

Datasheet

# OptiSwitch® 9124-410G Carrier-Ethernet Packet-Optical Aggregation

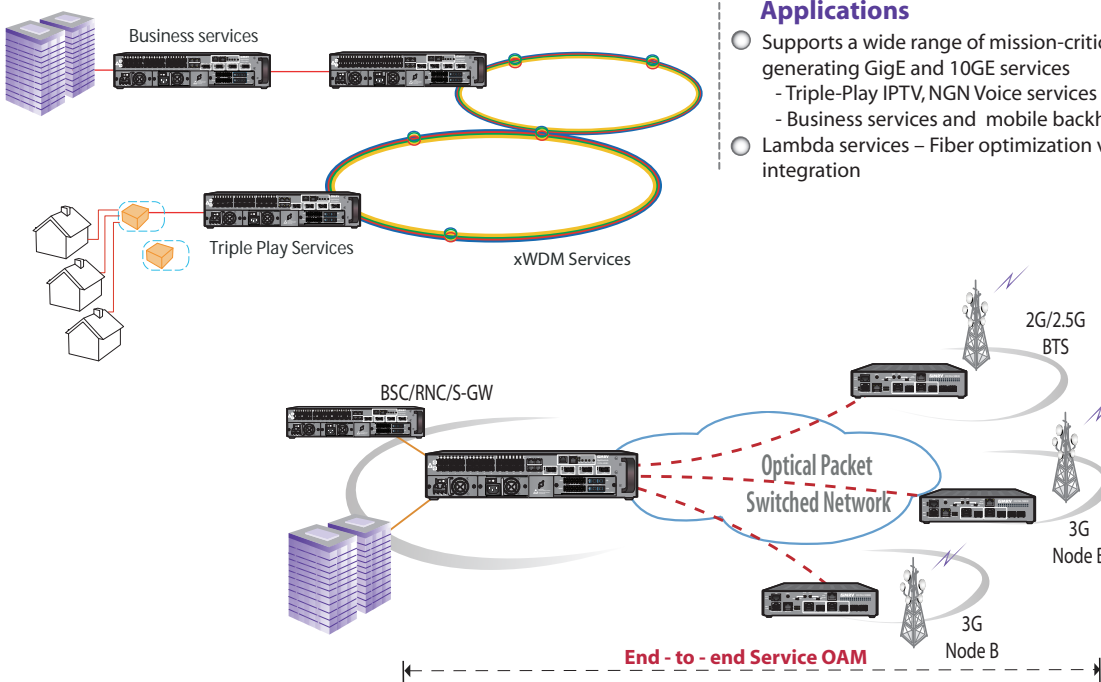


OS9124 - 410G

MRV OptiSwitch® 9124-410G is an award-winning compact Carrier-Ethernet packet-optical aggregation platform for 1<sup>st</sup> and 2<sup>nd</sup> mile optical FE, GigE and 10GE NGN infrastructure.

OptiSwitch 9124-410G provides service providers with a full suite of carrier-grade Ethernet services along with high-availability, enhanced quality of services, security, Packet-WDM and Ethernet Operation, Administration and Maintenance (OAM) support. The uniqueness of a full suite of Carrier-Ethernet tools creates flexible service awareness and rigid SLAs to enable converged Triple Play, Business and Mobile backhaul services.

OptiSwitch® Metro Ethernet solution meets IEEE, ITU, IETF and MEF standards, offering complete control to simplify deployment and management, while maintaining full interoperability and guaranteed Service Level Agreements (SLAs).



