

Standards and Protocol Support

Standards Compliance

IEEE 802.1ab-REV/D3 Station and Media Access Control Connectivity Discovery
IEEE 802.1d Bridging
IEEE 802.1p/Q VLAN Tagging
IEEE 802.1s Multiple Spanning Tree
IEEE 802.1w Rapid Spanning Tree Protocol
IEEE 802.1x Port Based Network Access Control
IEEE 802.1ad Provider Bridges
IEEE 802.1ah Provider Backbone Bridges
IEEE 802.1ag Service Layer OAM
IEEE 802.3ah Ethernet in the First Mile
IEEE 802.1ak Multiple MAC Registration Protocol
IEEE 802.3 10BaseT
IEEE 802.3ad Link Aggregation
IEEE 802.3ae 10Gbps Ethernet
IEEE 802.3ah Ethernet OAM
IEEE 802.3u 100BaseTX
IEEE 802.3x Flow Control
IEEE 802.3z 1000BaseSX/LX
ITU-T Y.1731 OAM functions and mechanisms for Ethernet based networks
ITU-T G.8031 Ethernet linear protection switching
ITU-T G.8032 Ethernet Ring Protection Switching (version 2)

Protocol Support

OSPF

RFC 1765 OSPF Database Overflow
RFC 2328 OSPF Version 2
RFC 2370 Opaque LSA Support
RFC 2740 OSPF for IPv6 (OSPFv3)
draft-ietf-ospf-ospfv3-update-14.txt
RFC 3101 OSPF NSSA Option
RFC 3137 OSPF Stub Router Advertisement

RFC 3623 Graceful OSPF Restart – GR helper
RFC 3630 Traffic Engineering (TE) Extensions to OSPF Version 2
RFC 4203 OSPF Extensions in Support of
Generalized Multi-Protocol Label Switching (GMPLS) - (support of Link Local/Remote Identifiers and SRLG sub-TLVs)
RFC 5185 OSPF Multi-Area Adjacency

BGP

RFC 1397 BGP Default Route Advertisement
RFC 1772 Application of BGP in the Internet
RFC 1965 Confederations for BGP
RFC 1997 BGP Communities Attribute
RFC 2385 Protection of BGP Sessions via MD5
RFC 2439 BGP Route Flap Dampening
RFC 2558 Multiprotocol Extensions for BGP-4
RFC 2918 Route Refresh Capability for BGP-4
RFC 3107 Carrying Label Information in BGP-4
RFC 3392 Capabilities Advertisement with BGP4
RFC 4271 BGP-4 (previously RFC 1771)
RFC 4360 BGP Extended Communities Attribute
RFC 4364 BGP/MPLS IP Virtual Private Networks (VPNs)(previously RFC 2547bis BGP/MPLS VPNS)
RFC 4456 BGP Route Reflection: Alternative to Full-mesh IBGP (previously RFC 1966 & 2796)
RFC 4486 Subcodes for BGP Cease Notification Message
RFC 4577 OSPF as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs)

RFC 4659 BGP/MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN
RFC 4684 Constrained Route Distribution for Border Gateway Protocol/MultiProtocol Label Switching (BGP/MPLS) Internet Protocol (IP) Virtual Private Networks (VPNs)
RFC 4724 Graceful Restart Mechanism for BGP – GR helper
RFC 4760 Multi-protocol Extensions for BGP
RFC 4798 Connecting IPv6 Islands over IPv4 MPLS Using IPv6 Provider Edge Routers (6PE)
RFC 4893 BGP Support for Four-octet AS Number Space
RFC 5004 Avoid BGP Best Path Transitions from One External to Another
RFC 5065 Confederations for BGP (obsoletes 3065)
RFC 5291 Outbound Route Filtering Capability for BGP-4
RFC 5575 Dissemination of Flow Specification Rules
RFC 5668 4-Octet AS Specific BGP Extended Community
draft-ietf-idr-add-paths
draft-ietf-idr-best-external

