Omnitron Systems

Product Catalog

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

About Omnitron Systems

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

- 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

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.

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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iConverter XGT+

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

Click on blue hyperlink text or text in the Table of Contents to navigate to the product page in this catalog.

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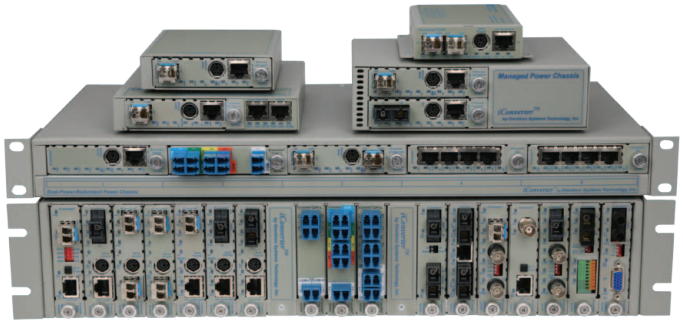


iConverter® Multi-service Platform

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 Carrier Ethernet access, First Mile Fiber-to-the-X, Enterprise and Government network applications.

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 GM3 and GM4 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 extended 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 UTP to Fiber
Fiber to Fiber
Coax to Fiber
4-Port Copper Switch
T1/E1 Multiplexer
CWDM Multiplexer
CWDM Transponder

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)
- Hierarchical Rate Limiting for efficient bandwidth utilization
- 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
- ITU-T G.8031 Linear Protection Switching and ITU-T G.8032 Ethernet Ring Protection Switching with sub-50ms failover
- Sync-E and IEEE 1588v2 Transparent Clock
- Granular Rate Limiting per port, per service and per CoS
- 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.

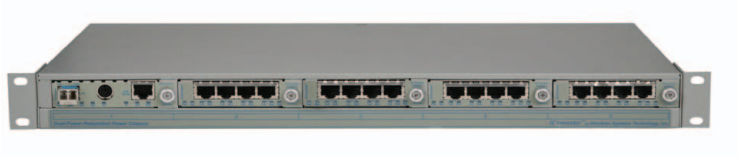
To support Next-Generation networks, iConverter media converters feature:

- 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 with state-of-the-art provisioning, performance monitoring, protection and fault detection capabilities. iConverter NIDs provide demarcation for Ethernet business services, cloud services, cell tower and small cell mobile backhaul delivered across one or more operator networks.



T1/E1 Multiplexers

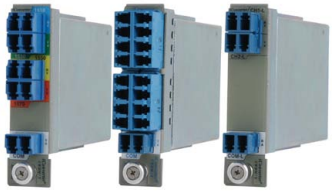
iConverter T1/E1 Multiplexers transport up to sixteen independent T1/E1 circuits and Ethernet from copper links onto a fiber link, CWDM wavelength or Ethernet Virtual Connection (EVC). Designed for mobile backhaul, building-to-building PBX connectivity, and demarcation extension, iConverter T1/E1 multiplexers 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.

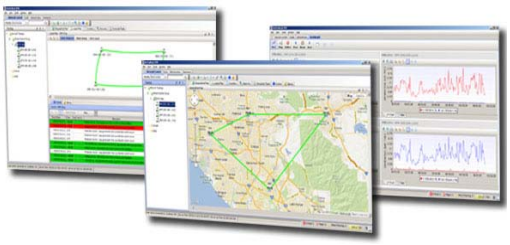
Ethernet Switch Modules

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

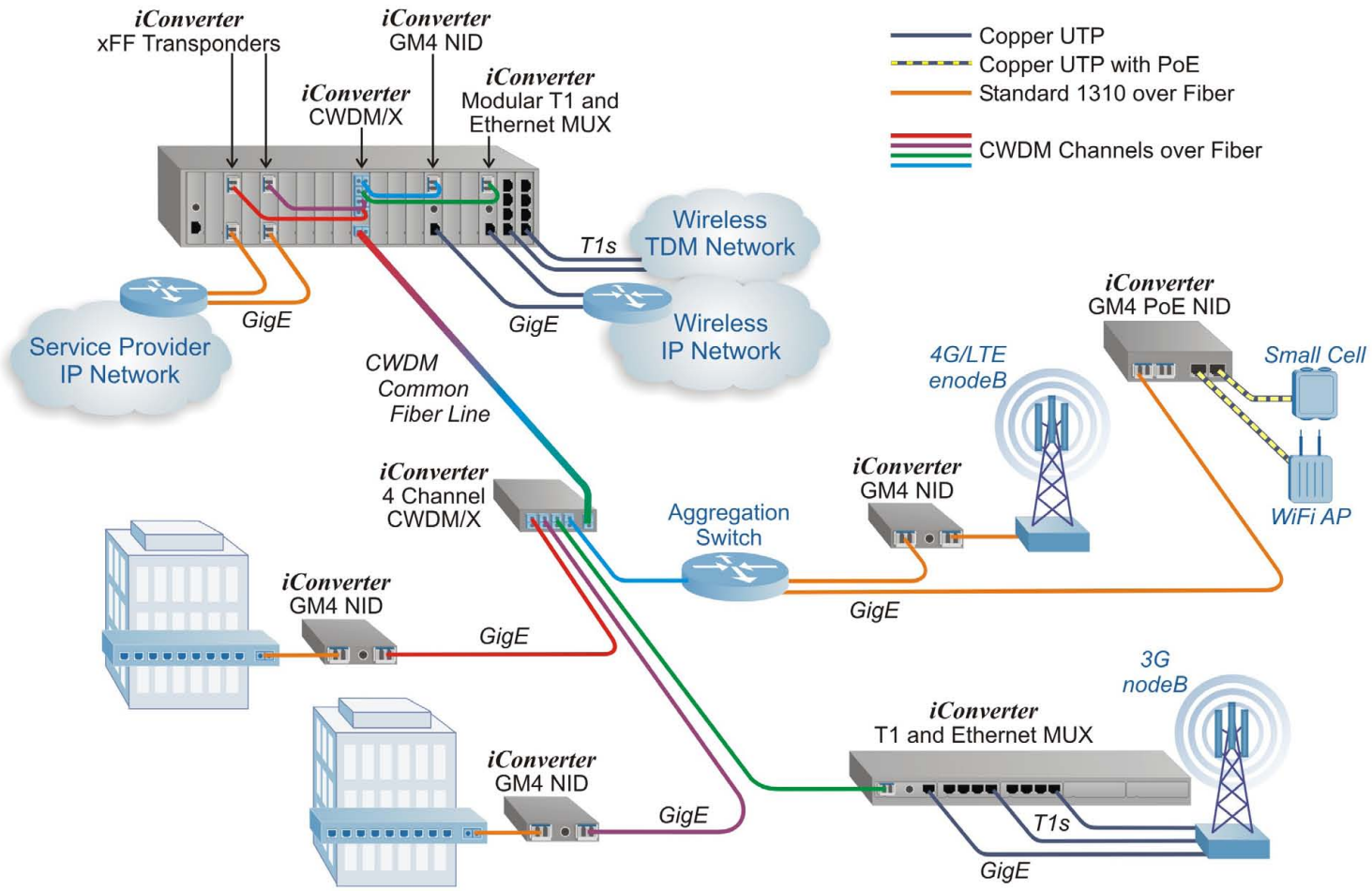
iConverter CWDM Multiplexers/Demultiplexers and Add+Drop Multiplexers are passive devices that increase the capacity of existing fiber infrastructure by multiplexing up to sixteen independent wavelengths over a fiber optic link. The modular iConverter CWDM MUX products utilize a small and scalable plug-in 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 fiber access network with a CWDM fiber link.

At the top of the diagram, Carrier Ethernet business services and mobile backhaul circuits are multiplexed over a CWDM common fiber line at an aggregation hub. iConverter xFF Transponders, Modular T1 and Ethernet MUX modules and a GM4 NID module are installed in a 19-Module Chassis with a 4-Channel CWDM/X MUX. The iConverter 4-Channel CWDM/X multiplexes all four channels (wavelengths) over a common fiber link. At the opposite end of the common CWDM link, a standalone CWDM MUX demultiplexes the four services, and fiber links connect to each destination device in one or more locations (the colors of the fiber cables in the diagram represents different CWDM wavelengths).

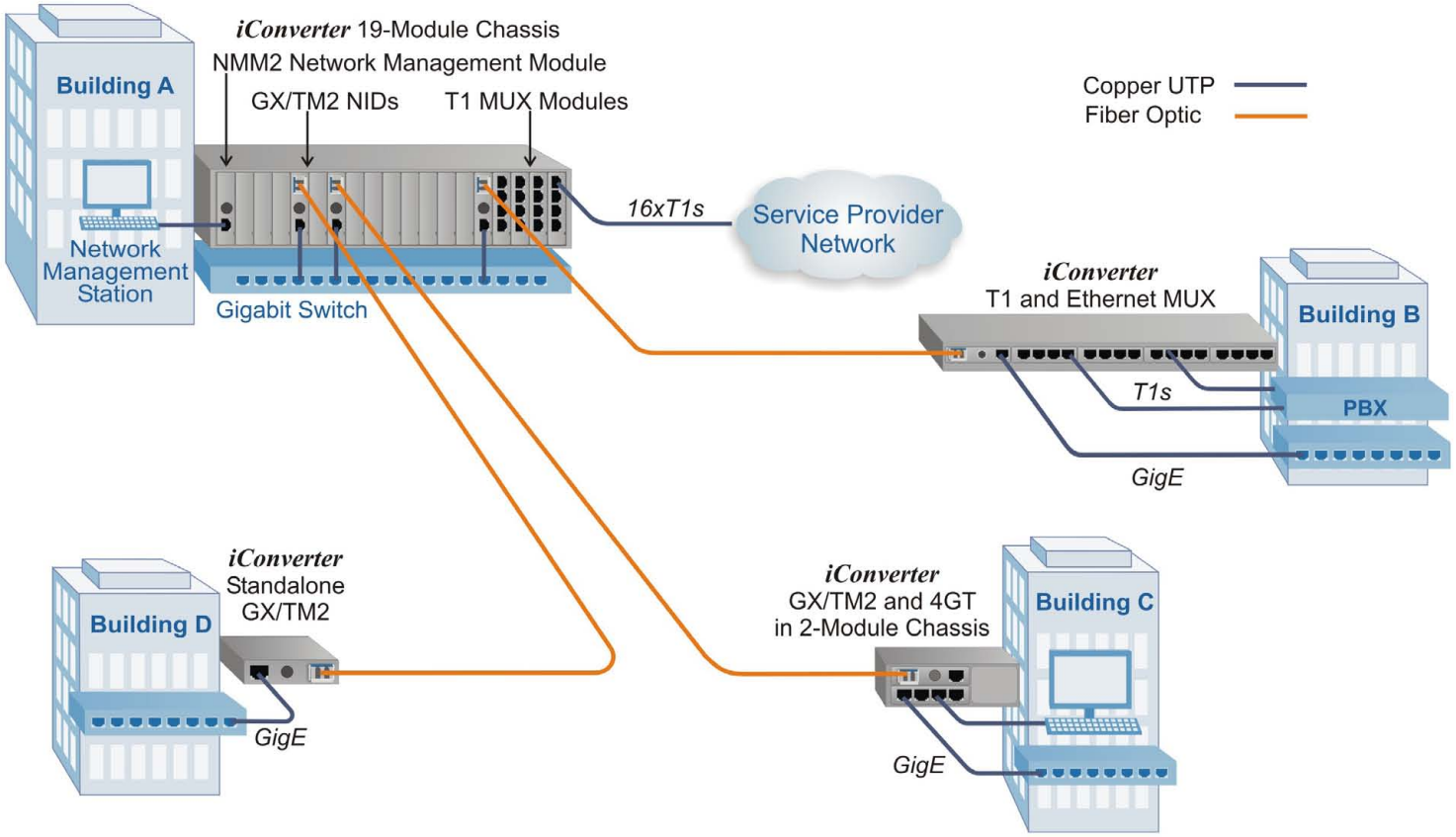
On the left side of the diagram, two Carrier Ethernet business services are transported over a Packet Switched Network and delivered over the access network to customer premises locations. At the aggregation hub, standard wavelength fiber links from an aggretion switch are converted to CWDM channels with xFF Transponders. The CWDM channels are multiplexed over the common fiber line, and iConverter GM4 NIDs provide Carrier Ethernet 2.0 certified demarcation of the business services at the customer locations.

On the right side of the diagram, T1s from a wireless TDM network are connected to iConverter Modular T1 and Ethernet MUX modules that multiplex the T1s over an Ethernet Virtual Connection (EVC). The T1 MUX modules also support CWDM SFPs for connectivity to the CWDM MUX. The T1 EVC is transported as a CWDM channel over the common fiber line, and on to another iConverter T1 and Ethernet MUX that provides connectivity to the 3G nodeB cell tower.

The two other Mobile Backhaul services are transporting 4G/LTE IP traffic from a Wireless IP network to a cell tower and a small cell. An iConverter GM4 NID provides demarcation for two Ethernet Virtual Connections (EVCs) at the aggregation hub (at the top of the illustration), and enables connectivity to the CWDM MUX. An aggregation switch at the other end of the CWDM common line directs one EVC to an iConverter GM4 NID that provides demarcation and timing synchronization at the 4G/LTE enodeB cell tower. The other EVC is directed to a GM4 PoE NID that provides demarcation for the metro cell service, and also provides Power over Ethernet to power the small cell and a WiFi access point.

This application illustrates that data from virtually any type of communications equipment can be carried over a CWDM network with the iConverter Multi-Service Platform.

iConverter Enterprise Fiber Network



In this application, fiber optic links connect multiple buildings in a campus, business or municipal network. Managed Gigabit Ethernet network with multiple T1 circuits are extended from a Service Provider demarcation point.

At Building A in the upper left, two copper UTP links from a core switch are converted to 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 and data over Ethernet.

The two fiber links connect to Buildings C and D. At Building C, 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 to multiple workstations and switches. At Building D, the fiber link is connected to standalone iConverter GX/TM2 NID that provides media conversion, and managed connectivity to an Ethernet switch.

A Service Provider has provided sixteen T1 circuits via UTP cabling at the demarcation point in Building A that need to be extended to a PBX in Building B. T1 and Ethernet MUX modules in the 19-Module Chassis transports the T1s plus Gigabit Ethernet from the switch over the fiber link to another T1 and Ethernet MUX at Building B, where the Ethernet and T1s are converted back to individual UTP cables.

This application example illustrates how the iConverter Multi-Service Platform enables the delivery of Gigabit Ethernet and demarcation extension of multiple T1s in a managed campus fiber network.

Related Applications

Managed Ethernet Campus LAN Network.....Page 21
T1 Demarcation Extension / Riser Management .....Page 25
CWDM Campus Network.....Page 29

iConverter Chassis and Mounting Options

All iConverter modules are hot-swappable and 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, PoE and redundant power options.

The chassis and modules are managed with an iConverter 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 iConverter 19-Module Managed Chassis can be mounted in a 19 or 23-inch rack, and features three redundant, load-sharing power supplies. The high-density chassis supports universal AC, 24VDC or 48VDC hot-swappable power supplies that can be used in any combination, and features an Ethernet backplane for connectivity between modules. The 19-Module Managed Chassis provides high-density copper and fiber distribution for the iConverter Multi-Service Platform and is ideal for deployments where reliability is critical and space is limited.

Configuration	AC/60W	AC/120W	24VDC/66W	48VDC/66W	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. Tray	8095-1				
23” Cable Mgt. Tray	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).

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, load-sharing power supplies. Universal AC, 24VDC or 48VDC power supplies are hot-swappable and can be used in any combination. 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	AC High Airflow 66W	24VDC 33W	48VDC 33W	48VDC High Airflow 66W
1 Power Supply	8220-1	-	8226-1	8225-1	-
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).

iConverter 1U Rack-Mount Shelf

The 1U 19" Rack-Mount Shelf accommodates iConverter standalone Network Interface Devices and media converters, the iConverter 1-Module chassis and the iConverter 2-Module chassis. The shelf supports a variety of mounting configurations, and features easy-to-use snap-rivets, multiple grounding points and convenient locations for cable ties. The Rack-Mount Shelf also accomodates up to three OmniConverter media converters.

Model	Description
8260-0	1U Rack-Mount Shelf

Modules not included with rack-mount shelf.

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	High Airflow AC/16.5W	DC/6.6W	DC/16.5W	High Airflow 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.

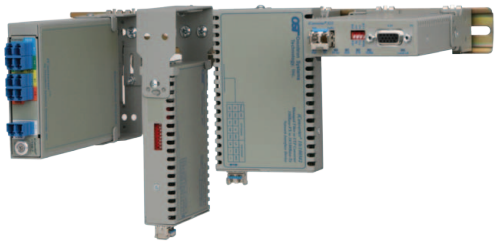
- Supports 9-28VDC (terminal or barrel) or 24-60VDC (terminal)
- PoE Powered Device (PD) via optional Ethernet port
- Four optional contact closure alarm sensors

Model	Contact Closures	UTP Ports	Redundant Power	AC Power Supply
8245-111	-	-	(2) 9-28VDC Barrel	(2) US
8245-112	-	-	(2) 9-28VDC Barrel	(2) Universal
8247-220	X	-	(2) 9-28VDC Terminal	-
8248-111	X	X	(2) 9-28VDC Barrel	(2) US
8248-112	X	X	(2) 9-28VDC Barrel	(2) Universal
8248-220	X	X	(2) 9-28VDC Terminal	-
8248-312	X	X	9-28VDC Barrel + 24-60VDC Terminal	(1) Universal
8248-320	X	X	9-28VDC Terminal + 24-60VDC Terminal	-
8248-512	X	X	PoE + 9-28VDC Barrel	(1) Universal
8248-520	X	X	PoE + 9-28VDC 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 Bracket

The 1 inch high iConverter 1-Module Chassis is tabletop or wall-mountable and supports a single iConverter module. The 1-Module Chassis 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.



