



INDEX

A

- abbreviating commands [4](#)
- AC (command switch) [9](#)
- access-class command [34](#)
- access control entries
 - See ACEs
- access-denied response, VMPS [23](#)
- access groups, applying IPv4 ACLs to interfaces [35](#)
- accessing
 - clusters, switch [12](#)
 - command switches [10](#)
 - member switches [12](#)
 - switch clusters [12](#)
- access lists
 - See ACLs
- access ports
 - in switch clusters [8](#)
- access ports, defined [2](#)
- accounting
 - with 802.1x [47](#)
 - with IEEE 802.1x [15](#)
 - with RADIUS [33](#)
 - with TACACS+ [11, 17](#)
- ACEs
 - and QoS [7](#)
 - defined [20](#)
 - Ethernet [20](#)
 - IP [20](#)
- ACLs
 - ACEs [20](#)
 - any keyword [27](#)
 - applying
 - time ranges to [32](#)
 - to an interface [34](#)
 - to QoS [7](#)
 - classifying traffic for QoS [40](#)
 - comments in [33](#)
 - compiling [37](#)
 - defined [19, 23](#)
 - examples of [37, 40](#)
 - extended IP, configuring for QoS classification [41](#)
 - extended IPv4
 - creating [26](#)
 - matching criteria [23](#)
 - hardware and software handling [36](#)
 - host keyword [28](#)
 - IP
 - creating [23](#)
 - fragments and QoS guidelines [31](#)
 - implicit deny [25, 29, 31](#)
 - implicit masks [25](#)
 - matching criteria [23](#)
 - undefined [35](#)
 - IPv4
 - applying to interfaces [34](#)
 - creating [23](#)
 - matching criteria [23](#)
 - named [30](#)
 - numbers [24](#)
 - terminal lines, setting on [34](#)
 - unsupported features [22](#)
 - MAC extended [39, 42](#)
 - matching [23, 35](#)
 - monitoring [42](#)
 - named, IPv4 [30](#)

- number per QoS class map [31](#)
- QoS [7, 40](#)
- resequencing entries [30](#)
- standard IP, configuring for QoS classification [40](#)
- standard IPv4
 - creating [25](#)
 - matching criteria [23](#)
- support for [10](#)
- support in hardware [36](#)
- time ranges [32](#)
- unsupported features, IPv4 [22](#)
- active link [4, 5, 6](#)
- active links [2](#)
- active traffic monitoring, IP SLAs [1](#)
- address aliasing [2](#)
- addresses
 - displaying the MAC address table [29](#)
 - dynamic
 - accelerated aging [8](#)
 - changing the aging time [21](#)
 - default aging [8](#)
 - defined [19](#)
 - learning [20](#)
 - removing [21](#)
 - IPv6 [2](#)
 - MAC, discovering [30](#)
 - multicast, STP address management [8](#)
 - static
 - adding and removing [26](#)
 - defined [19](#)
- address resolution [30](#)
- Address Resolution Protocol
 - See ARP
- advertisements
 - CDP [1](#)
 - LLDP [1, 2](#)
 - VTP [15, 3, 4](#)
- aggregatable global unicast addresses [3](#)
- aggregated ports
 - See EtherChannel
- aggregate policers [48](#)
- aggregate policing [13](#)
- aging, accelerating [8](#)
- aging time
 - accelerated
 - for MSTP [23](#)
 - for STP [8, 21](#)
 - MAC address table [21](#)
 - maximum
 - for MSTP [23, 24](#)
 - for STP [21, 22](#)
- alarms, RMON [3](#)
- allowed-VLAN list [16](#)
- ARP
 - defined [5, 30](#)
 - table
 - address resolution [30](#)
 - managing [30](#)
- attributes, RADIUS
 - vendor-proprietary [36](#)
 - vendor-specific [34](#)
- attribute-value pairs [13, 15, 19, 20](#)
- authentication
 - local mode with AAA [38](#)
 - NTP associations [4](#)
 - open1x [29](#)
 - RADIUS
 - key [26](#)
 - login [28](#)
 - TACACS+
 - defined [11](#)
 - key [13](#)
 - login [14](#)
 - See also port-based authentication
- authentication compatibility with Catalyst 6000 switches [9](#)
- authentication failed VLAN
 - See restricted VLAN

- authentication manager
 - CLI commands [10](#)
 - compatibility with older 802.1x CLI commands [10 to ??](#)
 - overview [8](#)
- authoritative time source, described [2](#)
- authorization
 - with RADIUS [32](#)
 - with TACACS+ [11, 16](#)
- authorized ports with IEEE 802.1x [11](#)
- autoconfiguration [3](#)
- auto enablement [30](#)
- automatic discovery
 - considerations
 - beyond a noncandidate device [7](#)
 - brand new switches [8](#)
 - connectivity [4](#)
 - different VLANs [6](#)
 - management VLANs [7](#)
 - non-CDP-capable devices [6](#)
 - noncluster-capable devices [6](#)
 - in switch clusters [4](#)
 - See also CDP
- automatic QoS
 - See QoS
- automatic recovery, clusters [9](#)
 - See also HSRP
- auto-MDIX
 - configuring [20](#)
 - described [20](#)
- autonegotiation
 - duplex mode [3](#)
 - interface configuration guidelines [17](#)
 - mismatches [11](#)
- autosensing, port speed [3](#)
- Auto Smartports macros
 - built-in macros [3, 9](#)
 - Cisco Medianet [2](#)
 - configuration guidelines [4](#)

- default configuration [3](#)
 - defined [1](#)
 - displaying [19](#)
 - enabling [5, 8](#)
 - event triggers [12](#)
 - IOS shell [1, 15](#)
 - LLDP [1](#)
 - mapping [9](#)
 - user-defined macros [15](#)
 - See also Smartports macros
- auxiliary VLAN
 - See voice VLAN
- availability, features [7](#)

B

- BackboneFast
 - described [5](#)
 - disabling [14](#)
 - enabling [13](#)
 - support for [7](#)
- backup interfaces
 - See Flex Links
- backup links [2](#)
- banners
 - configuring
 - login [18](#)
 - message-of-the-day login [18](#)
 - default configuration [17](#)
 - when displayed [17](#)
- Berkeley r-tools replacement [50](#)
- binding database
 - DHCP snooping
 - See DHCP snooping binding database
- bindings
 - DHCP snooping database [6](#)
 - IP source guard [13](#)
- binding table, DHCP snooping
 - See DHCP snooping binding database

- blocking packets [7](#)
 - booting
 - boot loader, function of [2](#)
 - boot process [1](#)
 - manually [17](#)
 - specific image [18](#)
 - boot loader
 - accessing [18](#)
 - described [2](#)
 - environment variables [18](#)
 - prompt [18](#)
 - trap-door mechanism [2](#)
 - BPDU
 - error-disabled state [2](#)
 - filtering [3](#)
 - RSTP format [12](#)
 - BPDU filtering
 - described [3](#)
 - disabling [12](#)
 - enabling [12](#)
 - support for [8](#)
 - BPDU guard
 - described [2](#)
 - disabling [12](#)
 - enabling [11](#)
 - support for [8](#)
 - bridge protocol data unit
 - See BPDU
 - broadcast storm-control command [4](#)
 - broadcast storms [1](#)
-
- C**
- cables, monitoring for unidirectional links [1](#)
 - candidate switch
 - automatic discovery [4](#)
 - defined [3](#)
 - requirements [3](#)
 - See also command switch, cluster standby group, and member switch
 - Catalyst 6000 switches
 - authentication compatibility [9](#)
 - CA trustpoint
 - configuring [47](#)
 - defined [45](#)
 - CDP
 - and trusted boundary [35](#)
 - automatic discovery in switch clusters [4](#)
 - configuring [2](#)
 - default configuration [2](#)
 - defined with LLDP [1](#)
 - described [1](#)
 - disabling for routing device [3 to 4](#)
 - enabling and disabling
 - on an interface [4](#)
 - on a switch [3](#)
 - monitoring [4](#)
 - overview [1](#)
 - power negotiation extensions [4](#)
 - support for [5](#)
 - transmission timer and holdtime, setting [2](#)
 - updates [2](#)
 - CGMP
 - as IGMP snooping learning method [8](#)
 - joining multicast group [3](#)
 - CipherSuites [46](#)
 - Cisco 7960 IP Phone [1](#)
 - Cisco Discovery Protocol
 - See CDP
 - Cisco intelligent power management [4](#)
 - Cisco IOS File System
 - See IFS
 - Cisco IOS IP Service Level Agreements (SLAs) responder [4](#)
 - Cisco IOS IP SLAs [1](#)
 - Cisco Medianet
 - See Auto Smartports macros

- Cisco Secure ACS
 - attribute-value pairs for downloadable ACLs [20](#)
 - attribute-value pairs for redirect URL [19](#)
- Cisco Secure ACS configuration guide [59](#)
- CiscoWorks 2000 [5, 4](#)
- CISP [30](#)
- CIST regional root
 - See MSTP
- CIST root
 - See MSTP
- civic location [3](#)
- class maps for QoS
 - configuring [43](#)
 - described [7](#)
 - displaying [68](#)
- class of service
 - See CoS
- clearing interfaces [28](#)
- CLI
 - abbreviating commands [4](#)
 - command modes [1](#)
 - configuration logging [5](#)
 - described [5](#)
 - editing features
 - enabling and disabling [7](#)
 - keystroke editing [7](#)
 - wrapped lines [9](#)
 - error messages [5](#)
 - filtering command output [9](#)
 - getting help [3](#)
 - history
 - changing the buffer size [6](#)
 - described [5](#)
 - disabling [6](#)
 - recalling commands [6](#)
 - managing clusters [14](#)
 - no and default forms of commands [4](#)
- Client Information Signalling Protocol
 - See CISP
- client mode, VTP [3](#)
- clock
 - See system clock
- clusters, switch
 - accessing [12](#)
 - automatic discovery [4](#)
 - automatic recovery [9](#)
 - benefits [2](#)
 - compatibility [4](#)
 - described [1](#)
 - LRE profile considerations [13](#)
 - managing
 - through CLI [14](#)
 - through SNMP [14](#)
 - planning [4](#)
 - planning considerations
 - automatic discovery [4](#)
 - automatic recovery [9](#)
 - CLI [14](#)
 - host names [12](#)
 - IP addresses [12](#)
 - LRE profiles [13](#)
 - passwords [12](#)
 - RADIUS [13](#)
 - SNMP [13, 14](#)
 - TACACS+ [13](#)
 - See also candidate switch, command switch, cluster standby group, member switch, and standby command switch
- cluster standby group
 - automatic recovery [11](#)
 - considerations [10](#)
 - defined [2](#)
 - requirements [3](#)
 - virtual IP address [10](#)
 - See also HSRP
- CNS [5](#)
 - management functions [5](#)
- CoA Request Commands [23](#)

