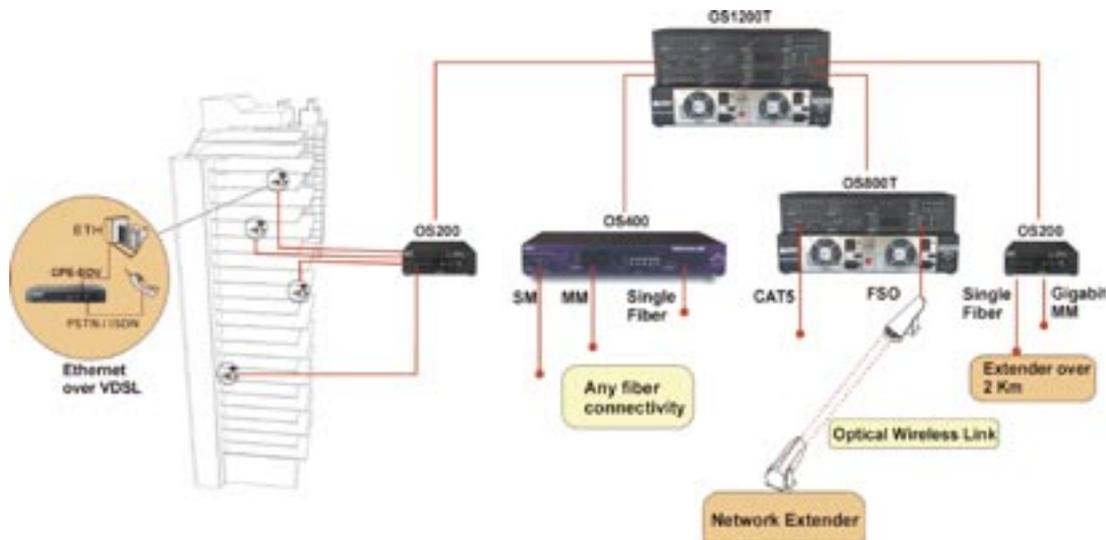


First Mile Ethernet Access and Connectivity



The Required Application

Transport of advanced services is mandatory for City Carriers, First Mile Access providers and all broadband access providers. In order to reach the goal of supplying a cost-effective, modern service offering and comply with the flexibility demands of next generation service enabling networks, the Ethernet First Mile (EFM) providers should be able to run networks over any existing infrastructure. The fundamental questions are:

- What type of technology do you deploy to achieve high availability and redundant services when the available cables are FIBER OPTIC CABLE?
- What type of technology do you deploy to achieve high availability and redundant services when the available cables are TWISTED PAIR lines?
- What type of technology do you deploy to achieve high availability and redundant services when you DON'T HAVE any AVAILABLE infrastructure?

MRV provides a "grow-along" modular solution that enables responding to today's as well as tomorrow's user service's demands, with higher potential capacity, at lower costs, using the OptiSwitch™ modular solution. This solution assists with the providers' needs to rise above their competitors with new and more lucrative and efficient technologies such as video, voice and data QoS enabled services over Ethernet/IP.

Equipment building block

Using MRV's OptiSwitch modular family you can achieve:

- Fiber Optics Connectivity for FIBER OPTIC CABLE connectivity in the First Mile
- Ethernet over VDSL for TWISTED PAIR lines connectivity
- Optical Wireless Links Connectivity, if there is no available network infrastructure
- E1/T1 module for PABX Voice connectivity

All using the same equipment modular OptiSwitch™ platform!

Relevant Links: [OptiSwitch Family](#)

The OptiSwitch™ (OS) product line presents a unique integration of Ethernet multi-layer systems, QoS and carrier circuit switches, with its choice of five chassis (hosting from 1 to 24 expansion slots or ports) and over 50 different module types. It is an exclusive combination of hardware features with Ethernet pricing and simplicity of operation.

