



INDEX

Numerics

802.1x Accounting
 Overview [13-31](#)

A

AAA down policy, NAC Layer 2 IP validation [1-9](#)
abbreviating commands [2-4](#)
access-class command [37-17](#)
access control entries
 See ACEs
access-denied response, VMPS [17-14](#)
access groups
 Layer 2 [37-17](#)
accessing
 clusters, switch [6-11](#)
 member switches [6-11](#)
 switch clusters [6-11](#)
access lists
 See ACLs
access ports
 defined [15-3](#)
 in switch clusters [6-10](#)
accounting
 with IEEE 802.1x [13-13](#)
 with RADIUS [12-16, 12-37](#)
 with TACACS+ [12-6, 12-8, 12-33](#)
ACEs
 and QoS [38-13](#)
 defined [37-2](#)
 Ethernet [37-2](#)
 IP [37-2](#)

ACLs

ACEs [37-2](#)
any keyword [37-14](#)
applying
 time ranges to [37-8, 37-16](#)
 to an interface [37-9, 37-17](#)
 to QoS [38-13](#)
classifying traffic for QoS [38-36](#)
comments in [37-8](#)
defined [37-1, 37-5](#)
examples of [38-36](#)
extended IPv4
 creating [37-6, 37-13](#)
 matching criteria [37-5](#)
hardware and software handling [37-10](#)
host keyword [37-14](#)
IP
 creating [37-5](#)
 fragments and QoS guidelines [38-5](#)
 implicit deny [37-7, 37-8, 37-11](#)
 implicit masks [37-11](#)
 matching criteria [37-5](#)
 undefined [37-10](#)
IPv4
 applying to interfaces [37-9, 37-17](#)
 creating [37-5](#)
 matching criteria [37-5](#)
 named [37-7, 37-15](#)
 numbers [37-5](#)
 terminal lines, setting on [37-9, 37-17](#)
 unsupported features [37-1](#)
logging messages [37-6](#)
MAC extended [37-11](#)

- matching [37-5, 37-9](#)
- named, IPv4 [37-7](#)
- number per QoS class map [38-5](#)
- port [37-2](#)
- QoS [38-13, 38-36](#)
- resequencing entries [37-7](#)
- standard IPv4
 - creating [37-11](#)
 - matching criteria [37-5](#)
- support for [1-7](#)
- support in hardware [37-10](#)
- types supported [37-2](#)
- unsupported features, IPv4 [37-1](#)
- active link [24-4, 24-10, 24-11](#)
- active links [24-1](#)
- active traffic monitoring, IP SLAs [45-1](#)
- address aging time for VLANs [7-6](#)
- address aliasing [28-2](#)
- addresses
 - dynamic
 - accelerated aging [20-8](#)
 - changing the aging time [7-6](#)
 - default aging [20-8](#)
 - defined [7-5](#)
 - learning [7-5](#)
 - IPv6 [42-2](#)
 - MAC, discovering [7-8](#)
 - multicast
 - STP address management [20-8](#)
 - static
 - adding and removing [7-6](#)
 - defined [7-5](#)
- address resolution [7-8](#)
- Address Resolution Protocol
 - See ARP
- administrative VLAN, REP [23-9](#)
- advertisements
 - CDP [32-1](#)
 - LLDP [31-2](#)
 - VTP [17-11, 18-3](#)
- age timer, REP [23-8](#)
- aggregatable global unicast addresses [42-3](#)
- aggregated ports
 - See EtherChannel
- aggregate policers [38-46](#)
- aggregate policing [1-10](#)
- aging, accelerating [20-8](#)
- aging time
 - accelerated
 - for STP [20-8](#)
 - MAC address table [7-13](#)
- alarm profiles
 - creating or modifying [3-8](#)
- alarms
 - displaying [3-9](#)
 - power supply [3-2](#)
 - temperature [3-2](#)
- allowed-VLAN list [17-12](#)
- ARP
 - defined [1-4, 7-8](#)
 - table
 - address resolution [7-8](#)
 - managing [7-8](#)
- attributes, RADIUS
 - vendor-proprietary [12-17, 12-38](#)
 - vendor-specific [12-16](#)
- attribute-value pairs [13-10, 13-13, 13-19](#)
- authentication
 - local mode with AAA [12-20, 12-39](#)
 - open1x [13-28](#)
 - RADIUS
 - key [12-15](#)
 - login [12-15, 12-36](#)
 - TACACS+
 - defined [12-6](#)
 - key [12-7, 12-30](#)
 - login [12-7, 12-31](#)

authentication compatibility with Catalyst 6500 switches [13-7](#)

authentication failed VLAN

See restricted VLAN

authentication manager

CLI commands [13-8](#)

overview [13-6](#)

authoritative time source, described [7-2](#)

authorization

with RADIUS [12-16, 12-37](#)

with TACACS+ [12-6, 12-7, 12-33](#)

authorized ports with IEEE 802.1x [13-9](#)

auto enablement [13-29](#)

automatic discovery

considerations

beyond a noncandidate device [6-8](#)

brand new switches [6-10](#)

connectivity [6-5](#)

different VLANs [6-7](#)

management VLANs [6-8](#)

non-CDP-capable devices [6-7](#)

noncluster-capable devices [6-7](#)

routed ports [6-9](#)

in switch clusters [6-5](#)

See also CDP

automatic QoS

See QoS

auto-MDIX

described [15-10](#)

autonegotiation

duplex mode [1-2](#)

interface configuration guidelines [15-9](#)

mismatches [46-1](#)

autosensing, port speed [1-2](#)

auxiliary VLAN

See voice VLAN

availability, features [1-5](#)

B

BackboneFast

described [22-5](#)

backup interfaces

See Flex Links

backup links [24-1](#)

banners

configuring

login [7-13](#)

message-of-the-day login [7-12](#)

when displayed [7-4](#)

Berkeley r-tools replacement [12-24](#)

binding database

address, DHCP server

See DHCP, Cisco IOS server database

DHCP snooping

See DHCP snooping binding database

bindings

address, Cisco IOS DHCP server [25-6](#)

DHCP snooping database [25-6](#)

IP source guard [27-2](#)

binding table, DHCP snooping

See DHCP snooping binding database

blocking packets [29-4, 29-11](#)

booting

boot loader, function of [4-2](#)

boot process [4-1](#)

specific image [4-17](#)

boot loader

accessing [4-10](#)

described [4-2](#)

environment variables [4-10](#)

prompt [4-10](#)

trap-door mechanism [4-2](#)

BPDU

error-disabled state [22-2](#)

filtering [22-3](#)

RSTP format [21-11](#)

BPDU filtering

- described [22-3](#)
- support for [1-6](#)

BPDU guard

- described [22-2](#)
- support for [1-6](#)

bridge protocol data unit

See BPDU

broadcast storm-control command [29-9](#)broadcast storms [29-1](#)

C
cables, monitoring for unidirectional links [33-1](#)

candidate switch

- automatic discovery [6-5](#)
- defined [6-2](#)
- requirements [6-2](#)
- See also command switch, cluster standby group, and member switch

Catalyst 6500 switches

- authentication compatibility [13-7](#)

CA trustpoint

- configuring [12-23](#)
- defined [12-23](#)

CDP

- and trusted boundary [38-27](#)
- automatic discovery in switch clusters [6-5](#)
- configuring [32-2](#)
- defined with LLDP [31-1](#)
- described [32-1](#)
- monitoring [32-3](#)
- overview [32-1](#)
- support for [1-4](#)
- transmission timer and holdtime, setting [32-2](#)
- updates [32-2](#)

CGMP

- as IGMP snooping learning method [28-7](#)
- joining multicast group [28-3](#)

- switch support of [1-2](#)

CIP, enabling [10-2](#)CIP configuration [10-1](#)CipherSuites [12-24](#)Cisco 7960 IP Phone [19-1](#)

Cisco Discovery Protocol

See CDP

Cisco Group Management Protocol

See CGMP

Cisco IOS DHCP server

See DHCP, Cisco IOS DHCP server

Cisco IOS File System

See IFS

Cisco IOS IP SLAs [45-2](#)

Cisco Secure ACS

- attribute-value pairs for downloadable ACLs [13-19](#)

- attribute-value pairs for redirect URL [13-19](#)

Cisco Secure ACS configuration guide [13-48](#)CiscoWorks 2000 [1-3, 36-5](#)CISP [13-29](#)

CIST regional root

See MSTP

CIST root

See MSTP

civic location [31-3](#)

class maps for QoS

- configuring [38-38](#)
- described [38-13](#)
- displaying [38-56](#)

class of service

See CoS

clearing interfaces [15-19](#)

CLI

- abbreviating commands [2-4](#)
- command modes [2-1](#)
- configuration logging [2-5](#)
- described [1-3](#)
- editing features
 - enabling and disabling [2-7](#)

- keystroke editing [2-7](#)
 - wrapped lines [2-9](#)
- error messages [2-5](#)
- filtering command output [2-10](#)
- getting help [2-3](#)
- history
 - changing the buffer size [2-6](#)
 - described [2-6](#)
 - disabling [2-7](#)
 - recalling commands [2-6](#)
- managing clusters [6-13](#)
- no and default forms of commands [2-4](#)
- Client Information Signalling Protocol
 - See CISP
- client mode, VTP [18-3](#)
- clock
 - See system clock
- clusters, switch
 - accessing [6-11](#)
 - automatic discovery [6-5](#)
 - benefits [1-2](#)
 - compatibility [6-4](#)
 - LRE profile considerations [6-13](#)
 - managing
 - through CLI [6-13](#)
 - through SNMP [6-14](#)
 - planning considerations
 - automatic discovery [6-5](#)
 - CLI [6-13](#)
 - host names [6-11](#)
 - IP addresses [6-11](#)
 - LRE profiles [6-13](#)
 - passwords [6-12](#)
 - RADIUS [6-12](#)
 - SNMP [6-12, 6-14](#)
 - TACACS+ [6-12](#)
 - See also candidate switch, command switch, cluster standby group, member switch, and standby command switch
- cluster standby group
 - defined [6-3](#)
 - requirements [6-2](#)
- CNS [1-4](#)
- Configuration Engine
 - configID, deviceID, hostname [5-4](#)
 - configuration service [5-3](#)
 - event service [5-3](#)
- embedded agents
 - described [5-5](#)
 - enabling configuration agent [5-8](#)
 - enabling event agent [5-7](#)
 - management functions [1-3](#)
- CoA Request Commands [12-12](#)
- command-line interface
 - See CLI
- command modes [2-1](#)
- commands
 - abbreviating [2-4](#)
 - no and default [2-4](#)
- commands, setting privilege levels [12-29](#)
- command switch
 - configuration conflicts [46-9](#)
 - defined [6-3](#)
 - password privilege levels [6-13](#)
 - recovery
 - from lost member connectivity [46-9](#)
 - requirements [6-1](#)
 - See also candidate switch, cluster standby group, member switch, and standby command switch
- Common Industrial Protocol (CIP) [10-1](#)
- community strings
 - configuring [6-12, 36-6, 36-9](#)
 - for cluster switches [36-4](#)
 - in clusters [6-12](#)
 - overview [36-4](#)
 - SNMP [6-12](#)
- compatibility, feature [29-7](#)
- config.text [4-3](#)