Coarse Wave Division Multiplexer

See CWDM SFPs

command-line interface

See CLI

command modes 1

commands

abbreviating 4

no and default 4

commands, setting privilege levels 8

command switch

accessing 10

active (AC) 9

configuration conflicts 11

defined 2

passive (PC) 9

password privilege levels 14

priority 9

recovery

from command-switch failure 9,7

from lost member connectivity 11

redundant 9

replacing

with another switch 9

with cluster member 8

requirements 3

standby (SC) 9

See also candidate switch, cluster standby group, member switch, and standby command switch

community strings

configuring 13,8

for cluster switches 4

in clusters 13

overview 4

SNMP 13

compatibility, feature 12

config.text 16

configurable leave timer, IGMP 5

configuration, initial

defaults 14

Express Setup 2

configuration changes, logging 10

configuration conflicts, recovering from lost member connectivity 11

configuration examples, network 17

configuration files

archiving 19

clearing the startup configuration 19

creating using a text editor 10

default name 16

deleting a stored configuration 19

described 8

downloading

automatically 16

preparing 10,13,16

reasons for 8

using FTP 13

using RCP 17

using TFTP 11

guidelines for creating and using 9

guidelines for replacing and rolling back 20

invalid combinations when copying 5

limiting TFTP server access 16

obtaining with DHCP 8

password recovery disable considerations 5

replacing a running configuration 19,20

rolling back a running configuration 19,20

specifying the filename 16

system contact and location information 16

types and location 9

uploading

preparing 10,13,16

reasons for 8

using FTP 14

using RCP 18

using TFTP 11

configuration logger 10

configuration logging 5

configuration replacement 19

- configuration rollback [19](#)
 - configuration settings, saving [15](#)
 - configure terminal command [10](#)
 - configuring 802.1x user distribution [54](#)
 - configuring port-based authentication violation modes [38](#)
 - configuring small-frame arrival rate [5](#)
 - config-vlan mode [2](#)
 - conflicts, configuration [11](#)
 - connections, secure remote [40](#)
 - connectivity problems [13, 14, 16](#)
 - consistency checks in VTP Version 2 [5](#)
 - console port, connecting to [10](#)
 - control protocol, IP SLAs [4](#)
 - corrupted software, recovery steps with Xmodem [2](#)
 - CoS
 - in Layer 2 frames [2](#)
 - override priority [6](#)
 - trust priority [6](#)
 - CoS input queue threshold map for QoS [14](#)
 - CoS output queue threshold map for QoS [17](#)
 - CoS-to-DSCP map for QoS [51](#)
 - counters, clearing interface [28](#)
 - CPU utilization, troubleshooting [23](#)
 - crashinfo file [22](#)
 - critical authentication, IEEE 802.1x [51](#)
 - critical VLAN [22](#)
 - cryptographic software image
 - SSH [39](#)
 - SSL [44](#)
 - customizable web pages, web-based authentication [6](#)
 - CWDM SFPs [22](#)
-
- D**
- DAACL
 - See downloadable ACL
 - daylight saving time [13](#)
 - debugging
 - enabling all system diagnostics [19](#)
 - enabling for a specific feature [19](#)
 - redirecting error message output [20](#)
 - using commands [18](#)
 - default commands [4](#)
 - default configuration
 - 802.1x [32](#)
 - auto-QoS [19](#)
 - banners [17](#)
 - booting [16](#)
 - CDP [2](#)
 - DHCP [7](#)
 - DHCP option 82 [8](#)
 - DHCP snooping [8](#)
 - DHCP snooping binding database [8](#)
 - DNS [16](#)
 - dynamic ARP inspection [5](#)
 - EtherChannel [9](#)
 - Ethernet interfaces [14](#)
 - Flex Links [8](#)
 - IGMP filtering [24](#)
 - IGMP snooping [6, 5, 6](#)
 - IGMP throttling [24](#)
 - initial switch information [3](#)
 - IP SLAs [5](#)
 - IP source guard [15](#)
 - IPv6 [6](#)
 - Layer 2 interfaces [14](#)
 - LLDP [5](#)
 - MAC address table [20](#)
 - MAC address-table move update [8](#)
 - MSTP [14](#)
 - MVR [19](#)
 - NTP [4](#)
 - optional spanning-tree configuration [9](#)
 - password and privilege level [2](#)
 - RADIUS [26](#)
 - RMON [3](#)
 - RSPAN [9](#)
 - SDM template [2](#)

- SNMP 6
- SPAN 9
- SSL 46
- standard QoS 28
- STP 11
- system message logging 3
- system name and prompt 15
- TACACS+ 13
- UDLD 4
- VLAN, Layer 2 Ethernet interfaces 14
- VLANs 7
- VMPS 24
- voice VLAN 3
- VTP 8
- default gateway 14
- default web-based authentication configuration
 - 802.1X 9
- deleting VLANs 9
- denial-of-service attack 1
- description command 25
- designing your network, examples 17
- destination addresses
 - in IPv4 ACLs 27
- destination-IP address-based forwarding, EtherChannel 7
- destination-MAC address forwarding, EtherChannel 7
- detecting indirect link failures, STP 5
- device 23
- device discovery protocol 1
- device manager
 - benefits 2
 - described 2, 4
 - in-band management 6
 - upgrading a switch 23
- DHCP
 - Cisco IOS server database
 - configuring 12
 - enabling
 - relay agent 9
- DHCP-based autoconfiguration
 - client request message exchange 4
 - configuring
 - client side 3
 - DNS 7
 - relay device 8
 - server side 6
 - TFTP server 7
 - example 9
 - lease options
 - for IP address information 6
 - for receiving the configuration file 6
 - overview 3
 - relationship to BOOTP 3
 - relay support 5
 - support for 5
- DHCP-based autoconfiguration and image update
 - configuring 11 to 13
 - understanding 5
- DHCP binding database
 - See DHCP snooping binding database
- DHCP binding table
 - See DHCP snooping binding database
- DHCP option 82
 - circuit ID suboption 5
 - configuration guidelines 8
 - default configuration 7
 - displaying 13
 - overview 3
 - packet format, suboption
 - circuit ID 5
 - remote ID 5
 - remote ID suboption 5
- DHCP server port-based address allocation
 - configuration guidelines 22
 - default configuration 22
 - described 21
 - displaying 24
 - enabling 22
 - reserved addresses 22

- DHCP server port-based address assignment
 - support for [5](#)
- DHCP snooping
 - accepting untrusted packets form edge switch [3, 10](#)
 - binding database
 - See DHCP snooping binding database
 - configuration guidelines [8](#)
 - default configuration [7](#)
 - displaying binding tables [13](#)
 - message exchange process [4](#)
 - option 82 data insertion [3](#)
 - trusted interface [3](#)
 - untrusted interface [3](#)
 - untrusted messages [2](#)
- DHCP snooping binding database
 - adding bindings [12](#)
 - binding entries, displaying [13](#)
 - binding file
 - format [6](#)
 - location [6](#)
 - bindings [6](#)
 - clearing agent statistics [13](#)
 - configuration guidelines [9](#)
 - configuring [12](#)
 - default configuration [7, 8](#)
 - deleting
 - binding file [12](#)
 - bindings [13](#)
 - database agent [12](#)
 - described [6](#)
 - displaying [13](#)
 - displaying status and statistics [13](#)
 - enabling [12](#)
 - entry [6](#)
 - renewing database [13](#)
 - resetting
 - delay value [12](#)
 - timeout value [12](#)
- DHCP snooping binding table
 - See DHCP snooping binding database
- Differentiated Services architecture, QoS [2](#)
- Differentiated Services Code Point [2](#)
- directed unicast requests [5](#)
- directories
 - changing [3](#)
 - creating and removing [4](#)
 - displaying the working [3](#)
- discovery, clusters
 - See automatic discovery
- DNS
 - and DHCP-based autoconfiguration [7](#)
 - default configuration [16](#)
 - displaying the configuration [17](#)
 - in IPv6 [3](#)
 - overview [15](#)
 - setting up [16](#)
 - support for [5](#)
- domain names
 - DNS [15](#)
 - VTP [8](#)
- Domain Name System
 - See DNS
- downloadable ACL [19, 20, 59](#)
- downloading
 - configuration files
 - preparing [10, 13, 16](#)
 - reasons for [8](#)
 - using FTP [13](#)
 - using RCP [17](#)
 - using TFTP [11](#)
 - image files
 - deleting old image [27](#)
 - preparing [25, 28, 32](#)
 - reasons for [23](#)
 - using CMS [2](#)
 - using FTP [29](#)
 - using HTTP [2, 23](#)
 - using RCP [33](#)

- using TFTP 25
 - using the device manager or Network Assistant 23
- DRP
 - support for 13
- DSCP 12, 2
- DSCP input queue threshold map for QoS 14
- DSCP output queue threshold map for QoS 17
- DSCP-to-CoS map for QoS 54
- DSCP-to-DSCP-mutation map for QoS 55
- DSCP transparency 36
- DTP 8, 13
- dual-action detection 5
- dual IPv4 and IPv6 templates 5
- dual protocol stacks
 - IPv4 and IPv6 5
 - SDM templates supporting 5
- dual-purpose uplinks
 - defined 4
 - LEDs 4
 - link selection 4, 15
 - setting the type 15
- dynamic access ports
 - characteristics 4
 - configuring 25
 - defined 3
- dynamic addresses
 - See addresses
- dynamic ARP inspection
 - ARP cache poisoning 1
 - ARP requests, described 1
 - ARP spoofing attack 1
 - clearing
 - log buffer 15
 - statistics 14
 - configuration guidelines 6
 - configuring
 - ACLs for non-DHCP environments 8
 - in DHCP environments 7
 - log buffer 12
 - rate limit for incoming ARP packets 4, 10
 - default configuration 5
 - denial-of-service attacks, preventing 10
 - described 1
 - DHCP snooping binding database 2
 - displaying
 - ARP ACLs 14
 - configuration and operating state 14
 - log buffer 15
 - statistics 14
 - trust state and rate limit 14
 - error-disabled state for exceeding rate limit 4
 - function of 2
 - interface trust states 3
 - log buffer
 - clearing 15
 - configuring 12
 - displaying 15
 - logging of dropped packets, described 4
 - man-in-the-middle attack, described 2
 - network security issues and interface trust states 3
 - priority of ARP ACLs and DHCP snooping entries 4
 - rate limiting of ARP packets
 - configuring 10
 - described 4
 - error-disabled state 4
 - statistics
 - clearing 14
 - displaying 14
 - validation checks, performing 11
- dynamic auto trunking mode 13
- dynamic desirable trunking mode 13
- Dynamic Host Configuration Protocol
 - See DHCP-based autoconfiguration
- dynamic port VLAN membership
 - described 23
 - reconfirming 26
 - troubleshooting 28

types of connections [25](#)
 Dynamic Trunking Protocol
 See DTP

E

editing features

enabling and disabling [7](#)
 keystrokes used [7](#)
 wrapped lines [9](#)

