

## Datasheet

# OptiSwitch® 930 - 10 Gigabit Ethernet Service Demarcation



**OS930**

### Overview

The OptiSwitch 930 is a carrier-class 10 Gigabit Ethernet Demarcation service platform.

The OptiSwitch 930 10GE demarcation solution is a small form factor (1RU) that offers wide range of intelligent packet services with industry-leading 10GE line rate performance and advanced feature integration. The product provides high availability based on redundant and hot-swappable elements to insure maximum uptime for mission-critical 10GE Telco services.

The OptiSwitch 930 enables premium revenue, generating 10GE manageable services with extensive traffic management and end-to-end control for service level conformance.

The OS930 Series acts as 10GE demarcation device at the customer premises and is owned by the service provider. It provides a carrier-to-customer 10GE User/Network Interface (UNI) that separates the carrier's WAN from the customer's LAN. The OS930 enables bandwidth limiting, security and monitoring of customer and network interfaces with clear visibility of LAN and WAN segments.

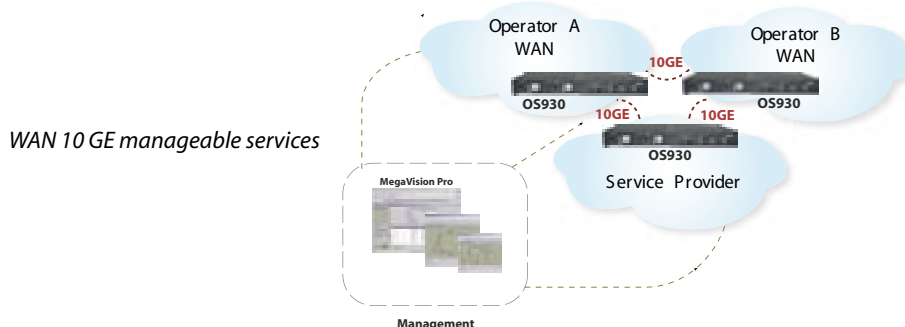
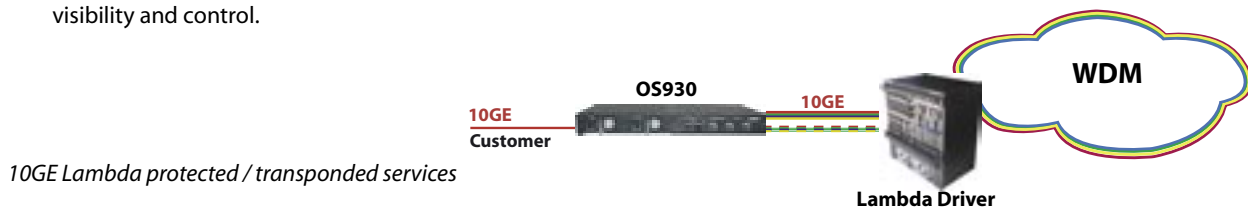
For interprovider demarcation points, the OS930 serves as a 10GE demarcation device at the carrier-to-carrier on-net locations, and provides Network/Network interfaces (NNI) that separate two different service provider networks. In such an application, the OS930 Series enables Ethernet service delivery over multiple carrier transport networks with end-to-end visibility and control.

### Product highlights

- 10GE Service Demarcation for Metro Ethernet
  - E-Line, E-LAN & EPL MEF9 connectivity services
- 3 10GE XFP LAN/WAN interfaces (UNI/NNI)
  - Single 10GE XFP service interface
  - Dual 10GE XFP network interfaces
  - 10GE interfaces can be configured as UNI/NNI
  - 10GE interfaces supports jumbo frames up to 16 k
  - Hot Swappable XFP pluggable optics
  - XFP slots support DWDM pluggables
  - LAN/WAN software configurable: 10GE / OC192/STM64
  - Optical Level monitoring and alarm thresholds
- Hierarchical QoS traffic management
  - MEF14 conformance
- End-to-end Ethernet Service OAM to guarantee SLAs
  - On-demand in-service loopback per port and VLAN
- Carrier-class reliability
  - 10GE Service protection (50msec)
  - Hot swap fully redundant power supplies
  - Compact form factor – 1RU height / 12" depth
  - Front facing maintainability

### Applications

- Mission critical revenue by generating 10GE services
- WAN 10GE manageable services for Intra-provider & inter-providers Intra-provider and Inter-provider
- 10GE Lambda services – Fiber optimization via DWDM XFPs



### Carrier-class Metro Ethernet 10GE demarcation E-Line, E-LAN, EPL services

- MEF 9 services and MEF 14 Traffic Management conformance
- H-QoS – enables dynamic bandwidth sharing with superior performance
- Service protection (50msec)
- Multilayer end-to-end OAM to guarantee SLAs

### Architecture

Designed based on a state-of-the-art wire speed technology, the OS930 offers a future-proof solution for ILECs, IXCs, MSOs or green-field service providers, suitable for various business subscriber SLAs. The OS930 encompasses a wide spectrum of features to facilitate the provisioning of revenue generating new value-added services by offering a single 10GE demarcation device.

