



INDEX

A

- abbreviating commands [4](#)
- AC (command switch) [9](#)
- access-class command [34](#)
- access control entries
 - See ACEs
- access-denied response, VMPS [24](#)
- 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 [46](#)
 - with IEEE 802.1x [13](#)
 - with RADIUS [28](#)
 - with TACACS+ [11, 17](#)
- ACEs
 - and QoS [7](#)
 - defined [20](#)
 - Ethernet [20](#)
 - IP [20](#)
- ACLs
 - ACEs [20](#)
 - any keyword [27](#)

ACLs (continued)

- applying
 - time ranges to [32](#)
 - to an interface [34](#)
 - to QoS [7](#)
- classifying traffic for QoS [41](#)
- comments in [33](#)
- compiling [36](#)
- defined [19, 23](#)
- examples of [36, 41](#)
- extended IP, configuring for QoS classification [42](#)
- extended IPv4
 - creating [26](#)
 - matching criteria [23](#)
- hardware and software handling [35](#)
- host keyword [28](#)
- IP
 - creating [23](#)
 - fragments and QoS guidelines [32](#)
 - 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 [38, 43](#)
- matching [23, 35](#)

- ACLs (continued)
 - monitoring [41](#)
 - named, IPv4 [30](#)
 - number per QoS class map [32](#)
 - QoS [7, 41](#)
 - resequencing entries [30](#)
 - standard IP, configuring for QoS classification [41](#)
 - standard IPv4
 - creating [25](#)
 - matching criteria [23](#)
 - support for [9](#)
 - support in hardware [35](#)
 - 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 [27](#)
 - dynamic
 - accelerated aging [8](#)
 - changing the aging time [21](#)
 - default aging [8](#)
 - defined [19](#)
 - learning [20](#)
 - removing [21](#)
 - IPv6 [2](#)
 - MAC, discovering [27](#)
 - multicast, STP address management [8](#)
 - static
 - adding and removing [24](#)
 - defined [19](#)
- address resolution [27](#)
- Address Resolution Protocol
 - See ARP
- advertisements
 - CDP [1](#)
 - LLDP [1, 2](#)
 - VTP [16, 3](#)
- aggregatable global unicast addresses [3](#)
- aggregated ports
 - See EtherChannel
- aggregate policers [49](#)
- aggregate policing [11](#)
- 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 [18](#)
- ARP
 - defined [5, 27](#)
 - table
 - address resolution [27](#)
 - managing [27](#)
- attributes, RADIUS
 - vendor-proprietary [31](#)
 - vendor-specific [29](#)
- attribute-value pairs [12, 14, 17, 18, 27](#)
- authentication
 - local mode with AAA [32](#)
 - NTP associations [4](#)
 - openIx [25](#)
 - RADIUS
 - key [21](#)
 - login [23](#)

- authentication (continued)
 - 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 [9](#)
 - compatibility with older 802.1x CLI commands [9 to 10](#)
 - overview [8](#)
- authoritative time source, described [2](#)
- authorization
 - with RADIUS [27](#)
 - with TACACS+ [11, 16](#)
- authorized ports with IEEE 802.1x [10](#)
- autoconfiguration [3](#)
- auto enablement [26](#)
- 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 [2, 4](#)
 - configuration guidelines [3](#)
 - default configuration [2](#)
 - defined [1](#)
 - displaying [14](#)
 - enabling [3](#)
 - event triggers [6](#)
 - IOS shell [1, 9](#)
 - mapping [4](#)
 - user-defined macros [9](#)
 - See also Smartports macros
- auxiliary VLAN
 - See voice VLAN
- availability, features [6](#)

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](#)

- banners (continued)
 - default configuration [17](#)
 - when displayed [17](#)
 - Berkeley r-tools replacement [44](#)
 - binding database
 - DHCP snooping
 - See DHCP snooping binding database
 - bindings
 - DHCP snooping database [5](#)
 - IP source guard [12](#)
 - 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 [7](#)
 - BPDU guard
 - described [2](#)
 - disabling [12](#)
 - enabling [11](#)
 - support for [7](#)
 - 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 [40](#)
 - defined [38](#)
 - CDP
 - and trusted boundary [36](#)
 - 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 [39](#)
- 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 Secure ACS
 - attribute-value pairs for downloadable ACLs [18](#)
 - attribute-value pairs for redirect URL [17](#)
- Cisco Secure ACS configuration guide [58](#)
- CiscoWorks 2000 [4](#)
- CISP [26](#)
- CIST regional root
 - See MSTP
- CIST root
 - See MSTP
- civic location [3](#)
- class maps for QoS
 - configuring [44](#)
 - described [7](#)
 - displaying [69](#)
- class of service
 - See CoS
- clearing interfaces [27](#)
- CLI
 - abbreviating commands [4](#)
 - command modes [1](#)
 - configuration logging [5](#)
 - described [4](#)
 - editing features
 - enabling and disabling [7](#)
 - keystroke editing [7](#)
 - wrapped lines [9](#)
 - error messages [5](#)
 - filtering command output [10](#)
 - CLI (continued)
 - getting help [3](#)
 - history
 - changing the buffer size [6](#)
 - described [6](#)
 - disabling [7](#)
 - 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](#)

clusters, switch (continued)

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](#)

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](#)

command switch (continued)

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 [13](#)

Express Setup [2](#)

configuration changes, logging [10](#)configuration conflicts, recovering from lost member connectivity [11](#)configuration examples, network [16](#)