ELIN location [3](#)

enable password [3](#)

enable secret password [3](#)

encryption, CipherSuite [46](#)

encryption for passwords [3](#)

environment variables, function of [19](#)

error-disabled state, BPDU [2](#)

error messages during command entry [5](#)

EtherChannel

automatic creation of [4,5](#)
 channel groups
 binding physical and logical interfaces [3](#)
 numbering of [3](#)

configuration guidelines [9](#)

configuring Layer 2 interfaces [10](#)

default configuration [9](#)

described [2](#)

displaying status [17](#)

forwarding methods [7,12](#)

IEEE 802.3ad, described [5](#)

interaction

 with STP [10](#)
 with VLANs [10](#)

LACP

 described [5](#)

 displaying status [17](#)

 hot-standby ports [15](#)

 interaction with other features [6](#)

 modes [6](#)

port priority [16](#)

system priority [15](#)

load balancing [7,12](#)

PAgP

 aggregate-port learners [13](#)

 compatibility with Catalyst 1900 [14](#)

 described [4](#)

 displaying status [17](#)

 interaction with other features [5](#)

 interaction with virtual switches [5](#)

 learn method and priority configuration [13](#)

 modes [4](#)

 support for [3](#)

 with dual-action detection [5](#)

port-channel interfaces

 described [3](#)

 numbering of [3](#)

port groups [3](#)

support for [3](#)

EtherChannel guard

 described [7](#)

 disabling [14](#)

 enabling [14](#)

Ethernet VLANs

 adding [7](#)

 defaults and ranges [7](#)

 modifying [7](#)

EUI [3](#)

events, RMON [3](#)

examples

 network configuration [17](#)

expedite queue for QoS [67](#)

Express Setup [2](#)

 See also getting started guide

extended crashinfo file [22](#)

extended-range VLANs

 configuration guidelines [11](#)

 configuring [10](#)

 creating [11](#)

- defined 1
 - extended system ID
 - MSTP 17
 - STP 4, 14
 - extended universal identifier
 - See EUI
 - Extensible Authentication Protocol over LAN 1
-
- F**
- fa0 interface 6
 - Fast Convergence 3
 - features, incompatible 12
 - fiber-optic, detecting unidirectional links 1
 - files
 - basic crashinfo
 - description 22
 - location 22
 - copying 4
 - crashinfo, description 22
 - deleting 5
 - displaying the contents of 8
 - extended crashinfo
 - description 22
 - location 22
 - tar
 - creating 6
 - displaying the contents of 6
 - extracting 7
 - image file format 24
 - file system
 - displaying available file systems 2
 - displaying file information 3
 - local file system names 1
 - network file system names 4
 - setting the default 3
 - filtering
 - non-IP traffic 39
 - show and more command output 9
 - filtering show and more command output 9
 - filters, IP
 - See ACLs, IP
 - flash device, number of 1
 - flexible authentication ordering
 - configuring 62
 - overview 28
 - Flex Link Multicast Fast Convergence 3
 - Flex Links
 - configuration guidelines 8
 - configuring 9
 - configuring preferred VLAN 12
 - configuring VLAN load balancing 11
 - default configuration 8
 - description 2
 - link load balancing 2
 - monitoring 14
 - VLANs 2
 - flooded traffic, blocking 8
 - flow-based packet classification 12
 - flowcharts
 - QoS classification 6
 - QoS egress queueing and scheduling 16
 - QoS ingress queueing and scheduling 13
 - QoS policing and marking 10
 - flowcontrol
 - configuring 19
 - described 19
 - forward-delay time
 - MSTP 23
 - STP 21
 - FTP
 - accessing MIB files 3
 - configuration files
 - downloading 13
 - overview 12
 - preparing the server 13
 - uploading 14
 - image files

deleting old image [31](#)
 downloading [29](#)
 preparing the server [28](#)
 uploading [31](#)

G

general query [5](#)
 Generating IGMP Reports [4](#)
 get-bulk-request operation [3](#)
 get-next-request operation [3, 4](#)
 get-request operation [3, 4](#)
 get-response operation [3](#)
 global configuration mode [2](#)
 global leave, IGMP [12](#)
 guest VLAN and 802.1x [20](#)
 guide mode [2](#)
 GUIs
 See device manager and Network Assistant

H

hello time
 MSTP [22](#)
 STP [20](#)
 help, for the command line [3](#)
 history
 changing the buffer size [6](#)
 described [5](#)
 disabling [6](#)
 recalling commands [6](#)
 history table, level and number of syslog messages [10](#)
 host names, in clusters [12](#)
 hosts, limit on dynamic ports [28](#)
 HP OpenView [5](#)
 HSRP
 automatic cluster recovery [11](#)
 cluster standby group considerations [10](#)

See also clusters, cluster standby group, and standby command switch

HTTP over SSL
 see HTTPS
 HTTPS [44](#)
 configuring [48](#)
 self-signed certificate [45](#)
 HTTP secure server [44](#)

I

ICMP
 IPv6 [3](#)
 time-exceeded messages [16](#)
 traceroute and [16](#)
 ICMP ping
 executing [13](#)
 overview [13](#)
 ICMPv6 [3](#)
 IDS appliances
 and ingress RSPAN [20](#)
 and ingress SPAN [13](#)
 IEEE 802.1D
 See STP
 IEEE 802.1p [1](#)
 IEEE 802.1Q
 and trunk ports [3](#)
 configuration limitations [14](#)
 encapsulation [13](#)
 native VLAN for untagged traffic [18](#)
 IEEE 802.1s
 See MSTP
 IEEE 802.1w
 See RSTP
 IEEE 802.1x
 See port-based authentication
 IEEE 802.3ad
 See EtherChannel
 IEEE 802.3af

- See PoE
- IEEE 802.3x flow control [19](#)
- ifIndex values, SNMP [5](#)
- IFS [6](#)
- IGMP
 - configurable leave timer
 - described [5](#)
 - enabling [10](#)
 - flooded multicast traffic
 - controlling the length of time [11](#)
 - disabling on an interface [12](#)
 - global leave [12](#)
 - query solicitation [12](#)
 - recovering from flood mode [12](#)
 - joining multicast group [3](#)
 - join messages [3](#)
 - leave processing, enabling [10,9](#)
 - leaving multicast group [5](#)
 - queries [4](#)
 - report suppression
 - described [6](#)
 - disabling [15,11](#)
 - supported versions [2](#)
 - support for [4](#)
- IGMP filtering
 - configuring [24](#)
 - default configuration [24](#)
 - described [23](#)
 - monitoring [28](#)
 - support for [4](#)
- IGMP groups
 - configuring filtering [27](#)
 - setting the maximum number [26](#)
- IGMP Immediate Leave
 - configuration guidelines [10](#)
 - described [5](#)
 - enabling [10](#)
- IGMP profile
 - applying [25](#)
 - configuration mode [24](#)
 - configuring [25](#)
- IGMP snooping
 - and address aliasing [2](#)
 - configuring [6](#)
 - default configuration [6,5,6](#)
 - definition [1](#)
 - enabling and disabling [7,6](#)
 - global configuration [7](#)
 - Immediate Leave [5](#)
 - method [8](#)
 - monitoring [15,11](#)
 - querier
 - configuration guidelines [13](#)
 - configuring [13](#)
 - supported versions [2](#)
 - support for [4](#)
 - VLAN configuration [7](#)
- IGMP throttling
 - configuring [27](#)
 - default configuration [24](#)
 - described [24](#)
 - displaying action [28](#)
- Immediate Leave, IGMP [5](#)
 - enabling [9](#)
- inaccessible authentication bypass [22](#)
 - support for multiauth ports [23](#)
- initial configuration
 - defaults [14](#)
 - Express Setup [2](#)
- interface
 - number [9](#)
 - range macros [12](#)
- interface command [9 to 10](#)
- interface configuration mode [3](#)
- interfaces
 - auto-MDIX, configuring [20](#)
 - configuration guidelines
 - duplex and speed [17](#)

- configuring
 - procedure 10
 - counters, clearing 28
 - default configuration 14
 - described 25
 - descriptive name, adding 25
 - displaying information about 27
 - flow control 19
 - management 4
 - monitoring 27
 - naming 25
 - physical, identifying 9
 - range of 10
 - restarting 28
 - shutting down 28
 - speed and duplex, configuring 18
 - status 27
 - supported 9
 - types of 1
- interfaces range macro command 12
- interface types 9
- Internet Protocol version 6
- See IPv6
- Intrusion Detection System
- See IDS appliances
- inventory management TLV 3, 8
- IOS shell
- See Auto Smartports macros
- IP ACLs
- for QoS classification 7
 - implicit deny 25, 29
 - implicit masks 25
 - named 30
 - undefined 35
- IP addresses
- 128-bit 2
 - candidate or member 3, 12
 - cluster access 2
 - command switch 3, 10, 12
 - discovering 30
 - IPv6 2
 - redundant clusters 10
 - standby command switch 10, 12
 - See also IP information
- ip igmp profile command 24
- IP information
- assigned
 - manually 14
 - through DHCP-based autoconfiguration 3
 - default configuration 3
- IP phones
- and QoS 1
 - automatic classification and queuing 19
 - configuring 4
 - ensuring port security with QoS 35
 - trusted boundary for QoS 35
- IP Port Security for Static Hosts
- on a Layer 2 access port 17
- IP precedence 2
- IP-precedence-to-DSCP map for QoS 52
- IP protocols in ACLs 27
- IP Service Level Agreements
- See IP SLAs
- IP service levels, analyzing 1
- IP SLAs
- benefits 2
 - configuration guidelines 5
 - Control Protocol 4
 - default configuration 5
 - definition 1
 - measuring network performance 3
 - monitoring 6
 - operation 3
 - responder
 - described 4
 - enabling 6
 - response time 4
 - SNMP support 2

