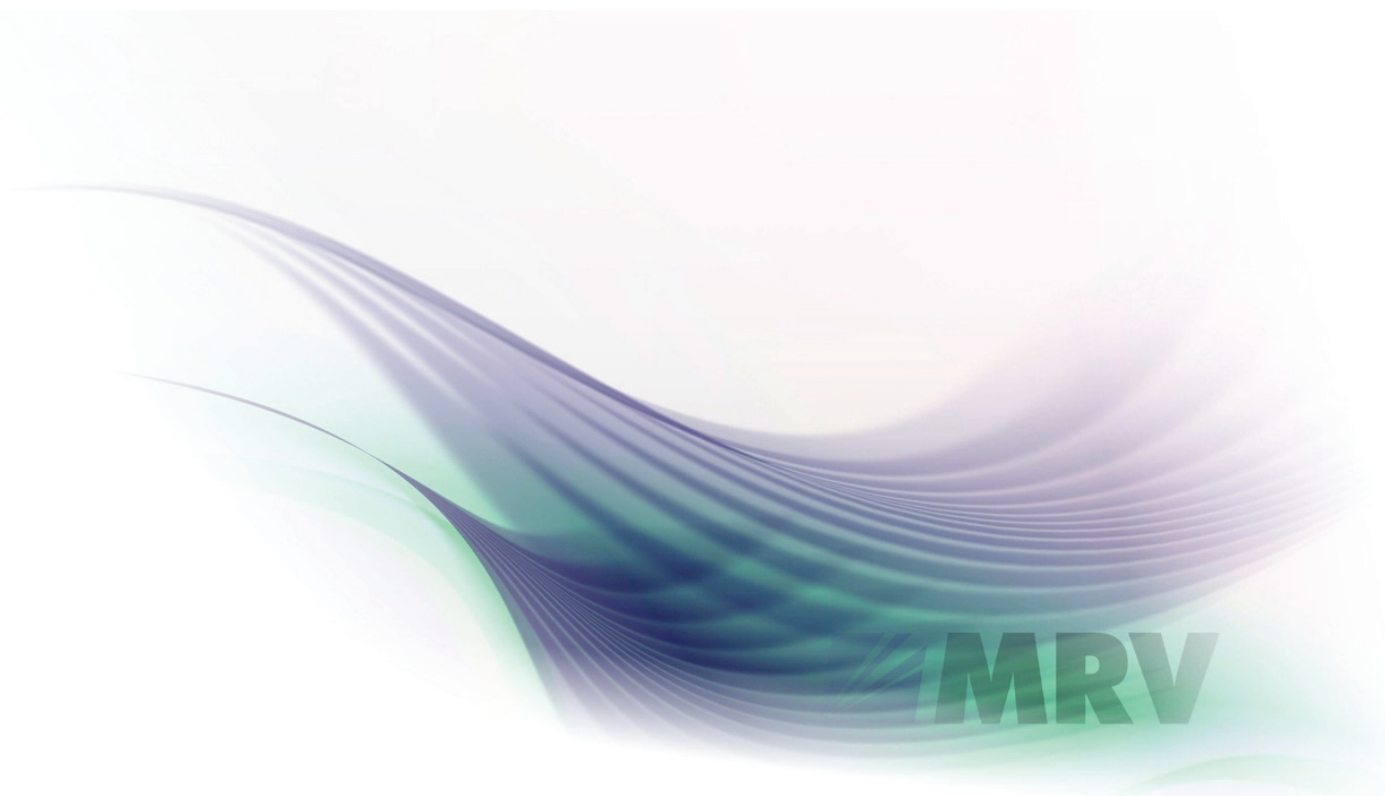




Optical Communications Systems®

# Carrier Ethernet Access Solutions

*Empowering The Optical Edge™*



MRV Communications, Inc. is a leading global provider of carrier Ethernet, WDM optical transport, infrastructure management equipment and solutions, as well as network integration and managed services. MRV's solutions enable the delivery and provisioning of next-generation optical transport and carrier Ethernet services over any fiber infrastructure. MRV provides equipment and services worldwide to telecommunications service providers, enterprises, and governments, enabling network evolution and increasing efficiency, while reducing complexity and costs. Through its subsidiaries, MRV operates R&D centers in North America and Europe, along with support centers and sales offices around the world.