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 [21](#)

invalid combinations when copying [5](#)

limiting TFTP server access [16](#)

obtaining with DHCP [8](#)

password recovery disable considerations [5](#)

- configuration files (continued)
 - 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 [10](#)
 - uploading
 - preparing [10, 13, 16](#)
 - reasons for [9](#)
 - using FTP [14](#)
 - using RCP [18](#)
 - using TFTP [12](#)
 - configuration logger [10](#)
 - configuration logging [5](#)
 - configuration replacement [19](#)
 - configuration rollback [19](#)
 - configuration settings, saving [14](#)
 - configure terminal command [10](#)
 - configuring port-based authentication violation modes [37 to 38](#)
 - configuring small-frame arrival rate [5](#)
 - config-vlan mode [2, 6](#)
 - conflicts, configuration [11](#)
 - connections, secure remote [33](#)
 - connectivity problems [13, 14, 16](#)
 - consistency checks in VTP Version 2 [4](#)
 - 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 [52](#)
 - counters, clearing interface [27](#)
 - CPU utilization, troubleshooting [23](#)
 - crashinfo file [22](#)
 - critical authentication, IEEE 802.1x [50](#)
 - cryptographic software image
 - SSH [33](#)
 - SSL [37](#)
 - CWDM SFPs [20](#)
-
- ## 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 [7](#)
 - DHCP snooping [7](#)
 - DHCP snooping binding database [7](#)
 - 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 [13](#)
 - IPv6 [7](#)

- default configuration (continued)
 - Layer 2 interfaces [14](#)
 - LLDP [4](#)
 - 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 [20](#)
 - RMON [3](#)
 - RSPAN [9](#)
 - SDM template [2](#)
 - SNMP [6](#)
 - SPAN [9](#)
 - SSL [40](#)
 - standard QoS [29](#)
 - STP [11](#)
 - system message logging [3](#)
 - system name and prompt [15](#)
 - TACACS+ [13](#)
 - UDLD [4](#)
 - VLAN, Layer 2 Ethernet interfaces [16](#)
 - VLANs [7](#)
 - VMPS [25](#)
 - voice VLAN [3](#)
 - VTP [6](#)
- default gateway [14](#)
- default router preference
 - See [DRP](#)
- deleting VLANs [10](#)
- denial-of-service attack [1](#)
- description command [24](#)
- designing your network, examples [16](#)
- 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 [10](#)
 - enabling
 - relay agent [9](#)
- DHCP-based autoconfiguration
 - client request message exchange [4](#)
 - configuring
 - client side [3](#)
 - DNS [7](#)
 - relay device [7](#)
 - 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 [4 to 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 [7](#)
 - default configuration [7](#)
 - displaying [12](#)
 - overview [3](#)
 - packet format, suboption
 - circuit ID [5](#)
 - remote ID [5](#)
 - remote ID suboption [5](#)
- DHCP server port-based address allocation
 - configuration guidelines [17](#)
 - default configuration [16](#)
 - described [16](#)
 - displaying [19](#)
 - enabling [17](#)
- DHCP server port-based address assignment
 - support for [5](#)
- DHCP snooping
 - accepting untrusted packets form edge switch [3,9](#)
 - binding database
 - See DHCP snooping binding database
 - configuration guidelines [7](#)
 - default configuration [7](#)
 - displaying binding tables [12](#)
 - message exchange process [4](#)
 - option 82 data insertion [3](#)
 - trusted interface [2](#)
 - untrusted interface [2](#)
 - untrusted messages [2](#)
- DHCP snooping binding database
 - adding bindings [11](#)
 - binding entries, displaying [12](#)
 - binding file
 - format [6](#)
 - location [5](#)
 - bindings [5](#)
 - clearing agent statistics [11](#)
 - configuration guidelines [8](#)
- DHCP snooping binding database (continued)
 - configuring [11](#)
 - default configuration [7](#)
 - deleting
 - binding file [11](#)
 - bindings [11](#)
 - database agent [11](#)
 - described [5](#)
 - displaying [12](#)
 - displaying status and statistics [12](#)
 - enabling [11](#)
 - entry [5](#)
 - renewing database [11](#)
 - resetting
 - delay value [11](#)
 - timeout value [11](#)
- 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 [4](#)
 - creating and removing [4](#)
 - displaying the working [4](#)
- 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 [17, 18, 58](#)

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, 29, 33](#)reasons for [23](#)using CMS [2](#)using FTP [30](#)using HTTP [2, 23](#)using RCP [34](#)using TFTP [26](#)using the device manager or Network Assistant [23](#)

DRP

configuring [9](#)described [4](#)IPv6 [4](#)support for [12](#)DSCP [11, 2](#)DSCP input queue threshold map for QoS [14](#)DSCP output queue threshold map for QoS [17](#)DSCP-to-CoS map for QoS [55](#)DSCP-to-DSCP-mutation map for QoS [56](#)DSCP transparency [37](#)DTP [8, 14](#)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 [3](#)configuring [26](#)defined [3](#)

dynamic addresses

See addresses

dynamic ARP inspection

ARP cache poisoning [1](#)ARP requests, described [1](#)ARP spoofing attack [1](#)

clearing

log buffer [14](#)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 [14](#)statistics [14](#)trust state and rate limit [14](#)error-disabled state for exceeding rate limit [4](#)function of [2](#)interface trust states [3](#)

dynamic ARP inspection (continued)

