MRV Communications, Inc.

ETHERNET ACCESS SOLUTIONS

Datasheet

OptiSwitch Chassis Family

OptiSwitch®: the Application Aware Switch family

The OptiSwitch family is a networking equipment that consists of five main chassis and two Telco flavored chassis that can host more than 90 types of modules for applications that address the needs of a Carrier and an Enterprise. The OptiSwitch family's unique modular architecture offers a wire speed non-blocking switching solution designed for high density of Fiber optic interfaces , VDSL connectivity, Optical Wireless links and TDM Voice over Ethernet . The systems are ideal for large Enterprises and Carriers (broadband service providers), who offer communications services and are looking for fast ROI and scale-up solution design.
The OptiSwitch solutions provide flexible options that enable building a network which would seem to the end customer as a layer 2 network, while maintaining the security, QoS and traffic policing rules implemented at the higher layers.

Modularity

With over 90 different types of modules and a variety of chassis, OptiSwitch enables a "pay as you grow" model: only the port density required at the time of installation is acquired. Thanks to its "all-modular" design, you can either replace/add modules as needed, or reuse the existing modules in a larger chassis.

Intelligence by Classifier Engine

The OptiSwitch classification modules provide network intelligence to implement features such as access rules according to Layer 2-3-4 parameters like MAC, VLAN, IP and TCP/UDP with rate limit and marking of QoS fields in the packet header. OptiSwitch performs connectivity, VLAN tagging for traffic separation, marking of priority for QoS (based on the DiffServ protocol) and rate limitation, with the ability to support 8 different service levels per port.
OptiSwitch allows the creation of an end-to-end transparent network, in most cases an end-to-end IP network. The flexibility and economics to place the "intelligence" of the network at the first access point through aggregation to the core of the business, meet the requirements of high-end Enterprise as well as any carrier class networks.

Bandwidth Control

A network partitioning is required to preserve each valuable Kilobit and ensure allocated flows from the end users to network resources. OptiSwitch classification modules allow isolation and rate limitation of the traffic based on variable flows definitions that ensure rates limiting from 64 Kbps up to Gbps with fractions of 1Kbps. Each OptiSwitch is capable of marking the Type of Service bits in the IP header for high priority traffic, such as Voice or Video or critical ERP applications , thus identifying each frame as it is passed through the network with allocated rate limit rules.

Security

The implementation of Policy ACL capability into the OptiSwitch family permitted a powerful feature to enforce another protection at the access and aggregation points for the Enterprise or Metro Carrier.
Traffic filters can be implemented on the subscriber's traffic to ensure data integrity. Based on different parameters such as 802.1p/q tags, IP source/destination/subnet address or TCP/UDP ports, an access filter can be configured to ensure that only authorized subscribers enjoy certain resources. After such rules are defined, the access management system performs the custom filtering on every IP frame or stream of frames known as Ethernet circuit technology in real-time.
A powerful VLAN processing allows a full 4096 VLAN tags implementation by OptiSwitch hardware, thus allowing large number of users to have their own isolated pipe towards central applications, thus eliminating any broadcast malicious attacks between close or grouped users. Another scenario is that most of the applications servers are connected by Gigabit interfaces, which opens the severity for a single user to attack and consume all Gigabit bandwidth , in other words - Deny of Service attacks.

Highlights

- 2, 4, 8, 12 and 24 slots chassis capable of hosting an exceptionally wide range of modules
- Modular design: Use of same modules and features – ideal for maintenance and minimal inventory
- Telco chassis with highest optical, copper and VDSL density per rack in the industry
- 10/100/1000 Ethernet ports over Copper and Fiber
- Support of long haul Singlemode optics and single fiber variations
- Gigabit Multimode Extender (GMX) for MM fiber up to 2 Km
- Various fiber connectors for flexibility: ST,MT-RJ, LC and SC
- Hybrid modules of copper and Fiber for cross and vertical applications
- Wide range of Ethernet over VDSL modules unique in the industry, including QoS
- Voice over Ethernet modules
- Sophisticated policy based rules for efficient network resources planning
- Enhanced VLANs engine, rate limit, CoS/QoS L2-3-4 Application aware switching
- Gbic & SFP pluggable optics

Applications

- Customer Premises Equipment for optical access (FTTx) applications
- Central Office aggregations and concentration of 10/100 Ethernet Interfaces for DSL and Optical Service providers
- Fiber to the Desktop applications with various density options
- Traffic Engineering - Distribution of bandwidth in buildings and organizations
- Unique Optical Wireless Mesh Application
- Fiber to the building and distribution with Ethernet over VDSL
- Unified Voice TDM and Data QoS access networks

By rate-limiting the traffic, you can ensure that the servers are protected from this condition and not flooded with spoofing techniques , and are available all the time.