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

Configuration	US AC	UNIV AC	48VDC
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 Kit	8250-0		

Modules not included with chassis.

iConverter chassis support Ethernet backplane connectivity between modules, enabling configurations that provide multi-port Ethernet connectivity to end users and subscribers.

The example below illustrates a 2-Module chassis with a backplane that enables sharing of Ethernet data between a plug-in Network Interface Device and 4-Port Switch Module. This configuration functions as a managed switch and supports advanced features such as VLAN, Quality of Service prioritization (QoS), bandwidth control and port access control.

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 extended 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).

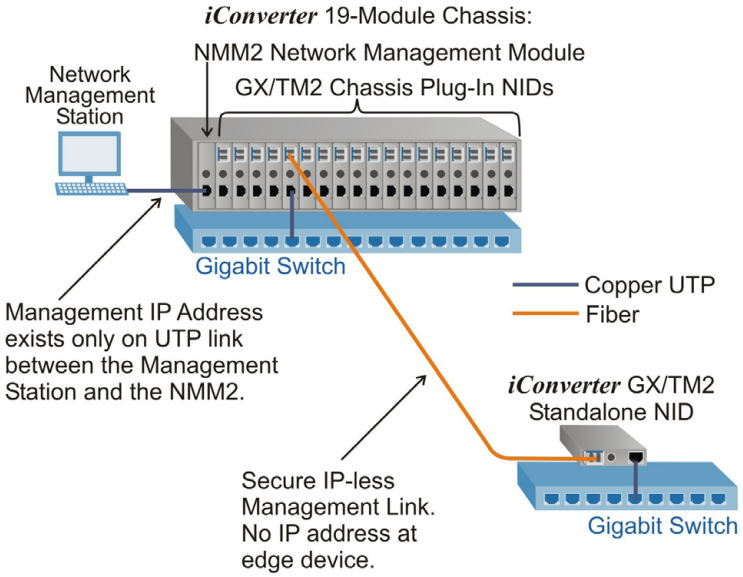
Management functions can be accessed locally through the serial console port, or remotely through IP-based management protocols, including SNMP v1/2c/3, TELNET, SSH, TFTP and FTP. Management VLAN provides protection for IP-based protocols by isolating the management data from user data.

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	• 802.1ah 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	• GM3 and GM4 NIDs • HybridNIDs	• 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 GM3 and GM4 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.

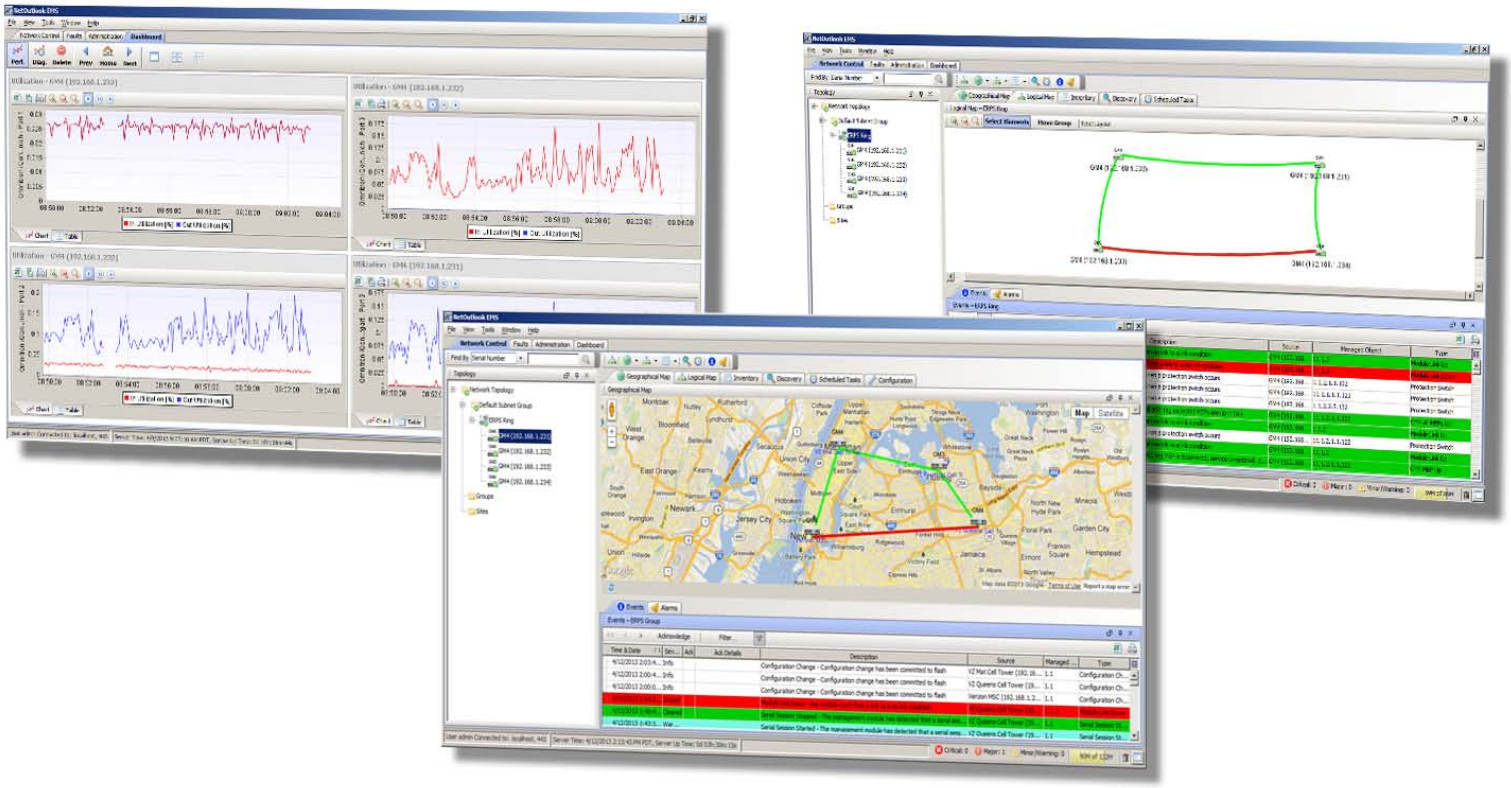
- Intuitive Graphical User Interface (GUI) provides configuration, monitoring and reporting of iConverter modules and chassis
- Real-time trap notification provides network status to identify specific network problems and their locations
- Supports SNMPv1, SNMPv2c and SNMPv3
- IP-less management with 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)



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 10,000 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 iConverter GM3 and GM4 NIDs. iConverter GM4 NIDs are MEF Carrier Ethernet 2.0 certified compliant to deliver advanced services, enable rapid service deployments, SLA assurance and comprehensive fault management.

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 ♦
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 ♦
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

♦ Includes 1 year service and maintenance.

NetOutlook® EMS

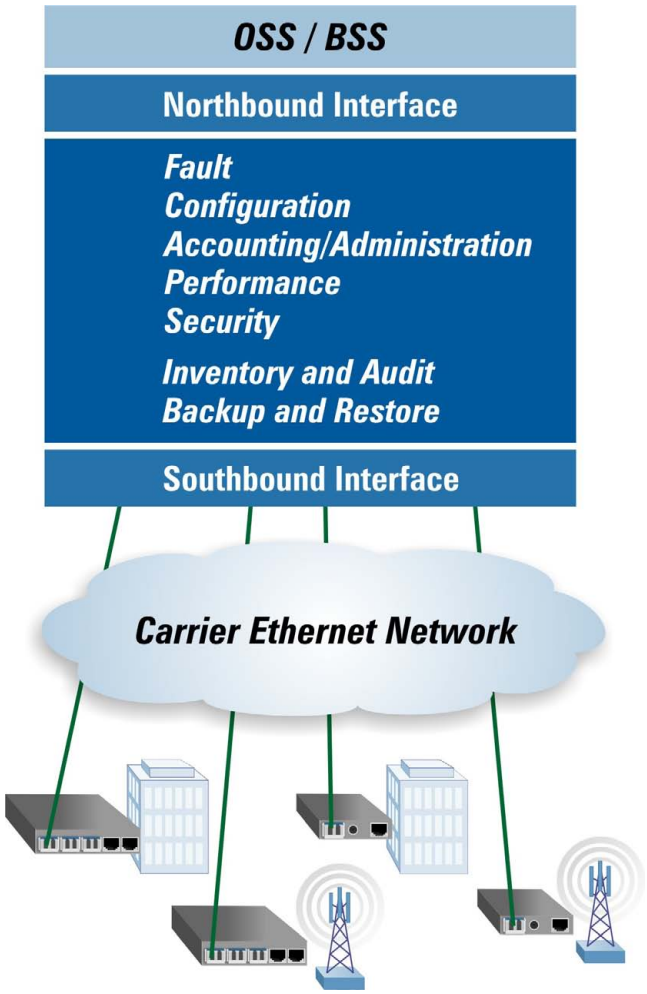
The Challenge

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.

iConverter GM4 NIDs

iConverter GM4 NIDs are the smallest full-function NIDs available, and have the lowest power consumption. GM4 NIDs support all the GM3 features and add Carrier Ethernet 2.0 Certified Compliance, service activation testing and service protection. The GM4 supports ITU-T Y.1564 Service Activation Testing and RFC 2544 throughput testing for rapid service activation and SLA validation. The GM4 provides service protection with ITU-T G.8031 Ethernet Linear Protection Switching and ITU-T G.8032v2 Ethernet Ring Protection Switching with sub-50 millisecond failover. The GM4 also supports ITU-T G.8262 Sync-E and IEEE 1588v2 timing, and Hierarchical Rate Limiting for efficient bandwidth utilization.

iConverter GM4 PoE NIDs

The iConverter GM4 PoE NIDs function as Power Sourcing Equipment (PSE), and provide Power over Ethernet (PoE) in small cell and WiFi applications. The GM4 PoE NIDs support all the features of the GM4 NIDs and add 802.3af PoE (15.4W), 802.3at PoE+ (25.5W) and up to 60W PoE on each RJ-45 port.

iConverter HybridNID®

The iConverter HybridNID enables the delivery of E-Access wholesale services with value-added revenue from independent SLA verification. The HybridNID clearly defines the service responsibilities between the Service Provider and the Access Provider with dual management elements that support secure and independent management access. The HybridNID is available in GM3 and GM4 configurations.

Related Applications

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 M2 NIDs

iConverter M2 Class NIDs provide “best effort” Ethernet E-Line service demarcation for subscribers who do not require SLA 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. They 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.

CE 2.0 MEF CERTIFIED

Carrier Ethernet 2.0 is the next generation in the evolution of Ethernet services, and is defined as “networks and services that enable multiple Classes of Service and manageability over interconnected provider networks”. These three service attributes of Multiple Classes of Service (Multi-CoS), Manageability and Interconnect reflect major new capabilities of E-Line and E-LAN services, as well as the addition of new E-Tree and E-Access services.

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

iConverter NID Features Comparison Chart

	Feature	M2 Class	GM3	GM4, GM4 PoE and HybridNID
MEF Compliance	Carrier Ethernet 2.0 Certified Compliant			✓
	MEF 9, 14 and 21 Compliant	✓	✓	✓
Traffic Management	IEEE 802.1Q VLAN Tagging	✓	✓	✓
	IEEE 802.1ad Q-in-Q VLAN Tagging	✓	✓	✓
	64k Granular Rate Limiting	✓	✓	✓
	CIR/EIR and CBS/EBS Policing and Shaping		✓	✓
	per Port, EVC and Class of Service		✓	✓
	per MAC Address, IP Address, ToS, DiffServe		✓	✓
	IEEE 802.1p CoS Priority		✓	✓
	Hierarchical Rate Limiting		✓	✓
	L2CP Policy Management		✓	✓
	Synchronous Ethernet (Sync-E)			✓
	IEEE 1588v2 Transparent Clock			✓
Operations, Administration and Maintenance (OAM)	IEEE 802.3ah Link OAM	✓	✓	✓
	IEEE 802.1ag Service OAM		✓	✓
	ITU-T Y.1731 Performance Monitoring		✓	✓
	MIB Statistics (RMON)	✓	✓	✓
Service Activation Testing	IETF RFC 2544 with built-in test-head			✓
	Third-party in-band loopback support			✓
	ITU-T Y.1564 Ethernet Service Activation Testing			✓
Protection and Redundancy	Port Redundancy (Primary and Backup Link)		✓	✓
	ITU-T G.8031 Ethernet Linear Protection			✓
	ITU-T G.8032 Ethernet Ring Protection			✓
	IEEE 802.1w Rapid Spanning Tree Protocol		✓	✓
Network Management	Serial Console Interface	✓	✓	✓
	Telnet	✓	✓	✓
	SSH			✓
	SNMP v1/v2c/v3	✓	✓	✓
	Integrated with 3rd-Party SLA Portals		✓	✓
Automatic Provisioning	Zero-Touch Provisioning (DHCP/TFTP)		✓	✓
	DPoE DEMARC Auto Configuration algorithm			✓

iConverter NID Port Configurations

Interfaces	M2 Class	GM3	GM4	GM4 PoE	HybridNID
Number of ports	2	2 or 3	2, 3 or 5	2, 4 or 5	6
10/100/1000BASE-T Copper	✓	✓	Up to 4		2 (1/1)
10/100/1000BASE-T Copper with PoE (up to 60W)				Up to 4	
Fiber SFP (100/1000Mbps)	✓	✓	✓	Up to 2	4 (2/2)
Chassis Plug-In Modules (Backplane Port)	✓	✓	✓*		

iConverter NIDs are available as chassis plug-in modules with backplane connectivity to other modules in the chassis. The plug-in NID module can manage a chassis of modules or be managed as a regular media converter by another management module.

* Backplane ports available only on 2-Port and 3-Port GM4 NIDs

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+ (25.5W) 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 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 (25.5W) and up to 60W
- Commercial (0 to 50ºC), wide (-40º to 60ºC) and extended (-40º to 75ºC) temperature ranges

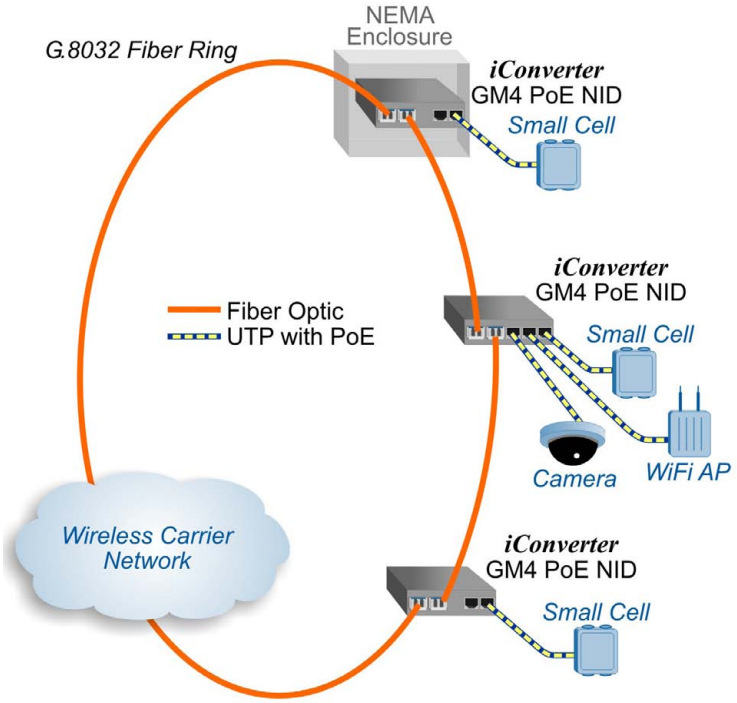
Port Configurations		GM4-PoE+	GM4-HPoE	
Number of Fiber Ports	Number of RJ-45 PoE Ports	PoE, PoE+	PoE, PoE+, 60W PoE (Full power per RJ-45 port)	PoE, PoE+, 60W PoE (120W shared on all RJ-45 ports)
1	1	8991S-11-x	8991T-11-x	N/A
1	4	8991S-14-x	8991T-14-x	8991L-14-x
2	2	8991S-22-x	8991T-22-x	N/A
2	3	8991S-23-x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

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

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 the end of the model number.
Contact Omnitron for for other fiber options and more information on extended temperature range models.

Small Cell and WiFi Backhaul Application

In this application example, a Service Provider offers small cell (metro cell) coverage in addition to WiFi offloading and video surveillance. Multiport GM4 PoE NIDs are deployed to provide automated provisioning and testing, performance monitoring and fault management. The integrated Power over Ethernet provides power for up to four PoE/PD devices.



The Service Provider is deploying small cells along a fiber ring. iConverter GM4 PoE NIDs are available with two SFP fiber ports, and support G.8032 Ethernet Ring Protection Switching to enable resilient ring configurations.

The location at the top of the ring is an outdoor small cell deployment. The GM4 PoE NID is temperature hardened, and both the NID and the power supply can be installed in a weather-proof NEMA enclosure. On-board contact closure monitors the equipment enclosure for unauthorized tampering.