log buffer

clearing 14

configuring 12

displaying 14

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 15

dynamic desirable trunking mode 15

Dynamic Host Configuration Protocol

See DHCP-based autoconfiguration

dynamic port VLAN membership

described 24

reconfirming 27

troubleshooting 29

types of connections 26

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 39

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, 13

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 16

load balancing 7, 13

PAgP

aggregate-port learners 14

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 14

modes 4

support for 3

with dual-action detection 5

- EtherChannel (continued)
 - 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 8
 - defaults and ranges 7
 - modifying 8
- EUI 3
- events, RMON 3
- examples
 - network configuration 16
- expedite queue for QoS 68
- Express Setup 2
 - See also getting started guide
- extended crashinfo file 22
- extended-range VLANs
 - configuration guidelines 12
 - configuring 11
 - creating 13
 - defined 1
- extended system ID
 - MSTP 17
 - STP 4, 14
- extended universal identifier
 - See EUI
- Extensible Authentication Protocol over LAN 1
- fiber-optic, detecting unidirectional links 1
- files
 - basic crashinfo
 - description 22
 - location 22
 - copying 5
 - crashinfo, description 22
 - deleting 5
 - displaying the contents of 8
 - extended crashinfo
 - description 22
 - location 22
 - tar
 - creating 6
 - displaying the contents of 7
 - 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 5
 - setting the default 3
- filtering
 - non-IP traffic 38
 - show and more command output 10
- filtering show and more command output 10
- filters, IP
 - See ACLs, IP
- flash device, number of 1
- flexible authentication ordering
 - configuring 60
 - overview 25
- Flex Link Multicast Fast Convergence 3
- Flex Links
 - configuration guidelines 8
 - configuring 9
 - configuring preferred VLAN 12
 - configuring VLAN load balancing 11

F

- fa0 interface 6
- Fast Convergence 3
- features, incompatible 12

Flex Links (continued)

- default configuration 8
- description 2
- link load balancing 2
- monitoring 14
- VLANs 2

flooded traffic, blocking 8

flow-based packet classification 11

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 30
 - preparing the server 29
 - 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 18

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 6
- disabling 7
- recalling commands 6

history table, level and number of syslog messages 10

host names, in clusters 12

hosts, limit on dynamic ports 29

HP OpenView 4

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 38

- configuring 41
- self-signed certificate 38

HTTP secure server 38

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 [15](#)
- encapsulation [14](#)
- native VLAN for untagged traffic [19](#)

IEEE 802.1s

See MSTP

IEEE 802.1w

See RSTP

IEEE 802.1x

See port-based authentication

IEEE 802.3ad

See EtherChannel

IEEE 802.3af

See PoE

IEEE 802.3x flow control [19](#)ifIndex values, SNMP [5](#)IFS [5](#)

IGMP

- configurable leave timer
 - described [5](#)
 - enabling [10](#)

IGMP (continued)

- 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 [3](#)

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](#)

- IGMP snooping (continued)
 - 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 [3](#)
- VLAN configuration [7](#)
- IGMP throttling
 - configuring [27](#)
 - default configuration [24](#)
 - described [24](#)
 - displaying action [28](#)
- Immediate Leave, IGMP [5](#)
 - enabling [9](#)
- inaccessible authentication bypass [20](#)
- initial configuration
 - defaults [13](#)
 - 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 [27](#)
 - default configuration [14](#)
 - described [24](#)
 - descriptive name, adding [24](#)
 - displaying information about [26](#)
- interfaces (continued)
 - flow control [19](#)
 - management [4](#)
 - monitoring [26](#)
 - naming [24](#)
 - physical, identifying [9](#)
 - range of [10](#)
 - restarting [28](#)
 - shutting down [28](#)
 - speed and duplex, configuring [18](#)
 - status [26](#)
 - 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, 7](#)
- 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 [27](#)
 - 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 queueing [19](#)
 - configuring [4](#)
 - ensuring port security with QoS [36](#)
 - trusted boundary for QoS [36](#)
- IP precedence [2](#)
- IP-precedence-to-DSCP map for QoS [53](#)
- 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 [14](#)
 - and DHCP snooping [12](#)
 - and EtherChannels [14](#)
 - and port security [14](#)
 - and private VLANs [14](#)
 - and routed ports [14](#)
- IP source guard (continued)
 - and TCAM entries [14](#)
 - and trunk interfaces [14](#)
 - and VRF [14](#)
 - binding configuration
 - automatic [12](#)
 - manual [12](#)
 - binding table [12](#)
 - configuration guidelines [14](#)
 - default configuration [13](#)
 - described [12](#)
 - disabling [15](#)
 - displaying
 - bindings [16](#)
 - configuration [16](#)
 - enabling [14](#)
 - filtering
 - source IP address [13](#)
 - source IP and MAC address [13](#)
 - source IP address filtering [13](#)
 - source IP and MAC address filtering [13](#)
 - static bindings
 - adding [14](#)
 - deleting [15](#)
- 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 [5](#)
- IPv6
 - addresses [2](#)
 - address formats [2](#)
 - applications [4](#)
 - assigning address [7](#)