- configurable leave timer, IGMP [28-5](#)
 - configuration, initial
 - defaults [1-11](#)
 - Express Setup [1-2](#)
 - configuration changes, logging [35-9](#)
 - configuration conflicts, recovering from lost member connectivity [46-9](#)
 - configuration examples, network [1-14](#)
 - configuration files
 - archiving [A-19](#)
 - clearing the startup configuration [A-19](#)
 - creating using a text editor [A-10](#)
 - default name [4-3](#)
 - deleting a stored configuration [A-19](#)
 - described [A-9](#)
 - downloading
 - preparing [A-11, A-13, A-16](#)
 - reasons for [A-9](#)
 - using FTP [A-14](#)
 - using RCP [A-17](#)
 - using TFTP [A-11](#)
 - guidelines for creating and using [A-9](#)
 - guidelines for replacing and rolling back [A-20](#)
 - invalid combinations when copying [A-6](#)
 - obtaining with DHCP [4-9](#)
 - password recovery disable considerations [12-3](#)
 - replacing a running configuration [A-19, A-20](#)
 - rolling back a running configuration [A-19, A-20](#)
 - specifying the filename [4-15](#)
 - types and location [A-10](#)
 - uploading
 - preparing [A-11, A-13, A-16](#)
 - reasons for [A-9](#)
 - using FTP [A-15](#)
 - using RCP [A-18](#)
 - using TFTP [A-12](#)
 - configuration guidelines
 - REP [23-7](#)
 - configuration logger [35-9](#)
 - configuration logging [2-5](#)
 - configuration replacement [A-19](#)
 - configuration rollback [A-19](#)
 - configuration settings, saving [4-17](#)
 - configure terminal command [15-13](#)
 - configuring 802.1x user distribution [13-46](#)
 - configuring small-frame arrival rate [29-10](#)
 - config-vlan mode [2-2](#)
 - conflicts, configuration [46-9](#)
 - connections, secure remote [12-21](#)
 - consistency checks in VTP Version 2 [18-5](#)
 - console port, connecting to [2-10](#)
 - control protocol, IP SLAs [45-3](#)
 - convergence
 - REP [23-4](#)
 - corrupted software, recovery steps with Xmodem [46-7](#)
 - CoS
 - override priority [19-4](#)
 - trust priority [19-4](#)
 - CoS input queue threshold map for QoS [38-22](#)
 - CoS output queue threshold map for QoS [38-24](#)
 - CoS-to-DSCP map for QoS [38-47](#)
 - counters, clearing interface [15-19](#)
 - CPU utilization, troubleshooting [46-6](#)
 - crashinfo file [46-5](#)
 - critical authentication, IEEE 802.1x [13-44](#)
 - critical VLAN [13-22](#)
 - cryptographic software image
 - Kerberos [12-17](#)
 - SSH [12-1, 12-21](#)
 - SSL [12-22](#)
 - customizable web pages, web-based authentication [14-6](#)
-
- D**
- DAACL
 - See downloadable ACL
 - daylight saving time [7-10](#)
 - debugging

- enabling all system diagnostics [46-12](#)
- enabling for a specific feature [46-12](#)
- redirecting error message output [46-13](#)
- default commands [2-4](#)
- default configuration
 - 802.1x [13-30](#)
 - auto-QoS [39-3](#)
 - DHCP [25-7](#)
 - DHCP option 82 [25-8](#)
 - DHCP snooping [25-8](#)
 - DHCP snooping binding database [25-8](#)
 - DNS [7-4](#)
 - EtherChannel [40-10](#)
 - Ethernet interfaces [15-8](#)
 - Flex Links [24-5](#)
 - IGMP filtering [28-12](#)
 - IGMP snooping [28-6, 44-5](#)
 - IGMP throttling [28-12](#)
 - Layer 2 interfaces [15-15](#)
 - LLDP [31-4](#)
 - MAC address-table move update [24-5](#)
 - MSTP [21-13](#)
 - MVR [28-11](#)
 - optional spanning-tree configuration [22-9](#)
 - password and privilege level [12-2](#)
 - PROFINET [9-4](#)
 - PTP [8-2](#)
 - RADIUS [12-10](#)
 - REP [23-7](#)
 - RSPAN [30-10](#)
 - SNMP [36-8](#)
 - SPAN [30-10](#)
 - SSL [12-23](#)
 - standard QoS [38-6](#)
 - STP [20-11](#)
 - system message logging [35-5](#)
 - TACACS+ [12-7](#)
 - UDLD [33-4](#)
 - VLANs [17-6](#)
 - VMPS [17-15](#)
 - voice VLAN [19-3](#)
 - VTP [18-9](#)
- default gateway [4-14, 4-15](#)
- default router preference
 - See [DRP](#)
- default web-based authentication configuration
 - 802.1X [14-10](#)
- deleting VLANs [17-7, 17-17](#)
- denial-of-service attack [29-1](#)
- designing your network, examples [1-14](#)
- destination addresses
 - in IPv4 ACLs [37-13](#)
- destination-IP address-based forwarding, EtherChannel [40-8](#)
- destination-MAC address forwarding, EtherChannel [40-8](#)
- detecting indirect link failures, STP [22-5](#)
- device discovery protocol [31-1, 32-1](#)
- device manager
 - benefits [1-2](#)
 - described [1-2, 1-3](#)
 - in-band management [1-5](#)
- DHCP
 - Cisco IOS server database
 - default configuration [25-8](#)
 - described [25-6](#)
 - enabling
 - relay agent [25-10](#)
- DHCP-based autoconfiguration
 - client request message exchange [4-5](#)
 - configuring
 - client side [4-5](#)
 - DNS Server [4-8](#)
 - relay device [4-8](#)
 - server side [4-7](#)
 - TFTP server [4-7](#)
 - lease options
 - for IP address information [4-7](#)
 - for receiving the configuration file [4-7](#)

- relationship to BOOTP [4-5](#)
- relay support [1-4](#)
- support for [1-4](#)
- DHCP binding database
 - See DHCP snooping binding database
- DHCP binding table
 - See DHCP snooping binding database
- DHCP option 82
 - circuit ID suboption [25-4](#)
 - configuration guidelines [25-8](#)
 - default configuration [25-7](#)
 - forwarding address, specifying [25-9, 25-10](#)
 - helper address [25-9](#)
 - overview [25-3](#)
 - packet format, suboption
 - circuit ID [25-4](#)
 - remote ID [25-4](#)
 - remote ID suboption [25-4](#)
- DHCP server port-based address allocation
 - default configuration [25-10](#)
 - described [25-9](#)
 - enabling [25-13](#)
- DHCP server port-based address assignment
 - support for [1-4](#)
- DHCP snooping
 - accepting untrusted packets form edge switch [25-3, 25-11](#)
 - binding database
 - See DHCP snooping binding database
 - configuration guidelines [25-8](#)
 - default configuration [25-7](#)
 - message exchange process [25-4](#)
 - option 82 data insertion [25-3](#)
 - trusted interface [25-2](#)
 - untrusted interface [25-2](#)
 - untrusted messages [25-2](#)
- DHCP snooping binding database
 - binding file
 - format [25-7](#)
 - location [25-6](#)
 - bindings [25-6](#)
 - default configuration [25-7, 25-8](#)
 - described [25-6](#)
 - displaying
 - status and statistics [25-14](#)
 - entry [25-6](#)
- DHCP snooping binding table
 - See DHCP snooping binding database
- Differentiated Services architecture, QoS [38-2](#)
- Differentiated Services Code Point [38-2](#)
- directed unicast requests [1-4](#)
- directories
 - changing [A-5](#)
 - creating and removing [A-5](#)
 - displaying the working [A-5](#)
- discovery, clusters
 - See automatic discovery
- displaying switch alarms [3-9](#)
- DNS
 - and DHCP-based autoconfiguration [4-8](#)
 - default configuration [7-4](#)
 - in IPv6 [42-3](#)
 - overview [7-4](#)
 - support for [1-4](#)
- domain names
 - DNS [7-4](#)
 - VTP [18-10](#)
- Domain Name System
 - See DNS
- downloadable ACL [13-18, 13-19, 13-48](#)
- downloading
 - configuration files
 - preparing [A-11, A-13, A-16](#)
 - reasons for [A-9](#)
 - using FTP [A-14](#)
 - using RCP [A-17](#)
 - using TFTP [A-11](#)
 - image files