IS-IS

RFC 1142 OSI IS-IS Intra-domain Routing Protocol (ISO 10589)
RFC 1195 Use of OSI IS-IS for routing in TCP/IP & dual environments
RFC 2763 Dynamic Hostname Exchange for IS-IS
RFC 2966 Domain-wide Prefix Distribution with Two-Level IS-IS
RFC 2973 IS-IS Mesh Groups
RFC 3567 Intermediate System to Intermediate System (ISIS) Cryptographic Authentication

Standards and Protocols

RFC 3719 Recommendations for Interoperable Networks using IS-IS
RFC 3784 Intermediate System to Intermediate System (IS-IS) Extensions for Traffic Engineering (TE)
RFC 3787 Recommendations for Interoperable IP Networks
RFC 3847 Restart Signaling for IS-IS – GR helper
draft-ietf-isis-igp-p2p-over-lan-05.txt
RFC 5303 Three-Way Handshake for Intermediate System to Intermediate System (IS-IS) Point-to-Point Adjacencies
RFC 5305 IS-IS Extensions for Traffic Engineering
RFC 5307 IS-IS Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS) – (support of Link Local/Remote Identifiers and SRLG sub-TLVs)

IPSec

RFC 2401 Security Architecture for the Internet Protocol
RFC 2409 The Internet Key Exchange (IKE)
RFC 3706 IKE Dead Peer Detection
RFC 3947 Negotiation of NAT-Traversal in the IKE
RFC 3948 UDP Encapsulation of IPsec ESP Packets
draft-ietf-ipsec-isakmp-xauth-06.txt – Extended Authentication within ISAKMP/Oakley (XAUTH)
draft-ietf-ipsec-isakmp-modecfg-05.txt – The ISAKMP Configuration Method

IPv6

RFC 1981 Path MTU Discovery for IPv6
RFC 2375 IPv6 Multicast Address Assignments
RFC 2460 Internet Protocol, Version 6 (IPv6) Specification
RFC 2461 Neighbor Discovery for IPv6
RFC 2462 IPv6 Stateless Address Auto configuration

RFC 2463 Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 Specification
RFC 2464 Transmission of IPv6 Packets over Ethernet Networks
RFC 2529 Transmission of IPv6 over IPv4 Domains without Explicit Tunnels
RFC 2545 Use of BGP-4 Multiprotocol Extension for IPv6 Inter-Domain Routing
RFC 2710 Multicast Listener Discovery (MLD) for IPv6
RFC 2740 OSPF for IPv6
RFC 3306 Unicast-Prefix-based IPv6 Multicast Addresses
RFC 3315 Dynamic Host Configuration Protocol for IPv6
RFC 3587 IPv6 Global Unicast Address Format
RFC 3590 Source Address Selection for the Multicast Listener Discovery (MLD) Protocol
RFC 3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6
RFC 4007 IPv6 Scoped Address Architecture
RFC 4193 Unique Local IPv6 Unicast Addresses
RFC 4291 IPv6 Addressing Architecture
RFC 4552 Authentication/Confidentiality for OSPFv3
RFC 4659 BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN
RFC 5072 IP Version 6 over PPP
RFC 5095 Deprecation of Type 0 Routing Headers in IPv6
draft-ietf-isis-ipv6-05
draft-ietf-isis-wg-multi-topology-xx.txt

Multicast

RFC 1112 Host Extensions for IP Multicasting (Snooping)
RFC 2236 Internet Group Management Protocol, (Snooping)
RFC 3376 Internet Group Management Protocol, Version 3 (Snooping)
RFC 2362 Protocol Independent Multicast-Sparse Mode (PIMSM)
RFC 3618 Multicast Source Discovery Protocol (MSDP)