- IPv6 (continued)
 - autoconfiguration [4](#)
 - configuring static routes [11](#)
 - default configuration [7](#)
 - default router preference (DRP) [4](#)
 - defined [1](#)
 - forwarding [7](#)
 - ICMP [3](#)
 - monitoring [12](#)
 - 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 [12](#)
 - 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 [18](#)
 - LLDP
 - configuring [4](#)
 - characteristics [6](#)
 - default configuration [4](#)
 - enabling [5](#)
 - monitoring and maintaining [10](#)
 - overview [1](#)
 - supported TLVs [2](#)
 - switch stack considerations [2](#)
 - transmission timer and holdtime, setting [6](#)
 - LLDP-MED
 - configuring
 - procedures [4](#)
 - TLVs [6](#)
 - monitoring and maintaining [10](#)
 - overview [1,2](#)
 - supported TLVs [2](#)
 - LLDP Media Endpoint Discovery
 - See LLDP-MED
 - local SPAN [2](#)

location TLV [3,7](#)

login authentication

- with RADIUS [23](#)
- with TACACS+ [14](#)

login banners [17](#)

log messages

- See system message logging

Long-Reach Ethernet (LRE) technology [17](#)

loop guard

- described [9](#)
- enabling [15](#)
- support for [7](#)

LRE profiles, considerations in switch clusters [13](#)

M

MAB

See MAC authentication bypass

MAB inactivity timer

- default setting [32](#)
- 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 [26](#)
- discovering [27](#)
- displaying [27](#)
- displaying in the IP source binding table [16](#)
- dynamic
 - learning [20](#)
 - removing [21](#)
- in ACLs [38](#)

MAC addresses (continued)

static

- adding [24](#)
- allowing [25,27](#)
- characteristics of [24](#)
- dropping [25](#)
- removing [24](#)

MAC address learning [5](#)

MAC address learning, disabling on a VLAN [26](#)

MAC address notification, support for [13](#)

MAC address-table move update

- configuration guidelines [8](#)
- configuring [12](#)
- default configuration [8](#)
- description [6](#)
- monitoring [14](#)

MAC address-to-VLAN mapping [24](#)

MAC authentication bypass [35](#)

- configuring [54](#)
- overview [15](#)

MAC extended access lists

- applying to Layer 2 interfaces [40](#)
- configuring for QoS [43](#)
- creating [38](#)
- defined [38](#)
- for QoS classification [5](#)

macros

See Auto Smartports macros

See Smartports macros

magic packet [23](#)

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 [52](#)
 - DSCP [51](#)
 - DSCP-to-CoS [55](#)
 - DSCP-to-DSCP-mutation [56](#)
 - IP-precedence-to-DSCP [53](#)
 - policed-DSCP [54](#)
 - described [10](#)
- marking
 - action with aggregate policers [49](#)
 - 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 [12 to 13](#)
 - described [9, 12](#)
 - exceptions with authentication process [6](#)
- membership mode, VLAN port [3](#)
- member switch
 - automatic discovery [4](#)
 - defined [2](#)
 - managing [14](#)
 - passwords [12](#)
 - recovering from lost connectivity [11](#)
 - requirements [3](#)
- member switch (continued)
 - 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 [41](#)
 - cables for unidirectional links [1](#)
 - CDP [4](#)
 - features [13](#)
 - Flex Links [14](#)
 - IGMP
 - filters [28](#)
 - snooping [15, 11](#)
 - interfaces [26](#)
 - IP SLAs operations [6](#)
 - IPv4 ACL configuration [41](#)
 - IPv6 [12](#)
 - 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 [14](#)

monitoring (continued)

VMPS 28

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

MSTP (continued)

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 7

overview 2

Port Fast

described 2

enabling 10

preventing root switch selection 8

MSTP (continued)

- 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 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 [13](#)

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](#)

MVR (continued)

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

N

NAC

- critical authentication [20,50](#)
- IEEE 802.1x authentication using a RADIUS server [55](#)
- IEEE 802.1x validation using RADIUS server [55](#)
- inaccessible authentication bypass [50](#)
- Layer 2 IEEE 802.1x validation [10,25,55](#)

named IPv4 ACLs [30](#)

native VLAN

- configuring [19](#)
- default [19](#)

NEAT

- configuring [56](#)
- overview [26](#)

neighbor discovery, IPv6 [3](#)

Network Admission Control

See NAC

Network Admission Control Software Configuration Guide [63,64](#)

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 [16](#)
- long-distance, high-bandwidth transport [20](#)
- providing network services [16](#)

network configuration examples (continued)

- server aggregation and Linux server cluster [18](#)
- small to medium-sized network [19](#)

network design

- performance [16](#)
- services [16](#)

Network Edge Access Toplogy

- See NEAT

network management

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

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

network policy TLV [2,7](#)

Network Time Protocol

- See NTP

no commands [4](#)

nonhierarchical policy maps

- described [9](#)

non-IP traffic filtering [38](#)

nontrunking mode [15](#)

normal-range VLANs [4](#)

- configuration guidelines [5](#)
- configuration modes [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](#)

NTP (continued)

- source IP address, configuring [10](#)
- stratum [2](#)
- support for [5](#)
- synchronizing devices [5](#)
- time
 - services [2](#)
 - synchronizing [2](#)

O

open1x

- configuring [61](#)

open1x authentication

- overview [25](#)

optimizing system resources [1](#)

options, management [4](#)

out-of-profile markdown [11](#)

P

packet modification, with QoS [18](#)

PAgP

- See EtherChannel

passwords

- default configuration [2](#)
- disabling recovery of [5](#)
- encrypting [3](#)
- for security [8](#)
- in clusters [12](#)
- overview [1](#)
- recovery of [3](#)
- setting
 - enable [3](#)
 - enable secret [3](#)
 - Telnet [6](#)
 - with usernames [6](#)
- VTP domain [8](#)