Resiliency and Redundancy

OptiSwitch®, serving as a critical network component, supports different level of redundancy at all layers to increase system resilience and redundancy.

Resiliency focus :

- GER provide auto-redundant Gigabit ports for millisecond fail over at physical layer (L1)that relied on signal detection failure and provides transparency for upper layer protocols
- Rapid Spanning tree for fast loop recovery at Data Layer (L2),
- Multiple redundant power supply (AC and DC) options
- Special OptiSwitch-400R with triple external power redundancy AC or DC.
- Proofed for extreme environmental conditions with special out door cabinets.
- Enhanced redundancy needs addressed intensively in by Telco version chassis as enhanced cooling , hot-swap and front loading of power supplies and modules.
- In a scenario, that only one port failure malfunction occur , no need to replace entire switch and only specific module replaced with advantage of preserving existing configuration by Software and Hardware.

Transparent LAN and VPN services

Transparent LAN service enables organizations to seamlessly integrate their distributed LANs network resources that span provider cloud through high-speed interconnection, quality of service, transparent performance characteristics, and native connectivity. This seamless integration decreases management burdens and shields them from having to invest in the ever changing burden of complex routing cross carrier configurations or even allow non-routing protocols to traverse trough the network transparently.

The VMAN feature in OptiSwitch enables configuring a Virtual Private Network (VPN) at Layer 2 while preserving existing VLANs within the organization. Traffic entering the provider network is marked with the network VLAN. The principle is using non-proprietary encapsulate methods and encapsulate the organization's VLANs independent of the VLAN configuration in the network.

Packets traveling in the network are being forwarded according to the network VLAN. When the packet leaves the network cloud the network VLAN Tag is removed and packet is forwarded inside the organization according to the original VLAN header.

Voice E1/T1 TDM over Ethernet

The OptiSwitch Voice TDM Over Ethernet connection module provides for the transparent interconnection of PBXs, Telecom Switches and T1/E1 based communication systems via LANs, MANs, and Optical Wireless networks.

This solution provides a high-quality, cost effective method of transporting native voice traffic from Enterprise PBXs, Class 5 switches in Central Offices over the data network, thus saving the costs associated with duplicated networks for voice and data. The EM2004-E1 module encapsulates full E1/T1 circuits, along with their framing and signaling bits, into IP packets of Ethernet network and derive smooth convergence of voice traffic and data through OptiSwitch QoS series . The OptiSwitch solution supports the full range of QoS techniques required to enable unified Voice and data services to be provisioned over the Ethernet.

Modular Ethernet VDSL with QoS solution

The most advanced in the industry modular Ethernet over VDSL (Very high bit rate Digital Subscriber Line) or EoV technology enables the creation of high-speed links of up to 15 Mbps full duplex, over standard telephone lines . The Ethernet over VDSL modules with OptiSwitch's existing hardware and software, delivering standard Ethernet traffic over VDSL, reach distances of up to 1500 m, in parallel to the POTS or ISDN service, or Unique Long range EoV up to 2400m. OptiSwitch Ethernet over VDSL solution includes extended rich software features including EM2004-EoV QoS modules to answer any type of application demand.

Modular Optical Wireless solution

The OptiSwitch optical wireless modules in accordance with the TereScope systems provide direct, fiber-speed communication to solve the bottleneck often found in last mile applications. They are reliable, cost-effective and easy to deploy for Mesh networks and backbones providing high speed wireless connectivity for metro and access areas.

Management

Fully managed solution through out-of-band CLI or in-band powerful Web based NMS MegaVision SNMP .

Central management by MegaVision allows the network managers to access their management elements by any browser console through authentication control interface and to have complete control for entire map of devices for configuration, analysis and inventory .

