



INDEX

A

- abbreviating commands [4](#)
- AC (command switch) [10](#)
- access-class command [18](#)
- access control entries
 - See ACEs
- access-denied response, VMPS [24](#)
- access groups, applying IPv4 ACLs to interfaces [19](#)
- accessing
 - clusters, switch [13](#)
 - command switches [11](#)
 - member switches [13](#)
 - switch clusters [13](#)
- accessing stack members [22](#)
- access lists
 - See ACLs
- access ports
 - in switch clusters [9](#)
- access ports, defined [3](#)
- accounting
 - with 802.1x [48](#)
 - with IEEE 802.1x [15](#)
 - with RADIUS [35](#)
 - with TACACS+ [11,17](#)
- ACEs
 - and QoS [8](#)
 - defined [2](#)
 - Ethernet [2](#)
 - IP [2](#)
- ACLs
 - ACEs [2](#)
 - any keyword [11](#)
 - applying
 - time ranges to [15](#)
 - to an interface [18](#)
 - to QoS [8](#)
 - classifying traffic for QoS [43](#)
 - comments in [17](#)
 - compiling [21](#)
 - defined [2,7](#)
 - examples of [21,43](#)
 - extended IP, configuring for QoS classification [44](#)
 - extended IPv4
 - creating [9](#)
 - matching criteria [7](#)
 - hardware and software handling [19](#)
 - host keyword [11](#)
 - IP
 - creating [7](#)
 - fragments and QoS guidelines [34](#)
 - implicit deny [9,13,15](#)
 - implicit masks [9](#)
 - matching criteria [7](#)
 - undefined [19](#)
 - IPv4
 - applying to interfaces [18](#)
 - creating [7](#)
 - matching criteria [7](#)
 - named [13](#)
 - numbers [7](#)
 - terminal lines, setting on [18](#)
 - unsupported features [6](#)

- MAC extended [23, 45](#)
- matching [7, 19](#)
- monitoring [25](#)
- named, IPv4 [13](#)
- number per QoS class map [34](#)
- QoS [8, 43](#)
- resequencing entries [13](#)
- standard IP, configuring for QoS classification [43](#)
- standard IPv4
 - creating [8](#)
 - matching criteria [7](#)
 - support for [10](#)
 - support in hardware [19](#)
 - time ranges [15](#)
 - unsupported features, IPv4 [6](#)
- active link [4, 5, 6](#)
- active links [2](#)
- active traffic monitoring, IP SLAs [1](#)
- address aliasing [2](#)
- addresses
 - displaying the MAC address table [30](#)
 - dynamic
 - accelerated aging [9](#)
 - changing the aging time [22](#)
 - default aging [9](#)
 - defined [20](#)
 - learning [21](#)
 - removing [23](#)
 - IPv6 [2](#)
 - MAC, discovering [31](#)
 - multicast, STP address management [9](#)
 - static
 - adding and removing [27](#)
 - defined [20](#)
- address resolution [31](#)
- Address Resolution Protocol
 - See ARP
- advertisements
 - CDP [1](#)
 - LLDP [2](#)
 - VTP [16, 3, 4](#)
- aggregatable global unicast addresses [3](#)
- aggregated ports
 - See EtherChannel
- aggregate policers [52](#)
- aggregate policing [13](#)
- aging, accelerating [9](#)
- aging time
 - accelerated
 - for MSTP [25](#)
 - for STP [9, 23](#)
 - MAC address table [22](#)
 - maximum
 - for MSTP [26](#)
 - for STP [23, 24](#)
- alarms, RMON [4](#)
- allowed-VLAN list [18](#)
- ARP
 - defined [6, 31](#)
 - table
 - address resolution [31](#)
 - managing [31](#)
- attributes, RADIUS
 - vendor-proprietary [38](#)
 - vendor-specific [36](#)
- attribute-value pairs [13, 16, 20](#)
- authentication
 - local mode with AAA [40](#)
 - NTP associations [6](#)
 - openIx [30](#)
 - RADIUS
 - key [28](#)
 - login [30](#)

- 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 [3](#)
 - authorization
 - with RADIUS [34](#)
 - with TACACS+ [11, 16](#)
 - authorized ports with IEEE 802.1x [11](#)
 - autoconfiguration [4](#)
 - auto enablement [31](#)
 - automatic advise (auto-advise) in switch stacks [11](#)
 - automatic copy (auto-copy) in switch stacks [11](#)
 - automatic discovery
 - considerations
 - beyond a noncandidate device [8](#)
 - brand new switches [9](#)
 - connectivity [5](#)
 - different VLANs [7](#)
 - management VLANs [8](#)
 - non-CDP-capable devices [7](#)
 - noncluster-capable devices [7](#)
 - in switch clusters [5](#)
 - See also CDP
 - automatic extraction (auto-extract) in switch stacks [11](#)
 - automatic QoS
 - See QoS
 - automatic recovery, clusters [10](#)
 - See also HSRP
 - automatic upgrades (auto-upgrade) in switch stacks [11](#)
 - auto-MDIX
 - configuring [29](#)
 - described [29](#)
 - autonegotiation
 - duplex mode [4](#)
 - interface configuration guidelines [26](#)
 - mismatches [13](#)
 - autosensing, port speed [4](#)
 - Auto Smartports macros
 - built-in macros [3, 9](#)
 - Cisco Medianet [2](#)
 - configuration guidelines [4](#)
 - default configuration [3](#)
 - defined [1](#)
 - displaying [20](#)
 - enabling [5, 8](#)
 - event triggers [12](#)
 - IOS shell [1, 15](#)
 - LLDP [2](#)
 - mapping [9](#)
 - user-defined macros [15](#)
 - See also Smartports macros
 - auxiliary VLAN
 - See voice VLAN
 - availability, features [8](#)
-
- ## B
- BackboneFast
 - described [7](#)
 - disabling [17](#)
 - enabling [17](#)
 - support for [8](#)
 - backup interfaces
 - See Flex Links
 - backup links [2](#)

banners

- configuring
 - login [20](#)
 - message-of-the-day login [19](#)
- default configuration [18](#)
- when displayed [18](#)

Berkeley r-tools replacement [53](#)

binding database

- DHCP snooping
 - See DHCP snooping binding database

bindings

- DHCP snooping database [7](#)
- IP source guard [15](#)

binding table, DHCP snooping

- See DHCP snooping binding database

blocking packets [8](#)

booting

- boot loader, function of [2](#)
- boot process [2](#)
- manually [19](#)
- specific image [20](#)

boot loader

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

BPDU

- error-disabled state [3](#)
- filtering [3](#)
- RSTP format [13](#)

BPDU filtering

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

BPDU guard

- described [2](#)
- disabling [14](#)

- enabling [14](#)
- support for [8](#)

bridge protocol data unit

- See BPDU

broadcast storm-control command [4](#)

broadcast storms [2](#)

C

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

candidate switch

- automatic discovery [5](#)
- defined [4](#)
- requirements [4](#)

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

Catalyst 6000 switches

- authentication compatibility [9](#)

CA trustpoint

- configuring [50](#)
- defined [47](#)

CDP

- and trusted boundary [38](#)
- automatic discovery in switch clusters [5](#)
- configuring [2](#)
- default configuration [2](#)
- defined with LLDP [1](#)
- described [1](#)
- disabling for routing device [4](#)
- enabling and disabling
 - on an interface [4](#)
 - on a switch [4](#)
- monitoring [5](#)
- overview [1](#)
- power negotiation extensions [5](#)
- support for [6](#)
- switch stack considerations [2](#)
- transmission timer and holdtime, setting [3](#)
- updates [3](#)

- CGMP
 - as IGMP snooping learning method 9
 - joining multicast group 3
- CipherSuites 48
- Cisco 7960 IP Phone 1
- Cisco Discovery Protocol
 - See CDP
- Cisco intelligent power management 5
- Cisco IOS File System
 - See IFS
- Cisco IOS IP Service Level Agreements (SLAs) responder 5
- Cisco IOS IP SLAs 2
- Cisco Medianet
 - See Auto Smartports macros
- Cisco Secure ACS
 - attribute-value pairs for downloadable ACLs 20
 - attribute-value pairs for redirect URL 20
- Cisco Secure ACS configuration guide 60
- CiscoWorks 2000 5
- CISP 31
- CIST regional root
 - See MSTP
- CIST root
 - See MSTP
- civic location 3
- class maps for QoS
 - configuring 46
 - described 8
 - displaying 73
- class of service
 - See CoS
- clearing interfaces 38
- CLI
 - abbreviating commands 4
 - command modes 1
 - configuration logging 5
 - described 5
 - editing features
 - enabling and disabling 7
 - keystroke editing 8
 - wrapped lines 9
 - error messages 5
 - filtering command output 10
 - getting help 3
 - history
 - changing the buffer size 6
 - described 6
 - disabling 7
 - recalling commands 6
 - managing clusters 17
 - no and default forms of commands 4
- Client Information Signalling Protocol
 - See CISP
- client mode, VTP 3
- clock
 - See system clock
- clusters, switch
 - accessing 13
 - automatic discovery 5
 - automatic recovery 10
 - benefits 2
 - compatibility 5
 - described 1
 - LRE profile considerations 16
 - managing
 - through CLI 17
 - through SNMP 18
 - planning 5
 - planning considerations
 - automatic discovery 5
 - automatic recovery 10
 - CLI 17
 - host names 14
 - IP addresses 13
 - LRE profiles 16
 - passwords 14

- RADIUS 16
- SNMP 14, 18
- switch stacks 15
- TACACS+ 16
- See also candidate switch, command switch, cluster standby group, member switch, and standby command switch
- cluster standby group
 - automatic recovery 13
 - considerations 11
 - defined 2
 - requirements 3
 - virtual IP address 11
 - See also HSRP
- CNS 6
 - Configuration Engine
 - configID, deviceID, hostname 3
 - configuration service 2
 - described 1
 - event service 3
 - embedded agents
 - described 5
 - enabling automated configuration 6
 - enabling configuration agent 9
 - enabling event agent 7
 - 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 11
 - active (AC) 10
 - configuration conflicts 12
 - defined 2
 - passive (PC) 10
 - password privilege levels 17
 - priority 10
 - recovery
 - from command-switch failure 10, 9
 - from lost member connectivity 12
 - redundant 10
 - replacing
 - with another switch 11
 - with cluster member 9
 - requirements 3
 - standby (SC) 10
 - See also candidate switch, cluster standby group, member switch, and standby command switch
- community strings
 - configuring 14, 8
 - for cluster switches 4
 - in clusters 14
 - overview 4
 - SNMP 14
- compatibility, feature 13
- compatibility, software
 - See stacks, switch
- config.text 17
- configurable leave timer, IGMP 6
- configuration, initial
 - defaults 16
 - Express Setup 2
- configuration changes, logging 11
- configuration conflicts, recovering from lost member connectivity 12
- configuration examples, network 18
- configuration files
 - archiving 21
 - clearing the startup configuration 20
 - creating using a text editor 11
 - default name 17