### Product highlights

- MRV Unified Master-OS® control plane for Metro-E services
  - Simplifies operation and management integration with OSS
- MEF CE2.0 compliant services
- Non-blocking hardware architecture
  - 24 x GigE and 4 x 10GE (LAN/WAN)
    - FE, GigE, 2,5G and 10GE Services
- Outstanding variety for Optical Layer 1 & Layer 2 VPN Services
  - EPL X-connect, E-Line, E-Tree and E-LAN
  - Point-to-point, point-to-multipoint and multipoint-to-multipoint
  - Any-to-any transparent cross-connect - eROADM services
- Flexible UNI/NNI interfaces - 100FX/1000FX/2000FX and 10GE
  - Same device for all aggregation scenarios
  - Support for jumbo frames on all ports
- Advanced traffic management with line rate performance
  - Classification, policing, metering, marking per-flow QoS
  - Low-latency and precise service rates
- Unmatched flexibility of Ethernet Virtual Circuits
  - Selective Q-in-Q and VLAN translation
- End-to-end Ethernet service OAM to monitor SLAs
  - Standard compliant – CFM IEEE802.1ag / PM ITU-T.Y.1731
  - RFC2544 throughput measurements
  - IP SLA measurements
  - EFM link OAM – IEEE802.3ah
  - Simplifies, monitors and troubleshoots services/applications
- Protection mechanism
  - ELPS G.8031 and ERPS G.8032
  - Link Protection 1:1 (LOS) and n+1 (LAG)
  - Sub 50ms SONET-like recovery and deterministic SLA
- Multicasting service for IP-TV Triple Play
- Compact 2RU form factor for space saving
- Hot-swap fully redundant power supplies and fans
- Excellent price/performance for fast ROI

### Applications

- Supports a wide range of mission-critical revenue generating GigE and 10GE services
  - Triple-Play IPTV, NGN Voice services
  - Business services and mobile backhaul
- Lambda services – Fiber optimization via C/DWDM integration

### Features and Solution Benefits

OS9124-410G platform is a high-performance system with non-blocking hardware and software architecture engineered for deployment in new and demanding packet-optical network environments to support the provider's value-added services offering. By integrating packet switching and aggregation with WDM transport, the OS9124-410G enables increased efficiencies in bandwidth utilization, optimizing interface and simplifying the network by eliminating the need for dedicated hardware. For service providers who build next-generation optical networks, the consolidation of WDM services with intelligent traffic forwarding on the same platform offers significant costs savings in capital expenditure.

### 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.

The integration of CWDM / DWDM SFP / XFP eliminates the need for a transponder in the network, and offers better fiber optimization along physical services separation with dedicated Gigabit or 10G rates for premium optical services with the same concept of legacy "leased-line" services.

Port numbering	Service Interface Options
<b>Ports 1-16</b>	10/100/1000BaseT - RJ45 SFPs (SFP-GA-R or SFP-GC-R) 100BaseFX - SGMII 100FX SFPs 1000BaseFX - standard GigE SFPs 2.5Gbps - 2000BaseFX - Standard multi-rate SFPs
<b>Ports 17-18</b>	10/100/1000BaseT - RJ45 SFPs (SFP-GA-R or SFP-GC-R) 100BaseFX - SGMII 100FX SFPs 1000BaseFX - standard GigE SFPs
<b>Port 19-20</b>	100BaseFX - Standard 100FX SFPs 1000BaseFX - Standard GigE SFPs
<b>Port 21-24</b>	Tri-mode built-in options Built-in 10/100/1000BaseT 100BaseFX - Standard 100FX SFPs 1000BaseFX - standard GigE SFPs
<b>Port 25-28</b>	10GE LAN/WAN(STM-64/OC192) PHY - Standard XFPs
<b>Multi-Service slot</b>	<b>WDM &amp; CES Services</b> ITU-T G.694.1 Standard (DWDM) ITU-T G.694.2 Standard (CWDM) OADM, MUX/DEMUX E1/T1 CES STM-1/OC3 CES