- supported metrics [2](#)
- IP source guard
 - and 802.1x [16](#)
 - and DHCP snooping [13](#)
 - and EtherChannels [16](#)
 - and port security [16](#)
 - and private VLANs [16](#)
 - and routed ports [15](#)
 - and TCAM entries [16](#)
 - and trunk interfaces [15](#)
 - and VRF [16](#)
 - binding configuration
 - automatic [13](#)
 - manual [13](#)
 - binding table [13](#)
 - configuration guidelines [15](#)
 - default configuration [15](#)
 - described [13](#)
 - disabling [17](#)
 - displaying
 - active IP or MAC bindings [21](#)
 - bindings [21](#)
 - configuration [21](#)
 - enabling [16,17](#)
 - filtering
 - source IP address [14](#)
 - source IP and MAC address [14](#)
 - source IP address filtering [14](#)
 - source IP and MAC address filtering [14](#)
 - static bindings
 - adding [16,17](#)
 - deleting [17](#)
 - static hosts [17](#)
- IP traceroute
 - executing [17](#)
 - overview [16](#)
- IPv4 ACLs
 - applying to interfaces [34](#)
 - extended, creating [26](#)

- named [30](#)
- standard, creating [25](#)
- IPv4 and IPv6
 - dual protocol stacks [4](#)
- IPv6
 - addresses [2](#)
 - address formats [2](#)
 - applications [4](#)
 - assigning address [6](#)
 - autoconfiguration [4](#)
 - configuring static routes [10](#)
 - default configuration [6](#)
 - defined [1](#)
 - forwarding [6](#)
 - ICMP [3](#)
 - monitoring [11](#)
 - neighbor discovery [3](#)
 - SDM templates [1](#)
 - Stateless Autoconfiguration [4](#)
 - supported features [2](#)
 - understanding static routes [5](#)

J

- join messages, IGMP [3](#)

L

- LACP
 - See EtherChannel
- Layer 2 frames, classification with CoS [2](#)
- Layer 2 interfaces, default configuration [14](#)
- Layer 2 traceroute
 - and ARP [15](#)
 - and CDP [15](#)
 - broadcast traffic [14](#)
 - described [14](#)
 - IP addresses and subnets [15](#)

- MAC addresses and VLANs [15](#)
 - multicast traffic [15](#)
 - multiple devices on a port [15](#)
 - unicast traffic [14](#)
 - usage guidelines [15](#)
 - Layer 3 features [13](#)
 - Layer 3 interfaces
 - assigning IPv6 addresses to [7](#)
 - Layer 3 packets, classification methods [2](#)
 - Leaking IGMP Reports [4](#)
 - LEDs, switch
 - See hardware installation guide
 - line configuration mode [3](#)
 - Link Aggregation Control Protocol
 - See EtherChannel
 - link failure, detecting unidirectional [7](#)
 - Link Layer Discovery Protocol
 - See CDP
 - link local unicast addresses [3](#)
 - link redundancy
 - See Flex Links
 - links, unidirectional [1](#)
 - link-state tracking
 - configuring [20](#)
 - described [17](#)
 - LLDP
 - configuring [5](#)
 - characteristics [7](#)
 - default configuration [5](#)
 - enabling [6](#)
 - monitoring and maintaining [11](#)
 - overview [1](#)
 - supported TLVs [2](#)
 - switch stack considerations [2](#)
 - transmission timer and holdtime, setting [7](#)
 - LLDP-MED
 - configuring
 - procedures [5](#)
 - TLVs [7](#)
 - monitoring and maintaining [11](#)
 - overview [1, 2](#)
 - supported TLVs [2](#)
 - LLDP Media Endpoint Discovery
 - See LLDP-MED
 - local SPAN [2](#)
 - location TLV [3, 8](#)
 - login authentication
 - with RADIUS [28](#)
 - with TACACS+ [14](#)
 - login banners [17](#)
 - log messages
 - See system message logging
 - Long-Reach Ethernet (LRE) technology [19](#)
 - loop guard
 - described [9](#)
 - enabling [15](#)
 - support for [8](#)
 - LRE profiles, considerations in switch clusters [13](#)
-
- ## M
- MAB
 - See MAC authentication bypass
 - MAB inactivity timer
 - default setting [33](#)
 - range [35](#)
 - MAC/PHY configuration status TLV [2](#)
 - MAC addresses
 - aging time [21](#)
 - and VLAN association [20](#)
 - building the address table [20](#)
 - default configuration [20](#)
 - disabling learning on a VLAN [29](#)
 - discovering [30](#)
 - displaying [29](#)
 - displaying in the IP source binding table [21](#)
 - dynamic
 - learning [20](#)

- removing [21](#)
- in ACLs [39](#)
- static
 - adding [26](#)
 - allowing [28, 29](#)
 - characteristics of [26](#)
 - dropping [28](#)
 - removing [27](#)
- MAC address learning [5](#)
- MAC address learning, disabling on a VLAN [29](#)
- MAC address notification, support for [14](#)
- MAC address-table move update
 - configuration guidelines [8](#)
 - configuring [12](#)
 - default configuration [8](#)
 - description [6](#)
 - monitoring [14](#)
- MAC address-to-VLAN mapping [22](#)
- MAC authentication bypass [35](#)
 - configuring [54](#)
 - overview [16](#)
- MAC extended access lists
 - applying to Layer 2 interfaces [40](#)
 - configuring for QoS [42](#)
 - creating [39](#)
 - defined [39](#)
 - for QoS classification [5](#)
- macros
 - See Auto Smartports macros
 - See Smartports macros
- magic packet [25](#)
- manageability features [5](#)
- management access
 - in-band
 - browser session [6](#)
 - CLI session [6](#)
 - device manager [6](#)
 - SNMP [6](#)
 - out-of-band console port connection [6](#)
 - management address TLV [2](#)
 - management options
 - CLI [1](#)
 - clustering [3](#)
 - Network Assistant [2](#)
 - overview [4](#)
 - management VLAN
 - considerations in switch clusters [7](#)
 - discovery through different management VLANs [7](#)
 - mapping tables for QoS
 - configuring
 - CoS-to-DSCP [51](#)
 - DSCP [50](#)
 - DSCP-to-CoS [54](#)
 - DSCP-to-DSCP-mutation [55](#)
 - IP-precedence-to-DSCP [52](#)
 - policed-DSCP [53](#)
 - described [10](#)
 - marking
 - action with aggregate policers [48](#)
 - described [4, 8](#)
 - matching, IPv4 ACLs [23](#)
 - maximum aging time
 - MSTP [23](#)
 - STP [21](#)
 - maximum hop count, MSTP [24](#)
 - maximum number of allowed devices, port-based authentication [35](#)
 - MDA
 - configuration guidelines [13](#)
 - described [10, 12](#)
 - exceptions with authentication process [6](#)
 - Medianet
 - See Auto Smartports macros
 - membership mode, VLAN port [3](#)
 - member switch
 - automatic discovery [4](#)
 - defined [2](#)
 - managing [14](#)

- passwords [12](#)
- recovering from lost connectivity [11](#)
- requirements [3](#)
- See also candidate switch, cluster standby group, and standby command switch
- messages, to users through banners [17](#)
- MIBs
 - accessing files with FTP [3](#)
 - location of files [3](#)
 - overview [1](#)
 - SNMP interaction with [4](#)
 - supported [1](#)
- mirroring traffic for analysis [1](#)
- mismatches, autonegotiation [11](#)
- module number [9](#)
- monitoring
 - access groups [42](#)
 - cables for unidirectional links [1](#)
 - CDP [4](#)
 - features [14](#)
 - Flex Links [14](#)
 - IGMP
 - filters [28](#)
 - snooping [15, 11](#)
 - interfaces [27](#)
 - IP SLAs operations [6](#)
 - IPv4 ACL configuration [42](#)
 - IPv6 [11](#)
 - MAC address-table move update [14](#)
 - multicast router interfaces [16, 11](#)
 - MVR [23](#)
 - network traffic for analysis with probe [2](#)
 - port
 - blocking [18](#)
 - protection [18](#)
 - SFP status [27, 13](#)
 - speed and duplex mode [18](#)
 - traffic flowing among switches [1](#)
 - traffic suppression [18](#)
 - VLANs [12](#)
 - VMPS [27](#)
 - VTP [16](#)
- mrouter Port [3](#)
- mrouter port [5](#)
- MSTP
 - boundary ports
 - configuration guidelines [15](#)
 - described [6](#)
 - BPDU filtering
 - described [3](#)
 - enabling [12](#)
 - BPDU guard
 - described [2](#)
 - enabling [11](#)
 - CIST, described [3](#)
 - CIST regional root [3](#)
 - CIST root [5](#)
 - configuration guidelines [14, 10](#)
 - configuring
 - forward-delay time [23](#)
 - hello time [22](#)
 - link type for rapid convergence [24](#)
 - maximum aging time [23](#)
 - maximum hop count [24](#)
 - MST region [15](#)
 - neighbor type [25](#)
 - path cost [20](#)
 - port priority [19](#)
 - root switch [17](#)
 - secondary root switch [18](#)
 - switch priority [21](#)
 - CST
 - defined [3](#)
 - operations between regions [3](#)
 - default configuration [14](#)
 - default optional feature configuration [9](#)
 - displaying status [26](#)
 - enabling the mode [15](#)