The other locations along the ring are indoor deployments with small cells, a WiFi access point, and an IP surveillance camera powered by GM4 PoE NIDs.

The GM4 PoE NIDs are installed near available AC or DC sources, and provide PoE, PoE+ or 60W PoE from each RJ-45 port on the NID. The GM4 PoE NIDs reduce equipment costs because they eliminate the need for mid-span PoE power injectors.

Ethernet Virtual Connections (EVCs) are configured from the Wireless Carrier Network to each device, and the GM4 PoE NIDs provide Carrier Ethernet 2.0 certified demarcation at each location.

iConverter GM4 Carrier Ethernet 2.0 NIDs

iConverter GM4 NIDs support all the features of the GM3 NIDs and offer Ethernet service testing to verify all service parameters for quick turn-up, troubleshooting and SLA verification. The GM4 also supports link protection and service protection switching.

- MEF Carrier Ethernet 2.0 Certified Compliant
- Smallest full-function NID available with the lowest power consumption
- Traffic management, policing and shaping with service mapping
- Hierarchical Rate Limiting for efficient bandwidth utilization
- DEMARC Auto-Configuration (DAC) for DPoE Networks
- ITU-T Y.1564 and IETF RFC 2544 Ethernet Service Testing
- Remote management through TELNET, SSH, SNMP v1/v2c/v3
- ITU-T G.8031 Linear Protection Switching and ITU-T G.8032 Ethernet Ring Protection Switching with sub-50ms failover
- ITU-T G.8262 Sync-E and IEEE 1588v2 Transparent Clock
- Commercial (0 to 50ºC), wide (-40º to 60ºC) and extended (-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 56 and 57.

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 the end of the model number.

Use the ordering notes at right for model number configuration of GM4 plug-in and wall-mount models.

iConverter GM3 NIDs

iConverter GM3 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
- Zero-Touch Provisioning allows for easy and automated installs
- 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 extended (-40 to 75°C) temperature ranges

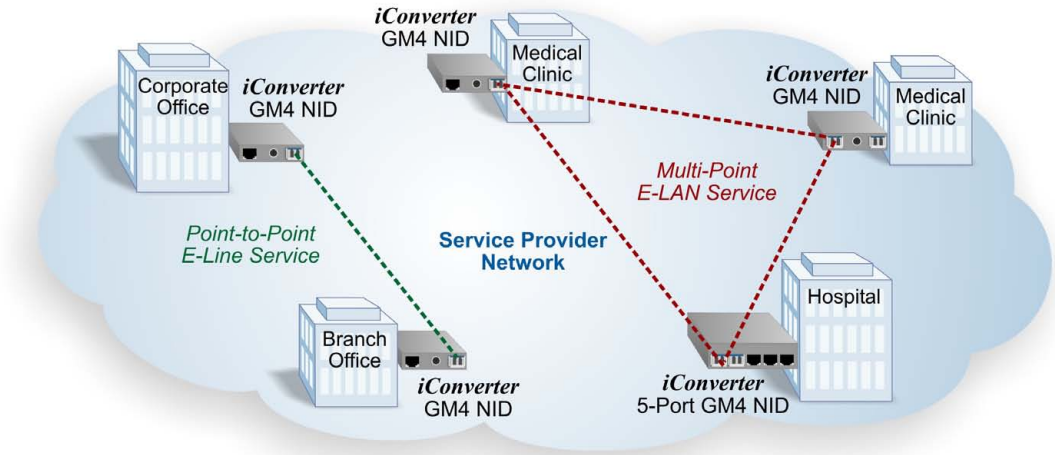
Ports			Fiber	Distance	Wavelength (nm)	Connector Type	
P1	P2	P3				ST	SC
FF	RJ-45	-	MM/DF	220/550m	850	8920P-0	8922P-0
FF	RJ-45	-	SM/DF	12km	1310	8921P-1	8923P-1
FF	RJ-45	-	SM/DF	34km	1310	-	8923P-2
FF	RJ-45	-	SM/DF	80km	1550	-	8923P-3
FF	RJ-45	-	SM/DF	110km	1550	-	8923P-4
FF	RJ-45	-	SM/DF	140km	1550	-	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 56 and 57.

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 DC Power Terminal Connector

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 the end of the model number.
Contact Omnitron for other fiber options.

Carrier Ethernet Business Services Application



In this application diagram, a Service Provider is providing Carrier Ethernet 2.0 E-Line services to a corporate subscriber, and E-LAN services to a health care subscriber. The Service Provider deploys iConverter GM4 Network Interface Devices (NIDs) for demarcation of the business services, and to provide crucial traffic management and performance assurance functions throughout the lifecycle of the Carrier Ethernet service.

iConverter GM4 NIDs serve as the traffic manager for the subscriber traffic to be delivered across the Service Provider network. The advanced traffic management features enable the Service Provider to offer MEF-certified Carrier Ethernet 2.0 services with Multiple Classes of Service (Multi-CoS), granular rate-limiting, and 802.1ad Provider Bridge VLAN stacking (Q-in-Q) for service multiplexing. GM4 NIDs filter the subscriber traffic, assign the traffic to different Classes of Services, enforce rate-limiting for each CoS, and forward the allowed traffic to the other subscriber locations.

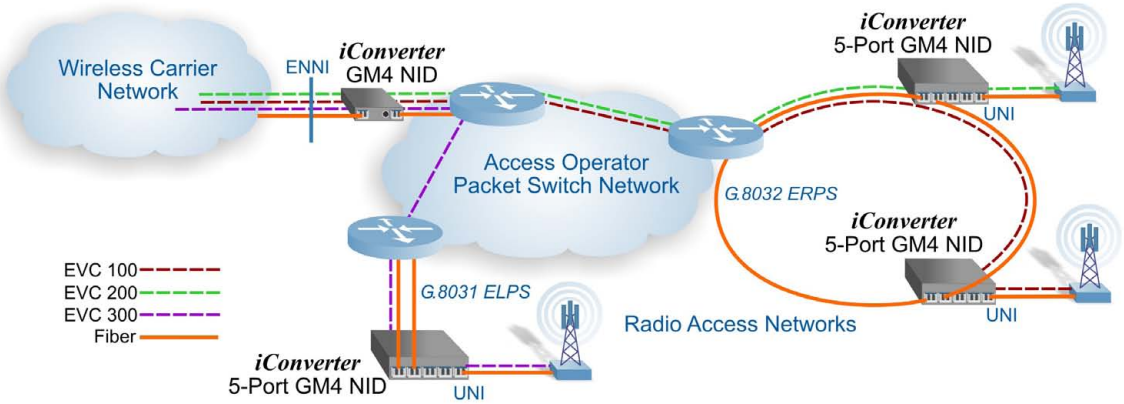
In a multipoint E-LAN service, the NIDs also manage traffic delivered to each customer location, monitoring and enforcing the total delivered utilization rate (for billing purposes).

Service activation and testing tools include Zero-Touch Provisioning and DEMARC Auto Configuration (DAC) for DPoE networks. Built-in ITU-T Y.1564 and RFC 2544 test-heads allow the NIDs to perform tests with synthetic subscriber traffic, and eliminate the need for service personnel and test equipment at the customer premises. Service testing ensures proper service provisioning and validates the Service Level Agreement (SLA) parameters. These features shorten time to market and reduce operating costs by simplifying service provisioning and testing.

During operation, the GM4 NIDs regularly communicate with each other, ensuring the service paths between the subscriber locations are uninterrupted. Advanced fault management features include support for IEEE 802.1ag Connectivity Fault Management (CFM) for proactive fault monitoring and isolation.

The Service Provider also deploys NetOutlook® EMS with FCAPS functionality to automate the entire Carrier Ethernet 2.0 service lifecycle and simplify the management of the NIDs.

4G/LTE Backhaul Application



In this 4G/LTE backhaul application, GM4 Network Interface Devices (NIDs) are deployed throughout Ethernet Mobile Backhaul and Radio Access Networks (RAN) to provide carrier-class performance monitoring, fault management and timing synchronization.

The Wireless Carrier hands off multiple Ethernet Virtual Connections (EVCs) to the Access Operator at the External Network-to-Network Interface (ENNI). Each EVC is transported across the Access Operator Packet Switch Network (PSN) and a fiber RAN to the cell towers. The GM4 NIDs installed at the ENNI and the User to Network Interface (UNI) at each cell tower monitor the delay, delay variation, loss and availability to ensure the SLA assurances to the Wireless Carrier are met. The GM4 NIDs support IEEE 1588v2 and Sync-E timing synchronization, and also provide ITU-T G.8031 linear and G.8032 ring protection switching.

iConverter HybridNID®

The iConverter HybridNID is a Network Interface Device that enables two carriers to collaborate in the delivery of carrier-grade Ethernet services across multiple networks.

The iConverter HybridNID provides demarcation for both an end-to-end Ethernet connection and a wholesale E-Access service, and clearly defines the service responsibilities between the Service Provider and the Wholesale Access Provider. By unifying these demarcation points into a single device, the HybridNID reduces time to market and simplifies service maintenance at out-of-franchise customer locations.

The HybridNID features dual management elements with secure and independent management access for a Service Provider and a Wholesale Access Provider. With the iConverter HybridNID installed at the customer premise or cell tower, both a Service Provider and Wholesale Access Provider partner can independently provision, manage and monitor the Ethernet service.

- End-to-End Service OAM with IEEE 802.1ag Connectivity Fault Management and ITU-T Y.1731 Performance Monitoring
- Zero-touch and one-touch provisioning for rapid service deployment
- Tiered back-up and restore of service provisioning configurations
- Remote management through SNMP v1/v2c/v3
- IP-less 802.3ah OAM extensions and TELNET
- SNMP management via Omnitron's NetOutlook® Network Management Software or NetOutlook EMS
- Supports wide temperature range (-40 to 60°C)

Description	AC Power	DC Power
HybridNID	2459R-33-1	2459R-33-9

For HybridNID with GM3 functionality, change the **R** to a **P** in the model number: 2459**P**-33-1

For wide temperature (-40 to 60°C), add a **W** to the end of the model number: 2459R-33-1**W**

Order Fiber or Copper SFPs separately. See SFP ordering information on pages 56 and 57.

Conventional NIDs are a challenge when Service Providers deliver E-Access services outside of their network (off-net), and must partner with Wholesale Access Providers to provide Carrier Ethernet business services or LTE mobile backhaul.

Omnitron's iConverter HybridNID delivers the Ethernet service via one User Network Interface and enables both the Service Provider and the Access Provider to manage and monitor the Ethernet service.

Generate Value Added Revenue

- Provide Ethernet services with SLA assurance for both Access Service (wholesale) and End-to-End (retail)
- Offer HybridNID functionality with secure access to management, provisioning and performance monitoring

Time to Market

- Zero-Touch Provisioning enables turn-up in days instead of weeks
- Y.1564 and 2544 Service Activation Testing reduces time for testing both the end-to-end service and the E-Access service

System Reliability

- Single device is more reliable than multiple devices
- Compact platform is easier to maintain and troubleshoot

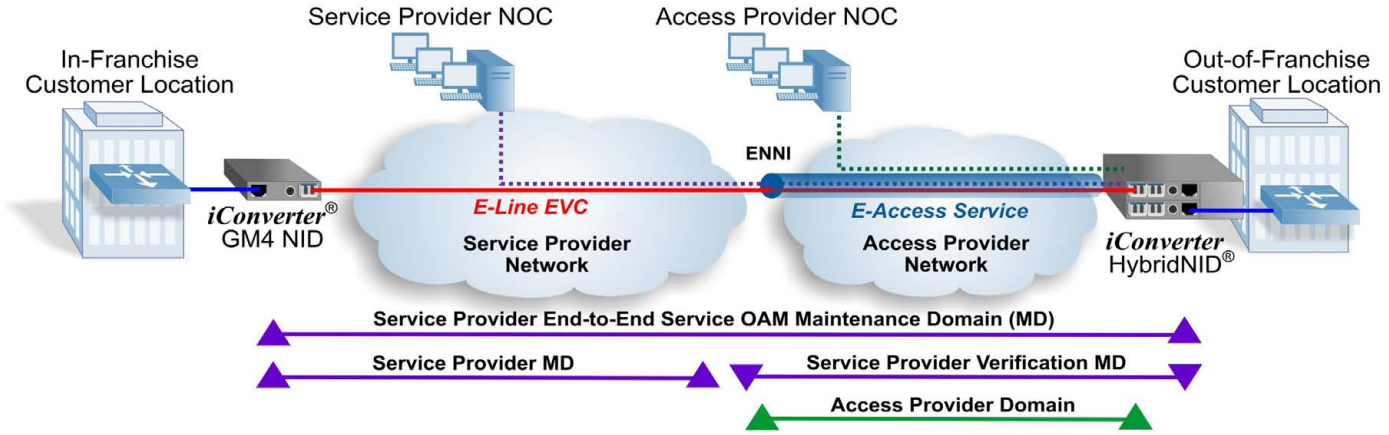
Hardware Cost Savings

- No need for multiple devices at the customer premises
- Single platform for inventory and sparing

Operational Savings

- Easy to install and turn-up service
- Deploy NID functionality uniformly

Wholesale Ethernet Application



The iConverter HybridNID enables clear partitioning of responsibilities between the Service Provider and the Access Provider by incorporating two securely segregated management entities. The Access Provider owns, installs, manages and maintains the HybridNID. The Service Provider has management access to provision service attributes. Both the Access Provider and Service Provider can independently and securely monitor OAM functions.

The HybridNID can be used in any deployment that requires delivery of carrier-grade Ethernet services with independent SLA verification.

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 VLAN with Q-in-Q and 802.1ad Provider VLAN 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 extended (-40º to 75ºC) temperature ranges

Fiber to Fiber Ethernet NIDs

2FXM2 100BASE-FX to 100BASE-FX 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 56 and 57.

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 DC Power Terminal Connector

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 the end of the model number.

Contact Omnitron for other fiber options.

Copper to Fiber Ethernet NIDs

10/100M2 10/100BASE-TX to 100BASE-FX 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	220m/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 56 and 57.

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 DC Power Terminal Connector

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 the end of the model number.

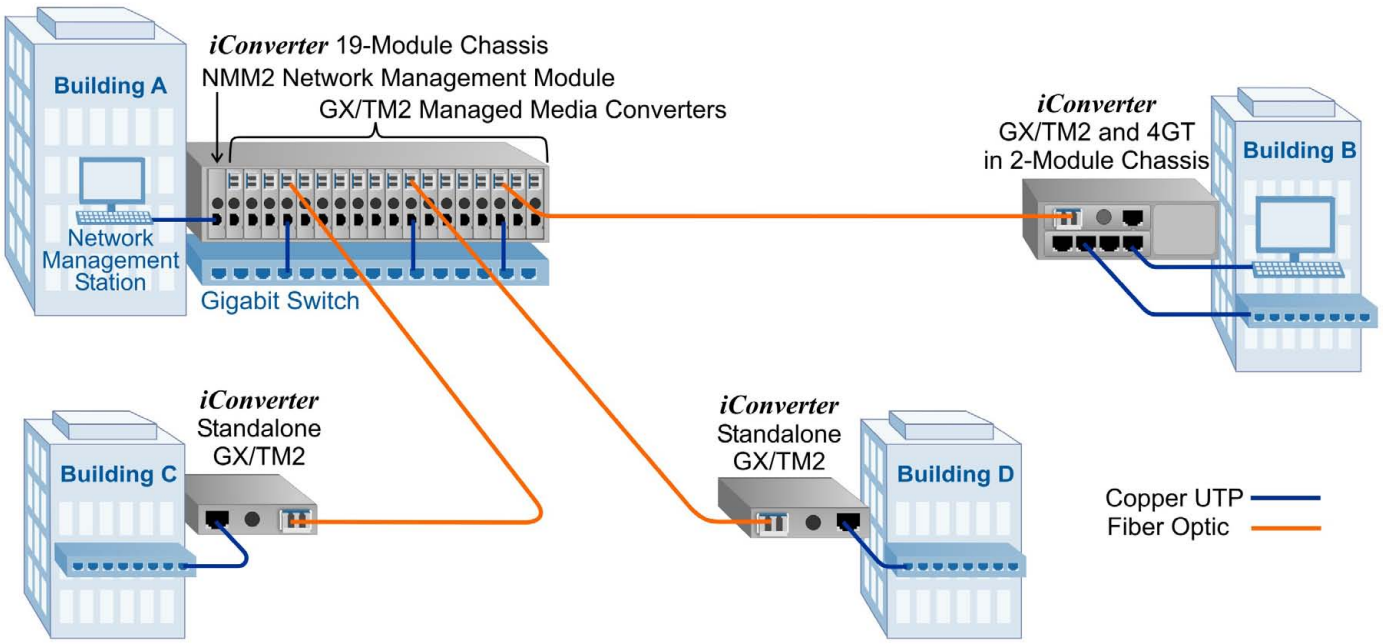
Contact Omnitron for other fiber options.

M2 NID Application Examples

Multi-Service Enterprise Fiber Network.....Page 7

Managed Ethernet Campus LAN.....Page 21

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, CWDM wavelength or Ethernet Virtual Connection (EVC). 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 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 24
Building to Building PBX Connectivity.....Page 25
Multiple T1s and Ethernet Riser Management.....Page 25

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-DF	220/550m	850	8820N-0	8822N-0	-
SM-DF	12km	1310	8821N-1	8823N-1	-
SM-DF	34km	1310	8821N-2	8823N-2	-
SM-DF	80km	1310	-	8823N-3	-
SM-DF	110km	1550	-	8823N-4	-
SM-DF	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 ft			

* 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 56 and 57.

