Cloud & Data Center Solutions



WD-GS-48G80

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-48G80 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		ENVIRONMENTAL			
 8 x 1G/10G SF 48 x 100M/1G 1 x 100/1000/ 	P+ ports RJ45 port M RJ45 management port	Power Specs.	AC input: 100 t DC input: -36 t Typical power:	to 240V, 3 o -72V, 6 44 Watt	3A A s (no transceiver)
 1 x RJ45 seria 1 x USB 2.0 Ty 	l console port rpe-A port	Max. Operating Specs.	Operating tempe Operating humi	erature: 0 dity: 5% 1	°C to 45°C (32°F to 113°F) to 95% (RH), non-condensing
Processor	Intel Denverton 2-Core @ 1.6GHz (Standard) Intel Denverton 4-Core @ 1.6GHz (Premium)	Max. Non-Operatiı Specs.	1g Storage temper Storage humidi	rature: -40 ty: 5% to	°C to 70°C (-40°F to 158°F) 95% (RH), non-condensing
Memory	8GB DDR4				
Storage	32GB SSD	PERFORMAN	CE		
ASIC	Broadcom Trident3-X2 BCM56277	Switching Capacity	256 Gbps		
Performance	MAC Support 64K VLAN - 4K Jumbo - 9K Stack - 80 Gbps Routes - Ipv4-10K, IPv6- 5K	Packet Buffer REGULATORY	4 MB	CE	
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	Safety IE	C 62368-1	EMC	FCC Part 15, Subpart B, Class A
Redundancy	Hot swappable, 1+1 redundant PSU Hot swappable, 1+1 redundant Fans	Environment Re	oHS		

Specifications are subject to change without notice.

Image: Constrained and the second a

ACCESSORIES

WD-GS-48G80 Front and Back Views

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

WD-GS-48G80

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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 VI AN 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) OoS - 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 1/2/3 Level queuing hierarchy Link bundling 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 Weighted Random Early Detection (WRED) Pseudowire Redundancy MLAG with RSTP 802.1p remarking Classification based on interface, ACL, DSCP, IP precedence, RTP, 802.1p, MLAG Active/Active over po interface 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 Explicit Congestion Notification MLAG + Provider Bridging (PB) with RSTP 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 Management - General enabled) + VRRPv4 with Non-Owner (VRRP Virtual-IP is unique) + Static route MLAG+VRRPv4 Active/Active over po interface + VRRPv4 (VMAC Role based CLI management and access enabled) + VRRPv4 with Non-Owner (VRRP Virtual-IP is unique) + EBGP MLAG+VRRPv4 Active/Standby over po interface + VRRPv4 (VMAC enabled) + VRRPv4 with Non-Owner (VRRP Virtual-IP is unique) + Static CLI access via console, telnet (IPv4 and IPv6) and SSH (IPv4 and IPv6) route MLAG+VRRPv4 Active/Standby over po interface + VRRPv4 (VMAC Authentication using TACACS+/radius client (IPv4 and IPv6) enabled) + VRRPv4 with Non-Owner (VRRP Virtual-IP is unique) + EBGP 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 Error Disable enabled) + VRRPv6 with Non-Owner (VRRP Virtual-IP is unique) + VRRPv6 Virtual-IPv6 address as Link-Local Address + Static route 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 Ansible supports Untag-Provider Edge Port (PEP)/ Untag-Customer Edge Port (CEP) option) SVLAN translation (Also supports CVLAN modification option) Upgrade Mechanism from ONIE prompt using onie nos install and from OcNOS shell using sys-update ACL support over Management, VTY and Loopback Changing the outer TPID (Tag Protocol Identifier) of provider network

port

Remarking COS, Canonical Format Indicator (CFI) for C-Tag and S-Tag	Licensing (IPv4 and IPv6) - 32K IPv4 FIB routes and 8K IPv6 FIB routes.