- deleting a stored configuration [20](#)
- described [9](#)
- downloading
 - automatically [18](#)
 - preparing [11, 14, 17](#)
 - reasons for [9](#)
 - using FTP [14](#)
 - using RCP [18](#)
 - using TFTP [12](#)
- guidelines for creating and using [10](#)
- guidelines for replacing and rolling back [22](#)
- invalid combinations when copying [5](#)
- limiting TFTP server access [17](#)
- obtaining with DHCP [9](#)
- password recovery disable considerations [5](#)
- replacing a running configuration [20, 21](#)
- rolling back a running configuration [20, 22](#)
- specifying the filename [18](#)
- system contact and location information [17](#)
- types and location [10](#)
- uploading
 - preparing [11, 14, 17](#)
 - reasons for [9](#)
 - using FTP [16](#)
 - using RCP [19](#)
 - using TFTP [13](#)
- configuration logger [11](#)
- configuration logging [5](#)
- configuration replacement [20](#)
- configuration rollback [20, 21](#)
- configuration settings, saving [16](#)
- configure terminal command [16](#)
- configuring 802.1x user distribution [56](#)
- configuring port-based authentication violation modes [39](#)
- configuring small-frame arrival rate [5](#)
- config-vlan mode [2](#)
- conflicts, configuration [12](#)
- connections, secure remote [42](#)
- connectivity problems [15, 16, 18](#)
- consistency checks in VTP Version 2 [5](#)
- console port, connecting to [11](#)
- 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 [16](#)
- CoS output queue threshold map for QoS [19](#)
- CoS-to-DSCP map for QoS [55](#)
- counters, clearing interface [38](#)
- CPU utilization, troubleshooting [27](#)
- crashinfo file [24](#)
- critical authentication, IEEE 802.1x [52](#)
- critical VLAN [23](#)
- cross-stack EtherChannel
 - configuration guidelines [13](#)
 - described [3](#)
 - illustration [4](#)
 - support for [8](#)
- cross-stack UplinkFast, STP
 - described [5](#)
 - disabling [17](#)
 - enabling [17](#)
 - fast-convergence events [7](#)
 - Fast Uplink Transition Protocol [6](#)
 - normal-convergence events [7](#)
 - support for [8](#)
- cryptographic software image
 - SSH [41](#)
 - SSL [46](#)
 - switch stack considerations [15](#)
- customizable web pages, web-based authentication [6](#)
- CWDM SFPs [23](#)

D

DACL

See downloadable ACL

daylight saving time [14](#)

debugging

enabling all system diagnostics [22](#)

enabling for a specific feature [21](#)

redirecting error message output [22](#)

using commands [21](#)

default commands [4](#)

default configuration

802.1x [33](#)

auto-QoS [21](#)

banners [18](#)

booting [17](#)

CDP [2](#)

DHCP [9](#)

DHCP option 82 [9](#)

DHCP snooping [9](#)

DHCP snooping binding database [9](#)

DNS [17](#)

dynamic ARP inspection [5](#)

EtherChannel [11](#)

Ethernet interfaces [23](#)

Flex Links [8](#)

IGMP filtering [26](#)

IGMP snooping [7,6](#)

IGMP throttling [26](#)

initial switch information [3](#)

IP SLAs [5](#)

IP source guard [17](#)

IPv6 [7](#)

Layer 2 interfaces [23](#)

LLDP [5](#)

MAC address table [22](#)

MAC address-table move update [8](#)

MSTP [16](#)

MVR [21](#)

NTP [5](#)

optional spanning-tree configuration [12](#)

password and privilege level [3](#)

RADIUS [27](#)

RMON [3](#)

RSPAN [11](#)

SDM template [2](#)

SNMP [7](#)

SPAN [11](#)

SSL [49](#)

standard QoS [31](#)

STP [13](#)

switch stacks [17](#)

system message logging [4](#)

system name and prompt [16](#)

TACACS+ [13](#)

UDLD [4](#)

VLAN, Layer 2 Ethernet interfaces [15](#)

VLANs [7](#)

VMPS [25](#)

voice VLAN [3](#)

VTP [9](#)

default gateway [15](#)

default web-based authentication configuration

802.1X [9](#)

deleting VLANs [9](#)

denial-of-service attack [2](#)

description command [35](#)

designing your network, examples [18](#)

destination addresses

in IPv4 ACLs [10](#)

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

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

detecting indirect link failures, STP [8](#)

device [25](#)

device discovery protocol [1](#)

device manager

benefits [2](#)

described [2,5](#)

- in-band management [6](#)
- upgrading a switch [25](#)
- DHCP
 - enabling
 - relay agent [11](#)
- DHCP-based autoconfiguration
 - client request message exchange [4](#)
 - configuring
 - client side [4](#)
 - DNS [8](#)
 - relay device [9](#)
 - server side [7](#)
 - TFTP server [8](#)
 - example [10](#)
 - lease options
 - for IP address information [7](#)
 - for receiving the configuration file [7](#)
 - overview [4](#)
 - relationship to BOOTP [4](#)
 - relay support [6](#)
 - support for [6](#)
- DHCP-based autoconfiguration and image update
 - configuring [12 to 15](#)
 - understanding [5 to 6](#)
- 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 [9](#)
 - default configuration [9](#)
 - displaying [14](#)
 - overview [4](#)
 - packet format, suboption
 - circuit ID [5](#)
 - remote ID [5](#)
 - remote ID suboption [5](#)
- DHCP server port-based address allocation
 - configuration guidelines [24](#)
 - default configuration [24](#)
 - described [23](#)
 - displaying [26](#)
 - enabling [24](#)
 - reserved addresses [24](#)
- DHCP server port-based address assignment
 - support for [6](#)
- DHCP snooping
 - accepting untrusted packets form edge switch [3, 12](#)
 - binding database
 - See DHCP snooping binding database
 - configuration guidelines [9](#)
 - default configuration [9](#)
 - displaying binding tables [14](#)
 - message exchange process [4](#)
 - option 82 data insertion [4](#)
 - trusted interface [3](#)
 - untrusted interface [3](#)
 - untrusted messages [3](#)
- DHCP snooping binding database
 - adding bindings [13](#)
 - binding entries, displaying [14](#)
 - binding file
 - format [7](#)
 - location [7](#)
 - bindings [7](#)
 - clearing agent statistics [14](#)
 - configuration guidelines [10](#)
 - configuring [13](#)
 - default configuration [9](#)
 - deleting
 - binding file [14](#)
 - bindings [14](#)
 - database agent [14](#)
 - described [7](#)
 - displaying [14](#)
 - displaying status and statistics [14](#)

- enabling [13](#)
- entry [7](#)
- renewing database [14](#)
- resetting
 - delay value [14](#)
 - timeout value [14](#)
- DHCP snooping binding table
 - See DHCP snooping binding database
- Differentiated Services architecture, QoS [2](#)
- Differentiated Services Code Point [2](#)
- directed unicast requests [6](#)
- directories
 - changing [4](#)
 - creating and removing [4](#)
 - displaying the working [4](#)
- discovery, clusters
 - See automatic discovery
- DNS
 - and DHCP-based autoconfiguration [8](#)
 - default configuration [17](#)
 - displaying the configuration [18](#)
 - in IPv6 [3](#)
 - overview [16](#)
 - setting up [17](#)
 - support for [6](#)
- domain names
 - DNS [16](#)
 - VTP [10](#)
- Domain Name System
 - See DNS
- downloadable ACL [19, 20, 60](#)
- downloading
 - configuration files
 - preparing [11, 14, 17](#)
 - reasons for [9](#)
 - using FTP [14](#)
 - using RCP [18](#)
 - using TFTP [12](#)
 - image files
 - deleting old image [29](#)
 - preparing [27, 31, 35](#)
 - reasons for [25](#)
 - using CMS [2](#)
 - using FTP [32](#)
 - using HTTP [2, 25](#)
 - using RCP [36](#)
 - using TFTP [28](#)
 - using the device manager or Network Assistant [25](#)
- DRP
 - support for [14](#)
- DSCP [13, 2](#)
- DSCP input queue threshold map for QoS [16](#)
- DSCP output queue threshold map for QoS [19](#)
- DSCP-to-CoS map for QoS [58](#)
- DSCP-to-DSCP-mutation map for QoS [59](#)
- DSCP transparency [39](#)
- DTP [9, 14](#)
- dual-action detection [6](#)
- 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, 24](#)
 - setting the type [24](#)
- dynamic access ports
 - characteristics [4](#)
 - configuring [27](#)
 - defined [3](#)
- dynamic addresses
 - See addresses
- dynamic ARP inspection
 - ARP cache poisoning [1](#)
 - ARP requests, described [1](#)

- ARP spoofing attack [1](#)
- clearing
 - log buffer [16](#)
 - statistics [16](#)
- configuration guidelines [6](#)
- configuring
 - ACLs for non-DHCP environments [9](#)
 - in DHCP environments [7](#)
 - log buffer [13](#)
 - rate limit for incoming ARP packets [4, 11](#)
- default configuration [5](#)
- denial-of-service attacks, preventing [11](#)
- described [1](#)
- DHCP snooping binding database [2](#)
- displaying
 - ARP ACLs [15](#)
 - configuration and operating state [15](#)
 - log buffer [16](#)
 - statistics [16](#)
 - trust state and rate limit [15](#)
- error-disabled state for exceeding rate limit [4](#)
- function of [2](#)
- interface trust states [3](#)
- log buffer
 - clearing [16](#)
 - configuring [13](#)
 - displaying [16](#)
- logging of dropped packets, described [5](#)
- 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 [11](#)
 - described [4](#)
 - error-disabled state [4](#)
- statistics
 - clearing [16](#)
 - displaying [16](#)
- validation checks, performing [12](#)

- dynamic auto trunking mode [14](#)
- dynamic desirable trunking mode [14](#)
- Dynamic Host Configuration Protocol
 - See DHCP-based autoconfiguration
- dynamic port VLAN membership
 - described [25](#)
 - reconfirming [27](#)
 - troubleshooting [29](#)
 - types of connections [27](#)
- Dynamic Trunking Protocol
 - See DTP

