



## INDEX

### A

abbreviating commands [2-3](#)  
AC (command switch) [6-9](#)  
access-class command [31-18](#)  
access control entries  
    See ACEs  
access control entry (ACE) [37-3](#)  
access-denied response, VMPS [13-24](#)  
access groups  
    Layer 3 [31-19](#)  
access groups, applying IPv4 ACLs to interfaces [31-19](#)  
accessing  
    clusters, switch [6-12](#)  
    command switches [6-10](#)  
    member switches [6-12](#)  
    switch clusters [6-12](#)  
accessing stack members [7-22](#)  
access lists  
    See ACLs  
access ports  
    in switch clusters [6-8](#)  
access ports, defined [12-3](#)  
accounting  
    with 802.1x [10-51](#)  
    with IEEE 802.1x [10-16](#)  
    with RADIUS [9-35](#)  
    with TACACS+ [9-11, 9-17](#)  
ACEs  
    and QoS [33-8](#)  
    defined [31-2](#)  
    Ethernet [31-2](#)  
    IP [31-2](#)

### ACLs

ACEs [31-2](#)  
any keyword [31-10](#)  
applying  
    time ranges to [31-15](#)  
    to an interface [31-18, 37-7](#)  
    to IPv6 interfaces [37-7](#)  
    to QoS [33-8](#)  
classifying traffic for QoS [33-50](#)  
comments in [31-17](#)  
compiling [31-21](#)  
defined [31-1, 31-7](#)  
examples of [31-21, 33-50](#)  
extended IP, configuring for QoS classification [33-51](#)  
extended IPv4  
    creating [31-9](#)  
    matching criteria [31-7](#)  
hardware and software handling [31-20](#)  
host keyword [31-11](#)  
IP  
    creating [31-7](#)  
    fragments and QoS guidelines [33-40](#)  
    implicit deny [31-9, 31-13, 31-14](#)  
    implicit masks [31-9](#)  
    matching criteria [31-7](#)  
    undefined [31-19](#)  
IPv4  
    applying to interfaces [31-18](#)  
    creating [31-7](#)  
    matching criteria [31-7](#)  
    named [31-13](#)  
    numbers [31-7](#)  
    terminal lines, setting on [31-18](#)

- unsupported features [31-6](#)
  - IPv6
    - applying to interfaces [37-7](#)
    - configuring [37-3, 37-4](#)
    - displaying [37-8](#)
    - interactions with other features [37-4](#)
    - limitations [37-2, 37-3](#)
    - matching criteria [37-3](#)
    - named [37-2](#)
    - precedence of [37-2](#)
    - supported [37-2](#)
    - unsupported features [37-3](#)
  - MAC extended [31-23, 33-52](#)
  - matching [31-7, 31-19, 37-3](#)
  - monitoring [31-26, 37-8](#)
  - named, IPv4 [31-13](#)
  - named, IPv6 [37-2](#)
  - names [37-4](#)
  - number per QoS class map [33-40](#)
  - port [31-2, 37-1](#)
  - precedence of [31-2](#)
  - QoS [33-8, 33-50](#)
  - resequencing entries [31-13](#)
  - router [31-2, 37-1](#)
  - standard IP, configuring for QoS classification [33-50](#)
  - standard IPv4
    - creating [31-8](#)
    - matching criteria [31-7](#)
  - support for [1-10](#)
  - support in hardware [31-20](#)
  - time ranges [31-15](#)
  - types supported [31-2](#)
  - unsupported features, IPv4 [31-6](#)
  - unsupported features, IPv6 [37-3](#)
- active link [19-4, 19-5, 19-6](#)
  - active links [19-2](#)
  - active traffic monitoring, IP SLAs [32-1](#)
  - address aliasing [21-2](#)
  - addresses
    - displaying the MAC address table [5-24](#)
    - dynamic
      - accelerated aging [16-9](#)
      - changing the aging time [5-15](#)
      - default aging [16-9](#)
      - defined [5-13](#)
      - learning [5-14](#)
      - removing [5-16](#)
    - IPv6 [35-2](#)
    - MAC, discovering [5-24](#)
    - multicast, STP address management [16-9](#)
    - static
      - adding and removing [5-20](#)
      - defined [5-13](#)
  - address resolution [5-24](#)
  - Address Resolution Protocol
    - See ARP
  - advertisements
    - CDP [25-1](#)
    - LLDP [26-2](#)
    - VTP [13-15, 14-3, 14-4](#)
  - aggregatable global unicast addresses [35-3](#)
  - aggregated ports
    - See EtherChannel
  - aggregate policers [33-60](#)
  - aggregate policing [1-14](#)
  - aging, accelerating [16-9](#)
  - aging time
    - accelerated
      - for MSTP [17-24](#)
      - for STP [16-9, 16-23](#)
    - MAC address table [5-15](#)
    - maximum
      - for MSTP [17-25](#)
      - for STP [16-23, 16-24](#)
  - alarms, RMON [28-4](#)
  - allowed-VLAN list [13-17](#)
  - ARP
    - defined [1-6, 5-24](#)

- table
    - address resolution [5-24](#)
    - managing [5-24](#)
  - attributes, RADIUS
    - vendor-proprietary [9-38](#)
    - vendor-specific [9-37](#)
  - attribute-value pairs [10-13, 10-16, 10-21, 10-22](#)
  - authentication
    - local mode with AAA [9-41](#)
    - open1x [10-31](#)
    - RADIUS
      - key [9-27](#)
      - login [9-30](#)
    - TACACS+
      - defined [9-11](#)
      - key [9-13](#)
      - login [9-14](#)

See also port-based authentication
  - authentication compatibility with Catalyst 6000 switches [10-8](#)
  - authentication failed VLAN
    - See restricted VLAN
  - authentication manager
    - CLI commands [10-9](#)
    - compatibility with older 802.1x CLI commands [10-9 to ??](#)
    - overview [10-7](#)
  - authoritative time source, described [5-3](#)
  - authorization
    - with RADIUS [9-34](#)
    - with TACACS+ [9-11, 9-16](#)
  - authorized ports with IEEE 802.1x [10-10](#)
  - autoconfiguration [3-3](#)
  - auto enablement [10-32](#)
  - automatic advise (auto-advise) in switch stacks [7-11](#)
  - automatic copy (auto-copy) in switch stacks [7-11](#)
  - automatic discovery
    - considerations
      - beyond a noncandidate device [6-8](#)
      - brand new switches [6-8](#)
      - connectivity [6-5](#)
      - different VLANs [6-7](#)
      - management VLANs [6-7](#)
      - non-CDP-capable devices [6-6](#)
      - noncluster-capable devices [6-6](#)
      - in switch clusters [6-5](#)
    - See also CDP
  - automatic extraction (auto-extract) in switch stacks [7-11](#)
  - automatic QoS
    - See QoS
  - automatic recovery, clusters [6-9](#)
    - See also HSRP
  - automatic upgrades (auto-upgrade) in switch stacks [7-11](#)
  - auto-MDIX
    - configuring [12-30](#)
    - described [12-30](#)
  - autonegotiation
    - duplex mode [1-4](#)
    - interface configuration guidelines [12-27](#)
    - mismatches [39-12](#)
  - Auto-QoS video devices [1-14](#)
  - autosensing, port speed [1-4](#)
  - auxiliary VLAN
    - See voice VLAN
  - availability, features [1-8](#)
- 
- ## B
- BackboneFast
    - described [18-7](#)
    - disabling [18-17](#)
    - enabling [18-17](#)
    - support for [1-8](#)
  - backup interfaces
    - See Flex Links
  - backup links [19-2](#)
  - banners
    - configuring

- login [5-13](#)
  - message-of-the-day login [5-12](#)
- default configuration [5-11](#)
- when displayed [5-11](#)

Berkeley r-tools replacement [9-52](#)

binding database

- DHCP snooping
  - See DHCP snooping binding database

bindings

- DHCP snooping database [20-6](#)
- IP source guard [20-13](#)

binding table, DHCP snooping

- See DHCP snooping binding database

blocking packets [23-7](#)

booting

- boot loader, function of [3-1](#)
- boot process [3-1](#)
- manually [3-19](#)
- specific image [3-20](#)

boot loader

- accessing [3-21](#)
- described [3-1](#)
- environment variables [3-21](#)
- prompt [3-21](#)
- trap-door mechanism [3-2](#)

BPDU

- error-disabled state [18-2](#)
- filtering [18-3](#)
- RSTP format [17-12](#)

BPDU filtering

- described [18-3](#)
- disabling [18-15](#)
- enabling [18-14](#)
- support for [1-8](#)

BPDU guard

- described [18-2](#)
- disabling [18-14](#)
- enabling [18-13](#)
- support for [1-8](#)

- bridge protocol data unit
  - See BPDU
- broadcast storm-control command [23-4](#)
- broadcast storms [23-1](#)

---

## C

cables, monitoring for unidirectional links [24-1](#)

candidate switch

- automatic discovery [6-5](#)
- defined [6-4](#)
- requirements [6-4](#)
- See also command switch, cluster standby group, and member switch

Catalyst 6000 switches

- authentication compatibility [10-8](#)

CA trustpoint

- configuring [9-49](#)
- defined [9-47](#)

CDP

- and trusted boundary [33-45](#)
- automatic discovery in switch clusters [6-5](#)
- configuring [25-2](#)
- default configuration [25-2](#)
- defined with LLDP [26-1](#)
- described [25-1](#)
- disabling for routing device [25-4](#)
- enabling and disabling
  - on an interface [25-4](#)
  - on a switch [25-4](#)
- monitoring [25-5](#)
- overview [25-1](#)
- power negotiation extensions [12-5](#)
- support for [1-6](#)
- switch stack considerations [25-2](#)
- transmission timer and holdtime, setting [25-3](#)
- updates [25-3](#)

CGMP

- as IGMP snooping learning method [21-9](#)

- joining multicast group [21-3](#)
- CipherSuites [9-48](#)
- Cisco 7960 IP Phone [15-1](#)
- Cisco Discovery Protocol
  - See CDP
- Cisco intelligent power management [12-5](#)
- Cisco IOS File System
  - See IFS
- Cisco IOS IP SLAs [32-1](#)
- Cisco Secure ACS
  - attribute-value pairs for downloadable ACLs [10-22](#)
  - attribute-value pairs for redirect URL [10-21](#)
- Cisco Secure ACS configuration guide [10-61](#)
- CiscoWorks 2000 [1-5, 30-5](#)
- CISP [10-32](#)
- CIST regional root
  - See MSTP
- CIST root
  - See MSTP
- civic location [26-3](#)
- class maps for QoS
  - configuring [33-53](#)
  - described [33-8](#)
  - displaying [33-81](#)
- class of service
  - See CoS
- clearing interfaces [12-41](#)
- CLI
  - abbreviating commands [2-3](#)
  - command modes [2-1](#)
  - configuration logging [2-4](#)
  - described [1-5](#)
  - editing features
    - enabling and disabling [2-6](#)
    - keystroke editing [2-7](#)
    - wrapped lines [2-8](#)
  - error messages [2-4](#)
  - filtering command output [2-9](#)
  - getting help [2-3](#)
  - history
    - changing the buffer size [2-5](#)
    - described [2-5](#)
    - disabling [2-6](#)
    - recalling commands [2-6](#)
  - managing clusters [6-15](#)
  - no and default forms of commands [2-4](#)
- Client Information Signalling Protocol
  - See CISP
- client mode, VTP [14-3](#)
- clock
  - See system clock
- clusters, switch
  - accessing [6-12](#)
  - automatic discovery [6-5](#)
  - automatic recovery [6-9](#)
  - benefits [1-1](#)
  - compatibility [6-4](#)
  - described [6-1](#)
  - LRE profile considerations [6-15](#)
  - managing
    - through CLI [6-15](#)
    - through SNMP [6-16](#)
  - planning [6-4](#)
  - planning considerations
    - automatic discovery [6-5](#)
    - automatic recovery [6-9](#)
    - CLI [6-15](#)
    - host names [6-12](#)
    - IP addresses [6-12](#)
    - LRE profiles [6-15](#)
    - passwords [6-13](#)
    - RADIUS [6-15](#)
    - SNMP [6-13, 6-16](#)
    - switch stacks [6-13](#)
    - TACACS+ [6-15](#)
  - See also candidate switch, command switch, cluster standby group, member switch, and standby command switch

- cluster standby group
  - automatic recovery [6-11](#)
  - considerations [6-10](#)
  - defined [6-2](#)
  - requirements [6-3](#)
  - virtual IP address [6-10](#)
  - See also HSRP
- CNS [1-6](#)
- Configuration Engine
  - configID, deviceID, hostname [4-3](#)
  - configuration service [4-2](#)
  - described [4-1](#)
  - event service [4-3](#)
- embedded agents
  - described [4-5](#)
  - enabling automated configuration [4-6](#)
  - enabling configuration agent [4-9](#)
  - enabling event agent [4-7](#)
- management functions [1-6](#)
- CoA Request Commands [9-23](#)
- Coarse Wave Division Multiplexer
  - See CWDM SFPs
- command-line interface
  - See CLI
- command modes [2-1](#)
- commands
  - abbreviating [2-3](#)
  - no and default [2-4](#)
- commands, setting privilege levels [9-8](#)
- command switch
  - accessing [6-10](#)
  - active (AC) [6-9](#)
  - configuration conflicts [39-12](#)
  - defined [6-2](#)
  - passive (PC) [6-9](#)
  - password privilege levels [6-16](#)
  - priority [6-9](#)
  - recovery
    - from command-switch failure [6-9, 39-8](#)
    - from lost member connectivity [39-12](#)
  - redundant [6-9](#)
  - replacing
    - with another switch [39-11](#)
    - with cluster member [39-9](#)
  - requirements [6-3](#)
  - standby (SC) [6-9](#)
  - See also candidate switch, cluster standby group, member switch, and standby command switch
- community strings
  - configuring [6-13, 30-8](#)
  - for cluster switches [30-4](#)
  - in clusters [6-13](#)
  - overview [30-4](#)
  - SNMP [6-13](#)
- compatibility, feature [23-12](#)
- compatibility, software
  - See stacks, switch
- config.text [3-18](#)
- configurable leave timer, IGMP [21-6](#)
- configuration, initial
  - defaults [1-16](#)
  - Express Setup [1-1](#)
- configuration changes, logging [29-11](#)
- configuration conflicts, recovering from lost member connectivity [39-12](#)
- configuration examples, network [1-18](#)
- configuration files
  - archiving [A-20](#)
  - clearing the startup configuration [A-19](#)
  - creating using a text editor [A-10](#)
  - default name [3-18](#)
  - deleting a stored configuration [A-19](#)
  - described [A-8](#)
  - downloading
    - automatically [3-18](#)
    - preparing [A-11, A-13, A-16](#)
    - reasons for [A-8](#)
    - using FTP [A-13](#)

