

### **iConverter GM3 Network Interface Devices** Carrier-Grade NIDs for 1000Mbps and 100Mbps Ethernet Fiber Access

The *iConverter* GM3 is a flexible and cost-effective Network Interface Device (NID) with carrier-grade Service and Link Operations, Administration and Maintenance (OAM) capabilities. It provides demarcation functions for in-franchise and out-of-franchise Ethernet service applications.

The GM3 supports MEF-certified User-to-Network Interface (UNI) functions such as CoS prioritization, granular rate-limiting, and 802.1ad Provider Bridge VLAN stacking (Q-in-Q) for service multiplexing of multiple E-LINE and E-LAN services. The GM3 provides Service Mapping and Traffic Policing and Shaping.

The GM3 conforms to the latest carrier-class Ethernet OAM standards. IEEE 802.3ah Link OAM proactively monitors the network provider's fiber access link and subscriber link (customer-facing) for physical failures and data errors. IEEE 802.1ag provides end-to-end Connectivity Fault Management (CFM). ITU-T Y.1731 adds Performance Monitoring capability to monitor key Service Level Agreement (SLA) parameters including frame delay, frame delay variation, frame loss and availability. These OAM features provide the efficient detection and rapid isolation of potential service problems enabling SLA assurance while reducing Operational costs (OPEX).

The GM3 fiber ports can support Gigabit (1000BASE-X) or Fast Ethernet (100BASE-FX) fiber access links by utilizing an SFP transceiver with the desired data rate. The triple-speed copper interface operates at 1000, 100 or 10Mbps rate. The GM3 is available in 2-port or 3-port options. In the 3-port configuration, the GM3 can be used in geo-diverse redundant applications or in a multi-tenant application with two subscriber ports.

The GM3 is available as a compact standalone unit or as a chassis plug-in module. The hot-swappable GM3 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 mounted in a 2-Module AC or DC powered chassis, or in a 1-Module chassis with AC or DC power input.

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. It features two Gigabit Ethernet backplane ports for connectivity to adjacent modules in a chassis for multi-port and multi-service configurations.

The standalone GM3 is available as a DC powered tabletop or wall-mounted unit that can be ordered with an external AC/DC power adapter or direct terminal connector.



SFPs not included

### **KEY FEATURES**

- IEEE 802.1ag End-to-End Connectivity Fault Management (CFM)
- ITU-T Y.1731 End-to-End Ethernet Service OAM including CFM and Performance Monitoring
- IEEE 802.3ah Link OAM for per port link monitoring
- Geo-diverse uplink redundancy (1:1) option
- Remote management through TELNET, SNMPv1/v2c/v3 and IP-less 802.3ah OAM extensions
- SNMP management via Omnitron's NetOutlook® Network Management software
- 802.1ad VLAN stacking (Q-in-Q) for E-Line and E-LAN service multiplexing
- Granular Rate Limiting using Committed Information Rate (CIR) and Committed Burst Size (CBS) per UNI, EVC and CoS
- Small Form Pluggable (SFP) transceivers for standard or CWDM applications
- Supports 1000BASE-X and 100BASE-FX SFPs for interoperability with Gigabit and Fast Ethernet fiber equipment
- Fixed-fiber connectors available for multimode and single-mode dual fiber and single-mode single-fiber
- Customer-facing service port available in copper RJ-45 or SFP fiber interfaces
- 10,240 byte Jumbo frames
- Commercial, wide and extended temperature ranges