at CEP and PNP (Provider Network Port)	

Other Laver 2 Features	Two Way Active Measurement Protocol (TWAMP)
Bridge Protocol Data Unit (BPDU) Protect	TWO-way Active measurement Protocol (Twamp)
Root Guard	Zero Touch Provisioning (ZTP)(with IPv4)
Media Access Control (MAC) Learning disable	Zero Touch Provisioning (ZTP) (with IPv/6)
Static MAC Address Assignment	DHCPy6 Prefix Delegation
Port based authentication with Padius server	DNS Polay (IPv4 and IPv6)
Port Socurity	Storing Multiple images on Platform
Brotected Port on Physical Interface	Infractructure for pluggable QLT modules
Inidirectional Link Detection (UDLD)	TWAMP Defloctor/Sorver
Layer 3	
Address Resolution Protocol (ARP)	
	Network Configuration Protocol (NETCONF)
	NETCONF Protocol over Secure Shell (SSH)
I ransmission 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	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	100G Port Breakout into 2X50G
Gateway Protocol (eBGP) and internal BGP (iBGP) paths for improved	
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	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 PIC Edge BGP Flowspec	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support
BGP PIC Edge BGP Flowspec BGP-LS (Link State)	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF)	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution (ISIS)	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution (ISIS) BGP Link state distribution for OSPF-SR	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution (ISIS) BGP Link state distribution for OSPF-SR BGP Link state distribution for ISIS-SR	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution (ISIS) BGP Link state distribution for OSPF-SR BGP Link state distribution for ISIS-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver)
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution (ISIS) BGP Link state distribution for OSPF-SR BGP Link state distribution for ISIS-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) - General
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution (ISIS) BGP Link state distribution for OSPF-SR BGP Link state distribution for ISIS-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering Performance Metric Extensions Routing Information Protocol (RIP)	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) - General Temperature monitor
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution (ISIS) BGP Link state distribution for OSPF-SR BGP Link state distribution for ISIS-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering Performance Metric Extensions Routing Information Protocol (RIP) RIP Version 1	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) - General Temperature monitor Power Monitoring (Power, Current, Voltage)
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution (ISIS) BGP Link state distribution for OSPF-SR BGP Link state distribution for ISIS-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering Performance Metric Extensions Routing Information Protocol (RIP) RIP Version 1 RIP and RIP Version 2	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) - General Temperature monitor Power Monitoring (Power, Current, Voltage) Hardware MIB and Traps
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution (ISIS) BGP Link state distribution for OSPF-SR BGP Link state distribution for ISIS-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering Performance Metric Extensions Routing Information Protocol (RIP) RIP version 1 RIP and RIP Version 2 Increment Metrics When Sending Routes, Not When Receiving	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) - General Temperature monitor Power Monitoring (Power, Current, Voltage) Hardware MIB and Traps Timing and Synchronization
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution for OSPF.SR BGP Link state distribution for OSPF-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering Performance Metric Extensions Routing Information Protocol (RIP) RIP Version 1 RIP and RIP Version 2 Increment Metrics When Sending Routes, Not When Receiving RIP-2 MD5 Authentication	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) Power Annitoring (Power, Current, Voltage) Hardware MIB and Traps Timing and Synchronization Timing and Synchronization - General