E

- editing features
 - enabling and disabling [7](#)
 - keystrokes used [8](#)
 - wrapped lines [9](#)
- elections
 - See stack master
- ELIN location [3](#)
- enable password [4](#)
- enable secret password [4](#)
- encryption, CipherSuite [48](#)
- encryption for passwords [4](#)
- environment variables, function of [22](#)
- error-disabled state, BPDU [3](#)
- error messages during command entry [5](#)
- EtherChannel
 - automatic creation of [5, 7](#)
 - channel groups
 - binding physical and logical interfaces [4](#)
 - numbering of [4](#)
 - configuration guidelines [12](#)
 - configuring Layer 2 interfaces [13](#)
 - default configuration [11](#)
 - described [2](#)
 - displaying status [20](#)
 - forwarding methods [8, 15](#)

- IEEE 802.3ad, described [7](#)
 - interaction
 - with STP [12](#)
 - with VLANs [13](#)
 - LACP
 - described [7](#)
 - displaying status [20](#)
 - hot-standby ports [18](#)
 - interaction with other features [8](#)
 - modes [7](#)
 - port priority [19](#)
 - system priority [18](#)
 - load balancing [8, 15](#)
 - PAgP
 - aggregate-port learners [16](#)
 - compatibility with Catalyst 1900 [17](#)
 - described [5](#)
 - displaying status [20](#)
 - interaction with other features [7](#)
 - interaction with virtual switches [6](#)
 - learn method and priority configuration [16](#)
 - modes [6](#)
 - support for [4](#)
 - with dual-action detection [6](#)
 - port-channel interfaces
 - described [4](#)
 - numbering of [4](#)
 - port groups [4](#)
 - stack changes, effects of [10](#)
 - support for [4](#)
 - EtherChannel guard
 - described [10](#)
 - disabling [18](#)
 - enabling [18](#)
 - Ethernet management port
 - active link [20](#)
 - and routing [21](#)
 - and TFTP [22](#)
 - configuring [22](#)
 - default setting [21](#)
 - described [20](#)
 - for network management [20](#)
 - specifying [22](#)
 - supported features [21](#)
 - unsupported features [21](#)
 - Ethernet management port, internal
 - and routing [21](#)
 - unsupported features [21](#)
 - Ethernet VLANs
 - adding [8](#)
 - defaults and ranges [7](#)
 - modifying [8](#)
 - EUI [3](#)
 - events, RMON [4](#)
 - examples
 - network configuration [18](#)
 - expedite queue for QoS [72](#)
 - Express Setup [2](#)
 - See also getting started guide
 - extended crashinfo file [24](#)
 - extended-range VLANs
 - configuration guidelines [11](#)
 - configuring [11](#)
 - creating [12](#)
 - defined [1](#)
 - extended system ID
 - MSTP [19](#)
 - STP [5, 16](#)
 - extended universal identifier
 - See EUI
 - Extensible Authentication Protocol over LAN [1](#)
-
- ## F
- fa0 interface [6](#)
 - Fa0 port
 - See Ethernet management port
 - failover support [8](#)

- Fast Convergence [3](#)
- fastethernet0 port
 - See Ethernet management port
- Fast Uplink Transition Protocol [6](#)
- features, incompatible [13](#)
- fiber-optic, detecting unidirectional links [1](#)
- files
 - basic crashinfo
 - description [24](#)
 - location [24](#)
 - copying [5](#)
 - crashinfo, description [24](#)
 - deleting [6](#)
 - displaying the contents of [8](#)
 - extended crashinfo
 - description [25](#)
 - location [25](#)
 - tar
 - creating [6](#)
 - displaying the contents of [7](#)
 - extracting [8](#)
 - image file format [26](#)
- 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 [23](#)
 - 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 [63](#)
 - overview [29](#)
- Flex Link Multicast Fast Convergence [3](#)
- Flex Links
 - configuration guidelines [8](#)
 - configuring [9,10](#)
 - configuring preferred VLAN [12](#)
 - configuring VLAN load balancing [11](#)
 - default configuration [8](#)
 - description [2](#)
 - link load balancing [3](#)
 - monitoring [15](#)
 - VLANs [3](#)
- flooded traffic, blocking [8](#)
- flow-based packet classification [13](#)
- flowcharts
 - QoS classification [7](#)
 - QoS egress queueing and scheduling [18](#)
 - QoS ingress queueing and scheduling [15](#)
 - QoS policing and marking [11](#)
- flowcontrol
 - configuring [28](#)
 - described [28](#)
- forward-delay time
 - MSTP [25](#)
 - STP [23](#)
- FTP
 - accessing MIB files [4](#)
 - configuration files
 - downloading [14](#)
 - overview [13](#)
 - preparing the server [14](#)
 - uploading [16](#)
 - image files
 - deleting old image [33](#)
 - downloading [32](#)
 - preparing the server [31](#)
 - uploading [34](#)

G

- general query [5](#)
- Generating IGMP Reports [4](#)
- get-bulk-request operation [4](#)
- get-next-request operation [4, 5](#)
- get-request operation [4, 5](#)
- get-response operation [4](#)
- Gigabit modules
 - See SFPs
- global configuration mode [2](#)
- global leave, IGMP [13](#)
- guest VLAN and 802.1x [21](#)
- guide mode [2](#)
- GUIs
 - See device manager and Network Assistant

H

- hello time
 - MSTP [25](#)
 - STP [22](#)
- 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 [14](#)
- hosts, limit on dynamic ports [29](#)
- HP OpenView [5](#)
- HSRP
 - automatic cluster recovery [13](#)
 - cluster standby group considerations [11](#)
 - See also clusters, cluster standby group, and standby command switch
- HTTP over SSL
 - see HTTPS
- HTTPS [47](#)
 - configuring [51](#)
 - self-signed certificate [47](#)
- HTTP secure server [47](#)

I

- ICMP
 - IPv6 [4](#)
 - time-exceeded messages [18](#)
 - traceroute and [18](#)
- ICMP ping
 - executing [15](#)
 - overview [15](#)
- ICMPv6 [4](#)
- IDS appliances
 - and ingress RSPAN [21](#)
 - and ingress SPAN [14](#)
- 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 [20](#)
- IEEE 802.1s
 - See MSTP
- IEEE 802.1w
 - See RSTP
- IEEE 802.1x
 - See port-based authentication
- IEEE 802.3ad
 - See EtherChannel
- IEEE 802.3ad, PoE+ [14, 5](#)
- IEEE 802.3af
 - See PoE
- IEEE 802.3x flow control [28](#)
- ifIndex values, SNMP [6](#)

- IFS [6](#)
- IGMP
 - configurable leave timer
 - described [6](#)
 - enabling [12](#)
 - flooded multicast traffic
 - controlling the length of time [13](#)
 - disabling on an interface [14](#)
 - global leave [13](#)
 - query solicitation [13](#)
 - recovering from flood mode [13](#)
 - joining multicast group [3](#)
 - join messages [3](#)
 - leave processing, enabling [11,9](#)
 - leaving multicast group [5](#)
 - queries [4](#)
 - report suppression
 - described [6](#)
 - disabling [16,11](#)
 - supported versions [3](#)
 - support for [4](#)
- IGMP filtering
 - configuring [26](#)
 - default configuration [26](#)
 - described [25](#)
 - monitoring [30](#)
 - support for [4](#)
- IGMP groups
 - configuring filtering [29](#)
 - setting the maximum number [28](#)
- IGMP Immediate Leave
 - configuration guidelines [12](#)
 - described [6](#)
 - enabling [11](#)
- IGMP profile
 - applying [27](#)
 - configuration mode [26](#)
 - configuring [27](#)
- IGMP snooping
 - and address aliasing [2](#)
 - and stack changes [7](#)
 - configuring [7](#)
 - default configuration [7,6](#)
 - definition [2](#)
 - enabling and disabling [8,7](#)
 - global configuration [8](#)
 - Immediate Leave [6](#)
 - in the switch stack [7](#)
 - method [9](#)
 - monitoring [17,12](#)
 - querier
 - configuration guidelines [15](#)
 - configuring [15](#)
 - supported versions [3](#)
 - support for [4](#)
 - VLAN configuration [8](#)
- IGMP throttling
 - configuring [29](#)
 - default configuration [26](#)
 - described [25](#)
 - displaying action [30](#)
- Immediate Leave, IGMP [6](#)
 - enabling [9](#)
- inaccessible authentication bypass [23](#)
 - support for multiauth ports [23](#)
- initial configuration
 - defaults [16](#)
 - Express Setup [2](#)
- interface
 - number [15](#)
 - range macros [18](#)
- interface command [15 to ??, 15 to 16](#)
- interface configuration mode [3](#)
- interfaces
 - auto-MDIX, configuring [29](#)
 - configuration guidelines
 - duplex and speed [26](#)

- configuring
 - procedure **16**
 - counters, clearing **38**
 - default configuration **23**
 - described **35**
 - descriptive name, adding **35**
 - displaying information about **37**
 - flow control **28**
 - management **5**
 - monitoring **37**
 - naming **35**
 - physical, identifying **14, 15**
 - range of **16**
 - restarting **38**
 - shutting down **38**
 - speed and duplex, configuring **27**
 - status **37**
 - supported **14**
 - types of **1**
- interfaces range macro command **18**
- interface types **15**
- 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 **8**
 - implicit deny **9, 13**
 - implicit masks **9**
 - named **13**
 - undefined **19**
- IP addresses
- 128-bit **2**
 - candidate or member **4, 13**
 - cluster access **2**
 - command switch **3, 11, 13**
 - discovering **31**
 - IPv6 **2**
 - redundant clusters **11**
 - standby command switch **11, 13**
 - See also IP information
- ip igmp profile command **26**
- IP information
- assigned
 - manually **15**
 - through DHCP-based autoconfiguration **4**
 - default configuration **3**
- IP phones
- and QoS **1**
 - automatic classification and queuing **21**
 - configuring **5**
 - ensuring port security with QoS **38**
 - trusted boundary for QoS **38**
- IP Port Security for Static Hosts
- on a Layer 2 access port **19**
- IP precedence **2**
- IP-precedence-to-DSCP map for QoS **56**
- IP protocols in ACLs **10**
- 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 [17](#)
 - and DHCP snooping [15](#)
 - and EtherChannels [17](#)
 - and port security [17](#)
 - and private VLANs [17](#)
 - and routed ports [17](#)
 - and TCAM entries [18](#)
 - and trunk interfaces [17](#)
 - and VRF [17](#)
 - binding configuration
 - automatic [15](#)
 - manual [15](#)
 - binding table [15](#)
 - configuration guidelines [17](#)
 - default configuration [17](#)
 - described [15](#)
 - disabling [19](#)
 - displaying
 - active IP or MAC bindings [23](#)
 - bindings [23](#)
 - configuration [23](#)
 - enabling [18, 19](#)
 - filtering
 - source IP address [15](#)
 - source IP and MAC address [15](#)
 - on provisioned switches [18](#)
 - source IP address filtering [15](#)
 - source IP and MAC address filtering [15](#)
 - static bindings
 - adding [18, 19](#)
 - deleting [19](#)
 - static hosts [19](#)