RFC 3446 Anycast Rendezvous Point (RP) mechanism using Protocol Independent Multicast (PIM) and Multicast Source Discovery Protocol (MSDP)
RFC 4601 Protocol Independent Multicast - Sparse Mode (PIM-SM): Protocol Specification (Revised)
RFC 4604 Using IGMPv3 and MLDv2 for Source-Specific Multicast
RFC 4607 Source-Specific Multicast for IP
RFC 4608 Source-Specific Protocol Independent Multicast in 232/8
RFC 4610 Anycast-RP Using Protocol Independent Multicast (PIM)
draft-ietf-pim-sm-bsr-06.txt
draft-roosen-vpn-mcast-15.txt Multicast in MPLS/BGP IP VPNs
draft-ietf-mboned-msdp-mib-01.txt
draft-ietf-l3vpn-2547bis-mcast-07: Multicast in MPLS/BGP IP VPNs
draft-ietf-l3vpn-2547bis-mcast-bgp-05: BGP Encodings and Procedures for Multicast in MPLS/BGP IP VPNs
RFC 3956: Embedding the Rendezvous Point (RP) Address in an IPv6 Multicast Address

MPLS — General

RFC 2430 A Provider Architecture DiffServ & TE
RFC 2474 Definition of the DS Field the IPv4 and IPv6 Headers (Rev)
RFC 2597 Assured Forwarding PHB Group (rev3260)
RFC 2598 An Expedited Forwarding PHB
RFC 3031 MPLS Architecture
RFC 3032 MPLS Label Stack Encoding
RFC 3443 Time To Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks
RFC 4182 Removing a Restriction on the use of MPLS Explicit NULL
RFC 3140 Per-Hop Behavior Identification Codes
RFC 5332 MPLS Multicast Encapsulations

MPLS — LDP

RFC 3037 LDP Applicability
 RFC 3478 Graceful Restart Mechanism for LDP – GR helper
 RFC 5036 LDP Specification
 RFC 5283 LDP extension for Inter-Area LSP
 RFC 5443 LDP IGP Synchronization
 RFC 6388 LDP Extensions for Point-to-Multipoint and Multipoint-to-Multipoint LSP
 RFC 6826 Multipoint LDP in-band signaling for Point-to-Multipoint and Multipoint-to-Multipoint Label Switched Paths
 draft-pdutta-mpls-tldp-hello-reduce-04.txt, Targeted LDP Hello Reduction

MPLS/RSVP-TE

RFC 2702 Requirements for Traffic Engineering over MPLS
 RFC2747 RSVP Cryptographic Authentication
 RFC 2961 RSVP Refresh Overhead Reduction Extensions
 RFC3097 RSVP Cryptographic Authentication - Updated Message Type Value
 RFC 3209 Extensions to RSVP for Tunnels
 RFC 3473 Generalized Multi-Protocol Label Switching (GMPLS) Signaling
 Resource Reservation Protocol-Traffic Engineering (RSVP-TE) Extensions – (support of of IF_ID RSVP_HOP object with unnumbered interface and RSVP-TE Graceful Restart Helper Procedures)
 RFC 3477 Signalling Unnumbered Links in Resource Reservation Protocol-Traffic Engineering (RSVP-TE)
 RFC 3564 Requirements for Diff-Serv-aware TE
 RFC 3906 Calculating Interior Gateway Protocol (IGP) Routes Over Traffic Engineering Tunnels
 RFC 4090 Fast reroute Extensions to RSVP-TE for LSP Tunnels

RFC 4124 Protocol Extensions for Support of Diffserv-aware MPLS Traffic Engineering
 RFC 4125 Maximum Allocation Bandwidth Constraints Model for Diffserv-aware MPLS Traffic Engineering
 RFC 4127 Russian Dolls Bandwidth Constraints Model for Diffserv-aware MPLS Traffic Engineering
 draft-newton-mpls-te-dynamic-overbooking-00 A Diffserv-TE Implementation Model to dynamically change booking factors during failure events
 RFC 4561 Definition of a RRO Node-Id Sub-Object
 RFC 4875 Extensions to Resource Reservation Protocol - Traffic Engineering (RSVP-TE) for Point-to-Multipoint TE Label Switched Paths (LSPs)
 RFC 5151 Inter-domain MPLS and GMPLS Traffic Engineering – RSVP-TE Extensions
 RFC 5712 MPLS Traffic Engineering Soft Preemption
 RFC 5817 Graceful Shutdown in GMPLS Traffic Engineering Networks