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 - 88xxN-x-x**W**

Example: 8820N-0-BW = MM-DF, 220m, 850nm, ST, AC power, wide temperature
Contact Omnitron for other fiber options and extended 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-DF	2km	850	8820-5	8822-5	-	-
MM-DF	5km	1310	8820-0	8822-0	8826-0	-
SM-DF	30km	1310	8821-1	8823-1	8827-1	-
SM-DF	60km	1310	-	8823-2	8827-2	-
SM-DF	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 ft				

* 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 56 and 57.

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 extended temperature (-40 to 75°C) models.

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-DF	220/550m	850	2420-0	2422-0	-
SM-DF	12km	1310	2421-1	2423-1	-
SM-DF	34km	1310	-	2423-2	-
SM-DF	80km	1550	-	2423-3	-
SM-DF	110km	1550	-	2423-4	-
SM-DF	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 ft			

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 56 and 57.

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-DF, 12km, 1310nm, Four 4-Port MUX Modules (16 ports total), Two 24VDC Power Supplies, wide temperature.

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

iConverter Modular T1/E1 Multiplexer

Modular T1/E1 Multiplexer Solution

The Modular iConverter T1/E1 Multiplexer Solution 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 multiplexing 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 extended 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	-	-	-	-	2499-1-T**
MM-DF	220/550m	850	2420-0-T	2422-0-T	-
SM-DF	12km	1310	2421-1-T	2423-1-T	-
SM-DF	34km	1310	2421-2-T	2423-2-T	-
SM-DF	80km	1550	-	2423-3-T	-
SM-DF	110km	1550	-	2423-4-T*	-
SM-DF	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 56 and 57.

To order a GM3 NID or GM4 chassis plug-in module, see page 17.

To order a wide temperature (-40 to 60°C) TM3 module, add a "W" to the end of the model number.
To order an extended 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	**4 T1/E1**	**4 T1/E1 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 extended 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

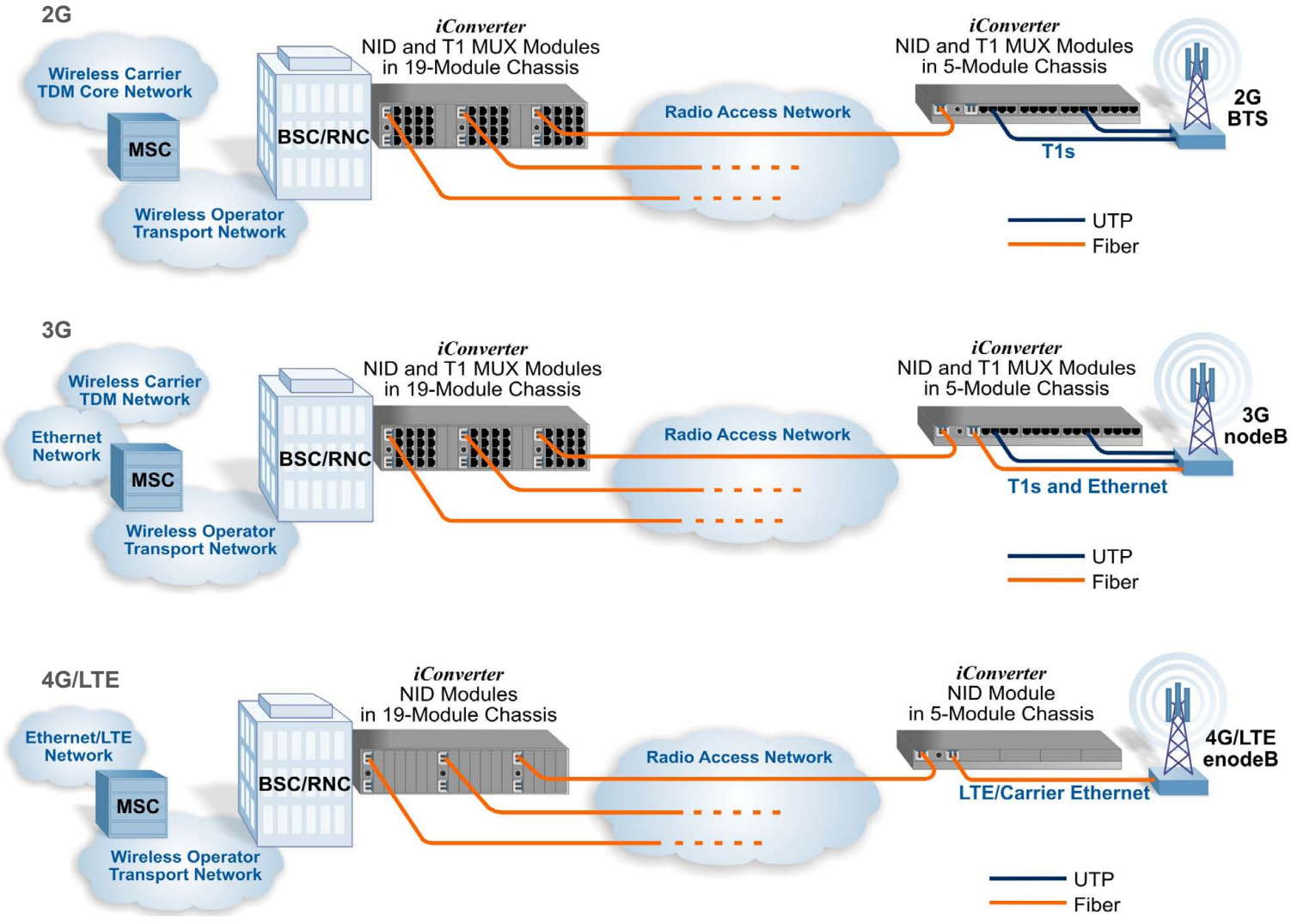
Multiple T1 circuits and Ethernet are transported via an EVC over a RAN. The same chassis configurations are used at the BSC/RNC, and the 3G nodeB cell tower.

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

4G/LTE – Carrier Ethernet

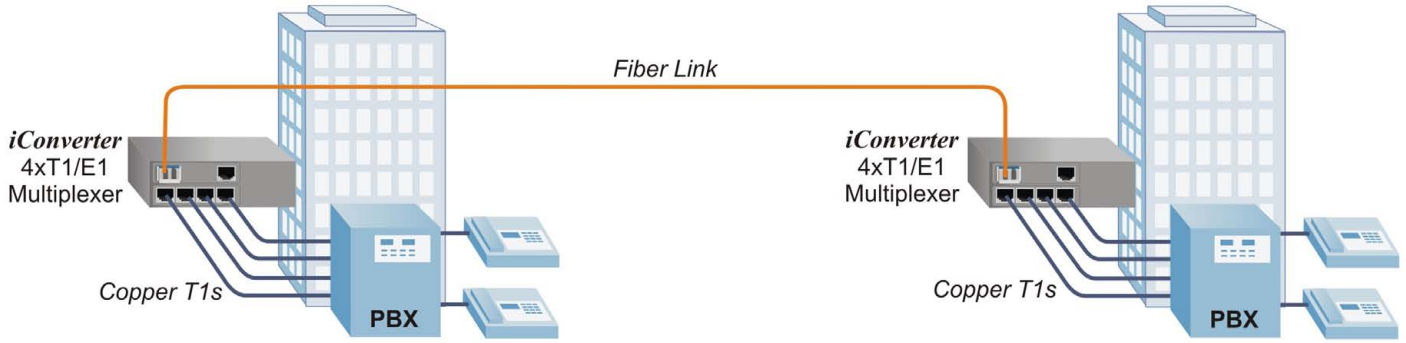
4G/LTE IP packets are transported via an EVC over a RAN. The T1/E1 MUX modules are decommissioned from both chassis, and GM4 NIDs are used to transport Gigabit Carrier Ethernet.

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.

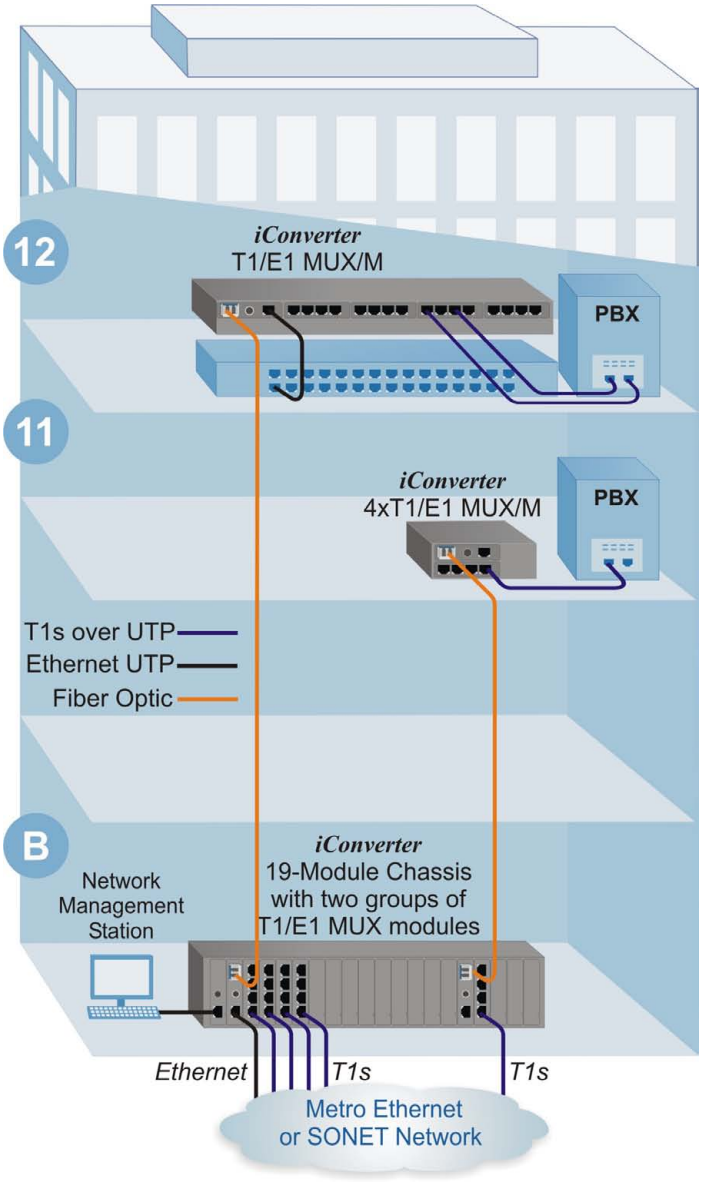
The T1s and Ethernet are handed off at the Service Provider demarcation with UTP copper cables for each T1 (blue cables in the application diagram) and Ethernet (black cables). iConverter Modular T1/E1 Multiplexers are installed in a 19-Module Chassis at the demarcation point in the basement. The Modular 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.

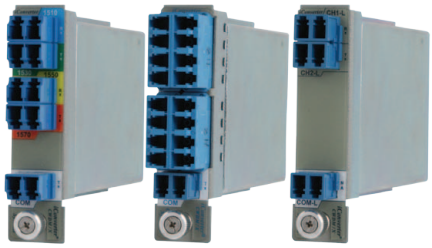
iConverter CWDM modules are protocol and rate transparent allowing different services up to 10Gbps each to be transported across the same fiber link. They provide a reliable and cost-effective solution for increasing bandwidth capacity over existing fiber infrastructure in Service Provider, Municipal, 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 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 with up to 120 ports in a 2U chassis
- 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
- Managed via SNMP v1/2c/3 or TELNET
- One (1) Year Warranty and Free 24/7 Technical Support
- Supports wide temperature range (-40 to 60°C)

Related Applications

Service Provider CWDM Access Network .....Page 6
Mobile Backhaul to Multiple Cell Towers.....Page 28
CWDM Enterprise Campus .....Page 29



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 (such as SDH or SONET). CWDM channels in the range of 1470nm to 1610nm can be overlaid on the same fiber pair as the existing 1310nm network with no changes to the legacy equipment.

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 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)

Channel Port - Model # 8867-xx (xx= two digit number below)					
27 = 1271	33 = 1331	39 = 1391	45 = 1451	51 = 1511	57 = 1571
29 = 1291	35 = 1351	41 = 1411	47 = 1471	53 = 1531	59 = 1591
31 = 1311	37 = 1371	43 = 1431	49 = 1491	55 = 1551	61 = 1611

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

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

Channel Port 1	Model # 8868-xx (xx= two digit number below)								
	1291	1311	1331	1351	1371	1391	1411	1431	1451
1271	01	02	03	04	05	06	07	08	09
1291	-	12	13	14	15	16	17	18	19
1311	-	-	23	24	25	26	27	28	29
1331	-	-	-	34	35	36	37	38	39
1351	-	-	-	-	45	46	47	48	49
1371	-	-	-	-	-	56	57	58	59
1391	-	-	-	-	-	-	67	68	69
1411	-	-	-	-	-	-	-	78	79
1431	-	-	-	-	-	-	-	-	89

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

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

Channel Port 1	Model # 8869-xx (xx= two digit number below)						
	1491	1511	1531	1551	1571	1591	1611
1471	01	02	03	04	05	06	07
1491	-	12	13	14	15	16	17
1511	-	-	23	24	25	26	27
1531	-	-	-	34	35	36	37
1551	-	-	-	-	45	46	47
1571	-	-	-	-	-	56	57
1591	-	-	-	-	-	-	67

NOTES: When using with 1310nm legacy SDH/SONET, wavelengths between 1260nm to 1360nm should not be used. Contact Omnitron for custom CWDM modules. 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.

iConverter Band-Splitters

Band-Splitters and Lower/Upper Band OADMs

The iConverter Band-Splitter module combines and separates the upper CWDM Channels (1471nm to 1611nm) and the lower CWDM Channels (1271nm to 1451nm).

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 (1471 to 1611nm) on both directions of the CWDM fiber link.

Model Number	Module Type
8865-0	CWDM/X Band-Splitter
8865-2	CWDM/X Dual Band-Splitter
8867-1	Lower Band OADM (1271-1451nm) common port 1271 - 1611nm
8867-2	Upper Band OADM (1471-1611nm) common port 1271 - 1611nm

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

iConverter Single-Fiber CWDM/X

iConverter Single-Fiber CWDM/X modules are available in 2 and 4-Channel models.

Model Type	Model Number	Channel Port ITU Center Wavelength Tx/Rx (nm)
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
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

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.

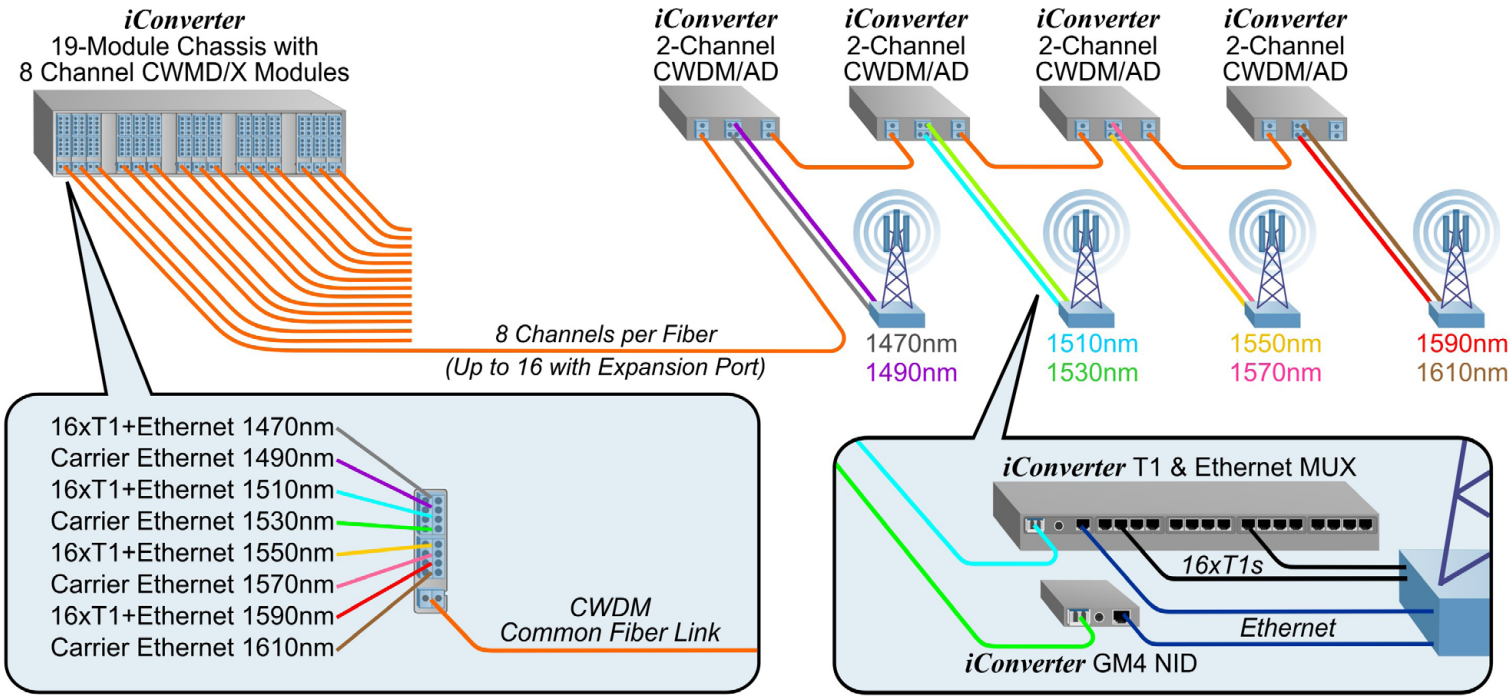
1-Channel CWDM/AD (ITU Center Wavelength in nm)

Channel Port Wavelength Pairing - Model # 8878-xx		
27 = 1271/1291	39 = 1391/1411	51 = 1511/1531
31 = 1311/1331	43 = 1431/1451	55 = 1551/1571
35 = 1351/1371	47 = 1471/1491	59 = 1591/1611

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

Contact Omnitron for custom CWDM modules.