[www.mrv.com](http://www.mrv.com)

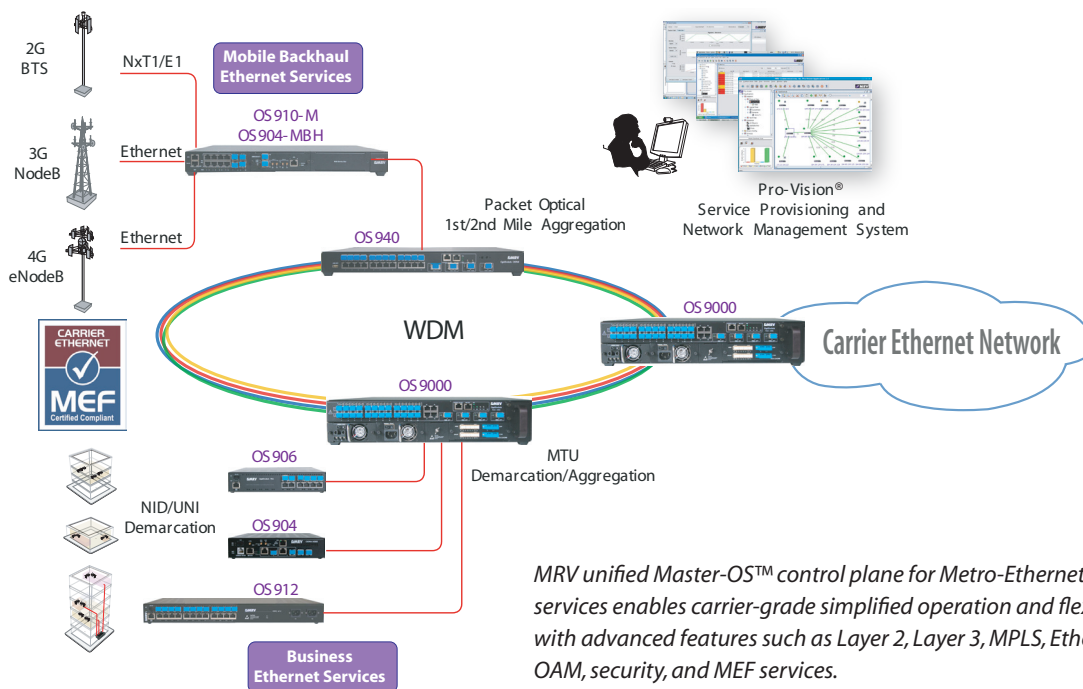
# OptiSwitch® Carrier Ethernet Access Series

MRV's OptiSwitch® family is an award-winning line of compact & intelligent Carrier Ethernet Access platforms that range from the OS900 Carrier Ethernet Demarcation series to the OS9000 Carrier Ethernet Aggregation series.

OptiSwitch products provide service providers with a full suite of MEF compliant carrier-grade Ethernet services including high-availability, enhanced quality of service, security, TDM Circuit Emulation Service, and Timing & Synchronization over Packet.

This enhanced set is monitored and managed with intuitive Ethernet Operation, Administration and Maintenance (OAM) capabilities. This distinctive suite of OAM tools creates flexible service awareness and rigid SLAs. OptiSwitch products meet IEEE, ITU, IETF standards and MEF specifications, offering complete control to simplify deployment and management, while maintaining full interoperability and visibility into customer and provider networks.

## OptiSwitch® - Carrier Ethernet Demarcation & 1<sup>st</sup>/2<sup>nd</sup> Mile Aggregation, FE/GigE/10GigE Ethernet Services, and Managed Mobile Ethernet Backhaul



MRV unified Master-OS™ control plane for Metro-Ethernet services enables carrier-grade simplified operation and flexibility with advanced features such as Layer 2, Layer 3, MPLS, Ethernet OAM, security, and MEF services.

## OptiSwitch® Carrier Ethernet Solution Highlights

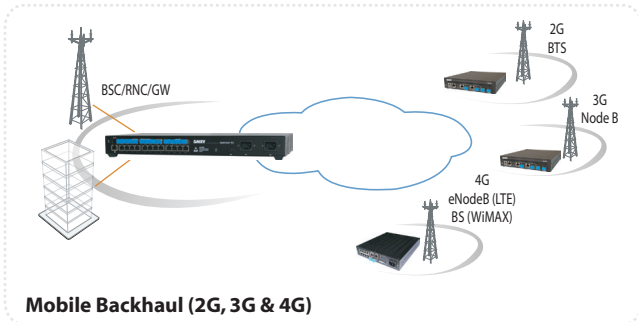
- OptiSwitch® 9000 series Carrier-Ethernet 1<sup>st</sup>/2<sup>nd</sup> mile Aggregation
- OptiSwitch® 900 series Carrier Ethernet Demarcation
- More than 10 years of field-proven Carrier Ethernet deployments in Carrier Networks worldwide
  - Unified Mobile Ethernet Backhaul and Business Ethernet Services Delivery solutions through common software and hardware architecture for operational efficiency
  - Future-proof design and modular feature enhancements
  - Standards-based solutions with proven interoperability
- Supported MEF Services and Implementation Agreements
  - EPL, E-Line, E-Tree and E-LAN connectivity services
  - NID / UNI / E-NNI specifications (MEF 26)
  - MEF 9, MEF 14, MEF 18, and MEF 21
  - MEF 22 Mobile Backhaul Implementation Agreement
- Carrier-grade resiliency with 50ms SONET-like convergence and ITU-T G.8032 (ERPS) ring-based protection
- Zero-touch provisioning with rapid service turn-up
- Supports advanced and intelligent Traffic Management per UNI, EVC, CoS, and flow for premium and rigid SLAs based on the Hierarchical-QoS model
  - Supports service differentiation
  - Guarantees bandwidth and defined OAM metrics per service
- Carrier-class end-to-end hardware-based OAM tools for SLA verification and assurance
  - Supports Ethernet Service OAM [IEEE 802.1ag/ITU-T.Y.1731, MEF 17 (IA)], EFM OAM IEEE 802.3ah, and Performance Monitoring (ITU-T Y.1731 and built-in RFC-2544 traffic generator & throughput tester)
- Addresses the various sizes of multigenerational mobile communications cell sites that exist within a mobile operator's network (2G, 3G and 4G/LTE)
  - Future-proof LTE Ready
- Provides Timing and Synchronization service over Packet (IEEE1588v2 – Telecom Profile and ITU-T G.8262/4 Synchronous Ethernet)