- using RCP [A-17](#)
    - using TFTP [A-11](#)
  - guidelines for creating and using [A-9](#)
  - guidelines for replacing and rolling back [A-21](#)
  - invalid combinations when copying [A-5](#)
  - limiting TFTP server access [30-17](#)
  - obtaining with DHCP [3-8](#)
  - password recovery disable considerations [9-5](#)
  - replacing a running configuration [A-19, A-20](#)
  - rolling back a running configuration [A-19, A-21](#)
  - specifying the filename [3-18](#)
  - system contact and location information [30-17](#)
  - types and location [A-10](#)
  - uploading
    - preparing [A-11, A-13, A-16](#)
    - reasons for [A-9](#)
    - using FTP [A-15](#)
    - using RCP [A-18](#)
    - using TFTP [A-12](#)
  - configuration logger [29-11](#)
  - configuration logging [2-4](#)
  - configuration replacement [A-19](#)
  - configuration rollback [A-19, A-20](#)
  - configuration settings, saving [3-15](#)
  - configure terminal command [12-17](#)
  - configuring 802.1x user distribution [10-57](#)
  - configuring port-based authentication violation modes [10-41](#)
  - configuring small-frame arrival rate [23-5](#)
  - conflicts, configuration [39-12](#)
  - connections, secure remote [9-42](#)
  - connectivity problems [39-14, 39-15, 39-17](#)
  - consistency checks in VTP Version 2 [14-5](#)
  - console port, connecting to [2-10](#)
  - control protocol, IP SLAs [32-4](#)
  - corrupted software, recovery steps with Xmodem [39-2](#)
  - CoS
    - in Layer 2 frames [33-2](#)
    - override priority [15-6](#)
    - trust priority [15-6](#)
  - CoS input queue threshold map for QoS [33-16](#)
  - CoS output queue threshold map for QoS [33-19](#)
  - CoS-to-DSCP map for QoS [33-63](#)
  - counters, clearing interface [12-41](#)
  - CPU utilization, troubleshooting [39-28](#)
  - crashinfo file [39-23](#)
  - critical authentication, IEEE 802.1x [10-54](#)
  - critical VLAN [10-24](#)
  - critical voice VLAN
    - configuring [10-54](#)
  - cross-stack EtherChannel
    - configuration guidelines [38-13](#)
    - described [38-3](#)
    - illustration [38-4](#)
    - support for [1-8](#)
  - cross-stack UplinkFast, STP
    - described [18-5](#)
    - disabling [18-16](#)
    - enabling [18-16](#)
    - fast-convergence events [18-7](#)
    - Fast Uplink Transition Protocol [18-6](#)
    - normal-convergence events [18-7](#)
    - support for [1-8](#)
  - cryptographic software image
    - SSH [9-42](#)
    - SSL [9-46](#)
    - switch stack considerations [7-15](#)
  - customizable web pages, web-based authentication [11-6](#)
  - CWDM SFPs [1-24](#)
- 
- ## D
- DAACL
    - See downloadable ACL
  - daylight saving time [5-7](#)
  - debugging
    - enabling all system diagnostics [39-21](#)
    - enabling for a specific feature [39-20](#)

- redirecting error message output [39-21](#)
  - using commands [39-20](#)
- default commands [2-4](#)
- default configuration
  - 802.1x [10-35](#)
  - auto-QoS [33-22](#)
  - banners [5-11](#)
  - CDP [25-2](#)
  - DHCP [20-8](#)
  - DHCP option 82 [20-8](#)
  - DHCP snooping [20-8](#)
  - DHCP snooping binding database [20-8](#)
  - DNS [5-10](#)
  - dynamic ARP inspection [22-5](#)
  - EtherChannel [38-11](#)
  - Ethernet interfaces [12-24](#)
  - Flex Links [19-8](#)
  - IGMP filtering [21-25](#)
  - IGMP snooping [21-7, 36-6](#)
  - IGMP throttling [21-25](#)
  - initial switch information [3-3](#)
  - IP SLAs [32-5](#)
  - IP source guard [20-15](#)
  - IPv6 [35-7](#)
  - Layer 2 interfaces [12-24](#)
  - LLDP [26-5](#)
  - MAC address table [5-15](#)
  - MAC address-table move update [19-8](#)
  - MSTP [17-14](#)
  - MVR [21-20](#)
  - optional spanning-tree configuration [18-12](#)
  - password and privilege level [9-2](#)
  - RADIUS [9-27](#)
  - RMON [28-3](#)
  - RSPAN [27-10](#)
  - SDM template [8-4](#)
  - SNMP [30-7](#)
  - SPAN [27-10](#)
  - SSL [9-49](#)
  - standard QoS [33-38](#)
  - STP [16-13](#)
  - switch stacks [7-17](#)
  - system message logging [29-4](#)
  - system name and prompt [5-9](#)
  - TACACS+ [9-13](#)
  - UDLD [24-4](#)
  - VLAN, Layer 2 Ethernet interfaces [13-15](#)
  - VLANs [13-7](#)
  - VMPS [13-25](#)
  - voice VLAN [15-3](#)
  - VTP [14-9](#)
- default gateway [3-14](#)
- default web-based authentication configuration
  - 802.1X [11-9](#)
- deleting VLANs [13-9](#)
- denial-of-service attack [23-1](#)
- description command [12-37](#)
- designing your network, examples [1-18](#)
- destination addresses
  - in IPv4 ACLs [31-10](#)
  - in IPv6 ACLs [37-5](#)
- destination-IP address-based forwarding, EtherChannel [38-9](#)
- destination-MAC address forwarding, EtherChannel [38-9](#)
- detecting indirect link failures, STP [18-8](#)
- device [A-24](#)
- device discovery protocol [25-1, 26-1](#)
- device manager
  - benefits [1-1](#)
  - described [1-2, 1-5](#)
  - in-band management [1-7](#)
  - upgrading a switch [A-24](#)
- DHCP
  - enabling
    - relay agent [20-9](#)
  - DHCP-based autoconfiguration
    - client request message exchange [3-4](#)
    - configuring

- client side [3-3](#)
  - DNS [3-7](#)
  - relay device [3-7](#)
  - server side [3-6](#)
  - TFTP server [3-7](#)
- example [3-9](#)
- lease options
  - for IP address information [3-6](#)
  - for receiving the configuration file [3-6](#)
- overview [3-3](#)
- relationship to BOOTP [3-3](#)
- relay support [1-6](#)
- support for [1-6](#)
- DHCP-based autoconfiguration and image update
  - configuring [3-11 to 3-14](#)
  - understanding [3-5](#)
- DHCP binding database
  - See DHCP snooping binding database
- DHCP binding table
  - See DHCP snooping binding database
- DHCP option 82
  - circuit ID suboption [20-5](#)
  - configuration guidelines [20-8](#)
  - default configuration [20-8](#)
  - displaying [20-12](#)
  - overview [20-3](#)
  - packet format, suboption
    - circuit ID [20-5](#)
    - remote ID [20-5](#)
  - remote ID suboption [20-5](#)
- DHCP server port-based address allocation
  - configuration guidelines [20-21](#)
  - default configuration [20-21](#)
  - described [20-21](#)
  - displaying [20-24](#)
  - enabling [20-21](#)
  - reserved addresses [20-22](#)
- DHCP server port-based address assignment
  - support for [1-6](#)
- DHCP snooping
  - accepting untrusted packets form edge switch [20-3, 20-10](#)
  - binding database
    - See DHCP snooping binding database
  - configuration guidelines [20-8](#)
  - default configuration [20-8](#)
  - displaying binding tables [20-12](#)
  - message exchange process [20-4](#)
  - option 82 data insertion [20-3](#)
  - trusted interface [20-2](#)
  - untrusted interface [20-2](#)
  - untrusted messages [20-2](#)
- DHCP snooping binding database
  - adding bindings [20-11](#)
  - binding entries, displaying [20-12](#)
  - binding file
    - format [20-6](#)
    - location [20-6](#)
  - bindings [20-6](#)
  - clearing agent statistics [20-12](#)
  - configuration guidelines [20-9](#)
  - configuring [20-11](#)
  - default configuration [20-8](#)
  - deleting
    - binding file [20-12](#)
    - bindings [20-12](#)
    - database agent [20-12](#)
  - described [20-6](#)
  - displaying [20-12](#)
  - displaying status and statistics [20-12](#)
  - enabling [20-11](#)
  - entry [20-6](#)
  - renewing database [20-12](#)
  - resetting
    - delay value [20-12](#)
    - timeout value [20-12](#)
- DHCP snooping binding table
  - See DHCP snooping binding database

- Differentiated Services architecture, QoS [33-2](#)
- Differentiated Services Code Point [33-2](#)
- directed unicast requests [1-6](#)
- directories
  - changing [A-4](#)
  - creating and removing [A-4](#)
  - displaying the working [A-4](#)
- discovery, clusters
  - See automatic discovery
- DNS
  - and DHCP-based autoconfiguration [3-7](#)
  - default configuration [5-10](#)
  - displaying the configuration [5-11](#)
  - in IPv6 [35-3](#)
  - overview [5-9](#)
  - setting up [5-10](#)
  - support for [1-6](#)
- domain names
  - DNS [5-9](#)
  - VTP [14-10](#)
- Domain Name System
  - See DNS
- downloadable ACL [10-20, 10-22, 10-61](#)
- downloading
  - configuration files
    - preparing [A-11, A-13, A-16](#)
    - reasons for [A-8](#)
    - using FTP [A-13](#)
    - using RCP [A-17](#)
    - using TFTP [A-11](#)
  - image files
    - deleting old image [A-28](#)
    - preparing [A-26, A-30, A-34](#)
    - reasons for [A-24](#)
    - using CMS [1-2](#)
    - using FTP [A-31](#)
    - using HTTP [1-2, A-24](#)
    - using RCP [A-35](#)
    - using TFTP [A-27](#)
  - using the device manager or Network Assistant [A-24](#)
- DRP
  - support for [1-15](#)
- DSCP [1-13, 33-2](#)
- DSCP input queue threshold map for QoS [33-16](#)
- DSCP output queue threshold map for QoS [33-19](#)
- DSCP-to-CoS map for QoS [33-66](#)
- DSCP-to-DSCP-mutation map for QoS [33-67](#)
- DSCP transparency [33-46](#)
- DTP [1-9, 13-14](#)
- dual-action detection [38-6](#)
- dual IPv4 and IPv6 templates [35-5](#)
- dual protocol stacks
  - IPv4 and IPv6 [35-5](#)
  - SDM templates supporting [35-5](#)
- dual-purpose uplinks
  - defined [12-4](#)
  - LEDs [12-5](#)
  - link selection [12-4, 12-25](#)
  - setting the type [12-25](#)
- dynamic access ports
  - characteristics [13-4](#)
  - configuring [13-26](#)
  - defined [12-3](#)
- dynamic addresses
  - See addresses
- dynamic ARP inspection
  - ARP cache poisoning [22-1](#)
  - ARP requests, described [22-1](#)
  - ARP spoofing attack [22-1](#)
  - clearing
    - log buffer [22-16](#)
    - statistics [22-16](#)
  - configuration guidelines [22-6](#)
  - configuring
    - ACLs for non-DHCP environments [22-9](#)
    - in DHCP environments [22-7](#)
    - log buffer [22-13](#)

- rate limit for incoming ARP packets [22-4, 22-11](#)
- default configuration [22-5](#)
- denial-of-service attacks, preventing [22-11](#)
- described [22-1](#)
- DHCP snooping binding database [22-2](#)
- displaying
  - ARP ACLs [22-15](#)
  - configuration and operating state [22-15](#)
  - log buffer [22-16](#)
  - statistics [22-16](#)
  - trust state and rate limit [22-15](#)
- error-disabled state for exceeding rate limit [22-4](#)
- function of [22-2](#)
- interface trust states [22-3](#)
- log buffer
  - clearing [22-16](#)
  - configuring [22-13](#)
  - displaying [22-16](#)
- logging of dropped packets, described [22-5](#)
- man-in-the middle attack, described [22-2](#)
- network security issues and interface trust states [22-3](#)
- priority of ARP ACLs and DHCP snooping entries [22-4](#)
- rate limiting of ARP packets
  - configuring [22-11](#)
  - described [22-4](#)
  - error-disabled state [22-4](#)
- statistics
  - clearing [22-16](#)
  - displaying [22-16](#)
- validation checks, performing [22-12](#)
- dynamic auto trunking mode [13-14](#)
- dynamic desirable trunking mode [13-14](#)
- Dynamic Host Configuration Protocol
  - See DHCP-based autoconfiguration
- dynamic port VLAN membership
  - described [13-24](#)
  - reconfirming [13-27](#)
  - troubleshooting [13-29](#)