- EtherChannel guard
 - described [7](#)
 - enabling [14](#)
- extended system ID
 - effects on root switch [17](#)
 - effects on secondary root switch [18](#)
 - unexpected behavior [17](#)
- IEEE 802.1s
 - implementation [6](#)
 - port role naming change [6](#)
 - terminology [5](#)
- instances supported [9](#)
- interface state, blocking to forwarding [2](#)
- interoperability and compatibility among modes [10](#)
- interoperability with IEEE 802.1D
 - described [8](#)
 - restarting migration process [25](#)
- IST
 - defined [2](#)
 - master [3](#)
 - operations within a region [3](#)
- loop guard
 - described [9](#)
 - enabling [15](#)
- mapping VLANs to MST instance [16](#)
- MST region
 - CIST [3](#)
 - configuring [15](#)
 - described [2](#)
 - hop-count mechanism [5](#)
 - IST [2](#)
 - supported spanning-tree instances [2](#)
- optional features supported [8](#)
- overview [2](#)
- Port Fast
 - described [2](#)
 - enabling [10](#)
- preventing root switch selection [8](#)
- root guard
 - described [8](#)
 - enabling [15](#)
- root switch
 - configuring [17](#)
 - effects of extended system ID [17](#)
 - unexpected behavior [17](#)
- shutdown Port Fast-enabled port [2](#)
- status, displaying [26](#)
- multiauth
 - support for inaccessible authentication bypass [23](#)
- multiauth mode
 - See multiple-authentication mode
- multicast groups
 - Immediate Leave [5](#)
 - joining [3](#)
 - leaving [5](#)
 - static joins [9,7](#)
- multicast router interfaces, monitoring [16,11](#)
- multicast router ports, adding [9,8](#)
- multicast storm [1](#)
- multicast storm-control command [4](#)
- multicast television application [17](#)
- multicast VLAN [16](#)
- Multicast VLAN Registration
 - See MVR
- multidomain authentication
 - See MDA
- multiple authentication [14](#)
- multiple authentication mode
 - configuring [41](#)
- MVR
 - and address aliasing [20](#)
 - and IGMPv3 [20](#)
 - configuration guidelines [19](#)
 - configuring interfaces [21](#)
 - default configuration [19](#)
 - described [16](#)
 - example application [17](#)
 - modes [20](#)

- monitoring [23](#)
- multicast television application [17](#)
- setting global parameters [20](#)
- support for [4](#)

N

NAC

- critical authentication [22, 51](#)
- IEEE 802.1x authentication using a RADIUS server [57](#)
- IEEE 802.1x validation using RADIUS server [57](#)
- inaccessible authentication bypass [51](#)
- Layer 2 IEEE 802.1x validation [11, 28, 57](#)

named IPv4 ACLs [30](#)

native VLAN

- configuring [18](#)
- default [18](#)

NEAT

- configuring [58](#)
- overview [29](#)

neighbor discovery, IPv6 [3](#)

Network Admission Control

See NAC

Network Assistant

- benefits [2](#)
- described [4](#)
- downloading image files [2](#)
- guide mode [2](#)
- management options [2](#)
- upgrading a switch [23](#)
- wizards [2](#)

network configuration examples

- increasing network performance [18](#)
- long-distance, high-bandwidth transport [22](#)
- providing network services [18](#)
- server aggregation and Linux server cluster [20](#)
- small to medium-sized network [21](#)

network design

- performance [18](#)

- services [18](#)

Network Edge Access Topology

See NEAT

network management

- CDP [1](#)
- RMON [1](#)
- SNMP [1](#)

network performance, measuring with IP SLAs [3](#)

network policy TLV [2, 8](#)

Network Time Protocol

See NTP

no commands [4](#)

nonhierarchical policy maps

described [9](#)

non-IP traffic filtering [39](#)

nontrunking mode [13](#)

normal-range VLANs [4](#)

- configuration guidelines [6](#)

- configuring [4](#)

- defined [1](#)

NTP

associations

- authenticating [4](#)
- defined [2](#)
- enabling broadcast messages [6](#)
- peer [5](#)
- server [5](#)

default configuration [4](#)

displaying the configuration [11](#)

overview [2](#)

restricting access

- creating an access group [8](#)
- disabling NTP services per interface [10](#)

source IP address, configuring [10](#)

stratum [2](#)

support for [6](#)

synchronizing devices [5](#)

time

services [2](#)
 synchronizing [2](#)

O

off mode, VTP [3](#)
 open1x
 configuring [63](#)
 open1x authentication
 overview [29](#)
 optimizing system resources [1](#)
 options, management [4](#)
 out-of-profile markdown [13](#)

P

packet modification, with QoS [18](#)
 PAgP
 See EtherChannel
 passwords
 default configuration [2](#)
 disabling recovery of [5](#)
 encrypting [3](#)
 for security [9](#)
 in clusters [12](#)
 overview [1](#)
 recovery of [3](#)
 setting
 enable [3](#)
 enable secret [3](#)
 Telnet [6](#)
 with usernames [6](#)
 VTP domain [9](#)
 path cost
 MSTP [20](#)
 STP [18](#)
 PC (passive command switch) [9](#)
 performance, network design [18](#)

performance features [3](#)
 persistent self-signed certificate [45](#)
 per-user ACLs and Filter-Ids [9](#)
 per-VLAN spanning-tree plus
 See PVST+
 physical ports [2](#)
 PIM-DVMRP, as snooping method [8](#)
 ping
 character output description [14](#)
 executing [13](#)
 overview [13](#)
 PoE
 auto mode [6](#)
 CDP with power consumption, described [4](#)
 CDP with power negotiation, described [4](#)
 Cisco intelligent power management [4](#)
 configuring [21](#)
 cutoff power
 determining [7](#)
 cutoff-power
 support for [7](#)
 devices supported [4](#)
 high-power devices operating in low-power mode [5](#)
 IEEE power classification levels [5](#)
 monitoring [7](#)
 monitoring power [24](#)
 policing power consumption [24](#)
 policing power usage [7](#)
 power budgeting [22](#)
 power consumption [8,22](#)
 powered-device detection and initial power allocation [5](#)
 power management modes [6](#)
 power monitoring [7](#)
 power negotiation extensions to CDP [4](#)
 power sensing [7](#)
 standards supported [4](#)
 static mode [6](#)
 total available power [8](#)

- troubleshooting **11**
- policed-DSCP map for QoS **53**
- policers
 - configuring
 - for each matched traffic class **45**
 - for more than one traffic class **48**
 - described **4**
 - displaying **68**
 - number of **31**
 - types of **9**
- policing
 - described **4**
 - token-bucket algorithm **9**
- policy maps for QoS
 - characteristics of **45**
 - described **7**
 - displaying **69**
 - nonhierarchical on physical ports
 - described **9**
- port ACLs, described **20**
- Port Aggregation Protocol
 - See EtherChannel
- port-based authentication
 - accounting **15**
 - authentication server
 - defined **3, 2**
 - RADIUS server **3**
 - client, defined **3, 2**
 - configuration guidelines **33, 9**
 - configuring
 - 802.1x authentication **39**
 - guest VLAN **48**
 - host mode **41**
 - inaccessible authentication bypass **51**
 - manual re-authentication of a client **44**
 - periodic re-authentication **43**
 - quiet period **44**
 - RADIUS server **41, 13**
 - RADIUS server parameters on the switch **40, 11**
 - restricted VLAN **49**
 - switch-to-client frame-retransmission number **45, 46**
 - switch-to-client retransmission time **45**
 - violation modes **38**
- default configuration **32, 9**
- described **1**
- device roles **3, 2**
- displaying statistics **64, 17**
- downloadable ACLs and redirect URLs
 - configuring **59 to 61, ?? to 62**
 - overview **19 to 20**
- EAPOL-start frame **6**
- EAP-request/identity frame **6**
- EAP-response/identity frame **6**
- enabling
 - 802.1X authentication **11**
- encapsulation **3**
- flexible authentication ordering
 - configuring **62**
 - overview **28**
- guest VLAN
 - configuration guidelines **21, 22**
 - described **20**
- host mode **12**
- inaccessible authentication bypass
 - configuring **51**
 - described **22**
 - guidelines **34**
- initiation and message exchange **6**
- magic packet **25**
- maximum number of allowed devices per port **35**
- method lists **39**
- multiple authentication **14**
- per-user ACLs
 - configuration tasks **19**
 - described **18**
 - RADIUS server attributes **18**
- ports

- authorization state and dot1x port-control command **11**
- authorized and unauthorized **11**
- voice VLAN **24**
- port security
 - and voice VLAN **25**
 - described **24**
 - interactions **25**
 - multiple-hosts mode **12**
- readiness check
 - configuring **35**
 - described **16, 35**
- resetting to default values **64**
- statistics, displaying **64**
- switch
 - as proxy **3, 2**
 - RADIUS client **3**
- switch supplicant
 - configuring **58**
 - overview **29**
- user distribution
 - guidelines **27**
 - overview **27**
- VLAN assignment
 - AAA authorization **39**
 - characteristics **17**
 - configuration tasks **17**
 - described **16**
- voice aware 802.1x security
 - configuring **36**
 - described **29, 36**
- voice VLAN
 - described **24**
 - PVID **24**
 - VVID **24**
- wake-on-LAN, described **25**
- with ACLs and RADIUS Filter-Id attribute **31**
- port-based authentication methods, supported **8**
- port blocking **3, 7**
- port-channel
 - See EtherChannel
- port description TLV **2**
- Port Fast
 - described **2**
 - enabling **10**
 - mode, spanning tree **24**
 - support for **8**
- port membership modes, VLAN **3**
- port priority
 - MSTP **19**
 - STP **16**
- ports
 - access **2**
 - blocking **7**
 - dual-purpose uplink **4**
 - dynamic access **4**
 - protected **6**
 - secure **8**
 - static-access **3, 9**
 - switch **2**
 - trunks **3, 13**
 - VLAN assignments **9**
- port security
 - aging **17**
 - and QoS trusted boundary **35**
 - configuring **12**
 - default configuration **11**
 - described **8**
 - displaying **18**
 - on trunk ports **14**
 - sticky learning **9**
 - violations **10**
 - with other features **11**
- port-shutdown response, VMPS **23**
- port VLAN ID TLV **2**
- power management TLV **2, 8**
- Power over Ethernet
 - See PoE

- preemption, default configuration [8](#)
- preemption delay, default configuration [8](#)
- preferential treatment of traffic
 - See QoS
- preventing unauthorized access [1](#)
- primary links [2](#)
- priority
 - overriding CoS [6](#)
 - trusting CoS [6](#)
- private VLAN edge ports
 - See protected ports
- privileged EXEC mode [2](#)
- privilege levels
 - changing the default for lines [9](#)
 - command switch [14](#)
 - exiting [9](#)
 - logging into [9](#)
 - mapping on member switches [14](#)
 - overview [2,7](#)
 - setting a command with [8](#)
- protected ports [9,6](#)
- proxy reports [4](#)
- pruning, VTP
 - disabling
 - in VTP domain [15](#)
 - on a port [18](#)
 - enabling
 - in VTP domain [14](#)
 - on a port [17](#)
 - examples [6](#)
 - overview [6](#)
- pruning-eligible list
 - changing [17](#)
 - for VTP pruning [6](#)
 - VLANs [15](#)
- PVST+
 - described [9](#)
 - IEEE 802.1Q trunking interoperability [10](#)
 - instances supported [9](#)