- deleting old image [A-26](#)
 - preparing [A-25, A-28, A-32](#)
 - reasons for [A-23](#)
 - using FTP [A-29](#)
 - using HTTP [A-23](#)
 - using RCP [A-33](#)
 - using TFTP [A-25](#)
 - using the device manager or Network Assistant [A-23](#)
- DRP**
- configuring [42-8](#)
 - described [42-4](#)
 - IPv6 [42-4](#)
- DSCP** [1-10, 38-2](#)
- DSCP input queue threshold map for QoS [38-22](#)
- DSCP output queue threshold map for QoS [38-24](#)
- DSCP-to-CoS map for QoS [38-48](#)
- DSCP-to-DSCP-mutation map for QoS [38-30, 38-49](#)
- DSCP transparency [38-27, 38-34](#)
- DTP** [1-6, 17-9](#)
- dual-action detection [40-5](#)
- dual IPv4 and IPv6 templates [11-3, 42-5](#)
- dual protocol stacks
- IPv4 and IPv6 [42-5](#)
 - SDM templates supporting [42-5](#)
- dual-purpose uplinks
- defined [15-4](#)
 - LEDs [15-5](#)
 - link selection [15-5](#)
 - setting the type [15-15](#)
- dynamic access ports
- characteristics [17-4](#)
 - configuring [17-23](#)
 - defined [15-3](#)
- dynamic addresses
- See addresses
- dynamic ARP inspection
- ARP cache poisoning [26-2](#)
 - ARP requests, described [26-1](#)
- ARP spoofing attack [26-2](#)
- configuration guidelines [26-5](#)
- configuring
- ACLs for non-DHCP environments [26-7](#)
 - in DHCP environments [26-6](#)
 - log buffer [26-11](#)
 - rate limit for incoming ARP packets [26-4, 26-9](#)
- described [26-1](#)
- DHCP snooping binding database [26-2](#)
- displaying
- ARP ACLs [26-12](#)
 - configuration and operating state [26-12](#)
 - trust state and rate limit [26-12](#)
- error-disabled state for exceeding rate limit [26-4](#)
- function of [26-2](#)
- interface trust states [26-3](#)
- log buffer
- configuring [26-11](#)
- logging of dropped packets, described [26-4](#)
- man-in-the middle attack, described [26-2](#)
- network security issues and interface trust states [26-3](#)
- priority of ARP ACLs and DHCP snooping entries [26-4](#)
- rate limiting of ARP packets
- configuring [26-9](#)
 - described [26-4](#)
 - error-disabled state [26-4](#)
 - validation checks, performing [26-10](#)
- dynamic auto trunking mode [17-10](#)
- dynamic desirable trunking mode [17-10](#)
- Dynamic Host Configuration Protocol
- See DHCP-based autoconfiguration
- dynamic port VLAN membership
- described [17-15](#)
 - reconfirming [17-16](#)
 - troubleshooting [17-16](#)
 - types of connections [17-23](#)
- Dynamic Trunking Protocol
- See DTP

E

editing features

- enabling and disabling [2-7](#)
- keystrokes used [2-7](#)
- wrapped lines [2-9](#)

ELIN location [31-3](#)enable password [12-3](#)enable secret password [12-3](#)enabling SNMP traps [3-9](#)encryption, CipherSuite [12-24](#)encryption for passwords [12-3, 12-27](#)environment variables, function of [4-11](#)error-disabled state, BPDU [22-2](#)error messages during command entry [2-5](#)

EtherChannel

- automatic creation of [40-4, 40-6](#)
- channel groups
 - binding physical and logical interfaces [40-3](#)
 - numbering of [40-3](#)

configuration guidelines [40-10](#)

configuring

- Layer 2 interfaces [40-11](#)

default configuration [40-10](#)forwarding methods [40-8, 40-14](#)IEEE 802.3ad, described [40-6](#)

interaction

- with STP [40-10](#)
- with VLANs [40-11](#)

LACP

- described [40-6](#)
- hot-standby ports [40-7](#)
- interaction with other features [40-7](#)
- modes [40-6](#)

load balancing [40-8, 40-14](#)logical interfaces, described [40-3](#)

PAgP

- aggregate-port learners [40-5](#)
- compatibility with Catalyst 1900 [40-5](#)

described [40-4](#)interaction with other features [40-6](#)interaction with virtual switches [40-5](#)learn method and priority configuration [40-5, 40-14](#)modes [40-4](#)support for [1-2](#)with dual-action detection [40-5](#)

port-channel interfaces

described [40-3](#)port groups [15-4](#)

EtherChannel guard

described [22-7](#)

Ethernet VLANs

- adding [17-17](#)
- defaults and ranges [17-7](#)
- modifying [17-17](#)

EUI [42-3](#)

examples

- network configuration [1-14](#)

expedite queue for QoS [38-56](#)Express Setup [1-2](#)

- See also getting started guide

extended crashinfo file [46-5](#)

extended-range VLANs

- configuration guidelines [17-8](#)
- configuring [17-8](#)
- creating with an internal VLAN ID [17-18](#)

extended system ID

- MSTP [21-14](#)
- STP [20-3, 20-11](#)

extended universal identifier

- See EUI

Extensible Authentication Protocol over LAN [13-1](#)**F**fa0 interface [1-5](#)

fallback bridging

- connecting interfaces with [15-6](#)
 - VLAN-bridge STP [20-10](#)
 - Fast Convergence [24-3](#)
 - FCS bit error rate alarm
 - configuring [3-8](#)
 - defined [3-3](#)
 - FCS error hysteresis threshold [3-2](#)
 - features, incompatible [29-7](#)
 - fiber-optic, detecting unidirectional links [33-1](#)
 - files
 - basic crashinfo
 - description [46-5](#)
 - location [46-5](#)
 - copying [A-6](#)
 - crashinfo, description [46-5](#)
 - deleting [A-6](#)
 - displaying the contents of [A-9](#)
 - extended crashinfo
 - description [46-5](#)
 - location [46-5](#)
 - tar
 - creating [A-7](#)
 - displaying the contents of [A-7](#)
 - extracting [A-8](#)
 - image file format [A-23](#)
 - file system
 - displaying available file systems [A-1](#)
 - displaying file information [A-4](#)
 - local file system names [A-1](#)
 - network file system names [A-6](#)
 - setting the default [A-3](#)
 - filtering
 - non-IP traffic [37-11](#)
 - show and more command output [2-10](#)
 - filtering show and more command output [2-10](#)
 - filters, IP
 - See ACLs, IP
 - flash device, number of [A-1](#)
 - flexible authentication ordering
 - overview [13-27](#)
 - Flex Link Multicast Fast Convergence [24-3](#)
 - Flex Links
 - configuration guidelines [24-6](#)
 - configuring preferred VLAN [24-12](#)
 - default configuration [24-5](#)
 - description [24-1](#)
 - link load balancing [24-2](#)
 - VLANs [24-2](#)
 - flow-based packet classification [1-10](#)
 - flowcharts
 - QoS classification [38-12](#)
 - QoS egress queueing and scheduling [38-23](#)
 - QoS ingress queueing and scheduling [38-21](#)
 - QoS policing and marking [38-16](#)
 - flowcontrol
 - described [15-9](#)
 - FTP
 - configuration files
 - downloading [A-14](#)
 - overview [A-13](#)
 - preparing the server [A-13](#)
 - uploading [A-15](#)
 - image files
 - deleting old image [A-30](#)
 - downloading [A-29](#)
 - preparing the server [A-28](#)
 - uploading [A-30](#)
-
- ## G
- general query [24-10](#)
 - Generating IGMP Reports [24-3](#)
 - get-bulk-request operation [36-4](#)
 - get-next-request operation [36-4, 36-5](#)
 - get-request operation [36-4, 36-5](#)
 - get-response operation [36-4](#)
 - global configuration mode [2-2](#)
 - global leave, IGMP [28-7](#)

global status monitoring alarms [3-2](#)

guest VLAN and 802.1x [13-20](#)

GUIs

See device manager and Network Assistant

H

hardware limitations and Layer 3 interfaces [15-12](#)

help, for the command line [2-3](#)

hierarchical policy maps [38-14](#)

configuration guidelines [38-5](#)

configuring [38-29, 38-42](#)

described [38-17](#)

history

changing the buffer size [2-6](#)

described [2-6](#)

disabling [2-7](#)

recalling commands [2-6](#)

history table, level and number of syslog messages [35-9](#)

host names, in clusters [6-11](#)

hosts, limit on dynamic ports [17-16](#)

HP OpenView [1-3](#)

HTTP over SSL

see HTTPS

HTTPS [12-22](#)

configuring [12-42](#)

self-signed certificate [12-23](#)

HTTP secure server [12-22](#)

ICMP

IPv6 [42-3](#)

time-exceeded messages [46-4](#)

traceroute and [46-4](#)

unreachable messages [37-9](#)

unreachables and ACLs [37-10](#)

ICMP Echo operation

IP SLAs [45-6](#)

ICMP ping

executing [46-9](#)

overview [46-2](#)

ICMPv6 [42-3](#)

IEEE 802.1D

See STP

IEEE 802.1p [19-1](#)

IEEE 802.1Q

and trunk ports [15-4](#)

configuration limitations [17-10](#)

native VLAN for untagged traffic [17-12, 17-20](#)

IEEE 802.1s

See MSTP

IEEE 802.1w

See RSTP

IEEE 802.3ad

See EtherChannel

IEEE 802.3x flow control [15-9, 15-16](#)

ifIndex values, SNMP [36-6](#)

IFS [1-5](#)

IGMP

configurable leave timer

described [28-5](#)

flooded multicast traffic

controlling the length of time [28-7](#)

disabling on an interface [28-7](#)

global leave [28-7](#)

query solicitation [28-7](#)

recovering from flood mode [28-7](#)

joining multicast group [28-3](#)

join messages [28-3](#)

leave processing, enabling [44-6, 44-8](#)

leaving multicast group [28-5](#)

queries [28-4](#)

report suppression

described [28-6](#)

supported versions [28-2](#)

support for [1-2](#)