- types of connections [13-26](#)
- Dynamic Trunking Protocol
  - See DTP

---

## E

- editing features
  - enabling and disabling [2-6](#)
  - keystrokes used [2-7](#)
  - wrapped lines [2-8](#)
- elections
  - See stack master
- ELIN location [26-3](#)
- enable password [9-3](#)
- enable secret password [9-3](#)
- encryption, CipherSuite [9-48](#)
- encryption for passwords [9-3](#)
- environment variables, function of [3-22](#)
- error-disabled state, BPDU [18-2](#)
- error messages during command entry [2-4](#)
- EtherChannel
  - automatic creation of [38-5, 38-7](#)
  - channel groups
    - binding physical and logical interfaces [38-4](#)
    - numbering of [38-4](#)
  - configuration guidelines [38-12](#)
  - configuring Layer 2 interfaces [38-13](#)
  - default configuration [38-11](#)
  - described [38-2](#)
  - displaying status [38-21](#)
  - forwarding methods [38-8, 38-16](#)
  - IEEE 802.3ad, described [38-7](#)
  - interaction
    - with STP [38-12](#)
    - with VLANs [38-12](#)
- LACP
  - described [38-7](#)
  - displaying status [38-21](#)
  - hot-standby ports [38-18](#)

- interaction with other features [38-8](#)
    - modes [38-7](#)
    - port priority [38-19](#)
    - system priority [38-19](#)
  - load balancing [38-8, 38-16](#)
  - PAGP
    - aggregate-port learners [38-16](#)
    - compatibility with Catalyst 1900 [38-17](#)
    - described [38-5](#)
    - displaying status [38-21](#)
    - interaction with other features [38-7](#)
    - interaction with virtual switches [38-6](#)
    - learn method and priority configuration [38-16](#)
    - modes [38-6](#)
    - support for [1-4](#)
    - with dual-action detection [38-6](#)
  - port-channel interfaces
    - described [38-4](#)
    - numbering of [38-4](#)
  - port groups [12-4](#)
  - stack changes, effects of [38-10](#)
  - support for [1-4](#)
- EtherChannel guard
- described [18-10](#)
  - disabling [18-17](#)
  - enabling [18-17](#)
- Ethernet management port
- active link [12-22](#)
  - and routing [12-22](#)
  - and TFTP [12-23](#)
  - configuring [12-23](#)
  - default setting [12-22](#)
  - described [12-21](#)
  - for network management [12-21](#)
  - specifying [12-23](#)
  - supported features [12-22](#)
  - unsupported features [12-23](#)
- Ethernet management port, internal
- and routing [12-22](#)
- unsupported features [12-23](#)
  - Ethernet VLANs
    - adding [13-8](#)
    - defaults and ranges [13-8](#)
    - modifying [13-8](#)
  - EUI [35-3](#)
  - events, RMON [28-4](#)
  - examples
    - network configuration [1-18](#)
  - expedite queue for QoS [33-80](#)
  - Express Setup [1-1](#)
    - See also getting started guide
  - extended crashinfo file [39-23](#)
  - extended-range VLANs
    - configuration guidelines [13-11](#)
    - configuring [13-11](#)
    - creating [13-12](#)
    - defined [13-1](#)
  - extended system ID
    - MSTP [17-18](#)
    - STP [16-4, 16-16](#)
  - extended universal identifier
    - See EUI
  - Extensible Authentication Protocol over LAN [10-1](#)
- 
- F**
- fa0 interface [1-7](#)
  - Fa0 port
    - See Ethernet management port
  - failover support [1-8](#)
  - Fast Convergence [19-3](#)
  - fastethernet0 port
    - See Ethernet management port
  - Fast Uplink Transition Protocol [18-6](#)
  - features, incompatible [23-12](#)
  - fiber-optic, detecting unidirectional links [24-1](#)
  - files
    - basic crashinfo

- description [39-23](#)
    - location [39-23](#)
  - copying [A-5](#)
  - crashinfo, description [39-23](#)
  - deleting [A-5](#)
  - displaying the contents of [A-8](#)
  - extended crashinfo
    - description [39-24](#)
    - location [39-24](#)
  - tar
    - creating [A-6](#)
    - displaying the contents of [A-7](#)
    - extracting [A-7](#)
    - image file format [A-25](#)
  - file system
    - displaying available file systems [A-2](#)
    - displaying file information [A-3](#)
    - local file system names [A-1](#)
    - network file system names [A-5](#)
    - setting the default [A-3](#)
  - filtering
    - IPv6 traffic [37-3](#), [37-7](#)
    - non-IP traffic [31-23](#)
    - show and more command output [2-9](#)
  - filtering show and more command output [2-9](#)
  - filters, IP
    - See ACLs, IP
  - flash device, number of [A-1](#)
  - flexible authentication ordering
    - configuring [10-64](#)
    - overview [10-30](#)
  - Flex Link Multicast Fast Convergence [19-3](#)
  - Flex Links
    - configuration guidelines [19-8](#)
    - configuring [19-9](#)
    - configuring preferred VLAN [19-12](#)
    - configuring VLAN load balancing [19-11](#)
    - default configuration [19-8](#)
    - description [19-2](#)
    - link load balancing [19-3](#)
    - monitoring [19-14](#)
    - VLANs [19-3](#)
  - flooded traffic, blocking [23-8](#)
  - flow-based packet classification [1-13](#)
  - flowcharts
    - QoS classification [33-7](#)
    - QoS egress queueing and scheduling [33-18](#)
    - QoS ingress queueing and scheduling [33-15](#)
    - QoS policing and marking [33-11](#)
  - flowcontrol
    - configuring [12-29](#)
    - described [12-29](#)
  - forward-delay time
    - MSTP [17-24](#)
    - STP [16-23](#)
  - FTP
    - configuration files
      - downloading [A-13](#)
      - overview [A-12](#)
      - preparing the server [A-13](#)
      - uploading [A-15](#)
    - image files
      - deleting old image [A-32](#)
      - downloading [A-31](#)
      - preparing the server [A-30](#)
      - uploading [A-32](#)
- 
- G**
  - general query [19-5](#)
  - Generating IGMP Reports [19-4](#)
  - get-bulk-request operation [30-4](#)
  - get-next-request operation [30-3](#), [30-5](#)
  - get-request operation [30-3](#), [30-4](#), [30-5](#)
  - get-response operation [30-4](#)
  - Gigabit modules
    - See SFPs
  - global configuration mode [2-2](#)

global leave, IGMP [21-13](#)  
 guest VLAN and 802.1x [10-22](#)  
 guide mode [1-2](#)  
 GUIs  
     See device manager and Network Assistant

## H

hello time  
     MSTP [17-24](#)  
     STP [16-22](#)  
 help, for the command line [2-3](#)  
 HFTM space [39-26](#)  
 history  
     changing the buffer size [2-5](#)  
     described [2-5](#)  
     disabling [2-6](#)  
     recalling commands [2-6](#)  
 history table, level and number of syslog messages [29-10](#)  
 host names, in clusters [6-12](#)  
 hosts, limit on dynamic ports [13-29](#)  
 HP OpenView [1-5](#)  
 HQATM space [39-26](#)  
 HSRP  
     automatic cluster recovery [6-11](#)  
     cluster standby group considerations [6-10](#)  
     See also clusters, cluster standby group, and standby command switch  
 HTTP over SSL  
     see HTTPS  
 HTTPS [9-46](#)  
     configuring [9-50](#)  
     self-signed certificate [9-47](#)  
 HTTP secure server [9-46](#)  
 Hulp Forwarding TCAM Manager  
     See HFTM space  
 Hulp QoS/ACL TCAM Manager  
     See HQATM space

## ICMP

IPv6 [35-3](#)  
 time-exceeded messages [39-17](#)  
 traceroute and [39-17](#)  
 unreachable messages and IPv6 [37-4](#)  
 ICMP ping  
     executing [39-15](#)  
     overview [39-14](#)  
 ICMPv6 [35-3](#)  
 IDS appliances  
     and ingress RSPAN [27-21](#)  
     and ingress SPAN [27-14](#)  
 IEEE 802.1D  
     See STP  
 IEEE 802.1p [15-1](#)  
 IEEE 802.1Q  
     and trunk ports [12-3](#)  
     configuration limitations [13-15](#)  
     encapsulation [13-14](#)  
     native VLAN for untagged traffic [13-19](#)  
 IEEE 802.1s  
     See MSTP  
 IEEE 802.1w  
     See RSTP  
 IEEE 802.1x  
     See port-based authentication  
 IEEE 802.3ad  
     See EtherChannel  
 IEEE 802.3ad, PoE+ [1-15](#), [12-6](#)  
 IEEE 802.3af  
     See PoE  
 IEEE 802.3x flow control [12-29](#)  
 ifIndex values, SNMP [30-6](#)  
 IFS [1-6](#)  
 IGMP  
     configurable leave timer  
         described [21-6](#)

- enabling [21-11](#)
  - flooded multicast traffic
    - controlling the length of time [21-12](#)
    - disabling on an interface [21-13](#)
    - global leave [21-13](#)
    - query solicitation [21-13](#)
    - recovering from flood mode [21-13](#)
  - joining multicast group [21-3](#)
  - join messages [21-3](#)
  - leave processing, enabling [21-10, 36-9](#)
  - leaving multicast group [21-5](#)
  - queries [21-4](#)
  - report suppression
    - described [21-6](#)
    - disabling [21-16, 36-11](#)
  - supported versions [21-3](#)
  - support for [1-4](#)
- IGMP filtering
- configuring [21-25](#)
  - default configuration [21-25](#)
  - described [21-24](#)
  - monitoring [21-29](#)
  - support for [1-5](#)
- IGMP groups
- configuring filtering [21-28](#)
  - setting the maximum number [21-27](#)
- IGMP Immediate Leave
- configuration guidelines [21-11](#)
  - described [21-5](#)
  - enabling [21-10](#)
- IGMP profile
- applying [21-26](#)
  - configuration mode [21-25](#)
  - configuring [21-26](#)
- IGMP snooping
- and address aliasing [21-2](#)
  - and stack changes [21-6](#)
  - configuring [21-7](#)
  - default configuration [21-7, 36-6](#)
  - definition [21-2](#)
  - enabling and disabling [21-7, 36-7](#)
  - global configuration [21-7](#)
  - Immediate Leave [21-5](#)
  - in the switch stack [21-6](#)
  - method [21-8](#)
  - monitoring [21-16, 36-11](#)
  - querier
    - configuration guidelines [21-14](#)
    - configuring [21-14](#)
  - supported versions [21-3](#)
  - support for [1-4](#)
  - VLAN configuration [21-8](#)
- IGMP throttling
- configuring [21-28](#)
  - default configuration [21-25](#)
  - described [21-24](#)
  - displaying action [21-29](#)
- Immediate Leave, IGMP
- enabling [36-9](#)
- inaccessible authentication bypass
- support for multiauth ports [10-25](#)
- initial configuration
- defaults [1-16](#)
  - Express Setup [1-1](#)
- interface
- number [12-16](#)
  - range macros [12-19](#)
- interface command [12-16 to ??, 12-16 to 12-17](#)
- interface configuration mode [2-2](#)
- interfaces
- auto-MDIX, configuring [12-30](#)
  - configuration guidelines
    - duplex and speed [12-27](#)
  - configuring
    - procedure [12-17](#)
  - counters, clearing [12-41](#)
  - default configuration [12-24](#)
  - described [12-37](#)

- descriptive name, adding [12-37](#)
- displaying information about [12-40](#)
- flow control [12-29](#)
- management [1-5](#)
- monitoring [12-40](#)
- naming [12-37](#)
- physical, identifying [12-16](#)
- range of [12-18](#)
- restarting [12-41](#)
- shutting down [12-41](#)
- speed and duplex, configuring [12-28](#)
- status [12-40](#)
- supported [12-16](#)
- types of [12-1](#)
- interfaces range macro command [12-19](#)
- interface types [12-16](#)
- Internet Protocol version 6
  - See IPv6
- inter-VLAN routing [34-1](#)
- Intrusion Detection System
  - See IDS appliances
- inventory management TLV [26-3, 26-7](#)
- IP ACLs
  - for QoS classification [33-8](#)
  - implicit deny [31-9, 31-13](#)
  - implicit masks [31-9](#)
  - named [31-13](#)
  - undefined [31-19](#)
- IP addresses
  - 128-bit [35-2](#)
  - candidate or member [6-4, 6-12](#)
  - classes of [34-4](#)
  - cluster access [6-2](#)
  - command switch [6-3, 6-10, 6-12](#)
  - discovering [5-24](#)
  - for IP routing [34-4](#)
  - IPv6 [35-2](#)
  - redundant clusters [6-10](#)
  - standby command switch [6-10, 6-12](#)
- See also IP information
- ip igmp profile command [21-25](#)
- IP information
  - assigned
    - manually [3-14](#)
    - through DHCP-based autoconfiguration [3-3](#)
  - default configuration [3-3](#)
- IP phones
  - and QoS [15-1](#)
  - automatic classification and queuing [33-21](#)
  - configuring [15-4](#)
  - ensuring port security with QoS [33-45](#)
  - trusted boundary for QoS [33-45](#)
- IP Port Security for Static Hosts
  - on a Layer 2 access port [20-17](#)
- IP precedence [33-2](#)
- IP-precedence-to-DSCP map for QoS [33-64](#)
- IP protocols in ACLs [31-10](#)
- IP routing
  - disabling [34-4](#)
  - enabling [34-4](#)
- IP Service Level Agreements
  - See IP SLAs
- IP service levels, analyzing [32-1](#)
- IP SLAs
  - benefits [32-2](#)
  - configuration guidelines [32-5](#)
  - Control Protocol [32-4](#)
  - default configuration [32-5](#)
  - definition [32-1](#)
  - measuring network performance [32-3](#)
  - monitoring [32-6](#)
  - operation [32-3](#)
  - responder
    - described [32-4](#)
    - enabling [32-6](#)
  - response time [32-4](#)
  - SNMP support [32-2](#)
  - supported metrics [32-2](#)