Q

QoS

- and MQC commands [1](#)
- auto-QoS
 - categorizing traffic [19](#)
 - configuration and defaults display [27](#)
 - configuration guidelines [24](#)
 - described [19](#)
 - disabling [25](#)
 - displaying generated commands [25](#)
 - displaying the initial configuration [27](#)
 - effects on running configuration [24](#)
 - egress queue defaults [20](#)
 - enabling for VoIP [25](#)
 - example configuration [26](#)
 - ingress queue defaults [20](#)
 - list of generated commands [21](#)
- basic model [4](#)
- classification
 - class maps, described [7](#)
 - defined [4](#)
 - DSCP transparency, described [36](#)
 - flowchart [6](#)
 - forwarding treatment [3](#)
 - in frames and packets [3](#)
 - IP ACLs, described [5,7](#)
 - MAC ACLs, described [5,7](#)
 - options for IP traffic [5](#)
 - options for non-IP traffic [5](#)
 - policy maps, described [7](#)
 - trust DSCP, described [5](#)
 - trusted CoS, described [5](#)
 - trust IP precedence, described [5](#)
- class maps
 - configuring [43](#)
 - displaying [68](#)
- configuration guidelines
 - auto-QoS [24](#)

- standard QoS 31
- configuring
 - aggregate policers 48
 - auto-QoS 19
 - default port CoS value 34
 - DSCP maps 50
 - DSCP transparency 36
 - DSCP trust states bordering another domain 37
 - egress queue characteristics 60
 - ingress queue characteristics 56
 - IP extended ACLs 41
 - IP standard ACLs 40
 - MAC ACLs 42
 - port trust states within the domain 33
 - trusted boundary 35
- default auto configuration 19
- default standard configuration 28
- displaying statistics 68
- DSCP transparency 36
- egress queues
 - allocating buffer space 61
 - buffer allocation scheme, described 16
 - configuring shaped weights for SRR 65
 - configuring shared weights for SRR 66
 - described 4
 - displaying the threshold map 64
 - flowchart 16
 - mapping DSCP or CoS values 63
 - scheduling, described 4
 - setting WTD thresholds 61
 - WTD, described 17
- enabling globally 32
- flowcharts
 - classification 6
 - egress queueing and scheduling 16
 - ingress queueing and scheduling 13
 - policing and marking 10
- implicit deny 7
- ingress queues
 - allocating bandwidth 58
 - allocating buffer space 58
 - buffer and bandwidth allocation, described 14
 - configuring shared weights for SRR 58
 - configuring the priority queue 59
 - described 4
 - displaying the threshold map 57
 - flowchart 13
 - mapping DSCP or CoS values 57
 - priority queue, described 14
 - scheduling, described 4
 - setting WTD thresholds 57
 - WTD, described 14
- IP phones
 - automatic classification and queueing 19
 - detection and trusted settings 19, 35
- limiting bandwidth on egress interface 67
- mapping tables
 - CoS-to-DSCP 51
 - displaying 68
 - DSCP-to-CoS 54
 - DSCP-to-DSCP-mutation 55
 - IP-precedence-to-DSCP 52
 - policed-DSCP 53
 - types of 10
- marked-down actions 47
- marking, described 4, 8
- overview 2
- packet modification 18
- policers
 - configuring 47, 49
 - described 8
 - displaying 68
 - number of 31
 - types of 9
- policies, attaching to an interface 8
- policing
 - described 4, 8
 - token bucket algorithm 9

- policy maps
 - characteristics of [45](#)
 - displaying [69](#)
 - nonhierarchical on physical ports [45](#)
 - QoS label, defined [4](#)
 - queues
 - configuring egress characteristics [60](#)
 - configuring ingress characteristics [56](#)
 - high priority (expedite) [18, 67](#)
 - location of [11](#)
 - SRR, described [12](#)
 - WTD, described [12](#)
 - rewrites [18](#)
 - support for [12](#)
 - trust states
 - bordering another domain [37](#)
 - described [5](#)
 - trusted device [35](#)
 - within the domain [33](#)
 - quality of service
 - See QoS
 - queries, IGMP [4](#)
 - query solicitation, IGMP [12](#)
-
- ## R
- RADIUS
 - attributes
 - vendor-proprietary [36](#)
 - vendor-specific [34](#)
 - configuring
 - accounting [33](#)
 - authentication [28](#)
 - authorization [32](#)
 - communication, global [26, 34](#)
 - communication, per-server [26](#)
 - multiple UDP ports [26](#)
 - default configuration [26](#)
 - defining AAA server groups [30](#)
 - displaying the configuration [38](#)
 - identifying the server [26](#)
 - in clusters [13](#)
 - limiting the services to the user [32](#)
 - method list, defined [25](#)
 - operation of [19](#)
 - overview [18](#)
 - server load balancing [38](#)
 - suggested network environments [18](#)
 - support for [11](#)
 - tracking services accessed by user [33](#)
 - RADIUS Change of Authorization [19](#)
 - range
 - macro [12](#)
 - of interfaces [11](#)
 - rapid convergence [9](#)
 - rapid per-VLAN spanning-tree plus
 - See rapid PVST+
 - rapid PVST+
 - described [9](#)
 - IEEE 802.1Q trunking interoperability [10](#)
 - instances supported [9](#)
 - Rapid Spanning Tree Protocol
 - See RSTP
 - rcommand command [14](#)
 - RCP
 - configuration files
 - downloading [17](#)
 - overview [15](#)
 - preparing the server [16](#)
 - uploading [18](#)
 - image files
 - deleting old image [35](#)
 - downloading [33](#)
 - preparing the server [32](#)
 - uploading [35](#)
 - readiness check
 - port-based authentication
 - configuring [35](#)

- described [16, 35](#)
- reconfirmation interval, VMPS, changing [26](#)
- reconfirming dynamic VLAN membership [26](#)
- recovery procedures [1](#)
- redirect URL [19, 59](#)
- redundancy
 - EtherChannel [3](#)
 - STP
 - backbone [8](#)
 - path cost [21](#)
 - port priority [19](#)
- redundant links and UplinkFast [13](#)
- reloading software [20](#)
- Remote Authentication Dial-In User Service
 - See RADIUS
- Remote Copy Protocol
 - See RCP
- Remote Network Monitoring
 - See RMON
- Remote SPAN
 - See RSPAN
- remote SPAN [2](#)
- report suppression, IGMP
 - described [6](#)
 - disabling [15, 11](#)
- resequencing ACL entries [30](#)
- reserved addresses in DHCP pools [22](#)
- resetting a UDLD-shutdown interface [6](#)
- responder, IP SLAs
 - described [4](#)
 - enabling [6](#)
- response time, measuring with IP SLAs [4](#)
- restricted VLAN
 - configuring [49](#)
 - described [21](#)
 - using with IEEE 802.1x [21](#)
- restricting access
 - NTP services [8](#)
 - overview [1](#)
 - passwords and privilege levels [2](#)
 - RADIUS [17](#)
 - TACACS+ [10](#)
- retry count, VMPS, changing [27](#)
- RFC
 - 1112, IP multicast and IGMP [2](#)
 - 1157, SNMPv1 [2](#)
 - 1305, NTP [2](#)
 - 1757, RMON [2](#)
 - 1901, SNMPv2C [2](#)
 - 1902 to 1907, SNMPv2 [2](#)
 - 2236, IP multicast and IGMP [2](#)
 - 2273-2275, SNMPv3 [2](#)
- RFC 5176 Compliance [20](#)
- RMON
 - default configuration [3](#)
 - displaying status [6](#)
 - enabling alarms and events [3](#)
 - groups supported [2](#)
 - overview [1](#)
 - statistics
 - collecting group Ethernet [5](#)
 - collecting group history [5](#)
 - support for [14](#)
- root guard
 - described [8](#)
 - enabling [15](#)
 - support for [8](#)
- root switch
 - MSTP [17](#)
 - STP [14](#)
- RSPAN
 - characteristics [7](#)
 - configuration guidelines [16](#)
 - default configuration [9](#)
 - defined [2](#)
 - destination ports [6](#)
 - displaying status [23](#)
 - interaction with other features [8](#)

- monitored ports [5](#)
 - monitoring ports [6](#)
 - overview [14, 1](#)
 - received traffic [4](#)
 - sessions
 - creating [17](#)
 - defined [3](#)
 - limiting source traffic to specific VLANs [22](#)
 - specifying monitored ports [17](#)
 - with ingress traffic enabled [20](#)
 - source ports [5](#)
 - transmitted traffic [5](#)
 - VLAN-based [6](#)
- RSTP**
- active topology [9](#)
 - BPDU
 - format [12](#)
 - processing [12](#)
 - designated port, defined [9](#)
 - designated switch, defined [9](#)
 - interoperability with IEEE 802.1D
 - described [8](#)
 - restarting migration process [25](#)
 - topology changes [13](#)
 - overview [8](#)
 - port roles
 - described [9](#)
 - synchronized [11](#)
 - proposal-agreement handshake process [10](#)
 - rapid convergence
 - described [9](#)
 - edge ports and Port Fast [9](#)
 - point-to-point links [10, 24](#)
 - root ports [10](#)
 - root port, defined [9](#)
 - See also MSTP
- running configuration
- replacing [19, 20](#)
 - rolling back [19, 20](#)
- running configuration, saving [15](#)
-
- S**
- SC (standby command switch) [9](#)
 - scheduled reloads [20](#)
 - SCP
 - and SSH [51](#)
 - configuring [51](#)
 - SDM
 - templates
 - configuring [3](#)
 - number of [1](#)
 - SDM template
 - configuration guidelines [2](#)
 - configuring [2](#)
 - types of [1](#)
 - Secure Copy Protocol
 - secure HTTP client
 - configuring [49](#)
 - displaying [50](#)
 - secure HTTP server
 - configuring [48](#)
 - displaying [50](#)
 - secure MAC addresses
 - deleting [16](#)
 - maximum number of [10](#)
 - types of [9](#)
 - secure ports, configuring [8](#)
 - secure remote connections [40](#)
 - Secure Shell
 - See SSH
 - Secure Socket Layer
 - See SSL
 - security, port [8](#)
 - security features [9](#)
 - See SCP
 - sequence numbers in log messages [8](#)
 - server mode, VTP [3](#)