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution for OSPF.SR BGP Link state distribution for OSPF-SR BGP Link state distribution for SPF-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering Performance Metric Extensions Routing Information Protocol (RIP) RIP Version 1 RIP and RIP Version 2 Increment Metrics When Sending Routes, Not When Receiving RIP-2 MD5 Authentication Open Shortest Path First (OSPF)	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) - General Temperature monitor Power Monitoring (Power, Current, Voltage) Hardware MIB and Traps Timing and Synchronization Timing and Synchronization - General Timing characteristics of a synchronous equipment slave clock (SyncE)
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution for OSPF-SR BGP Link state distribution for OSPF-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering Performance Metric Extensions Routing Information Protocol (RIP) RIP Version 1 RIP and RIP Version 2 Increment Metrics When Sending Routes, Not When Receiving RIP-2 MD5 Authentication Open Shortest Path First (OSPF) Open Shortest Path First Version 2	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) - General Temperature monitor Power Monitoring (Power, Current, Voltage) Hardware MIB and Traps Timing and Synchronization Timing and Synchronization - General Timing characteristics of a synchronous equipment slave clock (SyncE) Distribution of timing information through packet networks (ESMC)
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution for OSPF.SR BGP Link state distribution for OSPF-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering Performance Metric Extensions Routing Information Protocol (RIP) RIP Version 1 RIP and RIP Version 2 Increment Metrics When Sending Routes, Not When Receiving RIP-2 MD5 Authentication Open Shortest Path First (OSPF) Open Shortest Path First Version 2 Applicability statement for OSPF	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) - General Temperature monitor Power Monitoring (Power, Current, Voltage) Hardware MIB and Traps Timing and Synchronization Timing and Synchronization - General Timing characteristics of a synchronous equipment slave clock (SyncE) Distribution of timing information through packet networks (ESMC) PTP Telecom profile for phase/time synchronization with full timing
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution for OSPF-SR BGP Link state distribution for ISIS-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering Performance Metric Extensions Routing Information Protocol (RIP) RIP version 1 RIP and RIP Version 2 Increment Metrics When Sending Routes, Not When Receiving RIP-2 MD5 Authentication Open Shortest Path First (OSPF) Open Shortest Path First Version 2 Applicability statement for OSPF OSPF Opaque Link State Advertisements (LSA)	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) - General Temperature monitor Power Monitoring (Power, Current, Voltage) Hardware MIB and Traps Timing and Synchronization Timing and Synchronization - General Timing characteristics of a synchronous equipment slave clock (SyncE) Distribution of timing information through packet networks (ESMC) PTP Telecom profile for phase/time synchronization with full timing support from the network (T-BC)
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution for OSPF-SR BGP Link state distribution for ISIS-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering Performance Metric Extensions Routing Information Protocol (RIP) RIP Version 1 RIP and RIP Version 2 Increment Metrics When Sending Routes, Not When Receiving RIP-2 MD5 Authentication Open Shortest Path First (OSPF) Open Shortest Path First Version 2 Applicability statement for OSPF OSPF Opaque Link State Advertisements (LSA) OSPF Graceful Restart	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) - General Temperature monitor Power Monitoring (Power, Current, Voltage) Hardware MIB and Traps Timing and Synchronization Timing and Synchronization - General Timing characteristics of a synchronous equipment slave clock (SyncE) Distribution of timing information through packet networks (ESMC) PTP Telecom profile for phase/time synchronization with full timing support from the network (T-BC) Timing characteristics of telecom boundary clocks for use with full timing support from the network (T-GM with Antenna compensatation)
