WATCHDOG BY APOLLO INFOWAYS

Cloud & Data Center Solutions

WD-GS-48G8O

L2/L3 OOB Management Switch

Enterprises network comprises of many connected devices such as laptops, computers, and access point to meet the employee's demand at work. The WD-GS-48G8O L2/L3 OOB management switch is a high quality and low-cost switch that provides enterprise and small businesses versatile scalability and simple management. With a small form factor and high-density configurations, the S6301-56ST L2/L3 OOB management switch is a white box switch that can be positioned in enterprises due to its versatile connectivity and in data center as a management switch to manage all the OOB ports in the rack.

KEY BENEFITS

- A broad range of Layer 2 and Layer 3 intelligent-enterprise switching solutions
- Top connectivity for small, medium sized or branch-level offices.
- Simple L2/L3 management switch for data center switch and servers.
- Advanced quality of service (QoS) and resiliency

KEY FEATURES

- High density 48 x 1G + 8 x 10G service interfaces
- 256Gbps switching capacity
- Intel® Denverton Dual/Quad-Cores
- Broadcom Trident3-X2 Silicon
- 1 RU small form factor with 440mm depth
- Hot swappable power supplies with 1+1 redundancy support
- Hot swappable fan modules with 1+1 redundancy support

SPECIFICATIONS

PHYSICAL

- 8 x 1G/10G SFP+ ports
- 48 x 100M/1G RJ45 port
- 1 x 100/1000M RJ45 management port
- 1 x RJ45 serial console port
- 1 x USB 2.0 Type-A port

Processor	Intel Denverton 2-Core @ 1.6GHz (Standard) Intel Denverton 4-Core @ 1.6GHz (Premium)
Memory	8GB DDR4
Storage	32GB SSD
ASIC	Broadcom Trident3-X2 BCM56277
Performance	MAC Support 64K VLAN - 4K Jumbo - 9K Stack - 80 Gbps Routes - Ipv4-10K, IPv6- 5K
Chassis (WxDxH)	1RU, 440 x 440 x 43.8 mm or 17.32" x 17.32" x 1.72" Weight: 5.62kg or 12.39lbs
Redundancy	Hot swappable, 1+1 redundant PSU Hot swappable, 1+1 redundant Fans

ENVIRONMENTAL

Power Specs.	AC input: 100 to 240V, 3A DC input: -36 to -72V, 6A Typical power: 44 Watts (no transceiver)
Max. Operating Specs.	Operating temperature: 0°C to 45°C (32°F to 113°F) Operating humidity: 5% to 95% (RH), non-condensing
Max. Non-Operating Specs.	Storage temperature: -40°C to 70°C (-40°F to 158°F) Storage humidity: 5% to 95% (RH), non-condensing

PERFORMANCE

Switching Capacity	256 Gbps
Packet Buffer	4 MB

REGULATORY COMPLIANCE

Safety	IEC 62368-1
Environment	RoHS
EMC	FCC Part 15, Subpart B, Class A

Specifications are subject to change without notice.

WD-GS-48G8O

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WD-GS-48G8O **Front and Back Views**

Front to Back Airflow

Back to Front Airflow

ACCESSORIES

Compatible Transceivers Types
10G SFP+ SR, 10G SFP+ LR, 10G SFP+ ER, 10G SFP+ ZR

Available to Order
Power Supply Types
PSU-151-DESR, 150W DC, exhaust air flow
PSU-151-DISB, 150W DC, intake air flow
PSU-151-AESR, 150W AC, exhaust air flow
PSU-151-AISB, 150W AC, intake air flow

