iConverter GM4 Network Interface Devices

**Carrier-Grade NIDs with Ethernet Service Testing
for 1000Mbps and 100Mbps Fiber Access**

The *iConverter* GM4 is an intelligent Network Interface Device (NID), that delivers advanced Carrier Ethernet services and provides demarcation at the edges of a network. The GM4 enables rapid service deployments, Service Level Agreement (SLA) assurances and protection switching.

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 per-flow Service Mapping and Traffic Policing and Shaping.

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 adds Performance Monitoring to monitor key SLA parameters including frame delay, frame delay variation, and frame loss. IEEE 802.3ah Link OAM monitors the subscriber's link for physical failures and provides dying gasp notification. These OAM features provide proactive fault detection and rapid isolation of potential service problems, enabling SLA assurance while reducing Operational costs (OPEX).

For Ethernet Service Activation Testing, the GM4 supports ITU-T Y.1564 and IETF RFC 2544. These standards allow Service Providers to rapidly verify the configuration and performance of Ethernet services prior to customer hand off. RFC 2544 provides wire-speed, per flow testing of throughput, latency, jitter and frame loss. Y.1564 tests the same performance parameters as RFC 2544, and is also a comprehensive Carrier Ethernet testing standard. Y.1564 tests Carrier Ethernet service attributes including multi-flow Information Rate and Traffic Policing. Y.1564 tests all attributes simultaneously so testing is run more quickly and efficiently.

Zero-Touch Provisioning (ZTP) allows providers to achieve efficiencies in service activation. ZTP allows service provisioning to be centralized, standardized and remotely managed thereby eliminating errors and operational issues associated with manual on-site provisioning.

The GM4 supports the ITU-T G.8031 standard for automatic linear protection switching, and features Link Failover as an alternative mechanism, providing 50ms protection switching over fiber.

Secure management access to the GM4 is provided through SSH and SNMPv3.

SFPs not included

KEY FEATURES

- Network Interface Device for 1000Mbps and 100Mbps Ethernet Fiber Access

- 802.1ad VLAN stacking (Q-in-Q) for E-Line and E-LAN service multiplexing

- MEF 9, 14 and 21 Certified Compliant

- MEF 30 and 31 Compliant

- IEEE 802.1ag End-to-End Connectivity Fault Management (CFM)

- ITU-T Y.1731 End-to-End Performance Monitoring

- IEEE 802.3ah Link OAM for per port link monitoring

- ITU-T Y.1564 Ethernet Service Activation testing

- RFC 2544 built-in test-head

- Compatible with third party tester loop-up command

- Loopback with MAC swap

- ITU-T G.8031 Ethernet Linear Protection

- Link Failover 50ms protection switching

- Zero-Touch Provisioning

- Remote management through TELNET, SSH and SNMPv1/v2c/v3

- SNMP management via Omnitron's *NetOutlook*® Network Management software

- Commercial (0 to 50ºC), wide (-40º to 60ºC) and extended (-40º to 75º C) temperature ranges

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The *iConverter* GM4 is available as a compact standalone unit or as a chassis plug-in module. The hot-swappable GM4 plug-in module can be mounted in a high-density 19 or 5-Module chassis with any combination of redundant AC and DC power supplies. It can also be installed in a 2-Module AC or DC powered chassis.

The plug-in module can function as a management module and manage other modules in the same chassis and as well as operate as a Network Interface Device (NID). It features two Gigabit Ethernet backplane ports for connectivity to adjacent modules in a chassis for multi-port and multi-service configurations.

The standalone GM4 is available with or without built-in mounting brackets. It is DC powered and available with an external AC/DC power adapter, or with a terminal connector for wiring directly to a DC power source.

ETHERNET SWITCHING

- IEEE 802.1Q VLAN tagging
- IEEE 802.1ad Provider Bridge and Q-in-Q VLAN stacking
- Configurable EtherType
- Ingress and Egress traffic management
- Granular Policing and Shaping – CIR/EIR and CBS/EBS per Port, EVC and CoS
- Class of Service (CoS) – IEEE 802.1p Priority, Differentiated Services Code Point IPv4/IPv6 Priority
- Layer 2 Control Protocol management
- All ports configurable as UNI or NNI
- 10,240 byte Jumbo frames

PROTECTION AND REDUNDANCY

- ITU-T G.8031 Ethernet Linear Protection
- Link Failover 50ms protection switching
- Rapid Spanning Tree
- Link modes for failure propagation

INTERFACES

- 10/100/1000BASE-T Copper and 1000BASE-X/100BASE-FX fiber
- Small Form Pluggable (SFP) transceivers for standard or CWDM applications up to 140km

