km	1310/15-13	8673-2*	8677-2*
***iConverter* OC12FF**				
MM/SM	550m/12km	1310/1310	-	8681-1
MM/SM	550m/34km	1310/1310	-	8681-2
MM/SM	550m/80km	1310/1550	-	8681-3
MM/SM-SF	550m/20km	1310/13-15	-	8690-1*
MM/SM-SF	550m/20km	1310/15-13	-	8691-1*
SM/SM-SF	12km/20km	1310/13-15	-	8692-1*
SM/SM-SF	12km/20km	1310/15-13	-	8693-1*

* Single-fiber converters must be used in pairs. All single-fiber ports are SC connectors.

To order an unmanaged standalone model, add a suffix to the model number as follows:
-D: Wall-Mount with External US AC Power Supply Adapter
-E: Wall-Mount with External Universal AC Power Supply Adapter
-F: Wall-Mount with DC Terminal Connector

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

Example: 8660-1-DW = MM/SM, 5km/30km, 1310, ST Connector, Wall-Mount External US AC Power Supply, wide temperature.

Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.

iConverter OC3/STM1

OC-3/STM-1 Coax to Fiber Media Converter Modules

The iConverter OC3/STM1 converts OC-3/STM-1e coax to OC-3/STM-1 fiber.

- Mini-BNC to BNC adapters cables
- SFP transceivers for standard and CWDM wavelengths
- Multimode, single-mode and single-fiber
- Supports wide temperature range (-40 to 60°C)

Port 1	Port 2	Model #
SFP	Coax	8899S-0

Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order an unmanaged standalone unit, add a suffix to the model number as follows:
-D: Wall-Mount with External US AC Power Supply
-E: Wall-Mount with External Universal AC Power Supply
-F: Wall-Mount with 2-Pin DC Terminal Power

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

Contact Omnitron for industrial temperature (-40 to 75°C) models.

Mini-BNC to BNC adapter cables included with the STM1 media converter.

iConverter T1/E1

T1/E1 Copper to Fiber Media Converter Modules

The iConverter T1/E1 converts UTP or coax copper to multimode or single-mode fiber to extend T1 or E1 to distances up to 120km. A variety of test modes facilitate easy installation and testing of the fiber link without the need for external test equipment.

- Converts T1/E1 UTP or coax to fiber
- ST, SC and LC fiber connectors
- SFP transceivers for standard and CWDM wavelengths
- Multimode (MM), single-mode (SM) and single-fiber (SF)
- Supports ANSI, AT&T, ITU and ETSI standards
- Supports AMI, B8ZS and HDB3 line codes
- User-selectable Local Loopback and a variety of test modes
- Crossover switch on RJ-45/RJ-48 port for easy configuration
- Supports wide temperature range (-40 to 60°C)

Fiber	Distance	Wavelength (nm)	Connector Type			
			ST	SC	LC	SFP
***iConverter* T1/E1 Copper RJ-45/RJ-48 to Fiber**						
SFP	-	-	-	-	-	8719-0***
MM	5km	1310	8700-0	8702-0	8706-0	-
SM	30km	1310	8701-1	8703-1	8707-1	-
SM	60km	1310	8701-2	8703-2	8707-2	-
SM	120km	1550	-	8703-3	8707-3	-
SM/SF	20km	1310/1550	-	8710-1*	-	-
SM/SF	20km	1550/1310	-	8711-1*	-	-
SM/SF	40km	1310/1550	-	8710-2*	-	-
SMSF	40km	1550/1310	-	8711-2*	-	-
iConverter* T1/E1 Copper Coax + RJ-45/RJ-48 to Fiber*						
SFP	-	-	-	-	-	8739-0***
MM	5km	1310	8720-0	8722-0	8726-0	-
SM	30km	1310	8721-1	8723-1	8727-1	-
SM	60km	1310	8721-2	8723-2	8727-2	-
SM	120km	1550	-	8723-3	8727-3	-
SM/SF	20km	1310/1550	-	8730-1*	-	-
SM-SF	20km	1550/1310	-	8731-1*	-	-
SM/SF	40km	1310/1550	-	8730-2*	-	-
SM/SF	40km	1550/1310	-	8731-2*	-	-

* Single-Fiber converters must be used in pairs.

** The T1/E1 Copper Coax + RJ-45/RJ-48 to Fiber converter occupies two chassis slots, and is not compatible with 5-Module or 1-Module chassis.

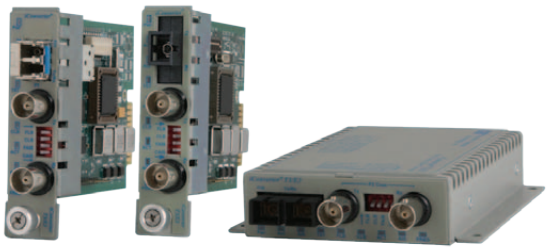
*** Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order an unmanaged standalone module, add a suffix the model number as follows:
-D: Wall-Mount with External US AC Power Supply Adapter
-E: Wall-Mount with External Universal AC Power Supply Adapter
-F: Wall-Mount with 2-Pin DC Terminal Connector

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

Example: 8700-0-DW = T1/E1, MM, 5km, 1310, Wall-Mount External US AC Power Supply, wide temperature.

Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.



iConverter T3/E3

T3/E3 Media Converter Modules

The iConverter T3/E3 converts T3/DS3 or E3 coax to fiber. The T3/E3 operates with framed or unframed data, and can operate with channelized or unchannelized data streams. The T3/E3 operates in pairs extending distances up to 120km.

- T3 or E3 copper to fiber converter
- ST, SC and LC fiber connectors
- SFP transceivers for standard and CWDM wavelengths
- Multimode (MM), single-mode (SM) and single-fiber (SF)
- Distances up to 120km
- Supports ANSI, ETSI and ITU specifications
- Supports B3ZS for T3 (DS3) and HDB3 for E3 codes
- Individual coax and fiber port enable/disable
- Local and remote loopback for easy installation
- Supports wide temperature range (-40 to 60°C)

Fiber	Distance	Wavelength (nm)	Connector Type			
			ST	SC	LC	SFP
SFP	-	-	-	-	-	8759-0**
MM	5km	1310	8740-0	8742-0	8746-0	-
SM	30km	1310	8741-1	8743-1	8747-1	-
SM	60km	1310	8741-2	8743-2	8747-2	-
SM	120km	1550	-	8743-3	8747-3	-
SM/SF	20km	1310/1550	-	8750-1*	-	-
SM/SF	20km	1550/1310	-	8751-1*	-	-
SM/SF	40km	1310/1550	-	8750-2*	-	-
SM/SF	40km	1550/1310	-	8751-2*	-	-

* Single-Fiber converters must be used in pairs.

** Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order an unmanaged standalone module, add a suffix the model number as follows:
-D: Wall-Mount with External US AC Power Supply Adapter
-E: Wall-Mount with External Universal AC Power Supply Adapter
-F: Wall-Mount with 2-Pin DC Terminal Connector

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

Example: 8740-0-DW = T3/E3, MM, 5km, 1310, Wall-Mount External US AC Power Supply, wide temperature.

Contact Omnitron for other fiber options and industrial temperature (-40 to 75°C) models.

Related Applications

T1 Demarcation Extension Application.....Page 53

OmniLight™ Overview

The demand for more bandwidth is forcing network operators, service providers and enterprises to increase the capacity of fiber networks, without significant upgrades to existing equipment investment. The OmniLight family of passive optical products modules and chassis support the highest port density available in the LGX form factor, and provides a versatile and cost-effective solution to leverage existing fiber infrastructure.

The OmniLight family of products consists of standard LGX® chassis and passive LGX® CWDM/DWDM optical modules that provde a scalable and high-density solution for distributing wavelength services from Central Offices, Headends and Data Centers.

OmniLight CWDM and DWDM modules expand fiber capacity with up to 24 channels, and up to 10G per channel. They support legacy 1310, 1550 pass band ports, and OTDR port for fiber troubleshooting and testing. The passive optical modules support dual fiber duplex and/or single-fber simplex (BIDI) with an optional cascade port for future capacity expansion, and unidirectional/bidirectional monitoring ports for diagnostics and testing.

The innovative LGX chassis design can house up to 14 full-size LGX modules or up to 28 half-size LGX modules. The OmniLight rack mount shelf can house up to 3 full-size LGX modules or 6 half-size LGX modules, and is an ideal solution for street cabinet installations. The chassis and rack mount shelf can house any combination of CWDM and DWDM modules, and can be deployed in intra and inter data center connectivity, fiber to the curb and fiber to the building applications.

Omnitron customers can preserve their investment in existing iConverter CWDM equipment by seamlessly migrating to the industry standard LGX form factor using the iConverter LGX adapter.

The versatility and flexibility of the OmniLight passive optical modules and chassis makes an ideal solution for telecom and cable operators to deliver passive Broadband Ethernet, Mobile Backhaul and Fronthaul, X-PON, FTTx, Multiple Dwelling Unit (MDU) and Multiple-Tenant Unit (MTU) services.

OmniLight Chassis

14 Module Chassis and 3 Module Shelf

The OmniLight Chassis and Rack-Mount Shelf support any combination of full-size and half-size OmniLight LGX modules, or any third-party CWDM, DWDM or EPON LGX form factor modules. Both the shelf and the chassis can be installed in 19” or 23” racks.

The 3RU OmniLight Chassis can support 14 standard LGX modules or 28 half-size LGX modules, and provides a high-density solution for distributing wavelength services.

The 1RU OmniLight 3-Module Rack-Mount Shelf is the first in the industry to support three standard LGX modules or six half-width LGX modules, and can be deployed at curb-side cabinets for remote terminal deployments.

Model #	Description
5800-1	OmniLight 14 Module 3-RU Passive Chassis
5800-5	OmniLight 3 Module 1-RU Passive Shelf

Accessories	
Model #	**Description**
8099-0	iConverter LGX Adpater
5800-20	23” Rack Mount Bracket
5800-21	Mounting bracket for individual full size LGX module

OmniLight 8-Channel DWDM MUX/DEMUX

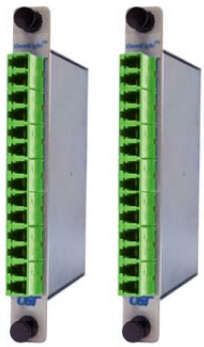
DWDM Multiplexer/Demultiplexer with Expansion, Tap and optional OTDR Ports

OmniLight full-size LGX® 8-Channel Dual Fiber DWDM Multiplexer/Demultiplexer (MUX/DEMUX) modules support DWDM channels 28 through 35, 36 through 43 and 52 through 59 in 100GHz spacing.

An expansion port is available to cascade up to three DWDM MUX/DEMUX modules, increasing fiber capacity up to 24 channels. Tap ports are available to monitor the optical levels of the incoming and outgoing common channels. An optional Optical Time Domain Reflectometer (OTDR) port is available which provides the ability to test the integrity of the fiber optic link without disturbing the wavelength channels.

- 8-Channel DWDM MUX/DEMUX with Tap and Expansion Ports
- Optional OTDR port available
- Scalable for new deployments and network upgrades using the expansion port
- Protocol and rate transparent for applications up to 10Gbps
- Industry standard LC/UPC connectors
- LGX Form Factor

Model #	Description	Channel Port ITU Grid Channel Numbers ITU Center Wavelengths (nm)
5520-101	8-Channel DWDM MUX/DEMUX Channel 28 - Channel 35 with Expansion Port and Tap Ports	C28, C29, C30, C31, C32, C33, C34, C35 1554.94, 1554.13, 1553.33,1552.52, 1551.72, 1550.92,1550.12,1549.32
5520-102	8-Channel DWDM MUX/DEMUX Channel 28 - Channel 35 with Expansion Port, Tap Ports and OTDR	C28, C29, C30, C31, C32, C33, C34, C35 1554.94, 1554.13, 1553.33, 1552.52, 1551.72, 1550.92, 1550.12, 1549.32
5520-103	8-Channel DWDM MUX/DEMUX Channel 36 - Channel 43 with Expansion Port and Tap Ports	C36, C37, C38, C39, C40, C41, C42, C43 1548.51, 1547.72, 1546.92, 1546.12, 1545.32, 1544.53, 1543.73, 1542.94
5520-104	8-Channel DWDM MUX/DEMUX Channel 36 - Channel 43 with Expansion Port, Tap Ports and OTDR	C36, C37, C38, C39, C40, C41, C42, C43 1548.51, 1547.72, 1546.92, 1546.12, 1545.32, 1544.53, 1543.73, 1542.94
5520-105	8-Channel DWDM MUX/DEMUX Channel 52 - Channel 59 with Expansion Port and Tap Ports	C52, C533, C54, C55, C56, C57, C58, C59 1535.82, 1535.04, 1534.25, 1533.47, 1532.68, 1534.90, 1531.12, 1530.33
5520-106	8-Channel DWDM MUX/DEMUX Channel 52 - Channel 59 with Expansion Port, Tap Ports and OTDR	C52, C533, C54, C55, C56, C57, C58, C59 1535.82, 1535.04, 1534.25, 1533.47, 1532.68, 1534.90, 1531.12, 1530.33