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution for OSPF-SR BGP Link state distribution for OSPF-SR BGP Link state distribution for ISIS-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering Performance Metric Extensions Routing Information Protocol (RIP) RIP Version 1 RIP and RIP Version 2 Increment Metrics When Sending Routes, Not When Receiving RIP-2 MD5 Authentication Open Shortest Path First (OSPF) Open Shortest Path First Version 2 Applicability statement for OSPF OSPF Opaque Link State Advertisements (LSA) OSPF Graceful Restart OSPF as PE/CE protocol for BGP/MPLS IP VPN	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) - General Temperature monitor Power Monitoring (Power, Current, Voltage) Hardware MIB and Traps Timing and Synchronization Timing characteristics of a synchronous equipment slave clock (SyncE) Distribution of timing information through packet networks (ESMC) PTP Telecom profile for phase/time synchronization with full timing support from the network (T-BC) Timing characteristics of telecom boundary clocks for use with full timing support from the network (T-BC) PTP Telecom profile for phase/time synchronization with full timing support from the network (T-BC) PTP Telecom profile for phase/time synchronization with full timing support from the network (T-BC) PTP Telecom profile for phase/time synchronization with full timing support from the network (T-BC) PTP Telecom profile for phase/time synchronization with full timing support from the network (T-BC) PTP Telecom profile for phase/time synchronization with full timing support from the network (T-BC)
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution for OSPF-SR BGP Link state distribution for ISIS-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering Performance Metric Extensions Routing Information Protocol (RIP) RIP Version 1 RIP and RIP Version 2 Increment Metrics When Sending Routes, Not When Receiving RIP-2 MD5 Authentication Open Shortest Path First (OSPF) Open Shortest Path First Version 2 Applicability statement for OSPF OSPF Opaque Link State Advertisements (LSA) OSPF as PE/CE protocol for BGP/MPLS IP VPN Passive Interface Support for OSPFv2	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) - General Temperature monitor Power Monitoring (Power, Current, Voltage) Hardware MIB and Traps Timing and Synchronization - General Timing and Synchronization - General Timing characteristics of a synchronous equipment slave clock (SyncE) Distribution of timing information through packet networks (ESMC) PTP Telecom profile for phase/time synchronization with full timing support from the network (T-BC) Timing characteristics of telecom boundary clocks for use with full timing support from the network (T-BC) PTP Telecom profile for phase/time synchronization with full timing support from the network (T-BC) PTP TP for time/phase synchronization with partial timing support from the network (T-GM with Antenna compensatation) PTP TP for time/phase synchronization with partial timing support from the network (T-GM has a compensation)
BGP PIC Edge BGP Flowspec BGP-LS (Link State) BGP Link state distribution (OSPF) BGP Link state distribution for OSPF-SR BGP Link state distribution for ISIS-SR BGP-LS extensions for Segment Routing (SR) BGP Egress Peer Engineering BGP - Link State (BGP-LS) Advertisement of IGP Traffic Engineering Performance Metric Extensions Routing Information Protocol (RIP) RIP Version 1 RIP Version 1 RIP-2 MD5 Authentication Open Shortest Path First (OSPF) Open Shortest Path First Version 2 Applicability statement for OSPF OSPF Opaque Link State Advertisements (LSA) OSPF Graceful Restart OSPF As PE/CE protocol for BGP/MPLS IP VPN Passive Interface Support for OSPFv2 OSPF Not-So-Stubby-Area (NSSA) Option	Configuration and monitoring attributes such as target-output, target-gain, operating modes Digital Diagnostic Monitoring (DDM) support QSFP-DD ZR/ZR+ Support of PRBS Support of Loopback Support of Laser Tuning Netconf Support Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) Digital Diagnostics Monitoring (Transceiver) - General Temperature monitor Power Monitoring (Power, Current, Voltage) Hardware MIB and Traps Timing and Synchronization Timing and Synchronization - General Timing characteristics of a synchronous equipment slave clock (SyncE) Distribution of timing information through packet networks (ESMC) PTP Telecom profile for phase/time synchronization with full timing support from the network (T-BC) Timing characteristics of telecom boundary clocks for use with full timing support from the network (T-BC) PTP Telecom profile for phase/time synchronization with full timing support from the network (T-GM with Antenna compensatation) PTP TP for time/phase synchronization with partial timing support from the network (T-BC-P, T-BC-A) PTP TP for time/phase synchronization with partial timing support from the network (T-GM with Antenna Compensation) Default profile (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
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
Use of OSI IS-IS for routing in TCP/IP and dual environments	802.1ad(88a8/9100/9200) 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	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)	LDP and SR interworking			
MPLS Diffserv,	SR Mapping server			
Multiprotocol Label Switching (MPLS) Label Switching Router (LSR)	Segment-Routing Policy (Traffic Engineering)			
Multiprotocol Label Switching (MPLS) Forwarding Equivalence Class to Next Hop Label Forwarding Entry (FEC-To-NHLFE) Management	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			
LDP	Segment Routing 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	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 Inutiple secondary	CCM over VPWS using Subinterface			
only)	CCM over VPWS using Subinterface			
RSVP Multinath (Manning services over multiple RSVP trunks)	CEM over EVPN MPI S ELINE Single Homing			
RSVP Graceful Restart	CFM over PB			
Laver 2 VPN (VPWS and VPLS)	CFM using L2 subinterface			
Pseudowire Setup and Maintenance using the Label Distribution	Performance Monitoring			
Protocol				
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 - Units	2> Outer and inner tag Match	VPWS using service Template
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1 - MCMONE Fig. Seat Lag 2 - Solt Lag Frame Loss Measurement using LMM/LAR and SLM/SLR over VPMS 2 - Solt Tag Frame Loss Measurement using LMM/LAR and SLM/SLR over VPMS 2 - Solt Tag Frame Loss Measurement using LMM/LAR and SLM/SLR over VPMS 2 - Solt Tag Frame Loss Measurement using LMM/LAR and SLM/SLR over VPMS 2 - Solt Tag Frame Loss Measurement using LMM/LAR and SLM/SLR over VPMS Encapulation Methods for Transport of Ethemet Encapulation using Service Y.1731 Ethernet Bandwidth Notification (EN) Encapulation Methods for Transport of Ethemet Over MPLS Networis Ethernet Client Signal Fail (ETH-CSF) Static VPLS Y.1731 over MPLS/VPMS using Service Template UPULIA Private LAN Service (VPLS) Using Lobel Distribution Protocol Y.1731 over MPLS/VPMS using Service Template UPULIA Private LAN Service (VPLS) Using BCP for signaling and auto- discovery Sub-ring support (Multiple ring and Ladder topologies) Static pseudowire SMU support Support of multiple ERP Instance on single ring Extender UPW over BME Service (WPLS) Using BCP for signaling and auto- fibermet Pseudowire (PM) Langement Information Base (MB) Over LAG Interface EXEP DEP over WWS WHO of The Nature L2 Extender UPM) Split-horton for VPLS Multiple major ring Extrared VMNs with BC/PAMPLS IP Virtu	VPWS ethernet action (Service Mapping, Action)	Frame Loss Measurement using LMM/LMR and SLM/SLR over Layer 2 Bridge