- IP source guard
  - and 802.1x [20-15](#)
  - and DHCP snooping [20-13](#)
  - and EtherChannels [20-15](#)
  - and port security [20-15](#)
  - and private VLANs [20-15](#)
  - and routed ports [20-15](#)
  - and TCAM entries [20-15](#)
  - and trunk interfaces [20-15](#)
  - and VRF [20-15](#)
  - binding configuration
    - automatic [20-13](#)
    - manual [20-13](#)
  - binding table [20-13](#)
  - configuration guidelines [20-15](#)
  - default configuration [20-15](#)
  - described [20-13](#)
  - disabling [20-16](#)
  - displaying
    - active IP or MAC bindings [20-20](#)
    - bindings [20-20](#)
    - configuration [20-20](#)
  - enabling [20-16, 20-17](#)
  - filtering
    - source IP address [20-13](#)
    - source IP and MAC address [20-13](#)
  - on provisioned switches [20-15](#)
  - source IP address filtering [20-13](#)
  - source IP and MAC address filtering [20-13](#)
  - static bindings
    - adding [20-16, 20-17](#)
    - deleting [20-16](#)
  - static hosts [20-17](#)
- IP traceroute
  - executing [39-18](#)
  - overview [39-17](#)
- IP unicast routing
  - assigning IP addresses to Layer 3 interfaces [34-4](#)
  - configuring static routes [34-5](#)
  - disabling [34-4](#)
  - enabling [34-4](#)
  - inter-VLAN [34-1](#)
  - IP addressing
    - classes [34-4](#)
    - configuring [34-4](#)
    - steps to configure [34-3](#)
    - subnet mask [34-4](#)
    - with SVIs [34-3](#)
- IPv4 ACLs
  - applying to interfaces [31-18](#)
  - extended, creating [31-9](#)
  - named [31-13](#)
  - standard, creating [31-8](#)
- IPv4 and IPv6
  - dual protocol stacks [35-4](#)
- IPv6
  - ACLs
    - displaying [37-8](#)
    - limitations [37-2](#)
    - matching criteria [37-3](#)
    - port [37-1](#)
    - precedence [37-2](#)
    - router [37-1](#)
    - supported [37-2](#)
  - addresses [35-2](#)
  - address formats [35-2](#)
  - and switch stacks [35-6](#)
  - applications [35-4](#)
  - assigning address [35-7](#)
  - autoconfiguration [35-4](#)
  - configuring static routes [35-10](#)
  - default configuration [35-7](#)
  - defined [35-1](#)
  - forwarding [35-7](#)
  - ICMP [35-3](#)
  - monitoring [35-11](#)
  - neighbor discovery [35-4](#)
  - SDM templates [36-1, 37-1](#)

stack master functions [35-6](#)  
 Stateless Autoconfiguration [35-4](#)  
 supported features [35-2](#)  
 IPv6 traffic, filtering [37-3](#)

---

## J

join messages, IGMP [21-3](#)

---

## L

### LACP

See EtherChannel

Layer 2 frames, classification with CoS [33-2](#)

Layer 2 interfaces, default configuration [12-24](#)

### Layer 2 traceroute

and ARP [39-16](#)

and CDP [39-16](#)

broadcast traffic [39-16](#)

described [39-16](#)

IP addresses and subnets [39-16](#)

MAC addresses and VLANs [39-16](#)

multicast traffic [39-16](#)

multiple devices on a port [39-17](#)

unicast traffic [39-16](#)

usage guidelines [39-16](#)

Layer 3 features [1-15](#)

### Layer 3 interfaces

assigning IP addresses to [34-4](#)

assigning IPv6 addresses to [35-7](#)

changing from Layer 2 mode [34-4](#)

Layer 3 packets, classification methods [33-2](#)

LDAP [4-2](#)

Leaking IGMP Reports [19-4](#)

### LEDs, switch

See hardware installation guide

lightweight directory access protocol

See LDAP

line configuration mode [2-2](#)

Link Aggregation Control Protocol

See EtherChannel

link failure, detecting unidirectional [17-8](#)

Link Layer Discovery Protocol

See CDP

link local unicast addresses [35-3](#)

link redundancy

See Flex Links

links, unidirectional [24-1](#)

link-state tracking

configuring [38-23](#)

described [38-21](#)

### LLDP

configuring [26-5](#)

characteristics [26-6](#)

default configuration [26-5](#)

enabling [26-6](#)

monitoring and maintaining [26-11](#)

overview [26-1](#)

supported TLVs [26-2](#)

switch stack considerations [26-2](#)

transmission timer and holdtime, setting [26-6](#)

### LLDP-MED

configuring

procedures [26-5](#)

TLVs [26-7](#)

monitoring and maintaining [26-11](#)

overview [26-1, 26-2](#)

supported TLVs [26-2](#)

LLDP Media Endpoint Discovery

See LLDP-MED

local SPAN [27-2](#)

location TLV [26-3, 26-7](#)

login authentication

with RADIUS [9-30](#)

with TACACS+ [9-14](#)

login banners [5-11](#)

log messages

- See system message logging
- Long-Reach Ethernet (LRE) technology [1-20](#)
- loop guard
  - described [18-11](#)
  - enabling [18-18](#)
  - support for [1-9](#)
- LRE profiles, considerations in switch clusters [6-15](#)

## M

- MAB
  - See MAC authentication bypass
- MAB inactivity timer
  - default setting [10-36](#)
  - range [10-38](#)
- MAC/PHY configuration status TLV [26-2](#)
- MAC addresses
  - aging time [5-15](#)
  - and VLAN association [5-14](#)
  - building the address table [5-14](#)
  - default configuration [5-15](#)
  - disabling learning on a VLAN [5-23](#)
  - discovering [5-24](#)
  - displaying [5-24](#)
  - displaying in the IP source binding table [20-20](#)
  - dynamic
    - learning [5-14](#)
    - removing [5-16](#)
  - in ACLs [31-23](#)
  - static
    - adding [5-21](#)
    - allowing [5-22, 5-23](#)
    - characteristics of [5-20](#)
    - dropping [5-22](#)
    - removing [5-21](#)
- MAC address learning [1-6](#)
- MAC address learning, disabling on a VLAN [5-23](#)
- MAC address notification, support for [1-15](#)
- MAC address-table move update
  - configuration guidelines [19-8](#)
  - configuring [19-12](#)
  - default configuration [19-8](#)
  - description [19-6](#)
  - monitoring [19-14](#)
- MAC address-to-VLAN mapping [13-23](#)
- MAC authentication bypass [10-38](#)
  - configuring [10-57](#)
  - overview [10-17](#)
- MAC extended access lists
  - applying to Layer 2 interfaces [31-24](#)
  - configuring for QoS [33-52](#)
  - creating [31-23](#)
  - defined [31-23](#)
  - for QoS classification [33-5](#)
- magic packet [10-27](#)
- manageability features [1-6](#)
- management access
  - in-band
    - browser session [1-7](#)
    - CLI session [1-7](#)
    - device manager [1-7](#)
    - SNMP [1-7](#)
  - out-of-band console port connection [1-7](#)
- management address TLV [26-2](#)
- management options
  - CLI [2-1](#)
  - clustering [1-3](#)
  - CNS [4-1](#)
  - Network Assistant [1-2](#)
  - overview [1-5](#)
- management VLAN
  - considerations in switch clusters [6-7](#)
  - discovery through different management VLANs [6-7](#)
- mapping tables for QoS
  - configuring
    - CoS-to-DSCP [33-63](#)
    - DSCP [33-63](#)
    - DSCP-to-CoS [33-66](#)

- DSCP-to-DSCP-mutation [33-67](#)
- IP-precedence-to-DSCP [33-64](#)
- policed-DSCP [33-65](#)
- described [33-11](#)
- marking
  - action with aggregate policers [33-60](#)
  - described [33-4, 33-9](#)
- matching
  - IPv6 ACLs [37-3](#)
- matching, IPv4 ACLs [31-7](#)
- maximum aging time
  - MSTP [17-25](#)
  - STP [16-23](#)
- maximum hop count, MSTP [17-25](#)
- maximum number of allowed devices, port-based authentication [10-38](#)
- MDA
  - configuration guidelines [10-13](#)
  - described [1-11, 10-12](#)
  - exceptions with authentication process [10-5](#)
- membership mode, VLAN port [13-3](#)
- member switch
  - automatic discovery [6-5](#)
  - defined [6-2](#)
  - managing [6-15](#)
  - passwords [6-12](#)
  - recovering from lost connectivity [39-12](#)
  - requirements [6-4](#)
  - See also candidate switch, cluster standby group, and standby command switch
- memory consistency check errors
  - example [39-27](#)
- memory consistency check routines [1-5, 39-26](#)
- memory consistency integrity [1-5, 39-26](#)
- messages, to users through banners [5-11](#)
- MIBs
  - overview [30-1](#)
  - SNMP interaction with [30-5](#)
- mirroring traffic for analysis [27-1](#)
- mismatches, autonegotiation [39-12](#)
- module number [12-16](#)
- monitoring
  - access groups [31-26](#)
  - cables for unidirectional links [24-1](#)
  - CDP [25-5](#)
  - features [1-15](#)
  - Flex Links [19-14](#)
  - IGMP
    - filters [21-29](#)
    - snooping [21-16, 36-11](#)
  - interfaces [12-40](#)
  - IP SLAs operations [32-6](#)
  - IPv4 ACL configuration [31-26](#)
  - IPv6 [35-11](#)
  - IPv6 ACL configuration [37-8](#)
  - MAC address-table move update [19-14](#)
  - multicast router interfaces [21-17, 36-12](#)
  - MVR [21-23](#)
  - network traffic for analysis with probe [27-2](#)
- port
  - blocking [23-20](#)
  - protection [23-20](#)
  - SFP status [12-40, 39-14](#)
  - speed and duplex mode [12-28](#)
  - traffic flowing among switches [28-1](#)
  - traffic suppression [23-20](#)
  - VLANs [13-13](#)
  - VMPS [13-28](#)
  - VTP [14-18](#)
- mrouter Port [19-3](#)
- mrouter port [19-5](#)
- MSTP
  - boundary ports
    - configuration guidelines [17-15](#)
    - described [17-6](#)
  - BPDU filtering
    - described [18-3](#)
    - enabling [18-14](#)
  - BPDU guard

- described [18-2](#)
- enabling [18-13](#)
- CIST, described [17-3](#)
- CIST regional root [17-3](#)
- CIST root [17-5](#)
- configuration guidelines [17-15, 18-12](#)
- configuring
  - forward-delay time [17-24](#)
  - hello time [17-24](#)
  - link type for rapid convergence [17-25](#)
  - maximum aging time [17-25](#)
  - maximum hop count [17-25](#)
  - MST region [17-16](#)
  - neighbor type [17-26](#)
  - path cost [17-22](#)
  - port priority [17-20](#)
  - root switch [17-18](#)
  - secondary root switch [17-19](#)
  - switch priority [17-23](#)
- CST
  - defined [17-3](#)
  - operations between regions [17-4](#)
- default configuration [17-14](#)
- default optional feature configuration [18-12](#)
- displaying status [17-27](#)
- enabling the mode [17-16](#)
- EtherChannel guard
  - described [18-10](#)
  - enabling [18-17](#)
- extended system ID
  - effects on root switch [17-18](#)
  - effects on secondary root switch [17-19](#)
  - unexpected behavior [17-18](#)
- IEEE 802.1s
  - implementation [17-6](#)
  - port role naming change [17-7](#)
  - terminology [17-5](#)
- instances supported [16-10](#)
- interface state, blocking to forwarding [18-2](#)
- interoperability and compatibility among modes [16-11](#)
- interoperability with IEEE 802.1D
  - described [17-9](#)
  - restarting migration process [17-27](#)
- IST
  - defined [17-3](#)
  - master [17-3](#)
  - operations within a region [17-3](#)
- loop guard
  - described [18-11](#)
  - enabling [18-18](#)
- mapping VLANs to MST instance [17-16](#)
- MST region
  - CIST [17-3](#)
  - configuring [17-16](#)
  - described [17-2](#)
  - hop-count mechanism [17-5](#)
  - IST [17-3](#)
  - supported spanning-tree instances [17-2](#)
- optional features supported [1-8](#)
- overview [17-2](#)
- Port Fast
  - described [18-2](#)
  - enabling [18-12](#)
- preventing root switch selection [18-10](#)
- root guard
  - described [18-10](#)
  - enabling [18-18](#)
- root switch
  - configuring [17-18](#)
  - effects of extended system ID [17-18](#)
  - unexpected behavior [17-18](#)
- shutdown Port Fast-enabled port [18-2](#)
- stack changes, effects of [17-8](#)
- status, displaying [17-27](#)
- multiauth
  - support for inaccessible authentication bypass [10-25](#)
- multiauth mode