- IGMP filtering
 - configuring [28-13](#)
 - default configuration [28-12](#)
 - described [28-12](#)
 - support for [1-2](#)
- IGMP groups
 - configuring filtering [28-13](#)
 - setting the maximum number [28-1](#)
- IGMP helper [1-2](#)
- IGMP Immediate Leave
 - described [28-5](#)
- IGMP profile
 - applying [28-13](#)
 - configuration mode [28-13](#)
- IGMP snooping
 - and address aliasing [28-2](#)
 - default configuration [28-6, 44-5](#)
 - definition [28-2](#)
 - enabling and disabling [28-14, 44-6](#)
 - Immediate Leave [28-5](#)
 - method [28-6](#)
 - monitoring [44-9](#)
 - querier
 - configuring [28-7, 28-16](#)
 - supported versions [28-2](#)
 - support for [1-2](#)
- IGMP throttling
 - configuring [28-13](#)
 - default configuration [28-12](#)
 - described [28-12](#)
- Immediate Leave, IGMP [28-5](#)
 - enabling [44-6, 44-8](#)
- inaccessible authentication bypass [13-22](#)
 - support for multiauth ports [13-22](#)
- initial configuration
 - defaults [1-11](#)
 - Express Setup [1-2](#)
- interface
 - range macros [15-14](#)
- interface command [15-6 to 15-13](#)
- interface configuration mode [2-3](#)
- interfaces
 - auto-MDIX, configuring [15-10, 15-17](#)
 - configuration guidelines
 - duplex and speed [15-9](#)
 - configuring
 - procedure [15-13](#)
 - counters, clearing [15-19](#)
 - default configuration [15-8](#)
 - descriptive name, adding [15-17](#)
 - displaying information about [15-18](#)
 - flow control [15-9, 15-16](#)
 - management [1-3](#)
 - physical, identifying [15-6](#)
 - range of [15-13](#)
 - restarting [15-19](#)
 - shutting down [15-19](#)
 - speed and duplex, configuring [15-16](#)
 - supported [15-6](#)
 - types of [15-1](#)
- interfaces range macro command [15-14](#)
- interface types [15-6](#)
- Internet Protocol version 6
 - See IPv6
- inter-VLAN routing [41-2](#)
- Intrusion Detection System
 - See IDS appliances
- inventory management TLV [31-3, 31-5](#)
- IP ACLs
 - for QoS classification [38-13](#)
 - implicit deny [37-7, 37-11](#)
 - implicit masks [37-11](#)
 - named [37-7](#)
 - undefined [37-10](#)
- IP addresses
 - 128-bit [42-2](#)
 - candidate or member [6-2, 6-11](#)
 - classes of [41-3](#)

- cluster access [6-3](#)
- command switch [6-1, 6-11](#)
- discovering [7-8](#)
- for IP routing [41-3](#)
- IPv6 [42-2](#)
- standby command switch [6-11](#)
- See also IP information
- ip igmp profile command [28-13](#)
- IP information
 - assigned
 - manually [4-15](#)
 - through DHCP-based autoconfiguration [4-4](#)
- IP multicast routing
 - and IGMP snooping [28-2](#)
- IP phones
 - and QoS [19-1](#)
 - automatic classification and queuing [39-2](#)
 - ensuring port security with QoS [38-26](#)
 - trusted boundary for QoS [38-26](#)
- IP Port Security for Static Hosts
 - on a PVLAN host port [27-5](#)
- IP precedence [38-2](#)
- IP-precedence-to-DSCP map for QoS [38-48](#)
- IP protocols
 - in ACLs [37-13](#)
- IP routing
 - connecting interfaces with [15-6](#)
 - enabling [41-3](#)
- IP Service Level Agreements
 - See IP SLAs
- IP service levels, analyzing [45-1](#)
- IP SLAs
 - benefits [45-2](#)
 - Control Protocol [45-3](#)
 - definition [45-1](#)
 - ICMP echo operation [45-6](#)
 - measuring network performance [45-3](#)
 - operation [45-3](#)
 - responder
 - described [45-3](#)
 - response time [45-4](#)
 - scheduling [45-4](#)
 - SNMP support [45-2](#)
 - supported metrics [45-2](#)
 - threshold monitoring [45-5](#)
 - UDP jitter operation [45-5](#)
- IP source guard
 - and 802.1x [27-4](#)
 - and DHCP snooping [27-2](#)
 - and EtherChannels [27-3](#)
 - and port security [27-3](#)
 - and private VLANs [27-3](#)
 - and routed ports [27-3](#)
 - and TCAM entries [27-4](#)
 - and trunk interfaces [27-3](#)
 - and VRF [27-4](#)
 - binding configuration
 - automatic [27-2](#)
 - manual [27-2](#)
 - binding table [27-2](#)
 - configuration guidelines [27-3](#)
 - described [27-1](#)
 - filtering
 - source IP address [27-2](#)
 - source IP and MAC address [27-2](#)
 - source IP address filtering [27-2](#)
 - source IP and MAC address filtering [27-2](#)
- IP traceroute
 - executing [46-10](#)
 - overview [46-4](#)
- IP unicast routing
 - assigning IP addresses to Layer 3 interfaces [41-4](#)
 - configuring static routes [41-4](#)
 - enabling [41-3](#)
 - inter-VLAN [41-2](#)
 - IP addressing
 - classes [41-3](#)
 - configuring [41-3](#)

steps to configure [41-3](#)

subnet mask [41-3](#)

with SVIs [41-3](#)

IPv4 ACLs

applying to interfaces [37-9, 37-17](#)

extended, creating [37-6, 37-13](#)

named [37-7, 37-15](#)

standard, creating [37-11](#)

IPv4 and IPv6

dual protocol stacks [42-4](#)

IPv6

addresses [42-2](#)

address formats [42-2](#)

applications [42-4](#)

assigning address [42-7](#)

autoconfiguration [42-4](#)

default router preference (DRP) [42-4](#)

defined [42-1](#)

forwarding [42-7](#)

ICMP [42-3](#)

neighbor discovery [42-3](#)

SDM templates [11-3, 44-1](#)

Stateless Autoconfiguration [42-4](#)

supported features [42-2](#)

understanding static routes [42-5](#)

J

join messages, IGMP [28-3](#)

K

KDC

described [12-17](#)

See also Kerberos

Kerberos

authenticating to

boundary switch [12-19](#)

KDC [12-19](#)

network services [12-20](#)

configuring [12-20](#)

credentials [12-17](#)

cryptographic software image [12-17](#)

described [12-17](#)

KDC [12-17](#)

operation [12-19](#)

realm [12-18](#)

server [12-19](#)

support for [1-9](#)

terms [12-18](#)

TGT [12-19](#)

tickets [12-17](#)

key distribution center

See KDC

L

LACP

See EtherChannel

Layer 2 frames, classification with CoS [38-2](#)

Layer 2 interfaces, default configuration [15-15](#)

Layer 2 traceroute

and ARP [46-3](#)

and CDP [46-3](#)

broadcast traffic [46-3](#)

described [46-3](#)

IP addresses and subnets [46-3](#)

MAC addresses and VLANs [46-3](#)

multicast traffic [46-3](#)

multiple devices on a port [46-4](#)

unicast traffic [46-3](#)

usage guidelines [46-3](#)

Layer 3 interfaces

assigning IP addresses to [41-4](#)

changing from Layer 2 mode [41-4](#)

Layer 3 packets, classification methods [38-2](#)

LDAP [5-3](#)

- Leaking IGMP Reports [24-4](#)
 - LEDs, switch
 - See hardware installation guide
 - lightweight directory access protocol
 - See LDAP
 - line configuration mode [2-3](#)
 - Link Aggregation Control Protocol
 - See EtherChannel
 - link failure, detecting unidirectional [21-7](#)
 - link fault alarm [3-3](#)
 - link integrity, verifying with REP [23-4](#)
 - link local unicast addresses [42-3](#)
 - link redundancy
 - See Flex Links
 - links, unidirectional [33-1](#)
 - link-state tracking
 - configuring [43-4](#)
 - described [43-1](#)
 - LLDP
 - configuring
 - characteristics [31-5](#)
 - default configuration [31-4](#)
 - enabling [31-5](#)
 - monitoring and maintaining [31-8, 31-9](#)
 - supported TLVs [31-2](#)
 - switch stack considerations [31-2](#)
 - transmission timer and holdtime, setting [31-5](#)
 - LLDP-MED
 - configuring
 - TLVs [31-6](#)
 - monitoring and maintaining [31-8, 31-9](#)
 - overview [31-2](#)
 - supported TLVs [31-2](#)
 - local SPAN [30-2](#)
 - location TLV [31-3, 31-5](#)
 - logging messages, ACL [37-6](#)
 - login authentication
 - with RADIUS [12-15, 12-36](#)
 - with TACACS+ [12-7, 12-31](#)
 - login banners [7-4](#)
 - loop guard
 - described [22-8](#)
 - support for [1-6](#)
 - LRE profiles, considerations in switch clusters [6-13](#)
-
- ## M
- MAB
 - See MAC authentication bypass
 - MAB aging timer [1-7](#)
 - MAB inactivity timer
 - default setting [13-31](#)
 - range [13-34](#)
 - MAC/PHY configuration status TLV [31-2](#)
 - MAC addresses
 - aging time [7-6](#)
 - and VLAN association [7-5](#)
 - building the address table [7-5](#)
 - discovering [7-8](#)
 - dynamic
 - learning [7-5](#)
 - in ACLs [37-11](#)
 - static
 - allowing [7-8](#)
 - characteristics of [7-6](#)
 - MAC address learning [1-4](#)
 - MAC address notification, support for [1-11](#)
 - MAC address-table move update
 - configuration guidelines [24-6](#)
 - configuring [24-8](#)
 - default configuration [24-5](#)
 - description [24-4](#)
 - MAC address-to-VLAN mapping [17-14](#)
 - MAC authentication bypass [13-33](#)
 - overview [13-14](#)
 - See MAB
 - MAC extended access lists
 - applying to Layer 2 interfaces [37-11](#)