- IP traceroute
 - executing [19](#)
 - overview [18](#)
- IPv4 ACLs
 - applying to interfaces [18](#)
 - extended, creating [9](#)
 - named [13](#)
 - standard, creating [8](#)
- IPv4 and IPv6
 - dual protocol stacks [4](#)
- IPv6
 - addresses [2](#)
 - address formats [2](#)
 - and switch stacks [6](#)
 - applications [4](#)
 - assigning address [7](#)
 - autoconfiguration [4](#)
 - configuring static routes [10](#)
 - default configuration [7](#)
 - defined [2](#)
 - forwarding [7](#)
 - ICMP [4](#)
 - monitoring [11](#)
 - neighbor discovery [4](#)
 - SDM templates [1](#)
 - stack master functions [6](#)
 - Stateless Autoconfiguration [4](#)
 - supported features [3](#)

J

- join messages, IGMP [3](#)

L

- LACP

- See EtherChannel

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

- Layer 2 interfaces, default configuration [23](#)
- Layer 2 traceroute
 - and ARP [17](#)
 - and CDP [17](#)
 - broadcast traffic [16](#)
 - described [16](#)
 - IP addresses and subnets [17](#)
 - MAC addresses and VLANs [17](#)
 - multicast traffic [17](#)
 - multiple devices on a port [17](#)
 - unicast traffic [16](#)
 - usage guidelines [17](#)
- Layer 3 features [14](#)
- Layer 3 interfaces
 - assigning IPv6 addresses to [8](#)
- Layer 3 packets, classification methods [2](#)
- LDAP [2](#)
- Leaking IGMP Reports [4](#)
- LEDs, switch
 - See hardware installation guide
- lightweight directory access protocol
 - See LDAP
- line configuration mode [3](#)
- Link Aggregation Control Protocol
 - See EtherChannel
- link failure, detecting unidirectional [8](#)
- Link Layer Discovery Protocol
 - See CDP
- link local unicast addresses [3](#)
- link redundancy
 - See Flex Links
- links, unidirectional [1](#)
- link-state tracking
 - configuring [23](#)
 - described [20](#)
- LLDP
 - configuring [5](#)
 - characteristics [7](#)
 - default configuration [5](#)
 - enabling [6](#)
 - monitoring and maintaining [12](#)
 - overview [1](#)
 - supported TLVs [2](#)
 - switch stack considerations [2](#)
 - transmission timer and holdtime, setting [7](#)
- LLDP-MED
 - configuring
 - procedures [5](#)
 - TLVs [8](#)
 - monitoring and maintaining [12](#)
 - overview [1,2](#)
 - supported TLVs [2](#)
- LLDP Media Endpoint Discovery
 - See LLDP-MED
- local SPAN [2](#)
- location TLV [3,8](#)
- login authentication
 - with RADIUS [30](#)
 - with TACACS+ [14](#)
- login banners [18](#)
- log messages
 - See system message logging
- Long-Reach Ethernet (LRE) technology [20](#)
- loop guard
 - described [11](#)
 - enabling [19](#)
 - support for [8](#)
- LRE profiles, considerations in switch clusters [16](#)

M

MAB

See MAC authentication bypass

MAB inactivity timer

default setting [34](#)

range [36](#)

MAC/PHY configuration status TLV [2](#)

MAC addresses

aging time [22](#)

and VLAN association [21](#)

building the address table [21](#)

default configuration [22](#)

disabling learning on a VLAN [30](#)

discovering [31](#)

displaying [30](#)

displaying in the IP source binding table [23](#)

dynamic

learning [21](#)

removing [23](#)

in ACLs [23](#)

static

adding [27](#)

allowing [29,30](#)

characteristics of [27](#)

dropping [29](#)

removing [28](#)

MAC address learning [6](#)

MAC address learning, disabling on a VLAN [30](#)

MAC address notification, support for [15](#)

MAC address-table move update

configuration guidelines [8](#)

configuring [13](#)

default configuration [8](#)

description [6](#)

monitoring [15](#)

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

MAC authentication bypass [36](#)

configuring [56](#)

overview [17](#)

MAC extended access lists

applying to Layer 2 interfaces [24](#)

configuring for QoS [45](#)

creating [23](#)

defined [23](#)

for QoS classification [6](#)

macros

See Auto Smartports macros

See Smartports macros

magic packet [26](#)

manageability features [6](#)

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](#)

CNS [1](#)

Network Assistant [2](#)

overview [5](#)

management VLAN

considerations in switch clusters [8](#)

discovery through different management VLANs [8](#)

mapping tables for QoS

configuring

CoS-to-DSCP [55](#)

DSCP [54](#)

DSCP-to-CoS [58](#)

DSCP-to-DSCP-mutation [59](#)

- IP-precedence-to-DSCP [56](#)
 - policed-DSCP [57](#)
- described [11](#)
- marking
 - action with aggregate policers [52](#)
 - described [4, 9](#)
- matching, IPv4 ACLs [7](#)
- maximum aging time
 - MSTP [26](#)
 - STP [23](#)
- maximum hop count, MSTP [26](#)
- maximum number of allowed devices, port-based authentication [36](#)
- MDA
 - configuration guidelines [13 to 14](#)
 - described [11, 13](#)
 - exceptions with authentication process [6](#)
- Medianet
 - See Auto Smartports macros
- membership mode, VLAN port [3](#)
- member switch
 - automatic discovery [5](#)
 - defined [2](#)
 - managing [17](#)
 - passwords [13](#)
 - recovering from lost connectivity [12](#)
 - requirements [4](#)
 - See also candidate switch, cluster standby group, and standby command switch
- messages, to users through banners [18](#)
- MIBs
 - accessing files with FTP [4](#)
 - location of files [4](#)
 - overview [1](#)
 - SNMP interaction with [5](#)
 - supported [1](#)
- mirroring traffic for analysis [1](#)
- mismatches, autonegotiation [13](#)
- module number [15](#)
- monitoring
 - access groups [25](#)
 - cables for unidirectional links [1](#)
 - CDP [5](#)
 - features [15](#)
 - Flex Links [15](#)
 - IGMP
 - filters [30](#)
 - snooping [17, 12](#)
 - interfaces [37](#)
 - IP SLAs operations [6](#)
 - IPv4 ACL configuration [25](#)
 - IPv6 [11](#)
 - MAC address-table move update [15](#)
 - multicast router interfaces [17, 12](#)
 - MVR [24](#)
 - network traffic for analysis with probe [2](#)
 - port
 - blocking [19](#)
 - protection [19](#)
 - SFP status [37, 14](#)
 - speed and duplex mode [27](#)
 - traffic flowing among switches [2](#)
 - traffic suppression [19](#)
 - VLANs [13](#)
 - VMPS [28](#)
 - VTP [18](#)
- mrouter Port [3](#)
- mrouter port [5](#)
- MSTP
 - boundary ports
 - configuration guidelines [17](#)
 - described [6](#)
 - BPDU filtering
 - described [3](#)
 - enabling [15](#)
 - BPDU guard
 - described [2](#)
 - enabling [14](#)

- CIST, described [3](#)
- CIST regional root [3](#)
- CIST root [5](#)
- configuration guidelines [16, 12](#)
- configuring
 - forward-delay time [25](#)
 - hello time [25](#)
 - link type for rapid convergence [27](#)
 - maximum aging time [26](#)
 - maximum hop count [26](#)
 - MST region [17](#)
 - neighbor type [27](#)
 - path cost [23](#)
 - port priority [21](#)
 - root switch [19](#)
 - secondary root switch [20](#)
 - switch priority [24](#)
- CST
 - defined [3](#)
 - operations between regions [4](#)
- default configuration [16](#)
- default optional feature configuration [12](#)
- displaying status [28](#)
- enabling the mode [17](#)
- EtherChannel guard
 - described [10](#)
 - enabling [18](#)
- extended system ID
 - effects on root switch [19](#)
 - effects on secondary root switch [20](#)
 - unexpected behavior [19](#)
- IEEE 802.1s
 - implementation [7](#)
 - port role naming change [7](#)
 - terminology [5](#)
- instances supported [10](#)
- interface state, blocking to forwarding [2](#)
- interoperability and compatibility among modes [11](#)
- interoperability with IEEE 802.1D
 - described [9](#)
 - restarting migration process [28](#)
- IST
 - defined [3](#)
 - master [3](#)
 - operations within a region [3](#)
- loop guard
 - described [11](#)
 - enabling [19](#)
- mapping VLANs to MST instance [17](#)
- MST region
 - CIST [3](#)
 - configuring [17](#)
 - described [2](#)
 - hop-count mechanism [6](#)
 - IST [3](#)
 - supported spanning-tree instances [2](#)
- optional features supported [8](#)
- overview [2](#)
- Port Fast
 - described [2](#)
 - enabling [13](#)
- preventing root switch selection [10](#)
- root guard
 - described [10](#)
 - enabling [18](#)
- root switch
 - configuring [19](#)
 - effects of extended system ID [19](#)
 - unexpected behavior [19](#)
- shutdown Port Fast-enabled port [2](#)
- stack changes, effects of [9](#)
- status, displaying [28](#)
- multiauth
 - support for inaccessible authentication bypass [23](#)
- multiauth mode
 - See multiple-authentication mode