- path cost
 - MSTP [20](#)
 - STP [18](#)
- PC (passive command switch) [9](#)
- performance, network design [16](#)
- performance features [3](#)
- persistent self-signed certificate [38](#)
- 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 [23](#)
 - policing power consumption [23](#)
 - 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](#)
 - PoE (continued)
 - 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 [54](#)
 - policers
 - configuring
 - for each matched traffic class [46](#)
 - for more than one traffic class [49](#)
 - described [4](#)
 - displaying [69](#)
 - number of [32](#)
 - types of [9](#)
 - policing
 - described [4](#)
 - token-bucket algorithm [9](#)
 - policy maps for QoS
 - characteristics of [46](#)
 - described [7](#)
 - displaying [70](#)
 - nonhierarchical on physical ports
 - described [9](#)
 - port ACLs, described [20](#)
 - Port Aggregation Protocol
 - See EtherChannel
 - port-based authentication
 - accounting [13](#)
 - authentication server
 - defined [3](#)
 - RADIUS server [3](#)
 - client, defined [3](#)
 - configuration guidelines [33](#)

port-based authentication (continued)

- configuring
 - 802.1x authentication [38](#)
 - guest VLAN [47](#)
 - host mode [41](#)
 - inaccessible authentication bypass [50](#)
 - manual re-authentication of a client [43](#)
 - periodic re-authentication [42](#)
 - quiet period [44](#)
 - RADIUS server [41](#)
 - RADIUS server parameters on the switch [40](#)
 - restricted VLAN [48](#)
 - switch-to-client frame-retransmission number [45, 46](#)
 - switch-to-client retransmission time [44](#)
 - violation modes [37 to 38](#)
- default configuration [32](#)
- described [1](#)
- device roles [3](#)
- displaying statistics [66](#)
- downloadable ACLs and redirect URLs
 - configuring [58 to 60](#)
 - overview [17 to 18](#)
- EAPOL-start frame [6](#)
- EAP-request/identity frame [6](#)
- EAP-response/identity frame [6](#)
- encapsulation [3](#)
- flexible authentication ordering
 - configuring [60](#)
 - overview [25](#)
- guest VLAN
 - configuration guidelines [19, 20](#)
 - described [18](#)
- host mode [11](#)
- inaccessible authentication bypass
 - configuring [50](#)
 - described [20](#)
 - guidelines [34](#)
- initiation and message exchange [6](#)

port-based authentication (continued)

- magic packet [23](#)
- maximum number of allowed devices per port [35](#)
- method lists [38](#)
- multiple authentication [13](#)
- ports
 - authorization state and dot1x port-control command [10](#)
 - authorized and unauthorized [10](#)
 - critical [20](#)
 - voice VLAN [21](#)
- port security
 - and voice VLAN [23](#)
 - described [22](#)
 - interactions [22](#)
 - multiple-hosts mode [11](#)
- readiness check
 - configuring [35](#)
 - described [15, 35](#)
- resetting to default values [66](#)
- statistics, displaying [66](#)
- switch
 - as proxy [3](#)
 - RADIUS client [3](#)
- switch supplicant
 - configuring [56](#)
 - overview [26](#)
- VLAN assignment
 - AAA authorization [38](#)
 - characteristics [16](#)
 - configuration tasks [16](#)
 - described [15](#)
- voice aware 802.1x security
 - configuring [36](#)
 - described [26, 36](#)
- voice VLAN
 - described [21](#)
 - PVID [21](#)
 - VVID [21](#)

- port-based authentication (continued)
 - wake-on-LAN, described [23](#)
 - with ACLs and RADIUS Filter-Id attribute [30](#)
- 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 [25](#)
 - support for [7](#)
- port membership modes, VLAN [3](#)
- port priority
 - MSTP [19](#)
 - STP [16](#)
- ports
 - access [2](#)
 - blocking [7](#)
 - dual-purpose uplink [4](#)
 - dynamic access [3](#)
 - protected [6](#)
 - secure [8](#)
 - static-access [3, 10](#)
 - switch [2](#)
 - trunks [3, 14](#)
 - VLAN assignments [10](#)
- port security
 - aging [17](#)
 - and QoS trusted boundary [36](#)
 - 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 [24](#)
- port VLAN ID TLV [2](#)
- power management TLV [2, 7](#)
- 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 [14](#)
 - on a port [19](#)
 - enabling
 - in VTP domain [14](#)
 - on a port [19](#)
 - examples [5](#)
 - overview [4](#)

pruning-eligible list

- changing 19
- for VTP pruning 4
- VLANs 14

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 28
 - configuration guidelines 24
 - described 19
 - disabling 26
 - displaying generated commands 26
 - displaying the initial configuration 28
 - effects on running configuration 24
 - egress queue defaults 20
 - enabling for VoIP 25
 - example configuration 27
 - ingress queue defaults 20
 - list of generated commands 21
- basic model 4
- classification
 - class maps, described 7
 - defined 4
 - DSCP transparency, described 37
 - 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

QoS (continued)