OmniLight 5-Channel Single-Fiber CWDM

CWDM Multiplexer/Demultiplexer with 1310 Pass Band and optional OTDR Ports

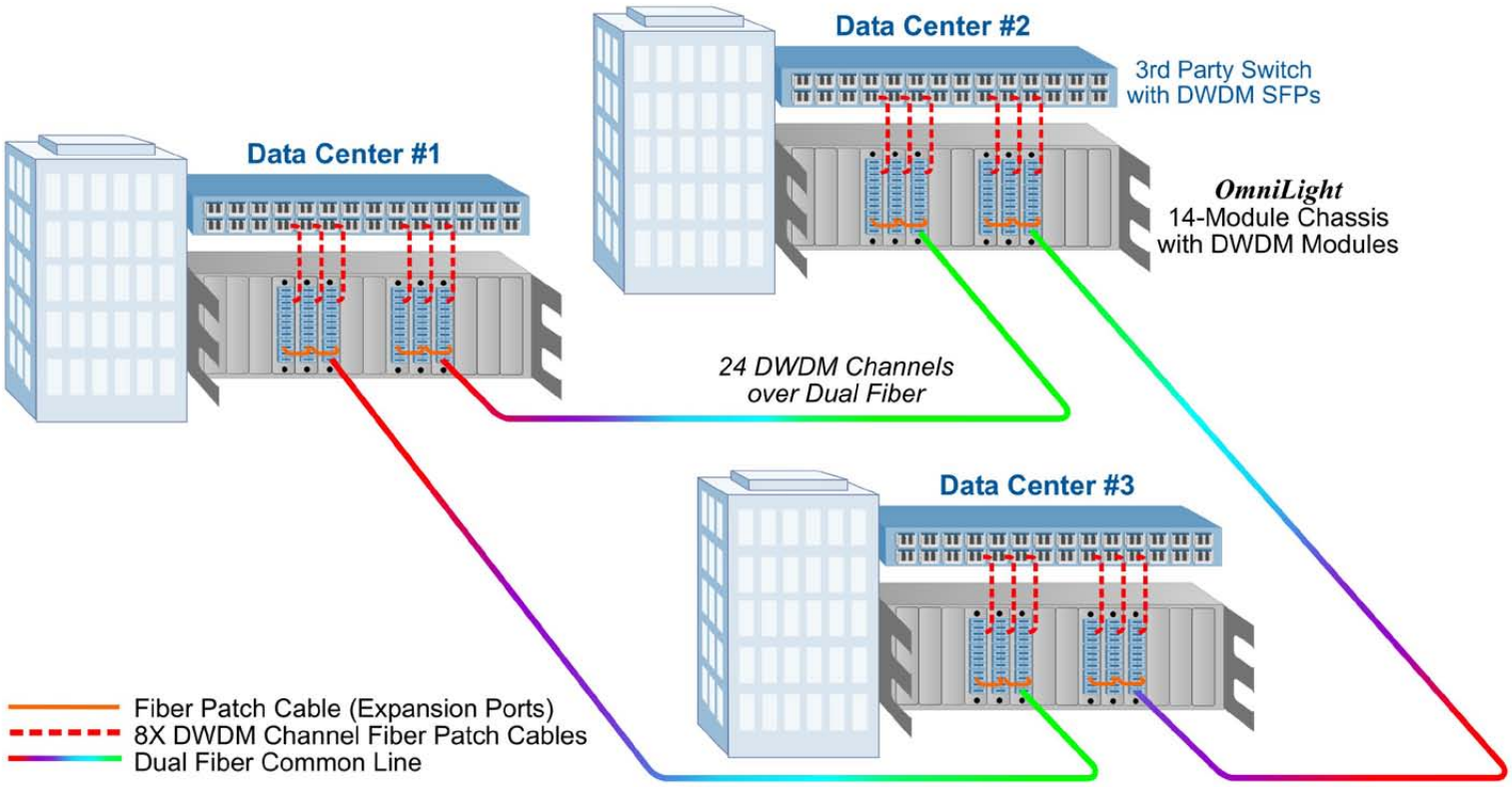
The OmniLight half-size LGX® 5-Channel Single-Fiber CWDM Multiplexer/Demultiplexer (MUX/DEMUX) modules support ITU-T G.694.2 wavelengths between 1431nm to 1611nm in 20nm increments with a 1310nm Pass Band Port. An optional Optical Time Domain Reflectometer (OTDR) port is available which provides the ability to test the integrity of the fiber optic link without disturbing the wavelength channels.

These CWDM modules are protocol and rate transparent allowing different services up to 10Gbps to be transported across the same common fiber link.

- Supports five bidirectional data channels for access or transport networks
- Supports ten unidirectional data channels for cable operator data/video overlay networks
- 1310nm Pass Band Port to transport legacy services
- Optional OTDR port
- Protocol and rate transparent for applications up to10Gbps
- Industry standard LC/APC connectors
- Half-size LGX Form Factor

Model #	Description
5900-03	5-Channel Single-Fiber CWDM MUX/DEMUX with 1310 Pass Band
5900-04	5-Channel Single-Fiber CWDM MUX/DEMUX with 1310 Pass Band and OTDR

Data Center DWDM Ring Application Example



Data Centers often have a cluster of Storage Area Networks (SAN) servers and storage discs connected using Fibre Channel or Ethernet. Data Centers require high speed connectivity to off-site locations for database mirroring and replication. To provide redundancy and disaster recovery, a SAN in one Data Center can be extended to a SAN in another Data Center. This allows each Data Center to have a mirror copy of its data at each location.

In this application diagram, three data centers in different locations are connected with a high-speed, high-bandwidth DWDM fiber ring architecture. At each data center there is a 10G switch and an OmniLight 14-Module LGX Chassis, with two groups of three OmniLight 8-Channel DWDM multiplexers installed in each chassis.

One group of DWDM multiplexers are for the fiber ring uplink, and the other group is for the fiber ring downlink.

Each of the 8-Channel DWDM multiplexers are connected via the DWDM channel ports with eight fiber patch cables (represented in the diagram with red dotted lines) to DWDM XFP 10G transponders installed in the switches. The three DWDM multiplexers are connected by the Expansion ports with fiber patch cables, enabling the three DWDM multiplexers to transport 24 DWDM channels. The 10G switches support spanning tree ring architecture with failover links.

Each DWDM wavelength supports up to 10G, so the DWDM ring supports up to 240 Gbps of data traffic.

Tap ports are available to monitor optical levels of the incoming and outgoing common channels. An optional Optical Time Domain Reflectometer (OTDR) port is also available, and enables non-intrusive testing of fiber optic link integrity.

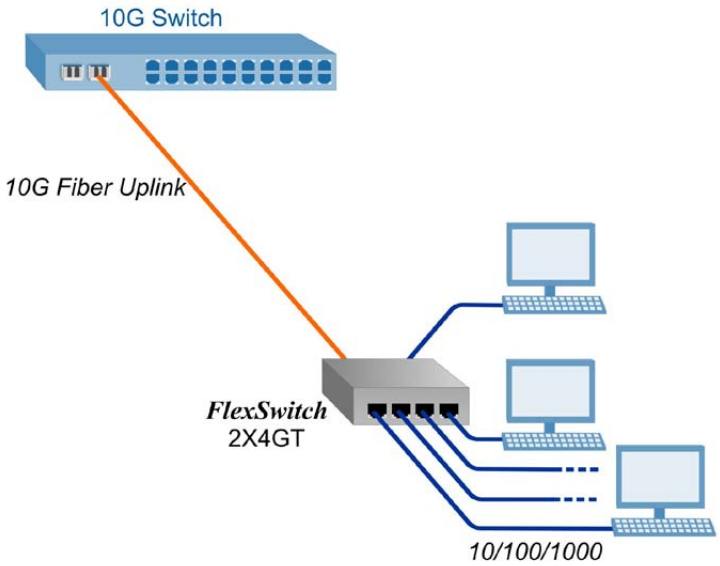
FlexSwitch™ Compact Unmanaged Switches

The FlexSwitch 2X4GT is a compact switch with a 10G fiber port, four 10/100/1000 RJ-45 ports, and a 1000/10G RJ-45 port. This unmanaged switch is ideal for applications that require 10G fiber to 10/100/1000 copper connectivity, and supports industrial temperature range for outdoor deployments.

FlexSwitch Application

The 2X4GT can connect up to five computers, storage devices, and printers within a local workstation network. The 10G Ethernet fiber uplink can connect the workgroup network to a 10G core switch which is part of the enterprise network.

The 2X4GT is compact and easy to use, and does not require user configuration for plug-and-play installation with features such as auto-negotiation and auto-crossover.



FlexSwitch™ 2X4GT

Six-Port Ethernet Switch

The FlexSwitch 2X4GT is a six-port Ethernet switch with four 10/100/1000 RJ-45 ports, one 10G (10GBASE-R) SFP+ or XFP fiber port, and one RJ-45 port that auto-negotiates to Gigabit or 10G (1000BASE-T/10GBASE-T). FlexSwitch 2X4GT models that support 10G SFP+ transceivers also support Gigabit transceivers for a seamless upgrade path from Gigabit to 10G.

The 1G/10G RJ-45 port is capable of full data rate up to 100 meter of CAT-6A (or better) cabling, and conserves energy by operating in Short Reach mode when the cabling is less than 30 meters.

The four RJ-45 ports support 10/100/1000Mbps bridging, with auto-negotiation for data-rate and duplex mode.

- 1x 1G/10G fiber port, 1x 1000BASE-T/10GBASE-T port, and 4x 10/100/1000BASE-T ports
- Supports MAC learning
- LEDs for power, port link/activity, data rates and transceiver status
- DC power input via barrel connector using external AC adapter or 2-Pin terminal connector
- 10,056 maximum frame size
- Commercial (0 to 50ºC), wide (-40º to 60ºC) and industrial (-40º to 75ºC) temperature ranges

Model #	Fiber Port Type	10G RJ-45 Port	Power Input Type
6900-0-01	SFP+	0	AC/DC Power Adapter
6900-0-09	SFP+	0	2-Pin Terminal Connector
6900-0-11	SFP+	1	AC/DC Power Adapter
6900-0-19	SFP+	1	2-Pin Terminal Connector
6900-1-01	XFP	0	AC/DC Power Adapter
6900-1-09	XFP	0	2-Pin Terminal Connector
6900-1-11	XFP	1	AC/DC Power Adapter
6900-1-19	XFP	1	2-Pin Terminal Connector

Order transceivers separately. See transceiver ordering information on pages 66 and 67.

For wide temperature (-40 to 60°C), add a "W" to the end of the model number: 8484-4-D**W**
To order an industrial temperature (-40 to 75°C), add a "Z" to the end of the model number.

Contact Omnitron for other configurations.

FlexPoint™ Overview

Omnitron's FlexPoint copper to fiber and fiber to fiber media converters provide unmanaged fiber connectivity between different cabling types. FlexPoint media converters support a variety of connectors and network protocols.

The self-contained FlexPoint media converter modules can be used as desktop or wall-mount standalone units, or be rack-mounted using a 5-Module shelf or a 14-Module FlexPoint powered chassis. FlexPoint media converter modules are AC powered, and can be DC powered (18-60VDC) by attaching an optional DC power adapter. Network administrators can mix and match FlexPoint media converter modules in a chassis for fiber access in a variety of network configurations.

- Supports most network interfaces with a wide variety of cable and connector types
- Completely software independent with no installation of drivers required
- Labeled status LEDs and switches for quick and easy installation
- Peace-of-mind reliability backed by a lifetime warranty and free 24/7 technical support

Technologies Supported:

- 10, 100, 10/100 Ethernet
- 10/100/1000 and 1000 Ethernet
- T1/E1
- OC3/STM-1 and OC12/STM-4
- Serial RS-232
- Token Ring

Module Types:

- Copper UTP to Fiber
- Coax to Fiber
- Copper UTP to Coax
- Fiber to Fiber

FlexPoint 14-Module Power-Redundant Chassis

Available in 110/230VAC or 48VDC, the Powered Chassis holds up to 14 individually secured and hot-swappable FlexPoint converters. Two redundant hot-swappable power supplies ensure continuous and reliable network operation.

FlexPoint 5-Module Rack-Mount Shelf

The rack-mount shelf provides a flexible, low-cost solution for up to five individually-powered FlexPoint converter modules.

FlexPoint DIN-rail and Wall-Mount kits

Wall and DIN-rail mounting kits are available for FlexPoint modules and FlexPoint modules with DC adapters.

FlexPoint DC Adapter

The FlexPoint DC Adapter allows a FlexPoint media converter to be powered from an 18 to 60VDC power source.

Description	14-Module	5-Module	1-Module
Chassis with 2 AC Power Supplies	4395	-	-
Chassis with 1 AC Power Supply	4396	-	-
Spare AC Power Supply	4399	-	-
Chassis with 2 48VDC Power Supplies	4385	-	-
Chassis with 1 48VDC Power Supply	4386	-	-
Spare 48VDC Power Supply	4389	-	-
Rack Mount Shelf	-	4392	-
Wall Mount Kit (Stand Alone AC)	-	-	4380
Wall Mount Kit (for DC Adapter)	-	-	4381
DIN Rail Mounting Bracket	-	-	8250-0
18-60VDC Power Adapter	-	-	4384
Wide Temperature (-40 to 60° C) 18-60VDC Power Adapter			4384-W

FlexPoint GX/T

10/100/1000 Mbps RJ-45 to Gigabit Fiber Media Converters

The FlexPoint GX/T is a 10/100/1000BASE-T copper to 1000BASE-X modular fiber media converter that supports jumbo frames up to 10,240 bytes. The GX/T supports both 100BASE-X and 1000BASE-X SFP transceivers for interoperability with Fast Ethernet and Gigabit fiber equipment.