# Target Applications

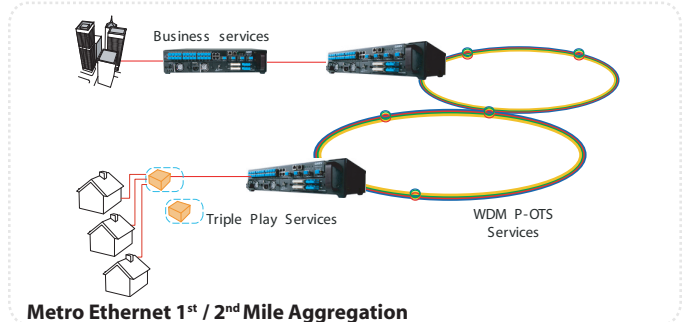
The OptiSwitch Series targets the following major applications :

- Business Ethernet demarcation services
- Wholesale Ethernet transport services
- Mobile Ethernet Backhaul (2G,3G & 4G/LTE)

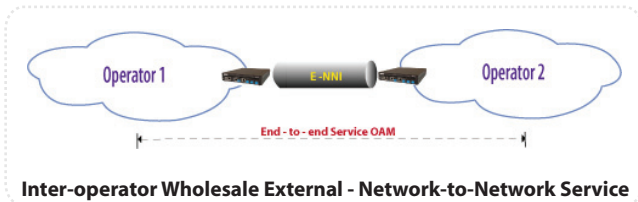
Some of most common OptiSwitch deployment scenarios are shown in the following network diagrams.



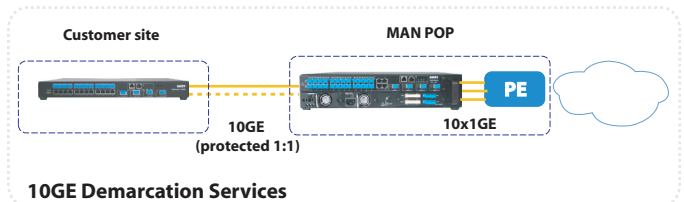
**Mobile Backhaul (2G, 3G & 4G)**



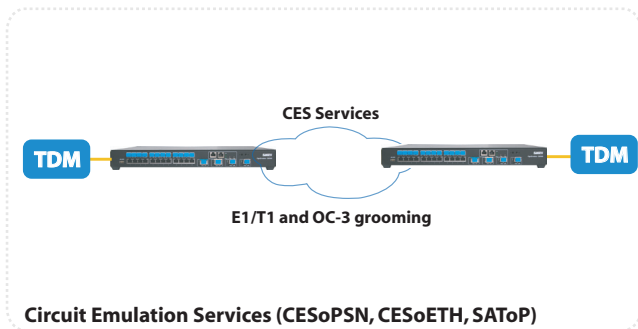
**Metro Ethernet 1<sup>st</sup> / 2<sup>nd</sup> Mile Aggregation**



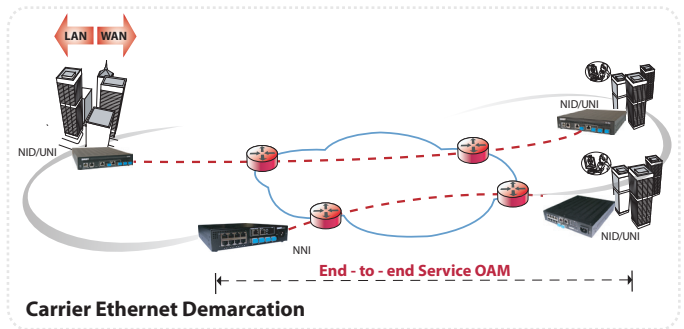
**Inter-operator Wholesale External - Network-to-Network Service**