# CARRIER-GRADE ETHERNET

## NID Functions

- Ethernet Service OAM and Link OAM
- Comprehensive Fault Detection and Notification
- Media conversion for connectivity to subscriber equipment
- Supports 10,240 byte Jumbo frames
- MEF 9, 14 and 21 Certified Compliant
- Service Mapping to enable multiple services per UNI
  - > 802.1ad Provider Bridge VLAN stacking (Q-in-Q)
  - > User configurable VLAN EtherType
  - > Service Multiplexing up to 64 EVCs for E-Line or E-LAN services
  - > Layer 2 Control Protocol policy management
- Traffic Policing and Shaping
  - > Granular Rate Limiting
    - Committed Information Rate (CIR)
    - Committed Burst Size (CBS)
  - > Class of Service (CoS) mapping per
    - 802.1p Priority Bit
    - Type of Service / Differentiated Services Code Point (ToS/DSCP) IPv4/IPv6 Priority Marker
    - Layer 2 Control Protocol (L2CP)

## Ethernet Service OAM and Link OAM

- 802.3ah Link OAM
  - > Link Loopback
  - > Unidirectional Link Fault Detection
  - > Threshold based monitoring and notification
  - > Dying Gasp
- 802.1ag Connectivity Fault Management (CFM)
  - > Supports 8 levels of Maintenance Domains and Maintenance End Points (MEP)
  - > Up to 256 Maintenance Associations
  - > Continuity Check Messages (CCM)
  - > Remote Defect Indication (RDI)
  - > Link Trace
  - > Diagnostic Loopback (Layer 2 PING)
- Y.1731 End-to-End Ethernet Service OAM and Performance Monitoring
  - > 802.1ag Functionality
  - > Frame Delay
  - > Frame Delay Variation (Jitter)
  - > Frame Loss
  - > Service Availability

## Fault Detection

- Supports a variety of Link Fault Detection and Fault Propagation Features
  - > Link Fault Notifications
  - > Remote Fault Detection
  - > Asymmetrical Link Propagation

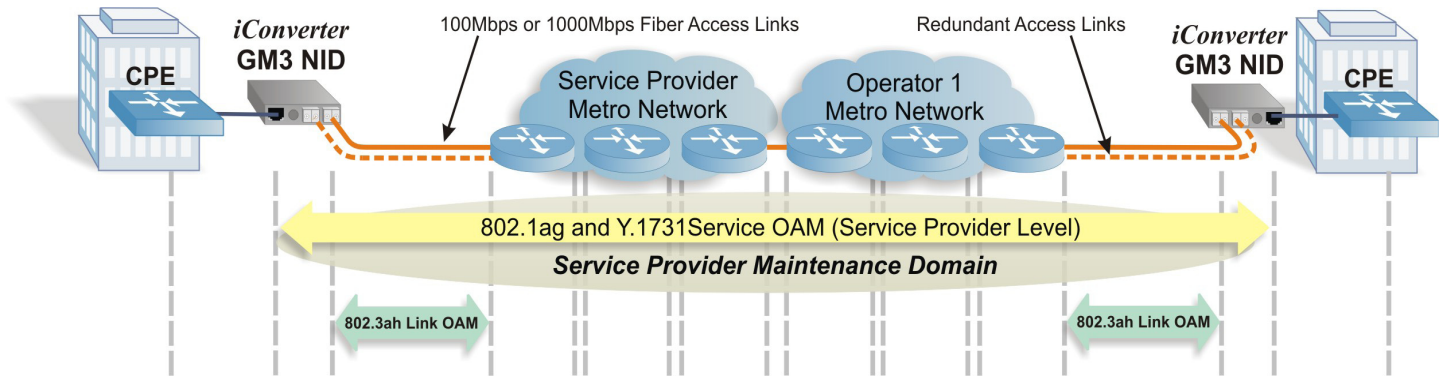
## INTEGRATED MANAGEMENT

- Local Management
  - > Access via Serial Console Port
- Remote Management
  - > SNMPv1/v2c/v3
  - > SNMP management via Omnitron's *NetOutlook*<sup>®</sup> Network Management Software
  - > TELNET
  - > IP-less 802.3ah OAM extensions
  - > Access also available via modem and terminal server
- Public (non-proprietary) 802.1ag CFM SNMP MIBs
  - > Easy 3rd party SNMP Management software integration
- SNTP support
- PING (ICMP/ARP)