- Conforms to 10BASE-T, 100BASE-TX, 1000BASE-T, 100BASE-X[1] and 1000BASE-X specifications
- Supports jumbo frames up to 10,240 bytes
- Supports 100BASE-X or 1000BASE-X SFP transceivers for standard or CWDM wavelengths
- Multimode (MM) and single-mode (SM) fiber with ST, SC and LC connectors and single-fiber (SF) with SC connectors
- Both the fiber and RJ-45 ports support auto-negotiation
- Auto or manual Pause function for flow control
- Loopback mode supports end-to-end testing
- User-selectable Link Modes with Remote Fault Indicators signal loss of link for Far-End Fault and Link Fault conditions
- Diagnostic and DIP-switch configurations are displayed with status LEDs for quick and easy installation
- Supports wide temperature range (-40 to 60°C)

Fiber	Distance	Wavelength (nm)	Connector Type			
			ST	SC	LC	SFP
SFP	-	-	-	-	-	4719-x**
MM	220/550m	850	4706-x	4700-x	4714-x	-
SM	12km	1310	4707-x	4701-x	4715-x	-
SM	34km	1310	-	4702-x	4716-x	-
SM	80km	1550	-	4703-x	4717-x	-
SM	110km	1550	-	4704-x	-	-
SM	140km	1550	-	4705-x	-	-
SM/SF	20km	1310/1550	-	4710-x*	-	-
SM/SF	20km	1550/1310	-	4711-x*	-	-
SM/SF	40km	1310/1550	-	4712-x*	-	-
SM/SF	40km	1550/1310	-	4713-x*	-	-

[1]100BASE-X is supported on SFP models only.
* Single-fiber converters must be used in pairs.
** Order SFPs separately. See SFP ordering information on pages 66 and 67.

POWER OPTIONS (-x)
-0 No power adapter included,
-1 110-120 VAC/60 Hz (US plug),
-2 100-240 VAC/50-60 Hz (IEC plug, no power cord)

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.
Contact Omnitron for other fiber options.

FlexPoint Gx and 100Fx/Tx

1000Mbps Ethernet Copper to Fiber Media Converters

Fast Ethernet Copper to Fiber Media Converters

The FlexPoint Gx copper to fiber media converters provide transparent integration between 1000BASE-X Gigabit fiber and 1000BASE-T Gigabit RJ-45 devices. The Gx supports jumbo packets and transparently passes VLAN frames.

- Fiber port supports auto or manual negotiation
- RJ-45 port supports Full and Half-Duplex operation
- Extends network distances up to 80km
- User-selectable or auto-sensing Pause flow control
- User-selectable Link Modes for quick fault detection
- Features a crossover switch
- Supports wide temperature range (-40 to 60°C)

The FlexPoint 100Fx/Tx converts 100BASE-TX copper to Fast Ethernet fiber and supports Half or Full-Duplex auto-negotiation with manual override. The 100Fx/Tx supports jumbo packets, transparently passes VLAN frames, and features a UTP crossover switch.

- Supports auto-negotiation of duplex modes for easy installation
- Extends network distances up to 120km
- Features a crossover switch for connection to switches or workstations
- Supports wide temperature range (-40 to 60°C)

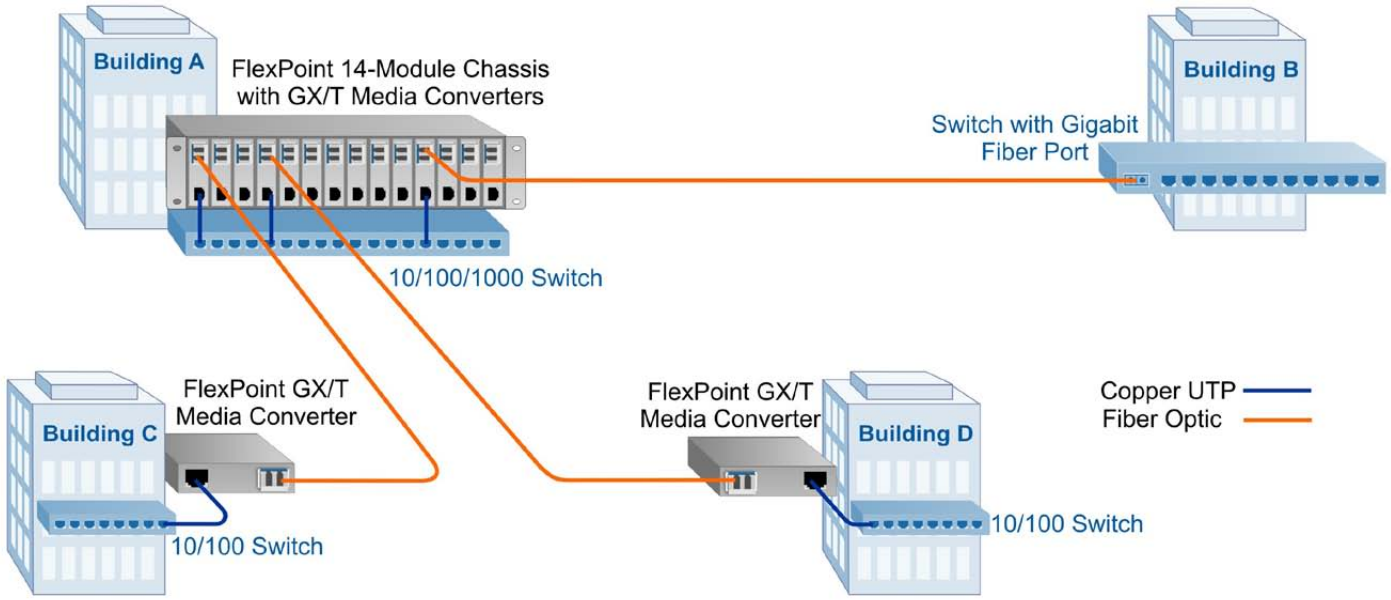
Fiber	Distance	Wavelength (nm)	Connector Type			
			ST	SC	MT-RJ	LC
FlexPoint Gx						
MM	220/550m	850	4376-x	4370-x	4670-x	4672-x
SM	12km	1310	4377-x	4371-x	4671-x	4673-x
SM	34km	1310	-	4372-x	-	4674-x
SM	80km	1550	-	4373-x	-	4675-x
SM	110km	1550	-	4374-x	-	4676-x
SM	140km	1550	-	4375-x	-	4677-x
FlexPoint 100Fx/Tx						
MM	5km	1310	4332-x	4330-x	4336-x	4353-1x
SM	30km	1310	4333-x	4331-x	-	4353-2x
SM	60km	1310	4335-x	4334-x	-	4353-3x
SM	120km	1550	-	4351-x	-	4353-4x
SM/SF	20km	1310/1550	-	4352-1x*	-	-
SM/SF	20km	1550/1310	-	4352-2x*	-	-

* Single-fiber converters must be used in pairs.

POWER OPTIONS (-x)
-0 No power adapter included,
-1 110-120 VAC/60 Hz (US plug),
-2 100-240 VAC/50-60 Hz (IEC plug, no power cord)

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.
Contact Omnitron for other fiber options.

Ethernet Campus LAN Star Topology Application



In this application example, FlexPoint GX/T media converters are deployed in a star topology network with multiple fiber links distributed from a central location. At Building A, a FlexPoint 14-Module Chassis with GX/T media converters are used to convert the RJ-45 ports from the copper switch to fiber links.

At Building B, the fiber is connected directly to an Ethernet switch Gigabit fiber port.

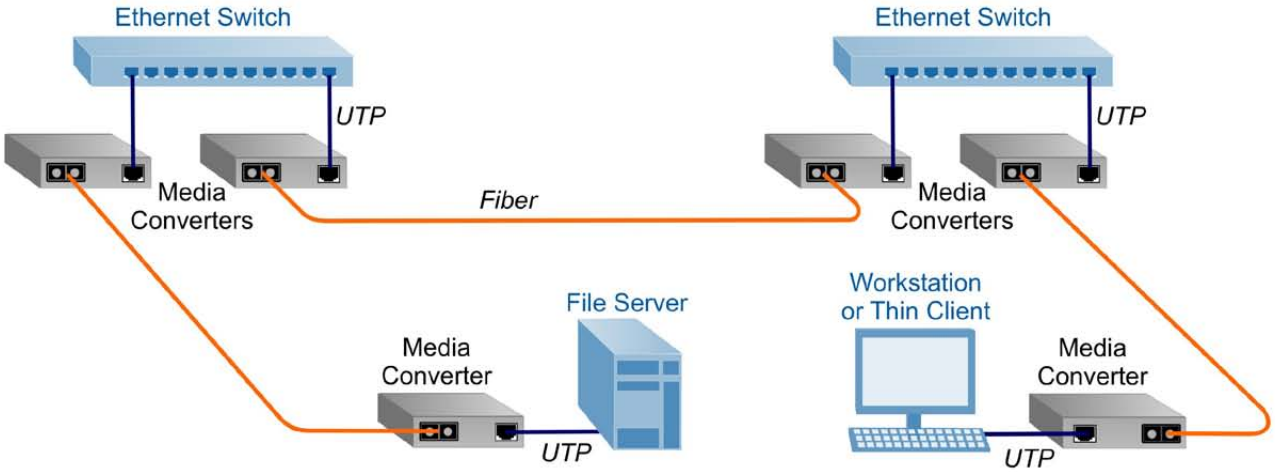
At Buildings C and D, FlexPoint GX/T media converters provide copper-to-fiber connectivity to department switches, and bridging between the Gigabit fiber and the 10/100 switches.

FlexPoint media converters provide transparent network connectivity, so the switches in the network can be managed via SNMP management software.

miConverter GX/T media converters and the miConverter 18-Module Chassis can also be used in unmanaged applications.

iConverter managed media converters and M2 Network Interface Devices can be deployed for managed fiber infrastructure with remote configuration, performance monitoring and fault notification.

Ethernet Point to Point Application

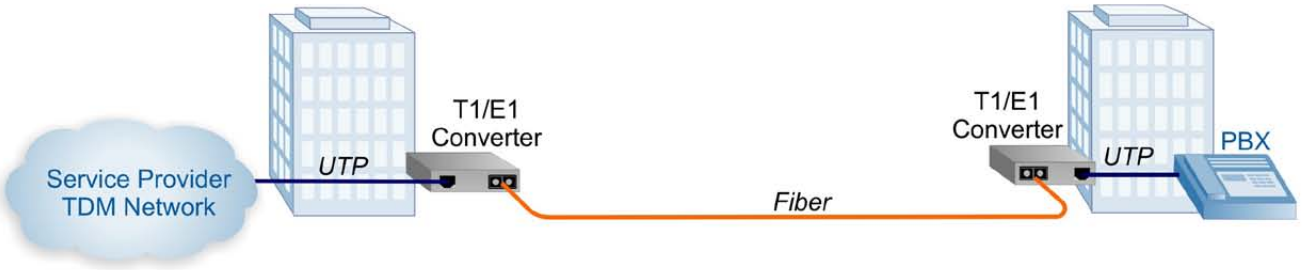


This application example demonstrates how copper to fiber media converters enable fiber connectivity to extend network distances. FlexPoint copper-to-fiber media converters support a variety of cabling and connectors, different network protocols, and data rates from 10 Mbps to 1 Gigabit.

In this application, a pair of copper to fiber media converters are used to connect copper switches, a workstation and a file server via fiber.

iConverter Managed Media Converters and miConverter Miniature Media Converters can also be used to extend distances with fiber.

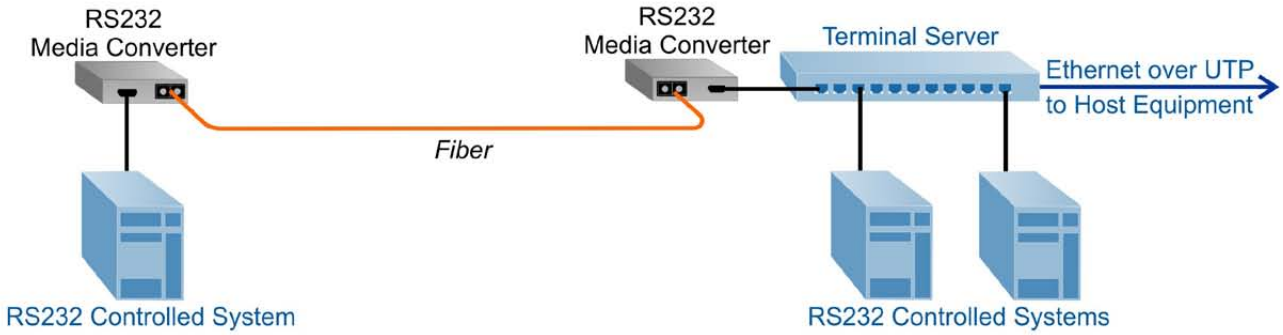
T1/E1 Demarcation Extension Application



FlexPoint T1/E1 copper-to-fiber media converters provide a cost-effective solution for extending telecom demarcation points across a business complex or up a high-rise building. In this application, a pair of T1/E1 or T3/E3 media converters is used to extend the demarcation point (hand-off from the Service Provider) to another tenant building with fiber. A variety of fiber types can be deployed, and fiber links can be extended up to 120km using single-mode fiber.

iConverter T1/E1 and T3/E3 media converters can also be used to extend TDM demarcation.

Serial RS-232 Application



In this industrial/manufacturing network application example, two RS-232 media converters provide fiber distance extension from a Terminal Server to a remote RS-232 controller.

A DB9 to RJ-45 dongle is used for connectivity between the Terminal Server and the serial media converter. Multimode or single-mode fiber can be used, and fiber links can be extended up to 60km using single-mode fiber.

iConverter RS-232 media converters can also be used to extend serial protocols over fiber.

INDUSTRIAL Temperature

FlexPoint 10/100

10/100 Copper to Fast Ethernet Fiber Media Converters

The FlexPoint 10/100 media converters allow connectivity between any Half and Full-Duplex, copper-based Ethernet devices operating at either 10 or 100Mbps via Fast Ethernet fiber.