### Optical XFP 10GE Services

XFP interfaces on the OS930 provide unmatched deployment flexibility to enable versatile optical extensions from short to long haul and DWDM 10GE connections – simply by means of the use of a specific XFP.

For service providers that build next-generation 10GE optical networks, the consolidation of DWDM services with intelligent traffic forwarding on the same platform offers significant costs savings in capital expenditures .

The integration of DWDM XFPs eliminates the need for a transponder on the OTN network, and offers better fiber optimization along physical services separation with dedicated 10GE rate for premium optical services with the same concept of legacy “leased-line” services.

### VPN Services

Compliant to MEF Ethernet Virtual Circuit (EVC), the OptiSwitch 930 can offer three types of VPNs:

1. Layer 1 Optical VPN – a cross-connect mode with transparent mode (no MAC learning)
2. Layer 2 VPN – VLAN-based tunneling Q-in-Q stacking, swapping or mapping services
3. Layer 2.5 VPN – a label-based MPLS VC for direct connection into MPLS domains or H-VPLS MTU-s \*

In addition to L2 VPN, the OS930 can offer integrated 10GE IP router services to save the costs of an external router and provides a single demarcation platform for managed L2 VPN and IP services.

### Traffic Management

The OptiSwitch 930 enables a value-added network infrastructure, with end-to-end per flow QoS.

It supports full CoS and QoS (MEF 14 model) including flows classification, rate limiting, shaping, WFQ scheduling, and strict priority for lower delay/jitter and guaranteed throughput in real-time applications. In addition, it enables dynamic/adaptive buffer pools to prevent bursty traffic starvation and ensure queuing resources effectiveness.

For network convergence applications that have a clear boundary between customer’s and carrier’s networks, CoS layers (802.1p, IP ToS & MPLS EXP bits) can be mapped/marked to preserve priorities or map them into predefined protection profiles set by the carrier.

### Hierarchical QoS – CoS-Aware rate limit

Defining premium SLAs is a key fundamental for service differentiation.

The OS930 enables traffic management based on innovative CoS-aware rate limit to dynamically reuse bandwidth profiles. Dynamic QoS is an important feature that allows for sharing defined rate limited flows with aggregate profile applied to a user network interface or an Ethernet Virtual Circuit. In the new service offering, the consolidated real-time, high-priority and best effort data require different rates and marked class of service. Dynamic QoS helps to share/borrow the bandwidth that was allocated for real-time or high priority applications at a time when these services are not active. Such an offering contributes to a more efficient way of provisioning bandwidth at the access/demarcation of the network without complex configuration sets at the aggregation layer.

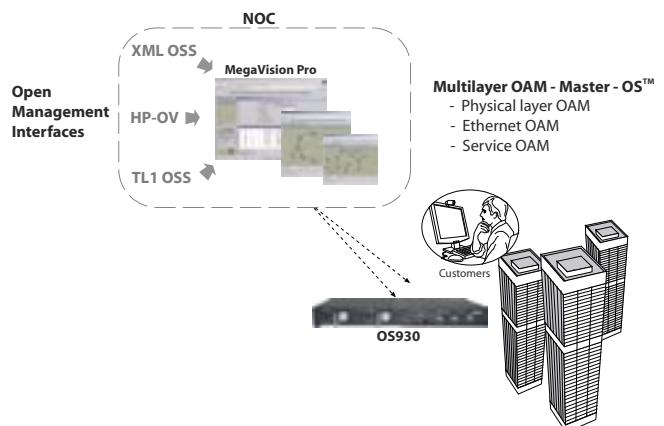
### Denial of Service (DoS) protection

The OS930 incorporates multilayer DoS protection at the hardware architecture on the CPU control plane and data-switching plane. The multilayer control protects the service and the device functionality from hostile traffic without degradation of service performance or affecting of the forwarding database or CPU availability. Multiple traffic types can be policed or discarded starting from frame level such as broadcast, multicast up to IP/TCP/UDP layers.