SERVICE OAM AND TESTING

- IEEE 802.1ag End-to-End Connectivity Fault Management (CFM) – with 8 Maintenance Domain levels and 256 Maintenance Associations
- Standard 802.1ag Connectivity Fault Management MIB conformance
- Supports 802.1ag Maintenance Intermediate Points (MIPs) for fault isolation
- ITU-T Y.1731 End-to-End Performance Monitoring
- IEEE 802.3ah Ethernet Link OAM with dying gasp
- Threshold based monitoring and threshold crossing alerts
- ITU-T Y.1564 Ethernet Service Activation testing with multi-flow testing of Information Rate, Traffic Policing, latency, jitter and frame loss
- RFC 2544 built-in test-head with wire-speed, per flow testing of throughput, latency, jitter and loss
- Layer 1, Layer 2 and per flow Loopback with MAC swap
- Compatible with third party tester loop-up command

NETWORK MANAGEMENT

- Remote management via TELNET, SSH, SNMPv1/v2c/v3
- SNMP management via Omnitron's *NetOutlook* Network Management software
- IP-less management through 802.3ah OAM extensions
- SNTP – Simple Network Time Protocol
- Zero-Touch Provisioning enabling automated installation

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ETHERNET SERVICE LIFECYCLE

The GM4 provides tools for optimizing service delivery and managing the customer experience throughout the lifecycle of an Ethernet service. Network management combined with Service OAM provides higher perceived service quality and workforce productivity, rapid outage restoration, fewer reported problems and greater customer satisfaction.

Provisioning and Turn-Up — Performance Monitoring — Fault Management

1) Provisioning and Turn-up

The GM4 Zero-Touch Provisioning (ZTP) allows Ethernet Services to be turned up quickly and accurately. ZTP allows service provisioning to be centralized, standardized and remotely managed. ZTP can remotely provision Ethernet Virtual Connections (EVCs), Bandwidth Profiles, Class of Service management and Ethernet Service OAM probes. ZTP accelerates turn up and reduces the need for onsite technicians.

Once a service is provisioned, GM4 NIDs can be remotely controlled to validate the integrity of the end-to-end service. The GM4 at one end of a circuit provides a loopback, while the GM4 at the other end uses its built-in test head to run up to wire-speed Y.1564 multi-flow and per flow RFC 2544 traffic. The GM4 service validation includes checks for information rate, traffic policing, delay, delay variation, and loss. Once validated, a service is ready to be handed over to a customer.

2) Performance Monitoring

The GM4 enables the delivery of Ethernet services with SLAs and stringent requirements. IEEE 802.1ag Connectivity Fault Management and ITU-T Y.1731 Performance Monitoring OAM probes inject test and monitoring frames in-band with the Ethernet service to measure a variety of service parameters. Probes and standards-based reporting mechanisms provide for periodic and historical measures of delay, delay variation, frame loss and availability.

3) Fault Management

The GM4 proactively monitors the service, and in the event of a network fault, the GM4 instantly notifies the NOC of a problem. Depending on the failure, there are a number of fault notification mechanisms:

- Link down – loss of signal
- 802.1ag loss of CCM
- 802.3ah Remote Failure Indication (Dying gasp, Link fault or other critical event)

The GM4 provides a number of standards-based fault management tools to facilitate remote fault isolation and troubleshooting including:

- 802.3ah Loopback – tests the access link
- 802.1ag Loopback Message – tests end-to-end service
- 802.1ag Linktrace – fault isolation to locate segment outage

Working simultaneously with fault detection, the GM4 supports service protection features to minimize service down time:

- Rapid Spanning Tree for Loop-Prevention and Link Fault Restoration
- ITU-T G.8031 for end-to-end Service Protection
- Link Failover for sub-50ms Link Restoration

SPECIFICATIONS

Description	10/100/1000BASE-T to 100/1000BASE-X Network Interface Device
Protocols	10BASE-T, 100BASE-TX, 1000BASE-T, 100BASE-FX, 1000BASE-X
Other Protocols	TCP/IP, ICMP, ARP, RSTP, SNTP, DAYTIME, ELPS
IP-Based Management	Telnet, SNMPv1, SNMPv2c, SNMPv3, SSH
Compliances	UL, cUL, CE, FCC Class A, NEBS 3 compliant, MEF 9, MEF 14, MEF 21, MEF 30, MEF 31
Frame Size	Up to 10,240 bytes
UTP Cable	EIA/TIA 568 A/B, Category 5 and higher
Fiber Cable	Multimode: 50/125um, 62.5/125um, 100/140um Single-mode: 9/125um
Serial Cable	RS-232, 22 to 24 AWG, 12 to 50 pF/ft.
Copper Connector	RJ-45
Fiber Connectors	SFP: Any MSA Standard LC, RJ45 (1000, 10/100/1000Mbps) Dual Fiber: SC, ST, Single Fiber: SC
Serial Connector	Mini DIN-6 female; Mini DIN-6 male to DB-9 female adapter included
Temperature	Standard Operating: 0 to 50º C Wide Operating: -40 to 60º C Extended Operating: -40 to 75º C Storage: -40 to 80º C