Fan Types
FAN-402825-HD, exhaust air flow
FAN-402825-CD, intake air flow

SOFTWARE SPECIFICATIONS

Layer 2	Internet Group Management Protocol (IGMP)
Virtual Local Area Network (VLAN)	IGMP, Version 2
Virtual LANs with Port-based VLANs	IGMP, Version 3
Routed VLAN interface	Considerations for IGMP Snooping Switches
Port based VLAN interface	IGMP-based Multicast Forwarding ("IGMP Proxying")
Private VLAN	Multicast Listener Discovery (MLD)
Spanning Tree Protocol (STP)	MLD, Version 1
STP	MLD, Version 2
Multiple Spanning Tree Protocol (MSTP)	MLD-based Multicast Forwarding MLD Proxying")
Rapid Spanning Tree (RSTP)	Considerations for Multicast Listener Discovery (MLD) Snooping Switches
Link Layer Discovery Protocol (LLDP)	QoS - General
LLDP v2	DiffServ Field in IPv4/IPv6 Headers
Link Aggregation	Assign matching traffic flow to a specific queue
Link Aggregation Control Protocol (LACP) 802.3ad, supports multiple Link bundling	1/2/3 Level queuing hierarchy
Static link aggregation group	Layer 2 and Layer 3 QoS
Load Balancing on interfaces with unequal bandwidths	Shaping per queue, per port
Multi-Chassis Link Aggregation (Layer2 only)	Multiple hardware queues per port
Multi-Chassis Link Aggregation (MLAG)	Weighted Round Robin (WRR)/ Weighted Fair Queueing (WFQ)/ Strict Priority (SP) Scheduling Per Queue
MLAG Active/Standby support as attachment circuit for VPWS Pseudowire Redundancy	Weighted Random Early Detection (WRED)
MLAG with RSTP	802.1p remarking
MLAG Active/Active over po interface	Classification based on interface, ACL, DSCP, IP precedence, RTP, 802.1p, and VLAN
MLAG Active/Standby over po interface	Trust IEEE 802.1p/DSCP
MLAG Active/Active over sa interface	Police Rate (SRTCM/TRTCM)
MLAG Active/Standby over sa interface	Minimum and Maximum Bandwidth Per Queue
MLAG + Provider Bridging (PB) with RSTP	Explicit Congestion Notification
MLAG+PB Active/Active over po interface	QoS Class map statistics
MLAG+PB Active/Active over sa interface	IP SLA (ICMP Echo)
MLAG+VRRPv4 with RSTP	Management
MLAG+VRRPv4 Active/Active over po interface + VRRPv4 (VMAC enabled) + VRRPv4 with Non-Owner (VRRP Virtual-IP is unique) + Static route	Management - General
MLAG+VRRPv4 Active/Active over po interface + VRRPv4 (VMAC enabled) + VRRPv4 with Non-Owner (VRRP Virtual-IP is unique) + EBGP	Role based CLI management and access
MLAG+VRRPv4 Active/Standby over po interface + VRRPv4 (VMAC enabled) + VRRPv4 with Non-Owner (VRRP Virtual-IP is unique) + Static route	CLI access via console, telnet (IPv4 and IPv6) and SSH (IPv4 and IPv6)
MLAG+VRRPv4 Active/Standby over po interface + VRRPv4 (VMAC enabled) + VRRPv4 with Non-Owner (VRRP Virtual-IP is unique) + EBGP	Authentication using TACACS+/radius client (IPv4 and IPv6)
DHCP Relay over MLAG+VRRPv4 + Static route	SNMP: support for multiple instances of SNMP MIB- v2, and v3
MLAG+VRRPv6 with RSTP	sFlow
MLAG+VRRPv4 Active/Active over po interface + VRRPv6 (VMAC enabled) + VRRPv6 with Non-Owner (VRRP Virtual-IP is unique) + VRRPv6 Virtual-IPv6 address as Link-Local Address + Static route	Error Disable
Provider Bridging (PB)	Management VRF
Layer 2 Tunneling Protocol (L2PT)/ Layer 2 Control Protocols (L2CP)	Routing Protocols in Management VRF (RIP, RIPng, OSPF, and ISIS)
Customer VLAN (CVLAN)/ Service tag VLAN (SVLAN) translation (Also supports Untag-Provider Edge Port (PEP)/ Untag-Customer Edge Port (CEP) option)	Ansible
SVLAN translation (Also supports CVLAN modification option)	Upgrade Mechanism from ONIE prompt using onie nos install and from OcNOS shell using sys-update
Changing the outer TPID (Tag Protocol Identifier) of provider network port	ACL support over Management, VTY and Loopback