- multicast groups
 - Immediate Leave [6](#)
 - joining [3](#)
 - leaving [5](#)
 - static joins [10, 8](#)
 - multicast router interfaces, monitoring [17, 12](#)
 - multicast router ports, adding [10, 8](#)
 - multicast storm [2](#)
 - multicast storm-control command [4](#)
 - multicast television application [19](#)
 - multicast VLAN [18](#)
 - Multicast VLAN Registration
 - See MVR
 - multidomain authentication
 - See MDA
 - multiple authentication [14](#)
 - multiple authentication mode
 - configuring [42](#)
 - MVR
 - and address aliasing [21](#)
 - and IGMPv3 [21](#)
 - configuration guidelines [21](#)
 - configuring interfaces [23](#)
 - default configuration [21](#)
 - described [18](#)
 - example application [19](#)
 - modes [22](#)
 - monitoring [24](#)
 - multicast television application [19](#)
 - setting global parameters [21](#)
 - support for [4](#)
 - inaccessible authentication bypass [52](#)
 - Layer 2 IEEE 802.1x validation [12, 29, 58](#)
 - named IPv4 ACLs [13](#)
 - NameSpace Mapper
 - See NSM
 - native VLAN
 - configuring [20](#)
 - default [20](#)
 - NEAT
 - configuring [59](#)
 - overview [30](#)
 - neighbor discovery, IPv6 [4](#)
 - Network Admission Control
 - See NAC
 - Network Assistant
 - benefits [2](#)
 - described [5](#)
 - downloading image files [2](#)
 - guide mode [2](#)
 - management options [2](#)
 - managing switch stacks [2, 15](#)
 - upgrading a switch [25](#)
 - wizards [2](#)
 - network configuration examples
 - increasing network performance [19](#)
 - long-distance, high-bandwidth transport [23](#)
 - providing network services [19](#)
 - server aggregation and Linux server cluster [21](#)
 - small to medium-sized network [22](#)
 - network design
 - performance [19](#)
 - services [19](#)
 - Network Edge Access Topology
 - See NEAT
 - network management
 - CDP [1](#)
 - RMON [1](#)
 - SNMP [1](#)
 - network performance, measuring with IP SLAs [3](#)
-
- N**
- NAC
 - critical authentication [23, 52](#)
 - IEEE 802.1x authentication using a RADIUS server [58](#)
 - IEEE 802.1x validation using RADIUS server [58](#)

network policy TLV [2, 8](#)

Network Time Protocol

- See NTP

no commands [4](#)

nonhierarchical policy maps

- described [10](#)

non-IP traffic filtering [23](#)

nontrunking mode [14](#)

normal-range VLANs [4](#)

- configuration guidelines [6](#)
- configuring [4](#)
- defined [1](#)

NSM [3](#)

NTP

- associations
 - authenticating [6](#)
 - defined [3](#)
 - enabling broadcast messages [8](#)
 - peer [7](#)
 - server [7](#)
- default configuration [5](#)
- displaying the configuration [12](#)
- overview [3](#)
- restricting access
 - creating an access group [10](#)
 - disabling NTP services per interface [11](#)
- source IP address, configuring [11](#)
- stratum [3](#)
- support for [6](#)
- synchronizing devices [7](#)
- time
 - services [3](#)
 - synchronizing [3](#)

O

OBFL

- configuring [26](#)
- described [25](#)
- displaying [27](#)

offline configuration for switch stacks [7](#)

off mode, VTP [4](#)

on-board failure logging

- See OBFL

online diagnostics

- overview [1](#)
- running tests [3](#)
- understanding [1](#)

open1x

- configuring [64](#)

open1x authentication

- overview [30](#)

optimizing system resources [1](#)

options, management [5](#)

out-of-profile markdown [14](#)

P

packet modification, with QoS [20](#)

PAgP

- See EtherChannel

passwords

- default configuration [3](#)
- disabling recovery of [5](#)
- encrypting [4](#)
- for security [10](#)
- in clusters [14](#)
- overview [1](#)
- recovery of [4](#)

- setting
 - enable [3](#)
 - enable secret [4](#)
 - Telnet [6](#)
 - with usernames [7](#)
- VTP domain [10](#)
- path cost
 - MSTP [23](#)
 - STP [20](#)
- PC (passive command switch) [10](#)
- performance, network design [19](#)
- performance features [4](#)
- persistent self-signed certificate [47](#)
- per-user ACLs and Filter-Ids [9](#)
- per-VLAN spanning-tree plus
 - See PVST+
- physical ports [2](#)
- PIM-DVMRP, as snooping method [9](#)
- ping
 - character output description [16](#)
 - executing [15](#)
 - overview [15](#)
- PoE
 - auto mode [7](#)
 - CDP with power consumption, described [5](#)
 - CDP with power negotiation, described [5](#)
 - Cisco intelligent power management [5](#)
 - configuring [30](#)
 - cutoff power
 - determining [8](#)
 - cutoff-power
 - support for [8](#)
 - devices supported [5](#)
 - high-power devices operating in low-power mode [5](#)
 - IEEE power classification levels [6](#)
 - monitoring [8](#)
 - monitoring power [33](#)
 - policing power consumption [33](#)
 - policing power usage [8](#)
 - power budgeting [31](#)
 - power consumption [9, 31](#)
 - powered-device detection and initial power allocation [6](#)
 - power management modes [7](#)
 - power monitoring [8](#)
 - power negotiation extensions to CDP [5](#)
 - power sensing [8](#)
 - standards supported [5](#)
 - static mode [7](#)
 - total available power [9](#)
 - troubleshooting [13](#)
- PoE+ [14, 5, 6, 30](#)
- policed-DSCP map for QoS [57](#)
- policers
 - configuring
 - for each matched traffic class [48](#)
 - for more than one traffic class [52](#)
 - described [4](#)
 - displaying [73](#)
 - number of [34](#)
 - types of [10](#)
- policing
 - described [4](#)
 - token-bucket algorithm [10](#)
- policy maps for QoS
 - characteristics of [48](#)
 - described [8](#)
 - displaying [74](#)
 - nonhierarchical on physical ports
 - described [10](#)
- port ACLs, described [3](#)
- Port Aggregation Protocol
 - See EtherChannel
- port-based authentication
 - accounting [15](#)
 - authentication server
 - defined [3, 2](#)
 - RADIUS server [3](#)

- client, defined [3, 2](#)
- configuration guidelines [34, 9](#)
- configuring
 - 802.1x authentication [40](#)
 - guest VLAN [49](#)
 - host mode [42](#)
 - inaccessible authentication bypass [52](#)
 - manual re-authentication of a client [45](#)
 - periodic re-authentication [44](#)
 - quiet period [45](#)
 - RADIUS server [42, 13](#)
 - RADIUS server parameters on the switch [41, 11](#)
 - restricted VLAN [50](#)
 - switch-to-client frame-retransmission number [46, 47](#)
 - switch-to-client retransmission time [46](#)
 - violation modes [39](#)
- default configuration [33, 9](#)
- described [1](#)
- device roles [3, 2](#)
- displaying statistics [66, 17](#)
- downloadable ACLs and redirect URLs
 - configuring [60 to 62, ?? to 63](#)
 - 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 [63](#)
 - overview [29](#)
- guest VLAN
 - configuration guidelines [22, 23](#)
 - described [21](#)
- host mode [12](#)
- inaccessible authentication bypass
 - configuring [52](#)
 - described [23](#)
 - guidelines [35](#)
- initiation and message exchange [6](#)
- magic packet [26](#)
- maximum number of allowed devices per port [36](#)
- method lists [40](#)
- multiple authentication [14](#)
- per-user ACLs
 - configuration tasks [19](#)
 - described [18](#)
 - RADIUS server attributes [19](#)
- ports
 - authorization state and dot1x port-control command [11](#)
 - authorized and unauthorized [11](#)
 - voice VLAN [25](#)
- port security
 - and voice VLAN [26](#)
 - described [25](#)
 - interactions [25](#)
 - multiple-hosts mode [12](#)
- readiness check
 - configuring [36](#)
 - described [17, 36](#)
- resetting to default values [65](#)
- stack changes, effects of [12](#)
- statistics, displaying [66](#)
- switch
 - as proxy [3, 2](#)
 - RADIUS client [3](#)
- switch supplicant
 - configuring [59](#)
 - overview [30](#)
- user distribution
 - guidelines [28](#)
 - overview [28](#)

- VLAN assignment
 - AAA authorization [40](#)
 - characteristics [17](#)
 - configuration tasks [18](#)
 - described [17](#)
- voice aware 802.1x security
 - configuring [38](#)
 - described [30, 38](#)
- voice VLAN
 - described [25](#)
 - PVID [25](#)
 - VVID [25](#)
- wake-on-LAN, described [26](#)
- with ACLs and RADIUS Filter-Id attribute [32](#)
- port-based authentication methods, supported [8](#)
- port blocking [4, 8](#)
- port-channel
 - See EtherChannel
- port description TLV [2](#)
- Port Fast
 - described [2](#)
 - enabling [13](#)
 - mode, spanning tree [25](#)
 - support for [8](#)
- port membership modes, VLAN [3](#)
- port priority
 - MSTP [21](#)
 - STP [18](#)
- ports
 - access [3](#)
 - blocking [8](#)
 - dual-purpose uplink [4](#)
 - dynamic access [4](#)
 - protected [6](#)
 - secure [9](#)
 - static-access [3, 10](#)
 - switch [2](#)
 - trunks [3, 14](#)
 - VLAN assignments [10](#)
- port security
 - aging [18](#)
 - and QoS trusted boundary [38](#)
 - and stacking [19](#)
 - configuring [13](#)
 - default configuration [12](#)
 - described [9](#)
 - displaying [19](#)
 - on trunk ports [15](#)
 - sticky learning [10](#)
 - violations [11](#)
 - with other features [12](#)
- port-shutdown response, VMPS [24](#)
- port VLAN ID TLV [2](#)
- power management TLV [3, 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 [17](#)
 - exiting [10](#)
 - logging into [10](#)
 - mapping on member switches [17](#)
 - overview [2, 8](#)
 - setting a command with [8](#)
- protected ports [10, 6](#)
- provisioned switches and IP source guard [18](#)

- provisioning new members for a switch stack [7](#)
- proxy reports [4](#)
- pruning, VTP
 - disabling
 - in VTP domain [16](#)
 - on a port [19](#)
 - enabling
 - in VTP domain [16](#)
 - on a port [19](#)
 - examples [7](#)
 - overview [6](#)
- pruning-eligible list
 - changing [19](#)
 - for VTP pruning [6](#)
 - VLANs [16](#)
- PVST+
 - described [10](#)
 - IEEE 802.1Q trunking interoperability [11](#)
 - instances supported [10](#)

Q

- QoS
 - and MQC commands [1](#)
 - auto-QoS
 - categorizing traffic [21](#)
 - configuration and defaults display [30](#)
 - configuration guidelines [27](#)
 - described [21](#)
 - disabling [28](#)
 - displaying generated commands [28](#)
 - displaying the initial configuration [30](#)
 - effects on running configuration [26](#)
 - egress queue defaults [22](#)
 - enabling for VoIP [28](#)
 - example configuration [29](#)
 - ingress queue defaults [22](#)
 - list of generated commands [23](#)
 - basic model [4](#)