- policy maps, described 7
- trust DSCP, described 5
- trusted CoS, described 5
- trust IP precedence, described 5
- class maps
 - configuring 44
 - displaying 69
- configuration guidelines
 - auto-QoS 24
 - standard QoS 32
- configuring
 - aggregate policers 49
 - auto-QoS 19
 - default port CoS value 35
 - DSCP maps 51
 - DSCP transparency 37
 - DSCP trust states bordering another domain 38
 - egress queue characteristics 62
 - ingress queue characteristics 57
 - IP extended ACLs 42
 - IP standard ACLs 41
 - MAC ACLs 43
 - port trust states within the domain 34
 - trusted boundary 36
- default auto configuration 19
- default standard configuration 29
- displaying statistics 69
- DSCP transparency 37
- egress queues
 - allocating buffer space 62
 - buffer allocation scheme, described 16
 - configuring shaped weights for SRR 66
 - configuring shared weights for SRR 67
 - described 4
 - displaying the threshold map 65
 - flowchart 16
 - mapping DSCP or CoS values 65
 - scheduling, described 4

QoS (continued)

- setting WTD thresholds [62](#)
- WTD, described [17](#)
- enabling globally [33](#)
- flowcharts
 - classification [6](#)
 - egress queueing and scheduling [16](#)
 - ingress queueing and scheduling [13](#)
 - policing and marking [10](#)
- implicit deny [7](#)
- ingress queues
 - allocating bandwidth [60](#)
 - allocating buffer space [59](#)
 - buffer and bandwidth allocation, described [14](#)
 - configuring shared weights for SRR [60](#)
 - configuring the priority queue [61](#)
 - described [4](#)
 - displaying the threshold map [59](#)
 - flowchart [13](#)
 - mapping DSCP or CoS values [58](#)
 - priority queue, described [14](#)
 - scheduling, described [4](#)
 - setting WTD thresholds [58](#)
 - WTD, described [14](#)
- IP phones
 - automatic classification and queueing [19](#)
 - detection and trusted settings [19, 36](#)
- limiting bandwidth on egress interface [68](#)
- mapping tables
 - CoS-to-DSCP [52](#)
 - displaying [69](#)
 - DSCP-to-CoS [55](#)
 - DSCP-to-DSCP-mutation [56](#)
 - IP-precedence-to-DSCP [53](#)
 - policed-DSCP [54](#)
 - types of [10](#)
- marked-down actions [48](#)
- marking, described [4, 8](#)
- overview [2](#)

QoS (continued)

- packet modification [18](#)
- policers
 - configuring [48, 50](#)
 - described [8](#)
 - displaying [69](#)
 - number of [32](#)
 - types of [9](#)
- policies, attaching to an interface [8](#)
- policing
 - described [4, 8](#)
 - token bucket algorithm [9](#)
- policy maps
 - characteristics of [46](#)
 - displaying [70](#)
 - nonhierarchical on physical ports [46](#)
- QoS label, defined [4](#)
- queues
 - configuring egress characteristics [62](#)
 - configuring ingress characteristics [57](#)
 - high priority (expedite) [18, 68](#)
 - location of [11](#)
 - SRR, described [12](#)
 - WTD, described [12](#)
- rewrites [18](#)
- support for [11](#)
- trust states
 - bordering another domain [38](#)
 - described [5](#)
 - trusted device [36](#)
 - within the domain [34](#)
- quality of service
 - See QoS
- queries, IGMP [4](#)
- query solicitation, IGMP [12](#)

R**RADIUS**

attributes

vendor-proprietary [31](#)vendor-specific [29](#)

configuring

accounting [28](#)authentication [23](#)authorization [27](#)communication, global [21, 29](#)communication, per-server [20, 21](#)multiple UDP ports [20](#)default configuration [20](#)defining AAA server groups [25](#)displaying the configuration [32](#)identifying the server [20](#)in clusters [13](#)limiting the services to the user [27](#)method list, defined [19](#)operation of [19](#)overview [18](#)server load balancing [31](#)suggested network environments [18](#)support for [10](#)tracking services accessed by user [28](#)

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 [36](#)downloading [34](#)preparing the server [33](#)uploading [36](#)

readiness check

port-based authentication

configuring [35](#)described [15, 35](#)reconfirmation interval, VMPS, changing [27](#)reconfirming dynamic VLAN membership [27](#)recovery procedures [1](#)redirect URL [17, 58](#)

redundancy

EtherChannel [3](#)

STP

backbone [8](#)path cost [22](#)port priority [20](#)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](#)
- resetting a UDLD-shutdown interface [6](#)
- responder, IP SLAs
 - described [4](#)
 - enabling [6](#)
- response time, measuring with IP SLAs [4](#)
- restricted VLAN
 - configuring [48](#)
 - described [19](#)
 - using with IEEE 802.1x [19](#)
- restricting access
 - NTP services [8](#)
 - overview [1](#)
 - passwords and privilege levels [2](#)
 - RADIUS [17](#)
 - TACACS+ [10](#)
- retry count, VMPS, changing [28](#)
- 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](#)
- 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 [13](#)
- root guard
 - described [8](#)
 - enabling [15](#)
 - support for [7](#)
- 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 [13, 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](#)

RSTP (continued)

- 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 [14](#)**S**SC (standby command switch) [9](#)scheduled reloads [20](#)

SCP

- and SSH [44](#)
- configuring [44](#)

SDM

- described [1](#)
- templates
 - configuring [3](#)
 - number of [1](#)

SDM template

- configuration guidelines [2](#)
- configuring [2](#)
- types of [1](#)

Secure Copy Protocol

secure HTTP client

- configuring [43](#)
- displaying [44](#)

secure HTTP server

- configuring [42](#)
- displaying [44](#)

secure MAC addresses

- deleting [16](#)
- maximum number of [9](#)
- types of [9](#)

secure ports, configuring [8](#)secure remote connections [33](#)