- creating [37-11](#)
 - defined [37-11](#)
 - for QoS classification [38-10](#)
- magic packet [13-24](#)
- manageability features [1-4](#)
- management access
 - in-band
 - browser session [1-5](#)
 - CLI session [1-5](#)
 - device manager [1-5](#)
 - SNMP [1-5](#)
 - out-of-band console port connection [1-5](#)
- management address TLV [31-2](#)
- management options
 - CLI [2-1](#)
 - CNS [5-2](#)
 - overview [1-3](#)
- management VLAN
 - considerations in switch clusters [6-8](#)
 - discovery through different management VLANs [6-8](#)
- manual preemption, REP, configuring [23-12](#)
- mapping tables for QoS
 - configuring
 - CoS-to-DSCP [38-47](#)
 - DSCP [38-47](#)
 - DSCP-to-CoS [38-48](#)
 - DSCP-to-DSCP-mutation [38-30, 38-49](#)
 - IP-precedence-to-DSCP [38-48](#)
 - policed-DSCP [38-48](#)
 - described [38-18](#)
- marking
 - action with aggregate policers [38-46](#)
 - described [38-4, 38-14](#)
- matching, IPv4 ACLs [37-5](#)
- maximum number of allowed devices, port-based authentication [13-34](#)
- MDA
 - configuration guidelines [13-10 to 13-11](#)
 - described [1-8, 13-10](#)
- exceptions with authentication process [13-4](#)
- membership mode, VLAN port [17-3](#)
- member switch
 - automatic discovery [6-5](#)
 - defined [6-3](#)
 - managing [6-13](#)
 - passwords [6-11](#)
 - recovering from lost connectivity [46-9](#)
 - requirements [6-2](#)
 - See also candidate switch, cluster standby group, and standby command switch
- messages, to users through banners [7-4](#)
- MIBs
 - overview [36-2](#)
 - SNMP interaction with [36-5](#)
- mirroring traffic for analysis [30-2](#)
- mismatches, autonegotiation [46-1](#)
- monitoring
 - alarms [3-9](#)
 - cables for unidirectional links [33-1](#)
 - CDP [32-3](#)
 - features [1-11](#)
 - IGMP
 - snooping [44-9](#)
 - multicast router interfaces [28-20, 44-9](#)
 - network traffic for analysis with probe [30-2](#)
 - port
 - blocking [29-16](#)
 - protection [29-16](#)
 - PTP [8-3, 8-4](#)
 - SFP status [46-13](#)
 - speed and duplex mode [15-16](#)
 - traffic flowing among switches [34-1](#)
 - VTP [18-14](#)
- mrouter Port [24-3](#)
- mrouter port [24-10](#)
- MSTP
 - boundary ports
 - configuration guidelines [21-14](#)

- described [21-5](#)
- BPDU filtering
 - described [22-3](#)
- BPDU guard
 - described [22-2](#)
- CIST, described [21-3](#)
- CIST regional root [21-3](#)
- CIST root [21-4](#)
- configuration guidelines [21-13](#)
- configuring
 - link type for rapid convergence [21-15](#)
 - MST region [21-16](#)
 - neighbor type [21-15](#)
 - path cost [21-15](#)
 - port priority [21-15](#)
 - root switch [21-14](#), [21-17](#)
 - secondary root switch [21-15](#)
- CST
 - defined [21-3](#)
 - operations between regions [21-3](#)
- default configuration [21-13](#)
- enabling the mode [21-16](#)
- EtherChannel guard
 - described [22-7](#)
- extended system ID
 - effects on root switch [21-14](#)
 - effects on secondary root switch [21-15](#)
 - unexpected behavior [21-14](#)
- IEEE 802.1s
 - implementation [21-6](#)
 - port role naming change [21-6](#)
 - terminology [21-4](#)
- instances supported [20-9](#)
- interface state, blocking to forwarding [22-1](#)
- interoperability and compatibility among modes [20-10](#)
- interoperability with IEEE 802.1D
 - described [21-8](#)
 - restarting migration process [21-16](#)
- IST
 - defined [21-2](#)
 - master [21-3](#)
 - operations within a region [21-3](#)
- loop guard
 - described [22-8](#)
- mapping VLANs to MST instance [21-16](#)
- MST region
 - CIST [21-3](#)
 - configuring [21-16](#)
 - described [21-2](#)
 - hop-count mechanism [21-5](#)
 - IST [21-2](#)
 - supported spanning-tree instances [21-2](#)
- optional features supported [1-6](#)
- overview [21-2](#)
- Port Fast
 - described [22-1](#)
- preventing root switch selection [22-7](#)
- root guard
 - described [22-7](#)
- root switch
 - configuring [21-14](#)
 - effects of extended system ID [21-14](#)
 - unexpected behavior [21-14](#)
 - shutdown Port Fast-enabled port [22-2](#)
- multiauth
 - support for inaccessible authentication bypass [13-22](#)
- multiauth mode
 - See multiple-authentication mode
- multicast groups
 - Immediate Leave [28-5](#)
 - joining [28-3](#)
 - leaving [28-5](#)
 - static joins [44-7](#)
- multicast router interfaces, monitoring [28-20](#), [44-9](#)
- multicast router ports, adding [28-14](#), [44-6](#)
- multicast storm [29-1](#)
- multicast storm-control command [29-9](#)

multicast television application [28-9](#)

multicast VLAN [28-8](#)

Multicast VLAN Registration

See MVR

multidomain authentication

See MDA

multiple authentication [13-11](#)

multiple authentication mode

configuring [13-38](#)

MVR

and address aliasing [28-11](#)

and IGMPv3 [28-11](#)

default configuration [28-11](#)

described [28-8](#)

example application [28-9](#)

modes [28-17](#)

multicast television application [28-9](#)

setting global parameters [28-16](#)

N

NAC

AAA down policy [1-9](#)

critical authentication [13-22, 13-44](#)

IEEE 802.1x authentication using a RADIUS server [13-46](#)

IEEE 802.1x validation using RADIUS server [13-46](#)

inaccessible authentication bypass [1-9, 13-44](#)

Layer 2 IEEE 802.1x validation [1-8, 13-27, 13-46](#)

Layer 2 IP validation [1-9](#)

named IPv4 ACLs [37-7](#)

NameSpace Mapper

See NSM

native VLAN

configuring [17-12, 17-20](#)

default [17-12](#)

NEAT

configuring [13-47](#)

overview [13-28](#)

neighbor discovery, IPv6 [42-3](#)

neighbor offset numbers, REP [23-5](#)

Network Admission Control

NAC

Network Assistant

benefits [1-2](#)

described [1-3](#)

upgrading a switch [A-23](#)

network configuration examples

increasing network performance [1-14](#)

providing network services [1-14](#)

network design

performance [1-14](#)

services [1-14](#)

Network Edge Access Topology

See NEAT

network management

CDP [32-1](#)

RMON [34-1](#)

SNMP [36-1](#)

network performance, measuring with IP SLAs [45-3](#)

network policy TLV [31-2, 31-5](#)

Network Time Protocol

See NTP

no commands [2-4](#)

nonhierarchical policy maps

configuration guidelines [38-5](#)

described [38-15](#)

non-IP traffic filtering [37-11](#)

nontrunking mode [17-10](#)

normal-range VLANs [17-4](#)

configuration guidelines [17-6](#)

configuring [17-4](#)

no switchport command [15-3](#)

NSM [5-4](#)

NTP

associations

defined [7-2](#)

overview [7-2](#)

stratum 7-2
 support for 1-4
 time
 services 7-2
 synchronizing 7-2

O

off mode, VTP 18-3
 openlx
 configuring 13-50
 openlx authentication
 overview 13-28
 Open DeviceNet Vendors Association (ODVA) 10-1
 optimizing system resources 11-1
 options, management 1-3
 out-of-profile markdown 1-10

P

packet modification, with QoS 38-25
 PAgP
 See EtherChannel
 passwords
 default configuration 12-2
 disabling recovery of 12-3, 12-27
 encrypting 12-3, 12-27
 for security 1-7
 in clusters 6-12
 overview 12-2
 recovery of 46-8
 setting
 enable 12-26
 enable secret 12-3, 12-27
 Telnet 12-28
 with usernames 12-4
 VTP domain 18-10
 path cost

MSTP 21-15
 STP 20-13, 20-16
 performance, network design 1-14
 performance features 1-2
 persistent self-signed certificate 12-23
 per-user ACLs and Filter-Ids 13-7
 per-VLAN spanning-tree plus
 See PVST+
 physical ports 15-2
 PIM-DVMRP, as snooping method 28-7
 ping
 character output description 46-10
 executing 46-9
 overview 46-2
 policed-DSCP map for QoS 38-48
 policers
 configuring
 for each matched traffic class 38-28
 for more than one traffic class 38-46
 described 38-4
 displaying 38-57
 number of 38-6
 types of 38-15
 policing
 described 38-4
 hierarchical
 See hierarchical policy maps
 token-bucket algorithm 38-15
 policy maps for QoS
 characteristics of 38-28
 described 38-13
 displaying 38-57
 hierarchical 38-14
 hierarchical on SVIs
 configuration guidelines 38-5
 configuring 38-29, 38-42
 described 38-17
 nonhierarchical on physical ports
 configuration guidelines 38-5

- described [38-15](#)
- port ACLs
 - defined [37-2](#)
 - types of [37-2](#)
- Port Aggregation Protocol
 - See EtherChannel
- port-based authentication
 - accounting [13-13](#)
 - authentication server
 - defined [13-2, 14-2](#)
 - RADIUS server [13-2](#)
 - client, defined [13-2, 14-2](#)
 - configuring
 - guest VLAN [13-42](#)
 - host mode [13-38](#)
 - inaccessible authentication bypass [13-44](#)
 - RADIUS server parameters on the switch [13-4, 13-36, 14-10](#)
 - restricted VLAN [13-43](#)
 - default configuration [13-30, 14-10](#)
 - described [13-1](#)
 - device roles [13-2, 14-2](#)
 - downloadable ACLs and redirect URLs
 - overview [13-18 to 13-19](#)
 - EAPOL-start frame [13-4](#)
 - EAP-request/identity frame [13-4](#)
 - EAP-response/identity frame [13-4](#)
 - enabling
 - 802.1X authentication [14-10, 14-12](#)
 - encapsulation [13-2](#)
 - flexible authentication ordering
 - overview [13-27](#)
 - guest VLAN
 - configuration guidelines [13-21, 13-22](#)
 - described [13-20](#)
 - host mode [13-9](#)
 - inaccessible authentication bypass
 - configuring [13-44](#)
 - described [13-22](#)
 - guidelines [13-33](#)
 - initiation and message exchange [13-4](#)
 - magic packet [13-24](#)
 - maximum number of allowed devices per port [13-34](#)
 - method lists [13-34](#)
 - multiple authentication [13-11](#)
 - per-user ACLs
 - AAA authorization [13-34](#)
 - configuration tasks [13-17](#)
 - described [13-17](#)
 - RADIUS server attributes [13-17](#)
 - ports
 - authorization state and dot1x port-control command [13-9](#)
 - authorized and unauthorized [13-9](#)
 - voice VLAN [13-23](#)
 - port security
 - described [13-24](#)
 - readiness check
 - configuring [13-14](#)
 - described [13-14](#)
 - resetting to default values [13-51](#)
 - switch
 - as proxy [13-2, 14-3](#)
 - RADIUS client [13-2](#)
 - switch supplicant
 - configuring [13-47](#)
 - overview [13-28](#)
 - user distribution
 - guidelines [13-26](#)
 - overview [13-26](#)
 - VLAN assignment
 - AAA authorization [13-34](#)
 - characteristics [13-15](#)
 - configuration tasks [13-16](#)
 - described [13-15](#)
 - voice aware 802.1x security
 - configuring [13-16](#)
 - described [13-16](#)