The OS is designed to provide fiber optic based solutions and support applications such as Carrier-to-Carrier, ISP connectivity, Fiber-to-the-x coupled with Voice, Video and Data Solutions. OS enables the provision of legacy telephony services together

with advanced IP communication on a single optical access infrastructure as well as complete enterprise service enabling solutions to support different office and business networking and services requirements.

For more info about OptiSwitch (200, 400, 800, 1200, 2400): <http://www.mrv.com/products/line/optiswitch.php>

[Ethernet over VDSL solution paper](#)

The Ethernet over VDSL (Very high bit rate Digital Subscriber Line) (EoV) technology enables the creation of high-speed links of up to 12 Mbps full duplex, over standard telephone cables. The Ethernet over VDSL product line is delivering standard Ethernet traffic over VDSL transport, which reaches distances of up to 1200 m, in parallel to the POTS or ISDN service. EoV is a QAM based VDSL physical medium used as a transport for Ethernet as the layer-2 protocol. The Ethernet carrier uses standard Ethernet frames, and supports the full range of Ethernet features supported in the OptiSwitch™ such as Ethernet switching, Spanning tree, Virtual LAN (VLAN), QoS, rate-limitation and security intrusion control.

[FSO](#)

The TereScope family is an optical wireless links solution to provide high bandwidth broadband connectivity. The TereScope is an optical transceiver, which sits on rooftops and

provides fiber-like connection speeds. The TereScope systems respond to today's and tomorrow's user services demands, while providing higher potential capacity, license free and protocol independent (Ethernet/IP, TDM, SONET, ATM and Cellular) transmission, at lower costs, over the air.

For more info: <http://www.mrv.com/products/line/terescope.php>

The technology includes:

- OptiSwitch non-blocking, wire-speed policy based QoS and traffic engineering providing Kilobit granularity of rate limitation
- Any fiber connectivity – MM, SM and Single Fiber for different distances up to 120 km
- Ethernet over VDSL – up to 12 Mbps per port with QoS support
- Special optimization for WDM uplink connectivity
- Wire-speed Intrusion Control and flow redirection provide fully secure network without losing performance.
- Multicast IGMP snooping
- Redundancy solution in all layers:
 - Signal recovery by Gigabit Ethernet Redundancy (GER) module – less than 50 ms
 - Hot-Swap chassis for superior redundancy
 - Ethernet channel for redundant and higher bandwidth aggregation pipes
 - Wireless and wire redundancy using the TereScope™ optical wireless links and the OptiSwitch™ family
- **Management**
 - Managed MegaVision Web support for network management and accounting
 - Preserving minimum downtime (very low MTTR) by off-line configuration tools

Advantages:

- All of the above technologies are implemented in all OptiSwitch™ Chassis and Modules (existing or being designed)
- Low density (OS200) to high density chassis (OS2400)
- Modular “grow along” solution – starting from 4TP

- and up to 192 fiber ports
- Support of most sophisticated QoS capabilities for end-to-end QoS network availability
- Redundancy solution in all layers includes: Signal Redundancy (using GER), Hot-Swap modular chassis (the Telco Chassis), and full ethernet channel redundancy.
- Working over any infrastructure: Fiber, CAT5, copper-twisted pair and with MRV optical wireless links.
- Better margin for reseller and distributors with minimum stock and preservation of minimum downtime (very low MTTR)•

Drawbacks:

- When using optical wireless links, you need access to rooftops.

Economics and Time:

- Infrastructure:
 - Fiber based infrastructure installation (digging, cabling, technical stuff, ...) are usually quite high. The time is medium to long period.
 - Twisted pair – usually already there, thus the cost is minimal.
 - Optical Wireless Links installation cost is low and also the implementation time is minimal.
- Networking infrastructure: Using the OptiSwitch™ different chassis size, “grow with you modular solution” the cost is minimal and the installation time is low.
- Management system: low cost and installations time.

Services:

- Internet access
- Layer 2 transparent LAN services
- QoS services with guaranteed bandwidth and network availability
- Voice services over Ethernet Access networks
- Video and multicast based application



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