Secure Shell

- See SSH

Secure Socket Layer

- See SSL

security, port [8](#)security features [8](#)

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 [35](#)show and more command output, filtering [10](#)show cdp traffic command [5](#)show cluster members command [14](#)show configuration command [24](#)

- show forward command [20](#)
- show interfaces command [18, 24](#)
- show interfaces switchport [4](#)
- show lldp traffic command [11](#)
- show platform forward command [20](#)
- show running-config command
 - displaying ACLs [34, 35](#)
 - interface description in [24](#)
- shutdown command on interfaces [28](#)
- Simple Network Management Protocol
 - See SNMP
- small-frame arrival rate, configuring [5](#)
- Smartports macros
 - applying Cisco-default macros [12](#)
 - applying global parameter values [13](#)
 - configuration guidelines [12](#)
 - default configuration [11](#)
 - defined [1](#)
 - displaying [14](#)
 - tracing [12](#)
- SNAP [1](#)
- SNMP
 - accessing MIB variables with [4](#)
 - agent
 - described [3](#)
 - 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 [6, 9](#)
 - host [6](#)
 - ifIndex values [5](#)
 - in-band management [6](#)
 - SNMP (continued)
 - 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 [4, 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](#)
 - overview [1, 4](#)
 - types of [11](#)
 - users [6, 9](#)
 - versions supported [2](#)
 - SNMP and Syslog Over IPv6 [5](#)
 - SNMPv1 [2](#)
 - SNMPv2C [2](#)
 - SNMPv3 [2](#)
 - snooping, IGMP [1](#)

- software images
 - location in flash [24](#)
 - 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 [13,1](#)
 - 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 [15](#)
- Spanning Tree Protocol
 - See STP
- SPAN traffic [4](#)
- SRR
 - configuring
 - shaped weights on egress queues [66](#)
 - shared weights on egress queues [67](#)
 - shared weights on ingress queues [60](#)
 - described [12](#)
 - shaped mode [13](#)
 - shared mode [13](#)
 - support for [12](#)
- SSH
 - configuring [34](#)
 - cryptographic software image [33](#)
 - described [6,33](#)
 - encryption methods [34](#)
 - user authentication methods, supported [34](#)
- SSL
 - configuration guidelines [40](#)
 - configuring a secure HTTP client [43](#)
 - configuring a secure HTTP server [41](#)
 - cryptographic software image [37](#)
 - described [37](#)
 - monitoring [44](#)
- 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](#)

- startup configuration (continued)
 - configuration file
 - automatically downloading **16**
 - specifying the filename **16**
 - default boot configuration **16**
- static access ports
 - assigning to VLAN **10**
 - defined **3**
- static addresses
 - See addresses
- static MAC addressing **9**
- static routes
 - configuring for IPv6 **11**
 - understanding **5**
- static VLAN membership **2**
- statistics
 - 802.1x **66**
 - CDP **4**
 - interface **27**
 - LLDP **10**
 - LLDP-MED **10**
 - NMSP **10**
 - QoS ingress and egress **69**
 - 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**

STP (continued)

- extended system ID
 - effects on root switch [14](#)
 - effects on the secondary root switch [16](#)
 - overview [4](#)
 - unexpected behavior [14](#)
- features supported [6](#)
- 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 [20](#)
 - using path costs [22](#)
 - using port priorities [20](#)
- loop guard
 - described [9](#)
 - enabling [15](#)
- modes supported [9](#)
- multicast addresses, effect of [8](#)
- optional features supported [7](#)
- overview [2](#)
- path costs [22](#)
- Port Fast
 - described [2](#)
 - enabling [10](#)
- port priorities [21](#)
- preventing root switch selection [8](#)

STP (continued)

- 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 [24](#)
- summer time [13](#)
- SunNet Manager [4](#)
- 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 [13](#)
 - 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 [10](#)
 - tracking services accessed by user [17](#)
 - tar files
 - creating [6](#)
 - displaying the contents of [7](#)
 - extracting [7](#)
 - image file format [24](#)
 - TDR [13](#)
 - Telnet
 - accessing management interfaces [10](#)
 - number of connections [6](#)
 - setting a password [6](#)

- templates, SDM [1](#)
- temporary self-signed certificate [38](#)
- 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 [12](#)
 - configuration files in base directory [7](#)
 - configuring for autoconfiguration [7](#)
 - image files
 - deleting [27](#)
 - downloading [26](#)
 - preparing the server [25](#)
 - uploading [28](#)
 - 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 [11](#)
- 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 [11](#)
- traffic suppression [1](#)
- transmit hold-count
 - see STP
- transparent mode, VTP [3, 12](#)
- trap-door mechanism [2](#)
- traps
 - configuring MAC address notification [21](#)
 - configuring managers [11](#)
 - defined [3](#)
 - enabling [21, 11](#)
 - notification types [11](#)
 - 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](#)