- classification
 - class maps, described [8](#)
 - defined [4](#)
 - DSCP transparency, described [39](#)
 - flowchart [7](#)
 - forwarding treatment [3](#)
 - in frames and packets [3](#)
 - IP ACLs, described [6, 8](#)
 - MAC ACLs, described [6, 8](#)
 - options for IP traffic [6](#)
 - options for non-IP traffic [6](#)
 - policy maps, described [8](#)
 - trust DSCP, described [6](#)
 - trusted CoS, described [6](#)
 - trust IP precedence, described [6](#)
- class maps
 - configuring [46](#)
 - displaying [73](#)
- configuration guidelines
 - auto-QoS [27](#)
 - standard QoS [34](#)
- configuring
 - aggregate policers [52](#)
 - auto-QoS [21](#)
 - default port CoS value [37](#)
 - DSCP maps [54](#)
 - DSCP transparency [39](#)
 - DSCP trust states bordering another domain [40](#)
 - egress queue characteristics [66](#)
 - ingress queue characteristics [61](#)
 - IP extended ACLs [44](#)
 - IP standard ACLs [43](#)
 - MAC ACLs [45](#)
 - port trust states within the domain [36](#)
 - trusted boundary [38](#)
- default auto configuration [21](#)
- default standard configuration [31](#)
- displaying statistics [73](#)
- DSCP transparency [39](#)

- egress queues
 - allocating buffer space [66](#)
 - buffer allocation scheme, described [18](#)
 - configuring shaped weights for SRR [70](#)
 - configuring shared weights for SRR [71](#)
 - described [5](#)
 - displaying the threshold map [69](#)
 - flowchart [18](#)
 - mapping DSCP or CoS values [68](#)
 - scheduling, described [5](#)
 - setting WTD thresholds [66](#)
 - WTD, described [19](#)
- enabling globally [35](#)
- flowcharts
 - classification [7](#)
 - egress queueing and scheduling [18](#)
 - ingress queueing and scheduling [15](#)
 - policing and marking [11](#)
- implicit deny [8](#)
- ingress queues
 - allocating bandwidth [64](#)
 - allocating buffer space [63](#)
 - buffer and bandwidth allocation, described [16](#)
 - configuring shared weights for SRR [64](#)
 - configuring the priority queue [65](#)
 - described [4](#)
 - displaying the threshold map [62](#)
 - flowchart [15](#)
 - mapping DSCP or CoS values [61](#)
 - priority queue, described [17](#)
 - scheduling, described [4](#)
 - setting WTD thresholds [61](#)
 - WTD, described [16](#)
- IP phones
 - automatic classification and queueing [21](#)
 - detection and trusted settings [21, 38](#)
- limiting bandwidth on egress interface [72](#)
- mapping tables
 - CoS-to-DSCP [55](#)
 - displaying [74](#)
 - DSCP-to-CoS [58](#)
 - DSCP-to-DSCP-mutation [59](#)
 - IP-precedence-to-DSCP [56](#)
 - policed-DSCP [57](#)
 - types of [11](#)
- marked-down actions [51](#)
- marking, described [4, 9](#)
- overview [2](#)
- packet modification [20](#)
- policers
 - configuring [51, 53](#)
 - described [9](#)
 - displaying [73](#)
 - number of [34](#)
 - types of [10](#)
- policies, attaching to an interface [9](#)
- policing
 - described [4, 9](#)
 - token bucket algorithm [10](#)
- policy maps
 - characteristics of [48](#)
 - displaying [74](#)
 - nonhierarchical on physical ports [48](#)
- QoS label, defined [4](#)
- queues
 - configuring egress characteristics [66](#)
 - configuring ingress characteristics [61](#)
 - high priority (expedite) [20, 72](#)
 - location of [12](#)
 - SRR, described [14](#)
 - WTD, described [13](#)
- rewrites [20](#)
- support for [13](#)

- trust states
 - bordering another domain [40](#)
 - described [6](#)
 - trusted device [38](#)
 - within the domain [36](#)

quality of service

See QoS

queries, IGMP [4](#)

query solicitation, IGMP [13](#)

R

RADIUS

- attributes
 - vendor-proprietary [38](#)
 - vendor-specific [36](#)
 - configuring
 - accounting [35](#)
 - authentication [30](#)
 - authorization [34](#)
 - communication, global [28, 36](#)
 - communication, per-server [28](#)
 - multiple UDP ports [28](#)
 - default configuration [27](#)
 - defining AAA server groups [32](#)
 - displaying the configuration [40](#)
 - identifying the server [28](#)
 - in clusters [16](#)
 - limiting the services to the user [34](#)
 - method list, defined [27](#)
 - operation of [19](#)
 - overview [18](#)
 - server load balancing [40](#)
 - suggested network environments [18](#)
 - support for [12](#)
 - tracking services accessed by user [35](#)
- RADIUS Change of Authorization [20](#)

range

- macro [18](#)
- of interfaces [17](#)

rapid convergence [11](#)

rapid per-VLAN spanning-tree plus

See rapid PVST+

rapid PVST+

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

Rapid Spanning Tree Protocol

See RSTP

rcommand command [17](#)

RCP

- configuration files
 - downloading [18](#)
 - overview [17](#)
 - preparing the server [17](#)
 - uploading [19](#)

image files

- deleting old image [38](#)
- downloading [36](#)
- preparing the server [35](#)
- uploading [38](#)

readiness check

- port-based authentication
 - configuring [36](#)
 - described [17, 36](#)

reconfirmation interval, VMPS, changing [27](#)

reconfirming dynamic VLAN membership [27](#)

recovery procedures [1](#)

redirect URL [19, 20, 60](#)

redundancy

EtherChannel [3](#)

STP

- backbone [9](#)
- multidrop backbone [5](#)
- path cost [22](#)
- port priority [21](#)

- redundant links and UplinkFast **16**
- reloading software **23**
- Remote Authentication Dial-In User Service
 - See RADIUS
- Remote Copy Protocol
 - See RCP
- Remote Network Monitoring
 - See RMON
- Remote SPAN
 - See RSPAN
- remote SPAN **3**
- report suppression, IGMP
 - described **6**
 - disabling **16, 11**
- resequencing ACL entries **13**
- reserved addresses in DHCP pools **24**
- resetting a UDLD-shutdown interface **6**
- responder, IP SLAs
 - described **4**
 - enabling **6**
- response time, measuring with IP SLAs **4**
- restricted VLAN
 - configuring **50**
 - described **22**
 - using with IEEE 802.1x **22**
- restricting access
 - NTP services **9**
 - overview **1**
 - passwords and privilege levels **2**
 - RADIUS **18**
 - TACACS+ **10**
- retry count, VMPS, changing **28**
- RFC
 - 1112, IP multicast and IGMP **2**
 - 1157, SNMPv1 **2**
 - 1305, NTP **3**
 - 1757, RMON **2**
 - 1901, SNMPv2C **2**
 - 1902 to 1907, SNMPv2 **2**
 - 2236, IP multicast and IGMP **2**
 - 2273-2275, SNMPv3 **2**
- RFC 5176 Compliance **21**
- RMON
 - default configuration **3**
 - displaying status **7**
 - enabling alarms and events **3**
 - groups supported **2**
 - overview **2**
 - statistics
 - collecting group Ethernet **6**
 - collecting group history **5**
 - support for **15**
- root guard
 - described **10**
 - enabling **18**
 - support for **8**
- root switch
 - MSTP **19**
 - STP **16**
- RSPAN
 - and stack changes **10**
 - characteristics **9**
 - configuration guidelines **17**
 - default configuration **11**
 - defined **3**
 - destination ports **8**
 - displaying status **24**
 - in a switch stack **3**
 - interaction with other features **9**
 - monitored ports **6**
 - monitoring ports **8**
 - overview **15, 1**
 - received traffic **5**

- sessions
 - creating [18](#)
 - defined [4](#)
 - limiting source traffic to specific VLANs [23](#)
 - specifying monitored ports [18](#)
 - with ingress traffic enabled [21](#)
- source ports [6](#)
- transmitted traffic [6](#)
- VLAN-based [7](#)

RSTP

- active topology [10](#)
- BPDU
 - format [13](#)
 - processing [14](#)
- designated port, defined [10](#)
- designated switch, defined [10](#)
- interoperability with IEEE 802.1D
 - described [9](#)
 - restarting migration process [28](#)
 - topology changes [14](#)
- overview [10](#)
- port roles
 - described [10](#)
 - synchronized [12](#)
- proposal-agreement handshake process [11](#)
- rapid convergence
 - cross-stack rapid convergence [11](#)
 - described [11](#)
 - edge ports and Port Fast [11](#)
 - point-to-point links [11, 27](#)
 - root ports [11](#)
- root port, defined [10](#)
- See also MSTP

running configuration

- replacing [20, 21](#)
- rolling back [20, 22](#)

running configuration, saving [16](#)

S

- SC (standby command switch) [10](#)
- scheduled reloads [23](#)
- SCP
 - and SSH [53](#)
 - configuring [54](#)
- SDM
 - templates
 - configuring [3](#)
 - number of [1](#)
- SDM template
 - configuration guidelines [3](#)
 - configuring [2](#)
 - types of [1](#)
- Secure Copy Protocol
- secure HTTP client
 - configuring [52](#)
 - displaying [53](#)
- secure HTTP server
 - configuring [51](#)
 - displaying [53](#)
- secure MAC addresses
 - and switch stacks [19](#)
 - deleting [17](#)
 - maximum number of [10](#)
 - types of [10](#)
- secure ports
 - and switch stacks [19](#)
- secure ports, configuring [9](#)
- secure remote connections [42](#)
- Secure Shell
 - See SSH
- Secure Socket Layer
 - See SSL
- security, port [9](#)
- security features [10](#)
- See SCP
- sequence numbers in log messages [8](#)

