iConverter® GM4 Network Interface Devices
Carrier Ethernet 2.0 Certified NIDs

The iConverter® GM4 is a Network Interface Device (NID) that delivers advanced Carrier Ethernet 2.0 services and provides demarcation at the edges of a network. The GM4 enables rapid service deployments, Service Level Agreement (SLA) assurances, comprehensive fault management and service protection. These advanced capabilities reduce operating costs, provide faster return on investment (ROI) and improve customer satisfaction.

The GM4 supports MEF-certified User-to-Network Interface (UNI) functions including Class of Service (CoS) management, granular rate-limiting, and 802.1ad Provider Bridge VLAN stacking (Q-in-Q) for service multiplexing of multiple E-Line, E-LAN and E-Tree services. The GM4 provides flexible per-flow service mapping, traffic policing and shaping. CIR/EIR "two rates, three colors" ingress port policing provides the granular bandwidth optimization required for CE 2.0 services such as Business Ethernet Services and Mobile Backhaul. The GM4 also provides advanced classification and filtering of subscriber traffic as an EVC or CoS flow based on Layer 1, 2, 3 or 4 identifiers.

The GM4 supports carrier-class Ethernet Service OAM standards. IEEE 802.1ag Connectivity Fault Management (CFM) proactively monitors service availability and provides tools for rapid fault isolation. ITU-T Y.1731 Performance Monitoring provides the ability to monitor key SLA parameters including frame delay, frame delay variation and frame loss. These OAM features provide proactive fault detection and rapid isolation of potential service problems, enabling SLA assurance while reducing Operational costs (OPEX).

The GM4 supports ITU-T Y.1564 and RFC 2544 service testing to easily verify the configuration and performance of Ethernet services prior to customer hand off. RFC 2544 provides per flow testing of Key Performance Indicators (KPI), such as throughput, latency, jitter and frame loss up to full wire speed. Y.1564 is a comprehensive Carrier Ethernet testing standard that tests all data flows and service attributes, including multi-flow Information Rate and Traffic Policing.

The GM4 supports ITU-T G.8031 Ethernet Linear Protection Switching and G.8032v2 Ethernet Ring Protection Switching with Connectivity Check Messages (CCM) at 3.3ms rate for sub-50ms protection switching. G.8032v2 includes multi-ring protection and sub-ring support with 5-port GM4.

Zero-Touch Provisioning (ZTP) allows providers to achieve efficiencies in service activation that accelerate turn up and reduce the need for onsite technicians. ZTP allows service provisioning to be centralized, standardized and remotely managed.

SFPs not included

KEY FEATURES

- 100/1000Mbps MEF Carrier Ethernet 2.0 Fiber Access NID
- Smallest NIDs available with the lowest power consumption
- Integrated IPv4, IPv6, SNMPv1/v2c/v3, SSH, Telnet and IP-less 802.3ah OAM management
- SNMP management via NetOutlook® NMS
- Advanced traffic management with service mapping, traffic policing and shaping with Hierarchical Rate Limiting
- IEEE 802.1ag Connectivity Fault Management
- ITU-T Y.1731 End-to-End Performance Monitoring
- RFC 5357 TWAMP responder and initiator
- Zero-Touch Provisioning
- ITU-T Y.1564 Ethernet Service Activation Testing
- IETF RFC 2544 Ethernet Service Activation Testing
- ITU-T G.8262 Sync-E and IEEE 1588v2 Timing
- ITU-T G.8031 and G.8032v2 Ethernet Protection Switching
- IEEE 802.1ax/802.3ad LAG with LACP
- Configurable Link Fault Propagation modes on 2/3 Port Models
- Automatic Link Recovery
- Commercial (0 to 50ºC), wide (-40º to 60ºC) and extended (-40º to 75º C) temperature ranges
- TAA, BAA and NDAA compliant, and Made in the USA

SFPs not included

The integrated management eliminates the cost and space required for external management hardware. The integrated management provides comprehensive remote configuration and performance monitoring.

The GM4 supports IPv4 and IPv6 addressing, IP-Less protocol using the IEEE 802.3ah OAM channel, SNMPv1/v2c/v3, SSH, Telnet and serial console port.

The IP address is user-defined or can be resolved through DHCP. Telnet and serial console management interfaces are supported, and utilize an easy-to-use, menu-driven interface. The serial interface provides local configuration access.

SNMP management is available via Omnitron's NetOutlook® SNMP Network Management Software with an intuitive Graphical User Interface, or third party SNMP software.