Remarking COS, Canonical Format Indicator (CFI) for C-Tag and S-Tag at CEP and PNP (Provider Network Port)	Licensing (IPv4 and IPv6) - 32K IPv4 FIB routes and 8K IPv6 FIB routes.
Other Layer 2 Features	Two-Way Active Measurement Protocol (TWAMP)
Bridge Protocol Data Unit (BPDU) Protect	TWAMP - Link level Delay and Loss Measurement
Root Guard	Zero Touch Provisioning (ZTP)(with IPv4)
Media Access Control (MAC) Learning disable	Zero Touch Provisioning (ZTP) (with IPv6)
Static MAC Address Assignment	DHCPv6 Prefix Delegation
Port based authentication with Radius server	DNS Relay (IPv4 and IPv6)
TFO (Trigger FailOver)	DHCP-Option 82 (IPv4)
Port Security	Storing Multiple images on Platform
LACP Force-up	DHCP Relay across VRFs
Protected Port on Physical Interface	Infrastructure for pluggable OLT modules
MAC Authentication Bypass	TWAMP over MPLS transport
Unidirectional Link Detection (UDLD)	TWAMP - Reflector/Server
Layer 3	TWAMP over MPLS L3VPN
Address Resolution Protocol (ARP)	TWAMP over EVPN MPLS L3VPN
Ethernet ARP	Network Configuration Protocol (NETCONF)
Routing	NETCONF Protocol over Secure Shell (SSH)
Transmission of Internet Protocol (IP) Datagrams over Ethernet	NETCONF Protocol over Transport Layer Security (TLS)
Congestion Control in IP/Transmission Control Protocol (TCP) Networks	NETCONF Event Notifications
IP Broadcast	YANG Module for NETCONF Monitoring
IP Broadcast in the Presence of Subnets	NETCONF Base Notifications
IP Subnetting	YANG 1.1 Data Modeling Language
Classless Inter-Domain Routing (CIDR)	NETCONF Access Control Model
Requirements for IP Version 4 Routers	Multiple simultaneous config session for CLI
Route Redistribution across RIP, OSPF and BGP	Transaction based CLI
VLAN Routing	With-defaults trim
IPv6 IF MIB	Netconf Call Home
Policy Based Routing	Storm control
Inter Virtual Routing and Forwarding (VRF) Route Leaking	Flow control
Static Inter VRF Route Leaking for IPv6 (between Default and Non-Default instances)	DHCP Snooping
Multiple Loopback interfaces in same VRF	IP Source Guard
Static route tracking using object tracking (IP SLA)	Dynamic ARP Inspection
Route Advertisement for IPv6	Access Control Lists (ACLs)
URPF (Unicast Reverse Path Forwarding)	Source IP address
Loose mode	Destination IP address
Loose default mode	TCP/UDP source port
Strict mode	TCP/UDP destination port
Border Gateway Protocol (BGP)	IP protocol type
Border Gateway Protocol, Version 4	Source MAC address
BGP Community Attributes	Destination MAC address
BGP Large Community	Ethertype
BGP Route Flap Dampening	TCP Flags, Protocol type, IP fragment flags, DSCP, CoS, IP precedence
BGP Route Reflection	Rule prioritization and Re sequence
Autonomous System (AS) Confederations for BGP	On-fly modification
Capabilities Negotiation with BGP-4	Timed ACL
Applications of BGP-4 in the Internet	Hardware-Specific Features
Protection of BGP Sessions Via the TCP Message-digest (MD5) Signature Option	Hardware-Specific Features - General