**10GE Demarcation Services**



**Circuit Emulation Services (CESoPSN, CESoETH, SAToP)**



**Carrier Ethernet Demarcation**

## OptiSwitch<sup>®</sup> Benefits

**MRV's OptiSwitch<sup>®</sup> offers a standards based, interoperable, and unified solution that enables the delivery of Business Ethernet and Mobile Backhaul services with the following benefits:**

- Offers a complete portfolio of multi-functional Carrier Ethernet Demarcation and Aggregation devices
  - Same HW and SW architecture for operational efficiency
- Offers a variety for Optical L1, L2 and L2.5 services
  - Circuit Emulation Services over Carrier Ethernet Network
  - Managed FE, GigE/10GigE access and aggregation services
- Supports MEF compliant Carrier Ethernet business services
- Provides a full suite of high availability, protection, resiliency, and redundancy options including ITU-T G.8032 (ERPS) ring-based protection and redundant AC/DC power supplies
- Offers Service Provisioning and Management System that support Zero-touch provisioning and consequently enabling out-of-the-box configuration
  - Rapid service turn-up without manual intervention thus enabling mass deployment at minimal operational cost
- End-to-end hardware-based service OAM with SLA measurements and monitoring
  - Offers the widest and the most useful OAM tools in the industry
  - Enables simplified operation by implementing turn-up service with built-in hardware based traffic generator and throughput tester that provide RFC2544 compliant hardware-based solution to measure throughput up to GigE line rates as well as key metrics like latency, jitter, and frame loss
- Provides a full synchronization and timing solution over packet with IEEE 1588v2 and ITU-T G.8262 Synchronous Ethernet



**What others are saying on the OptiSwitch® Solution?****Ben Edmond, FiberLight's EVP of Sales & Marketing:**

"MRV's equipment is designed to offer optical transport technology that meets our mission critical, high performance focus, delivering low latency and optimal performance management tools to add value to our clients by enabling a higher level of SLAs and quality of service."

**Stan Hubbard, Senior Analyst at Heavy Reading:**

"The OAM and hierarchical quality of service features on MRV's OptiSwitch 930 should help operators cost-effectively deliver differentiated 10G Ethernet services with innovative service level agreements."

**Interoperability Commitment**

MRV demonstrated multi-vendor interoperability at the following public events:

- Carrier Ethernet Global Interconnect - New York, November 2010
- Carrier Ethernet Global Interconnect - London, April 2010
- MPLS and Ethernet World Congress - Paris, February 2010
- MPLS congress - Paris, February 2010
- Carrier Ethernet World Congress - Berlin, September 2009
- MPLS congress - Paris, February 2009
- Mobile Backhaul - Mobile World congress - Barcelona, Feb. 2008
- MPLS congress - Paris, February 2008
- Carrier Ethernet event - Geneva, September 2007
- MPLS Interoperability event - Paris, February 2007
- Converged Network Services - Paris, Feb 2006
- MPLS forum Layer 2 VPNs - Paris, February 2005
- SuperCOMM Interoperability event - Chicago, June 2004

**Technology Innovation**

With 22 years of technology innovation, MRV has always been at the forefront of innovation in demarcation, aggregation and transport platforms with some of the fastest, most feature-rich offerings on the market.

MRV invests significant resources as an active member of standardization organizations and industry forums to expand in-house technology development from components to operating system level for converged optical packet access networks.

**Awards****MRV Advantages**

MRV provides one of the broadest ranges of Optical Access solutions for Ethernet services, cell site demarcation, and packet optical 1st/2nd mile aggregation. This comprehensive portfolio offers the best breed of choices to any carrier network and delivers true versatility and a standards-based solution, meeting the most demanding network scenarios while offering a virtually unlimited range of network topologies from which to choose.

MRV's significant global expertise includes real life deployments and a cost optimized portfolio providing flexible, cost effective, and complete solution serving both Business Ethernet and Mobile Ethernet Services markets.

MRV offers excellent synergy and interoperability with 3rd party edge and core vendors combined with in-house optical development and system integration, enables the widest range of optical flexibility with outstanding CAPEX / OPEX for service provider nationwide service network.

The MRV's OptiSwitch® Carrier Ethernet Access Solution is carrier class in every respect, providing a complete suite of high-availability, protection, resiliency, and redundancy options.

MRV's solution creates and sustains superior performance to Service Providers' SLA by implementing field-proven carrier-grade demarcation solutions that have been commercially deployed by leading service providers worldwide.

MRV has more than 50 offices throughout the world. Addresses, phone numbers, and fax numbers are listed at [www.mrv.com](http://www.mrv.com). Please e-mail us at [info@mrv.com](mailto:info@mrv.com) or call us for assistance.

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