Overview

MRV’s OptiSwitch® 940 is a 1RU small form-factor Carrier-Ethernet access and mini aggregation device for 1st mile GigE and 10GE NGN networks.

As part of the OS900 series it provides carriers with industry best CAPEX and OPEX savings and for extra OPEX cuts it is also designed to meet the “Green Ethernet” standard for low power consumption.

OptiSwitch 940 presents service providers with a full suite of carrier-grade Ethernet services along with high-availability, enhanced quality of service, security, and Operations, Administration & Maintenance (OAM) support. The uniqueness of a full suite of Carrier-Ethernet tools enables flexible service awareness and rigid SLAs for converged Triple Play, Business, and Mobile backhaul services including clock synchronization per the Synchronized Ethernet Standard®.

The OptiSwitch 940 Metro Ethernet solution meets IEEE, ITU, IETF standards, and MEF specifications, and, it offers complete control for simplifying deployment and management, while providing full interoperability and guaranteed Service Level Agreements (SLAs). MRV’s OptiSwitch® 940 also supports the enhanced IP/MPLS suite,** which includes all standard IPv4 IGP & EGP protocols and MPLS LER & LSR functionalities.

* Will be available in the second Hardware version
** Future Software release

Key Features

- MRV Unified Master-OS® control plane for Metro-E services
- Non-blocking hardware architecture
  - 12 x GigE and 4 x 10GE (LAN/WAN)
  - As a mini aggregator
    - Uplink ports: 4 x 10GE XFP
    - Access ports: 12 x GigE SFP
    - As an access device
    - Uplink ports: 2 x 10GE XFP
    - Access ports: 2 x 10GE XFP + 12 x GigE SFP
- Wide range of Optical Layer 1 and Layer 2 VPN Services
  - MPLS LER and LSR functionalities
  - Supports all IGP and EGP protocols: RIP/OSPF/IS-IS/BGP
  - Supports label distribution protocols: LDP/CR-LDP/RSVP-TE
  - Supports all standard IPv4 protocols and MPLS LER & LSR functionalities.

Applications

- Wide range of mission-critical revenue generating GigE and 10GE services
  - Triple-Play IPTV, NGN Voice services
  - Business services and mobile backhaul

Not sure which solution best fits your needs? Visit www.mrv.com or e-mail us at sales@mrv.com
Features and Solution Benefits

OptiSwitch 940 is a high-performance system with non-blocking hardware and software architecture engineered for deployment in new and demanding packet-optical network environments. As a small form factor 1RU device that incorporates both 4x10GE ports and 12 tri-mode GE ports, the OptiSwitch 940 provides carriers with outstanding CAPEX and OPEX savings.

To add to these savings, the device supports standard Green Ethernet architecture and enables customers to minimize power consumption. As the device supports all industry standard OAM functionalities and has an internal hardware-based traffic generator, it enables the provider to save on expensive testing equipment required to monitor SLAs with 3rd party carriers.

In addition, this new state-of-the-art platform supports various technologies that enable the provider the utmost flexibility in network design and the capability to use the device for multiple purposes: an elaborated L2 suite for Metro Ethernet and Mobile Backhaul including Synchronized-Ethernet for clock synchronization*, full wire speed and full protocol suite for IP and MPLS networks (including MPLS LER and LSR functionalities**)

Multipurpose Service Interfaces

The platform offers a unique combination of features and optical interfaces that enable easy and flexible field configurations while making it ideal for maintenance and inventory. As a small device, it helps providers save on rack space and along with a very low power consumption it leads to substantial decrease in power consumption and overall operational maintenance cost.