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WL-S stermet, action Derived Appeng, Action) Frame Loss Measurement using DMULMX and SLM SLK over VPMS > FAUTE core ng Frame Loss Measurement using DMULMX and SLM SLK over VPMS > Path tag Frame Loss Diagnostics ETH-TST/LCK Response Term Sg Frame Loss Diagnostics ETH-TST/LCK Static Derivation Methods for Transport of Ethemet Over MPLS Networks Ethemet Client Signal Fail (ETH-CSF) Static Device (VPLS) Using Label Distribution Protocol. Y.1731 Over MB Virtual Private LAN Service (VPLS) Using BGP for signaling and auto- discovery Ethemet Networks (ETH) Static pseudowire Setup and Maintesance EEPS over CFM on Provider / Customer domain Paudowire (VPL) Using BGP for signaling and auto- discovery Support of multiple EPI Instances on single ring Static pseudowire Setup and Maintesance EEPS over CFM on Provider / Customer domain Paudowire (VPU SU Works BLK) Support of multiple EPI Instances on single ring Paudowire (VPU SU Bing Set VPU SU Provider Edge Protocol for BG/PMS IP Multiple major ring <td>3> Push tag</td> <td></td>	3> Push tag	
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Pseudowire (PW) over MPLS PSN (Packet Switched Network) Support of multiple ERP Instances on single ring Management Information Base (MIB) Over Native-L2 Over Native-L2 FAT Pseudowire(PW) Auasement Information Base (MIB) Over Native-L2 Over Native-L2 FAT Pseudowire(PW) Label Over LAG interface User 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 Sub-ring CMIP Private NetWorks (VPNS) Multiple Sub-ring OSPF as the Provider Edge /Customer Edge Protocol for BGP/MPLS IP Sub-ring without virtual channel Virtual Private Networks (VPNS) Sub-ring without virtual channel Static route as the Provider Edge/Customer Edge Protocol for IPv6 VPN E-LAN Over G.8032 (Ref. Sec.7.5 ITU-T-Series-G-Sup-52) GeP-MPLS IP Virtual Private Networks (VPNS) Sub-ring without virtual channel Multiple Instances over same physical ring BGP-MPLS IP Virtual Private Networks (VPNS) Revertive Mode Geree Support for L3PVN/6VPE/6PE Label Disposition for VPN4 and 6VPE Force Switch Label Dispositon for DPN4 And 6VPE Label Di	Pseudowire MIB support	Sub-ring support (Multiple ring and ladder topologies)
Management information Base (MIB) Der Native-L2 Ethernet Pseudowire (PW) Label 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 OSF as the Provider Edge (Customer Edge Protocol for BGP/MPLS IP Sub-ring without virtual channel Static route as the Provider Edge (VPNs) Sub-ring without virtual channel BGP-MPLS IP Virtual Private Networks (VPNs) Bultiple instances over same physical ring BGP-MPLS IP Virtual Private Networks (VPNs) Reutrice as over same physical ring BGP-MPLS IP Virtual Private Networks (VPNs) Revertive Mode Internet VPNs with BGP/MPLS IP Virtual Private Networks (VPNs) Revertive Mode Internet VPNs with BGP/MPLS IP Virtual Private Networks (VPNs) Bultiple instances over same physical ring BGP-MPLS IP Virtual Private Networks (VPNs) Revertive Mode Internet VPNs with BGP/MPLS IP Virtual Private Networks (VPNs) Revertive Mode Internet Soption for VPNv4 and GPE Flace Social Social Social Social Social S	Pseudowire (PW) over MPLS PSN (Packet Switched Network)	Support of multiple ERP Instances on single ring
Etherner Vseudowire (VPW) Management Information Base (WB) Over Native-L2 FAT Pseudowire(PW) Label Over Native-L2 UZP/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 Sub-ring with virtual channel Virtual Private Networks (VPNs) Sub-ring without virtual channel Static route as the Provider Edge/Customer Edge Protocol for BGP/MPLS IP Multiple instances over same physical ring BGP-MPLS IP Virtual Private Networks (VPNs) E-LAN Over G.8032 (Ref. Sec. 7.5 ITU-T-Series-G-Sup-52) BGP-MPLS IP Virtual Private Network (VPN) Extension for IPV-6 VPN E-LAN Over G.8032 (Ref. Sec. 7.5 ITU-T-Series-G-Sup-52) BGP-MPLS IP Virtual Private Network (VPN) Extension for IPV-6 VPN E-LAN Over G.8032 (Ref. Sec. 7.5 ITU-T-Series-G-Sup-52) BGP-MPLS IP Virtual Private Network (VPN) Extension for IPV-6 VPN E-LAN Over G.8032 (Ref. Sec. 7.5 ITU-T-Series-G-Sup-52) Cornecting IPv6 Islands over IP4-MPLS using IPv6 Provider Edge Routes Revertive Mode BGP Force Switch MLAG IDL Link as G.8032 ring port	Management Information Base (MIB)	