Route Refresh Capability for BGP-4	Switched port analyzer (SPAN)
BGP Support for Four-Octet AS Number Space	Remote switched port analyzer (RSPAN)
Subcodes for BGP Cease Notifications	Load balance
BGPv4 MD5 Authentication	TCAM space monitoring
BGP soft configuration	Chassis Monitoring
BFD Trigger for BGP	Chassis Monitoring - General
Route Target Filter	Temperature monitor
Next Hop Tracking	Fan control
BGP - Outbound Route Filter	Power Monitoring
BGP - Labeled Unicast (BGP-LU)	CPU load monitoring
BGP MIB	Board information (EEPROM)
BGP Graceful-Restart	Power Supply Unit (PSU) Field Replacement Unit (FRU) information
Inter-VRF route leaking for user-defined VRFs	Fan FRU information (EEPROM)
BGP Unnumbered – using extended next hop encoding (ENHE)	Port Breakout
BGP Peer Groups	100G Port Breakout into 4X10G
BGP Add Path - Advertisement of Multiple Paths in BGP	100G Port Breakout into 4X25G
EIBGP Max Path - Multipath load sharing among external Border Gateway Protocol (eBGP) and internal BGP (iBGP) paths for improved load balancing	100G Port Breakout into 2X50G
The Accumulated IGP Metric Attribute for BGP	Smart SFP
Extended BGP Administrative Shutdown Communication	Support of OAM Functionality over Remote Loopback
Extended Optional Parameters Length for BGP OPEN Message	Suuport of attributes (Reset/DDM/Disable Tx Transmission)
BGP community for IANA (Internet Assigned Numbers Authority) reserved address for blackholing	Digital Diagnostic Monitoring (DDM) support
Advertising IPv4 Network Layer Reachability Information (NLRI) with an IPv6 Next Hop	SNMP Support
BGP GR for VPN Address Family	EDFA
BGP PIC Edge	Configuration and monitoring attributes such as target-output, target-gain, operating modes
BGP Flowspec	Digital Diagnostic Monitoring (DDM) support
BGP-LS (Link State)	QSFP-DD ZR/ZR+
BGP Link state distribution (OSPF)	Support of PRBS
BGP Link state distribution (ISIS)	Support of Loopback
BGP Link state distribution for OSPF-SR	Support of Laser Tuning
BGP Link state distribution for ISIS-SR	Netconf Support
BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering	Digital Diagnostics Monitoring (Transceiver)
BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering Performance Metric Extensions	Digital Diagnostics Monitoring (Transceiver) - General
Routing Information Protocol (RIP)	Temperature monitor
RIP Version 1	Power Monitoring (Power, Current, Voltage)
RIP and RIP Version 2	Hardware MIB and Traps
Increment Metrics When Sending Routes, Not When Receiving	Timing and Synchronization
RIP-2 MD5 Authentication	Timing and Synchronization - General
Open Shortest Path First (OSPF)	Timing characteristics of a synchronous equipment slave clock (SyncE)
Open Shortest Path First Version 2	Distribution of timing information through packet networks (ESMC)
Applicability statement for OSPF	PTP Telecom profile for phase/time synchronization with full timing support from the network (T-BC)
OSPF Opaque Link State Advertisements (LSA)	Timing characteristics of telecom boundary clocks for use with full timing support from the network (T-BC)
OSPF Graceful Restart	PTP Telecom profile for phase/time synchronization with full timing support from the network (T-GM with Antenna compensatation)
OSPF as PE/CE protocol for BGP/MPLS IP VPN	PTP TP for time/phase synchronization with partial timing support from the network (T-BC-P, T-BC-A)
Passive Interface Support for OSPFv2	PTP TP for time/phase synchronization with partial timing support from the network (T-GM with Antenna Compensation)
OSPF Not-So-Stubby-Area (NSSA) Option	Default profile (T-GM)
IP FRR (Fast Reroute): OSPF-LFA (Loop-Free Alternate)	PTP Telecom Profile for frequency synchronization (T-GM)