- See multiple-authentication mode
- multicast groups
  - Immediate Leave [21-5](#)
  - joining [21-3](#)
  - leaving [21-5](#)
  - static joins [21-10, 36-8](#)
- multicast router interfaces, monitoring [21-17, 36-12](#)
- multicast router ports, adding [21-9, 36-8](#)
- multicast storm [23-1](#)
- multicast storm-control command [23-4](#)
- multicast television application [21-18](#)
- multicast VLAN [21-17](#)
- Multicast VLAN Registration
  - See MVR
- multidomain authentication
  - See MDA
- multiple authentication [10-14](#)
- multiple authentication mode
  - configuring [10-44](#)
- MVR
  - and address aliasing [21-20](#)
  - and IGMPv3 [21-21](#)
  - configuration guidelines [21-20](#)
  - configuring interfaces [21-22](#)
  - default configuration [21-20](#)
  - described [21-17](#)
  - example application [21-18](#)
  - modes [21-21](#)
  - monitoring [21-23](#)
  - multicast television application [21-18](#)
  - setting global parameters [21-21](#)
  - support for [1-4](#)
- IEEE 802.1x validation using RADIUS server [10-58](#)
- inaccessible authentication bypass [10-54](#)
- Layer 2 IEEE 802.1x validation [1-12, 10-30, 10-58](#)
- named IPv4 ACLs [31-13](#)
- NameSpace Mapper
  - See NSM
- native VLAN
  - configuring [13-19](#)
  - default [13-19](#)
- NEAT
  - configuring [10-59](#)
  - overview [10-31](#)
- neighbor discovery, IPv6 [35-4](#)
- Network Admission Control
  - See NAC
- Network Assistant
  - benefits [1-1](#)
  - described [1-5](#)
  - downloading image files [1-2](#)
  - guide mode [1-2](#)
  - management options [1-2](#)
  - managing switch stacks [7-2, 7-15](#)
  - upgrading a switch [A-24](#)
  - wizards [1-2](#)
- network configuration examples
  - cost-effective wiring closet [1-20](#)
  - increasing network performance [1-19](#)
  - long-distance, high-bandwidth transport [1-24](#)
  - providing network services [1-19](#)
  - server aggregation and Linux server cluster [1-22](#)
  - small to medium-sized network [1-23](#)
- network design
  - performance [1-19](#)
  - services [1-19](#)
- Network Edge Access Topology
  - See NEAT
- network management
  - CDP [25-1](#)
  - RMON [28-1](#)

---

## N

### NAC

- critical authentication [10-24, 10-54](#)
- IEEE 802.1x authentication using a RADIUS server [10-58](#)

- SNMP [30-1](#)
- network performance, measuring with IP SLAs [32-3](#)
- network policy TLV [26-2, 26-7](#)
- Network Time Protocol
  - See NTP
- no commands [2-4](#)
- nonhierarchical policy maps
  - described [33-10](#)
- non-IP traffic filtering [31-23](#)
- nontrunking mode [13-14](#)
- normal-range VLANs [13-4](#)
  - configuration guidelines [13-6](#)
  - configuring [13-4](#)
  - defined [13-1](#)
- NSM [4-3](#)
- NTP
  - associations
    - defined [5-3](#)
  - overview [5-3](#)
  - stratum [5-3](#)
  - support for [1-6](#)
  - time
    - services [5-3](#)
    - synchronizing [5-3](#)

---

## O

- OBFL
  - configuring [39-25](#)
  - described [39-24](#)
  - displaying [39-26](#)
- offline configuration for switch stacks [7-7](#)
- off mode, VTP [14-4](#)
- on-board failure logging
  - See OBFL
- online diagnostics
  - overview [40-1](#)
  - running tests [40-3](#)
  - understanding [40-1](#)

- openlx
  - configuring [10-64](#)
- openlx authentication
  - overview [10-31](#)
- optimizing system resources [8-1](#)
- options, management [1-5](#)
- out-of-profile markdown [1-14](#)

---

## P

- packet modification, with QoS [33-20](#)
- PAgP
  - See EtherChannel
- passwords
  - default configuration [9-2](#)
  - disabling recovery of [9-5](#)
  - encrypting [9-3](#)
  - for security [1-10](#)
  - in clusters [6-13](#)
  - overview [9-1](#)
  - recovery of [39-3](#)
  - setting
    - enable [9-3](#)
    - enable secret [9-3](#)
    - Telnet [9-6](#)
    - with usernames [9-6](#)
  - VTP domain [14-10](#)
- path cost
  - MSTP [17-22](#)
  - STP [16-20](#)
- PC (passive command switch) [6-9](#)
- performance, network design [1-19](#)
- performance features [1-4](#)
- persistent self-signed certificate [9-47](#)
- per-user ACLs and Filter-Ids [10-8](#)
- per-VLAN spanning-tree plus
  - See PVST+
- physical ports [12-2](#)
- PIM-DVMRP, as snooping method [21-8](#)

- ping
  - character output description [39-15](#)
  - executing [39-15](#)
  - overview [39-14](#)
- PoE
  - auto mode [12-7](#)
  - CDP with power consumption, described [12-5](#)
  - CDP with power negotiation, described [12-5](#)
  - Cisco intelligent power management [12-5](#)
  - configuring [12-31](#)
  - cutoff power
    - determining [12-8](#)
  - cutoff-power
    - support for [12-8](#)
  - devices supported [12-5](#)
  - high-power devices operating in low-power mode [12-5](#)
  - IEEE power classification levels [12-6](#)
  - monitoring [12-8](#)
  - monitoring power [12-34](#)
  - policing power consumption [12-34](#)
  - policing power usage [12-8](#)
  - power budgeting [12-32](#)
  - power consumption [12-9, 12-32](#)
  - powered-device detection and initial power allocation [12-6](#)
  - power management modes [12-7](#)
  - power monitoring [12-8](#)
  - power negotiation extensions to CDP [12-5](#)
  - power sensing [12-8](#)
  - standards supported [12-5](#)
  - static mode [12-7](#)
  - total available power [12-10](#)
  - troubleshooting [39-13](#)
- PoE+ [1-15, 12-5, 12-6, 12-31](#)
- policed-DSCP map for QoS [33-65](#)
- policers
  - configuring
    - for each matched traffic class [33-55](#)
    - for more than one traffic class [33-60](#)
    - described [33-4](#)
    - displaying [33-81](#)
    - number of [33-41](#)
    - types of [33-10](#)
- policing
  - described [33-4](#)
  - token-bucket algorithm [33-10](#)
- policy maps for QoS
  - characteristics of [33-55](#)
  - described [33-8](#)
  - displaying [33-82](#)
  - nonhierarchical on physical ports
    - described [33-10](#)
- port ACLs
  - defined [31-2](#)
  - types of [31-3](#)
- Port Aggregation Protocol
  - See EtherChannel
- port-based authentication
  - accounting [10-16](#)
  - authentication server
    - defined [10-3, 11-2](#)
    - RADIUS server [10-3](#)
  - client, defined [10-3, 11-2](#)
  - configuration guidelines [10-36, 11-9](#)
  - configuring
    - 802.1x authentication [10-42](#)
    - guest VLAN [10-52](#)
    - host mode [10-44](#)
    - inaccessible authentication bypass [10-54](#)
    - manual re-authentication of a client [10-47](#)
    - periodic re-authentication [10-46](#)
    - quiet period [10-47](#)
    - RADIUS server [10-44, 11-13](#)
    - RADIUS server parameters on the switch [10-43, 11-11](#)
    - restricted VLAN [10-53](#)

- switch-to-client frame-retransmission number [10-48, 10-49](#)
- switch-to-client retransmission time [10-47](#)
- violation modes [10-41](#)
- default configuration [10-35, 11-9](#)
- described [10-1](#)
- device roles [10-3, 11-2](#)
- displaying statistics [10-66, 11-17](#)
- downloadable ACLs and redirect URLs
  - configuring [10-61 to 10-63, ?? to 10-63](#)
  - overview [10-20 to 10-22](#)
- EAPOL-start frame [10-5](#)
- EAP-request/identity frame [10-5](#)
- EAP-response/identity frame [10-5](#)
- enabling
  - 802.1X authentication [11-11](#)
- encapsulation [10-3](#)
- flexible authentication ordering
  - configuring [10-64](#)
  - overview [10-30](#)
- guest VLAN
  - configuration guidelines [10-23, 10-24](#)
  - described [10-22](#)
- host mode [10-12](#)
- inaccessible authentication bypass
  - configuring [10-54](#)
  - described [10-24](#)
  - guidelines [10-37](#)
- initiation and message exchange [10-5](#)
- magic packet [10-27](#)
- maximum number of allowed devices per port [10-38](#)
- method lists [10-42](#)
- multiple authentication [10-14](#)
- per-user ACLs
  - configuration tasks [10-20](#)
  - described [10-19](#)
  - RADIUS server attributes [10-19](#)
- ports
  - authorization state and dot1x port-control command [10-11](#)
  - authorized and unauthorized [10-10](#)
  - voice VLAN [10-27](#)
- port security
  - described [10-27](#)
- readiness check
  - configuring [10-38](#)
  - described [10-17, 10-38](#)
- resetting to default values [10-66](#)
- stack changes, effects of [10-11](#)
- statistics, displaying [10-66](#)
- switch
  - as proxy [10-3, 11-2](#)
  - RADIUS client [10-3](#)
- switch supplicant
  - configuring [10-59](#)
  - overview [10-31](#)
- user distribution
  - guidelines [10-29](#)
  - overview [10-29](#)
- VLAN assignment
  - AAA authorization [10-42](#)
  - characteristics [10-18](#)
  - configuration tasks [10-18](#)
  - described [10-17](#)
- voice aware 802.1x security
  - configuring [10-39](#)
  - described [10-31, 10-39](#)
- voice VLAN
  - described [10-27](#)
  - PVID [10-27](#)
  - VVID [10-27](#)
- wake-on-LAN, described [10-27](#)
- with ACLs and RADIUS Filter-Id attribute [10-33](#)
- port-based authentication methods, supported [10-7](#)
- port blocking [1-4, 23-7](#)
- port-channel
  - See EtherChannel

- port description TLV [26-2](#)
- Port Fast
  - described [18-2](#)
  - enabling [18-12](#)
  - mode, spanning tree [13-25](#)
  - support for [1-8](#)
- port membership modes, VLAN [13-3](#)
- port priority
  - MSTP [17-20](#)
  - STP [16-18](#)
- ports
  - access [12-3](#)
  - blocking [23-7](#)
  - dual-purpose uplink [12-4](#)
  - dynamic access [13-4](#)
  - protected [23-6](#)
  - secure [23-9](#)
  - static-access [13-3, 13-10](#)
  - switch [12-2](#)
  - trunks [13-3, 13-14](#)
  - VLAN assignments [13-10](#)
- port security
  - aging [23-17](#)
  - and QoS trusted boundary [33-45](#)
  - and stacking [23-18](#)
  - configuring [23-12](#)
  - default configuration [23-11](#)
  - described [23-8](#)
  - displaying [23-20](#)
  - on trunk ports [23-14](#)
  - sticky learning [23-9](#)
  - violations [23-10](#)
  - with other features [23-11](#)
- port-shutdown response, VMPS [13-24](#)
- port VLAN ID TLV [26-2](#)
- power management TLV [26-3, 26-7](#)
- Power over Ethernet
  - See PoE
- preemption, default configuration [19-8](#)
- preferential treatment of traffic
  - See QoS
- preventing unauthorized access [9-1](#)
- primary links [19-2](#)
- priority
  - overriding CoS [15-6](#)
  - trusting CoS [15-6](#)
- private VLAN edge ports
  - See protected ports
- privileged EXEC mode [2-2](#)
- privilege levels
  - changing the default for lines [9-9](#)
  - command switch [6-16](#)
  - exiting [9-9](#)
  - logging into [9-9](#)
  - mapping on member switches [6-16](#)
  - overview [9-2, 9-7](#)
  - setting a command with [9-8](#)
- protected ports [1-10, 23-6](#)
- protocol storm protection [23-18](#)
- provisioned switches and IP source guard [20-15](#)
- provisioning new members for a switch stack [7-7](#)
- proxy reports [19-4](#)
- pruning, VTP
  - disabling
    - in VTP domain [14-16](#)
    - on a port [13-19](#)
  - enabling
    - in VTP domain [14-16](#)
    - on a port [13-18](#)
  - examples [14-7](#)
  - overview [14-6](#)
- pruning-eligible list
  - changing [13-18](#)
  - for VTP pruning [14-6](#)
  - VLANs [14-16](#)
- PVST+
  - described [16-10](#)

IEEE 802.1Q trunking interoperability [16-11](#)  
 instances supported [16-10](#)

## Q

### QoS

and MQC commands [33-1](#)  
 auto-QoS  
   categorizing traffic [33-22](#)  
   configuration and defaults display [33-37](#)  
   configuration guidelines [33-34](#)  
   described [33-21](#)  
   disabling [33-36](#)  
   displaying generated commands [33-36](#)  
   displaying the initial configuration [33-37](#)  
   effects on running configuration [33-34](#)  
   list of generated commands [33-25, 33-29](#)  
 basic model [33-4](#)  
 classification  
   class maps, described [33-8](#)  
   defined [33-4](#)  
   DSCP transparency, described [33-46](#)  
   flowchart [33-7](#)  
   forwarding treatment [33-3](#)  
   in frames and packets [33-3](#)  
   IP ACLs, described [33-6, 33-8](#)  
   MAC ACLs, described [33-5, 33-8](#)  
   options for IP traffic [33-6](#)  
   options for non-IP traffic [33-5](#)  
   policy maps, described [33-8](#)  
   trust DSCP, described [33-5](#)  
   trusted CoS, described [33-5](#)  
   trust IP precedence, described [33-5](#)  
 class maps  
   configuring [33-53](#)  
   displaying [33-81](#)  
 configuration guidelines  
   auto-QoS [33-34](#)  
   standard QoS [33-40](#)

configuring  
   aggregate policers [33-60](#)  
   auto-QoS [33-21](#)  
   default port CoS value [33-44](#)  
   DSCP maps [33-63](#)  
   DSCP transparency [33-46](#)  
   DSCP trust states bordering another domain [33-47](#)  
   egress queue characteristics [33-74](#)  
   ingress queue characteristics [33-69](#)  
   IP extended ACLs [33-51](#)  
   IP standard ACLs [33-50](#)  
   MAC ACLs [33-52](#)  
   port trust states within the domain [33-42](#)  
   trusted boundary [33-45](#)  
 default auto configuration [33-22](#)  
 default standard configuration [33-38](#)  
 displaying statistics [33-81](#)  
 DSCP transparency [33-46](#)  
 egress queues  
   allocating buffer space [33-74](#)  
   buffer allocation scheme, described [33-18](#)  
   configuring shaped weights for SRR [33-78](#)  
   configuring shared weights for SRR [33-79](#)  
   described [33-4](#)  
   displaying the threshold map [33-77](#)  
   flowchart [33-18](#)  
   mapping DSCP or CoS values [33-76](#)  
   scheduling, described [33-4](#)  
   setting WTD thresholds [33-74](#)  
   WTD, described [33-19](#)  
 enabling globally [33-42](#)  
 flowcharts  
   classification [33-7](#)  
   egress queueing and scheduling [33-18](#)  
   ingress queueing and scheduling [33-15](#)  
   policing and marking [33-11](#)  
 implicit deny [33-8](#)  
 ingress queues