- server mode, VTP [3](#)
 - service-provider network, MSTP and RSTP [1](#)
 - set-request operation [5](#)
 - setup program
 - failed command switch replacement [11](#)
 - replacing failed command switch [9](#)
 - severity levels, defining in system messages [9](#)
 - SFPs
 - monitoring status of [37, 14](#)
 - security and identification [14](#)
 - status, displaying [14](#)
 - shaped round robin
 - See SRR
 - Shell functions
 - See Auto Smartports macros
 - Shell triggers
 - See Auto Smartports macros
 - show access-lists hw-summary command [19](#)
 - show and more command output, filtering [10](#)
 - show cdp traffic command [5](#)
 - show cluster members command [17](#)
 - show configuration command [35](#)
 - show forward command [23](#)
 - show interfaces command [27, 35](#)
 - show interfaces switchport [4](#)
 - show lldp traffic command [12](#)
 - show platform forward command [23](#)
 - show running-config command
 - displaying ACLs [18, 19](#)
 - interface description in [35](#)
 - shutdown command on interfaces [38](#)
 - Simple Network Management Protocol
 - See SNMP
 - small form-factor pluggable modules
 - See SFPs
 - 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 [20](#)
 - tracing [17](#)
- SNAP [1](#)
 - SNMP
 - accessing MIB variables with [5](#)
 - agent
 - described [4](#)
 - disabling [8](#)
 - and IP SLAs [2](#)
 - authentication level [11](#)
 - community strings
 - configuring [8](#)
 - for cluster switches [4](#)
 - overview [4](#)
 - configuration examples [18](#)
 - default configuration [7](#)
 - engine ID [7](#)
 - groups [7, 10](#)
 - host [7](#)
 - ifIndex values [6](#)
 - in-band management [6](#)
 - in clusters [14](#)
 - informs
 - and trap keyword [13](#)
 - described [5](#)
 - differences from traps [5](#)
 - disabling [16](#)
 - enabling [16](#)
 - limiting access by TFTP servers [17](#)
 - limiting system log messages to NMS [10](#)
 - manager functions [5, 4](#)
 - managing clusters with [18](#)
 - MIBs
 - location of [4](#)
 - supported [1](#)
 - notifications [5](#)

- overview [1, 5](#)
- security levels [3](#)
- setting CPU threshold notification [16](#)
- status, displaying [19](#)
- system contact and location [17](#)
- trap manager, configuring [14](#)
- traps
 - described [4, 5](#)
 - differences from informs [5](#)
 - disabling [16](#)
 - enabling [13](#)
 - enabling MAC address notification [23, 25, 26](#)
 - overview [1, 5](#)
 - types of [13](#)
- users [7, 10](#)
- versions supported [2](#)
- SNMP and Syslog Over IPv6 [5](#)
- SNMPv1 [2](#)
- SNMPv2C [3](#)
- SNMPv3 [3](#)
- snooping, IGMP [2](#)
- software compatibility
 - See stacks, switch
- software images
 - location in flash [26](#)
 - recovery procedures [2](#)
 - scheduling reloads [23](#)
 - tar file format, described [26](#)
 - See also downloading and uploading
- source addresses
 - in IPv4 ACLs [10](#)
- source-and-destination-IP address based forwarding, EtherChannel [9](#)
- source-and-destination MAC address forwarding, EtherChannel [9](#)
- source-IP address based forwarding, EtherChannel [9](#)
- source-MAC address forwarding, EtherChannel [8](#)
- SPAN
 - and stack changes [10](#)
 - configuration guidelines [11](#)
 - default configuration [11](#)
 - destination ports [8](#)
 - displaying status [24](#)
 - interaction with other features [9](#)
 - monitored ports [6](#)
 - monitoring ports [8](#)
 - overview [15, 1](#)
 - ports, restrictions [13](#)
 - received traffic [5](#)
 - sessions
 - configuring ingress forwarding [15, 22](#)
 - creating [12](#)
 - defined [4](#)
 - limiting source traffic to specific VLANs [16](#)
 - removing destination (monitoring) ports [13](#)
 - specifying monitored ports [12](#)
 - with ingress traffic enabled [14](#)
 - source ports [6](#)
 - transmitted traffic [6](#)
 - VLAN-based [7](#)
- spanning tree and native VLANs [15](#)
- Spanning Tree Protocol
 - See STP
- SPAN traffic [5](#)
- SRR
 - configuring
 - shaped weights on egress queues [70](#)
 - shared weights on egress queues [71](#)
 - shared weights on ingress queues [64](#)
 - described [14](#)
 - shaped mode [14](#)
 - shared mode [14](#)
 - support for [14](#)

- SSH
 - configuring [43](#)
 - cryptographic software image [41](#)
 - described [6, 42](#)
 - encryption methods [42](#)
 - switch stack considerations [15](#)
 - user authentication methods, supported [42](#)
- SSL
 - configuration guidelines [49](#)
 - configuring a secure HTTP client [52](#)
 - configuring a secure HTTP server [51](#)
 - cryptographic software image [46](#)
 - described [46](#)
 - monitoring [53](#)
- stack, switch
 - MAC address of [6, 18](#)
- stack changes, effects on
 - 802.1x port-based authentication [12](#)
 - ACL configuration [5](#)
 - CDP [2](#)
 - cross-stack EtherChannel [13](#)
 - EtherChannel [10](#)
 - IGMP snooping [7](#)
 - MAC address tables [22](#)
 - MSTP [9](#)
 - MVR [18](#)
 - port security [19](#)
 - SNMP [2](#)
 - SPAN and RSPAN [10](#)
 - STP [12](#)
 - switch clusters [15](#)
 - system message log [2](#)
 - VLANs [6](#)
 - VTP [8](#)
- stack master
 - bridge ID (MAC address) [6](#)
 - defined [1](#)
 - election [5](#)
- IPv6 [6](#)
 - See also stacks, switch
- stack member
 - accessing CLI of specific member [22](#)
 - configuring
 - member number [20](#)
 - priority value [21](#)
 - defined [1](#)
 - displaying information of [23](#)
 - number [6](#)
 - priority value [7](#)
 - provisioning a new member [21](#)
 - replacing [14](#)
 - See also stacks, switch
- stack member number [15](#)
- stack protocol version [10](#)
- stacks, switch
 - accessing CLI of specific member [22](#)
 - assigning information
 - member number [20](#)
 - priority value [21](#)
 - provisioning a new member [21](#)
 - auto-advise [11](#)
 - auto-copy [11](#)
 - auto-extract [11](#)
 - auto-upgrade [11](#)
 - bridge ID [6](#)
 - CDP considerations [2](#)
 - compatibility, software [9](#)
 - configuration file [14](#)
 - configuration scenarios [16](#)
 - copying an image file from one member to another [39](#)
 - default configuration [17](#)
 - description of [1](#)
 - displaying information of [23](#)
 - enabling persistent MAC address timer [18](#)
 - in clusters [15](#)
 - incompatible software and image upgrades [13, 39](#)
 - IPv6 on [6](#)

- MAC address considerations [22](#)
- management connectivity [15](#)
- managing [1](#)
- membership [3](#)
- merged [3](#)
- MSTP instances supported [10](#)
- offline configuration
 - described [7](#)
 - effects of adding a provisioned switch [8](#)
 - effects of removing a provisioned switch [9](#)
 - effects of replacing a provisioned switch [9](#)
 - provisioned configuration, defined [7](#)
 - provisioned switch, defined [7](#)
 - provisioning a new member [21](#)
- partitioned [3,9](#)
- provisioned switch
 - adding [8](#)
 - removing [9](#)
 - replacing [9](#)
- replacing a failed member [14](#)
- software compatibility [9](#)
- software image version [9](#)
- stack protocol version [10](#)
- STP
 - bridge ID [3](#)
 - instances supported [10](#)
 - root port selection [3](#)
 - stack root switch election [3](#)
- system messages
 - hostnames in the display [1](#)
 - remotely monitoring [2](#)
- system prompt consideration [15](#)
- system-wide configuration considerations [14](#)
- upgrading [39](#)
- version-mismatch (VM) mode
 - automatic upgrades with auto-upgrade [11](#)
 - examples [12](#)
 - manual upgrades with auto-advise [11](#)
 - upgrades with auto-extract [11](#)
 - version-mismatch mode
 - described [10](#)
- See also stack master and stack member
- standby command switch
 - configuring
 - considerations [11](#)
 - defined [2](#)
 - priority [10](#)
 - requirements [3](#)
 - virtual IP address [11](#)
- See also cluster standby group and HSRP
- standby group, cluster
 - See cluster standby group and HSRP
- standby links [2](#)
- startup configuration
 - booting
 - manually [19](#)
 - specific image [20](#)
 - clearing [20](#)
 - configuration file
 - automatically downloading [18](#)
 - specifying the filename [18](#)
 - default boot configuration [17](#)
- static access ports
 - assigning to VLAN [10](#)
 - defined [3](#)
- static addresses
 - See addresses
- static MAC addressing [10](#)
- static routes
 - configuring for IPv6 [10](#)
- static VLAN membership [2](#)
- statistics
 - 802.1X [17](#)
 - 802.1x [66](#)
 - CDP [5](#)
 - interface [37](#)
 - LLDP [12](#)
 - LLDP-MED [12](#)

- NMSP 12
- QoS ingress and egress 73
- RMON group Ethernet 6
- RMON group history 5
- SNMP input and output 19
- VTP 18
- sticky learning 10
- storm control
 - configuring 3
 - described 2
 - disabling 5
 - displaying 19
 - support for 4
 - thresholds 2
- STP
 - accelerating root port selection 4
 - BackboneFast
 - described 7
 - disabling 17
 - enabling 17
 - BPDU filtering
 - described 3
 - disabling 15
 - enabling 15
 - BPDU guard
 - described 2
 - disabling 14
 - enabling 14
 - BPDU message exchange 3
 - configuration guidelines 13, 12
 - configuring
 - forward-delay time 23
 - hello time 22
 - maximum aging time 23
 - path cost 20
 - port priority 18
 - root switch 16
 - secondary root switch 18
 - spanning-tree mode 15
 - switch priority 21
 - transmit hold-count 24
 - counters, clearing 24
 - cross-stack UplinkFast
 - described 5
 - enabling 17
 - default configuration 13
 - default optional feature configuration 12
 - designated port, defined 4
 - designated switch, defined 4
 - detecting indirect link failures 8
 - disabling 16
 - displaying status 24
 - EtherChannel guard
 - described 10
 - disabling 18
 - enabling 18
 - extended system ID
 - effects on root switch 16
 - effects on the secondary root switch 18
 - overview 5
 - unexpected behavior 16
 - features supported 8
 - IEEE 802.1D and bridge ID 5
 - IEEE 802.1D and multicast addresses 9
 - IEEE 802.1t and VLAN identifier 5
 - inferior BPDU 3
 - instances supported 10
 - interface state, blocking to forwarding 2
 - interface states
 - blocking 7
 - disabled 8
 - forwarding 6, 7
 - learning 7
 - listening 7
 - overview 5
 - interoperability and compatibility among modes 11
 - limitations with IEEE 802.1Q trunks 11