- All Interfaces can be configured as UNI / NNI to enable access to edge and intra-network services
- 100FX and 1000FX interfaces can be muxponded over 10GE interface at dedicated wavelength
- Hot Swappable XFP and SFP pluggable optics to insure diverse distance, cost and performance
- XFP slots support distances from short to long haul and DWDM pluggable optics
- SFP slots support distances from short to long haul, single strand and CWDM and DWDM optics
- 10GE interfaces software configurable for 10GE LAN or WAN OC192/STM-64
- All SFP and XFP interfaces enabled for remote Optical Level monitoring and alarm thresholds
- Built-in RJ45 electrical interfaces enabled for remote copper-TDR cable diagnostics

### End-to-end Service ProVisioning and Operation, Administration & Maintenance\*

MRV's Pro-Vision® software enables complete easy-to-use GUI tool to Provision and activation management for packet-optical services. Network monitoring supported by real-time sampling, or historical performance reporting for customer SLA. The system is carrier-grade UNIX-based software that supports full FCAPS industry standards to insure simplified interoperability with existing Operation Support Systems (OSS) and 3rd party Network Management Systems (NMS) through northbound protocols, such as CORBA, SNMP, TL1, HTTP and XML.



Packet

WDM

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

\* Denotes future software release

### MEF Services

- UNI type 1 and Type 2 (MEF21)
- External-NNI & Internal-NNI
- EPL, E-Line, E-Tree & E-LAN – MEF9
- EPL, E-Line, E-Tree & E-LAN Traffic Mgm. – MEF14
- OAM Implementation Agreement (IA) – MEF17
- All interfaces can be configured as UNI / ENNI



### Packet Switching Services

- 200G (Full-duplex) non-blocking wire-speed architecture
- Configurable jumbo frames per port / EVC
- Packet buffer management
- IEEE802.1Q and IEEE802.1ad provider bridges
  - 4K active VLANs / EVCs
  - Selective Q-in-Q stacking per ACL criteria
  - Configurable Ethertype values
  - Private VLAN
- Transparent cross-connect mode
  - Per System, per port or per EVC non-learning mode
- Learning table limit per VLAN/port
- Layer 2 control protocols tunneling
- UNI protected ports / Layer 1 filtering

### Packet ring and Link protection Services

- Sub 50 ms ring and dual-homed topologies
- ELPS G.8031 and ERPS G.8032
- MSTP IEEE802.1s
- 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
- 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 VLAN Registration (MVR) protocol\*
- Multicast routing PIM-SM\*
- Wire-speed IPv4 / IPv6\* packet routing
  - RIP, OSPF, IS-IS, BGP-4, VRRP
  - Secondary interfaces
  - DHCP server/client/relay

### Layer 2.5 Services\*

- Ethernet over MPLS pseudowire with Traffic Engineering\*
- H-VPLS dual-homed spoke MTU-s (LER)\*
  - LDP, RSVP-TE, OSPF-TE, ISIS-TE, CSPF\*
- MPLS-Transport Profile – MPLS-TP\*

### Availability

- 1:1 Hot-swappable dual redundant power – AC/DC mix
- Hot-swappable fans and filter
- Temperature sensor for environmental alerts
- Dual image & rollback processes
- Modular control plane - Master-OS™

### Traffic Management

- Inbound & Outbound traffic management per flow/EVC
- In-service circuit parameters changes (hitless ACL)
- Dual-rate 3 color rate limit per flow or aggregate
  - Granular CIR/EIR rates up to 10GE
- Classification by any L2-3-4 criteria and mix
  - Physical port, MAC, Ethertype, VLAN, IP/TCP/UDP
- IEEE 802.1p (VPT), DiffServ (IPv4 & IPv6 TC)
- Marking/remarking profiles between layers
  - 802.1p, DSCP & MPLS EXP
- 8 hardware queues per port & configurable SL
- Per flow SLA metrics
  - per UNI, CoS, EVC, control protocols
  - 16,000 counters

### Security

- Wire-speed ACLs on L2-3-4 headers
  - Up to 8K 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
- ARP rate control
- DHCP option 82 & option 60
- ACL for management sessions from NOC
- VACM – View-based Access Control Model