- allocating bandwidth [33-72](#)
  - allocating buffer space [33-71](#)
  - buffer and bandwidth allocation, described [33-16](#)
  - configuring shared weights for SRR [33-72](#)
  - configuring the priority queue [33-73](#)
  - described [33-4](#)
  - displaying the threshold map [33-70](#)
  - flowchart [33-15](#)
  - mapping DSCP or CoS values [33-69](#)
  - priority queue, described [33-17](#)
  - scheduling, described [33-4](#)
  - setting WTD thresholds [33-69](#)
  - WTD, described [33-16](#)
  - IP phones
    - automatic classification and queueing [33-21](#)
    - detection and trusted settings [33-21, 33-45](#)
  - limiting bandwidth on egress interface [33-80](#)
  - mapping tables
    - CoS-to-DSCP [33-63](#)
    - displaying [33-81](#)
    - DSCP-to-CoS [33-66](#)
    - DSCP-to-DSCP-mutation [33-67](#)
    - IP-precedence-to-DSCP [33-64](#)
    - policed-DSCP [33-65](#)
    - types of [33-11](#)
  - marked-down actions [33-58](#)
  - marking, described [33-4, 33-9](#)
  - overview [33-2](#)
  - packet modification [33-20](#)
  - policers
    - configuring [33-58, 33-61](#)
    - described [33-9](#)
    - displaying [33-81](#)
    - number of [33-41](#)
    - types of [33-10](#)
  - policies, attaching to an interface [33-9](#)
  - policing
    - described [33-4, 33-9](#)
    - token bucket algorithm [33-10](#)
  - policy maps
    - characteristics of [33-55](#)
    - displaying [33-82](#)
    - nonhierarchical on physical ports [33-55](#)
  - QoS label, defined [33-4](#)
  - queues
    - configuring egress characteristics [33-74](#)
    - configuring ingress characteristics [33-69](#)
    - high priority (expedite) [33-20, 33-80](#)
    - location of [33-12](#)
    - SRR, described [33-14](#)
    - WTD, described [33-13](#)
  - rewrites [33-20](#)
  - support for [1-13](#)
  - trust states
    - bordering another domain [33-47](#)
    - described [33-5](#)
    - trusted device [33-45](#)
    - within the domain [33-42](#)
  - quality of service
    - See QoS
  - queries, IGMP [21-4](#)
  - query solicitation, IGMP [21-13](#)
- 
- ## R
- ### RADIUS
- attributes
    - vendor-proprietary [9-38](#)
    - vendor-specific [9-37](#)
  - configuring
    - accounting [9-35](#)
    - authentication [9-30](#)
    - authorization [9-34](#)
    - communication, global [9-27, 9-36](#)
    - communication, per-server [9-27](#)
    - multiple UDP ports [9-27](#)
  - default configuration [9-27](#)
  - defining AAA server groups [9-32](#)

- displaying the configuration [9-41](#)
- identifying the server [9-27](#)
- in clusters [6-15](#)
- limiting the services to the user [9-34](#)
- method list, defined [9-26](#)
- operation of [9-19](#)
- overview [9-18](#)
- server load balancing [9-40](#)
- suggested network environments [9-18](#)
- support for [1-12](#)
- tracking services accessed by user [9-35](#)
- RADIUS Change of Authorization [9-20](#)
- range
  - macro [12-19](#)
  - of interfaces [12-18](#)
- rapid convergence [17-10](#)
- rapid per-VLAN spanning-tree plus
  - See rapid PVST+
- rapid PVST+
  - described [16-10](#)
  - IEEE 802.1Q trunking interoperability [16-11](#)
  - instances supported [16-10](#)
- Rapid Spanning Tree Protocol
  - See RSTP
- rcommand command [6-15](#)
- RCP
  - configuration files
    - downloading [A-17](#)
    - overview [A-16](#)
    - preparing the server [A-16](#)
    - uploading [A-18](#)
  - image files
    - deleting old image [A-37](#)
    - downloading [A-35](#)
    - preparing the server [A-34](#)
    - uploading [A-37](#)
- readiness check
  - port-based authentication
    - configuring [10-38](#)
- described [10-17, 10-38](#)
- reconfirmation interval, VMPS, changing [13-27](#)
- reconfirming dynamic VLAN membership [13-27](#)
- recovery procedures [39-1](#)
- redirect URL [10-20, 10-21, 10-61](#)
- redundancy
  - EtherChannel [38-3](#)
  - STP
    - backbone [16-8](#)
    - multidrop backbone [18-5](#)
    - path cost [13-22](#)
    - port priority [13-20](#)
- redundant links and UplinkFast [18-15](#)
- reloading software [3-22](#)
- Remote Authentication Dial-In User Service
  - See RADIUS
- Remote Copy Protocol
  - See RCP
- Remote Network Monitoring
  - See RMON
- Remote SPAN
  - See RSPAN
- remote SPAN [27-3](#)
- report suppression, IGMP
  - described [21-6](#)
  - disabling [21-16, 36-11](#)
- resequencing ACL entries [31-13](#)
- reserved addresses in DHCP pools [20-22](#)
- resetting a UDLD-shutdown interface [24-6](#)
- responder, IP SLAs
  - described [32-4](#)
  - enabling [32-6](#)
- response time, measuring with IP SLAs [32-4](#)
- restricted VLAN
  - configuring [10-53](#)
  - described [10-23](#)
  - using with IEEE 802.1x [10-23](#)
- restricting access
  - overview [9-1](#)

- passwords and privilege levels [9-2](#)
- RADIUS [9-17](#)
- TACACS+ [9-10](#)
- retry count, VMPS, changing [13-28](#)
- RFC
  - 1112, IP multicast and IGMP [21-2](#)
  - 1157, SNMPv1 [30-2](#)
  - 1166, IP addresses [34-4](#)
  - 1305, NTP [5-3](#)
  - 1757, RMON [28-2](#)
  - 1901, SNMPv2C [30-2](#)
  - 1902 to 1907, SNMPv2 [30-2](#)
  - 2236, IP multicast and IGMP [21-2](#)
  - 2273-2275, SNMPv3 [30-2](#)
- RFC 5176 Compliance [9-21](#)
- RMON
  - default configuration [28-3](#)
  - displaying status [28-6](#)
  - enabling alarms and events [28-3](#)
  - groups supported [28-2](#)
  - overview [28-1](#)
  - statistics
    - collecting group Ethernet [28-6](#)
    - collecting group history [28-5](#)
  - support for [1-15](#)
- root guard
  - described [18-10](#)
  - enabling [18-18](#)
  - support for [1-9](#)
- root switch
  - MSTP [17-18](#)
  - STP [16-16](#)
- router ACLs
  - defined [31-2](#)
  - types of [31-4](#)
- RSPAN
  - and stack changes [27-10](#)
  - characteristics [27-9](#)
  - configuration guidelines [27-17](#)
  - default configuration [27-10](#)
  - defined [27-3](#)
  - destination ports [27-8](#)
  - displaying status [27-23](#)
  - in a switch stack [27-2](#)
  - interaction with other features [27-9](#)
  - monitored ports [27-6](#)
  - monitoring ports [27-8](#)
  - overview [1-15, 27-1](#)
  - received traffic [27-5](#)
  - sessions
    - creating [27-18](#)
    - defined [27-4](#)
    - limiting source traffic to specific VLANs [27-22](#)
    - specifying monitored ports [27-18](#)
    - with ingress traffic enabled [27-21](#)
  - source ports [27-6](#)
  - transmitted traffic [27-6](#)
  - VLAN-based [27-7](#)
- RSTP
  - active topology [17-10](#)
  - BPDU
    - format [17-12](#)
    - processing [17-13](#)
  - designated port, defined [17-9](#)
  - designated switch, defined [17-9](#)
  - interoperability with IEEE 802.1D
    - described [17-9](#)
    - restarting migration process [17-27](#)
    - topology changes [17-13](#)
  - overview [17-9](#)
  - port roles
    - described [17-9](#)
    - synchronized [17-11](#)
  - proposal-agreement handshake process [17-10](#)
  - rapid convergence
    - cross-stack rapid convergence [17-11](#)
    - described [17-10](#)
    - edge ports and Port Fast [17-10](#)

- point-to-point links [17-10, 17-25](#)
- root ports [17-10](#)
- root port, defined [17-9](#)
- See also MSTP
- running configuration
  - replacing [A-19, A-20](#)
  - rolling back [A-19, A-21](#)
- running configuration, saving [3-15](#)

## S

- SC (standby command switch) [6-9](#)
- scheduled reloads [3-22](#)
- SCP
  - and SSH [9-53](#)
  - configuring [9-53](#)
- SDM
  - templates
    - configuring [8-5](#)
    - number of [8-1](#)
  - SDM template [37-3](#)
    - configuration guidelines [8-4](#)
    - configuring [8-4](#)
    - types of [8-1](#)
- Secure Copy Protocol
- secure HTTP client
  - configuring [9-51](#)
  - displaying [9-52](#)
- secure HTTP server
  - configuring [9-50](#)
  - displaying [9-52](#)
- secure MAC addresses
  - and switch stacks [23-18](#)
  - deleting [23-16](#)
  - maximum number of [23-10](#)
  - types of [23-9](#)
- secure ports
  - and switch stacks [23-18](#)
- secure ports, configuring [23-9](#)
- secure remote connections [9-42](#)
- Secure Shell
  - See SSH
- Secure Socket Layer
  - See SSL
- security, port [23-8](#)
- security features [1-10](#)
- See SCP
- sequence numbers in log messages [29-8](#)
- server mode, VTP [14-3](#)
- service-provider network, MSTP and RSTP [17-1](#)
- set-request operation [30-5](#)
- setup program
  - failed command switch replacement [39-11](#)
  - replacing failed command switch [39-9](#)
- severity levels, defining in system messages [29-9](#)
- SFPs
  - monitoring status of [12-40, 39-14](#)
  - security and identification [39-13](#)
  - status, displaying [39-14](#)
- shaped round robin
  - See SRR
- show access-lists hw-summary command [31-20](#)
- show and more command output, filtering [2-9](#)
- show cdp traffic command [25-5](#)
- show cluster members command [6-15](#)
- show configuration command [12-37](#)
- show forward command [39-22](#)
- show interfaces command [12-28, 12-37](#)
- show interfaces switchport [19-4](#)
- show lldp traffic command [26-11](#)
- show platform forward command [39-22](#)
- show platform team command [39-26, 39-27](#)
- show running-config command
  - displaying ACLs [31-18, 31-19](#)
  - interface description in [12-37](#)
- shutdown command on interfaces [12-41](#)
- Simple Network Management Protocol
  - See SNMP

small form-factor pluggable modules

See SFPs

small-frame arrival rate, configuring [23-5](#)

SNAP [25-1](#)

SNMP

accessing MIB variables with [30-5](#)

agent

described [30-4](#)

disabling [30-8](#)

and IP SLAs [32-2](#)

authentication level [30-11](#)

community strings

configuring [30-8](#)

for cluster switches [30-4](#)

overview [30-4](#)

configuration examples [30-18](#)

default configuration [30-7](#)

engine ID [30-7](#)

groups [30-7, 30-10](#)

host [30-7](#)

ifIndex values [30-6](#)

in-band management [1-7](#)

in clusters [6-13](#)

informs

and trap keyword [30-13](#)

described [30-5](#)

differences from traps [30-5](#)

disabling [30-16](#)

enabling [30-16](#)

limiting access by TFTP servers [30-17](#)

limiting system log messages to NMS [29-10](#)

manager functions [1-5, 30-3](#)

managing clusters with [6-16](#)

notifications [30-5](#)

overview [30-1, 30-5](#)

security levels [30-3](#)

setting CPU threshold notification [30-16](#)

status, displaying [30-19](#)

system contact and location [30-17](#)

trap manager, configuring [30-14](#)

traps

described [30-4, 30-5](#)

differences from informs [30-5](#)

disabling [30-16](#)

enabling [30-13](#)

enabling MAC address notification [5-16, 5-18, 5-19](#)

overview [30-1, 30-5](#)

types of [30-13](#)

users [30-7, 30-10](#)

versions supported [30-2](#)

SNMP and Syslog Over IPv6 [35-5](#)

SNMPv1 [30-2](#)

SNMPv2C [30-3](#)

SNMPv3 [30-3](#)

snooping, IGMP [21-2](#)

software compatibility

See stacks, switch

software images

location in flash [A-25](#)

recovery procedures [39-2](#)

scheduling reloads [3-23](#)

tar file format, described [A-25](#)