- service-provider network, MSTP and RSTP [1](#)
- set-request operation [4](#)
- setup program
 - failed command switch replacement [9](#)
 - replacing failed command switch [8](#)
- severity levels, defining in system messages [8](#)
- SFPs
 - monitoring status of [27, 13](#)
 - security and identification [12](#)
 - status, displaying [13](#)
- shaped round robin
 - See SRR
- Shell functions
 - See Auto Smartports macros
- Shell triggers
 - See Auto Smartports macros
- show access-lists hw-summary command [36](#)
- show and more command output, filtering [9](#)
- show cdp traffic command [5](#)
- show cluster members command [14](#)
- show configuration command [25](#)
- show forward command [20](#)
- show interfaces command [18, 25](#)
- show interfaces switchport [4](#)
- show lldp traffic command [12](#)
- show platform forward command [20](#)
- show running-config command
 - displaying ACLs [34, 35](#)
 - interface description in [25](#)
- shutdown command on interfaces [28](#)
- Simple Network Management Protocol
 - See SNMP
- small-frame arrival rate, configuring [5](#)
- Smartports macros
 - applying Cisco-default macros [18](#)
 - applying global parameter values [18](#)
 - configuration guidelines [17](#)
 - default configuration [17](#)
 - defined [1](#)
 - displaying [19](#)
 - tracing [17](#)
- SNAP [1](#)
- SNMP
 - accessing MIB variables with [4](#)
 - agent
 - described [4](#)
 - disabling [7](#)
 - and IP SLAs [2](#)
 - authentication level [10](#)
 - community strings
 - configuring [8](#)
 - for cluster switches [4](#)
 - overview [4](#)
 - configuration examples [17](#)
 - default configuration [6](#)
 - engine ID [7](#)
 - groups [7, 9](#)
 - host [7](#)
 - ifIndex values [5](#)
 - in-band management [6](#)
 - in clusters [13](#)
 - informs
 - and trap keyword [11](#)
 - described [5](#)
 - differences from traps [5](#)
 - disabling [15](#)
 - enabling [15](#)
 - limiting access by TFTP servers [16](#)
 - limiting system log messages to NMS [10](#)
 - manager functions [5, 3](#)
 - managing clusters with [14](#)
 - MIBs
 - location of [3](#)
 - supported [1](#)
 - notifications [5](#)
 - overview [1, 4](#)
 - security levels [3](#)
 - setting CPU threshold notification [15](#)

- status, displaying [18](#)
- system contact and location [16](#)
- trap manager, configuring [13](#)
- traps
 - described [3, 5](#)
 - differences from informs [5](#)
 - disabling [15](#)
 - enabling [11](#)
 - enabling MAC address notification [21, 23, 25](#)
 - overview [1, 4](#)
 - types of [12](#)
- users [7, 9](#)
- versions supported [2](#)
- SNMP and Syslog Over IPv6 [5](#)
- SNMPv1 [2](#)
- SNMPv2C [2](#)
- SNMPv3 [2](#)
- snooping, IGMP [1](#)
- software images
 - location in flash [23](#)
 - recovery procedures [2](#)
 - scheduling reloads [20](#)
 - tar file format, described [24](#)
 - See also downloading and uploading
- source addresses
 - in IPv4 ACLs [27](#)
- source-and-destination-IP address based forwarding, EtherChannel [7](#)
- source-and-destination MAC address forwarding, EtherChannel [7](#)
- source-IP address based forwarding, EtherChannel [7](#)
- source-MAC address forwarding, EtherChannel [7](#)
- SPAN
 - configuration guidelines [10](#)
 - default configuration [9](#)
 - destination ports [6](#)
 - displaying status [23](#)
 - interaction with other features [8](#)
 - monitored ports [5](#)
 - monitoring ports [6](#)
 - overview [14, 1](#)
 - ports, restrictions [12](#)
 - received traffic [4](#)
 - sessions
 - configuring ingress forwarding [14, 21](#)
 - creating [10](#)
 - defined [3](#)
 - limiting source traffic to specific VLANs [15](#)
 - removing destination (monitoring) ports [12](#)
 - specifying monitored ports [10](#)
 - with ingress traffic enabled [13](#)
 - source ports [5](#)
 - transmitted traffic [5](#)
 - VLAN-based [6](#)
- spanning tree and native VLANs [14](#)
- Spanning Tree Protocol
 - See STP
- SPAN traffic [4](#)
- SRR
 - configuring
 - shaped weights on egress queues [65](#)
 - shared weights on egress queues [66](#)
 - shared weights on ingress queues [58](#)
 - described [12](#)
 - shaped mode [13](#)
 - shared mode [13](#)
 - support for [13](#)
- SSH
 - configuring [41](#)
 - cryptographic software image [39](#)
 - described [6, 40](#)
 - encryption methods [40](#)
 - user authentication methods, supported [40](#)
- SSL
 - configuration guidelines [47](#)
 - configuring a secure HTTP client [49](#)
 - configuring a secure HTTP server [48](#)
 - cryptographic software image [44](#)

- described [44](#)
- monitoring [50](#)
- standby command switch
 - configuring
 - considerations [10](#)
 - defined [2](#)
 - priority [9](#)
 - requirements [3](#)
 - virtual IP address [10](#)
 - See also cluster standby group and HSRP
- standby group, cluster
 - See cluster standby group and HSRP
- standby links [2](#)
- startup configuration
 - booting
 - manually [17](#)
 - specific image [18](#)
 - clearing [19](#)
 - configuration file
 - automatically downloading [16](#)
 - specifying the filename [16](#)
 - default boot configuration [16](#)
- static access ports
 - assigning to VLAN [9](#)
 - defined [3](#)
- static addresses
 - See addresses
- static MAC addressing [9](#)
- static routes
 - configuring for IPv6 [10](#)
 - understanding [5](#)
- static VLAN membership [2](#)
- statistics
 - 802.1X [17](#)
 - 802.1x [64](#)
 - CDP [4](#)
 - interface [27](#)
 - LLDP [11](#)
 - LLDP-MED [11](#)
 - NMSP [11](#)
 - QoS ingress and egress [68](#)
 - RMON group Ethernet [5](#)
 - RMON group history [5](#)
 - SNMP input and output [18](#)
 - VTP [16](#)
- sticky learning [9](#)
- storm control
 - configuring [3](#)
 - described [1](#)
 - disabling [5](#)
 - displaying [18](#)
 - support for [3](#)
 - thresholds [1](#)
- STP
 - accelerating root port selection [4](#)
 - BackboneFast
 - described [5](#)
 - disabling [14](#)
 - enabling [13](#)
 - BPDU filtering
 - described [3](#)
 - disabling [12](#)
 - enabling [12](#)
 - BPDU guard
 - described [2](#)
 - disabling [12](#)
 - enabling [11](#)
 - BPDU message exchange [3](#)
 - configuration guidelines [12, 10](#)
 - configuring
 - forward-delay time [21](#)
 - hello time [20](#)
 - maximum aging time [21](#)
 - path cost [18](#)
 - port priority [16](#)
 - root switch [14](#)
 - secondary root switch [16](#)
 - spanning-tree mode [13](#)

- switch priority [19](#)
 - transmit hold-count [22](#)
- counters, clearing [22](#)
- default configuration [11](#)
- default optional feature configuration [9](#)
- designated port, defined [3](#)
- designated switch, defined [3](#)
- detecting indirect link failures [5](#)
- disabling [14](#)
- displaying status [22](#)
- EtherChannel guard
 - described [7](#)
 - disabling [14](#)
 - enabling [14](#)
- extended system ID
 - effects on root switch [14](#)
 - effects on the secondary root switch [16](#)
 - overview [4](#)
 - unexpected behavior [14](#)
- features supported [7](#)
- IEEE 802.1D and bridge ID [4](#)
- IEEE 802.1D and multicast addresses [8](#)
- IEEE 802.1t and VLAN identifier [4](#)
- inferior BPDU [3](#)
- instances supported [9](#)
- interface state, blocking to forwarding [2](#)
- interface states
 - blocking [5](#)
 - disabled [7](#)
 - forwarding [5,6](#)
 - learning [6](#)
 - listening [6](#)
 - overview [4](#)
- interoperability and compatibility among modes [10](#)
- limitations with IEEE 802.1Q trunks [10](#)
- load sharing
 - overview [19](#)
 - using path costs [21](#)
 - using port priorities [19](#)
- loop guard
 - described [9](#)
 - enabling [15](#)
 - modes supported [9](#)
 - multicast addresses, effect of [8](#)
 - optional features supported [8](#)
 - overview [2](#)
 - path costs [21](#)
 - Port Fast
 - described [2](#)
 - enabling [10](#)
 - port priorities [20](#)
 - preventing root switch selection [8](#)
 - protocols supported [9](#)
 - redundant connectivity [8](#)
 - root guard
 - described [8](#)
 - enabling [15](#)
 - root port, defined [3](#)
 - root switch
 - configuring [14](#)
 - effects of extended system ID [4, 14](#)
 - election [3](#)
 - unexpected behavior [14](#)
 - shutdown Port Fast-enabled port [2](#)
 - status, displaying [22](#)
 - superior BPDU [3](#)
 - timers, described [20](#)
 - UplinkFast
 - described [3](#)
 - enabling [13](#)
 - stratum, NTP [2](#)
 - success response, VMPS [23](#)
 - summer time [13](#)
 - SunNet Manager [5](#)
 - supported port-based authentication methods [8](#)
 - Smartports macros
 - See also Auto Smartports macros
 - switch [2](#)