### Management - OAM

The OptiSwitch 930 control plane incorporates an array of highly manageable features that offer ensured interaction with carrier’s OSS and NMS platforms, based on industry standard southbound out-of-band or in-band interfaces. In addition, it can be managed via MRV’s MegaVision-Pro NMS to have complete GUI and Northbound gateway (XML, TL1 & SNMP) of an entire map of clustered devices for configuration, performance analysis, and inventory control.

For the service providers, the OAM that is provided by a demarcation device determines, to a significant extent, the metrics that can be used to establish the SLA with a business subscriber. The OS930 incorporates enhanced standards compliant MEF OAM and gives the service provider the ability to monitor the network and provision services, and promptly determine the location of faults remotely from the network operation center.



## Ethernet OAM with IEEE802.1ag & ITU-T Y.1731

The connectivity of Ethernet bridge devices across Metro Ethernet or other transport networks creates dedicated or virtual Ethernet circuits. An end-to-end service architecture requires administrative domain hierarchy with corresponding OAM enabled titles. The OS930 model incorporates connectivity, discovery and fault management along performance statistics of delay, jitter and frame loss for demarcation and intermediate points of service.

## Ethernet loopbacks

The OS930 offers remote loopback functionality on a physical 10GE interface or a specific VLAN that traverses UNI or NNI interfaces. The loopback function allows for the troubleshooting of the service, remotely, from NOC, or any other manageable location without needing to actually visit the customer premises. Loopback functionality performed in hardware level for performance monitoring and SLA verification in wire-speed.

## Per-service performance monitoring

The OptiSwitch 930 offers real-time and historical reporting on various service performance metrics, including port/VPN-EVC utilization, transmission errors, and QoS threshold exceptions.

Each service can be tracked for statistical information to help in base lining and troubleshooting traversing services. This service enables users to verify service guarantees, increase network reliability by validating network performance. Performance monitoring uses proactive monitoring to generate traffic in a continuous, reliable, and predictable manner, thus enabling the measurement of network performance and health.

## Link fault reflection/propagation

The link fault reflection propagates the fault from network 10GE interface to user interface. Such functionality is configurable and operated on LOS fault that will trigger the user link to down mode. In scenario of 10GE network interfaces protection, the fault propagation will be triggered only after the LOS of both network interfaces.

## Optical performance level monitoring (Digital Diagnostics)

The OptiSwitch 930 supports the XFP Digital Diagnostics standard (as per SFF-8472). A powerful OPM tool, it provides access to a number of real-time XFP operating parameters such as optical TX/RX power, voltage and temperature, as well as component information such as vendor code, serial number and wavelength. The information provided by Digital Diagnostics, together with alarm and warning thresholds, enables a network administrator to identify potential problems in optical transmission and take preemptive action before any service outage actually occurs.

## Sniffer VLAN on 10GE services

The OS930 incorporates a powerful tool called Sniffer VLAN. This feature enables the operator to configure a dedicated sniffer VLAN to remote surveillance center for remote analyzer. Sniffing on the OS930 can be set per specific customers' VLAN, per L2-3-4 fields or per learn table MAC. The remote service monitoring inline with interception processes based on requirements of Law Enforcement Monitoring.

## Specifications

### Physical ports:

- 3 x 10GE XFP ports
- Out-of-band management RS-232 & Ethernet
- Hot-swappable XFP optics – short /long haul multi-rate and DWDM

### Power supply:

- Hot Swappable 1+1 redundant AC/DC power supplies

### Mounting:

- Rack size: 1RU
- Rack mounting: 19" & 23" mounting

### Hardware

- Jumbo frames up to 16,000 bytes on 10GE ports
- Packet buffer management
- Environmental sensor

### Switching services

- IEEE 802.1Q and IEEE802.1ad provider bridges
  - 4K active VLANs
  - Q-in-Q stacking per port+VLAN
  - VLAN translation and mapped modes (per port +VLAN)
- Transparent cross-connect mode (No MAC learning)
- Learning table limit per VLAN/port
- Service protection
  - Automatic Optical switching on network interfaces (1:1)
  - IEEE802.3ad Link Aggregation (1+1)
  - Multiple Instance Spanning Tree IEEE802.1s