<table>
<thead>
<tr>
<th>Interface Protocol</th>
<th>Service Interfaces</th>
<th>Pluggable MSA</th>
<th>Port numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>10GE LAN / WAN (OC-192)</td>
<td>4</td>
<td>XFP</td>
<td>13 to 16</td>
</tr>
<tr>
<td>Tri-mode built-in RJ45 10/100/1000BaseT or 100/1000FX SFP ports</td>
<td>12</td>
<td>SFP</td>
<td>1 to 12</td>
</tr>
</tbody>
</table>

- All Interfaces can be configured as UNI / NNI to enable access to edge and intra-network services
- Hot Swappable XFP and SFP pluggable optics insure a wide range of operating distances, cost, and performance
- Tri-Mode built-in RJ45 electrical interfaces and optical SFP ports
- XFP ports support short-haul to long-haul operating distances
- SFP ports support short-haul to long-haul operating distances, single strand, and CWDM and DWDM optics
- 10GE interfaces software configurable for 10GE LAN or WAN OC192/STM64 protocol
- All SFP and XFP interfaces enabled for remote Optical Level monitoring and alarm thresholds
- All RJ45 electrical interfaces enabled for remote copper-TDR cable diagnostics
- All SFP and XFP ports have SyncE support for mobile backhaul clock synchronization*

End-to-end Service ProVisioning and Operations, Administration & Maintenance

MRV’s Pro-Vision℠ application provides a complete suite of easy-to-use GUI tools for Provisioning and activation management of bonded copper and fiber services. Network monitoring is supported by real-time sampling and historical performance reporting for customer SLA. The system has carrier-grade UNIX-based software that supports full FCAPS industry standards to insure simplified interoperability with existing Operation Support Systems (OSSs) and 3rd party Network Management Systems (NMSs) through northbound protocols, such as CORBA, SNMP, TL1, HTTP, and XML.

* Will be release in second Hardware version
** Future Software release

End-to-end service provisioning and activation across network infrastructure*
Service Specifications

**MEF Services**
- UNI Type 1 and Type 2
- External-NNI & Internal-NNI
- EPL, E-Line, E-Tree, and E-LAN – MEF9
- EPL, E-Line, E-Tree, and E-LAN Traffic Management – MEF14
- OAM Implementation Agreement (IA) – MEF17
- All interfaces can be configured as UNI / NNI

**Clock Synchronization**
- Physical Layer Synchronous Ethernet - ITU-T G.8261 and ITU-T G.8262 on all ports
- Ethernet Synchronization Messaging Channel - ITU-T G.8264 on all ports

**Packet Switching Services**
- 100 Gbps (Full-duplex) non-blocking wire-speed architecture
- Configurable jumbo frames per port / EVC
- Packet buffer management

**Packet Ring and Link Protection Services**
- Sub 50 ms network recovery for ring and dual–homed topologies
- MSTP IEEE802.1s
- ITU-T G.8032 (ERPS) ring-based protection
- Link Aggregation (LAG n+1) – static and LACP
- Load balancing based on L2-3-4 headers
- Link level 1:1 Loss of Signal (LOS) protection
- Hardware-based CFM (OAM) messages for fault detection and link fallback
- Bi-directional Link Fault Reflection
- Link flap protection and damping
- Unidirectional Link Detection

**Multicast and IP Services**
- Wire-speed multicast replication
- IGMP v1,v2 snooping, proxy, and fast leave
- Multicast routing PIM-SM **
- Wire-speed IPv4 / packet forwarding routing
  - RIP, OSPF, IS-IS, BGP4, VRRP
  - DHCP server/client/relay

**Layer 2.5 Services**
- Ethernet over MPLS pseudowire with Traffic Engineering
- GRE tunneling
- MPLS L2 LSP termination / hot-swappable MTU’s (LER)
- MPLS LSR functionality + FRR (RFC 4090)
- MPLS OAM (MPLS Ping / MPLS Traceroute)

**Traffic Management**
- Inbound & outbound traffic management per flow/EVC
- Dual-rate 3-color rate limit per flow or aggregate
  - Granular CIR/EIR rates up to 10Gbps
- Classification by L2, and/or L3, and/or L4 criteria
  - Physical port, MAC, Ethertype, double VLAN tags, IP/TCP/UDP
- IEEE 802.1p (PCP), Diffserv
- Marking/remarking profiles between layers
  - IEEE802.1p, DSCP, and MPLS EXP
- 8 hardware Service Level queues per port
- Heirarchical QoS based on inner queues
- Per flow SLA metrics
- Counters per UNI, CoS, EVC, control protocols
  - 4K counters