- troubleshooting (continued)
 - 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 [17](#)
 - defined [3](#)
- trunks
 - allowed-VLAN list [18](#)
 - load sharing
 - setting STP path costs [22](#)
 - using STP port priorities [20,21](#)
 - native VLAN for untagged traffic [19](#)
 - parallel [22](#)
 - pruning-eligible list [19](#)
 - to non-DTP device [14](#)
- trusted boundary for QoS [36](#)
- trusted port states
 - between QoS domains [38](#)
 - classification options [5](#)
 - ensuring port security for IP phones [36](#)
 - support for [11](#)
 - within a QoS domain [34](#)
- trustpoints, CA [38](#)
- 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 [6](#)
- unauthorized ports with IEEE 802.1x [10](#)
- unicast MAC address filtering [5](#)
 - and adding static addresses [25](#)
 - and broadcast MAC addresses [25](#)
 - and CPU packets [25](#)
 - and multicast addresses [25](#)
 - and router MAC addresses [25](#)
 - configuration guidelines [25](#)
 - described [25](#)
- 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 [9](#)
 - using FTP [14](#)
 - using RCP [18](#)
 - using TFTP [12](#)
 - image files
 - preparing [25, 29, 33](#)
 - reasons for [23](#)
 - using FTP [31](#)
 - using RCP [36](#)
 - using TFTP [28](#)
 - 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 [18](#)
 - VLAN 1 minimization [18](#)
 - vlan-assignment response, VMPS [24](#)
 - VLAN configuration
 - at bootup [7](#)
 - saving [7](#)
 - VLAN configuration mode [2, 6](#)
 - VLAN database
 - and startup configuration file [7](#)
 - and VTP [1](#)
 - VLAN configuration saved in [7](#)
 - VLANs saved in [4](#)
 - vlan database command [6](#)
 - VLAN filtering and SPAN [6](#)
 - vlan global configuration command [6](#)
 - VLAN ID, discovering [27](#)
 - VLAN load balancing on flex links [2](#)
 - configuration guidelines [8](#)
 - VLAN management domain [2](#)
 - VLAN Management Policy Server
 - See VMPS
 - VLAN membership
 - confirming [27](#)
 - modes [3](#)
 - VLAN Query Protocol
 - See VQP
 - VLANs
 - adding [8](#)
 - adding to VLAN database [8](#)
 - aging dynamic addresses [9](#)
 - allowed on trunk [18](#)
 - and spanning-tree instances [2, 6, 12](#)
 - configuration guidelines, extended-range VLANs [12](#)
 - configuration guidelines, normal-range VLANs [5](#)
 - configuration options [6](#)
 - configuring [1](#)
 - configuring IDs 1006 to 4094 [12](#)
 - creating in config-vlan mode [8](#)
 - creating in VLAN configuration mode [9](#)
 - default configuration [7](#)
 - deleting [10](#)

VLANs (continued)

- described [2, 1](#)
- displaying [14](#)
- extended-range [1, 11](#)
- features [7](#)
- illustrated [2](#)
- limiting source traffic with RSPAN [22](#)
- limiting source traffic with SPAN [15](#)
- modifying [8](#)
- multicast [16](#)
- native, configuring [19](#)
- normal-range [1, 4](#)
- number supported [7](#)
- parameters [4](#)
- port membership modes [3](#)
- static-access ports [10](#)
- 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 [14](#)

VMPS

- administering [28](#)
- configuration example [29](#)
- configuration guidelines [25](#)
- default configuration [25](#)
- description [23](#)
- dynamic port membership
 - described [24](#)
 - reconfirming [27](#)
 - troubleshooting [29](#)
- entering server address [26](#)
- mapping MAC addresses to VLANs [24](#)
- monitoring [28](#)
- reconfirmation interval, changing [27](#)
- reconfirming membership [27](#)

VMPS (continued)

- retry count, changing [28](#)
- voice aware 802.1x security
 - port-based authentication
 - configuring [36](#)
 - described [26, 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, 23](#)

VTP

- adding a client to a domain [14](#)
- advertisements [16, 3](#)
- and extended-range VLANs [2](#)
- and normal-range VLANs [2](#)
- client mode, configuring [11](#)
- configuration
 - global configuration mode [7](#)
 - guidelines [8](#)
 - privileged EXEC mode [7](#)
 - requirements [9](#)
 - saving [7](#)
 - VLAN configuration mode [7](#)
- configuration mode options [7](#)
- configuration requirements [9](#)

VTP (continued)

- configuration revision number
 - guideline [14](#)
 - resetting [15](#)
- configuring
 - client mode [11](#)
 - server mode [9](#)
 - transparent mode [12](#)
- consistency checks [4](#)
- default configuration [6](#)
- described [1](#)
- disabling [12](#)
- domain names [8](#)
- domains [2](#)
- modes
 - client [3,11](#)
 - server [3,9](#)
 - transitions [3](#)
 - transparent [3,12](#)
- monitoring [16](#)
- passwords [8](#)
- pruning
 - disabling [14](#)
 - enabling [14](#)
 - examples [5](#)
 - overview [4](#)
 - support for [8](#)
- pruning-eligible list, changing [19](#)
- server mode, configuring [9](#)
- statistics [16](#)
- support for [8](#)
- Token Ring support [4](#)
- transparent mode, configuring [12](#)
- using [1](#)
- version, guidelines [8](#)
- Version 1 [4](#)

VTP (continued)

- Version 2
 - configuration guidelines [8](#)
 - disabling [13](#)
 - enabling [13](#)
 - overview [4](#)

W

- web authentication [15](#)
 - configuring [62 to 64, 65 to ??](#)
 - described [8,27](#)
 - fallback for IEEE 802.1x [63](#)
- weighted tail drop
 - See WTD
- wired location service
 - configuring [9](#)
 - displaying [10](#)
 - location TLV [3](#)
 - understanding [3](#)
- wizards [2](#)
- WTD
 - described [12](#)
 - setting thresholds
 - egress queue-sets [62](#)
 - ingress queues [58](#)
 - support for [11,12](#)

X

- Xmodem protocol [2](#)