### Traffic management services – MEF Compliant

- Inbound & Outbound traffic management per flow
- Classification by physical port, MAC, Ethertype, VLAN, IP/TCP/UDP, IEEE 802.1p (VPT), DiffServ (IPv4 & IPv6 TC)
- Marking/remarking profiles between layers (802.1p, IP ToS & MPLS EXP bits)
- 8 hardware queues per port & configurable CoS adaptive buffer
- In-profile & out-of-profile service counter sets
- Class-aware rate limit – dynamic bandwidth reuse between mapped classes
  - Hierarchical -QoS model with CIR/EIR rates

### Tunneling - L2 services

- Q-in-Q - mapped mode or translation
- Layer 2 VPN – Martini MPLS pseudo-wire
- Spoke H-VPLS

### IP services

- Static & dynamic routing – Master-OS™\*
- DHCP Server/Client/Relay

### Security

- CPU DoS protection
  - Frame rate control
  - Dedicated queues
- Wire-speed Access Control Lists
  - L2-3-4: from frame to application layer
- MAC, ARP and BPDU filtering
- Rate limit protection for Unicast/Multicast/Broadcast packets
- Security thresholds for L2 statistics counters

**Management & Diagnostics tools**

- Industry Standard CLI
- Out-of-band Ethernet management – EIA-232 console
- Out-of-band Ethernet management – Dedicated Ethernet RJ45 port
- Telnet, SSH v2, SNMPv3, RMON (4 groups)
- Port mirroring - ingress & egress traffic to analyzer port
- Port mirroring per ACL – Sniffer VLAN
- Ping, Trace route, DNS lookup, TCP dump (built-in sniffer)
- Management ACL for trusted connections (Telnet, SSH, SNMP)
- Optional SNMP/CLI block
- Hierarchical Administration policy
- RADIUS AAA for management sessions
- Configuration load/save via FTP, Secure Copy (SCP)
- NTP – Network Time Protocol
- Logging Syslog
- Scripting tool for macro configurations & maintenance
- Action scheduler for automated rules

**OAM - Service assurance tools**

- Enhanced performance monitoring and SLA management
  - Local and Remote hardware-base loop back functionality
  - Per VLAN loopback & MAC swapping
  - Enhanced Latency/Jitter measurement (QOS Verification)
  - Alarming control
- Service end-to-end OAM - Connectivity Fault Management - 802.1ag
- Physical layer OAM - Cable Diagnostics
  - Optical signal level monitoring (SFP SFF-8472)
- Remote failure notification / reflection
  - Link Integrity Notification (LIN)
  - Dying Gasp

**Technical Specifications**

<b>Standard compliance</b>	UL-1950; CSA-22.2 No.950; FCC part 15 Class A; CE-89/336/EEC, 73/23/EEC – ROHS compliant		
<b>Operating temperature</b>	0 to 40°C (32 to 104°F)		
<b>Non-Operating temperature</b>	-40 to +70°C (-40 to 158°F)		
<b>Humidity</b>	85% maximum , non-condensing		
<b>Diagnostic LEDs</b>	Power, Power RST, Temperature, FAN, Management , PS Online/Active /Alarm Ports: Link, activity		
<b>Mounting</b>	19" or 23" racks (1RU)		
<b>Physical dimensions WxDxH</b>	443x315x43.65 mm / 17.44x12.4x1.72 inch		
<b>Weight</b>	2.5kg (5.5 lb)		
<b>MTBF</b>	540,353 HRS @ 25°C/77F		
<b>Power Specifications (AC/DC)</b>	AC Input Voltage Line frequencies 50-60Hz	DC Input Voltage	Power consumption(W) Min.            Max.
<b>Hot swappable dual redundant Power supplies</b>	90-240 VAC	-48VDC (-36VDC to 72VDC)	70W            110W
<b>BTU (min/max) per hour</b>	240 / 375		

<b>Order Info</b>	<b>OS-930 Platform</b>	
	OS930	10GE service platform – 3 10GE LAN/WAN XFP ports, hot-swappable dual redundant power supplies (AC/DC should be ordered separately)
	<b>Hot - swappable power supplies for OS930</b>	
	EM9005-PS/AC	AC power supply for the OptiSwitch® 9000 Series (90-240V AC)
	EM9005-PS/DC	DC power supply for the OptiSwitch® 9000 Series (-48V DC)
	<b>Accessories</b>	
	EM930-BR-1	19" mounting brackets for a Telco rack
EM930-BR-2	23" mounting brackets for a Telco rack	

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