- voice VLAN
 - described [13-23](#)
 - PVID [13-23](#)
 - VVID [13-23](#)
- wake-on-LAN, described [13-24](#)
- with ACLs and RADIUS Filter-Id attribute [13-29](#)
- port-based authentication configuration process [13-34](#)
- port-based authentication methods, supported [13-6](#)
- port blocking [1-2, 29-4, 29-11](#)
- port-channel
 - See EtherChannel
- port description TLV [31-2](#)
- Port Fast
 - described [22-1](#)
 - mode, spanning tree [17-15](#)
 - support for [1-6](#)
- port membership modes, VLAN [17-3](#)
- port not forwarding alarm [3-3](#)
- port not operating alarm [3-3](#)
- port priority
 - MSTP [21-15](#)
 - STP [20-12, 20-16](#)
- ports
 - access [15-3](#)
 - blocking [29-4, 29-11](#)
 - dual-purpose uplink [15-4](#)
 - dynamic access [17-4](#)
 - protected [29-3](#)
 - REP [23-6](#)
 - routed [15-3](#)
 - secure [29-4](#)
 - static-access [17-3, 17-7, 17-17](#)
 - switch [15-2](#)
 - trunks [17-3, 17-9](#)
 - VLAN assignments [17-7, 17-17](#)
- port security
 - aging [29-8, 29-15](#)
 - and QoS trusted boundary [38-26, 38-34](#)
 - described [29-4](#)
 - displaying [29-16](#)
 - on trunk ports [29-13](#)
 - sticky learning [29-5](#)
 - violations [29-5](#)
- port-shutdown response, VMPS [17-14](#)
- port status monitoring alarms
 - FCS bit error rate alarm [3-3](#)
 - link fault alarm [3-3](#)
 - port not forwarding alarm [3-3](#)
 - port not operating alarm [3-3](#)
- port VLAN ID TLV [31-2](#)
- power management TLV [31-2, 31-5](#)
- preempt delay time, REP [23-5](#)
- preemption, default configuration [24-5](#)
- preemption delay, default configuration [24-5](#)
- preferential treatment of traffic
 - See QoS
- preventing unauthorized access [12-2](#)
- primary edge port, REP [23-4](#)
- primary links [24-2](#)
- priority
 - overriding CoS [19-4](#)
 - trusting CoS [19-4](#)
- private VLAN edge ports
 - See protected ports
- privileged EXEC mode [2-2](#)
- privilege levels
 - changing the default for lines [12-29](#)
 - command switch [6-13](#)
 - exiting [12-30](#)
 - logging into [12-30](#)
 - mapping on member switches [6-13](#)
 - overview [12-2, 12-4](#)
 - setting a command with [12-29](#)
- PROFINET
 - configuring [9-4](#)
 - default configuration [9-4](#)
- protected ports [1-7, 29-3](#)
- protocol storm protection [29-8](#)

- proxy reports [24-3](#)
 - pruning, VTP
 - enabling
 - in VTP domain [18-13](#)
 - on a port [17-19](#)
 - examples [18-8](#)
 - overview [18-7](#)
 - pruning-eligible list
 - changing [17-19](#)
 - for VTP pruning [18-7](#)
 - PTP
 - configuring [8-3](#)
 - default configuration [8-2](#)
 - displaying configuration [8-3, 8-4](#)
 - PVST+
 - described [20-9](#)
 - IEEE 802.1Q trunking interoperability [20-10](#)
 - instances supported [20-9](#)
-
- ## Q
- QoS
 - and MQC commands [38-2, 39-2](#)
 - auto-QoS
 - categorizing traffic [39-3](#)
 - disabling [39-8](#)
 - displaying generated commands [39-8](#)
 - effects on running configuration [39-7](#)
 - egress queue defaults [39-3](#)
 - enabling for VoIP [39-8](#)
 - ingress queue defaults [39-3](#)
 - list of generated commands [39-4](#)
 - basic model [38-4](#)
 - classification
 - class maps, described [38-13](#)
 - defined [38-4](#)
 - DSCP transparency, described [38-27, 38-34](#)
 - flowchart [38-12](#)
 - forwarding treatment [38-3](#)
 - in frames and packets [38-3](#)
 - IP ACLs, described [38-11, 38-13](#)
 - MAC ACLs, described [38-10, 38-13](#)
 - options for IP traffic [38-10](#)
 - options for non-IP traffic [38-10](#)
 - policy maps, described [38-13](#)
 - trust DSCP, described [38-10](#)
 - trusted CoS, described [38-10](#)
 - trust IP precedence, described [38-10](#)
 - class maps
 - configuring [38-38](#)
 - displaying [38-56](#)
 - configuring
 - aggregate policers [38-46](#)
 - default port CoS value [38-33](#)
 - DSCP maps [38-47](#)
 - DSCP transparency [38-27, 38-34](#)
 - DSCP trust states bordering another domain [38-27, 38-35](#)
 - egress queue characteristics [38-31, 38-52](#)
 - ingress queue characteristics [38-30, 38-49](#)
 - IP standard ACLs [38-36](#)
 - policy maps, hierarchical [38-29, 38-42](#)
 - port trust states within the domain [38-26, 38-33](#)
 - trusted boundary [38-26, 38-34](#)
 - default auto configuration [39-3](#)
 - default standard configuration [38-6](#)
 - displaying statistics [38-57](#)
 - DSCP transparency [38-27, 38-34](#)
 - egress queues
 - allocating buffer space [38-31, 38-52](#)
 - buffer allocation scheme, described [38-23](#)
 - configuring shaped weights for SRR [38-54](#)
 - configuring shared weights for SRR [38-55](#)
 - described [38-4](#)
 - flowchart [38-23](#)
 - mapping DSCP or CoS values [38-53](#)
 - scheduling, described [38-4](#)
 - setting WTD thresholds [38-31, 38-52](#)

- WTD, described [38-24](#)
 - enabling globally [38-32](#)
 - flowcharts
 - classification [38-12](#)
 - egress queueing and scheduling [38-23](#)
 - ingress queueing and scheduling [38-21](#)
 - policing and marking [38-16](#)
 - implicit deny [38-13](#)
 - ingress queues
 - allocating bandwidth [38-51](#)
 - allocating buffer space [38-50](#)
 - buffer and bandwidth allocation, described [38-22](#)
 - configuring shared weights for SRR [38-51](#)
 - configuring the priority queue [38-30, 38-51](#)
 - described [38-4](#)
 - displaying the threshold map [38-57](#)
 - flowchart [38-21](#)
 - mapping DSCP or CoS values [38-49](#)
 - priority queue, described [38-22](#)
 - scheduling, described [38-4](#)
 - setting WTD thresholds [38-49](#)
 - WTD, described [38-22](#)
 - IP phones
 - automatic classification and queueing [39-2](#)
 - detection and trusted settings [38-26, 39-2](#)
 - limiting bandwidth on egress interface [38-56](#)
 - mapping tables
 - CoS-to-DSCP [38-47](#)
 - displaying [38-57](#)
 - DSCP-to-CoS [38-48](#)
 - DSCP-to-DSCP-mutation [38-30, 38-49](#)
 - IP-precedence-to-DSCP [38-48](#)
 - policed-DSCP [38-48](#)
 - types of [38-18](#)
 - marked-down actions [38-41, 38-44](#)
 - marking, described [38-4, 38-14](#)
 - packet modification [38-25](#)
 - policers
 - configuring [38-41, 38-44](#)
 - described [38-14](#)
 - displaying [38-57](#)
 - number of [38-6](#)
 - types of [38-15](#)
 - policies, attaching to an interface [38-14](#)
 - policing
 - described [38-4, 38-14](#)
 - token bucket algorithm [38-15](#)
 - policy maps
 - characteristics of [38-28](#)
 - displaying [38-57](#)
 - hierarchical [38-14](#)
 - hierarchical on SVIs [38-29](#)
 - nonhierarchical on physical ports [38-28](#)
 - QoS label, defined [38-4](#)
 - queues
 - configuring egress characteristics [38-31, 38-52](#)
 - configuring ingress characteristics [38-30, 38-49](#)
 - high priority (expedite) [38-25, 38-56](#)
 - location of [38-19](#)
 - SRR, described [38-20](#)
 - WTD, described [38-19](#)
 - rewrites [38-25](#)
 - support for [1-10](#)
 - trust states
 - bordering another domain [38-27, 38-35](#)
 - described [38-10](#)
 - trusted device [38-26, 38-34](#)
 - within the domain [38-26, 38-33](#)
 - quality of service
 - See QoS
 - queries, IGMP [28-4](#)
 - query solicitation, IGMP [28-7](#)
-
- ## R
- ### RADIUS
- attributes
 - vendor-proprietary [12-17, 12-38](#)