- Copper 10/100 and Full/Half-Duplex auto-sensing with manual override controls
- Supports 100BASE-X SFP transceivers for standard or CWDM wavelengths
- UTP crossover switch
- The fiber port supports 100Mbps Full/Half-Duplex, multimode or single-mode fiber
- The fiber port supports distances up to 120km
- Supports wide (-40 to 60°C) and industrial (-40 to 75°C) temperature ranges

Fiber	Distance	Wavelength (nm)	Connector Type			
			ST	SC	LC	SFP
SFP	-	-	-	-	-	4359-x**
MM	5km	1310	4342-x	4340-x	4355-1x	-
SM	30km	1310	4343-x	4341-x	4355-2x	-
SM	60km	1310	4345-x	4344-x	4355-3x	-
SM	120km	1550	-	4349-x	4355-4x	-
SM/SF	20km	1310/1550	-	4357-1x*	-	-
SM/SF	20km	1550/1310	-	4357-2x*	-	-

* Single-fiber converters must be used in pairs.

** Order SFPs separately. See SFP ordering information on pages 66 and 67.

POWER OPTIONS (-x)
-0 No power adapter included,
-1 110-120 VAC/60 Hz (US plug),
-2 100-240 VAC/50-60 Hz (IEC plug, no power cord)
-9 2-Pin Terminal Connector

To order a wide temperature (-40 to 60°C), add a "W" to the end of the model number.
To order a industrial temperature (-40 to 75°C), add a "Z" to the end of the model number.

Contact Omnitron for other fiber options.

Related Applications

Ethernet Point to Point Application.....Page 52

FlexPoint 10FL/T, 10FL/2, 10T/2 & 10AUI/T

Ethernet Media Converters

The FlexPoint 10Mbps converters provide media conversion between fiber (multimode or single-mode) and copper or coax.

- The FlexPoint 10FL/T connects 10BASE-FL fiber and 10BASE-T RJ-45 copper. It features a UTP crossover switch and supports distances up to 120km
- The FlexPoint 10FL/2 connects 10BASE-FL fiber and 10BASE-2 coax with a coax termination switch
- The FlexPoint 10T/2 connects 10BASE-2 coax and 10BASE-T RJ-45 copper, and features a UTP crossover switch and a coax termination switch. The 10T/2 supports wide temperature range (-40 to 60°C).
- The FlexPoint 10AUI/T connects AUI and 10BASE-T RJ-45 copper

Fiber	Distance	Wavelength (nm)	Connector Type		
			ST	SC	Coax
FlexPoint 10FL/T					
MM	2km	850	4300-x	4303-x	-
MM	5km	1310	4302-x	-	-
SM	30km	1310	4301-x	-	-
SM	60km	1310	4304-x	-	-
SM	85km	1550	-	4306-x	-
SM	120km	1550	-	4307-x	-
FlexPoint 10FL/2					
MM	2km	850	4310-x	-	-
MM	5km*	1310	4312-x	-	-
SM	30km*	1310	4311-x	-	-
FlexPoint 10T/2					
RJ-45/Coax 100m/185m		-	-	-	4320-x
FlexPoint 10AUI/T (AUI Connector)					
RJ-45/AUI 100m/50m		-	4321-x		

* When operating in half-duplex, the maximum distance is 2km.

POWER OPTIONS (-x)
-0 No power adapter included,
-1 110-120 VAC/60 Hz (US plug),
-2 100-240 VAC/50-60 Hz (IEC plug, no power cord)

To order a wide temperature (-40 to 60°C) 10T/2 , add a "W" to the end of the model number.

Contact Omnitron for other fiber options.

FlexPoint 100FF, 1000FF, OC3FF, OC12FF

Single-mode to Multimode Fiber Converters

The FlexPoint fiber to fiber converters convert between single-mode and multimode fiber. They support 10, 100 and Gigabit Ethernet, OC-3/STM-1, OC-12/STM-4, SONET, Token Ring, FDDI and Fibre Channel.

- The FlexPoint 100FF supports Ethernet, Fast Ethernet, Token Ring and FDDI, and is available with ST and SC connectors
- The FlexPoint 1000FF supports Gigabit Ethernet and Fibre Channel, and is available with SC connectors
- The FlexPoint OC3FF supports OC-3/STM-1 and is available with ST and SC connectors
- The FlexPoint OC12FF supports OC-12/STM-4 and is available with SC connectors

Fiber Port 1/Port 2	Distance Port 1/Port 2	Wavelength (nm) Port 1/Port 2	Connector Type	
			ST	SC
FlexPoint 100FF				
MM/SM	2km/30km	850/1310	4414-6x	4415-6x
MM/SM	5km/30km	1310/1310	4410-x	4411-x
MM/SM	5km/60km	1310/1310	4412-x	4413-x
MM/SM	5km/120km	1310/1550	-	4425-x
FlexPoint 1000FF				
MM/SM	220-550m/12km	850/1310	-	4433-x
MM/SM	220-550m/34km	850/1310	-	4440-x
MM/SM	220-550m/80km	850/1550	-	4437-x
SM/SM	12km/12km	1310/1310	-	4434-x
SM/SM	12km/34km	1310/1310	-	4441-x
FlexPoint OC3FF				
MM/SM	5km/30km	1310/1310	4450-x	4451-x
MM/SM	5km/60km	1310/1310	4452-x	4453-x
MM/SM	5km/120km	1310/1550	-	4458-x
SM/SM	30km/120km	1310/1550	-	4459-x
MM/SM-SF	5km/20km	1310/1310-1550	-	4650-x*
MM/SM-SF	5km/20km	1310/1550-1310	-	4651-x*
FlexPoint OC12FF				
MM/SM	550m/12km	1310/1310	-	4461-x
MM/SM	550m/34km	1310/1310	-	4463-x
MM/SM	550m/80km	1310/1550	-	4469-x

* Single-fiber converters must be used in pairs.

POWER OPTIONS (-x)
-0 No power adapter included,
-1 110-120 VAC/60 Hz (US plug),
-2 100-240 VAC/50-60 Hz (IEC plug, no power cord)

Contact Omnitron for other fiber options and wide temperature (-40 to 60°C) models.

Related Applications

Fiber-to-Fiber Applications.....Page 39
T1 Demarcation Extension Application.....Page 53
RS-232 Over Fiber Application.....Page 53

FlexPoint T1/E1

T1/E1 Copper to Fiber Media Converter

The T1/E1 extends twisted pair and coax distances over fiber. It supports ANSI, AT&T, ITU and ETSI standards, and AMI, B8ZS and HDB3 line codes. The T1/E1 features a crossover switch, fiber loopback and relay contacts for connection to alarm equipment.

Fiber	Distance	Wavelength (nm)	Connector Type	
			ST	SC
FlexPoint T1/E1 Copper RJ-45/RJ-48 to Fiber				
MM	5km	1310	4472-x	4470-x
SM	30km	1310	4473-x	4471-x
SM	60km	1310	-	4474-x
FlexPoint T1/E1 Copper Coax + RJ-45/RJ-48 to Fiber				
MM	5km	1310	4492-x	4490-x
SM	30km	1310	4493-x	4491-x
SM	60km	1310	-	4494-x

See power supply ordering information below.

FlexPoint 232

RS-232 to Fiber Media Converter

The FlexPoint 232 is a serial RS-232 to fiber converter with support for five control signals that enables flexible RS-232 network connectivity for a variety of serial applications.

Fiber	Distance	Wavelength (nm)	Connector Type		
			ST	SC	LC
MM	2.5km	850	4481-x	4480-x	-
MM	5km	1310	4483-x	4482-x	4489-1x
MM/SF	5km	1310/1550	-	4482-2x*	-
MM/SF	5km	1550/1310	-	4482-3x*	-
SM	30km	1310	4485-x	4484-x	4489-2x
SM	60km	1310	-	4486-x	

* Single-fiber converters must be used in pairs.

POWER OPTIONS (-x)
-0 No power adapter included,
-1 110-120 VAC/60 Hz (US plug),
-2 100-240 VAC/50-60 Hz (IEC plug, no power cord)

Contact Omnitron for other fiber options and wide temperature (-40 to 60°C) models.

miConverter Miniature Media Converters

The miniature miConverter copper UTP to fiber media converters provide cost-effective fiber connectivity to a desktop computer or a portable laptop. A special USB power adapter cable allows the miConverter to be powered by a computer USB port. Models with external AC power supplies in US and International versions are also available.

miConverter media converters are a cost-effective solution for connecting workstations in fiber-to-the-desktop applications, or military deployments where fiber connectivity to laptops is required in the field. They can also be deployed in remote edge locations where power outlets are at a premium, such as portable, temporary facilities.

miConverter 18-Module Power Chassis

The miConverter 18-Module Power Chassis is a cost-effective mounting and powering solution for miConverter miniature media converters. This compact, rack-mount chassis consolidates 18 individual media converters into a high-density form factor. It can be deployed in applications where fiber optic links are distributed from UTP switch equipment.

The chassis powers miConverter media converter modules with barrel-style DC connectors, and eliminates the need for individual power supplies. It is available with a single universal AC, 24VDC or 48VDC internal power supply, and supports a wide temperature range of -40 to 60°C.

The chassis is less than 1.5U high, and can be mounted in a standard 19" equipment rack, or it can be mounted in a 23" rack using optional 23" rack-mount brackets.

Model Number	Description
1020-1	miConverter 18-Module AC Powered Chassis
1025-1	miConverter 18-Module 48VDC Powered Chassis
1026-1	miConverter 18-Module 24VDC Powered Chassis
1092-0	Module Mounting Bracket (Secures Module in Chassis)
8092-0	23" rack mount brackets for 18-Module chassis

Chassis does not support miConverter S-Series media converters or -6U and -9 miConverter models. All chassis above ship with 19" rack mount brackets. Order 23" rack mount brackets separately.

For wide operating temperature (-40 to 60°C) add a "W" to the end of the model number.

Contact Omnitron for extended operating temperature (-40 to 75°C) models.

miConverter GX/T and *miConverter* Gx

Copper to Fiber Gigabit Media Converters

The miConverter GX/T converts 10/100/1000BASE-T copper to 1000BASE-X fiber and supports jumbo frames up to 10,240 bytes. It features fixed fiber connectors or SFP transceivers for standard and CWDM wavelengths. Both the fiber and RJ-45 ports support auto-negotiation, Pause and link fault modes that can be configured with DIP-switches.

The miConverter Gx converts 1000BASE-T copper to 1000BASE-X fixed fiber or SFP transceiver. It features an RJ-45 port that auto-detects the duplex and Pause modes which can be configured with DIP-switches, and features advanced fault detection modes for link failure notification.

- Weighs less than 5 ounces
- Powered from an AC/DC power adapter or a USB port
- Auto or manual RJ-45 configuration
- Advanced fault detection modes
- The GX supports wide (-40 to 60° C) temperature
- The GX/T supports wide (-40 to 60° C), extended (-40 to 75° C) and industrial*** (-40 to 85° C) temperatures

Fiber	Distance	Wavelength (nm)	Connector Type				
			miConverter Gx			*miConverter* GX/T	
			ST	SC	LC	ST	SC
SFP	-	-	1219-0-x**			1239-0-x**	
MM	220/550m	850	1200-0-x	1202-0-x	1206-0-x	1220-0-x	1222-0-x
SM	12km	1310	1201-1-x	1203-1-x	1207-0-x	1221-1-x	1223-1-x
SM	34km	1310	-	1203-2-x	-	-	1223-2-x
SM	80km	1550	-	1203-3-x	-	-	1223-3-x
SM	110km	1550	-	1203-4-x	-	-	1223-4-x
SM	140km	1550	-	1203-5-x	-	-	1223-5-x
MM/SF	550m	1310/1550	-	1210-0-x*	-	-	1230-0-x*
MM/SF	550m	1550/1310	-	1211-0-x*	-	-	1231-0-x*
SM/SF	20km	1310/1550	-	1210-1-x*	-	-	1230-1-x*
SM/SF	20km	1550/1310	-	1211-1-x*	-	-	1231-1-x*
SM/SF	40km	1310/1550	-	1210-2-x*	-	-	1230-2-x*
SM/SF	40km	1550/1310	-	1211-2-x*	-	-	1231-2-x*

* Single-fiber converters must be used in pairs.
** Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order a power supply, add a suffix to the model number (replace "x") as follows:

-1 External US AC Power Adapter
-2 External Universal Power Adapter (requires AC power cord)
-3 External European Power Adapter
-4 External UK AC Power Adapter
-5 External Australian AC Power Adapter
-6 USB Power Adapter Cable
-6U Type A to micro USB Adapter Cable (available only with Gx)
-8 External Japan/US AC Power Adapter
-9 2-pin 5-12VDC Terminal Connector (Gx has a voltage range of 5-15VDC)

For GX and GX/T wide temperature models (-40 to 60°C), add a "W" to the end of the model number.
For GX/T extended temperature models (-40 to 75°C), add a "Z" to the end of the model number.
For GX/T industrial temperature models (-40 to 85°C), add a "Y" to the end of the model number.
***GX/T industrial temperature models only available with 2-pin 5-12VDC terminal connector (-9).

miConverter 10/100 and 10/100 Plus

10/100 Copper to Fast Ethernet Fiber Media Converters

The miniature miConverter 10/100 is a rate-switching copper to fiber media converter. The miConverter 10/100 provides plug-and-play set up with an RJ-45 port that auto-detects the speed, duplex mode and crossover function of the connected device.

In addition to the features listed above, the miConverter 10/100 Plus features DIP-switches for manual RJ-45 port configuration and advanced link fault detection modes.