The GM4 2 and 3 Port models are available with ST and SC fixed-fiber connectors supporting multimode dual fiber, single-mode dual fiber and single-mode single-fiber options. The GM4 Small Form Pluggable (SFP) plug-in and standalone models support a wide variety of Fast Ethernet and Gigabit SFP transceivers in standard, CWDM and DWDM wavelengths.

The RJ-45 port supports 10/100/1000 and Half/Full-Duplex auto-negotiation and Pause control, with both hardware and software manual override controls. The module supports frame sizes up to 10,240 bytes

The hot-swappable plug-in module can be mounted in a high-density 19 or 5-Module chassis with redundant AC and DC power supplies. It can also be mounted in a 2-Module or in a 1-Module chassis with AC or DC power input.

The plug-in module features two Gigabit Ethernet backplane ports for connectivity to adjacent modules in a chassis for multi-port and multi-service configurations. It can also functions as a fiber transport module for the modular iConverter T1/E1 and Ethernet Multiplexer System.

The standalone GM4 is available in 2, 3, and 5 port models. They are available with an external AC to DC power adapter or with a terminal connector for direct connection to DC power. The 5 port model is available with dual power inputs.

ADVANCED FEATURES

Management
IPv4, IPv6, Telnet, SNMPv1, SNMPv2c, SNMPv3, SSH, Serial Console
SNMP management via NetOutlook Network Management software
IP-less management through 802.3ah OAM extensions
MEF 30 and 31 Service OAM Fault Management MIBs
Syslog
Traffic Management
IEEE 802.1Q VLAN Tagging
IEEE 802.1ad Q-in-Q VLAN Tagging
Service Multiplexing of up to 256 EVCs
User-configurable Ethertype
All ports configurable as UNI or NNI
Ingress and Egress traffic management
Hierarchical rate limiting with two-level color aware policing
CIR/EIR color aware "two rates, three colors" bandwidth profiles
Port Mirroring
IEEE 802.1p CoS Priority
per Port, VLAN ID, PCP, IPv4/IPv6 (TOS/DiffServe) Priority, MAC address, IP address, TCP Port or L2CP
L2CP Policy Management
L2PT Tunneling to encapsulate STP, VTP, PVST and CDP protocols
RFC 4541 IGMP Snooping
DHCP Relay Option 82
Timing and Synchronization
IEEE 1588v2 Transparent Clock
ITU-T G.8262 Synchronous Ethernet
Security and Authentication
TACACS+, RADIUS, 802.1x and Access Control Lists

| Service OAM and Testing |
| --- |
| IEEE 802.3ah Link OAM with Dying Gasp* |
| IEEE 802.1ag Connectivity Fault Management with 8 Maintenance Domain levels and 256 Maintenance Associations |
| IEEE 802.1ag Maintenance Intermediate Points for fault isolation |
| ITU-T-Y.1731 Performance Monitoring with threshold monitoring and crossing alerts |
| Advanced classification and filtering of Layer 1, 2, 3 or 4 subscriber traffic as an EVC or CoS flow |
| RFC 5357 TWAMP IP SLA Performance Monitoring |
| IETF RFC 2544 (built-in Test-head) with wire-speed, per flow testing of throughput, latency, jitter and loss |
| ITU-T-Y.1564 Service Testing (built-in Test-head) with multi-flow testing of information rate, latency, jitter and frame loss |
| Per port and per flow loopback with MAC (Layer 2) swap or IP (Layer 3) swap |
| Third party in-band loopback support |
| Zero-Touch Provisioning (DHCP/TFTP) |
| Portal integration with Cyan Blue Planet, Ocular IP, Orion Solarwinds and Web EMS |
| Built-in UTP cable tester for troubleshooting to the Customer Equipment |
| **Protection and Redundancy** |
| Port Redundancy (Primary and Backup Link) |
| IEEE 802.1ax/802.3ad LAG with LACP (1:1 and 1+1) |
| ITU-T-G.8031 Ethernet Linear Protection with sub-50ms failover |
| ITU-T-G.8032 Ethernet Ring Protection with sub-50ms failover |
| IEEE 802.1w Rapid Spanning Tree Protocol |
| Link Modes |
| **Power over Ethernet** |
| See iConverter GM4-PoE+ and HPoE models |

*Supported on all standalone models. Supported on plug-in models when installed in a 1-Module or 2-Module chassis with dying gasp support.