MPLS — OAM

RFC 4379 Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures
 RFC 6425 Detecting Data Plane Failures in Point-to-Multipoint Multiprotocol Label Switching (MPLS) - Extensions to LSP Ping

MPLS-TP (7750/7450 only)

RFC5586 MPLS Generic Associated Channel
 RFC5921 A Framework for MPLS in Transport Networks
 RFC5960 MPLS Transport Profile Data Plane Architecture
 RFC6370 MPLS-TP Identifiers
 RFC6378 MPLS-TP Linear Protection
 RFC6428 Proactive Connectivity Verification, Continuity Check and Remote Defect indication for MPLS Transport Profile

RFC6426 MPLS On-Demand Connectivity and Route Tracing
 RFC6478 Pseudowire Status for Static Pseudowires
 draft-ietf-mpls-tp-ethernet-addressing-02 MPLS-TP Next-Hop Ethernet Addressing

RIP

RFC 1058 RIP Version 1
 RFC 2082 RIP-2 MD5 Authentication
 RFC 2453 RIP Version 2

TCP/IP

RFC 768 UDP
 RFC 1350 The TFTP Protocol (Rev.
 RFC 791 IP
 RFC 792 ICMP
 RFC 793 TCP
 RFC 826 ARP
 RFC 854 Telnet
 RFC 951 BootP (rev)
 RFC 1519 CIDR
 RFC 1542 Clarifications and Extensions for the Bootstrap Protocol
 RFC 1812 Requirements for IPv4 Routers
 RFC 2347 TFTP option Extension
 RFC 2328 TFTP Blocksize Option
 RFC 2349 TFTP Timeout Interval and Transfer Size option
 RFC 2401 Security Architecture for Internet Protocol
 RFC 2428 FTP Extensions for IPv6 and NATs
 RFC 3596 DNS Extensions to Support IP version 6
 draft-ietf-bfd-mib-00.txt Bidirectional Forwarding Detection Management Information Base
 RFC 5880 Bidirectional Forwarding Detection
 RFC 5881 BFD IPv4 and IPv6 (Single Hop)
 RFC 5883 BFD for Multihop Paths
 RFC 5286 Basic Specification for IP Fast Reroute: Loop-Free Alternates

Standards and Protocols

VRRP

- RFC 2787 Definitions of Managed Objects for the Virtual Router Redundancy Protocol
- RFC 3768 Virtual Router Redundancy Protocol
- RFC 5798, Virtual Router Redundancy Protocol Version 3 for IPv4 and IPv6

DHCP

- RFC 2131 Dynamic Host Configuration Protocol (REV)
- RFC 3046 DHCP Relay Agent Information Option (Option 82)
- RFC 1534 Interoperation between DHCP and BOOTP

VPLS

- RFC 4762 Virtual Private LAN Services Using LDP
- RFC5501: Requirements for Multicast Support in Virtual Private LAN Services (previously draft-ietf-l2vpn-vpls-mcast-reqts-04)
- RFC6074: Provisioning, Auto-Discovery, and Signaling in Layer 2 Virtual Private Networks (L2VPNs) (previously draft-ietf-l2vpn-signaling-08)
- draft-ietf-l2vpn-vpls-mcast-13.txt
Multicast in VPLS