See also downloading and uploading

source addresses

in IPv4 ACLs [31-10](#)

in IPv6 ACLs [37-5](#)

source-and-destination-IP address based forwarding, EtherChannel [38-9](#)

source-and-destination MAC address forwarding, EtherChannel [38-9](#)

source-IP address based forwarding, EtherChannel [38-9](#)

source-MAC address forwarding, EtherChannel [38-8](#)

SPAN

and stack changes [27-10](#)

configuration guidelines [27-11](#)

default configuration [27-10](#)

destination ports [27-8](#)

displaying status [27-23](#)

- interaction with other features [27-9](#)
- monitored ports [27-6](#)
- monitoring ports [27-8](#)
- overview [1-15, 27-1](#)
- ports, restrictions [23-12](#)
- received traffic [27-5](#)
- sessions
  - configuring ingress forwarding [27-15, 27-22](#)
  - creating [27-12](#)
  - defined [27-4](#)
  - limiting source traffic to specific VLANs [27-16](#)
  - removing destination (monitoring) ports [27-13](#)
  - specifying monitored ports [27-12](#)
  - with ingress traffic enabled [27-14](#)
- source ports [27-6](#)
- transmitted traffic [27-6](#)
- VLAN-based [27-7](#)
- spanning tree and native VLANs [13-15](#)
- Spanning Tree Protocol
  - See STP
- SPAN traffic [27-5](#)
- SRR
  - configuring
    - shaped weights on egress queues [33-78](#)
    - shared weights on egress queues [33-79](#)
    - shared weights on ingress queues [33-72](#)
  - described [33-14](#)
  - shaped mode [33-14](#)
  - shared mode [33-14](#)
  - support for [1-14](#)
- SSH
  - configuring [9-43](#)
  - cryptographic software image [9-42](#)
  - described [1-7, 9-42](#)
  - encryption methods [9-43](#)
  - switch stack considerations [7-15](#)
  - user authentication methods, supported [9-43](#)
- SSL
  - configuration guidelines [9-49](#)
  - configuring a secure HTTP client [9-51](#)
  - configuring a secure HTTP server [9-50](#)
  - cryptographic software image [9-46](#)
  - described [9-46](#)
  - monitoring [9-52](#)
- stack, switch
  - MAC address of [7-6, 7-17](#)
- stack changes, effects on
  - 802.1x port-based authentication [10-11](#)
  - ACL configuration [31-6](#)
  - CDP [25-2](#)
  - cross-stack EtherChannel [38-13](#)
  - EtherChannel [38-10](#)
  - IGMP snooping [21-6](#)
  - IP routing [34-2](#)
  - MAC address tables [5-15](#)
  - MSTP [17-8](#)
  - MVR [21-18](#)
  - port security [23-18](#)
  - SDM template selection [8-3](#)
  - SNMP [30-2](#)
  - SPAN and RSPAN [27-10](#)
  - STP [16-12](#)
  - switch clusters [6-13](#)
  - system message log [29-2](#)
  - VLANs [13-7](#)
  - VTP [14-8](#)
- stack master
  - bridge ID (MAC address) [7-6](#)
  - defined [7-1](#)
  - election [7-5](#)
  - IPv6 [35-6](#)
  - See also stacks, switch
- stack member
  - accessing CLI of specific member [7-22](#)
  - configuring
    - member number [7-20](#)
    - priority value [7-21](#)
  - defined [7-1](#)

- displaying information of [7-23](#)
- number [7-6](#)
- priority value [7-7](#)
- provisioning a new member [7-21](#)
- replacing [7-14](#)
- See also stacks, switch
- stack member number [12-16](#)
- stack protocol version [7-10](#)
- stacks, switch
  - accessing CLI of specific member [7-22](#)
  - assigning information
    - member number [7-20](#)
    - priority value [7-21](#)
    - provisioning a new member [7-21](#)
  - auto-advise [7-11](#)
  - auto-copy [7-11](#)
  - auto-extract [7-11](#)
  - auto-upgrade [7-11](#)
  - bridge ID [7-6](#)
  - CDP considerations [25-2](#)
  - compatibility, software [7-9](#)
  - configuration file [7-14](#)
  - configuration scenarios [7-16](#)
  - copying an image file from one member to another [A-38](#)
  - default configuration [7-17](#)
  - description of [7-1](#)
  - displaying information of [7-23](#)
  - enabling persistent MAC address timer [7-17](#)
  - in clusters [6-13](#)
  - incompatible software and image upgrades [7-13, A-38](#)
  - IPv6 on [35-6](#)
  - MAC address considerations [5-15](#)
  - management connectivity [7-15](#)
  - managing [7-1](#)
  - membership [7-3](#)
  - merged [7-3](#)
  - MSTP instances supported [16-10](#)
  - offline configuration
    - described [7-7](#)
    - effects of adding a provisioned switch [7-8](#)
    - effects of removing a provisioned switch [7-9](#)
    - effects of replacing a provisioned switch [7-9](#)
    - provisioned configuration, defined [7-7](#)
    - provisioned switch, defined [7-7](#)
    - provisioning a new member [7-21](#)
  - partitioned [7-3, 39-8](#)
  - provisioned switch
    - adding [7-8](#)
    - removing [7-9](#)
    - replacing [7-9](#)
  - replacing a failed member [7-14](#)
  - software compatibility [7-9](#)
  - software image version [7-9](#)
  - stack protocol version [7-10](#)
  - STP
    - bridge ID [16-3](#)
    - root port selection [16-3](#)
    - stack root switch election [16-3](#)
  - system messages
    - hostnames in the display [29-1](#)
    - remotely monitoring [29-2](#)
  - system prompt consideration [5-8](#)
  - system-wide configuration considerations [7-14](#)
  - upgrading [A-38](#)
  - version-mismatch (VM) mode
    - automatic upgrades with auto-upgrade [7-11](#)
    - examples [7-12](#)
    - manual upgrades with auto-advise [7-11](#)
    - upgrades with auto-extract [7-11](#)
  - version-mismatch mode
    - described [7-10](#)
  - See also stack master and stack member
- standby command switch
  - configuring
  - considerations [6-10](#)
  - defined [6-2](#)
  - priority [6-9](#)

- requirements [6-3](#)
- virtual IP address [6-10](#)
- See also cluster standby group and HSRP
- standby group, cluster
  - See cluster standby group and HSRP
- standby links [19-2](#)
- startup configuration
  - booting
    - manually [3-19](#)
    - specific image [3-20](#)
  - clearing [A-19](#)
  - configuration file
    - automatically downloading [3-18](#)
    - specifying the filename [3-18](#)
- static access ports
  - assigning to VLAN [13-10](#)
  - defined [12-3, 13-3](#)
- static addresses
  - See addresses
- static MAC addressing [1-10](#)
- static routes
  - configuring [34-5](#)
  - configuring for IPv6 [35-10](#)
- static VLAN membership [13-2](#)
- statistics
  - 802.1X [11-17](#)
  - 802.1x [10-66](#)
  - CDP [25-5](#)
  - interface [12-40](#)
  - LLDP [26-11](#)
  - LLDP-MED [26-11](#)
  - NMSP [26-11](#)
  - QoS ingress and egress [33-81](#)
  - RMON group Ethernet [28-6](#)
  - RMON group history [28-5](#)
  - SNMP input and output [30-19](#)
  - VTP [14-18](#)
- sticky learning [23-9](#)
- storm control
  - configuring [23-3](#)
  - described [23-1](#)
  - disabling [23-5](#)
  - displaying [23-20](#)
  - support for [1-4](#)
  - thresholds [23-2](#)
- STP
  - accelerating root port selection [18-4](#)
  - BackboneFast
    - described [18-7](#)
    - disabling [18-17](#)
    - enabling [18-17](#)
  - BPDUs filtering
    - described [18-3](#)
    - disabling [18-15](#)
    - enabling [18-14](#)
  - BPDUs guard
    - described [18-2](#)
    - disabling [18-14](#)
    - enabling [18-13](#)
  - BPDUs message exchange [16-3](#)
  - configuration guidelines [16-13, 18-12](#)
  - configuring
    - forward-delay time [16-23](#)
    - hello time [16-22](#)
    - maximum aging time [16-23](#)
    - path cost [16-20](#)
    - port priority [16-18](#)
    - root switch [16-16](#)
    - secondary root switch [16-18](#)
    - spanning-tree mode [16-15](#)
    - switch priority [16-21](#)
    - transmit hold-count [16-24](#)
  - counters, clearing [16-24](#)
  - cross-stack UplinkFast
    - described [18-5](#)
    - enabling [18-16](#)
  - default configuration [16-13](#)
  - default optional feature configuration [18-12](#)

- designated port, defined [16-4](#)
- designated switch, defined [16-4](#)
- detecting indirect link failures [18-8](#)
- disabling [16-16](#)
- displaying status [16-24](#)
- EtherChannel guard
  - described [18-10](#)
  - disabling [18-17](#)
  - enabling [18-17](#)
- extended system ID
  - effects on root switch [16-16](#)
  - effects on the secondary root switch [16-18](#)
  - overview [16-4](#)
  - unexpected behavior [16-16](#)
- features supported [1-8](#)
- IEEE 802.1D and bridge ID [16-4](#)
- IEEE 802.1D and multicast addresses [16-9](#)
- IEEE 802.1t and VLAN identifier [16-5](#)
- inferior BPDU [16-3](#)
- instances supported [16-10](#)
- interface state, blocking to forwarding [18-2](#)
- interface states
  - blocking [16-6](#)
  - disabled [16-7](#)
  - forwarding [16-6, 16-7](#)
  - learning [16-7](#)
  - listening [16-7](#)
  - overview [16-5](#)
- interoperability and compatibility among modes [16-11](#)
- limitations with IEEE 802.1Q trunks [16-11](#)
- load sharing
  - overview [13-20](#)
  - using path costs [13-22](#)
  - using port priorities [13-20](#)
- loop guard
  - described [18-11](#)
  - enabling [18-18](#)
- modes supported [16-10](#)
- multicast addresses, effect of [16-9](#)
- optional features supported [1-8](#)
- overview [16-2](#)
- path costs [13-22](#)
- Port Fast
  - described [18-2](#)
  - enabling [18-12](#)
- port priorities [13-21](#)
- preventing root switch selection [18-10](#)
- protocols supported [16-10](#)
- redundant connectivity [16-8](#)
- root guard
  - described [18-10](#)
  - enabling [18-18](#)
- root port, defined [16-3](#)
- root port selection on a switch stack [16-3](#)
- root switch
  - configuring [16-16](#)
  - effects of extended system ID [16-4, 16-16](#)
  - election [16-3](#)
  - unexpected behavior [16-16](#)
- shutdown Port Fast-enabled port [18-2](#)
- stack changes, effects of [16-12](#)
- status, displaying [16-24](#)
- superior BPDU [16-3](#)
- timers, described [16-22](#)
- UplinkFast
  - described [18-3](#)
  - enabling [18-15](#)
- stratum, NTP [5-3](#)
- subnet mask [34-4](#)
- success response, VMPS [13-24](#)
- summer time [5-7](#)
- SunNet Manager [1-5](#)
- supported port-based authentication methods [10-7](#)
- SVIs
  - and IP unicast routing [34-3](#)
  - and router ACLs [31-4](#)
  - connecting VLANs [12-11](#)

- defined [12-3](#)
  - switch [35-2](#)
  - switch clustering technology [6-1](#)
    - See also clusters, switch
  - switch console port [1-7](#)
  - Switch Database Management
    - See SDM
  - Switched Port Analyzer
    - See SPAN
  - switched ports [12-2](#)
  - switchport backup interface [19-4, 19-5](#)
  - switchport block multicast command [23-8](#)
  - switchport block unicast command [23-8](#)
  - switchport protected command [23-7](#)
  - switch priority
    - MSTP [17-23](#)
    - STP [16-21](#)
  - switch software features [1-1](#)
  - switch virtual interface
    - See SVI
  - syslog
    - See system message logging
  - system capabilities TLV [26-2](#)
  - system clock
    - configuring
      - daylight saving time [5-7](#)
      - manually [5-5](#)
      - summer time [5-7](#)
      - time zones [5-6](#)
    - displaying the time and date [5-6](#)
    - overview [5-2](#)
    - See also NTP
  - system description TLV [26-2](#)
  - system message logging
    - default configuration [29-4](#)
    - defining error message severity levels [29-9](#)
    - disabling [29-4](#)
    - displaying the configuration [29-14](#)
    - enabling [29-5](#)
    - facility keywords, described [29-14](#)
    - level keywords, described [29-10](#)
    - limiting messages [29-10](#)
    - message format [29-2](#)
    - overview [29-1](#)
    - sequence numbers, enabling and disabling [29-8](#)
    - setting the display destination device [29-5](#)
    - stack changes, effects of [29-2](#)
    - synchronizing log messages [29-6](#)
    - syslog facility [1-15](#)
    - time stamps, enabling and disabling [29-8](#)
    - UNIX syslog servers
      - configuring the daemon [29-13](#)
      - configuring the logging facility [29-13](#)
      - facilities supported [29-14](#)
  - system name
    - default configuration [5-9](#)
    - default setting [5-9](#)
    - manual configuration [5-9](#)
    - See also DNS
  - system name TLV [26-2](#)
  - system prompt, default setting [5-8, 5-9](#)
  - system resources, optimizing [8-1](#)
- 
- ## T
- TACACS+
    - accounting, defined [9-11](#)
    - authentication, defined [9-11](#)
    - authorization, defined [9-11](#)
    - configuring
      - accounting [9-17](#)
      - authentication key [9-13](#)
      - authorization [9-16](#)
      - login authentication [9-14](#)
    - default configuration [9-13](#)
    - displaying the configuration [9-17](#)
    - identifying the server [9-13](#)
    - in clusters [6-15](#)