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APPLICATIONS

Metro Ethernet Ring

In this application example, 5-port GM4 NIDs are deployed as nodes on a Metro Ethernet ring. 5-port GM4 NID on the left is deployed as a hub aggregation device that provides connectivity to the ring and three fiber access links to customer locations. A 2-port GM4 terminates each fiber link and provides service demarcation at each customer premises.
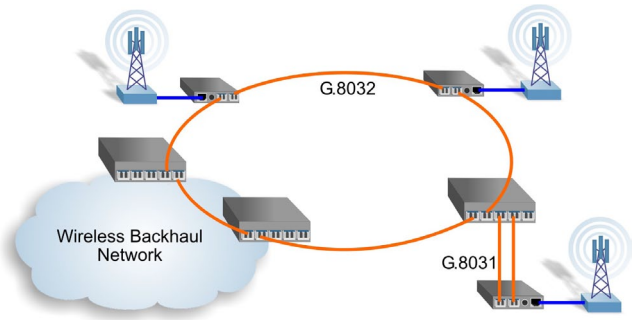
The 5-port GM4 NID on the right is deployed at a Multiple tenant building with three RJ-45 UNIs providing copper connectivity to three different subscribers.
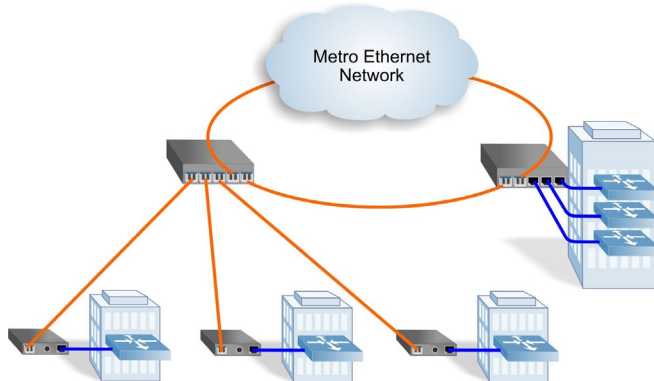
Mobile Backhaul Protected Ring

In this application example, GM4 NIDs are deployed as nodes on a wireless backhaul ring. The two 5-port GM4 NIDs connected to the Wireless Backhaul Network provide NNI functions for the ring. All GM4 NIDs on the ring support G.8032v2 Ethernet Ring Protection Switching for service protection with sub-50ms failover.

The 5-port GM4 NID on the right provides G.8032 ring connectivity and G.8031 linear protection with a redundant fiber access link to the tower. The 3-port GM4 NIDs provide LTE service demarcation at the cell towers, and all the GM4 NIDs on the network support 1588v2 clocking and G.8262 Sync-E timing.

SPECIFICATIONS

iConverter GM4	
Description	10/100/1000BASE-T Copper to 100/1000BASE-X Fiber Network Interface Device
Standard Compliances	IEEE 802.3, 802.1Q, 802.1ad, 802.1ax, 802.1p, 802.3ad, 802.3ah, 802.1ag, 1588v2 RFC 2819 (RMON), 2863 (IF-MIB), 2131 (DHCP), 2544 ITU-T G.8031, G.8032, G.8262, Y.1731, Y.1564 MEF Carrier Ethernet 2.0 Certified, 6.2, 9, 10.2, 14, 21, 26.1, 30, 31, 33
Regulatory Compliances	Safety: UL, cUL, CE, NEBS Level 3, UKCA EMI: FCC Class A ACT: TAA, BAA, NDAA
Environmental	RoHS, WEEE, REACH
Management	IPv4, IPv6, Telnet, SNMPv1, SNMPv2c, SNMPv3, SSH, Serial Console
Frame Size	Up to 10,240 bytes
Port Types	Copper: 10/100/1000BASE-T (RJ-45) Fiber: 100BASE-X (SFP) 1000BASE-X (ST, SC,SFP) Serial: RS-232 (Mini DIN-6 female) Mini DIN-6 to DB-9 adapter included
Cable Types	Copper: EIA/TIA 568A/B, Cat 5 UTP and higher Fiber: Multimode: 50/125µm, 62.5/125µm Single-mode: 9/125µm Serial: RS-232, 22 to 24 AWG, 12 to 50 pF/ft
Temperature	Commercial: 0 to 50°C Wide: -40 to 60°C Extended: -40 to 75° C Storage: -40 to 80°C
Humidity	5 to 95% (non-condensing)
Altitude	-100m to 4,000m
Warranty	3 year warranty with 24/7/365 free Technical Support