### Management & Diagnostics Tools

- Industry Standard CLI
- Out-of-band management - EIA-232 console
- Out-of-band Ethernet management - Dedicated ETH port
- Telnet, SSH v2, SNMPv3, RMON (4 groups)
- Port mirroring - ingress & egress traffic to analyzer port / VLAN
- Remote service/flow mirroring per ACL
- Ping, Trace route, DNS lookup, TCP dump (built-in sniffer)
- Management ACL for trusted connections (Telnet/SSH/SNMP)
- Hierarchical Administration policy
- RADIUS / TACACS+ AAA for management sessions
- Configuration load/save via FTP, Secure Copy (SCP)
- NTP - Network Time Protocol
- Internal / Remote Syslog
- Scripting tool for macro configurations & maintenance
- Action scheduler for automated rules (time/day/cycle)
- Remote auto-configuration - DHCP server/client/relay
- IPv6 management\*

### Standard Operation, Administration & Maintenance

- End-to-end Service OAM IEEE802.1ag
  - Connectivity Fault Management per service MEP/MIP
  - In-service EVC loopbacks, Linktrace & continuity check
- End-to-end Performance Measurement ITU-T Y.1731 & IP SLA
  - Per service Jitter, Latency & Loss - nano sec' precision
  - RFC2544 throughput measurements for service baseline
  - Scalable up to 64 measurements flows
- EFM Link OAM - IEEE802.3ah
  - discovery, port-loopback, remote failure indication
- Optical signal level monitoring (SFP SFF-8472)
- Copper cable diagnostics on RJ45 ports
- Remote failure notification / reflection

\*Future Master-OS™ Software release

### Technical Specifications

<b>Regulatory compliance</b>	FCC Part 15 (Class A); EMC Directive: Emission (Class A) and Immunity; LVD Directive: Electrical Safety; CE Marking; TUV-R mark (Canada, USA); GOST; RoHS Directive, REACH SVHC, WEEE Directive; ETSI, NEBS Level 3 Certified, C-Tick.		
<b>Operating Temperature</b>	0 to 50 °C (32 to 122 °F) - Short term operation 0 to 65 °C (32 to 149 °F)		
<b>Storage Temperature</b>	-40 to +70 °C (-40 to 158 °F)		
<b>Humidity</b>	10% to 85% non-condensing		
<b>Diagnostic LEDs</b>	Power, System RST, Temperature, FAN, Management, PS Online/Active /Alarm, Ports: Link, activity, MGT		
<b>Rack Mounting</b>	19" or 23" racks, compact 2 RU height		
<b>Maintainability</b>	Front facing system configuration: Eliminates the need to dismount the system for maintenance or installation of new hardware following initial installation Back-to-back installation in Telco racks: Doubling the 'port-per-rack' density.		
<b>Performance</b>	Non-blocking 200G (full-duplex) architecture Full-wire packet forwarding on all ports 95Mpps		
<b>Physical dimensions</b>	447.6x300x88.1 mm 17.62x11.81x3.46 inch		
<b>Weight (kg./lbs.)</b>	5 Kg/11 lbs (fully loaded with 2 PS 7Kg /15.43lbs)		
<b>MTBF HRS @25C /77F</b>	245,104		
<b>Power Specifications (AC/DC) Hot swappable dual redundant Power Supplies</b>	AC Input Voltage	DC Input Voltage Options	Power consumption(W)
	Line frequencies 50-60Hz 90-240 VAC	-48VDC (-36VDC to -72VDC)	Min. 100W min Max. 135W max
<b>Hot swappable fans</b>	Single Tray – field replaceable Side-to-side airflow		
<b>BTU per hour (min/max)</b>	341 / 460		