## INTERFACES & REDUNDANCY

- Available with dual SFP fiber ports for geo-diverse uplink redundancy (1:1)
- Supports Rapid Spanning Tree Protocol (RSTP)
- Subscriber network service port available in copper RJ-45 or SFP Fiber interfaces
- Three-port configuration supports redundant access link or multi-customer applications
- Supports Gigabit (1000BASE-X) and Fast Ethernet (100BASE-FX) fiber access networks
- Small Form Pluggable (SFP) transceivers for standard or CWDM wavelengths
- SFP transceivers models support maximum fiber distances up to 140km

# CARRIER-GRADE OAM



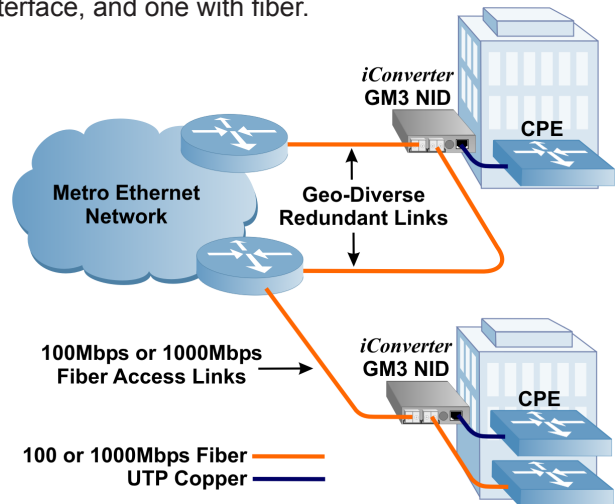
## SPECIFICATIONS

<b>Description</b>	10/100/1000BASE-T to 1000BASE-X Network Interface Device
<b>Protocols</b>	10BASE-T, 100BASE-TX, 1000BASE-T, 100BASE-FX, 1000BASE-X
<b>Other Protocols</b>	TCP/IP, ICMP, ARP, RSTP, SNTP, DAYTIME
<b>IP-Based Management</b>	Telnet, SNMPv1, SNMPv2c, SNMPv3
<b>Compliances</b>	UL, cUL, CE, FCC Class A, NEBS 3 compliant, MEF 9, MEF 14, MEF 21
<b>Frame Size</b>	Up to 10,240 bytes
<b>UTP Cable</b>	EIA/TIA 568 A/B, Category 5 and higher
<b>Fiber Cable</b>	Multimode: 50/125um, 62.5/125um, 100/140um Single-mode: 9/125um
<b>Serial Cable</b>	RS-232, 22 to 24 AWG, 12 to 50 pF/ft.
<b>Copper Connector</b>	RJ-45
<b>Fiber Connectors</b>	SFP: Any MSA Standard, RJ45 (1000, Dual Fiber: 10/100/1000Mbps) Single Fiber: SC, ST, SC
<b>Serial Connector</b>	Mini DIN-6 female; Mini DIN-6 male to DB-9 female adapter included
<b>Temperature</b>	Standard Operating: 0 to 50° C Wide Operating: -40 to 60° C Extended Operating: -40 to 75° C Storage: -40 to 80° C
<b>DC Power Input Connector</b>	Plug-in: Power supplied by backplane Standalone: 2.5mm Barrel Connector or 2-Pin Terminal Connector
<b>DC Power</b>	Plug-in: 2 Port - 1.6A @ 3.3VDC (typical) 3 Port - 2.0A @ 3.3VDC (typical) Standalone: 8 - 32VDC 0.60A @ 9VDC (typical) 0.45A @ 12VDC (typical)
<b>AC Power Adapter</b>	Plug-in: N/A Standalone w/ US Power Adapter: 100-120VAC/60Hz 0.1A @ 120VAC (typical) Standalone w/ Universal Adapter: 100 - 240VAC/60Hz 0.1A @ 120VAC (typical)
<b>Dimensions</b>	Plug-in: W: 0.85" x D: 4.5" X H: 2.8" Tabletop: W: 3.1" x D: 4.8" x H: 1.0" Wall-Mount: W: 3.8" x D: 4.8" x H: 1.0"
<b>Weight</b>	Plug-in: 8oz. Standalone without Power Adapter: 1.0 lb. Standalone with Power Adapter: 1.5 lb.
<b>Humidity</b>	5% to 95% (non-condensing)
<b>Altitude</b>	-100m to 4,000m
<b>MTBF (hrs)</b>	Plug-in: 340,000 Standalone without Power Adapter: 420,000 Standalone with US Power Adapter: 250,000 Standalone with Universal Adapter: 100,000