Bidirectional Forwarding Detection (BFD) Trigger for OSPFv2	PTP Telecom Profile for frequency synchronization (T-TSC)
Link Local Signaling	E2E Transparent clock (TC)
Virtual link	IWF (Interworking function)
OSPF Traffic Engineering (TE) Metric Extensions	Subinterface
OSPF Sham-link between VPN (Virtual Private Networks) sites	Layer 3 Subinterface
OSPF Version 3 for IPv6 Support	Layer 3 termination of IPv4 and IPv6 packets
Passive Interface Support in OSPFv3	Subinterface on channel group (LAG)
Graceful Restart Mechanism for OSPFv3	VLAN tagged packet - single / double for 802.1q and 802.1ad and combination
BFD Trigger for OSPFv3	VLAN tagged packet- 9100,9200 TPID
Authentication/Confidentiality for OSPFv3 with IPsec	IPv4 and IPv6 Unicast routing
OSPFv3 MTU	IP VRF - 32 VRF/L3 VPN and 200 L2 VPN
OSPF LDP Sync	MPLS support
OSPF Support For Demand Circuits	MAC and IPv4 ACL
OSPF Stub Router Advertisement	QoS
IP Fast Reroute - Loop-Free Alternate for OSPF	Layer 2 Subinterface
Intermediate System-Intermediate System (ISIS)	VLAN tagged packets - single/double for 802.1q and 802.1ad(88a8/9100/9200)
Use of OSI IS-IS for routing in TCP/IP and dual environments	Untagged and Default
Management Information Base (MIB) for ISIS	Static and Dynamic channel-group
Original ISO specification of IS-IS	Rewrite operations - PUSH/POP/TRANSLATE for subinterface
Dynamic Hostname Exchange Mechanism for IS-IS	AC-AC Cross-connect service(Ethernet Point-to-point)
Restart Signaling (Graceful Restart) for IS-IS	Bridge Domain (Local-Briging Ethernet Point-to-MultiPoint)
Routing IPv6 with IS-IS	MAC and IPv4 ACL
IS-IS Exponential Back-off of SPF (Shortest Path First)	QoS - HQoS supports 2K Queues
Intermediate System to Intermediate System for IPv6	VLAN range – 4K, Jumbo Frame - 9000
Passive Interface Support for IS-IS	Subinterface support for L2VPN (VPWS, VPLS)
Bidirectional Forwarding Detection Trigger for IS-IS	MPLS with EVPN
IS-IS Mesh Groups	MPLS with EVPN - General
Domain-wide Prefix Distribution with Two-Level IS-IS	E-LAN and E-LINE (Single/Multi Homing)
Three-Way Handshake for Intermediate System to Intermediate System (IS-IS) Point-to-Point Adjacencies	EVPN MPLS - Auto RT
IS-IS extensions for Traffic Engineering	QoS (Quality of Service)
ISIS Traffic Engineering (TE) Metric Extensions	E-TREE Only optionA (Single Homing)
IS-IS Cryptographic Authentication	EVPN MPLS Service Mapping via local Tunnel Policy
IP Fast Reroute - Loop-Free Alternate for IS-IS	EVPN MPLS - facility backup protection
Micro-loop avoidance (IS-IS)	Egress network counters support
Bidirectional Forwarding Detection (BFD)	Support EVPN MPLS with RSVP-ECMP
BFD	Support EVPN MPLS with LDP-ECMP
BFD for IPv4 single hop	EVPN MPLS - MAC statistics
Generic Application for BFD	EVPN MPLS - L2CP on EVPN Access
BFD Multi-hop	EVPN MPLS - SR + TI-LFA
BFD Over BGP / ISIS / OSPF / Static route	EVPN MPLS - BGP-LU
BFD Over Non-default VRF for static (IPv4 and IPv6) and OSPF v2 and v3	EVPN MPLS - LU/SR service-update Support
BFD Authentication for MultiHop BFD	EVPN MPLS - MAC hold timer
MIB support for BFD	EVPN MPLS - Control Word
Virtual Router Redundancy Protocol (VRRP)	Inter AS option A and C
VRRP Version 3 for IPv4	RSVP/LDP GR support with EVPN service
VRRP Version 3 for IPv6	Integrated Routing and Bridging in Ethernet VPN (EVPN MPLS with IRB)
VRRP Interface Tracking	EVPN MPLS L3VPN (without IRB)
VRRP Authetication for VRRP v2 backward compatibility	IRB support for advertising host routes