	2 and 3 Port	5 Port
AC Power Requirements	**US and Universal AC Adapter**	
	100 - 240VAC/50 - 60Hz, 0.1A @ 120VAC	100 - 240VAC/50 - 60Hz, 0.2A @ 120VAC
DC Power Requirements	**DC Input Plug-in Models (3.3 VDC)**	
	2 Port: 2.56A @ 3.3VDC 3 Port: 2.85A @ 3.3VDC	N/A
	DC Input Standalone with Terminal Block	
	8 - 60VDC 1.2A @ 9VDC (typical) 1.0A @ 12VDC (typical) 2-Pin Terminal (non-isolated)	11-60 VDC 1.5A @ 12VDC (typical) 0.4A @ 48VDC (typical) 3-Pin Terminal (isolated)
	DC Input Standalone with AC Adapter	
	8 - 60VDC 1.2A @ 9VDC (typical) 1.0A @ 12VDC (typical) 2.5mm Barrel Connector	11-60 VDC 1.5A @ 12VDC (typical) 0.4A @ 48VDC (typical) 2.5mm Barrel Connector
Dimensions W x D x H	Plug-in: 0.85" x 4.5" x 2.8" (21.6 mm x 114.3 mm x 71.1 mm) SA w/o Brackets: 3.1" x 4.8" x 1.0" (78.7 mm x 121.9 mm x 25.4 mm) SA w/Brackets: 3.8" x 4.8" x 1.0" (96.5 mm x 121.9 mm x 25.4 mm)	SA w/Brackets: 4.8" x 6.0" x 1.375" (121.9 mm x 152.4 mm x 34.9 mm)
Weight	Plug-in: 8 oz. (226.79 gm) SA w/o Adapter: 1.0 lbs. (0.454 kg) SA w/ Adapter: 1.5 lbs. (0.680 kg)	SA w/o Adapter: 5 lbs. (0.68 kg) SA w/ Adapter 2.0 lbs. (0.91 kg)
MTBF (hrs)	Plug-in: 340,000 SA w/o Adapter: 100,000 SA w/ AC Adapter: 100,000	SA w/o Adapter: 102,000 SA w/ AC Adapter: 100,000

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2 AND 3-PORT ORDERING INFORMATION

Step 1: Choose a Base Part Number (**xxxxR-x**-pt)

Port Configuration			Fiber Type	Distance	Connector Types				Tx / Rx Wavelength (nm)	Min. Tx Power (dBm)	Max. Tx Power (dBm)	Min. Rx Power (dBm)	Max. Rx Power (dBm)	Min Attenuation (dB)	Link Budget (dB)
P1	P2	P3			ST	SC	SFP	RJ45							
FF	RJ-45	-	MM/DF	220/550m[1]	8920R-0-pt	8922R-0-pt	-	-	850 / 850	-10	-4	-17	-3	-	7
FF	RJ-45	-	SM/DF	12km	8921R-1-pt	8923R-1-pt	-	-	1310 / 1310	-9.5	-3	-19.5	-3	-	10
FF	RJ-45	-	SM/DF	34km	-	8923R-2-pt	-	-	1310 / 1310	-5	0	-23	-3	3	18
FF	RJ-45	-	SM/DF	80km	-	8923R-3-pt	-	-	1550 / 1550	-5	0	-23	-3	3	18
FF	RJ-45	-	SM/DF	110km	-	8923R-4-pt	-	-	1550 / 1550	0	5	-24	-3	8	24
FF	RJ-45	-	SM/DF	140km	-	8923R-5-pt	-	-	1550 / 1550	2	5	-28	-8	13	30
FF	RJ-45	-	SM/SF[2]	20km	-	8930R-1-pt	-	-	1310 / 1550	-9.5	-3	-20	-3	-	10.5
FF	RJ-45	-	SM/SF[2]	20km	-	8931R-1-pt	-	-	1550 / 1310	-9.5	-3	-20	-3	-	10.5
FF	RJ-45	-	SM/SF[2]	40km	-	8930R-2-pt	-	-	1310 / 1550	-3	0	-20	-3	3	17
FF	RJ-45	-	SM/SF[2]	40km	-	8931R-2-pt	-	-	1550 / 1310	-3	0	-20	-3	3	17
SFP	RJ-45	-	-	-	-	-	8939R-0-pt	-	-	-	-	-	-	-	-
SFP	RJ-45	RJ-45	-	-	-	-	8970R-0-pt	-	-	-	-	-	-	-	-
RJ-45	RJ-45	RJ-45	-	100m	-	-	-	8974R-0-pt	-	-	-	-	-	-	-
SFP	SFP	RJ-45	-	-	-	-	8975R-0-pt	-	-	-	-	-	-	-	-
RJ-45	RJ-45	-	-	100m	-	-	-	8989R-0-pt	-	-	-	-	-	-	-
SFP	SFP	-	-	-	-	-	8999R-0-pt	-	-	-	-	-	-	-	-

[1] 62.5/125µm, 100/140µm multimode fiber up to 220m. 50/125µm multimode fiber up to 550m. Refer to the fiber cable manufacturer for multimode distance specifications.
[2] When using single-fiber (SF) media converter models, the Tx wavelength on one end has to match the Rx wavelength on the other.
FF - Fixed Fiber, SFP - Small Form Pluggable Transceiver, MM = Multimode, SM = Single-mode, DF = Dual Fiber, SF = Single-fiber
Contact Omnitron for other fiber options. Order the appropriate Fast or Gigabit SFPs separately. Visit the Omnitron Optical Transceivers web page.
For chassis options, see iConverter Chassis Overview web page.