- Weighs less than 5 ounces
- Supports 10BASE-T, 100BASE-TX and 100BASE-FX
- Multimode (MM), single-mode (SM) and single-fiber (SF)
- Powered from an AC/DC power adapter or a USB port
- Supports wide temperature (-40 to 60°C)
- The miConverter 10/100 Plus features manual RJ-45 configuration and advanced fault detection modes

Fiber	Distance	Wavelength (nm)	Connector Type			
			miConverter 10/100		*miConverter* 10/100 Plus	
			ST	SC	ST	SC
MM	5km	1310	1100-0-x	1102-0-x	1120-0-x	1122-0-x
SM	30km	1310	1101-1-x	1103-1-x	1121-1-x	1123-1-x
SM	60km	1310	1101-2-x	1103-2-x	1121-2-x	1123-2-x
SM	120km	1550	-	1103-3-x	-	1123-3-x
MM/SF	5km	1310/1550	-	1110-0-x*	-	1130-0-x*
MM/SF	5km	1550/1310	-	1111-0-x*	-	1131-0-x*
SM/SF	20km	1310/1550	-	1110-1-x*	-	1130-1-x*
SM/SF	20km	1550/1310	-	1111-1-x*	-	1131-1-x*
SM/SF	40km	1310/1550	-	1110-2-x*	-	1130-2-x*
SM/SF	40km	1550/1310	-	1111-2-x*	-	1131-2-x*
SM/SF	60km	1310/1550	-	1110-3-x*	-	1130-3-x*
SM/SF	60km	1550/1310	-	1111-3-x*	-	1131-3-x*

* Single-fiber converters must be used in pairs.

To order a power supply, add a suffix to the model number (replace "x") as follows:
-1 External US AC Power Adapter
-2 External Universal Power Adapter (requires AC power cord)
-3 External European Power Adapter
-4 External UK AC Power Adapter
-5 External Australian AC Power Adapter
-6 USB Power Adapter Cable
-8 External Japan/US AC Power Adapter

Wall mount brackets model number 1092-0.

Example: 1100-0-1 = miConverter 10/100 MM/DF/5km/1310/ST with External US AC Power Adapter.

For wide temperature (-40 to 60°C), add a "W" to the end of the model number.
Contact Omnitron for other fiber options and extended temperature (-40 to 75°C) models.

miConverter S-Series

S/FXT Fast Ethernet Fiber Media Converters

S/GXT Gigabit Ethernet Fiber Media Converters

The miConverter S/GXT Gigabit fiber to 10/100/1000BASE-T and the S/FXT Fast Ethernet fiber to 10/100/1000BASE-T are ultra-compact media converters that weigh less than 2.5 oz. (72 grams).

The S-Series is available with fixed fiber transceivers (SC or ST connectors), and supports multi-mode, single-mode and single-fiber options. Small Form Pluggable (SFP) transceivers are also supported to enable adaptability to different fiber types, speeds and wavelengths.

- Ultra compact and cost effective
- Powered from an AC/DC power adapter or a USB port
- Fiber port supports 1000BASE-X or 100BASE-X
- SFP transceivers or fixed fiber connectors (SC, ST)
- Supports Jumbo Ethernet Frames up to 10,240 bytes
- Convenient travel case that stores the media converter, power adapter, USB cable and other accessories.
- Supports wide temperature (-40 to 65°C)

Fiber	Distance	Wavelength (nm)	Connector Type		
			ST	ST Metal	SC
***miConverter* S/FXT Fast Ethernet Media Converter**					
SFP	-	-	1619-0-x**		
MM	5km	1310	1600-0-x	1600M-0-x	1602-0-x
SM	30km	1310	1601-1-x	1601M-1-x	1603-1-x
SM/SF	20km	1310/1550	-	-	1610-1-x*
SM/SF	20km	1550 /1310	-	-	1611-1-x*
***miConverter* S/GXT Gigabit Ethernet Media Converter**					
SFP	-	-	1639-0-x**		
MM	220/550	850	1620-0-x	1620M-0-x	1622-0-x
SM	12km	1310	1621-1-x	1621M-1-x	1623-1-x
SM	34km	1310	-	-	1623-2-x
SM/SF	20km	1310/1550	-	-	1630-1-x*
SM/SF	20km	1550 /1310	-	-	1631-1-x*

* Single-fiber converters must be used in pairs.
** Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order a power supply, add a suffix to the model number (replace "x") as follows:
-1 Includes US AC/DC Power Supply and USB power cable
-1T Includes US AC/DC power adapter, USB power cable and travel case
-3 Includes European AC/DC adapter and USB power cable
-4 Includes UK AC/DC adapter and USB power cable
-5 Includes Australian AC/DC adapter and USB power cable
-6 NO AC/DC adapter. Includes USB power cable
-6T NO AC/DC power adapter. Includes USB power cable and travel case
-8 Includes Japan AC/DC adapter and USB power cable
-8T Includes Japan AC/DC power adapter, USB power cable and travel case

For wide temperature models (-40 to 65°C), add a "W" to the end of the model number.
Contact Omnitron for other fiber options.
Example: 1623-2-4W = SM/DF/34km with UK AC/DC adapter and USB power cable with wide temperature range.

miConverter 10/100 and GX/T PoE/PD

10/100 and 10/100/1000 PoE Powered Media Converters

The miniature miConverter 10/100 PoE/D and GX/T PoE/D are rate-switching copper to fiber media converters that can be powered with Power over Ethernet (PoE) when connected to PoE switches and midspans. They can also be powered with DC power or AC power with an external power adapter.

The 10/100 PoE/D and GX/T PoE/D feature fixed fiber connectors or Small Form Pluggable (SFP) transceivers. The GX/T PoE/D supports 100Mbps and Gigabit SFPs.

The RJ-45 port can auto-negotiate by detecting the speed and duplex-mode of the connected device. Auto-crossover enables connection to workstations or hub/switches without requiring a crossover cable.

- The 10/100 PoE/PD supports 10BASE-T, 100BASE-TX, 100BASE-X and IEEE 802.3 specifications
- The 10/100 PoE/PD supports frames sizes up to 2,048 bytes
- The GX/T PoE/PD supports 10BASE-T, 100BASE-TX, 1000BASE-T, 100BASE-X, 1000BASE-X and IEEE 802.3 specifications
- The GX/T PoE/PD supports jumbo frames up to 10,240 bytes
- The GX/T PoE/D supports 100Mbps and Gigabit SFP transceivers
- Powered by IEEE 802.3af with redundant power options:
  - DC Power 8-60VDC (2-Pin Terminal) or
  - US, Universal and Country/Region specific AC power adapter (Barrel Connector)
- Available with or without integrated mounting brackets
- The 10/100 PoE/D supports extended (-40º to 75ºC) and industrial (-40º to 85ºC) temperature ranges (industrial with DC terminal models only)

Fiber	Distance	Wavelength (nm)	Connector Type		
			ST	SC	LC
***miConverter* 10/100 PoE/PD Ethernet Media Converter**					
SFP	-	-	1119D-0-xx**		
MM	5km	1310	1100D-0-xx	1102D-0-xx	1106D-0-xx
SM	30km	1310	1101D-1-xx	1103D-1-xx	1107D-1-xx
SM	60km	1310	1101D-2-xx	1103D-2-xx	-
SM	120km	1550	-	1103D-3-xx	-
MM/SF	5km	1310/1550	-	1110D-0-xx*	-
MM/SF	5km	1550/1310	-	1111D-0-xx*	-
SM/SF	20km	1310/1550	-	1110D-1-xx*	-
SM/SF	20km	1550 /1310	-	1111D-1-xx*	-
SM/SF	40km	1310/1550	-	1110D-2-xx*	-
SM/SF	40km	1550/1310	-	1111D-2-xx*	-
SM/SF	60km	1310/1550	-	1110D-3-xx*	-
SM/SF	60km	1550/1310	-	1111D-3-xx*	-
***miConverter* GX/T PoE/PD Gigabit Ethernet Media Converter**					
SFP	-	-	1239D-0-xx**		
MM	220/550m	850	1220D-0-xx	1222D-0-xx	1226D-0-xx
SM	12km	1310	1221D-1-xx	1223D-1-xx	1227D-1-xx
SM	34km	1310	-	1223D-2-xx	-
SM	80km	1550	-	1223D-3-xx	-
SM	110km	1550	-	1223D-4-xx	-
SM	140km	1550	-	1223D-5-xx	-
MM/SF	550m	1310/1550	-	1230D-0-xx*	-
MM/SF	550m	1550/1310	-	1231D-0-xx*	-
SM/SF	20km	1310/1550	-	1230D-1-xx*	-
SM/SF	20km	1550 /1310	-	1231D-1-xx*	-
SM/SF	40km	1310/1550	-	1230D-2-xx*	-
SM/SF	40km	1550/1310	-	1231D-2-xx*	-

* Single-fiber converters must be used in pairs.
** Order SFPs separately. See SFP ordering information on pages 66 and 67.

For no mounting brackets, add a "0" to the base model number above: 1239D-0-0x
For integrated mounting brackets, add a "1" to the base model number above: 1239D-0-1x

To order a power supply, add a suffix to the model number (replace the second "x") as follows:
-0 PoE/PD Power, No Power Adapter
-1 PoE/PD Power and External US AC Power Adapter
-2 PoE/PD Power and External Universal Power Adapter
-3 PoE/PD Power and External European Power Adapter
-4 PoE/PD Power and External UK AC Power Adapter
-5 PoE/PD Power and External Australian AC Power Adapter
-8 PoE/PD Power and External Japan/US AC Power Adapter
-9 PoE/PD Power and 2-pin 5-12VDC Terminal Connector

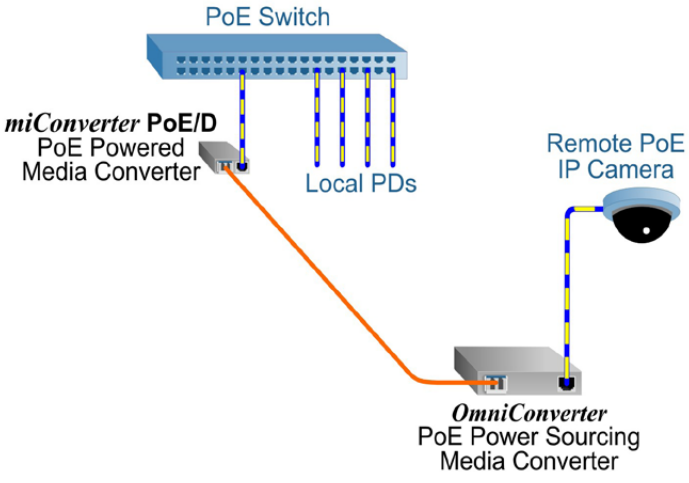
For wide temperature models (-40 to 60°C), add a "W" to the end of the model number: 1239D-0-11W
For extended temperature models (-40 to 75°C), add a "Z" to the end of the model number.

Fiber Distance Extension with PoE Power

PoE switches are used to provide data and power via copper UTP cabling to Powered Devices (PDs) such as VoIP phones, Wi-Fi Access Points and IP cameras. When the distance to the PD exceeds the 100 meter distance limitation of UTP cable, fiber can be deployed to extend the distance to PDs in remote locations.

The application example at right shows how to deploy a miConverter PoE/D (10/100 or GX/T) to enable plug-and-play fiber connectivity from PoE switches.

The miConverter PoE/D is powered by a UTP patch cable and converts the copper to fiber to connect to a remote PoE IP camera. At the remote end of the fiber run, an OmniConverter PoE power-sourcing media converter converts the fiber back to copper and injects PoE to power the IP camera. The OmniConverter is powered by AC or DC power and injects up to 60W PoE.



Fiber to the Desk and Field-Deployed Laptop Application

In this application diagram, miConverter media converters enable cost-effective fiber-to-the-desktop connectivity that is reliable and easy to install.

miConverter media converters overcome the challenges of installing a fiber optic Network Interface Card (NIC) in each workstation, and cost less than NIC cards because they do not require time-consuming installations (including software drivers). Unlike NIC cards, media converters function independently of Operating Systems, so they do not compete for processing resources, and are compatible with all PCs and workstations.

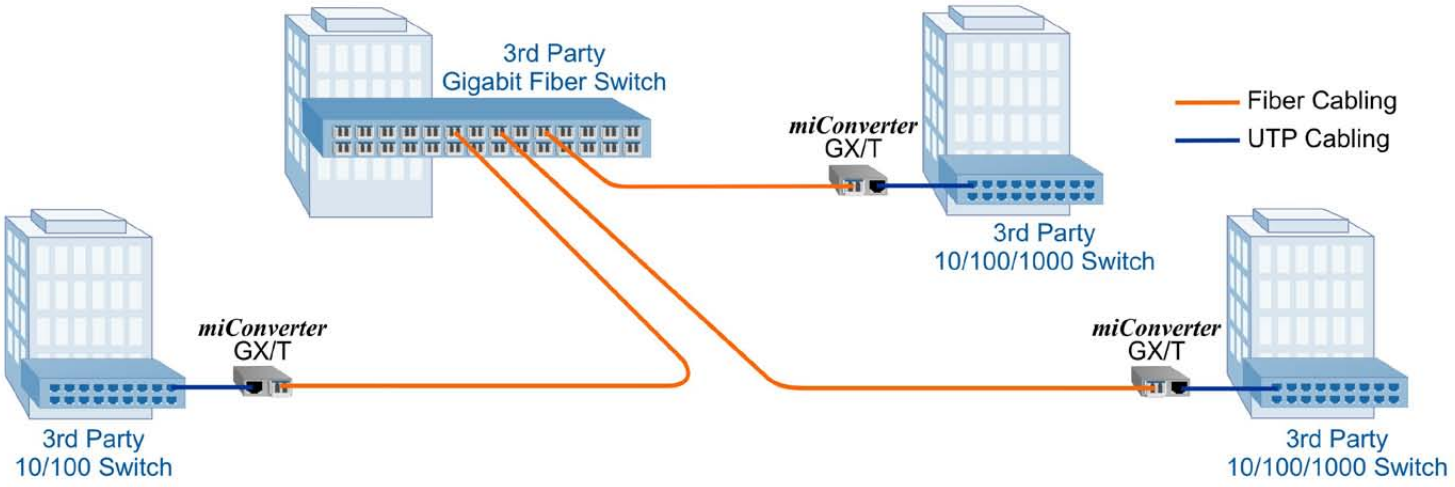
In the upper left of this diagram, UTP from a third-party copper switch is converted to fiber with miConverter media converters installed in a miConverter 18-Module Chassis.