Mobile Backhaul to Multiple Cell Towers CWDM Application



This application example demonstrates how to deploy iConverter CWDM Multiplexers and CWDM Add+Drop Multiplexers to expand the capacity of fiber mobile backhaul access networks. On the left is a high-density 19-Module Chassis populated with 8-Channel CWDM/X Multiplexer modules located at a Mobile Switching Center (MSC).

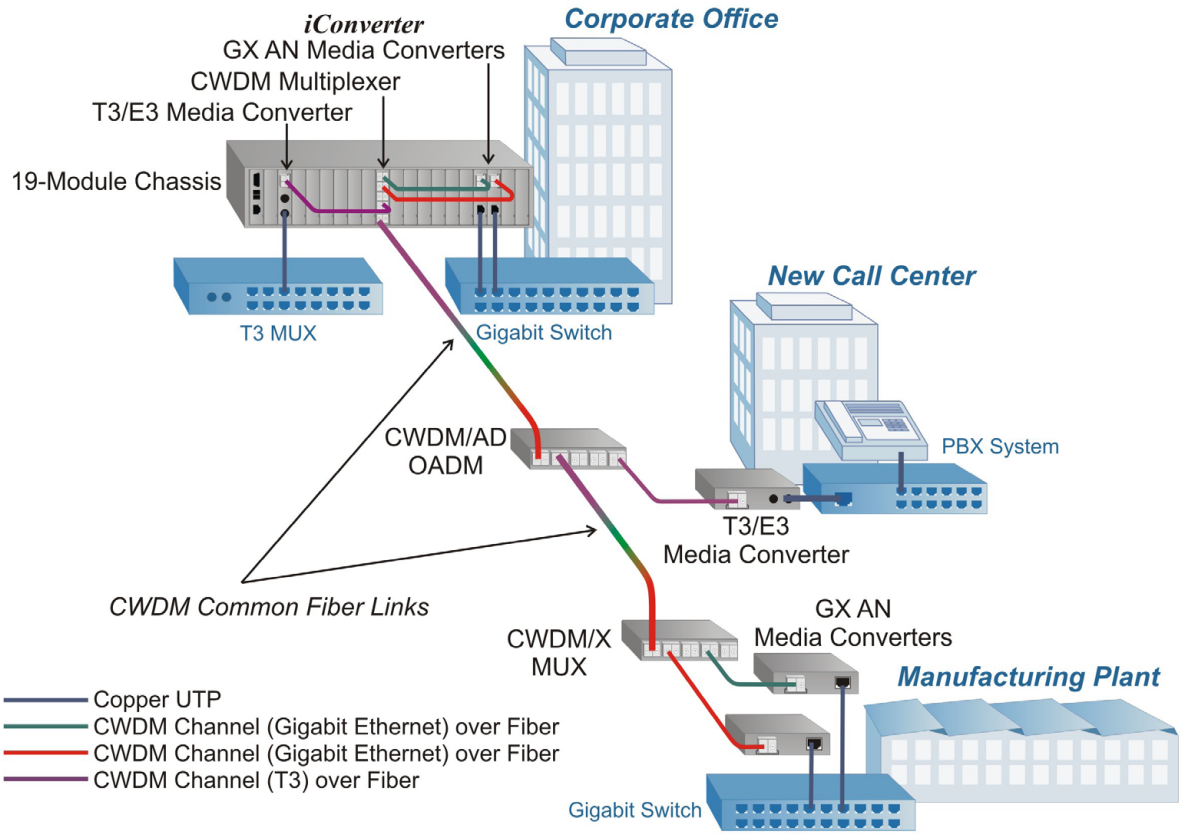
Each CWDM/X module has eight channel ports, and each channel port connects to a GM4 Network Interface Device (NID) or a Modular T1/E1 and Ethernet Multiplexer. The NIDs provide Gigabit Carrier Ethernet backhaul for 4G/LTE services, and the T1 MUX transports up to sixteen T1s and Gigabit Carrier Ethernet for 3G services. Each of the NIDs and T1 MUXes are equipped with CWDM SFP Transceivers that match the wavelength of the CWDM/X channel ports, and are connected to the channel ports with fiber patch cables (color coordinated in the illustration for each wavelength).

Each fiber strand (Common Fiber Link) from the MSC can transport up to 8 CWDM channels, and each channel has a capacity of up to 10 Gigabits. Sixteen channels can be transported over each fiber strand when two 8-Channel CWDM/X modules are connected with an optional Band Splitter.

A 2-Channel CWDM/AD Add+Drop Multiplexer is located at each tower along a fiber daisy chain (bus topology). Each CWDM/AD filters out two of the appropriate channels at each tower. The other channels pass through the CWDM/AD Multiplexer and daisy chain to the next Add+Drop location.

At the second cell tower, the 1510nm channel transports sixteen T1s and Carrier Ethernet for 3G services, and is connected to a Modular T1/E1 Multiplexer with a GM4 NID transport module equipped with a 1510nm CWDM SFP transceiver. The 1530nm channel is transporting Carrier Ethernet for the 4G/LTE service, and is connected to a standalone GM4 NID with a 1530nm CWDM SFP transceiver. The GM4 NID provides performance monitoring, fault management and 1588 time synchronization for the 4G/LTE service.

Enterprise CWDM Application



This application demonstrates how a point-to-point fiber link can be upgraded to a multi-protocol, multi-drop network. A campus LAN originally had a single-mode, dual fiber link between the Corporate Offices and the Manufacturing Plant. This fiber link was connected to copper Gigabit switches with media converters (not shown), and due to company growth, there is a need to add another Gigabit Ethernet connection. In addition, a new Call Center has been added that requires T3 connectivity to a PBX system.

To support the new requirements, the existing fiber is used to create a Coarse Wavelength Division Multiplexing (CWDM) network. In the diagram, the fiber links are color coded to represent the different CWDM channels (wavelengths).

Two UTP Gigabit ports from the copper Gigabit switch at the Corporate Office are converted to fiber using iConverter GX AN media converters equipped with CWDM Small Form Pluggable (SFP) transceivers with unique CWDM channels. Both media converters are installed in a high-density, 19-Module Chassis in order to save rack space, power and cost.

An iConverter T3/E3 media converter is used to convert the copper (coax) T3 circuit to fiber using a CWDM SFP with a third unique CWDM channel.

All three channels are connected with fiber jumpers to an iConverter 4-Channel CWDM/X Multiplexer module that is mounted in the same high-density chassis with the media converters. The CWDM/X MUX combines all the channels and sends them on a CWDM common link (the original single-mode dual fiber link).

At the new Call Center building, an iConverter CWDM/AD Optical Add+Drop Multiplexer (OADM) is used to filter out the 1590 channel carrying the T3 service from the CWDM common link. A standalone T3/E3 media converter with a CWDM SFP is used to convert the signal from optical back to its native coax interface. The remaining channels continue to the Manufacturing Plant.

At the Manufacturing Plant, a standalone CWDM/X MUX separates the remaining channels. The fibers for each channel are connected to standalone GX AN media converters with CWDM SFPs that provide the UTP connections to the Gigabit Ethernet switches.

This application demonstrates how CWDM multiplexers and OADMs can be used to add new data channels to existing fiber infrastructure in a simple and cost-effective manner. Three channels are multiplexed over the fiber links, and the 4-Channel MUX in this application has an unused channel port for future growth.

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						31
XG	8599				✓	2	✓**			✓	✓						UNL			✓	✓	✓	31
XG+	8599N				✓	2	✓***			✓	✓						UNL			✓	✓	✓	31
xFF	8699	Up to 8.5 Gbps				2	✓			✓	✓						UNL			✓			33
GX/T2	8520N	✓	✓	✓		1	1	1	10/100/1000	✓	✓	✓	✓	✓	✓	✓	10,240	✓*	✓	✓	✓		33
GX/T	8520	✓	✓	✓		1		1	10/100		✓	✓	✓	✓		✓	1,536		✓	✓	✓		33
Gx AN	8500N			✓		1	✓	1		✓	✓						UNL			✓			34
GX/X	8542			✓		2			10/100		✓	✓	✓	✓		✓	1,536		✓	✓	✓		34
GX/F	8562		✓	✓		2			10/100		✓	✓	✓	✓		✓	1,536		✓	✓	✓		34
1000FF	8642			✓		2				✓	✓						UNL						36
10/100	8380	✓	✓			1		1	10/100		✓						1,536			✓			37
100Fx/Tx	8360		✓			1		1			✓						UNL			✓			37
2Fx	8440		✓			2			10/100		✓	✓	✓	✓	✓	✓	1,536	✓	✓	✓	✓		36
100FF	8620	✓	✓			2				✓	✓						UNL						36
10FL/T	8300	✓				1		1			✓						UNL			✓			37
10T/2	8340	✓						2	10		✓												37
4GT	8482	✓	✓	✓				4	10/100/1000	✓	✓	✓	✓	✓	✓	✓	10,240	✓*	✓				38
4Tx	8480	✓	✓					4	10/100		✓	✓	✓				1,536		✓				38
4TxVT	8481	✓	✓					4	10/100		✓	✓	✓	✓	✓	✓	1,536	✓	✓				38
Tx/2Fx	8420		✓			2		1			✓						UNL			✓	✓		38
Tx/2Tx	8400		✓					3			✓						UNL			✓	✓		38

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

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 copper to fiber converters, 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 (fiber and CX4 copper)
  - SFP+ to XFP (fiber and CX4 copper)
  - SFP+ to SFP+
- 10GBASE-CX4 XFPs enable 10G copper to fiber conversion
- 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 extended 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 SFP+ and XFP transceivers separately. See ordering information on pages 56 and 57.

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 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 DC Power 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 extended 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) 1m
7499-DC-3	10 Gigabit SFP+ Direct Attach Cable (Twinax) 3m

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 and copper-to-copper media conversion. Copper-to-fiber conversion is achieved with XFP or SFP+ fiber transceivers. Copper-to-copper conversion is achieved with a CX4 XFP transceiver. 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+
- Copper-to-Copper interfaces: RJ-45 to CX4
- 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 SFP+ and XFP transceivers separately. See ordering information on pages 56 and 57.

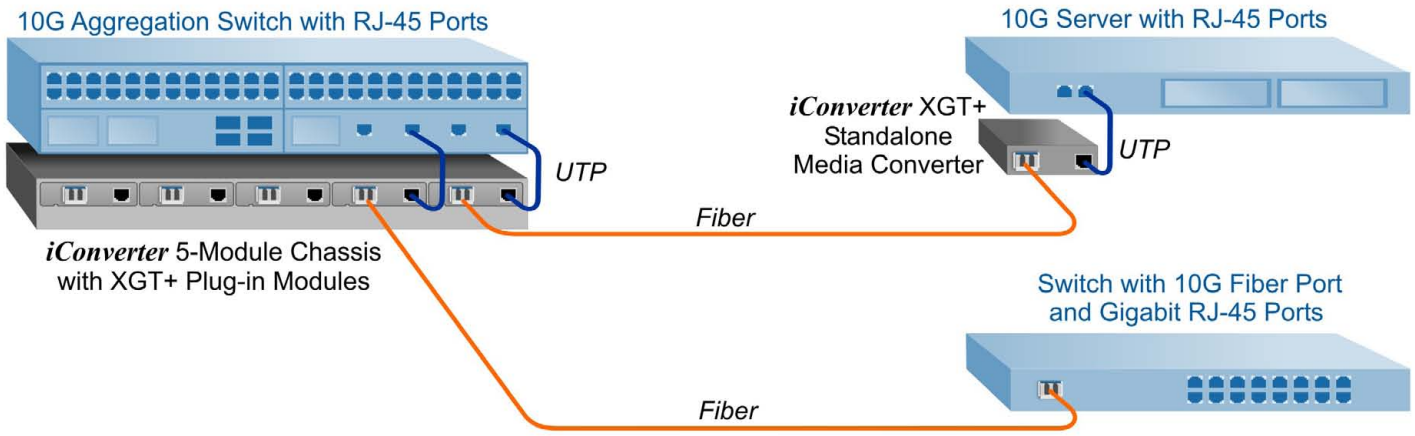
To specify standalone module type and power options, add a suffix to the model number:
- D: Standalone with mounting brackets and external US AC/DC Power Adapter
- E: Standalone with mounting brackets and external Universal AC/DC Power Adapter
- F: Standalone with mounting brackets and DC Power Terminal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



iConverter XGT+ 10G media converters provide a variety of 10G data center connectivity solutions, including resolving interface disparities between equipment with 10GBASE-T RJ-45 ports and existing rack servers or switches with fiber optic ports. Architecture changes such as migrating from Top of Rack to End of Row can present cabling challenges when extending network distances from racks of servers.

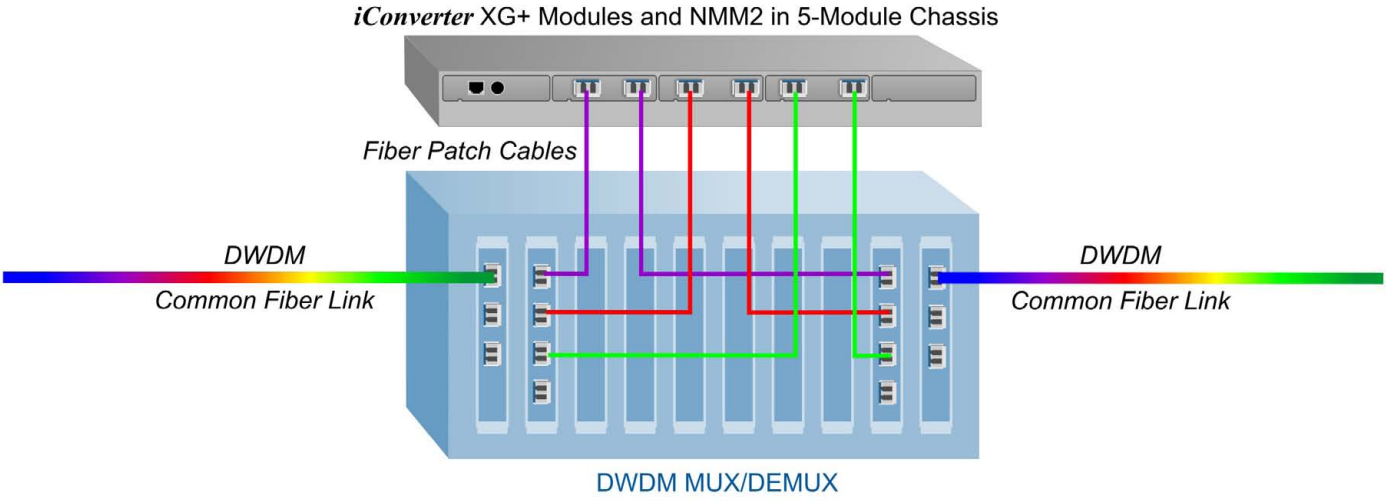
In this application, fiber cabling is used to extend distances between 10G switches and servers. A 5-Module Chassis with XGT+ 10G plug-in media converters is used to convert the CAT-6A cabling from the RJ-45 ports on the aggregation switch to fiber.

The XGT+ supports SFP+ or XFP transceivers, and can achieve fiber distances of up to 80km.

At the other end of the first fiber run, a standalone XGT+ is used to convert the fiber back to copper for connectivity to a 10G server with RJ-45 ports. The second fiber run connects directly to a fiber port on a 10G switch.

The XGT+ supports 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 to conserve energy by reducing power and cooling requirements.

10G DWDM Tunable Transceiver Application



Tunable XFP transceivers are configurable to support a specific channel in a DWDM optical network. Tunable XFPs allow network operators to remotely change wavelengths (channel paths) when they need to redistribute bandwidth, or reconfigure/upgrade traffic patterns and services.

The iConverter NMM2 Network Management Module enables the XG+ 10G media converter management to configure the tunable XFPs.

This application shows three 10G OTN connections across an DWDM network. Three iConverter XG+ modules with high-power XFPs are installed in a 5-Module Chassis and connected with fiber patch cables to a DWDM Multiplexer. The XG+ modules function as fiber repeaters and wavelength transponders. The installed high-power XFPs perform Forward Error Correction on the incoming signal, then the amplified and re-encapsulated outbound OTN signal is transmitted out the other port.