Support for VRRP Active/Standby and Active/Active on MLAG Active/Standby domain	Segment Routing
VRRP Object Tracking	Segment Routing - General
Multi-Protocol Label Switching (MPLS)	Support of Segment routing generic base infrastructure.
MPLS - General	User Defined Adjacency SID (OPSFv2)
MPLS Architecture	OSPF extensions for Segment-Routing
MPLS Label Stack Encoding, Supports 1K MPLS Labels	ISIS extensions for Segment-Routing
Time To Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks	LDP and SR interworking
MPLS Diffserv,	SR Mapping server
Multiprotocol Label Switching (MPLS) Label Switching Router (LSR) Management Information Base (MIB)	Segment-Routing Policy (Traffic Engineering)
Multiprotocol Label Switching (MPLS) Forwarding Equivalence Class to Next Hop Label Forwarding Entry (FEC-To-NHLFE) Management Information Base (MIB)	Segment-routing OAM (LSP Ping/Traceroute) for MPLS dataplane
MPLS reachability for LU nexthop tracking	Segment-routing BFD
Label Distribution Protocol (LDP)	Topology Independent Fast Reroute using Segment Routing
LDP	Service mapping using tunnel policy over SR policy
LDP Applicability	BGP On-demand nexthop (ODN) and auto steering
Support for LDP TCP-MD5	PCEP (Path Computation Element Protocol)
Definitions of Managed Objects for the MPLS and LDP	Support for path computation element protocol
LDP Downstream-on-Demand (DoD) in Seamless MPLS	Support for Stateful PCE
LDP Extension for Inter-Area Label Switched Paths (LSPs)	PCEP Extensions for Segment Routing
LDP Graceful Restart	PCEP MIB Support
LDP Fast Re-Route (FRR)	PCEP support for SRv6
LDP Remote Loop Free Alternate IP Fast Reroute (RLFA)	Segment Routing over IPv6 Data plane (SRv6)
LDP Session Protection	Support of Segment routing IPv6 generic base infrastructure.
LDP ECMP	OSPF Extension to Support Segment Routing over IPv6 Dataplane
LDP Authentication support for Auto Targeted Peer	IS-IS Extension to Support Segment Routing over IPv6 Dataplane
Resource Reservation Protocol (RSVP)	BGP based L3VPN (VPNv4) over SRv6 core
RSVPv1	BGP-LS support for Segment routing IPv6 (ISIS)
RSVP Refresh Overhead Reduction Extensions	BGP-LS support for Segment routing IPv6 (OSPF)
Fast Reroute Extensions to RSVP-TE for LSP Tunnels One-to-One Backup	EVPN ELINE (Multi Homing) for SRv6
Fast Reroute Extensions to RSVP-TE for LSP Tunnels - Facility Backup	SRv6 OAM
RSVPv1 message processing rules	Carrier Ethernet
Entropy label support for RSVP transport	Connectivity Fault Management (CFM)
RSVP re-optimization	Maintenance Domain (MD), Maintenance Association (MA), Maintenance domain Intermediate Point (MIP), Down Maintenance association End Point (MEP)
Protocol Extensions for Support of Diff-serv-aware MPLS Traffic Engineering	Ping (unicast)
Multiprotocol Label Switching (MPLS) Traffic Engineering (TE) Management Information Base (MIB)	Fault reporting (RDI, MAC Status defect, CCM Cross Connect Defect, Error CCM Defect)
RSVP multiple secondary	CFM over Layer 2 Bridge with xSTP
RSVP Shared Risk Link-Group (SRLG) support (Supported for OSPFv2 only)	CCM over VPWS using Subinterface
RSVP MIB	CCM over VPWS using Service Template
RSVP Muitipath (Mapping services over multiple RSVP trunks)	CFM over EVPN MPLS ELINE Single Homing
RSVP Graceful Restart	CFM over PB
Layer 2 VPN (VPWS and VPLS)	CFM using L2 subinterface
Pseudowire Setup and Maintenance using the Label Distribution Protocol	Performance Monitoring
Virtual Private Wire Service (VPWS) ethernet encapsulation mapping (Service Mapping) 1> Outer tag Match 2> Outer and inner tag Match 3> Outer tag range Match 4> Untag	Frame Delay and inter frame delay variation measurement using DMM and DMR over Layer 2 Bridge
VPLS ethernet encapsulation mapping (Service Mapping) 1> Outer tag Match	Frame Delay and inter frame delay variation measurement using DMM (Delay Measurement Message) and DMR (Delay Measurement Reply) over