Fiber is distributed to a PC or Workstation. A miConverter media converter converts the fiber to UTP copper that connects to the PC, and draws power from the PC's USB port (with a USB power cable represented by the black line), and can be attached to the PC with Velcro.

Fiber is also distributed to a field-deployed laptop. A miConverter S-Series media converter provides fiber connectivity to the laptop and draws power from the laptop's USB port, and can be attached to the laptop with Velcro. The miConverter S-Series is an excellent solution for fiber-to-the-laptop military field operations, a portable building with limited local power availability, or portable network testing equipment.

miConverter media converters support 10/100 to 100Mbps fiber, and 10/100/1000 to Gigabit fiber.

Campus Network Application



In this application diagram, miConverter media converters enable campus network fiber connectivity to existing copper network switches.

Fiber is distributed from a third-party Gigabit fiber switch. Compact and cost-effective miConverter GX/T media converters are deployed at remote buildings to provide connectivity to third-party copper switches.

At the campus buildings on the right side of the diagram, the miConverter GX/T provides copper-to-fiber conversion and connectivity to 10/100/1000 copper switches.

At the campus building on the left side of the diagram, the miConverter GX/T provides copper-to-fiber conversion and data bridging for connectivity to a 10/100 copper switch.

Note that the media converters provide transparent network connectivity, so the switches in the network can be managed via SNMP management software.

OmniConverter PoE/PoE+ Media Converters

OmniConverter multi-port media converters with Power-over-Ethernet (PoE) enable distance extension over fiber to PoE Powered Devices (PDs). Classified as Power Sourcing Equipment (PSE), OmniConverter PoE media converters provide power to up to four PoE PDs using standard UTP cables that carry the Ethernet data.

OmniConverter media converters support IEEE 802.3af PoE (15.4W), IEEE 802.3at PoE+ (34.2W) and HPoE (60W).

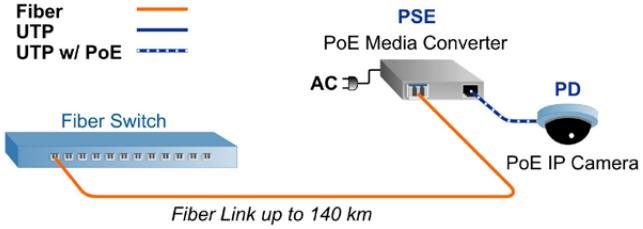
Models with two fiber ports support redundant fiber uplinks for critical applications that require protection and sub 50ms restoration in the event of a fiber failure. The second fiber port may also be used to cascade multiple media converters (daisy chain), or it may be used as another switch port. Gigabit models can support both Gigabit and Fast Ethernet SFP transceivers. The PoE RJ-45 ports support 10/100 or 10/100/1000 data rates.

OmniConverter media converters are available with DC power via terminal connectors or external 100 to 240V AC power adapters.

- Power over Ethernet injector/source
- Supports PoE, PoE+ and 60W HPoE
- Multiple port configurations available
- Supports fixed-fiber connectors or SFP transceivers
- AC or DC power options
- Integrated wall mount brackets
- Temperature hardened for outdoor deployments
- Lifetime Warranty and free 24/7 Technical Support
- Made in the USA

How PoE Injector Media Converters Work

OmniConverter media converters are installed at the end of a fiber run near a convenient AC or DC power source to provide media conversion and function as PoE Power Sourcing Equipment (PSE). It converts the fiber to copper, and injects PoE power (DC power) from the RJ-45 port to the UTP cable. A PoE Powered Device (PD) is connected to the other end of the UTP cable.



OmniConverter GPoE+/SX models are Gigabit media converters and switches that provide PoE+ and support four RJ-45 ports and up to two fiber ports. The GPoE+/SX models provide several advanced features that can be configured with DIP-switches.

OmniConverter /S and /SL models feature one or two RJ-45 ports, one or two fiber ports, and provide advanced features that can be configured with DIP-switches.

FPoE/S and FPoE+/S are Fast Ethernet media converters that provide PoE.

FPoE/SL are cost-effective Fast Ethernet media converters that provide PoE.

GPoE/S, GPoE+/S and GHPoE/S are Gigabit media converters that provide PoE, PoE+ or 60W PoE.

OmniConverter /SE models support one or two RJ-45 ports, and one fiber port. The /SE models provide a low-cost alternative for applications that do not require advanced features or two fiber ports. There are no DIP-switches for simple, plug-and-play installation.

FPoE/SE and FPoE+/SE are cost-effective Fast Ethernet media that provide PoE or PoE+.

GPoE/SE and GPoE+/SE are cost-effective Gigabit Ethernet media converters that provide PoE or PoE+.

OmniConverter 1U Rack-Mount Shelf

19” Rack-Mount for *OmniConverter* Media Converters

The OmniConverter 1U 19" Rack-Mount Shelf accommodates three OmniConverter media converters, and up to four GPoE/SE media converters. The shelf provides multiple grounding points, and convenient locations for cable ties.

Model #	Description
8260-0	1U Rack-Mount Shelf

OmniConverter Media Converters Comparison Table

Fiber Data Rate	Fast Ethernet					Gigabit Ethernet					
PoE	PoE 15.4W			PoE+ 34.2W		PoE 15.4W		PoE+ 34.2W			HPoE 60W
Product Line	FPoE/S	FPoE/SL	FPoE/SE	FPoE+/S	FPoE+/SE	GPoE/S	GPoE/SE	GPoE+/S	GPoE+/SE	GPoE+/SX	GHPoE/S
Model # Range	9300 - 9319	9340 - 9359	9360 - 9379	9320 - 9339	9380 - 9399	9400 - 9419	9460 - 9479	9420 - 9439	9480 - 9499	9440 - 9459	9500 - 9519
Low Cost		✓	✓		✓		✓		✓		
Ports and Data Rates											
Maximum Ports	4	4	3	4	3	4	3	4	3	6	4
Maximum Fiber Ports[1]	2	2	1	2	1	2	1	2	1	2	2
Maximum RJ-45 Ports	2	2	2	2	2	2	2	2	2	4	2
RJ-45 Data Rates	10/100	10/100	10/100/1000	10/100	10/100/1000	10/100/1000	10/100/1000	10/100/1000	10/100/1000	10/100/1000	10/100/1000
Fiber Data Rates	100	100	100	100	100	100 or 1000	1000	100 or 1000	1000	100 or 1000	100 or 1000
Form Factor											
W" x L" x H'	4.5" x 6" x 1"	4.5" x 6" x 1"	3.8"x 4.8"x 1"	4.5" x 6" x 1"	3.8"x 4.8"x 1"	4.5" x 6" x 1"	3.8"x 4.8"x 1"	4.5" x 6" x 1"	3.8"x 4.8"x 1"	5"x 6"x 1.375"	4.5" x 6" x 1"
Features											
Frame size	10K	2K	10K	10K	10K	10K	10K	10K	10K	10K	10K
PSE Mode	Alt A / Alt B	Alt A / Alt B	Alt B	Alt A / Alt B	Alt B	Alt A / Alt B	Alt B	Alt A / Alt B	Alt B	Alt B	Alt A / Alt B
Auto Polarity X-over[2]	✓			✓		✓		✓			
Link Fault Modes	✓	✓		✓		✓		✓		✓	✓
Fiber LoS reset PoE	✓	✓		✓		✓		✓		✓	✓
MUX Mode										✓	
Directed Switch Mode										✓	
Dual Device Converter										✓	
External Power Source											
DC Terminal	3- Pin	2- Pin	2-Pin and 3- Pin	3- Pin	2-Pin and 3- Pin	3- Pin	2-Pin and 3- Pin	3- Pin	2-Pin and 3- Pin	3- Pin	3- Pin
AC Barrel Connector	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Temperature Hardened											
Wide -40 to 60°C			✓		✓		✓		✓		
Industrial -40 to 75°C	✓	✓		✓		✓		✓		✓	✓

[1] Models with two fiber ports support redundant fiber uplinks and daisy chains.

[2] Auto Polarity X-over provides PoE power to legacy Cisco (Non-IEEE Standard) devices.

OmniConverter GPoE+/SX

6-Port Gigabit Power Sourcing Media Converters

The OmniConverter GPoE+/SX is a multi-port media converter and switch that converts 10/100/1000BASE-T copper to 1000BASE-X or 100BASE-X fiber, and provides PoE and PoE+ per RJ-45 port.

- 10/100/1000BASE-T copper to 100/1000BASE-X media converter
- Supports frame sizes up to 10,240 bytes
- IEEE 802.3at PoE+ fully powered on all four RJ-45 copper ports
- Available with one or two SFP fiber ports
- Supports 1000BASE-X fixed-fiber and 1000BASE-X or 100BASE-X SFP transceivers
- Dual PoE Device Mode and MUX Mode for traffic routing
- Directed Switch Mode prevents flooding of video traffic
- Configurable PoE power reset
- Supports wide temperature (-40 to 60°C) and industrial temperature (-40 to 75°C) ranges

Fiber Type	Distance	Wavelenght (nm)	Connector Type			
			ST	SC	LC	SFP
MM/DF	220/550m	850	9440-0-14	9442-0-14	9446-0-14	-
MM/DF (x2)	220/550m	850	-	-	9446-0-24	-
MM/DF	2km	1310	-	9442-6-14	-	-
SM/DF	12km	1310	9441-1-14	9443-1-14	9447-1-14	-
SM/DF (x2)	12km	1310	-	-	9447-1-24	-
SM/DF	34km	1310	-	9443-2-14	-	-
SM/DF	80km	1550	-	9443-3-14	-	-
SM/DF	110km	1550	-	9443-4-14	-	-
SM/DF	140km	1550	-	9443-5-14	-	-
MM/SF	220/550m	1310/1550	-	9450-0-14*	-	-
MM/SF	220/550m	1550/1310	-	9451-0-14*	-	-
SM/SF	20km	1310/1550	-	9450-1-14*	-	-
SM/SF	20km	1550/1310	-	9451-1-14*	-	-
SM/SF	40km	1310/1550	-	9450-2-14*	-	-
SM/SF	40km	1550/1310	-	9451-2-14*	-	-
SFP (x1)	-	-	-	-	-	9459-0-14**
SFP (x2)	-	-	-	-	-	9459-0-24**

*Single-fiber converters must be used in pairs.
** Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order an external power supply, add a number from below to the model number – 9xxx-x-x**X**

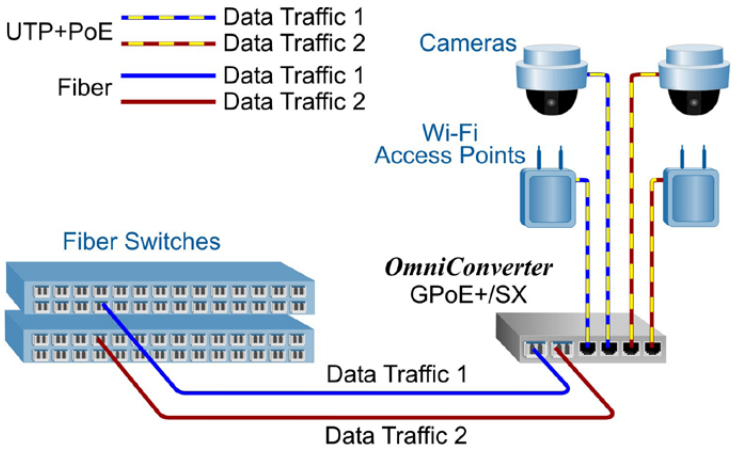
1 - External Power Supply, 100-240VAC, with US Power Cord
2 - External Power Supply, 100-240VAC, with no Power Cord
8 - External Power Supply, 100-240VAC (JET/PSE) with JPN Power Cord
9 - No external Power Supply, direct 48VDC input, with 3-Pin Terminal Connector

For industrial temperature (-40 to 75°C) add a "Z" to the end of the model number - 9xxx-x-xx**Z**.
Contact Omnitron for other fiber options.

GPoE+/SX Dual PoE Device Mode

For deployments requiring two fiber runs to the same location and independent connectivity to the Powered Devices, the OmniConverter GPoE+/SX can be configured for Dual PoE Device Mode.

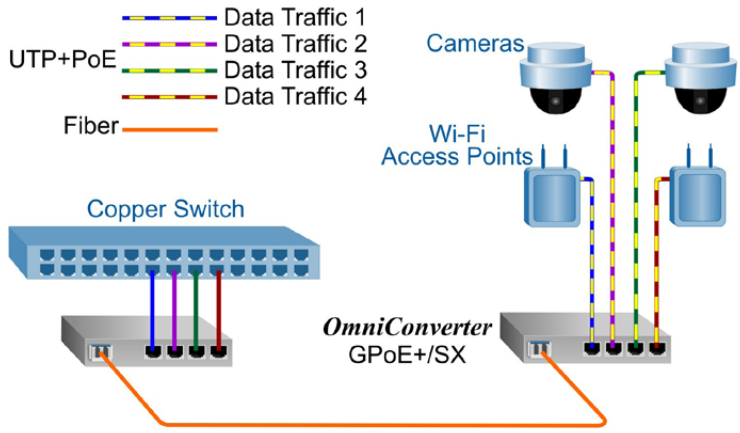
The GPoE+/SX provides separate and independent data traffic paths between the two fiber links and four RJ-45 ports. The blue lines represents one independent data traffic path and the red lines represent the other independent data traffic path.



GPoE+/SX MUX Mode

Configuring the GPoE+/SX PoE media converters in MUX Mode provides point-to-point connectivity of Powered Devices to a head end switch over a fiber. MUX Mode tunnels the data traffic between two GPoE+/SX converters, so data traffic from the RJ-45 ports on one GPoE+/SX is routed to the matching RJ-45 ports on the other GPoE+/SX.