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 temperature range (-40 to 60°C)

Port 1	Port 2	Model #
SFP	SFP	8699-0*

* Order SFP transceivers separately. See SFP ordering information on pages 56 and 57.

xFF media converters are available as chassis managed plug-in modules or compact, unmanaged standalone units. 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 DC Terminal Power

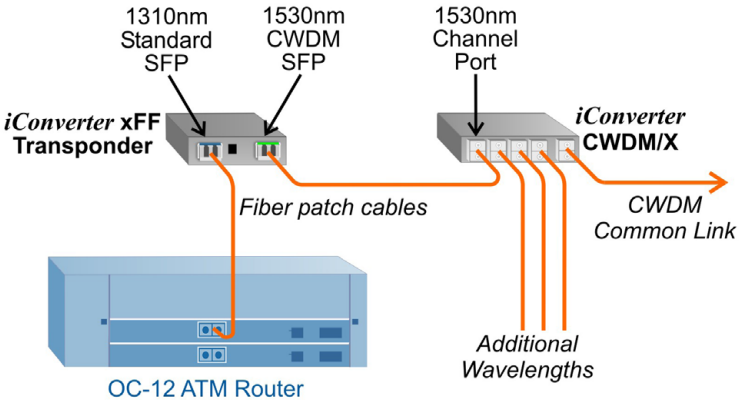
For wide temperature (-40 to 60°C), add a "W" to the end of the model number.

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

xFF CWDM Transponder Application

Fiber optic communications equipment with fixed fiber interfaces operating over 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/T and GX/T2

10/100/1000 Ethernet UTP to Fiber Converter Modules

The iConverter GX/T and GX/T2 are 10/100/1000BASE-T UTP 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.

- Supports IEEE 802.1Q VLAN Mapping
- 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)
- The GX/T2 supports the features of the GX/T, and adds:
  - 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

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

* Single-fiber converters must be used in pairs.
** Only available for GX/T2

To order a GX/T2 with ST or SC connectors, add an N to the model number - 8250**N**-0. Order SFP transceivers separately. See ordering information on pages 56 and 57.

GX/T2 media converters are available as chassis managed plug-in modules or compact, unmanaged standalone units. 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 DC Power 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 DC Terminal Power

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 - 8250-0**W**.

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

iConverter Gx AN

Gigabit Ethernet UTP to Fiber Converter Modules

The iConverter Gx AN provides 1000BASE-T UTP 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	8519N-0**				
MM	220m/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
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*	-

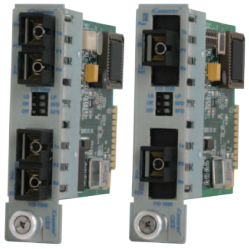
*Single-fiber converters must be used in pairs.
** Order SFP transceivers separately. See SFP ordering information on pages 56 and 57.

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 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 DC Power 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 extended temperature (-40 to 75°C) models.



iConverter GX/X and GX/F

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

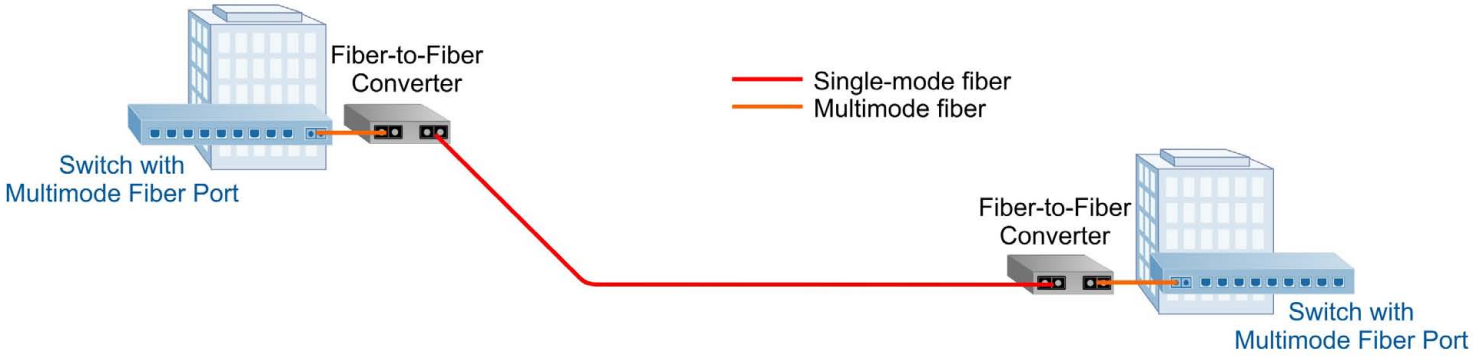
The iConverter GX/X is a Gigabit to Gigabit Ethernet fiber to fiber converter, and the iConverter GX/F is a Gigabit to Fast Ethernet bridging fiber to fiber converter. They provide single-mode to multimode and dual fiber to single-fiber conversion, and perform regeneration, retiming and reshaping of 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 extended temperature (-40 to 75°C) models.

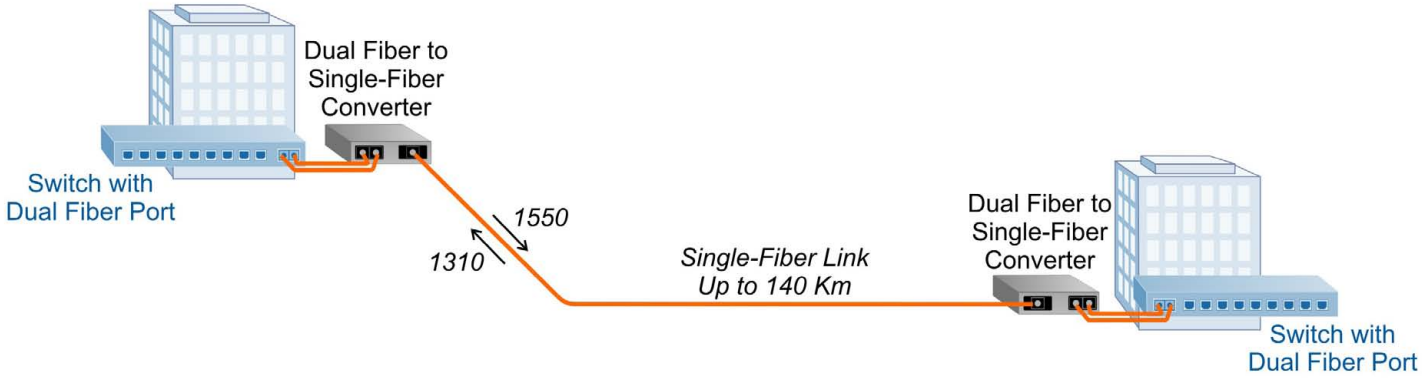
Multimode to Single-Mode Application



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	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**

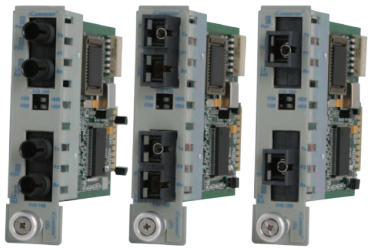
* All single-fiber ports are SC connectors.
** Single-fiber converters must be used in pairs with opposite Tx and Rx.

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 DC Terminal Power

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 extended 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
2 X SM-SF	20km	13-15/13-15	-	8450-1*	-
2 X SM-SF	20km	15-13/15-13	-	8451-1*	-
2 X SM-SF	40km	13-15/13-15	-	8450-2*	-
2 X 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 extended temperature (-40 to 75°C) models.

Related Applications

Multimode to Single-Mode Conversion.....Page 35
Dual Fiber to Single-Fiber Conversion.....Page 35

iConverter 10/100

10/100 Ethernet UTP to Fiber Converter Modules

The iConverter 10/100 converts 10/100Mbps UTP 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
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 extended temperature (-40 to 75°C) models.

Related Applications

Ethernet Point to Point Application.....Page 44

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

100Mbps and 10Mbps Ethernet Converter Modules

The iConverter 100Fx/Tx provides 100BASE-TX UTP 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 UTP 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 UTP 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
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			-

*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 extended 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 extended temperature (-40 to 75°C) ranges
- The 4GT supports wide temperature (-40 to 60°C)

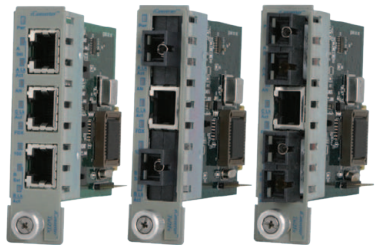
Module	Ports	Distance	Model Number
iConverter 4Tx	Four 10/100BASE-T RJ-45	100m	8480-4
iConverter 4TxVT	Four 10/100BASE-T RJ-45	100m	8481-4
iConverter 4GT	Four 10/100/1000BASE-T RJ-45	100m	8482-4

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 DC Terminal Power

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

Related Application

Managed Ethernet Campus LAN.....21



iConverter Tx/2Fx and Tx/2Tx

Fast Ethernet UTP to Redundant Fiber and

Fast Ethernet UTP to Redundant UTP 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/UTP	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**						
UTP	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 extended 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)

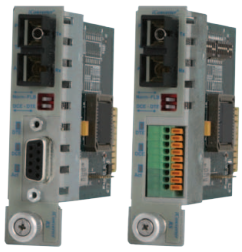
Fiber	Distance	Wavelength (nm)	Connector Type		
			ST	SC	LC
SFP	8859-0**				
MM	2km	850	8840-5	-	-
MM	5km	1310	8840-0	8842-0	8846-0
SM	30km	1310	8841-1	8843-1	8847-1
SM	60km	1310	8841-2	8843-2	8847-2
SM	120km	1550	-	8843-3	8847-3
SM-SF	20km	1310/1550	-	8850-1*	-
SM-SF	20km	1550/1310	-	8851-1*	-
SM-SF	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 SFP separately. See SFP ordering information on pages 56 and 57.

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 DC Power 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 DC Power 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 extended 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 extended temperature (-40 to 75°C) models.

Related Application

RS-232 Over Fiber Application.....Page 45

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 Power

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 extended 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)

Model #	Description
8899S-0*	OC3/STM1 Chassis Plug-In Module

* Order SFP transceivers separately. See SFP ordering information on pages 56 and 57.

iConverter STM1 media converters are available as chassis managed plug-in modules or compact, unmanaged standalone units. To order an unmanaged standalone unit, 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 Power

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

Contact Omnitron for extended 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
***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*	-
SM-SF	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.

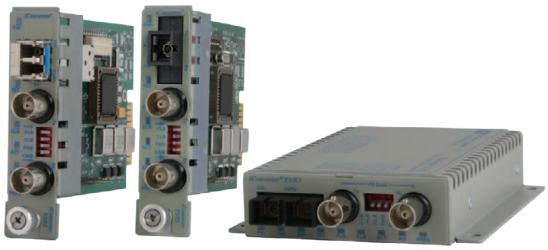
*** Order SFPs separately. See SFP ordering information on pages 56 and 57..

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 DC Terminal Power

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 extended 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	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 56 and 57.

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 DC Terminal Power

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 extended temperature (-40 to 75°C) models.

Related Applications

T3 over CWDM Application.....Page 29
T1 Demarcation Extension Application.....Page 45

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 UTP to Gigabit Fiber Media Converters

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

- Conforms to 10BASE-T, 100BASE-TX, 1000BASE-T, 100BASE-FX[1] and 1000BASE-X specifications
- Supports jumbo frames up to 10,240 bytes
- Supports 100BASE-FX or 1000BASE-X SFP transceivers for standard or CWDM wavelengths
- Multimode (MM) and single-mode (SM) fiber with ST and SC 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	SFP
SFP	-	-	-	-	4719-x**
MM	220/550m	850	4706-x	4700-x	-
SM	12km	1310	4707-x	4701-x	-
SM	34km	1310	-	4702-x	-
SM	80km	1550	-	4703-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-FX is supported on SFP models only.
* Single-fiber converters must be used in pairs.
** Order the required SFPs separately. See SFP ordering information on pages 56 and 57.

POWER OPTIONS (-x)
-0 No Power Supply
-1 110V (US Standard)
-2 110V/230V Auto-sensing (Universal)

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 UTP to Fiber Media Converters

Fast Ethernet UTP to Fiber Media Converters

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

- Fiber port supports auto or manual negotiation
- UTP 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 UTP 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.

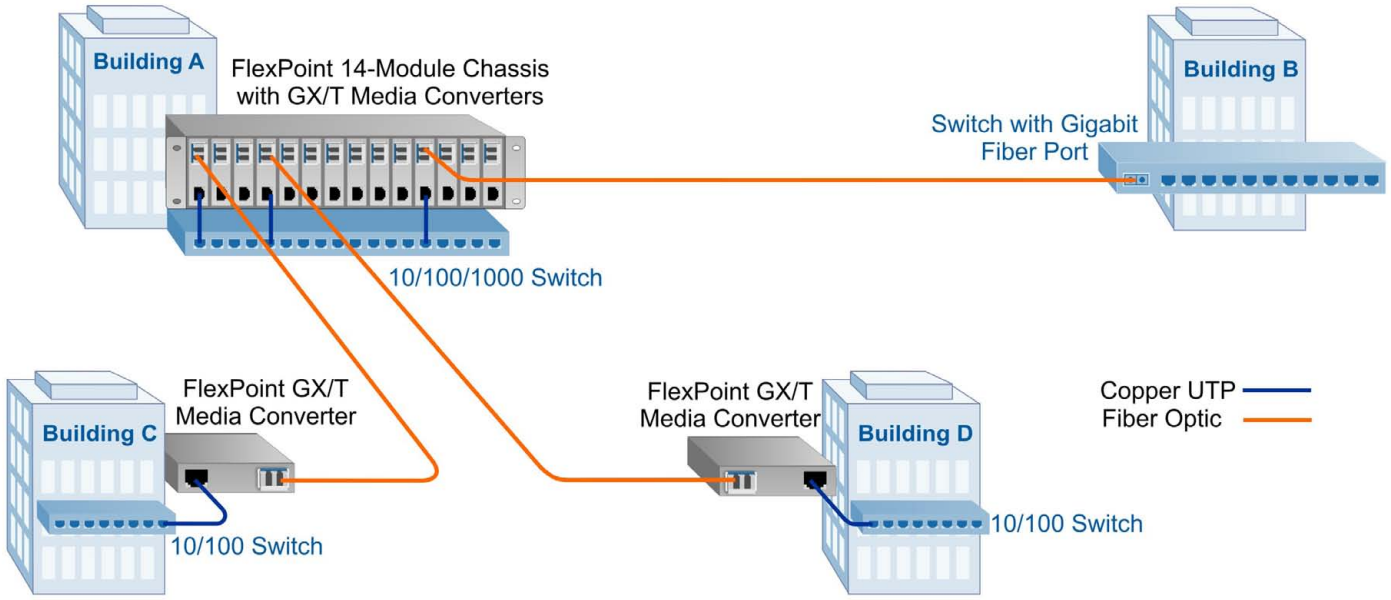
- Supports auto-negotiation of duplex modes for easy installation
- Extends network distances up to 120km
- Features a crossover switch for connection to switches or workstations
- Supports wide temperature range (-40 to 60°C)

Fiber	Distance	Wavelength (nm)	Connector Type			
			ST	SC	MT-RJ	LC
FlexPoint Gx						
MM	220m/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	-
SM	30km	1310	4333-x	4331-x	4337-x	-
SM	60km	1310	4335-x	4334-x	-	-
SM	120km	1550	-	4351-x	-	-

POWER OPTIONS (-x)
-0 No Power Supply
-1 110V (US Standard)
-2 110V/230V Auto-sensing (Universal)

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.

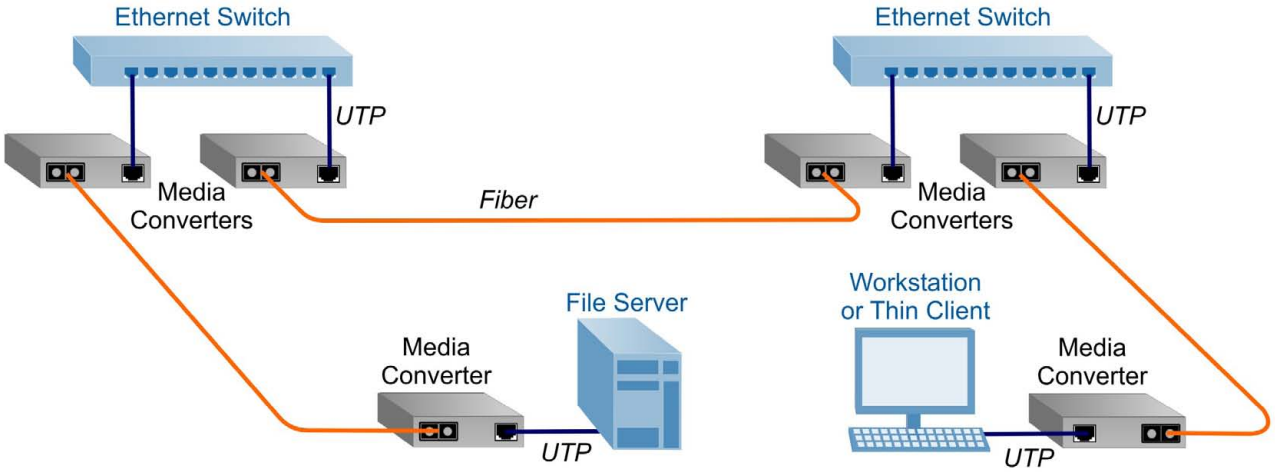
At Buildings C and D, FlexPoint GX/T media converters provide copper-to-fiber connectivity to department switches, and bridging between the Gigabit fiber and the 10/100 switches.