Enhanced management features :

- QoS/CoS extensive configurations
- Management VLANs
- Management ACL for trusted connections
- RADIUS AAA for management sessions
- Accounting information per flow for billing applications
- Configuration load/Save via TFTP
- Remote firmware download via TFTP (Client/Server)
- Enchanced security access (optional SNMP/CLI block)

Feature list

Model	OS-200	OS-400/ 400R/H	OS-800/ F/T	OS-1200T	OS-2400
Layer 2 Switching	y	y	y	y	y
IEEE 802.1D Spanning Tree	y	y	y	y	y
IEEE 802.1w Rapid Spanning Tree	y	y	y	y	y
IEEE 802.1Q VLAN Tagging	y	y	y	y	y
GVRP (Generic VLAN Registration Protocol)	y	y	y	y	y
IEEE 802.1p Traffic Prioritization	y	y	y	y	y
IEEE 802.1ad Link Aggregation	y	y	y	y	y
IEEE 802.3x Flow Control	y	y	y	y	y
Resilient Link (GER)	y	y	y	y	y
IGMP Snooping	y	y	y	y	y
VMAN (VLAN in VLAN)	y	y	y	y	y
Number of VLAN's	4000	4000	4000	2000	2000
Learning table size 2003/2004 modules	Up to 12K/ 32K	Up to 12K/ 32K	Up to 12K/ 32K	Up to 12K/32K	Up to 12K/ 32K
QOS with EM2004 modules Ingress Classification					
Per port/MAC	y	y	y	y	y
Per VLAN or VMAN	y	y	y	y	y
Protocol	y	y	y	y	y
Source or Destination IP or Subnet	y	y	y	y	y
TCP/UDP port	y	y	y	y	y
Behavior					
Accept	y	y	y	y	y
Redirect	y	y	y	y	y
Deny	y	y	y	y	y
Mark IP TOS -DSCP, 802.1p	y	y	y	y	y
Rate Limit 64K - 1Gbps (1Kbps granularity)	y	y	y	y	y
Queues					
Number of priority queues per port with 2 discardability levels	4	4	4	4	4
Management					
SNMP / MIB / RMON	y	y	y	y	y
Telnet/CLI	y	y	y	y	y
BootP	y	y	y	y	y
RADIUS for management	y	y	y	y	y
Management ACL for trusted connections	y	y	y	y	y

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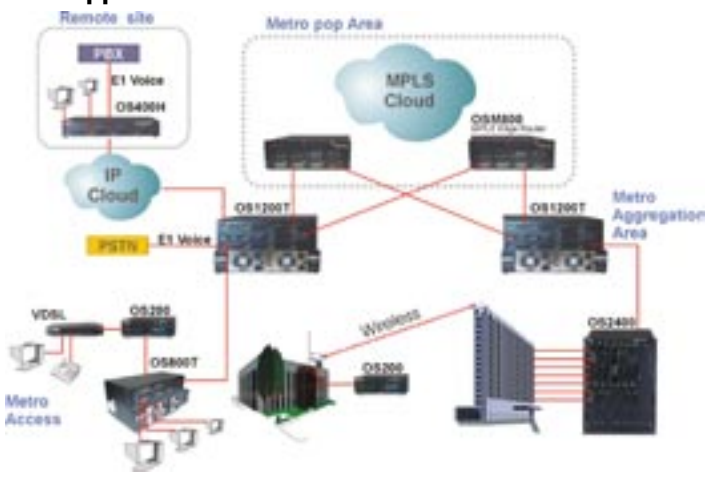
Metro Application



Enterprise Application

Technical Specifications Table for all chassis

Standard compliance	UL-1950; CSA-22.2 No.950; FCC part 15 Class A;CE-89/336/EEC,73/23/EEC
Environment	Operating Temp: 0-40C/32-104F Storage Temp: -10 – 50C/14-122F For extreme temperature conditions out-door weather proof cabinet exists (see ordering code)
Humidity	85% maximum , non-condensing
Diagnostic LEDs	Per port LEDs: port activity , link status Per Unit LEDs: Power status, management
Mounting	19-Inch Rack Mount ELARS-310C standard

Networking standards Compatibility

IEEE802.3z Gigabit Ethernet IEEE802.3u Fast Ethernet IEEE802.3 Ethernet IEEE802.3ab Gigabit Ethernet Copper IEEE802.1d Bridge/Spanning Tree IEEE802.1w Rapid Spanning Tree IEEE802ad Link Aggregation IEEE802.1q VLAN Tagging IEEE802.1p Priority Queuing IEEE802.3x Flow Control	RFC 2236 IGMP v2 RFC 2475 An Architecture for DiffServ RFC 2597 Assured Forwarding PHB Group RFC 768 UDP RFC 791 IP RFC 792 ICMP RFC 2131 BootP relay RFC 793 TCP RFC 826 ARP	RFC 783 TFTP RFC 854 Telnet RFC 2865 RADIUS Authentication RFC 2866 RADIUS Accounting RFC 1157 SNMP v1,2 RFC 1213 MIB II RFC 1643 Ethernet MIB RFC 1493 Bridge MIB RFC 2037 Entity MIB RMON 4 groups