Step 2: Choose a Power Option (xxxxP-x-**p**t)

<leave blank> = Plug-in module
A = Barrel Connector and AC/DC Power Adapter, 100-240VAC, 50-60Hz, with US power cord without integrated mounting brackets
B = Barrel Connector and Universal AC/DC Adapter, 100-240 VAC, 50-60Hz, No Power Cord, without integrated mounting brackets
C = Direct DC input, 2 pin terminal connector, no AC/DC power adapter, without integrated mounting brackets
D = Barrel Connector and AC/DC Power Adapter, 100-240VAC, 50-60Hz, with US power cord with integrated mounting brackets
E = Barrel Connector and Universal AC/DC Adapter, 100-240 VAC, 50-60Hz, No Power Cord, with integrated mounting brackets
F = Direct DC input, 2 pin terminal connector, no AC/DC power adapter, with integrated mounting brackets

Step 3: Choose an Operating Temperature Range (xxxxP-x-p**t**)

<leave blank> = Commercial temperature (0 to 50°C)
W = Wide temperature (-40 to 60°C)
Z = Extended temperature (-40 to 75°C)

5-PORT ORDERING INFORMATION

Step 1: Choose a Base Part Number (**xxxxR-x**-pt)

Port Configuration					Model Number	Description
P1	**P2**	**P3**	**P4**	**P5**		
SFP	RJ-45	RJ-45	RJ-45	RJ-45	8991R-14-pt	GM4 5-Port with 1 SFP and 4 RJ-45 Ports with single power input
SFP	SFP	RJ-45	RJ-45	RJ-45	8991R-23-pt	GM4 5-Port with 2 SFP and 4 RJ-45 Ports with single power input
SFP	SFP	SFP	SFP	SFP	8991R-50-pt	GM4 5-Port with 5 SFP and no RJ-45 Ports with single power input
SFP	SFP	SFP	SFP	RJ-45	8991R-41-pt	GM4 5-Port with 4 SFP and 1 RJ-45 Ports with single power input
SFP	RJ-45	RJ-45	RJ-45	RJ-45	8992R-14-pt	GM4 5-Port with 1 SFP and 4 RJ-45 Ports with dual power input
SFP	SFP	RJ-45	RJ-45	RJ-45	8992R-23-pt	GM4 5-Port with 2 SFP and 4 RJ-45 Ports with dual power input
SFP	SFP	SFP	SFP	SFP	8992R-50-pt	GM4 5-Port with 5 SFP and no RJ-45 Ports with dual power input
SFP	SFP	SFP	SFP	RJ-45	8992R-41-pt	GM4 5-Port with 4 SFP and 1 RJ-45 Ports with dual power input

RJ-45 - Fixed Copper Port, SFP - Small Form Pluggable Transceiver
Contact Omnitron for other fiber options. Order the appropriate Fast or Gigabit SFPs separately. Visit the Omnitron Optical Transceivers web page.

Step 2: Choose a Power Option (xxxxR-x-**p**t)

D = Barrel Connector and AC/DC Power Adapter, 100-240VAC, 50-60Hz, with US power cord with integrated mounting brackets

E = Barrel Connector and Universal AC/DC Adapter, 100-240 VAC, 50-60Hz, No Power Cord, with integrated mounting brackets

F = Direct DC input, 3 pin terminal connector, no AC/DC power adapter, with integrated mounting brackets

Step 3: Choose an Operating Temperature Range (xxxxR-x-p**t**)

<leave blank> = Commercial temperature (0 to 50°C)

W = Wide temperature (-40 to 60°C)

Z = Extended temperature (-40 to 75°C)

ACCESSORIES

Model Number	Description
8250-0	DIN Rail Mounting Bracket for standalone modules without integrated mounting brackets (power option -A, -B, -C)
8251-0	DIN Rail Mounting Clip for standalone models with integrated mounting brackets (power options -D, -E, -F)
8260-0	1U Rack Mount Shelf for standalone models (up to 4 GM4 2/3 port modules or up to 3 GM4 5 port modules)

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