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

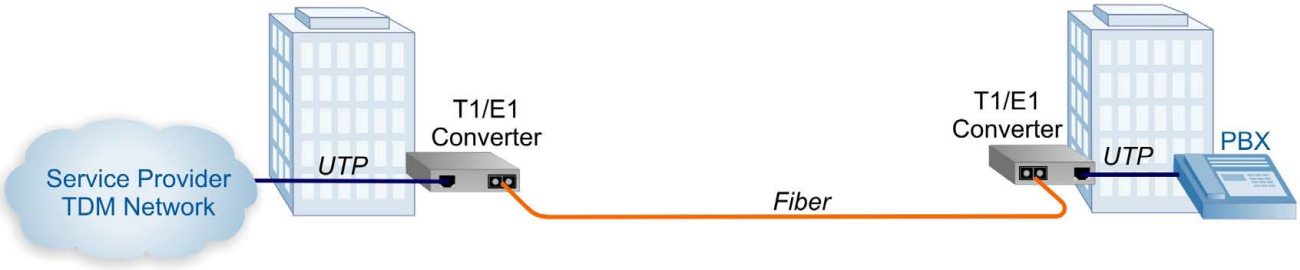


This application example demonstrates how copper to fiber media converters enable fiber connectivity to extend network distances. FlexPoint copper-to-fiber media converters support a variety of cabling and connectors, different network protocols, and data rates from 10 Mbps to 1 Gigabit.

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.

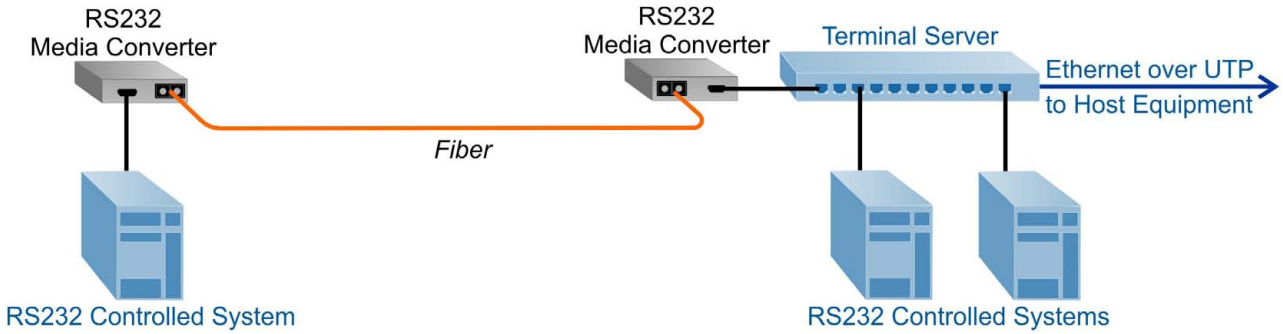
T1/E1 Demarcation Extension Application



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.

FlexPoint 10/100

10/100 UTP 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.

- UTP 10/100 and Full/Half-Duplex auto-sensing with manual override controls
- Supports 100BASE-FX 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 extended (-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.

POWER OPTIONS (-x)
-0 No Power Supply
-1 110V (US Standard)
-2 110V/230V Auto-sensing (Universal)
-9 2-Pin Terminal Connector

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

Related Applications

Ethernet Point to Point Application.....Page 44

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 UTP or coax.

- The FlexPoint 10FL/T connects 10BASE-FL fiber and 10BASE-T UTP 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 UTP 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 UTP 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	311-x	-	-
FlexPoint 10T/2					
UTP/Coax 100m/185m		-	-	-	4320-x
FlexPoint 10AUI/T (AUI Connector)					
UTP/AUI 100m/50m		-	4321-x		

POWER OPTIONS (-x)
-0 No Power Supply
-1 110V (US Standard)
-2 110V/230V Auto-sensing (Universal)

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/Port2	Wavelength (nm) Port 1/Port2	Connector Type	
			ST	SC
FlexPoint 100FF				
MM/MM	5km/5km	1310/1310	4420-x	4421-x
MM/MM	2km/5km	850/1310	4418-x	4419-x
MM/SM	5km/30km	1310/1310	4410-x	4411-x
MM/SM	5km/60km	1310/1310	4412-x	4413-x
MM/SM	2km/30km	850/1310	4414-x	4415-x
MM/SM	2km/60km	850/1310	4416-x	4417-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/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	2km/30km	850/1310	4454-x	4455-x
MM/SM	2km/60km	850/1310	4456-x	4457-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

POWER OPTIONS (-x)
-0 No Power Supply
-1 110V (US Standard)
-2 110V/230V Auto-sensing (Universal)

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

Related Applications

Multimode to Single-Mode Application.....Page 35
Dual Fiber to Single-Fiber Application.....Page 35

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

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
MM	2.5km	850	4481-x	4480-x
MM	5km	1310	4483-x	4482-x
SM	30km	1310	4485-x	4484-x
SM	60km	1310	-	4486-x

POWER OPTIONS (-x)
-0 No Power Supply
-1 110V (US Standard)
-2 110V/230V Auto-sensing (Universal)

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

Related Applications

T1 Demarcation Extension Application.....Page 45
RS-232 Over Fiber Application.....Page 45

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.
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

UTP to Fiber Gigabit Media Converters

The miConverter GX/T converts 10/100/1000BASE-T UTP 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 UTP copper to 1000BASE-X fiber. 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 UTP configuration
- Advanced fault detection modes
- The GX/T supports 10,240 byte jumbo frames and features fixed fiber connectors or SFPs
- 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)	*miConverter* Gx		*miConverter* GX/T	
			ST	SC	ST	SC
SFP	-	-	-		1239-0-x**	
MM	220m/550m	850	1200-0-x	1202-0-x	1220-0-x	1222-0-x
SM	12km	1310	1201-1-x	1203-1-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
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 56 and 57.

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
-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
-9 2-pin 5-12VDC terminal connector (Available only with GX/T)

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).

Example:1221-1-1Y miConverter GX/T SM/DF/12km/1310/ST with external US AC power adapter and industrial temperature range.

miConverter 10/100 and 10/100 Plus

10/100 UTP to Fast Ethernet Fiber Media Converters

The miniature miConverter 10/100 is a rate-switching copper UTP 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 UTP configuration and advanced fault detection modes

Fiber	Distance	Wavelength (nm)	*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
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	-	1131-3-x*	-	1131-3-x*

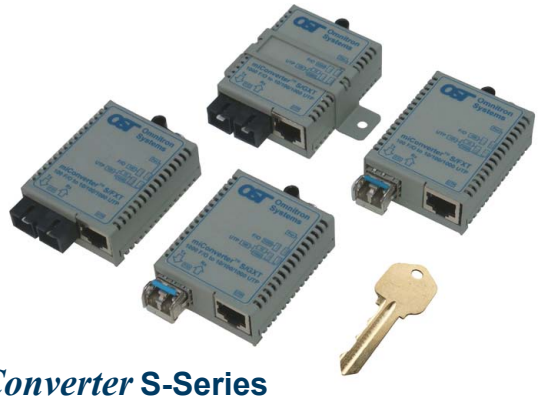
* Single-fiber converters must be used in pairs.

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
-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-FX
- 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)

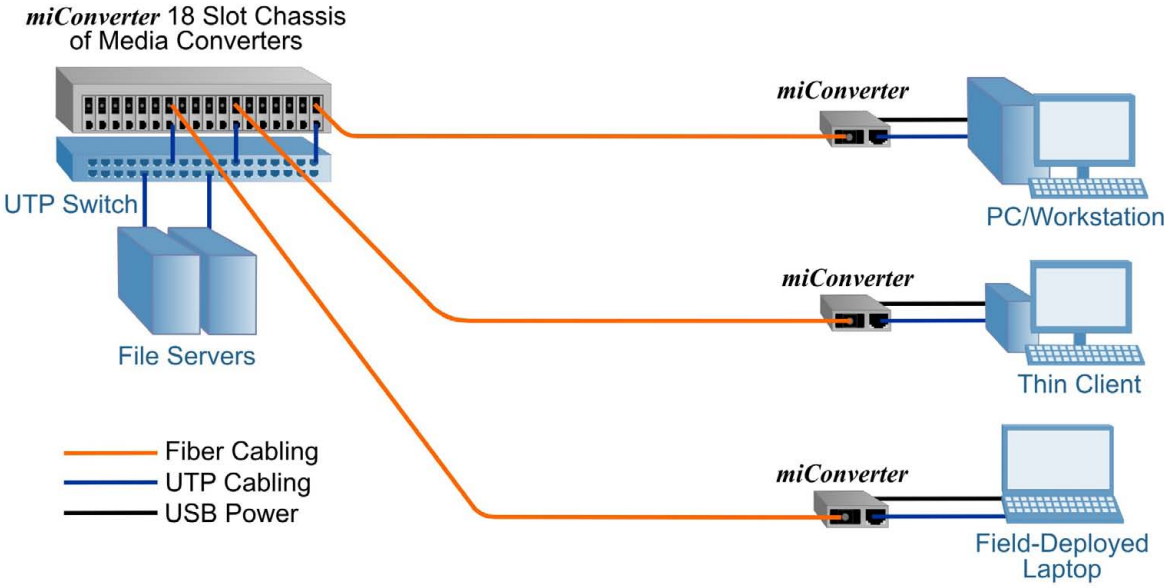
Fiber	Distance	Wavelength (nm)	ST	ST Metal	SC	SFP
***miConverter* S/FXT Fast Ethernet Media Converter**						
SFP	-	-	-	-	-	1619-0-x**
MM	5km	1310	1600-0-x	1600M-0-x	1602-0-x	-
SM	30km	1310	1601-1-x	1601M-1-x	1603-1-x	-
SM-SF	20km	1310/1550	-	-	1610-1-x*	-
SM-SF	20km	1550 /1310	-	-	1611-1-x*	-
***miConverter* 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 56 and 57.

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.

Fiber to the Desk and Field-Deployed Laptop Application



Fiber optic technology provides a higher level of signal quality and security than copper UTP. A fiber optic network link is immune to EMI, RFI, cross-talk, ground loops and other electrical problems, greatly enhancing the signal quality in severe environments. Conversely, fiber optic links do not generate EMI or RFI signals that can lead to security breaches like copper UTP. These characteristics make fiber to the desktop/laptop extremely attractive to operators of high-security Enterprise and Government networks.

- High-security networks
- Thin Client Virtualization
- LAN networks with long distance links to workstations
- Fiber-to-the-laptop where local power is unavailable

miConverter media converters enable fiber-to-the-desktop connectivity, and overcome the challenges of installing a fiber optic Network Interface Card (NIC) in each workstation. miConverter media converters are more cost-effective 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 core switch is converted to fiber with miConverter media converters installed in a miConverter 18-Module Chassis.

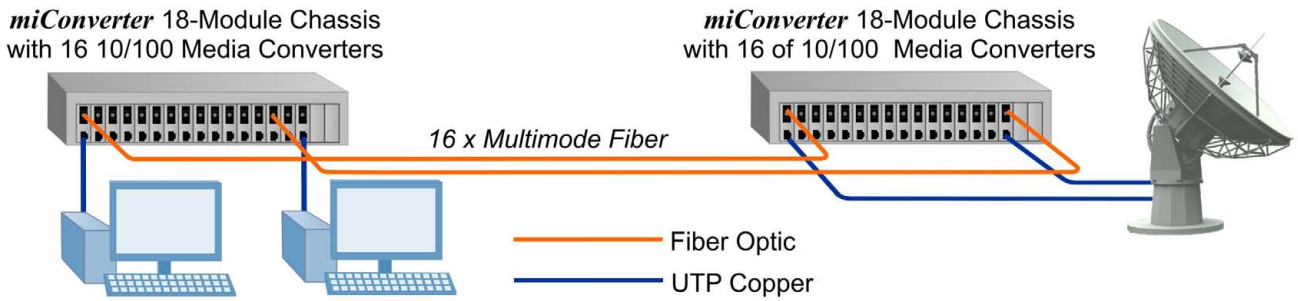
Fiber is distributed to a PC or Workstation. A miConverter media converter converts the fiber to a UTP cable that is connected to the PC, and draws power from the PC's USB port (with a USB power cable represented by the black line), and can be attached to the PC with Velcro.

Fiber is distributed to a Thin Client. A miConverter converts the fiber to copper and provides connectivity to the Thin Client device that does not have a fiber port. The miConverter can be attached to the side of the Thin Client device with a Velcro tab, or can be wall-mounted using optional wall-mounting brackets. The miConverter module is powered directly from a USB port on the Thin Client device, eliminating the need for an electrical outlet and saving energy costs.

Fiber is distributed to a field-deployed laptop computer. A miConverter 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 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 are a reliable and cost-effective solution for fiber-to-the-desk connectivity, and are available in 10/100 and 10/100/1000 models.

Military Satellite Uplink Application



Military network-centric systems integrate sensors, shooters and battle management, command, control, communications and intelligence systems for Army Air and Missile Defense. Network-centric systems allow warfighters to take advantage of expanded sensor and weapon system combinations via an integrated fire control network.

miConverter media converters are network-centric components that enable fiber optic connectivity between satellite equipment and workstations (portable laptops and/or desktops depending on locations).

In this application diagram, miConverter 18-module chassis with miniature miConverter media converters are deployed at a satellite uplink station and at a facility with workstations. Sixteen fiber optic cables are run between the two locations, and each cable transports 100Mbps Ethernet data for communications with other Army Air and Missile Defense vehicles and bases.

At the workstation facility, the media converters provide copper-to-fiber conversion for connectivity to PCs or laptop computers. At the satellite uplink, media converters provide fiber connectivity to sensors and communications devices with RJ-45 ports.

miConverter miniature media converters feature a compact form factor and support a wide temperature range of -40 to 60^{O}C to provide a reliable and cost-effective fiber connectivity solution for military communications.

OmniConverter PoE/PoE+ Media Converters

OmniConverter media converters provide Fiber to UTP conversion and support Power over Ethernet (PoE and PoE+) on the RJ-45 ports. Functioning as a PoE mini-switch, OmniConverter media converters support a variety of port configurations, including single or dual RJ-45 or fiber ports.

The OmniConverter GPoE/S, FPoE/S and FPoE/SL models support the IEEE 802.3af PoE standard (up to 15.4W per port), and the high power GPoE+/S and FPoE+/S models also support the IEEE 802.3at PoE+ standard (up to 25.5W per port).

Extend Distances to PoE/PoE+ Devices

OmniConverter PoE and PoE+ media converters provide network distance extension to surveillance cameras, wireless access points and other PoE Powered Devices (PDs) with fiber cabling.

Classified as Power Sourcing Equipment (PSE), OmniConverter media converters provide power to one or two Powered Devices (PDs) using standard UTP cables that carry the Ethernet data. PoE PDs include a variety of equipment such as IP phones, wireless access points and network cameras.

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 for daisy-chaining multiple media converters, or it may be used as another switch port.

OmniConverter media converters are temperature hardened for outdoor deployments in extreme environments with wide temperature (-40 to 60°C) and extended temperature (-40 to 75°C) ranges.

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 GPoE+/S and GPoE/S

Gigabit Power Sourcing Media Converters

- 100/1000BASE-X fiber to 10/100/1000BASE-T UTP
- GPoE+/S supports IEEE 802.3af PoE and IEEE 802.3at PoE+
- GPoE/S supports IEEE 802.3af PoE
- 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
- Supports wide temperature (-40 to 60°C) and extended temperature (-40 to 75°C) ranges

Fiber	Distance	Wavelength (nm)	Connector Type			
			GPoE+/S		GPoE/S	
			ST	SC	ST	SC
MM	220/550m	850	9420-0	9422-0	9400-0	9402-0
SM	12km	1310	9421-1	9423-1	9401-1	9403-1
SM	34km	1310	-	9423-2	-	9403-2
SM	80km	1550	-	9423-3	-	9403-3
SM	110km	1550	-	9423-4	-	9403-4
SM	140km	1550	-	9423-5	-	9403-5
SM-SF	20km	1310/1550	-	9430-1*	-	9410-1*
SM-SF	20km	1550/1310	-	9431-1*	-	9411-1*
SM-SF	40km	1310/1550	-	9430-2*	-	9410-2*
SM-SF	40km	1550/1310	-	9431-2*	-	9411-2*
100/1000 SFP			9439-0**		9419-0**	
100/1000 SFP (x2)			9439-1**		9419-1**	

*Single-fiber converters must be used in pairs.
** Order SFPs separately. See SFP ordering information on pages 56 and 57.

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 terminal block

To order wide operating temperature range (-40 to 60°C) add a "W" to the end of the model number - 9xxx-x-xxW. To order extended operating temperature (-40 to 75°C) add a "Z" to the end of the model number - 9xxx-x-xxZ.

Contact Omnitron for other fiber options.

OmniConverter GPoE/SE

Gigabit Power Sourcing Media Converters

The cost-effective OmniConverter GPoE/SE multi-port media converters provide 10/100/1000BASE-T UTP to 1000BASE-X fiber conversion with Power over Ethernet (PoE).

GPoE/SE media converters support fixed-fiber connectors and Small Form Pluggable (SFP) transceivers, enabling easy adaptability to different fiber types, distances and wavelengths. The products support multimode, single-mode, single-mode single-fiber, in standard and CWDM wavelengths.

Models are available with one or two RJ-45 ports. Each port independently provides up to 15.4W of power to a PD per the IEEE 802.3af specification.