Performance

All Chassis can host QoS modules	Max. 10/100 Mbps Ports	Max. 100 Mbps FO Ports	Max. Gig/Fiber/ copper Ports	Max. VDSL Ports	Backplane	Forwarding Rate	# of Slots
OS200	16	16	2	16	4 Gbps	5,950,000 PPS	2
OS400/OS400H/HR	32	32	4	32	4 Gbps	5,950,000 PPS	4
OS800/OS800T	64	64	8	64	8 Gbps	11,950,000 PPS	8
OS1200T	96	96	12	96	12 Gbps	16,500,000 PPS	12
OS2400	192	192	24	192	24 Gbps	35,700,000 PPS	24

Backplane and forwarding rate figures mentioned within the table reflect Half-Duplex mode. For Full-Duplex mode number, please double by 2.

Density per 40U Rack	Max. 10/100 Mbps Ports	Max. 100 Mbps FO Ports	Max. Gig/Fiber/ copper Ports	Max. VDSL Ports	Max. Voice TDM over Ethernet*
OS1200T	1536	1536	168	1536	1536
OS800T	1280	1280	80	1280	1280

Power Specifications

	Power Supply redundancy/ modularity	AC Input Voltage Options Line frequencies 50-60Hz	DC Input Voltage Options	Power consumption(W) Min.	Max.
OptiSwitch-100	N/A	90-240 VAC	N/A	25	25
OptiSwitch-200	N/A	90-240 VAC	48V DC / 24V DC	9	64
OptiSwitch-400/ 400R	400R external PS up to triple redundancy	90-240 VAC	48V DC	15/16	121/130
OptiSwitch-400H	N/A	90-240 VAC	48V DC	15	121
OptiSwitch-400H/R	External PS up to triple redundancy	90-240 VAC	48V DC	16	130
OptiSwitch-800	N/A	90-240 VAC	N/A	15	121
OptiSwitch-800F	Modular EM2005 power supply	90-240 VAC	48V DC 24V DC	13	310
OptiSwitch-800T	Modular EM2005 power supply	90-240 VAC	48V DC 24V DC	16	310
OptiSwitch-1200T	Modular EM2005 power supply	90-240 VAC	48V DC 24V DC	16	310
OptiSwitch-2400	Modular EM2005 power supply (minimum 2 power supplies required)	90-240 VAC	48V DC 24V DC	115	620

Physical dimensions

	Phys. Height	Size WxDxH (mm)	SizeWxDxH (inches)	Weight (kg. /lbs.)
OptiSwitch-100	1U	443x312.13x44.4	17.4x12.3x1.8	2 / 4.4
OptiSwitch-200	1.5U	229.6x294.8x66.5	9.1x11.6x2.6	2.5 / 5.5
OptiSwitch-400/400R	1.5U	442x360.4x66.5	17.4x12.6x2.6	5.5 / 12.1
OptiSwitch-400H/R	1.5U	442x321.9x66.5	17.4x12.6x2.6	5.5 / 12.1
OptiSwitch-800	2U	443x412.2x89.9	17.4x16.2x3.5	7 / 70.4
OptiSwitch-800F	2.5U	443.6x457.5x111.1	17.4x16.2x3.5	7 / 70.4
OptiSwitch-800T	4U	444.6x240x176.6	17.5x9.45x6.95	12.5 / 27.5
OptiSwitch-1200T	5U	444.6x240x223	17.5x9.45x8.78	14.5 / 32
OptiSwitch-2400	14.2U	447.8x415.5x632.7	17.6x16.35x24.88	32 / 70.4

MTBF

	OptiSwitch 100	OptiSwitch 200	OptiSwitch 400/400R	OptiSwitch 400H/R	OptiSwitch 800	OptiSwitch 800F	OptiSwitch 800T	OptiSwitch 1200T	OptiSwitch 2400
HRS @ 25C / 77F	97,500	140,151	135,291/ 215,449	215,449	176,941	192,931	208,794	186,403	155,421