- vendor-specific [12-16](#)
 - configuring
 - accounting [12-16, 12-37](#)
 - authentication [12-15, 12-36](#)
 - authorization [12-16, 12-37](#)
 - communication, global [12-15, 12-37](#)
 - communication, per-server [12-14, 12-15](#)
 - multiple UDP ports [12-14](#)
 - default configuration [12-10](#)
 - defining AAA server groups [12-15, 12-35](#)
 - identifying the server [12-14](#)
 - in clusters [6-12](#)
 - limiting the services to the user [12-16](#)
 - method list, defined [12-15](#)
 - operation of [12-9](#)
 - overview [12-8](#)
 - suggested network environments [12-8](#)
 - support for [1-9](#)
 - tracking services accessed by user [12-16, 12-37](#)
- RADIUS Change of Authorization** [12-10](#)
- range
- macro [15-14](#)
- rapid convergence [21-9](#)
- rapid per-VLAN spanning-tree plus
- See rapid PVST+
- rapid PVST+
- described [20-9](#)
 - IEEE 802.1Q trunking interoperability [20-10](#)
 - instances supported [20-9](#)
- Rapid Spanning Tree Protocol**
- See RSTP
- rcommand command [6-13](#)
- RCP**
- configuration files
 - downloading [A-17](#)
 - overview [A-16](#)
 - preparing the server [A-16](#)
 - uploading [A-18](#)
 - image files
 - deleting old image [A-34](#)
 - downloading [A-33](#)
 - preparing the server [A-32](#)
 - uploading [A-34](#)
- readiness check
- port-based authentication
 - configuring [13-14](#)
 - described [13-14](#)
- reconfirmation interval, VMPS, changing [17-16](#)
- redirect URL [13-18, 13-19, 13-48](#)
- redundancy
- EtherChannel [40-2](#)
 - STP
 - backbone [20-7](#)
 - path cost [17-13](#)
 - port priority [17-13](#)
- reloading software [4-11](#)
- Remote Authentication Dial-In User Service**
- See RADIUS
- Remote Copy Protocol**
- See RCP
- Remote SPAN**
- See RSPAN
- remote SPAN [30-2](#)
- REP**
- administrative VLAN [23-9](#)
 - age timer [23-8](#)
 - and STP [23-6](#)
 - configuration guidelines [23-7](#)
 - convergence [23-4](#)
 - default configuration [23-7](#)
 - manual preemption, configuring [23-12](#)
 - neighbor offset numbers [23-5](#)
 - open segment [23-2](#)
 - ports [23-6](#)
 - preempt delay time [23-5](#)
 - primary edge port [23-4](#)
 - ring segment [23-2](#)
 - secondary edge port [23-4](#)

- segments [23-2](#)
 - characteristics [23-3](#)
- SNMP traps, configuring [23-12](#)
- supported interfaces [23-2](#)
- triggering VLAN load balancing [23-6](#)
- verifying link integrity [23-4](#)
- VLAN blocking [23-14](#)
- VLAN load balancing [23-4](#)
- report suppression, IGMP
 - described [28-6](#)
- resequencing ACL entries [37-7](#)
- resetting a UDLD-shutdown interface [33-5](#)
- Resilient Ethernet Protocol
 - See REP
- responder, IP SLAs
 - described [45-3](#)
- response time, measuring with IP SLAs [45-4](#)
- restricted VLAN
 - configuring [13-43](#)
 - described [13-21](#)
 - using with IEEE 802.1x [13-21](#)
- restricting access
 - overview [12-2](#)
 - passwords and privilege levels [12-2](#)
 - RADIUS [12-8](#)
 - TACACS+ [12-5](#)
- RFC
 - 1112, IP multicast and IGMP [28-2](#)
 - 1157, SNMPv1 [36-2](#)
 - 1166, IP addresses [41-3](#)
 - 1305, NTP [7-2](#)
 - 1757, RMON [34-2](#)
 - 1901, SNMPv2C [36-2](#)
 - 1902 to 1907, SNMPv2 [36-2](#)
 - 2236, IP multicast and IGMP [28-2](#)
 - 2273-2275, SNMPv3 [36-2](#)
- RFC 5176 Compliance [12-10](#)
- RMON
 - enabling alarms and events [34-3](#)
 - groups supported [34-2](#)
 - overview [34-1](#)
 - statistics
 - collecting group Ethernet [34-4](#)
 - collecting group history [34-4](#)
 - support for [1-11](#)
- root guard
 - described [22-7](#)
 - support for [1-6](#)
- root switch
 - MSTP [21-14, 21-17](#)
 - STP [20-11, 20-15](#)
- routed ports
 - defined [15-3](#)
 - in switch clusters [6-9](#)
 - IP addresses on [15-12](#)
- RSPAN
 - characteristics [30-7](#)
 - configuration guidelines [30-9](#)
 - default configuration [30-10](#)
 - defined [30-2](#)
 - destination ports [30-6](#)
 - monitored ports [30-5](#)
 - monitoring ports [30-6](#)
 - overview [1-11, 30-1](#)
 - received traffic [30-4](#)
 - sessions
 - defined [30-3](#)
 - source ports [30-5](#)
 - transmitted traffic [30-4](#)
 - VLAN-based [30-6](#)
- RSTP
 - active topology [21-8](#)
 - BPDU
 - format [21-11](#)
 - processing [21-12](#)
 - designated port, defined [21-8](#)
 - designated switch, defined [21-8](#)
 - interoperability with IEEE 802.1D

- described [21-8](#)
- restarting migration process [21-16](#)
- topology changes [21-12](#)
- overview [21-8](#)
- port roles
 - described [21-8](#)
 - synchronized [21-10](#)
- proposal-agreement handshake process [21-9](#)
- rapid convergence
 - described [21-9](#)
 - edge ports and Port Fast [21-9](#)
 - point-to-point links [21-9, 21-15](#)
 - root ports [21-9](#)
- root port, defined [21-8](#)
- See also MSTP
- running configuration
 - replacing [A-19, A-20](#)
 - rolling back [A-19, A-20](#)
- running configuration, saving [4-17](#)

S

- scheduled reloads [4-11](#)
- scheduling, IP SLAs operations [45-4](#)
- SCP
 - and SSH [12-25](#)
- SD flash memory card [A-2](#)
- SDM
 - templates
 - number of [11-2](#)
- SDM template
 - configuring [11-4](#)
 - dual IPv4 and IPv6 [11-3](#)
 - types of [11-2](#)
- secondary edge port, REP [23-4](#)
- Secure Copy Protocol
- Secure Digital flash memory card
 - See SD flash memory card
- secure HTTP client

- configuring [12-44](#)
- secure MAC addresses
 - maximum number of [29-5](#)
 - types of [29-4](#)
- secure ports, configuring [29-4](#)
- secure remote connections [12-21](#)
- Secure Shell
 - See SSH
- Secure Socket Layer
 - See SSL
- security, port [29-4](#)
- security features [1-7](#)
- See SCP
- sequence numbers in log messages [35-8](#)
- server mode, VTP [18-3](#)
- service-provider network, MSTP and RSTP [21-1](#)
- set-request operation [36-5](#)
- setting the FCS error hysteresis threshold [3-8](#)
- severity levels, defining in system messages [35-8](#)
- SFPs
 - monitoring status of [46-13](#)
 - security and identification [46-2](#)
 - status, displaying [46-13](#)
- shaped round robin
 - See SRR
- show access-lists hw-summary command [37-10](#)
- show and more command output, filtering [2-10](#)
- show cdp traffic command [32-3](#)
- show cluster members command [6-13](#)
- show forward command [46-14](#)
- show interfaces command [15-16](#)
- show interfaces switchport [24-9](#)
- show lldp traffic command [31-9](#)
- show platform forward command [46-14](#)
- shutdown command on interfaces [15-19](#)
- Simple Network Management Protocol
 - See SNMP
- small-frame arrival rate, configuring [29-10](#)
- Smartports macros

- applying global parameter values [16-3](#)
- configuration guidelines [16-2](#)
- default configuration [16-1](#)
- tracing [16-2](#)
- SNAP [32-1](#)
- SNMP
 - accessing MIB variables with [36-5](#)
 - agent
 - described [36-4](#)
 - disabling [36-8](#)
 - and IP SLAs [45-2](#)
 - authentication level [36-11](#)
 - community strings
 - configuring [36-6, 36-9](#)
 - for cluster switches [36-4](#)
 - overview [36-4](#)
 - configuration examples [36-15](#)
 - default configuration [36-8](#)
 - engine ID [36-1](#)
 - groups [36-1, 36-10](#)
 - host [36-1](#)
 - ifIndex values [36-6](#)
 - in-band management [1-5](#)
 - in clusters [6-12](#)
 - informs
 - and trap keyword [36-6, 36-12](#)
 - described [36-5](#)
 - differences from traps [36-5](#)
 - limiting access by TFTP servers [36-15](#)
 - limiting system log messages to NMS [35-9](#)
 - manager functions [1-3, 36-4](#)
 - managing clusters with [6-14](#)
 - notifications [36-5](#)
 - overview [36-2, 36-5](#)
 - security levels [36-3](#)
 - setting CPU threshold notification [36-14](#)
 - system contact and location [36-14](#)
 - trap manager, configuring [36-12](#)
 - traps
 - described [36-4, 36-5](#)
 - differences from informs [36-5](#)
 - enabling [36-6, 36-12](#)
 - enabling MAC address notification [7-14, 7-15](#)
 - overview [36-2, 36-5](#)
 - types of [36-7](#)
 - users [36-1, 36-10](#)
 - versions supported [36-2](#)
- SNMP and Syslog Over IPv6 [42-5](#)
- SNMP traps
 - REP [23-12](#)
- SNMPv1 [36-3](#)
- SNMPv2C [36-3](#)
- SNMPv3 [36-3](#)
- snooping, IGMP [28-2](#)
- software images
 - location in flash [A-23](#)
 - recovery procedures [46-7](#)
 - tar file format, described [A-23](#)
 - See also downloading and uploading
- source addresses
 - in IPv4 ACLs [37-13](#)
- source-and-destination-IP address based forwarding, EtherChannel [40-9](#)
- source-and-destination MAC address forwarding, EtherChannel [40-8](#)
- source-IP address based forwarding, EtherChannel [40-8](#)
- source-MAC address forwarding, EtherChannel [40-8](#)
- SPAN
 - configuration guidelines [30-9](#)
 - default configuration [30-10](#)
 - destination ports [30-6](#)
 - monitored ports [30-5](#)
 - monitoring ports [30-6](#)
 - overview [1-11, 30-1](#)
 - ports, restrictions [29-7](#)
 - received traffic [30-4](#)
 - sessions
 - defined [30-3](#)