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

- tar files
 - creating [6](#)
 - displaying the contents of [6](#)
 - extracting [7](#)
 - image file format [24](#)
- TDR [14](#)
- Telnet
 - accessing management interfaces [10](#)
 - number of connections [6](#)
 - setting a password [6](#)
- temporary self-signed certificate [45](#)
- Terminal Access Controller Access Control System Plus
 - See TACACS+
- terminal lines, setting a password [6](#)
- TFTP
 - configuration files
 - downloading [11](#)
 - preparing the server [10](#)
 - uploading [11](#)
 - configuration files in base directory [7](#)
 - configuring for autoconfiguration [7](#)
 - image files
 - deleting [27](#)
 - downloading [25](#)
 - preparing the server [25](#)
 - uploading [27](#)
 - limiting access by servers [16](#)
- TFTP server [5](#)
- threshold, traffic level [2](#)
- time
 - See NTP and system clock
- Time Domain Reflector
 - See TDR
- time-range command [32](#)
- time ranges in ACLs [32](#)
- time stamps in log messages [7](#)
- time zones [12](#)
- TLVs
 - defined [1](#)
- LLDP [2](#)
- LLDP-MED [2](#)
- Token Ring VLANs
 - support for [5](#)
 - VTP support [4](#)
- ToS [12](#)
- traceroute, Layer 2
 - and ARP [15](#)
 - and CDP [15](#)
 - broadcast traffic [14](#)
 - described [14](#)
 - IP addresses and subnets [15](#)
 - MAC addresses and VLANs [15](#)
 - multicast traffic [15](#)
 - multiple devices on a port [15](#)
 - unicast traffic [14](#)
 - usage guidelines [15](#)
- traceroute command [17](#)
 - See also IP traceroute
- traffic
 - blocking flooded [8](#)
 - fragmented [21](#)
 - unfragmented [21](#)
- traffic policing [13](#)
- traffic suppression [1](#)
- transmit hold-count
 - see STP
- transparent mode, VTP [3](#)
- trap-door mechanism [2](#)
- traps
 - configuring MAC address notification [21, 23, 25](#)
 - configuring managers [11](#)
 - defined [3](#)
 - enabling [21, 23, 25, 11](#)
 - notification types [12](#)
 - overview [1, 4](#)
- troubleshooting
 - connectivity problems [13, 14, 16](#)
 - CPU utilization [23](#)

- detecting unidirectional links [1](#)
- displaying crash information [22](#)
- setting packet forwarding [20](#)
- SFP security and identification [12](#)
- show forward command [20](#)
- with CiscoWorks [4](#)
- with debug commands [18](#)
- with ping [13](#)
- with system message logging [1](#)
- with traceroute [16](#)
- trunk failover
 - See link-state tracking
- trunking encapsulation [8](#)
- trunk ports
 - configuring [15](#)
 - defined [3](#)
- trunks
 - allowed-VLAN list [16](#)
 - load sharing
 - setting STP path costs [21](#)
 - using STP port priorities [19, 20](#)
 - native VLAN for untagged traffic [18](#)
 - parallel [21](#)
 - pruning-eligible list [17](#)
 - to non-DTP device [13](#)
- trusted boundary for QoS [35](#)
- trusted port states
 - between QoS domains [37](#)
 - classification options [5](#)
 - ensuring port security for IP phones [35](#)
 - support for [12](#)
 - within a QoS domain [33](#)
- trustpoints, CA [44](#)
- twisted-pair Ethernet, detecting unidirectional links [1](#)
- type of service
 - See ToS

U

- UDLD
 - configuration guidelines [4](#)
 - default configuration [4](#)
 - disabling
 - globally [5](#)
 - on fiber-optic interfaces [5](#)
 - per interface [5](#)
 - echoing detection mechanism [2](#)
 - enabling
 - globally [5](#)
 - per interface [5](#)
 - link-detection mechanism [1](#)
 - neighbor database [2](#)
 - overview [1](#)
 - resetting an interface [6](#)
 - status, displaying [6](#)
 - support for [7](#)
- unauthorized ports with IEEE 802.1x [11](#)
- unicast MAC address filtering [5](#)
 - and adding static addresses [27](#)
 - and broadcast MAC addresses [27](#)
 - and CPU packets [27](#)
 - and multicast addresses [27](#)
 - and router MAC addresses [27](#)
 - configuration guidelines [27](#)
 - described [27](#)
- unicast storm [1](#)
- unicast storm control command [4](#)
- unicast traffic, blocking [8](#)
- UniDirectional Link Detection protocol
 - See UDLD
- UNIX syslog servers
 - daemon configuration [12](#)
 - facilities supported [13](#)
 - message logging configuration [12](#)
- unrecognized Type-Length-Value (TLV) support [4](#)
- upgrading a Catalyst 2950 switch

- configuration compatibility issues [1](#)
- differences in configuration commands [1](#)
- feature behavior incompatibilities [5](#)
- incompatible command messages [1](#)
- recommendations [1](#)
- upgrading software images
 - See downloading
- UplinkFast
 - described [3](#)
 - disabling [13](#)
 - enabling [13](#)
 - support for [7](#)
- uploading
 - configuration files
 - preparing [10, 13, 16](#)
 - reasons for [8](#)
 - using FTP [14](#)
 - using RCP [18](#)
 - using TFTP [11](#)
 - image files
 - preparing [25, 28, 32](#)
 - reasons for [23](#)
 - using FTP [31](#)
 - using RCP [35](#)
 - using TFTP [27](#)
- user EXEC mode [2](#)
- username-based authentication [6](#)

V

- version-dependent transparent mode [4](#)
- virtual IP address
 - cluster standby group [10](#)
 - command switch [10](#)
- virtual switches and PAgP [5](#)
- vlan.dat file [4](#)
- VLAN 1, disabling on a trunk port [17](#)
- VLAN 1 minimization [16](#)
- vlan-assignment response, VMPS [23](#)

- VLAN configuration
 - at bootup [7](#)
 - saving [7](#)
- VLAN configuration mode [2](#)
- VLAN database
 - and startup configuration file [7](#)
 - and VTP [1](#)
 - VLAN configuration saved in [6](#)
 - VLANs saved in [4](#)
- VLAN filtering and SPAN [6](#)
- vlan global configuration command [6](#)
- VLAN ID, discovering [30](#)
- VLAN load balancing on flex links [2](#)
 - configuration guidelines [8](#)
- VLAN management domain [2](#)
- VLAN Management Policy Server
 - See VMPS
- VLAN membership
 - confirming [26](#)
 - modes [3](#)
- VLAN Query Protocol
 - See VQP
- VLANs
 - adding [7](#)
 - adding to VLAN database [7](#)
 - aging dynamic addresses [9](#)
 - allowed on trunk [16](#)
 - and spanning-tree instances [3, 6, 11](#)
 - configuration guidelines, extended-range VLANs [11](#)
 - configuration guidelines, normal-range VLANs [6](#)
 - configuring [1](#)
 - configuring IDs 1006 to 4094 [11](#)
 - creating [8](#)
 - default configuration [7](#)
 - deleting [9](#)
 - described [2, 1](#)
 - displaying [12](#)
 - extended-range [1, 10](#)
 - features [8](#)

- illustrated [2](#)
- limiting source traffic with RSPAN [22](#)
- limiting source traffic with SPAN [15](#)
- modifying [7](#)
- multicast [16](#)
- native, configuring [18](#)
- normal-range [1, 4](#)
- number supported [8](#)
- parameters [5](#)
- port membership modes [3](#)
- static-access ports [9](#)
- STP and IEEE 802.1Q trunks [10](#)
- supported [2](#)
- Token Ring [5](#)
- traffic between [2](#)
- VTP modes [3](#)
- VLAN Trunking Protocol
 - See VTP
- VLAN trunks [13](#)
- VMPS
 - administering [27](#)
 - configuration example [28](#)
 - configuration guidelines [24](#)
 - default configuration [24](#)
 - description [22](#)
 - dynamic port membership
 - described [23](#)
 - reconfirming [26](#)
 - troubleshooting [28](#)
 - entering server address [25](#)
 - mapping MAC addresses to VLANs [22](#)
 - monitoring [27](#)
 - reconfirmation interval, changing [26](#)
 - reconfirming membership [26](#)
 - retry count, changing [27](#)
- voice aware 802.1x security
 - port-based authentication
 - configuring [36](#)
 - described [29, 36](#)
- voice-over-IP [1](#)
- voice VLAN
 - Cisco 7960 phone, port connections [1](#)
 - configuration guidelines [3](#)
 - configuring IP phones for data traffic
 - override CoS of incoming frame [6](#)
 - trust CoS priority of incoming frame [6](#)
 - configuring ports for voice traffic in
 - 802.1p priority tagged frames [5](#)
 - 802.1Q frames [5](#)
 - connecting to an IP phone [4](#)
 - default configuration [3](#)
 - described [1](#)
 - displaying [7](#)
 - IP phone data traffic, described [2](#)
 - IP phone voice traffic, described [2](#)
- VQP [8, 22](#)
- VTP
 - adding a client to a domain [15](#)
 - advertisements [15, 4](#)
 - and extended-range VLANs [2](#)
 - and normal-range VLANs [2](#)
 - client mode, configuring [12](#)
 - configuration
 - guidelines [8](#)
 - requirements [10](#)
 - saving [8](#)
 - configuration requirements [10](#)
 - configuration revision number
 - guideline [15](#)
 - resetting [16](#)
 - consistency checks [5](#)
 - default configuration [8](#)
 - described [1](#)
 - domain names [8](#)
 - domains [2](#)
 - modes
 - client [3](#)
 - off [3](#)

- server [3](#)
- transitions [3](#)
- transparent [3](#)
- monitoring [16](#)
- passwords [9](#)
- pruning
 - disabling [15](#)
 - enabling [14](#)
 - examples [6](#)
 - overview [6](#)
 - support for [8](#)
- pruning-eligible list, changing [17](#)
- server mode, configuring [10, 13](#)
- statistics [16](#)
- support for [8](#)
- Token Ring support [4](#)
- transparent mode, configuring [10](#)
- using [1](#)
- Version
 - enabling [13](#)
- version, guidelines [9](#)
- Version 1 [4](#)
- Version 2
 - configuration guidelines [9](#)
 - overview [4](#)
- Version 3
 - overview [5](#)

W

- web authentication [16](#)
 - configuring [16 to ??](#)
 - described [9](#)
- web-based authentication
 - customizeable web pages [6](#)
 - description [1](#)
- web-based authentication, interactions with other features [7](#)
- weighted tail drop

- See WTD
- wired location service
 - configuring [10](#)
 - displaying [11](#)
 - location TLV [3](#)
 - understanding [3](#)
- wizards [2](#)
- WTD
 - described [12](#)
 - setting thresholds
 - egress queue-sets [61](#)
 - ingress queues [57](#)
 - support for [13](#)

X

- Xmodem protocol [2](#)