This is illustrated by the colored lines that correspond the tunneled data traffic on the GPoE+/SX ports on the left with the ports on the GPoE+/SX on the right.



OmniConverter GPoE/S, GPoE+/S and GHPoE/S

Gigabit Power Sourcing Media Converters

- 100/1000BASE-X fiber to 10/100/1000BASE-T RJ-45 conversion
- GPoE/S supports IEEE 802.3af PoE
- GPoE+/S supports IEEE 802.3af PoE and IEEE 802.3at PoE+
- GHPoE/S supports 60W PoE
- Models available with single or dual SFP transceiver ports
- Supports 100Mbps and Gigabit SFPs
- Redundant protected fiber link option (using dual SFP models)
- Compatible with legacy pre-IEEE standard powered devices
- Configurable PoE power reset
- Configurable Link Fault Propagation
- Supports industrial temperature (-40 to 75°C) range

Fiber	Distance	Wave-length (nm)	Connector Type						
			GPoE/S		GPoE+/S		GHPoE/S		
			ST	SC	ST	SC	ST	SC	LC
MM	220/550m	850	9400-0	9402-0	9420-0	9422-0	9500-0	9502-0	9506-0
MM x2	220/550m	850	-	-	-	-	-	-	9506D-0
SM	12km	1310	9401-1	9403-1	9421-1	9423-1	9501-1	9503-1	9507-1
SM x2	12km	1310	-	-	-	-	-	-	9507D-1
SM	34km	1310	-	9403-2	-	9423-2	9501-2	9503-2	
SM	80km	1550	-	9403-3	-	9423-3	-	9503-3	
SM	110km	1550	-	9403-4	-	9423-4	-	9503-4	
SM	140km	1550	-	9403-5	-	9423-5	-	9503-5	
MM/SF	550m	13/15	-	9410-0*	-	9430-0*	-	9510-0*	
MM/SF	550m	15/13	-	9411-0*	-	9431-0*	-	9511-0*	
SM/SF	20km	13/15	-	9410-1*	-	9430-1*	-	9510-1*	
SM/SF	20km	15/13	-	9411-1*	-	9431-1*	-	9511-1*	
SM/SF	40km	13/15	-	9410-2*	-	9430-2*	-	9510-2*	
SM/SF	40km	15/13	-	9411-2*	-	9431-2*	-	9511-2*	
One 100/1000 SFP			9419-0**		9439-0**		9519-0**		
Two 100/1000 SFPs			9419-1**		9439-1**		9519-1**		

*Single-fiber converters must be used in pairs.
** Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order number of RJ-45 ports, add a number from below to the model number – 9xxx-x-**X**x
1 - One (1) RJ-45 port
2 - Two (2) RJ-45 ports

To order an external power supply, add a number from below to the model number – 9xxx-x-x**X**
1 - External Power Supply, 100-240VAC, with US Power Cord
2 - External Power Supply, 100-240VAC, with no Power Cord
8 - External Power Supply, 100-240VAC (JET/PSE) with JPN Power Cord
9 - No external Power Supply, direct 48VDC input, with 3-Pin Terminal Connector

For industrial temperature (-40 to 75°C) add a "Z" to the end of the model number: 9xxx-x-xx**Z**.
Contact Omnitron for other fiber options.

OmniConverter FPoE/SL, FPoE/S and FPoE+/S

100Mbps Power Sourcing Media Converters

- 100BASE-X fiber to 10/100BASE-T RJ-45 conversion
- FPoE/SL supports IEEE 802.3af PoE on one or two RJ-45 ports, and up to 2,000 byte frames
- FPoE/S supports IEEE 802.3af PoE on one or two RJ-45 ports, and up to 10,240 byte frames
- FPoE+/S supports IEEE 802.3at PoE+ on one or two RJ-45 ports, and up to 10,240 byte frames
- Models available with single or dual SFP transceiver ports
- Redundant protected fiber link option (using dual SFP models)
- Compatible with legacy pre-IEEE standard powered devices
- Configurable PoE power reset
- Configurable Link Fault Propagation
- Supports industrial temperature (-40 to 75°C) range

Fiber	Dist.	Wave-length (nm)	Connector Type					
			FPoE/SL		FPoE/S		FPoE+/S	
			ST	SC	ST	SC	ST	SC
MM	5km	1310	9340-0	9342-0	9300-0	9302-0	9320-0	9322-0
SM	30km	1310	9341-1	9343-1	9301-1	9303-1	9321-1	9323-1
SM	60km	1310	9341-2	9343-2	9301-2	9303-2	9321-2	9323-2
SM	120km	1550	-	9343-3	-	9303-3	-	9323-3
MM/SF	5km	1310/1550		9350-0*	-	9310-0*	-	9330-0*
MM/SF	5km	1550/1310	-	9351-0*	-	9311-0*	-	9331-0*
SM/SF	20km	1310/1550	-	9350-1*	-	9310-1*	-	9330-1*
SM/SF	20km	1550/1310	-	9351-1*	-	9311-1*	-	9331-1*
SM/SF	40km	1310/1550	-	9350-2*	-	9310-2*	-	9330-2*
SM/SF	40km	1550/1310	-	9351-2*	-	9311-2*	-	9331-2*
One100Mbps SFP			9359-0**		9319-0**		9339-0**	
Two 100Mbps SFPs			9359-1**		9319-1**		9339-1**	

*Single-fiber converters must be used in pairs.
** Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order number of RJ-45 ports, add a number from below to the model number – 9xxx-x-**X**x
1 - One (1) RJ-45 port
2 - Two (2) RJ-45 ports

To order an external power supply, add a number from below to the model number – 9xxx-x-x**X**
1 - External Power Supply, 100-240VAC, with US Power Cord
2 - External Power Supply, 100-240VAC, with no Power Cord
8 - External Power Supply, 100-240VAC (JET/PSE) with JPN Power Cord
9 - No external Power Supply, direct 48VDC input, with 3-Pin Terminal Connector

For extended temperature (-40 to 75°C) add a "Z" to the end of the model number - 9xxx-x-xx**Z**.
Contact Omnitron for other fiber options.

OmniConverter GPoE/SE and GPoE+/SE

Cost-Effective Gigabit Power Sourcing Media Converters

- 1000BASE-X fiber to 10/100/1000BASE-T RJ-45
- GPoE+/SE supports IEEE 802.3af PoE and IEEE 802.3at PoE+
- GPoE/SE supports IEEE 802.3af PoE
- Single or dual RJ-45 ports
- Supports wide temperature (-40 to 60°C)

Fiber	Distance	Wave-length (nm)	Connector Type			
			GPoE/SE (PoE)		GPoE+/SE (PoE+)	
			ST	SC	ST	SC
MM	220/550m	850	9460-0	9462-0	9480-0	9482-0
SM	12km	1310	9461-1	9463-1	9481-1	9483-1
SM	34km	1310	-	9463-2	-	9483-2
SM	80km	1550	-	9463-3	-	9483-3
SM	110km	1550	-	9463-4	-	9483-4
SM	140km	1550	-	9463-5	-	9483-5
MM/SF	550m	1310/1550	-	9470-0*	-	9490-0*
MM/SF	550m	1550/1310	-	9471-0*	-	9491-0*
SM/SF	20km	1310/1550	-	9470-1*	-	9490-1*
SM/SF	20km	1550/1310	-	9471-1*	-	9491-1*
SM/SF	40km	1310/1550	-	9470-2*	-	9490-2*
SM/SF	40km	1550/1310	-	9471-2*	-	9491-2*
SFP			9479-0**		9499-0**	

* Single-fiber converters must be used in pairs.

** Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order number of RJ-45 ports, add a number from below to the model number – 9xxx-x-**X**x
1 - One (1) RJ-45 port
2 - Two (2) RJ-45 ports

To order an external power supply, add a number from below to the model number – 9xxx-x-x**X**
1 - External Power Supply, 100-240VAC, with US Power Cord
2 - External Power Supply, 100-240VAC, with no Power Cord
8 - External Power Supply, 100-240VAC (JET/PSE) with JPN Power Cord
9 - No external Power Supply, direct 48VDC input, with 2-Pin Terminal Connector
F - No external Power Supply, direct 48VDC input, with 3-Pin Terminal Connector

For wide temperature (-40 to 65°C) add a "W" to the end of the model number - 9xxx-x-xx**W**.
Contact Omnitron for other fiber options.

OmniConverter FPoE/SE and FPoE+/SE

Cost-Effective 100Mbps Power Sourcing Media Converters

- 100BASE-X fiber to 10/100/1000BASE-T RJ-45
- FPoE+/SE supports IEEE 802.3af PoE and IEEE 802.3at PoE+
- FFPoE/SE supports IEEE 802.3af PoE
- Single or dual RJ-45 ports
- Supports wide temperature (-40 to 60°C)

Fiber	Distance	Wave-length (nm)	Connector Type			
			FPoE/SE (PoE)		FPoE+/SE (PoE+)	
			ST	SC	ST	SC
MM	5km	850	9360-0	9362-0	9380-0	9382-0
SM	30km	1310	9361-1	9363-1	9381-1	9383-1
SM	60km	1310	9361-2	9363-2	9381-2	9383-2
SM	120km	1550	-	9363-3	-	9383-3
MM/SF	5km	1310/1550	-	9370-0*	-	9390-0*
MM/SF	5km	1550/1310	-	9371-0*	-	9391-0*
SM/SF	20km	1310/1550	-	9370-1*	-	9390-1*
SM/SF	20km	1550/1310	-	9371-1*	-	9391-1*
SM/SF	40km	1310/1550	-	9370-2*	-	9390-2*
SM/SF	40km	1550/1310	-	9371-2*	-	9391-2*
SFP			9379-0**		9399-0**	

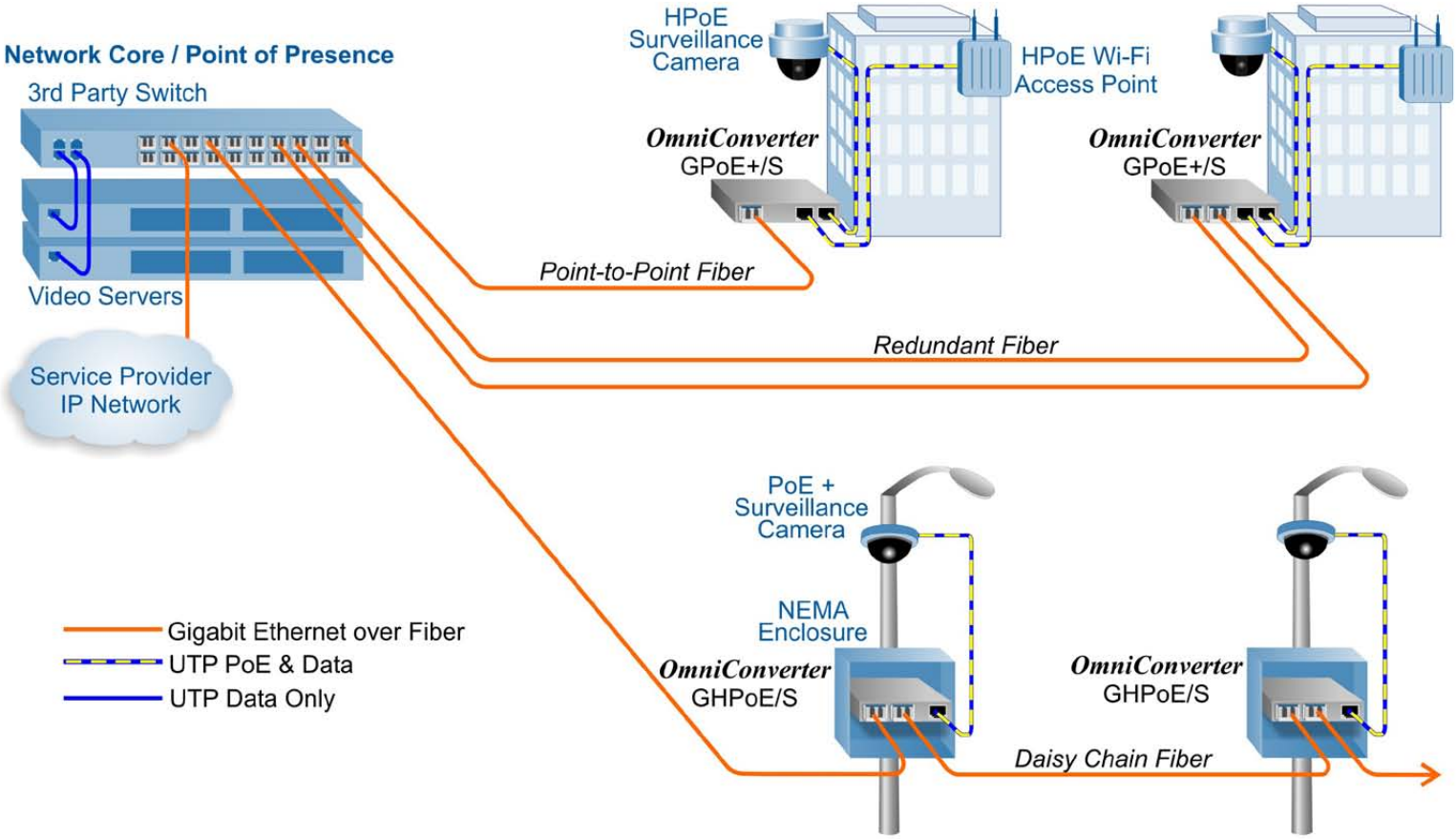
* Single-fiber converters must be used in pairs.
** Order SFPs separately. See SFP ordering information on pages 66 and 67.