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 Sub-ring without virtual channel Intranet VPNs with BGP/MPLS IP Virtual Private Networks (VPNs) Sub-ring without 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) E-LAN Over G.8032 (Ref. Sec. 7.5 ITU-T-Series-G-Sup-52) (GVFE) Connecting IPv6 Islands over IPv4 MPLS using IPv6 Provider Edge Routers Revertive Mode (GPP) Force Switch Label Disposition for VPNv4 and 6VPE Label Disposition for VPNv4 and 6VPE Force Switch Label Disposition for USPVN/6VPE/6PE Inter AS option A support for L3PVN/6VPE/6PE MLAG IDL link as G.8032 ring port Interface (as MPLS/IEVPN access interface) Inter AS option C support for C3PVN/6VPE/6PE Ethernet Linear Protection (ELPS) Ethernet Linear Protection (ELPS) PER VRF Label support for 6VPE/VPN Over Native L2	Ethernet Pseudowire (PW) Management Information Base (MIB)	Over Native-L2
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 BCP/MPLS IP Virtual Private Networks (VPNs) Multiple Sub-ring OSPF as the Provider Edge/Customer Edge Protocol for BGP/MPLS IP Sub-ring with virtual channel Virtual Private Networks (VPNs) Sub-ring without virtual channel Static route as the Provider Edge/Customer Edge Protocol for Multiple instances over same physical ring BGP-MPLS IP Virtual Private Network (VPNs) E-LAN Over G.8032 (Ref. Sec.7.5 ITU-T-Series-G-Sup-S2) (6VPE) Connecting IPv6 Islands over IPv4 MPLS using IPv6 Provider Edge Routers Connecting IPv6 Islands over IPv4 MPLS using IPv6 Provider Edge Routers Revertive Mode (APE) Edge IND A support for L3PVN/6VPE/6PE Inter AS option A support for L3PVN/6VPE/6PE MLAG IDL link as G.8032 ring port Inter AS option C support for L3PVN/6VPE/6PE ELPS LU as transport for 6PE/VPN Over Native L2 BGP Peer Group - static Different Control and Data-VLAN Interrat access for L3PVN/6VPE/6PE ELPS LU as transport for 6PE/VPN Over Native L2 BGP Peer Group - static Different Control and Data-VLAN	FAT Pseudowire(PW) Label	Over LAG interface
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 OSFF as the Provider Edge/Customer Edge Protocol for BGP/MPLS IP Sub-ring with virtual channel Virtual Private Networks (VPNs) Sub-ring with virtual channel Static route as the Provider Edge/Customer Edge Protocol for BGP/MPLS IP Sub-ring with virtual channel Static route as the Provider Edge/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs) Sub-ring without virtual channel BGP-MPLS IP Virtual Private Networks (VPNs) Sub-ring without virtual channel Connecting IPVs Islands over IPV4 MPLS using IPV6 Provider Edge Routers Revertive Mode (6PL) Label Disposition for VPN4 and 6VPE Force Switch Label Disposition for VPN4 and 6VPE 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 C support for L3PVN/6VPE/6PE MLAG IDL link as C.8032 ring port Inter AS option C support for C3PVN/6VPE/6PE Ethernet Linear Protection (ELPS) ELPS Ul as transport for 6VPE/VPN Over Native L2 BGP Peer Group - static Different Control and Data-VLA	L2CP/L2PT over VPWS	With CFM (for link fault detection)
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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 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) Sub-ring without virtual channel Static route as the Provider Edge/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPN) E-LAN Over G.8032 (Ref. Sec.7.5 ITU-T-Series-G-Sup-52) (6VPE) Connecting IPv6 Islands over IPv4 MPLS using IPv6 Provider Edge Routers Revertive Mode (6PE) Label Disposition for VPNv4 and 6VPE Force Switch Label Disposition for VPNv4 and 6VPE MLG (Active-Standby with IDP link) interconnection with G.8032 major ring Inter AS option A support for L3PVN/6VPE/6PE WLG (DL link as G.8032 ring port 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 OA	Layer 3 VPN	Multiple major ring
OSPF as the Provider Edge/Customer Edge Protocol for BGP/MPLS IPSub-ring with virtual channelVirtual Private Networks (VPNs)Sub-ring with virtual channelIntranet VPNs with BGP/MPLS IP Virtual Private Networks (VPNs)Sub-ring without virtual channelStatic route as the Provider Edge/Customer Edge Protocol forMultiple instances over same physical ringBGP/MPLS IP Virtual Private Networks (VPNs)ELAN Over G.8032 (Ref. Sec.7.5 ITU-T-Series-G-Sup-52)Connecting IPv6 Islands over IPv4 MPLS using IPv6 Provider Edge RoutersRevertive Mode(6PE)Label Disposition for VPNv4 and 6VPEForce SwitchLabel Disposition for GPEMLAG (Active-Standby with IDP link) interconnection with G.8032 major ringInter AS option A support for L3PVN/6VPE/6PEMLAG IDL link as G.8032 ring portInter AS option C support for L3PVN/6VPE/6PEEthernet Linear Protection (ELPS)PER VRF Label support for GPEELPSLU as transport for 6VPE/VPNOver Native L2BGP Peer Group - staticDifferent Control and Data-VLANInternet access for L3VPNELPSL3VPN MIBRevertive modeMPLS DAM1:1 Protection ModeOAM for MPLS DAMEthernet Inter First Mile (EFM)A framework for MPLS OAMEther OAM (EFM)Oetecting MPLS DAta Plane FailuresVirtual Extensible LAN (VXLAN)MPLS PV and LSP Traffic StatisticsLayer 2 EVPN Auto RT for VXLAN	Extranet VPNs with BGP/MPLS IP Virtual Private Networks (VPNs)	Multiple Sub-ring