This out-of-franchise (off-net) application illustrates an E-Line service (Ethernet Virtual Connection) between two customer locations that geographically spans two or more Independent Operator networks. The Service Provider responsible for billing and service contract has installed iConverter GM3 NIDs at each subscriber location, which function as the end points of the Service Provider Maintenance Domain. Through 802.1ag and Y.1731 Service OAM, the GM3 NIDs constantly monitor the end-to-end service performance of the network, and the Service Provider has visibility across the Operators' networks for assurance that the contracted Service Level Agreement commitments are being met.

In this application, the iConverter GM3 is used in a geo-diverse redundancy uplink in the upper right of the illustration. This provides a redundant path for mission-critical Enterprise customers. In the event of a fiber break, Rapid Spanning Tree Protocol will detect the failure and activate the redundant fiber link, minimizing interruption of service to critical Enterprise customers.

In the lower right of the illustration, the GM3 is used to deliver Ethernet services to two subscribers, one with a copper interface, and one with fiber.



# ORDERING INFORMATION

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

<Blank>	Plug-in Module
A	Tabletop with External US AC Power Supply
B	Tabletop with External Universal AC Power Supply
C	Tabletop with DC Terminal Power
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

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	8920P-0	8922P-0	-	-	850	850	-10	-4	-17	-3	-	7
FF	UTP	-	SM/DF	12km	8921P-1	8923P-1	-	-	1310	1310	-9.5	-3	-19.5	-3	-	10
FF	UTP	-	SM/DF	34km	-	8923P-2	-	-	1310	1310	-5	0	-23	-3	3	18
FF	UTP	-	SM/DF	80km	-	8923P-3	-	-	1550	1550	-5	0	-23	-3	3	18
FF	UTP	-	SM/DF	110km	-	8923P-4	-	-	1550	1550	0	5	-24	-3	8	24
FF	UTP	-	SM/DF	140km	-	8923P-5	-	-	1550	1550	2	5	-28	-8	13	30
FF	UTP	-	SM/SF	20kms	-	8930P-1	-	-	1310	1550	-9.5	-3	-20	-3	-	10.5
FF	UTP	-	SM/SF	20kms	-	8931P-1	-	-	1550	1310	-9.5	-3	-20	-3	-	10.5
FF	UTP	-	SM/SF	40kms	-	8930P-2	-	-	1310	1550	-3	0	-20	-3	3	17
FF	UTP	-	SM/SF	40kms	-	8931P-2	-	-	1550	1310	-3	0	-20	-3	3	17
SFP	UTP	-	-	-	-	-	8939P-0	-	See SFP Data Sheet for available transceivers and optical parameters							
UTP	UTP	SFP	-	-	-	-	8970P-0	-	See SFP Data Sheet for available transceivers and optical parameters							
UTP	UTP	UTP	-	100m	-	-	-	8974P-0								
SFP	SFP	UTP	-	-	-	-	8975P-0	-	See SFP Data Sheet for available transceivers and optical parameters							
SFP	SFP	SFP	-	-	-	-	8979P-0	-	See SFP Data Sheet for available transceivers and optical parameters							
UTP	UTP	-	-	100m	-	-	-	8989P-0								
SFP	SFP	-	-	-	-	-	8999P-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.



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