To order number of RJ-45 ports, add a number from below to the model number – 9xxx-x-**X**x
1 - One (1) RJ-45 port
2 - Two (2) RJ-45 ports

To order an external power supply, add a number from below to the model number – 9xxx-x-x**X**
1 - External Power Supply, 100-240VAC, with US Power Cord
2 - External Power Supply, 100-240VAC, with no Power Cord
8 - External Power Supply, 100-240VAC (JET/PSE) with JPN Power Cord
9 - No external Power Supply, direct 48VDC input, with 2-Pin Terminal Connector

For wide temperature (-40 to 65°C) add a "W" to the end of the model number - 9xxx-x-xx**W**.
Contact Omnitron for other fiber options.

Security Surveillance and Wi-Fi Network Application



In this application example, Wi-Fi services and security surveillance are delivered over a fiber network with extended distances between network devices. This application shows a campus or municipal fiber network, but these devices can be deployed in a similar fashion at an airport, retail shopping mall, sports arena or any facility with distances that require fiber network connectivity.

The fiber is distributed from a fiber switch at the upper left of the diagram, where the switch connects to video servers for the surveillance cameras, and a Service Provider IP Network for the Wi-Fi Access Points.

The fiber runs to different locations where OmniConverter media converters are deployed to convert the fiber to copper, and provide Power over Ethernet to different PoE powered devices.

At the top right of the diagram, OmniConverter GHPoE/S PoE media converters are installed at buildings near AC or DC power sources.

A point-to-point fiber run connects to one building and the OmniConverter GHPoE/S provides UTP connectivity and HPoE power to an IP surveillance camera and a Wi-Fi Access Point that require up to 60 watts of power each. Redundant fiber links are run to a highly secure building where another OmniConverter GHPoE/S with two fiber ports enables protection switching with less than 50 ms failover.

At the bottom of the diagram, OmniConverter GPoE+/S media converters with dual fiber ports are installed in weather-proof NEMA enclosures, and deployed in a daisy-chain configuration with fiber links running hop-to-hop along light poles. Each temperature hardened OmniConverter GPoE+/S provides up to 32.4 watts of power one or two PoE devices on each light pole. The fiber daisy chain continues to more light poles with similar equipment configurations.

OmniConverter media converters support 100Mbps and Gigabit fiber networks. They can provide PoE, PoE+ or 60W PoE for power-hungry surveillance cameras with heaters and blowers.

Omnitron Small Form Pluggable Transceivers

Omnitron SFP, SFP+ and XFP transceivers enable connectivity to a wide variety of fiber optic cables and wavelengths, including single-fiber, single-mode and multimode.

Based on the MSA SFF-8472 standard, Omnitron SFPs provide enhanced digital diagnostic information not available on most SFPs. SNMP management software, such as NetOutlook®, can collect real-time diagnostic information including fiber optic power, voltage and temperature of the SFP transceiver.

Omnitron's compact and interchangeable fiber transceivers reduce network equipment inventories by eliminating the need to maintain surplus modules of various media types for network repairs or upgrades.

- For use with iConverter®, miConverter™, FlexPoint™, OmniConverter™ and third party equipment that supports SFPs
- LC Connectors
- Compliant with MSA SFF-8472 and INF-8077i standard, which provides interoperability with other network devices
- Compliant with IEEE 802.3u Fast Ethernet, 802.3z Gigabit Ethernet and 802.3ae 10Gbps Ethernet specifications
- Supports operational data rates for SONET OC-3/12/48, SDH STM-1/4/16, and Fibre Channel x1/x2
- Industrial (-40°C to 85°C) temperature range available
- Low EMI metal enclosure

Standard Wavelength Transceivers

SFPs for Fast Ethernet, SONET OC-3, SDH STM-1, T1/E1, T3/E3 and X21				
Fiber Type	**Distance**	**Model #**	**Tx Wavelength**	**Rx Wavelength**
MM	5km	7006-0	1310	1310
SM	30km	7007-1	1310	1310
SM	60km	7007-2	1310	1310
SM	120km	7007-3	1550	1550
MM/SF	5km	7014-0	1310	1550
MM/SF	5km	7015-0	1550	1310
SM/SF	30km	7014-1	1310	1550
SM/SF	30km	7015-1	1550	1310
SM/SF	50km	7014-2	1310	1550
SM/SF	50km	7015-2	1550	1310
SM/SF	80km	7014-3	1310	1550
SM/SF	80km	7015-3	1550	1310

SFPs for Gigabit Ethernet, SONET OC-12 and SDH STM-4				
Fiber Type	**Distance**	**Model #**	**Tx Wavelength**	**Rx Wavelength**
MM	220/550m	7206-0	850	850
MM	2km	7206-6	1310	1310
SM	12km	7207-1	1310	1310
SM	34km	7207-2	1310	1310
SM	80km	7207-3	1550	1550
SM	110km	7207-4	1550	1550
SM	140km	7207-5	1550	1550
SM	160km	7207-6	1550	1550
MM/SF	550m	7241-0	1310	1550
MM/SF	550m	7215-0	1550	1310
SM/SF	20km	7214-1	1310	1550
SM/SF	20km	7215-1	1550	1310
SM/SF	40km	7214-2	1310	1550
SM/SF	40km	7215-2	1550	1310
SM/SF	60km	7214-3	1310	1550
SM/SF	60km	7215-3	1550	1310
SM/SF	20km	7216-1	1310	1490
SM/SF	20km	7217-1	1490	1310
SM/SF	80km	7218-4	1510	1570
SM/SF	80km	7219-4	1570	1510

Gigabit Ethernet SFP Copper Transceivers		
RJ-45 Connector	**Data Rate**	**Distance**
7299-RJ	1000 Mbps	100m (UTP)
7299-RJ-GI	10/100/1000 Mbps	100m (UTP)

2.5 Gigabit SFPs for Fibre Channel x2, SONET OC-48 and STM-16 network protocols				
Fiber	**Distance**	**Model #**	**Tx Wavelength**	**Rx Wavelength**
MM	300m	7226-0	850	850
SM	15km	7227-1	1310	1310
SM	40km	7227-2	1310	1310
SM	80km	7227-3	1550	1550

10 Gigabit SFP+ (Ethernet, Fibre Channel, SONET) with Digital Diagnostics				
Fiber	**Distance**	**Model #**	**Tx Wavelength**	**Rx Wavelength**
MM	300m*	7406-0	850	850
MM	220m	7406-6	1310	1310
SM	10km	7407-1	1310	1310
SM	40km	7407-2	1550	1550
SM	80km	7407-3	1550	1550
SM/SF	10km	7410-0	1270	1330
SM/SF	10km	7411-0	1330	1270
SM/SF	20km	7410-1	1270	1330
SM/SF	20km	7411-1	1330	1270
SM/SF	40km	7410-2	1270	1330
SM/SF	40km	7411-2	1330	1270
10 Gigabit XFP (Ethernet, Fibre Channel, SONET) with XFI-side Digital Diagnostics				
MM	300m**	7426-0	850	850
SM	10km	7427-1	1310	1310
SM	40km	7427-2	1550	1550
SM	80km	7427-3	1550	1550
SM/SF	10km	7430-0	1270	1330
SM/SF	10km	7431-0	1330	1270
SM/SF	20km	7430-1	1270	1330
SM/SF	20km	7431-1	1330	1270
SM/SF	40km	7430-2	1270	1330
SM/SF	40km	7431-2	1330	1270
10 Gigabit SFP+ Direct Attach Cable				
-	1m	7499-DC-1	-	-
-	3m	7499-DC-3	-	-

* Distance obtained with OM3 multimode cable

See Omnitron website for complete listing of SFPs. Contact Omnitron for other SFP options and industrial temperature (-40 to 85°C) models.

CWDM and DWDM Transceivers

Omnitron's Coarse Wave Division Multiplexing (CWDM) Pluggable Optical Transceivers support all eighteen ITU-T G694.2 CWDM wavelengths between 1270nm to 1610nm. Dense Wave Division Multiplexing (DWDM) Optical Transceivers support wavelengths between 1525–1565 nm (C band) with 100GHz spacing.

Omnitron CWDM transceivers are used to customize iConverter®, FlexPoint™, FlexSwitch™, OmniConverter™ and miConverter™ products to enable connectivity between existing network equipment and CWDM networks. Virtually any network protocol or port interface can be converted to a wavelength that can be transported over a CWDM network with an iConverter CWDM Multiplexer.

CWDM SFPs for Fast Ethernet, SONET OC-3, SDH STM-1, T1/E1, T3/E3 and X21							
Wavelength	Latch	60km	80km	100km	120km	140km	150km
1271	-	7127-1	7127-2	7127-3	-	-	-
1291	-	7129-1	7129-2	7129-3	-	-	-
1311	-	7131-1	7131-2	7131-3	-	-	-
1331	-	7133-1	7133-2	7133-3	-	-	-
1351	-	7135-1	7135-2	7135-3	-	-	-
1371	-	7137-1	7137-2	7137-3	-	-	-
1391	-	7139-1*	7139-2*	7139-3*	-	-	-
1411	-	7141-1	7141-2	7141-3	-	-	-
1431	-	7143-1	7143-2	7143-3	-	-	-
1451	-	7145-1	7145-2	7145-3	-	-	-
1471	Gray	-	-	-	7147-4	7147-5	7147-6
1491	Violet	-	-	-	7149-4	7149-5	7149-6
1511	Blue	-	-	-	7151-4	7151-5	7151-6
1531	Green	-	-	-	7153-4	7153-5	7153-6
1551	Yellow	-	-	-	7155-4	7155-5	7155-6
1571	Orange	-	-	-	7157-4	7157-5	7157-6
1591	Red	-	-	-	7159-4	7159-5	7159-6
1611	Brown	-	-	-	7161-4	7161-5	7161-6

CWDM SFPs for Gigabit Ethernet, SONET OC-12 and SDH STM-4							
Wavelength	Latch	40km	50km	70km	100km	130km	150km
1271	-	7327-1	7327-2	7327-3	-	-	-
1291	-	7329-1	7329-2	7329-3	-	-	-
1311	-	7331-1	7331-2	7331-3	-	-	-
1331	-	7333-1	7333-2	7333-3	-	-	-
1351	-	7335-1	7335-2	7335-3	-	-	-
1371	-	7337-1	7337-2	7337-3	-	-	-
1391	-	7339-1*	7339-2*	7339-3*	-	-	-
1411	-	7341-1	7341-2	7341-3	-	-	-
1431	-	7343-1	7343-2	7343-3	-	-	-
1451	-	7345-1	7345-2	7345-3	-	-	-
1471	Gray	-	-	7347-3	7347-4	7347-5	7347-6
1491	Violet	-	-	7349-3	7349-4	7349-5	7349-6
1511	Blue	-	-	7351-3	7351-4	7351-5	7351-6
1531	Green	-	-	7353-3	7353-4	7353-5	7353-6
1551	Yellow	-	-	7355-3	7355-4	7355-5	7355-6
1571	Orange	-	-	7357-3	7357-4	7357-5	7357-6
1591	Red	-	-	7359-3	7359-4	7359-5	7359-6
1611	Brown	-	-	7361-3	7361-4	7361-5	7361-6

* Not suitable for use with G.652 fiber (water peak).

See Omnitron website for complete listing of SFPs.

Contact Omnitron for other SFP options and industrial temperature (-40 to 85°C) models.

10G Ethernet CWDM					
Wavelength	10G Ethernet CWDM SFP+		10G Ethernet CWDM XFP		
	10km	40km	10km	40km	70km
1271	7327E-1	7327E-2	7527-1	7527-2	-
1291	7329E-1	7329E-2	7529-1	7529-2	-
1311	7331E-1	7331E-2	7531-1	7531-2	-
1331	7333E-1	7333E-2	7533-1	7533-2	-
1351	7335E-1	-	7535-1	-	-
1371	7337E-1	-	7537-1	-	-
1391	7339E-1	-	7539-1	-	-
1411	7341E-1	-	7541-1	-	-
1431	7343E-1	-	7543-1	-	-
1451	7345E-1	-	7545-1	-	-
1471	7347E-1	7347E-2	7547-1	7547-2	7547-2LH
1491	7349E-1	7349E-2	7549-1	7549-2	7549-2LH
1511	7351E-1	7351E-2	7551-1	7551-2	7551-2LH
1531	7353E-1	7353E-2	7553-1	7553-2	7553-2LH
1551	7355E-1	7355E-2	7555-1	7555-2	7555-2LH
1571	7357E-1	7357E-2	7557-1	7557-2	7557-2LH
1591	7359E-1	7359E-2	7559-1	7559-2	7559-2LH
1611	7361E-1	7361E-2	7561-1	7561-2	7561-2LH

DWDM Transceivers

7 x x x E - x

2	40km
3	80km
ITU Channel #	100GHz Spacing (Channel 18 - 61)
6	SFP+ Transceiver
7	XFP Transceiver

10G Ethernet DWDM							
Channel #	Wavelength (nm)	Channel #	Wavelength (nm)	Channel #	Wavelength (nm)	Channel #	Wavelength (nm)
18	1563.05	29	1554.13	40	1545.32	51	1536.61
19	1562.23	30	1553.33	41	1544.53	52	1535.82
20	1561.42	31	1552.52	42	1543.73	53	1535.04
21	1560.61	32	1551.72	43	1542.94	54	1534.25
22	1559.79	33	1550.92	44	1542.14	55	1533.47
23	1558.98	34	1550.12	45	1541.35	56	1532.68
24	1558.17	35	1549.32	46	1540.56	57	1531.90
25	1557.36	36	1548.51	47	1539.77	58	1531.12
26	1556.55	37	1547.72	48	1538.98	59	1530.33
27	1555.75	38	1546.92	49	1538.19	60	1529.55
28	1554.94	39	1546.12	50	1537.40	61	1528.77

25 YEARS OF INNOVATION 1992 - 2017

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