Ordering Information

OptiSwitch Chassis	
OptiSwitch-100	
NH2025-10	OptiSwitch-100, 24-port 10/100 Switch with single expansion slot (90-240V AC)
OptiSwitch-200	
NH3003/AC	OptiSwitch-200, 2-slot 10/100/1000 Chassis with AC power supply - (90-240V AC)
NH3003/DC	OptiSwitch-200, 2-slot 10/100/1000 Chassis with DC power supply - (48V DC)
NH3003/DC-24V	OptiSwitch-200, 2-slot 10/100/1000 Chassis with DC power supply - (24V DC)
OptiSwitch-400	
NH3004/AC	OptiSwitch-400, 4-slot 10/100/1000 Chassis with AC power supply - (90-240V AC)
NH3004/DC	OptiSwitch-400, 4-slot 10/100/1000 Chassis with DC power supply - (48V DC)
NH3004R/AC	OptiSwitch-400R, 4-slot 10/100/1000 Chassis with AC power supply (90-240V AC) plus an option for an external redundant power Supply
NH3004R/DC	OptiSwitch-400R, 4-slot 10/100/1000 Chassis with DC power supply (48V DC) plus an option for an external redundant power Supply
NH3004H/AC	OptiSwitch-400, Hot Swap 4-slot 10/100/1000 Chassis with AC power supply - (90-240V AC)
NH3004H/DC	OptiSwitch-400, Hot Swap 4-slot 10/100/1000 Chassis with DC power supply - (48V DC)
NH3004HR/AC	OptiSwitch-400R, Hot Swap 4-slot 10/100/1000 Chassis with AC power supply (90-240V AC) plus an option for an external redundant power Supply
NH3004HR/DC	OptiSwitch-400R, Hot Swap 4-slot 10/100/1000 Chassis with DC power supply (48V DC) plus an option for an external redundant power Supply
EM3004-PS/1AC	Single External Redundant power supply for the OptiSwitch-400 (90-240V AC)
EM3004-PS/2AC	Dual External Redundant power supplies for the OptiSwitch-400 (90-240V AC)
EM3004-PS/3AC	Triple External Redundant power supplies for the OptiSwitch-400 (90-240V AC)
EM3004-PS/1DC	Single External Redundant power supply for the OptiSwitch-400 (-48V DC)
EM3004-PS/2DC	Dual External Redundant power supplies for the OptiSwitch-400 (-48V DC)
EM3004-PS/3DC	Triple External Redundant power supplies for the OptiSwitch-400 (-48V DC)
OptiSwitch-800	
NH2064	OptiSwitch-800, 8-slot 10/100/1000 Chassis with power supply (90-240V AC)
NH2064F	OptiSwitch-800F, 8-slot 10/100/1000 Chassis for High Density Fiber ports without power supplies. (EM2005 power supplies must be ordered separately).
NH2064T	OptiSwitch-800 Telco Chassis, 8-slots 10/100/1000 Chassis ,front loadable and Hot Swap (EM2005 power supplies must be ordered separately)
OptiSwitch-1200	
NH1200T	OptiSwitch-1200 Telco Chassis, 12 I/O Slot 10/100/1000 Chassis ,front loadable and Hot Swap (EM2005 power supplies must be ordered separately)
OptiSwitch-2400	
NH2400	OptiSwitch-2400, 12 Slots for cassettes Chassis, for up to 24 I/O modules with Management card and one power host (EM2005 power supplies must be ordered separately).
EM2004-L3RC	L3 Routing Controller Single Board Computer (SBC) for the OptiSwitch Family
EM2400-CASSETTE	Special Cassette for the OptiSwitch-2400 Holds up to two OptiSwitch modules. The Cassette is mandatory when using OptiSwitch modules in the OptiSwitch-2400 Chassis. It delivered together with two blank panels.
Power Supplies	
EM2005-PS/AC	AC power supply for the OptiSwitch and OSM Families (OS800F, OS1200, OS1200T, OS800T, OS2400, OSM800) - (90-240V AC)
EM2005-PS/DC	DC power supply for the OptiSwitch and OSM Families (OS800F, OS1200, OS1200T, OS800T, OS2400, OSM800) - (48V DC)
EM2005-PS/DC24	DC power supply for the OptiSwitch and OSM Families (OS800F, OS1200, OS1200T, OS800T, OS2400, OSM800) - (24V DC)
EM2005-PS/DC110	DC power supply for the OptiSwitch and OSM Families (OS800F, OS1200, OS1200T, OS800T, OS2400, OSM800) - (110V DC)
OptiSwitch Accessories	
EM2003-BLANK	OptiSwitch Module Blank panel
EM2400-IO-BLANK	I/O Blank panel for the OptiSwitch-2400
EM3003-BR	19" Mounting Brackets for the OptiSwitch-200
EN-C54	Compact Cabinet
EN-FGI840M	Medium Cabinet
EN-FGI840L	Large Cabinet
MegaVision SNMP NMS	
MV-WEB20/ST	MegaVision Web (SNMP NMS) complete package for management of MRV product lines, including 1 year free upgrade support