DC Power Input Connector	Plug-in Module: Power supplied by backplane Standalone: 2.5mm Barrel Connector or 2-Pin Terminal Connector
DC Power	2 Port Plug-in Module: 2.56A @ 3.3VDC (typical) 3 Port Plug-in Module: 2.85A @ 3.3VDC (typical) Standalone: 8 - 60VDC 1.2A @ 9VDC (typical) 1.0A @ 12VDC (typical)
AC Power Adapter	AC Power Adapter: 100 - 240VAC/60Hz 0.1A @ 120VAC (typical)
Dimensions	Plug-in Module: W: 0.85" x D: 4.5" x H: 2.8" Standalone w/o brackets: W: 3.1" x D: 4.8" x H: 1.0" Standalone w/ brackets: W: 3.8" x D: 4.8" x H: 1.0"
Weight	Plug-in Module: 8oz. Without Power Adapter: 1.0 lb. With Power Adapter: 1.5 lb.
Humidity	5% to 95% (non-condensing)
Altitude	-100m to 4,000m
MTBF (hrs)	Plug-in Module: 340,000 Standalone Without Power Adapter: 100,000 US Power Adapter: 100,000 Universal Adapter: 100,000

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ORDERING INFORMATION

89xxR-x-xx

<Blank>	Standard Operating Temperature Range Model
W	Wide Operating Temperature Range Model

<Blank>	Plug-in Module
A	Standalone without mounting brackets and External US AC Power Supply
B	Standalone without mounting brackets and External Universal AC Power Supply
C	Standalone without mounting brackets and DC Terminal Power
D	Standalone with mounting brackets and External US AC Power Supply
E	Standalone with mounting brackets and External Universal AC Power Supply
F	Standalone with mounting brackets and DC Terminal Power

Port Configuration			Fiber Type	Distance	Connector Types				Tx Lambda (nm)	Rx Lambda (nm)	Min. Tx Power (dBm)	Max. Tx Power (dBm)	Min. Rx Sensitivity (dBm)	Max. Rx Power (dBm)	Min Att.	Link Budget (dB)
P1	P2	P3			ST	SC	SFP	RJ45								
FF	UTP	-	MM/DF	220/550m	8920R-0	8922R-0	-	-	850	850	-10	-4	-17	-3	-	7
FF	UTP	-	SM/DF	12km	8921R-1	8923R-1	-	-	1310	1310	-9.5	-3	-19.5	-3	-	10
FF	UTP	-	SM/DF	34km	-	8923R-2	-	-	1310	1310	-5	0	-23	-3	3	18
FF	UTP	-	SM/DF	80km	-	8923R-3	-	-	1550	1550	-5	0	-23	-3	3	18
FF	UTP	-	SM/DF	110km	-	8923R-4	-	-	1550	1550	0	5	-24	-3	8	24
FF	UTP	-	SM/DF	140km	-	8923R-5	-	-	1550	1550	2	5	-28	-8	13	30
FF	UTP	-	SM/SF	20km*	-	8930R-1	-	-	1310	1550	-9.5	-3	-20	-3	-	10.5
FF	UTP	-	SM/SF	20km*	-	8931R-1	-	-	1550	1310	-9.5	-3	-20	-3	-	10.5
FF	UTP	-	SM/SF	40km*	-	8930R-2	-	-	1310	1550	-3	0	-20	-3	3	17
FF	UTP	-	SM/SF	40km*	-	8931R-2	-	-	1550	1310	-3	0	-20	-3	3	17
SFP	UTP	-	-	-	-	-	8939R-0	-	See SFP Data Sheet for available transceivers and optical parameters							
SFP	UTP	UTP	-	-	-	-	8970R-0	-	See SFP Data Sheet for available transceivers and optical parameters							
UTP	UTP	UTP	-	100m	-	-	-	8974R-0								
SFP	SFP	UTP	-	-	-	-	8975R-0	-	See SFP Data Sheet for available transceivers and optical parameters							
UTP	UTP	-	-	100m	-	-	-	8989R-0								
SFP	SFP	-	-	-	-	-	8999R-0	-	See SFP Data Sheet for available transceivers and optical parameters							

FF - Fixed Fiber, UTP - Unshielded Twisted Pair, SFP - Small Form Pluggable Transceiver

* When using single-fiber (SF) media converter models, the Tx wavelength on one end has to match the Rx wavelength on the other.

Please consult Omnitron for other configurations.

NEBS LEVEL 3 · CARRIER ETHERNET MEF 9/14/21 Certified Compliant · RoHS & WEEE COMPLIANT · MADE IN THE USA

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