- limiting the services to the user [9-16](#)
- operation of [9-12](#)
- overview [9-10](#)
- support for [1-12](#)
- tracking services accessed by user [9-17](#)
- tar files
  - creating [A-6](#)
  - displaying the contents of [A-7](#)
  - extracting [A-7](#)
  - image file format [A-25](#)
- TCAM
  - memory consistency check errors
    - example [39-27](#)
  - memory consistency check routines [1-5, 39-26](#)
  - memory consistency integrity [1-5, 39-26](#)
  - space
    - HFTM [39-26](#)
    - HQATM [39-26](#)
    - unassigned [39-26](#)
- TDR [1-16](#)
- Telnet
  - accessing management interfaces [2-10](#)
  - number of connections [1-7](#)
  - setting a password [9-6](#)
- temporary self-signed certificate [9-47](#)
- Terminal Access Controller Access Control System Plus
  - See TACACS+
- terminal lines, setting a password [9-6](#)
- ternary content addressable memory
  - See TCAM
- TFTP
  - configuration files
    - downloading [A-11](#)
    - preparing the server [A-11](#)
    - uploading [A-12](#)
  - configuration files in base directory [3-7](#)
  - configuring for autoconfiguration [3-7](#)
  - image files
    - deleting [A-28](#)
    - downloading [A-27](#)
    - preparing the server [A-26](#)
    - uploading [A-29](#)
  - limiting access by servers [30-17](#)
- TFTP server [1-6](#)
- threshold, traffic level [23-2](#)
- time
  - See NTP and system clock
- Time Domain Reflector
  - See TDR
- time-range command [31-15](#)
- time ranges in ACLs [31-15](#)
- time stamps in log messages [29-8](#)
- time zones [5-6](#)
- TLVs
  - defined [26-2](#)
  - LLDP [26-2](#)
  - LLDP-MED [26-2](#)
- Token Ring VLANs
  - support for [13-6](#)
  - VTP support [14-5](#)
- ToS [1-13](#)
- traceroute, Layer 2
  - and ARP [39-16](#)
  - and CDP [39-16](#)
  - broadcast traffic [39-16](#)
  - described [39-16](#)
  - IP addresses and subnets [39-16](#)
  - MAC addresses and VLANs [39-16](#)
  - multicast traffic [39-16](#)
  - multiple devices on a port [39-17](#)
  - unicast traffic [39-16](#)
  - usage guidelines [39-16](#)
- traceroute command [39-18](#)
  - See also IP traceroute
- traffic
  - blocking flooded [23-8](#)
  - fragmented [31-4](#)
  - fragmented IPv6 [37-2](#)

- unfragmented [31-4](#)
  - traffic policing [1-14](#)
  - traffic suppression [23-2](#)
  - transmit hold-count
    - see STP
  - transparent mode, VTP [14-4](#)
  - trap-door mechanism [3-2](#)
  - traps
    - configuring MAC address notification [5-16, 5-18, 5-19](#)
    - configuring managers [30-13](#)
    - defined [30-4](#)
    - enabling [5-16, 5-18, 5-19, 30-13](#)
    - notification types [30-13](#)
    - overview [30-1, 30-5](#)
  - troubleshooting
    - connectivity problems [39-14, 39-15, 39-17](#)
    - CPU utilization [39-28](#)
    - detecting unidirectional links [24-1](#)
    - displaying crash information [39-23](#)
    - setting packet forwarding [39-22](#)
    - SFP security and identification [39-13](#)
    - show forward command [39-22](#)
    - with CiscoWorks [30-5](#)
    - with debug commands [39-20](#)
    - with ping [39-14](#)
    - with system message logging [29-1](#)
    - with traceroute [39-17](#)
  - trunk failover
    - See link-state tracking
  - trunking encapsulation [1-9](#)
  - trunk ports
    - configuring [13-16](#)
    - defined [12-3, 13-3](#)
  - trunks
    - allowed-VLAN list [13-17](#)
    - load sharing
      - setting STP path costs [13-22](#)
      - using STP port priorities [13-20, 13-21](#)
    - native VLAN for untagged traffic [13-19](#)
    - parallel [13-22](#)
    - pruning-eligible list [13-18](#)
    - to non-DTP device [13-14](#)
    - trusted boundary for QoS [33-45](#)
    - trusted port states
      - between QoS domains [33-47](#)
      - classification options [33-5](#)
      - ensuring port security for IP phones [33-45](#)
      - support for [1-13](#)
      - within a QoS domain [33-42](#)
    - trustpoints, CA [9-47](#)
    - twisted-pair Ethernet, detecting unidirectional links [24-1](#)
    - type of service
      - See ToS
- 
- ## U
- UDLD
    - configuration guidelines [24-4](#)
    - default configuration [24-4](#)
    - disabling
      - globally [24-5](#)
      - on fiber-optic interfaces [24-5](#)
      - per interface [24-6](#)
    - echoing detection mechanism [24-3](#)
    - enabling
      - globally [24-5](#)
      - per interface [24-6](#)
    - link-detection mechanism [24-1](#)
    - neighbor database [24-2](#)
    - overview [24-1](#)
    - resetting an interface [24-6](#)
    - status, displaying [24-7](#)
    - support for [1-8](#)
    - unauthorized ports with IEEE 802.1x [10-10](#)
    - unicast MAC address filtering [1-6](#)
      - and adding static addresses [5-22](#)
      - and broadcast MAC addresses [5-21](#)
      - and CPU packets [5-21](#)

- and multicast addresses [5-21](#)
- and router MAC addresses [5-21](#)
- configuration guidelines [5-21](#)
- described [5-21](#)
- unicast storm [23-1](#)
- unicast storm control command [23-4](#)
- unicast traffic, blocking [23-8](#)
- UniDirectional Link Detection protocol
  - See UDLD
- UNIX syslog servers
  - daemon configuration [29-13](#)
  - facilities supported [29-14](#)
  - message logging configuration [29-13](#)
- unrecognized Type-Length-Value (TLV) support [14-5](#)
- upgrading a Catalyst 2950 switch
  - configuration compatibility issues [C-1](#)
  - differences in configuration commands [C-1](#)
  - feature behavior incompatibilities [C-5](#)
  - incompatible command messages [C-1](#)
  - recommendations [C-1](#)
- upgrading software images
  - See downloading
- UplinkFast
  - described [18-3](#)
  - disabling [18-16](#)
  - enabling [18-15](#)
  - support for [1-8](#)
- uploading
  - configuration files
    - preparing [A-11](#), [A-13](#), [A-16](#)
    - reasons for [A-9](#)
    - using FTP [A-15](#)
    - using RCP [A-18](#)
    - using TFTP [A-12](#)
  - image files
    - preparing [A-26](#), [A-30](#), [A-34](#)
    - reasons for [A-24](#)
    - using FTP [A-32](#)
    - using RCP [A-37](#)

- using TFTP [A-29](#)
- USB mini-Type B console port [12-12](#)
- USB Type A port [1-8](#)
- user EXEC mode [2-2](#)
- username-based authentication [9-6](#)

---

## V

- version-dependent transparent mode [14-5](#)
- version-mismatch (VM) mode
  - automatic upgrades with auto-upgrade [7-11](#)
  - manual upgrades with auto-advise [7-11](#)
  - upgrades with auto-extract [7-11](#)
- version-mismatch mode
  - described [7-10](#)
- virtual IP address
  - cluster standby group [6-10](#)
  - command switch [6-10](#)
- virtual switches and PAgP [38-6](#)
- vlan.dat file [13-5](#)
- VLAN 1, disabling on a trunk port [13-17](#)
- VLAN 1 minimization [13-17](#)
- vlan-assignment response, VMPS [13-23](#)
- VLAN configuration
  - at bootup [13-7](#)
  - saving [13-7](#)
- VLAN configuration mode [2-2](#)
- VLAN database
  - and startup configuration file [13-7](#)
  - and VTP [14-1](#)
  - VLAN configuration saved in [13-7](#)
  - VLANs saved in [13-4](#)
- VLAN filtering and SPAN [27-7](#)
- vlan global configuration command [13-7](#)
- VLAN ID, discovering [5-24](#)
- VLAN load balancing on flex links [19-3](#)
  - configuration guidelines [19-8](#)
- VLAN management domain [14-2](#)
- VLAN Management Policy Server

- See VMPS
- VLAN membership
  - confirming [13-27](#)
  - modes [13-3](#)
- VLAN Query Protocol
  - See VQP
- VLANs
  - adding [13-8](#)
  - adding to VLAN database [13-8](#)
  - aging dynamic addresses [16-9](#)
  - allowed on trunk [13-17](#)
  - and spanning-tree instances [13-3, 13-6, 13-12](#)
  - configuration guidelines, extended-range VLANs [13-11](#)
  - configuration guidelines, normal-range VLANs [13-6](#)
  - configuring [13-1](#)
  - configuring IDs 1006 to 4094 [13-11](#)
  - connecting through SVIs [12-11](#)
  - creating [13-8](#)
  - default configuration [13-7](#)
  - deleting [13-9](#)
  - described [12-2, 13-1](#)
  - displaying [13-13](#)
  - extended-range [13-1, 13-11](#)
  - features [1-9](#)
  - illustrated [13-2](#)
  - in the switch stack [13-7](#)
  - limiting source traffic with RSPAN [27-22](#)
  - limiting source traffic with SPAN [27-16](#)
  - modifying [13-8](#)
  - multicast [21-17](#)
  - native, configuring [13-19](#)
  - normal-range [13-1, 13-4](#)
  - number supported [1-9](#)
  - parameters [13-5](#)
  - port membership modes [13-3](#)
  - static-access ports [13-10](#)
  - STP and IEEE 802.1Q trunks [16-11](#)
  - supported [13-2](#)
  - Token Ring [13-6](#)
  - traffic between [13-2](#)
  - VTP modes [14-3](#)
- VLAN Trunking Protocol
  - See VTP
- VLAN trunks [13-14](#)
- VMPS
  - administering [13-28](#)
  - configuration example [13-29](#)
  - configuration guidelines [13-25](#)
  - default configuration [13-25](#)
  - description [13-23](#)
  - dynamic port membership
    - described [13-24](#)
    - reconfirming [13-27](#)
    - troubleshooting [13-29](#)
  - entering server address [13-26](#)
  - mapping MAC addresses to VLANs [13-23](#)
  - monitoring [13-28](#)
  - reconfirmation interval, changing [13-27](#)
  - reconfirming membership [13-27](#)
  - retry count, changing [13-28](#)
- voice aware 802.1x security
  - port-based authentication
    - configuring [10-39](#)
    - described [10-31, 10-39](#)
- voice-over-IP [15-1](#)
- voice VLAN
  - Cisco 7960 phone, port connections [15-1](#)
  - configuration guidelines [15-3](#)
  - configuring IP phones for data traffic
    - override CoS of incoming frame [15-6](#)
    - trust CoS priority of incoming frame [15-6](#)
  - configuring ports for voice traffic in
    - 802.1p priority tagged frames [15-5](#)
    - 802.1Q frames [15-5](#)
  - connecting to an IP phone [15-4](#)
  - default configuration [15-3](#)
  - described [15-1](#)

- displaying [15-7](#)
  - IP phone data traffic, described [15-2](#)
  - IP phone voice traffic, described [15-2](#)
  - VQP [1-9, 13-23](#)
  - VTP
    - adding a client to a domain [14-17](#)
    - advertisements [13-15, 14-4](#)
    - and extended-range VLANs [13-2, 14-2](#)
    - and normal-range VLANs [13-2, 14-2](#)
    - client mode, configuring [14-13](#)
    - configuration
      - guidelines [14-9](#)
      - requirements [14-11](#)
      - saving [14-9](#)
    - configuration requirements [14-11](#)
    - configuration revision number
      - guideline [14-17](#)
      - resetting [14-17](#)
    - consistency checks [14-5](#)
    - default configuration [14-9](#)
    - described [14-1](#)
    - domain names [14-10](#)
    - domains [14-2](#)
    - modes
      - client [14-3](#)
      - off [14-4](#)
      - server [14-3](#)
      - transitions [14-3](#)
      - transparent [14-4](#)
    - monitoring [14-18](#)
    - passwords [14-10](#)
    - pruning
      - disabling [14-16](#)
      - enabling [14-16](#)
      - examples [14-7](#)
      - overview [14-6](#)
      - support for [1-9](#)
    - pruning-eligible list, changing [13-18](#)
    - server mode, configuring [14-11, 14-14](#)
    - statistics [14-18](#)
    - support for [1-9](#)
    - Token Ring support [14-5](#)
    - transparent mode, configuring [14-12](#)
    - using [14-1](#)
    - Version
      - enabling [14-15](#)
      - version, guidelines [14-10](#)
      - Version 1 [14-5](#)
      - Version 2
        - configuration guidelines [14-10](#)
        - overview [14-5](#)
      - Version 3
        - overview [14-5](#)
- 
- W**
  - web authentication [10-17](#)
    - configuring [11-16 to ??](#)
    - described [1-10](#)
  - web-based authentication
    - customizeable web pages [11-6](#)
    - description [11-1](#)
  - web-based authentication, interactions with other features [11-7](#)
  - weighted tail drop
    - See WTD
  - wired location service
    - configuring [26-9](#)
    - displaying [26-11](#)
    - location TLV [26-3](#)
    - understanding [26-4](#)
  - wizards [1-2](#)
  - WTD
    - described [33-13](#)
    - setting thresholds
      - egress queue-sets [33-74](#)
      - ingress queues [33-69](#)
    - support for [1-14](#)

I

---

**X**

Xmodem protocol [39-2](#)