**Security**
- Wire-speed ACLs on L2, L3, and L4 headers
  - Up to 3K rules
  - Ingress and Egress ACLs
  - Multiple actions in single ACL
- CPU Denial-of-Service protection
- MAC filters and MAC limit per port/per VLAN
- UNI Broadcast/Multicast/Unicast rate control
- Flood limit of OAM frames
- DHCP Option 82
- ACL for management sessions from NOC
- VACM – Virtual Access Control Model
- IEEE802.1x security for port authentication

**Management & Diagnostics Tools**
- Industry Standard CLI
- Out-of-band management via EIA-232 console port
- Out-of-band Ethernet management port
- Telnet, SSH v2, SNMPv3, RMON (4 groups)
- Port mirroring - ingress & egress traffic to analyzer port
- Remote service/flow mirroring per ACL Sniffer VLAN
- Built-in sniffer
- Hierarchical Administration policy
- AAA, RADIUS / TACACS+
- Configuration load/save with FTP or Secure Copy (SCP)
- Network Time Protocol
- Internal / Remote Syslog
- Scripting tool for macro configurations & maintenance
- Scheduler for automated preset actions (time/day/cycle)
- IPv6 management **
- Supported by MRV’s EMS/NMS (MegaVision/ProVision)
- USB interface to simplify and enable rapid software upgrades **

**Standard Operations, Administration & Maintenance**
- End-to-end Service OAM IEEE802.1ag
  - Connectivity Fault Management per service MEP/MIP
  - In-service EVC loopbacks (HW-based), Linktrace & continuity check (HW-based)
- End-to-end IP SLA measurement
  - Jitter, Latency, and Loss per service with nano-second accuracy
- RFC2544 internal tester with wire speed throughput measurements
- EFM Link OAM (segment-based CO-to-CE) IEEE802.3ah
  - Discovery, port-loopback, remote failure indication,
    dying gasp
- Optical signal level monitoring (SFP SFF-8472)
- Copper cable diagnostics TDR on RJ45 ports
- Bi-directional Link Integrity (LIN)
  - Remote failure notification / reflection

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** Future Software release
OS940
Intelligent 10GE services demarcation platform-12GE tri-mode (100FX-100FX SFP or RJ45 10/100/1000Base-T) ports 4x10 Gbps (LAN/WAN) ports. Power Supplies are to be ordered explicitly by the customer.

Hot-swappable power supplies for OS900 series

EM940-PS/AC  AC power supply for the OptiSwitch® 940 (90-240V AC)
EM940-PS/DC  DC power supply for the OptiSwitch® 940 (-48V DC nominal)

Hot-swappable power supplies for OS940 series

Master-OS™ - MPLS Software Upgrade Package for OS940
SW-UPG-94xMPLS **  Enhanced software upgrade package for OptiSwitch® 940 (Master-OS: MPLS LER VC - LDP, RSVP-TE, CR-LDP, OSPF-TE, ISIS-TE, CSPF)

* For ordering codes of SFP/XFP Pluggable optics, please refer to MRV's web site

Order Info

Standards compliance

Operating Temperature
Operating Temp: 0 to 50 °C (32 to 122 °F)  Storage Temp: -40 to +70 °C (-40 to 158 °F)

Humidity (max.)
85% (non-condensing)

Rack Mounting
19” or 23” racks, compact 1 RU height

Performance
Non-blocking 100Gbps (full-duplex) architecture
Full-wire packet forwarding on all ports at 95M pps

Physical dimensions
WxDxH  443.0 x 297.9 x 43.8 mm (17.44 x 11.73 x 1.72 inch)

Weight
3.05 kg (6.72 lb)

MTBF
324583 hr @ 25°C/77°F

Power Specifications

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