- 1000BASE-X fiber to 10/100/1000BASE-T UTP
- Supports IEEE 802.3af PoE
- Models available with single or dual RJ-45 PoE ports
- Supports wide temperature (-40 to 65°C) temperature range

Fiber	Distance	Wavelength (nm)	Connector Type		
			ST	SC	SFP
MM	220/550m	850	9460-0	9462-0	-
SM	12km	1310	9461-1	9463-1	-
SM	34km	1310	-	9463-2	-
SM	80km	1550	-	9463-3	-
SM	110km	1550	-	9463-4	-
SM	140km	1550	-	9463-5	-
SM-SF	20km	1310/1550	-	9470-1*	-
SM-SF	20km	1550/1310	-	9471-1*	-
SM-SF	40km	1310/1550	-	9470-2*	-
SM-SF	40km	1550/1310	-	9471-2*	-
-	-	-	-	-	9479-0**

* Single-fiber converters must be used in pairs.
** Order SFPs separately. See SFP ordering information on pages 56 and 57.

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 terminal block

To order wide operating temperature range (-40 to 65°C) add a “W” to the end of the model number - 9xxx-x-xxW.

Contact Omnitron for other fiber options.

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

Fast Ethernet Power Sourcing Media Converters

- 100BASE-FX fiber to 10/100BASE-T UTP conversion
- FPoE+/S supports IEEE 802.3af PoE and IEEE 802.3at PoE+
- FPoE/S and FPoE/SL support IEEE 802.3af PoE
- 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
- Supports wide temperature (-40 to 60°C) and extended temperature (-40 to 75°C) ranges

Fiber	Dist.	Wave-length (nm)	Connector Type					
			FPoE+/S		FPoE/S		FPoE/SL	
			ST	SC	ST	SC	ST	SC
MM	5km	1310	9320-0	9322-0	9300-0	9302-0	9340-0	9342-0
SM	30km	1310	9321-1	9323-1	9301-1	9303-1	9341-1	9343-1
SM	60km	1310	9321-2	9323-2	9301-2	9303-2	9341-2	9343-2
SM	120km	1550	-	9323-3	-	9303-3	-	9343-3
SM-SF	20km	1310/1550	-	9330-1*	-	9310-1*	-	9350-1*
SM-SF	20km	1550/1310	-	9331-1*	-	9311-1*	-	9351-1*
SM-SF	40km	1310/1550	-	9330-2*	-	9310-2*	-	9350-2*
SM-SF	40km	1550/1310	-	9331-2*	-	9311-2*	-	9351-2*
100 SFP			9339-0**		9319-0**		9359-0**	
100 SFP (x2)			9339-1**		9319-1**		9359-1**	

*Single-fiber converters must be used in pairs.
** Order SFPs separately. See SFP ordering information on pages 56 and 57.

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 terminal block

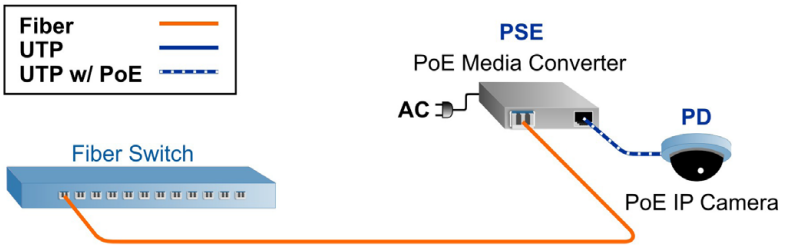
To order wide operating temperature range (-40 to 60°C) add a "W" to the end of the model number - 9xxx-x-xxW. To order extended operating temperature (-40 to 75°C) add a “Z” to the end of the model number - 9xxx-x-xxZ.

Contact Omnitron for other fiber options.

How PoE Injector Media Converters Work

In this surveillance camera application, a fiber switch is located in a control room and connected to video recording equipment.

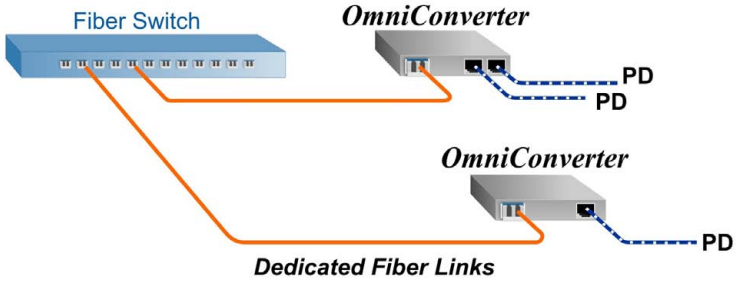
The fiber can extend up to 140 kilometers, depending on the fiber type and optical power of the media converters. At the remote end, fiber is terminated by an OmniConverter PoE/PoE+ media converter located near a convenient AC or DC power source. The OmniConverter functions as both a media converter and 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 Port Configuration Applications

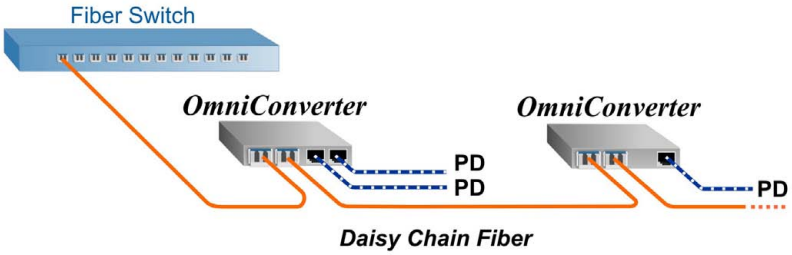
Dual RJ-45 Ports

OmniConverter media converters feature optional dual RJ-45 ports that support powering two PoE or PoE+ devices. This allows for connecting two cameras or wireless access points at the end of the fiber run. The UTP cable supports distances up to 100 meters, so the two devices can be up to 200 meters apart. Dual copper ports also allow for connecting different PoE devices such as cameras and wireless access points, or IP phones and video terminals in fiber-to-the-desk applications.

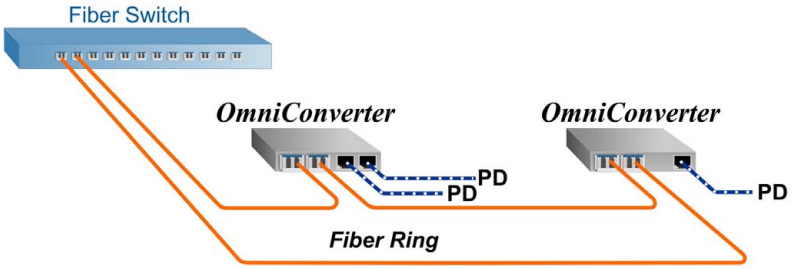


Dual Fiber Ports

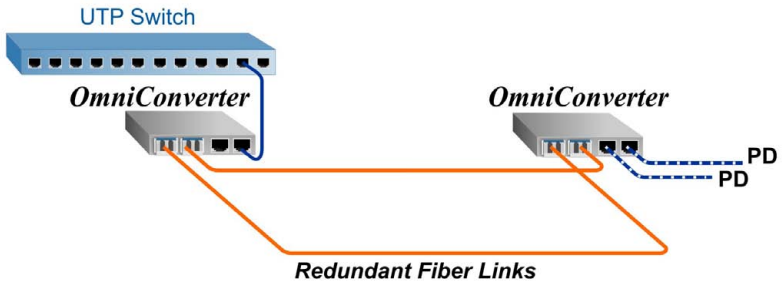
Dual fiber ports on the OmniConverter media converters enable daisy chaining multiple PoE devices along a fiber route. Applications for daisy chain devices include surveillance cameras along border fences and pipelines, and traffic monitoring cameras and wireless devices along highways and train routes.



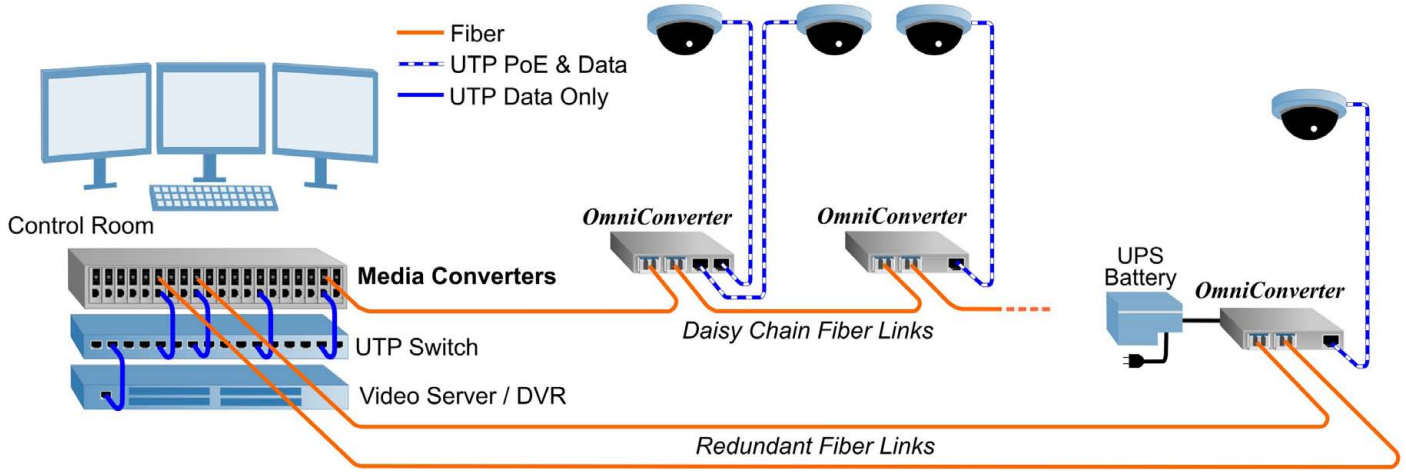
Dual fiber ports also enable installing multiple devices along a fiber ring. This architecture provides resilient protection with protocols such as Spanning Tree.



Dual fiber ports also provide protection with redundant fiber links. Use this architecture for critical applications requiring fiber facility protection. The OmniConverter supports fiber failure switchover in less than 50ms. One fiber port on the OmniConverter is the active fiber port, the other is the protect fiber port.



PoE/PoE+ Security Surveillance Camera Application



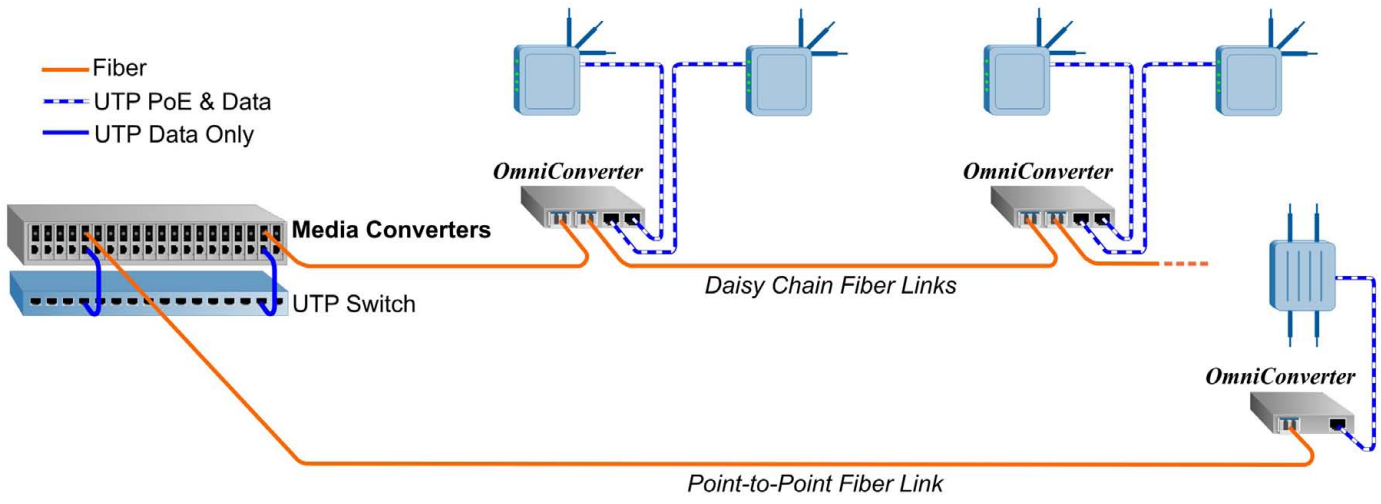
In this video surveillance application example, PoE and PoE+ IP cameras are installed throughout a large facility. Network switches with fiber ports can be used to distribute fiber links from a control room, or a switch with RJ-45 ports can be used with media converters.

At the control room, iConverter, miConverter or FlexPoint media converters can be installed in high-density rack-mount chassis to provide reliable and cost-effective fiber distribution from existing copper network equipment.

OmniConverter media converters with dual fiber ports are deployed in a daisy-chain with fiber links running hop-to-hop (along border fences, pipelines, highways or rail lines).

Dual fiber ports also enable redundant fiber links for mission-critical applications that require failover protection. The OmniConverter is powered by a UPS for battery back-up power. Even if a fiber link is cut and power is cut, the camera will continue to send image data over the failover fiber link.

PoE/PoE+ Wireless Access Point Application



In this application example, wireless access points need to be deployed long distances from network switch equipment. The environment may be a sports arena, restaurant, mall, airport, subway, office building or any other wireless hotspot. Fiber is used because the required link distances exceed the 100m limitation of UTP cabling.

Fiber is distributed from a copper network switch using media converters. Media converters are installed in high-density rack-mount chassis to provide reliable and cost-effective fiber distribution from existing copper network equipment.

OmniConverter media converters with dual fiber ports are deployed in daisy-chain configurations with fiber links running hop-to-hop around a large facility to preserve fiber runs. The media converters are installed near AC or DC power sources, and provide power over the UTP cables up to 100 meters in length.

An OmniConverter media converter with one fiber port is used in a point-to-point fiber run to an outdoor 802.11n wireless access point. OmniConverter media converters also support PoE+ for wireless devices that require up to 25.5W of power.

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**	**Rx**
MM/DF	5km	7006-0	1310	1310
SM/DF	30km	7007-1	1310	1310
SM/DF	60km	7007-2	1310	1310
SM/DF	120km	7007-3	1550	1550
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	550	1310

SFPs for Gigabit Ethernet, SONET OC-12 and SDH STM-4				
Fiber Type	**Distance**	**Model #**	**Tx**	**Rx**
MM/DF	220/550m	7206-0	850	850
SM/DF	2km	7206-6	1310	1310
SM/DF	12km	7207-1	1310	1310
SM/DF	34km	7207-2	1310	1310
SM/DF	80km	7207-3	1550	1550
SM/DF	110km	7207-4	1550	1550
SM/DF	140km	7207-5	1550	1550
SM/DF	160km	7207-6	1550	1550
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 #**	**Wavelength**
MM/DF	300m	7226-0	850
SM/DF	15km	7227-1	1310
SM/DF	40km	7227-2	1310
SM/DF	80km	7227-3	1550

10 Gigabit SFP+ (Ethernet, Fibre Channel, SONET) with Digital Diagnostics				
Fiber	**Distance**	**Model #**	**Tx Wavelength**	**Rx Wavelength**
MM/DF	300m**	7406-0	850	850
MM/DF	220m	7406-6	1310	1310
SM/DF	10km	7407-1	1310	1310
SM/DF	40km	7407-2LR	1310	1310
SM/DF	40km	7407-2	1550	1550
SM/DF	80km	7407-3	1550	1550
SM/SF	10km	7418-0	1270	1330
SM/SF	10km	7419-0	1330	1270
SM/SF	20km	7418-1	1270	1330
SM/SF	20km	7419-1	1330	1270
SM/SF	40km	7418-2	1270	1330
SM/SF	40km	7419-2	1330	1270
10 Gigabit XFP (Ethernet, Fibre Channel, SONET) with XFI-side Digital Diagnostics				
MM/DF	300m**	7426-0	850	850
SM/DF	10km	7427-1	1310	1310
SM/DF	40km	7427-2	1550	1550
SM/DF	80km	7427-3	1550	1550
SM/SF	10km	7438-0	1270	1330
SM/SF	10km	7439-0	1330	1270
SM/SF	20km	7438-1	1270	1330
SM/SF	20km	7439-1	1330	1270
SM/SF	40km	7438-2	1270	1330
SM/SF	40km	7439-2	1330	1270
10 Gigabit Copper XFP				
-	15m	7499-CX4	-	-
10 Gigabit SFP+ Direct Attach Cable				
-	1m	7499-DC-1	-	-
-	3m	7499-DC-3	-	-

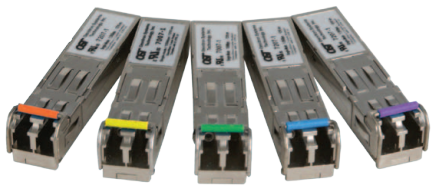
* Compatible only with *iConverter* GX/TM2, GM3, and GM4 NIDs.
** Distance obtained with OM3 multimode cable

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

CWDM Transceivers

Omnitron's Coarse Wave Division Multiplexing (CWDM) Pluggable Optical Transceivers support all eighteen ITU-T G694.2 CWDM wavelengths between 1270nm to 1610nm.

Omnitron CWDM transceivers are used to customize iConverter®, FlexPoint™, 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	7547-2LR
1491	7349E-1	7349E-2	7549-1	7549-2	7549-2LR
1511	7351E-1	7351E-2	7551-1	7551-2	7551-2LR
1531	7353E-1	7353E-2	7553-1	7553-2	7553-2LR
1551	7355E-1	7355E-2	7555-1	7555-2	7555-2LR
1571	7357E-1	7357E-2	7557-1	7557-2	7557-2LR
1591	7359E-1	7359E-2	7559-1	7559-2	7559-2LR
1611	7361E-1	7361E-2	7561-1	7561-2	7561-2LR

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