PSEUDOWIRE

- RFC 3985 Pseudo Wire Emulation Edge-to-Edge (PWE3)
- RFC 4385 Pseudo Wire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN
- RFC 3916 Requirements for Pseudo-Wire Emulation Edge-to-Edge (PWE3)
- RFC 4717 Encapsulation Methods for Transport ATM over MPLS Networks (draft-ietf-pwe3-atm-encap-10.txt)
- RFC 4816 PWE3 ATM Transparent Cell Transport Service (draft-ietf-pwe3-cell-transport-04.txt)
- RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks (draft-ietf-pwe3-ethernet-encap-11.txt)

- RFC 4619 Encapsulation Methods for Transport of Frame Relay over MPLS Networks (draft-ietf-pwe3-frame-relay-07.txt)
- RFC 4446 IANA Allocations for PWE3
- RFC 4447 Pseudowire Setup and Maintenance Using LDP (draft-ietf-pwe3-control-protocol-17.txt)
- RFC 5085, Pseudowire Virtual Circuit Connectivity Verification (VCCV): A Control Channel for Pseudowires
- RFC 5659 An Architecture for Multi-Segment Pseudowire Emulation Edge-to-Edge
draft-ietf-l2vpn-vpws-iw-oam-03.txt,
OAM Procedures for VPWS Interworking
draft-ietf-pwe3-mpls-eth-oam-iwk-07.txt,
MPLS and Ethernet OAM Interworking RFC6073, Segmented Pseudowire
draft-ietf-pwe3-dynamic-ms-pw-16.txt ,
Dynamic Placement of Multi Segment Pseudo Wires
- RFC 6310, Pseudowire (PW) OAM Message Mapping
- RFC6391 Flow Aware Transport of Pseudowires over an MPLS PSN
- RFC 6575 , ARP Mediation for IP Interworking of Layer 2 VPN
- RFC 6718, Pseudowire Redundancy
- RFC 6870, Pseudowire Preferential Forwarding Status bit
- MFA Forum 9.0.0 The Use of Virtual trunks for ATM/MPLS Control Plane Interworking
- MFA Forum 12.0.0 Multiservice Interworking - Ethernet over MPLS
- MFA forum 13.0.0 - Fault Management for Multiservice Interworking v1.0
- MFA Forum 16.0.0 – Multiservice Interworking - IP over MPLS

ANCP/L2CP

- RFC 5851 ANCP framework
draft-ietf-ancp-protocol-02.txt ANCP Protocol

Voice /Video Performance

- ITU-T G.107 The E Model- A computational model for use in planning.

- ETSI TS 101 329-5 Annex E extensions- QoS Measurement for VoIP - Method for determining an Equipment Impairment Factor using Passive Monitoring
- ITU-T Rec. P.564 - Conformance testing for voice over IP transmission quality assessment models
- ITU-T G.1020 - Appendix I - Performance Parameter Definitions for Quality of Speech and other Voiceband Applications Utilizing IP Networks- Mean Absolute Packet Delay Variation.& Markov Models.
- RFC 3550 Appendix A.8- RTP: A Transport Protocol for Real-Time Applications- Estimating the Interarrival Jitter

Circuit Emulation

- RFC 4553 Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP)
- RFC 5086 Structure-Aware Time Division Multiplexed (TDM) Circuit Emulation Service over Packet Switched Network (CESoPSN)
- MEF-8 Implementation Agreement for the Emulation of PDH Circuits over Metro Ethernet Networks, October 2004
- RFC 5287 Control Protocol Extensions for the Setup of Time-Division Multiplexing (TDM) Pseudowires in MPLS Networks

SONET/SDH

- ITU-G.841 Telecommunication Standardization Section of ITU, Types and Characteristics of SDH Networks Protection Architecture, issued in October 1998 and as augmented by Corrigendum1 issued in July 2002

RADIUS

- RFC 2865 Remote Authentication Dial In User Service
- RFC 2866 RADIUS Accounting

SSH

- RFC 4250 The Secure Shell (SSH) Protocol Protocol Assigned Numbers

RFC 4251 The Secure Shell (SSH) Protocol Architecture
 RFC 4252 The Secure Shell (SSH) Authentication Protocol
 RFC 4253 The Secure Shell (SSH) Transport Layer Protocol [ssh-rsa key only]
 RFC 4254 The Secure Shell (SSH) Connection Protocol
 RFC 4256 Generic Message Exchange Authentication for the Secure Shell Protocol (SSH)