- load sharing
 - overview [20](#)
 - using path costs [22](#)
 - using port priorities [21](#)
- loop guard
 - described [11](#)
 - enabling [19](#)
- modes supported [10](#)
- multicast addresses, effect of [9](#)
- optional features supported [8](#)
- overview [2](#)
- path costs [22, 23](#)
- Port Fast
 - described [2](#)
 - enabling [13](#)
- port priorities [21](#)
- preventing root switch selection [10](#)
- protocols supported [10](#)
- redundant connectivity [9](#)
- root guard
 - described [10](#)
 - enabling [18](#)
- root port, defined [3](#)
- root port selection on a switch stack [3](#)
- root switch
 - configuring [16](#)
 - effects of extended system ID [5, 16](#)
 - election [3](#)
 - unexpected behavior [16](#)
- shutdown Port Fast-enabled port [2](#)
- stack changes, effects of [12](#)
- status, displaying [24](#)
- superior BPDU [3](#)
- timers, described [22](#)
- UplinkFast
 - described [3](#)
 - enabling [16](#)
- stratum, NTP [3](#)
- success response, VMPS [24](#)
- summer time [14](#)
- 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 [24](#)
 - STP [21](#)
- switch software features [1](#)
- syslog
 - See system message logging
- system capabilities TLV [2](#)
- system clock
 - configuring
 - daylight saving time [14](#)
 - manually [12](#)
 - summer time [14](#)
 - time zones [13](#)
 - displaying the time and date [13](#)
 - overview [2](#)
 - See also NTP
- system description TLV [2](#)
- system message logging
 - default configuration [4](#)
 - defining error message severity levels [9](#)
 - disabling [4](#)

- displaying the configuration [14](#)
 - enabling [5](#)
 - facility keywords, described [14](#)
 - level keywords, described [10](#)
 - limiting messages [10](#)
 - message format [2](#)
 - overview [1](#)
 - sequence numbers, enabling and disabling [8](#)
 - setting the display destination device [5](#)
 - stack changes, effects of [2](#)
 - synchronizing log messages [7](#)
 - syslog facility [15](#)
 - time stamps, enabling and disabling [8](#)
 - UNIX syslog servers
 - configuring the daemon [13](#)
 - configuring the logging facility [13](#)
 - facilities supported [14](#)
 - system name
 - default configuration [16](#)
 - default setting [16](#)
 - manual configuration [16](#)
 - See also DNS
 - system name TLV [2](#)
 - system prompt, default setting [15, 16](#)
 - 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 [18](#)
 - identifying the server [13](#)
 - in clusters [16](#)
 - limiting the services to the user [16](#)
 - operation of [12](#)
 - overview [10](#)
 - support for [12](#)
 - tracking services accessed by user [17](#)
 - tar files
 - creating [6](#)
 - displaying the contents of [7](#)
 - extracting [8](#)
 - image file format [26](#)
 - TDR [15](#)
 - Telnet
 - accessing management interfaces [11](#)
 - number of connections [6](#)
 - setting a password [6](#)
 - temporary self-signed certificate [47](#)
 - Terminal Access Controller Access Control System Plus
 - See TACACS+
 - terminal lines, setting a password [6](#)
 - TFTP
 - configuration files
 - downloading [12](#)
 - preparing the server [11](#)
 - uploading [13](#)
 - configuration files in base directory [8](#)
 - configuring for autoconfiguration [8](#)
 - image files
 - deleting [29](#)
 - downloading [28](#)
 - preparing the server [27](#)
 - uploading [30](#)
 - limiting access by servers [17](#)
 - TFTP server [6](#)
 - threshold, traffic level [3](#)
 - time
 - See NTP and system clock

- Time Domain Reflector
 - See TDR
- time-range command [15](#)
- time ranges in ACLs [15](#)
- time stamps in log messages [8](#)
- time zones [13](#)
- TLVs
 - defined [2](#)
 - LLDP [2](#)
 - LLDP-MED [2](#)
- Token Ring VLANs
 - support for [5](#)
 - VTP support [5](#)
- ToS [13](#)
- traceroute, Layer 2
 - and ARP [17](#)
 - and CDP [17](#)
 - broadcast traffic [16](#)
 - described [16](#)
 - IP addresses and subnets [17](#)
 - MAC addresses and VLANs [17](#)
 - multicast traffic [17](#)
 - multiple devices on a port [17](#)
 - unicast traffic [16](#)
 - usage guidelines [17](#)
- traceroute command [19](#)
 - See also IP traceroute
- traffic
 - blocking flooded [8](#)
 - fragmented [4](#)
 - unfragmented [4](#)
- traffic policing [13](#)
- traffic suppression [2](#)
- transmit hold-count
 - see STP
- transparent mode, VTP [4](#)
- trap-door mechanism [2](#)
- traps
 - configuring MAC address notification [23, 25, 26](#)
 - configuring managers [13](#)
 - defined [4](#)
 - enabling [23, 25, 26, 13](#)
 - notification types [13](#)
 - overview [1, 5](#)
- troubleshooting
 - connectivity problems [15, 16, 18](#)
 - CPU utilization [27](#)
 - detecting unidirectional links [1](#)
 - displaying crash information [24](#)
 - setting packet forwarding [23](#)
 - SFP security and identification [14](#)
 - show forward command [23](#)
 - with CiscoWorks [5](#)
 - with debug commands [21](#)
 - with ping [15](#)
 - with system message logging [1](#)
 - with traceroute [18](#)
- trunk failover
 - See link-state tracking
- trunking encapsulation [9](#)
- trunk ports
 - configuring [17](#)
 - defined [3](#)
- trunks
 - allowed-VLAN list [18](#)
 - load sharing
 - setting STP path costs [22](#)
 - using STP port priorities [21](#)
 - native VLAN for untagged traffic [20](#)
 - parallel [22](#)
 - pruning-eligible list [19](#)
 - to non-DTP device [14](#)
- trusted boundary for QoS [38](#)

trusted port states

- between QoS domains [40](#)
- classification options [6](#)
- ensuring port security for IP phones [38](#)
- support for [13](#)
- within a QoS domain [36](#)

trustpoints, CA [47](#)

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 [6](#)
- echoing detection mechanism [3](#)
- enabling
 - globally [5](#)
 - per interface [6](#)
- link-detection mechanism [1](#)
- neighbor database [2](#)
- overview [1](#)
- resetting an interface [6](#)
- status, displaying [7](#)
- support for [8](#)

unauthorized ports with IEEE 802.1x [11](#)

unicast MAC address filtering [6](#)

- and adding static addresses [28](#)
- and broadcast MAC addresses [28](#)
- and CPU packets [28](#)
- and multicast addresses [28](#)

- and router MAC addresses [28](#)
- configuration guidelines [28](#)
- described [28](#)

unicast storm [2](#)

unicast storm control command [4](#)

unicast traffic, blocking [8](#)

UniDirectional Link Detection protocol

See UDLD

UNIX syslog servers

- daemon configuration [13](#)
- facilities supported [14](#)
- message logging configuration [13](#)

unrecognized Type-Length-Value (TLV) support [5](#)

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 [16](#)
- enabling [16](#)
- support for [8](#)

uploading

- configuration files
 - preparing [11, 14, 17](#)
 - reasons for [9](#)
 - using FTP [16](#)
 - using RCP [19](#)
 - using TFTP [13](#)

image files

- preparing [27, 31, 35](#)
- reasons for [25](#)
- using FTP [34](#)
- using RCP [38](#)
- using TFTP [30](#)

USB mini-Type B console port [10](#)
 USB Type A port [7](#)
 user EXEC mode [2](#)
 username-based authentication [7](#)

V

version-dependent transparent mode [5](#)
 version-mismatch (VM) mode
 automatic upgrades with auto-upgrade [11](#)
 manual upgrades with auto-advise [11](#)
 upgrades with auto-extract [11](#)
 version-mismatch mode
 described [10](#)
 virtual IP address
 cluster standby group [11](#)
 command switch [11](#)
 virtual switches and PAgP [6](#)
 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](#)
 VLAN database
 and startup configuration file [7](#)
 and VTP [1](#)
 VLAN configuration saved in [7](#)
 VLANs saved in [4](#)
 VLAN filtering and SPAN [7](#)
 vlan global configuration command [7](#)
 VLAN ID, discovering [31](#)
 VLAN load balancing on flex links [3](#)
 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 [10](#)
 allowed on trunk [11](#)
 and spanning-tree instances [3, 6, 12](#)
 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 [13](#)
 extended-range [1, 11](#)
 features [9](#)
 illustrated [2](#)
 in the switch stack [6](#)
 limiting source traffic with RSPAN [23](#)
 limiting source traffic with SPAN [16](#)
 modifying [8](#)
 multicast [18](#)
 native, configuring [20](#)
 normal-range [1, 4](#)
 number supported [9](#)
 parameters [5](#)
 port membership modes [3](#)
 static-access ports [10](#)
 STP and IEEE 802.1Q trunks [11](#)
 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 24

dynamic port membership

described 25

reconfirming 27

troubleshooting 29

entering server address 26

mapping MAC addresses to VLANs 24

monitoring 28

reconfirmation interval, changing 27

reconfirming membership 27

retry count, changing 28

voice aware 802.1x security

port-based authentication

configuring 38

described 30, 38

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 5

default configuration 3

described 1

displaying 7

IP phone data traffic, described 3

IP phone voice traffic, described 2

VQP 9, 24

VTP

adding a client to a domain 17

advertisements 16, 4

and extended-range VLANs 2

and normal-range VLANs 2

client mode, configuring 13

configuration

guidelines 9

requirements 11

saving 9

configuration requirements 11

configuration revision number

guideline 17

resetting 18

consistency checks 5

default configuration 9

described 1

domain names 10

domains 2

modes

client 3

off 4

server 3

transitions 3

transparent 4

monitoring 18

passwords 10

pruning

disabling 16

enabling 16

examples 7

overview 6

support for 9

pruning-eligible list, changing 19

server mode, configuring 11, 14

statistics 18

support for 9

Token Ring support 5

transparent mode, configuring [12](#)
 using [1](#)
 Version
 enabling [15](#)
 version, guidelines [10](#)
 Version 1 [5](#)
 Version 2
 configuration guidelines [10](#)
 overview [5](#)
 Version 3
 overview [5](#)

X

Xmodem protocol [2](#)

W

web authentication [17](#)
 configuring [16 to ??](#)
 described [10](#)
 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 [12](#)
 location TLV [3](#)
 understanding [3](#)
 wizards [2](#)
 WTD
 described [13](#)
 setting thresholds
 egress queue-sets [66](#)
 ingress queues [61](#)
 support for [14](#)