Virtual Private Networks (VPNs) Eds Trococor for UPN Drive 2 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) Sub-ring without virtual channel BGP/MPLS IP Virtual Private Networks (VPN) Extension for IPv6 VPN E-LAN Over G.8032 (Ref. Sec.7.5 ITU-T-Series-G-Sup-52) (6vPE) Connecting IPv6 Islands over IPv4 MPLS using IPv6 Provider Edge Routers (GPE) Revertive Mode Label Disposition for VPNv4 and 6VPE Force Switch Revertive Mode Label Disposition for GPE 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 C support for L3PVN/6VPE/6PE User control over non-data VLAN forwarding (Block/unblock) : For Sub- Interface (as MPLS/EVPN access interface) Itter AS option C support for GPE Ethernet Linear Protection (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 DAM 1:1 Protection Mode OAM for MPLS DAM Ethernet in the First M	OSPE as the Provider Edge/Customer Edge Protocol for BGP/MPIS IP	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 Multiple instances over same physical ring BGP/MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN (ovPE) 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 Routes (BPE) Revertive Mode Label Disposition for VPNv4 and 6VPE Force Switch Label Disposition for SPE MLAG (Active-Standby with IDP link) interconnection with G.8032 major ring Inter AS option A 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 ELPS LU as transport for 6PE ELPS LU as transport for 6PE Different Control and Data-VLAN Intermet access for L3VPN ELPS with CFM L3VPN MIB Revertive mode MPLS OAM 1:1 Protection Mode OAM for MPLS Data Plane Failures Virtual Extensible LAN (VXLAN) MPLS DAA Virtual Extensible LAN (VXLAN) A framework for MPLS OAM Ethernet Inthe First Mile (EFM) Detecting MP	Virtual Private Networks (VPNs)	
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BGF/ MPLS IP Virtual Private Network (VPN) Etension 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 Revertive Mode (6VPE) Force Switch 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 C 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 DAM Ether OAM (EFM) Detecting MPLS Data Plane Failures Virtual Extensible LAN (VXLAN) MPLS BFD Detection Virtual	Static route as the Provider Edge/Customer Edge Protocol for	Multiple instances over same physical ring
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Label Disposition for 6PEMLAG (Active-Standby with IDP link) interconnection with G.8032 major ringInter AS option A support for L3PVN/6VPE/6PEMLAG IDL link as G.8032 ring portInter AS option C support for L3PVN/6VPE/6PEUser control over non-data VLAN forwarding (Block/unblock) : For Sub- Interface (as MPLS/EVPN access interface)PER VRF Label support for C 3PVN/6VPE/6PEEthernet Linear Protection (ELPS)PER VRF Label support for 6PEELPSLU as transport for 6VPE/VPNOver Native L2BGP Peer Group - staticDifferent Control and Data-VLANInternet access for L3VPNELPS with CFML3VPN MIBRevertive modeMPLS OAM1:1 Protection ModeOAM for MPLS networksEthernet in the First Mile (EFM)A framework for MPLS OAMEther OAM (EFM)MPLS BFD DetectionVirtual Extensible LAN (VXLAN)MPLS BFD DetectionVirtual Extensible LAN (VXLAN)Stats per Label Switched Path (LSP)Layer 2 EVPN Auto RT for VXLAN	Label Disposition for VPNv4 and 6VPE	Force Switch
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MPLS PW and LSP Traffic Statistics Layer 2 EVPN for VXLAN Stats per Label Switched Path (LSP) Layer 2 EVPN Auto RT for VXLAN	MPLS BFD Detection	Virtual Extensible LAN (VxLAN) - General
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	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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