Timing

GR-253-CORE SONET Transport Systems: Common Generic Criteria. Issue 3, September 2000
 ITU-T G.781 Telecommunication Standardization Section of ITU, Synchronization layer functions, issued 09/2008
 ITU-T G.813 Telecommunication Standardization Section of ITU, Timing characteristics of SDH equipment slave clocks (SEC), issued 03/2003.
 GR-1244-CORE Clocks for the Synchronized Network: Common Generic Criteria, Issue 3, May 2005
 ITU-T G.8261 Telecommunication Standardization Section of ITU, Timing and synchronization aspects in packet networks, issued 04/2008.
 ITU-T G.8262 Telecommunication Standardization Section of ITU, Timing characteristics of synchronous Ethernet equipment slave clock (EEC), issued 08/2007.
 ITU-T G.8264 Telecommunication Standardization Section of ITU, Distribution of timing information through packet networks, issued 10/2008.
 ITU-T G.8265.1 Telecommunication Standardization Section of ITU, Precision time protocol telecom profile for frequency synchronization, issued 10/2010
 IEEE Std 1588tm-2008, IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems, July 2008

NETWORK MANAGEMENT

ITU-T X.721: Information technology- OSI-Structure of Management Information
 ITU-T X.734: Information technology- OSI-Systems Management: Event Report Management Function
 M.3100/3120 Equipment and Connection Models
 TMF 509/613 Network Connectivity Model
 RFC 1157 SNMPv1
 RFC 1215 A Convention for Defining Traps for use with the SNMP
 RFC 1657 BGP4-MIB
 RFC 1724 RIPv2-MIB
 RFC 1850 OSPF-MIB
 RFC 1907 SNMPv2-MIB
 RFC 2011 IP-MIB
 RFC 2138 RADIUS
 RFC 2206 RSVP-MIB
 RFC 2452 IPv6 Management Information Base for the Transmission Control Protocol
 RFC 2465 Management Information Base for IPv6: Textual Conventions and General Group
 RFC 2558 SONET-MIB
 RFC 2571 SNMP-FRAMEWORKMIB
 RFC 2572 SNMP-MPD-MIB
 RFC 2573 SNMP-TARGET-&-NOTIFICATION-MIB
 RFC 2574 SNMP-USER-BASED-SMMIB
 RFC 2575 SNMP-VIEW-BASED-ACM-MIB
 RFC 2576 SNMP-COMMUNITY-MIB
 RFC 2578 Structure of Management Information Version 2 (SMIv2)
 RFC 2665 EtherLike-MIB
 RFC 2819 RMON-MIB
 RFC 2863 IF-MIB
 RFC 2864 INVERTED-STACK-MIB
 RFC 2987 VRRP-MIB
 RFC 3014 NOTIFICATION-LOGMIB
 RFC 3019 IP Version 6 Management Information Base for The Multicast Listener Discovery Protocol
 RFC 3164 Syslog
 RFC 3273 HCRMON-MIB
 RFC 3411 An Architecture for Describing Simple Network

Management Protocol (SNMP) Management Frameworks
 RFC 3412 - Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)
 RFC 3413 - Simple Network Management Protocol (SNMP) Applications
 RFC 3414 - User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)
 RFC 3418 - SNMP MIB
 RFC 3826 The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model
 RFC 4113 Management Information Base for the User Datagram Protocol (UDP)
 RFC 4292 IP-FORWARD-MIB
 RFC 4293 MIB for the Internet Protocol
 RFC 5101 - Specification of the IP Flow Information Export (IPFIX) Protocol for the Exchange of IP Traffic Flow Information
 RFC 6242 Using the NETCONF Protocol over Secure Shell (SSH)