2> Outer and inner tag Match 3> Outer tag range Match 4> Untag	VPWS using service Template
VPWS ethernet action (Service Mapping, Action) 1> POP outer tag 2> XLATE outer tag 3> Push tag	Frame Loss Measurement using LMM/LMR and SLM/SLR over Layer 2 Bridge
VPLS ethernet action (Service Mapping, Action) 1> POP outer tag 2> XLATE outer tag 3> Push tag	Frame Loss Measurement using LMM/LMR and SLM/SLR over VPWS
Multiple match criteria for VPWS Ethernet Encapsulation using Service Template	Frame Loss Diagnostics ETH-TST/LCK
Multiple match criteria for VPLS Ethernet Encapsulation using Service Template	Y.1731 Ethernet Bandwidth Notification (EBN)
Encapsulation Methods for Transport of Ethernet Over MPLS Networks	Ethernet Client Signal Fail (ETH-CSF)
Static VPLS	Y.1731 over PB
Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling	Y.1731 over MPLS/VPWS using Service Template
Virtual Private LAN Service (VPLS) Using BGP for signaling and auto-discovery	Ethernet Ring Protection (ERPS)
Static pseudowire Setup and Maintenance	ERPS over CFM on Provider/Customer domain
Pseudowire MIB support	Sub-ring support (Multiple ring and ladder topologies)
Pseudowire (PW) over MPLS PSN (Packet Switched Network) Management Information Base (MIB)	Support of multiple ERP Instances on single ring
Ethernet Pseudowire (PW) Management Information Base (MIB)	Over Native-L2
FAT Pseudowire(PW) Label	Over LAG interface
L2CP/L2PT over VPWS	With CFM (for link fault detection)
Split-horizon for VPLS	Separate Control and Data-VLAN
Layer 3 VPN	Multiple major ring
Extranet VPNs with BGP/MPLS IP Virtual Private Networks (VPNs)	Multiple Sub-ring
OSPF as the Provider Edge/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs)	Sub-ring with virtual channel
Intranet VPNs with BGP/MPLS IP Virtual Private Networks (VPNs)	Sub-ring without virtual channel
Static route as the Provider Edge/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs)	Multiple instances over same physical ring
BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN (6vPE)	E-LAN Over G.8032 (Ref. Sec.7.5 ITU-T-Series-G-Sup-52)
Connecting IPv6 Islands over IPv4 MPLS using IPv6 Provider Edge Routers (6PE)	Revertive Mode
Label Disposition for VPNv4 and 6VPE	Force Switch
Label Disposition for 6PE	MLAG (Active-Standby with IDP link) interconnection with G.8032 major ring
Inter AS option A support for L3PVN/6VPE/6PE	MLAG IDL link as G.8032 ring port
Inter AS option B support for L3PVN/6VPE/6PE	User control over non-data VLAN forwarding (Block/unblock) : For Sub-Interface (as MPLS/EVPN access interface)
Inter AS option C support for L3PVN/6VPE/6PE	Ethernet Linear Protection (ELPS)
PER VRF Label support for 6PE	ELPS
LU as transport for 6VPE/VPN	Over Native L2
BGP Peer Group - static	Different Control and Data-VLAN
Internet access for L3VPN	ELPS with CFM
L3VPN MIB	Revertive mode
MPLS OAM	1:1 Protection Mode
OAM for MPLS networks	Ethernet in the First Mile (EFM)
A framework for MPLS OAM	Ether OAM (EFM)
Detecting MPLS Data Plane Failures	Virtual Extensible LAN (VXLAN)
MPLS BFD Detection	Virtual Extensible LAN (VxLAN) - General
MPLS PW and LSP Traffic Statistics	Layer 2 EVPN for VXLAN
Stats per Label Switched Path (LSP)	Layer 2 EVPN Auto RT for VXLAN

Stats per Virtual Circuit (VC)	Layer 2 EVPN Multihoming for VXLAN
L2VPN Statistics MIB	VxLAN EVPN with BGP unnumbered
Multicast	EVPN VXLAN- L2CP on EVPN Access
Protocol Independent Multicast (PIM)	VXLAN - QoS
PIM - Sparse Mode (PIM-SM)	VXLAN - Ethernet Virtual Connection (EVC)
Bootstrap Router (BSR) Mechanism for PIM	Integrated Routing and Bridging (IRB) with VXLAN
Static Rendezvous Point Configuration	VXLAN IRB QoS
PIM - Dense Mode (PIM-DM): Protocol Specification (Revised)	Prefix Route for EVPN IRB for VxLAN
PIM - Source Specific Multicast	VXLAN EVPN ARP/ND cache Ageing
Multicast Source Discovery Protocol (MSDP)	Inter-VRF route leaking over VXLAN-EVPN
Support for More than 32 PIM Interfaces	DHCP Relay for VXLAN IRB
Source-Specific Multicast for IP	VXLAN tunnel over SVI interface
Source-Specific Protocol-Independent Multicast in 232/8	Static VXLAN
Bidirectional Protocol Independent Multicast (BIDIR-PIM)	VXLAN - Overlay Equal-Cost Multipath (ECMP)
Interoperability between the Virtual Router Redundancy Protocol and PIM	VxLAN E-LINE/X-connect
PIM MIB for IPv4	IRB support for advertising host routes
Group To RP Mapping	
Anycast-RP Using Protocol Independent	
PIM ECMP IPv4	
Protocol Independent Multicast (PIMv6)	
PIM - Sparse Mode (PIM-SM)-IPv6	
Bootstrap Router (BSR) Mechanism for PIMv6	
Static Rendezvous Point Configuration-IPv6	
PIM - Dense Mode (PIM-DM): Protocol Specification (Revised)-IPv6	
Overview of Source-Specific Multicast (SSM)-IPv6	

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