Ordering Information

P/N	Description
OS9124-410G	OptiSwitch® 9000 Series multi-layer platform with 16 SFP (100FX/1000FX/2000FX) + 4 SFP (1000FX) + 4 x Tri-Mode RJ45 10/100/1000BaseT or SFP (100FX/1000FX) + 4 x 10GE (LAN/WAN) + Optional Multi-Service Slot (AC/DC Power supplies should be ordered separately)
Hot-swappable power supplies for OS9000 series	
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)
Accessories	
MS9000-Blank	Blank panel for multi-service slot
EM9005-Blank	Blank panel for Power Supply.
EM9005-BR-2-C	23" mounting bracket
MS9000-FG-A	Fiber guard tray for OS9124-410G model
EM9005-FAN-T	Spare part- Fan tray for OS9124-410G model
Master-OS™ - MPLS LER Software Upgrade Package for OS9124-410G	
SW-UPG-91MPLS*	Enhanced software upgrade package for OptiSwitch® 9124-410G (Master-OS: Label Edge Router MPLS spoke VC - LDP, RSVP-TE, CR-LDP, OSPF-TE, CSPF)
* For ordering codes of SFP/XFP and SGMII Pluggable optics, please refer to MRV's web site	
<b>OS9000 - CWDM fiber optimization modules</b>	
O9ADCxx	1 CWDM wavelengths DF OADM module for OS9000
O9ADCxxyy	2 CWDM wavelengths DF OADM module for OS9000
O9ADCxxyzz	3 CWDM wavelengths DF OADM module for OS9000
O9ADCxxyzzww	4 CWDM wavelengths DF OADM module for OS9000
O9ADCDxx	1 CWDM wavelengths DF Dual Sided OADM module for OS9000
O9ADCDxxyy	2 CWDM wavelengths DF Dual Sided OADM module for OS9000
O9ADCDxxyzz	3 CWDM wavelengths DF Dual Sided OADM module for OS9000
O9ADCDxxyzzww	4 CWDM wavelengths DF Dual Sided OADM module for OS9000
O9ADCDSxx	1 CWDM wavelengths SF Dual Sided OADM module for OS9000
O9ADCDSxxyy	2 CWDM wavelengths SF Dual Sided OADM module for OS9000
O9ADCDSxxyzz	3 CWDM wavelengths SF Dual Sided OADM module for OS9000
O9ADCDSxxyzzww	4 CWDM wavelengths SF Dual Sided OADM module for OS9000
O9-Mux/Demux8	8 wavelengths CWDM Multiplexer/Demultiplexer module for OS9000
<b>OS9000 - DWDM fiber optimization modules</b>	
O9ADDxx	1 DWDM wavelengths DF Dual Sided OADM module for OS9000
O9ADDxxyy	2 DWDM wavelengths DF OADM module for OS9000
O9ADDxxyzz	3 DWDM wavelengths DF OADM module for OS9000
O9ADDxxyzzww	4 DWDM wavelengths DF OADM module for OS9000
O9ADDxx	1 DWDM wavelengths DF Dual Sided OADM module for OS9000
O9ADDxxyy	2 DWDM wavelengths DF Dual Sided OADM module for OS9000
O9ADDxxyzz	3 DWDM wavelengths DF Dual Sided OADM module for OS9000
O9ADDxxyzzww	3 DWDM wavelengths DF Dual Sided OADM module for OS9000
O9ADDsxx	1 DWDM wavelengths SF Dual Sided OADM module for OS9000
O9ADDsxyy	2 DWDM wavelengths SF Dual Sided OADM module for OS9000
O9ADDsxyzz	3 DWDM wavelengths SF Dual Sided OADM module for OS9000
O9ADDsxyzzww	4 DWDM wavelengths SF Dual Sided OADM module for OS9000
O9-Mux/Demux8DB	8 wavelengths DWDM Multiplexer/Demultiplexer (ch#43 to ch#57) module for OS9000
O9-Mux/Demux8DR	8 wavelengths DWDM Multiplexer/Demultiplexer (ch#21 to ch#35) module for OS9000