- source ports [30-5](#)
- transmitted traffic [30-4](#)
- VLAN-based [30-6](#)
- spanning tree and native VLANs [17-10](#)
- Spanning Tree Protocol
 - See STP
- SRR
 - configuring
 - shaped weights on egress queues [38-54](#)
 - shared weights on egress queues [38-55](#)
 - shared weights on ingress queues [38-51](#)
 - described [38-20](#)
 - shaped mode [38-20](#)
 - shared mode [38-20](#)
 - support for [1-10, 1-11](#)
- SSH
 - cryptographic software image [12-1, 12-21](#)
 - described [1-5, 12-21](#)
 - encryption methods [12-21](#)
 - user authentication methods, supported [12-21](#)
- SSL
 - configuring a secure HTTP client [12-44](#)
 - configuring a secure HTTP server [12-42](#)
 - cryptographic software image [12-22](#)
 - described [12-22](#)
- standby command switch
 - configuring
 - defined [6-3](#)
 - requirements [6-2](#)
 - See also cluster standby group and HSRP
- standby group, cluster
 - See cluster standby group and HSRP
- standby links [24-2](#)
- startup configuration
 - booting
 - specific image [4-17](#)
 - clearing [A-19](#)
 - configuration file
 - specifying the filename [4-15](#)
 - static access ports
 - assigning to VLAN [17-7, 17-17](#)
 - defined [15-3, 17-3](#)
 - static addresses
 - See addresses
 - static MAC addressing [1-7](#)
 - static routes
 - configuring [41-4](#)
 - understanding [42-5](#)
 - static VLAN membership [17-2](#)
 - statistics
 - interface [15-18](#)
 - QoS ingress and egress [38-57](#)
 - RMON group Ethernet [34-4](#)
 - RMON group history [34-4](#)
 - VTP [18-14](#)
 - sticky learning [29-5](#)
 - storm control
 - configuring [29-3, 29-9](#)
 - displaying [29-16](#)
 - support for [1-2](#)
 - thresholds [29-1](#)
 - STP
 - accelerating root port selection [22-4](#)
 - and REP [23-6](#)
 - BackboneFast
 - described [22-5](#)
 - BPDU filtering
 - described [22-3](#)
 - BPDU guard
 - described [22-2](#)
 - BPDU message exchange [20-2](#)
 - configuration guidelines [20-13](#)
 - configuring
 - path cost [20-13, 20-16](#)
 - port priority [20-12, 20-16](#)
 - root switch [20-11, 20-15](#)
 - secondary root switch [20-12, 20-16](#)
 - spanning-tree mode [20-14](#)

- switch priority [20-17](#)
- default configuration [20-11](#)
- default optional feature configuration [22-9](#)
- designated port, defined [20-3](#)
- designated switch, defined [20-3](#)
- detecting indirect link failures [22-5](#)
- disabling [20-11](#)
- EtherChannel guard
 - described [22-7](#)
- extended system ID
 - effects on root switch [20-11](#)
 - effects on the secondary root switch [20-12](#)
 - overview [20-3](#)
 - unexpected behavior [20-12](#)
- features supported [1-6](#)
- IEEE 802.1D and bridge ID [20-3](#)
- IEEE 802.1D and multicast addresses [20-8](#)
- IEEE 802.1t and VLAN identifier [20-4](#)
- inferior BPDU [20-3](#)
- instances supported [20-9](#)
- interface state, blocking to forwarding [22-1](#)
- interface states
 - blocking [20-5](#)
 - disabled [20-6](#)
 - forwarding [20-5, 20-6](#)
 - learning [20-6](#)
 - listening [20-6](#)
 - overview [20-4](#)
- interoperability and compatibility among modes [20-10](#)
- limitations with IEEE 802.1Q trunks [20-10](#)
- load sharing
 - overview [17-12](#)
 - using path costs [17-13](#)
 - using port priorities [17-13](#)
- loop guard
 - described [22-8](#)
- modes supported [20-9](#)
- multicast addresses, effect of [20-8](#)
- optional features supported [1-6](#)
- path costs [17-13](#)
- Port Fast
 - described [22-1](#)
 - preventing root switch selection [22-7](#)
 - protocols supported [20-9](#)
 - redundant connectivity [20-7](#)
 - root guard
 - described [22-7](#)
 - root port, defined [20-3](#)
 - root switch
 - configuring [20-12](#)
 - effects of extended system ID [20-3, 20-11](#)
 - election [20-3](#)
 - unexpected behavior [20-12](#)
 - shutdown Port Fast-enabled port [22-2](#)
 - superior BPDU [20-3](#)
 - UplinkFast
 - described [22-3](#)
 - VLAN-bridge [20-10](#)
- stratum, NTP [7-2](#)
- subnet mask [41-3](#)
- success response, VMPS [17-14](#)
- summer time [7-10](#)
- SunNet Manager [1-3](#)
- supported port-based authentication methods [13-6](#)
- SVI autostate exclude
 - configuring [15-10](#)
- SVIs
 - and IP unicast routing [41-3](#)
 - connecting VLANs [15-5](#)
 - routing between VLANs [17-2](#)
- switch [42-2](#)
- switch boot process [4-1](#)
- switch console port [1-5](#)
- Switch Database Management
 - See SDM
- Switched Port Analyzer
 - See SPAN

- switched ports [15-2](#)
- switch information assignment [4-4](#)
- switchport backup interface [24-4, 24-10](#)
- switchport block multicast command [29-11](#)
- switchport block unicast command [29-11](#)
- switchport command [15-8](#)
- switchport protected command [29-11](#)
- switch priority
 - STP [20-17](#)
- switch software features [1-1](#)
- system capabilities TLV [31-2](#)
- system clock
 - configuring
 - daylight saving time [7-10](#)
 - manually [7-9](#)
 - summer time [7-10](#)
 - time zones [7-9](#)
 - overview [7-1](#)
 - See also NTP
- system description TLV [31-2](#)
- system message logging
 - default configuration [35-5](#)
 - defining error message severity levels [35-8](#)
 - disabling [35-5](#)
 - facility keywords, described [35-4](#)
 - level keywords, described [35-3](#)
 - limiting messages [35-9](#)
 - message format [35-2](#)
 - overview [35-1](#)
 - sequence numbers, enabling and disabling [35-8](#)
 - setting the display destination device [35-6](#)
 - synchronizing log messages [35-2, 35-7](#)
 - syslog facility [1-11](#)
 - time stamps, enabling and disabling [35-8](#)
 - UNIX syslog servers
 - configuring the daemon [35-4](#)
 - configuring the logging facility [35-10](#)
 - facilities supported [35-4](#)
- system name

- manual configuration [7-11](#)

- See also DNS

- system name TLV [31-2](#)

- system prompt, default setting [7-5](#)

- system resources, optimizing [11-1](#)

T

TACACS+

- accounting, defined [12-6](#)

- authentication, defined [12-6](#)

- authorization, defined [12-6](#)

- configuring

- accounting [12-8, 12-33](#)

- authentication key [12-7, 12-30](#)

- authorization [12-7, 12-33](#)

- login authentication [12-7, 12-31](#)

- default configuration [12-7](#)

- identifying the server [12-7, 12-30](#)

- in clusters [6-12](#)

- limiting the services to the user [12-7](#)

- operation of [12-6](#)

- overview [12-5](#)

- support for [1-9](#)

- tracking services accessed by user [12-8, 12-33](#)

- tar files

- creating [A-7](#)

- displaying the contents of [A-7](#)

- extracting [A-8](#)

- image file format [A-23](#)

- TDR [1-11](#)

- Telnet

- accessing management interfaces [2-10](#)

- number of connections [1-5](#)

- setting a password [12-28](#)

- temporary self-signed certificate [12-23](#)

- Terminal Access Controller Access Control System Plus

- See TACACS+

- terminal lines, setting a password [12-28](#)

TFTP

configuration files

- downloading [A-11](#)

- preparing the server [A-11](#)

- uploading [A-12](#)

- configuration files in base directory [4-8](#)

- configuring for autoconfiguration [4-7](#)

image files

- deleting [A-26](#)

- downloading [A-25](#)

- preparing the server [A-25](#)

- uploading [A-27](#)

- limiting access by servers [36-15](#)

TFTP server [1-4](#)

threshold, traffic level [29-2](#)

threshold monitoring, IP SLAs [45-5](#)

time

- See NTP and system clock

Time Domain Reflector

- See TDR

time-range command [37-8](#)

time ranges in ACLs [37-8, 37-16](#)

time stamps in log messages [35-8](#)

time zones [7-9](#)

TLVs

- defined [31-2](#)

- LLDP [31-2](#)

- LLDP-MED [31-2](#)

Token Ring VLANs

- support for [17-5](#)

- VTP support [18-5](#)

ToS [1-10](#)

traceroute, Layer 2

- and ARP [46-3](#)

- and CDP [46-3](#)

- broadcast traffic [46-3](#)

- described [46-3](#)

- IP addresses and subnets [46-3](#)

- MAC addresses and VLANs [46-3](#)

- multicast traffic [46-3](#)

- multiple devices on a port [46-4](#)

- unicast traffic [46-3](#)

- usage guidelines [46-3](#)

traceroute command [46-10](#)

- See also IP traceroute

traffic

- blocking flooded [29-11](#)

- fragmented [37-3](#)

- unfragmented [37-3](#)

traffic policing [1-10](#)

traffic suppression [29-1](#)

transparent mode, VTP [18-3](#)

trap-door mechanism [4-2](#)

traps

- configuring MAC address notification [7-14, 7-15](#)

- configuring managers [36-6, 36-12](#)

- defined [36-4](#)

- enabling [7-14, 7-15, 36-6, 36-12](#)

- notification types [36-7](#)

- overview [36-2, 36-5](#)

triggering alarm options

- configurable relay [3-3](#)

- methods [3-3](#)

- SNMP traps [3-3](#)

- syslog messages [3-4](#)

troubleshooting

- CPU utilization [46-6](#)

- displaying crash information [46-5](#)

- setting packet forwarding [46-14](#)

- SFP security and identification [46-2](#)

- show forward command [46-14](#)

- with CiscoWorks [36-5](#)

- with ping [46-2](#)

- with system message logging [35-1](#)

- with traceroute [46-4](#)

trunk failover

- See link-state tracking

trunking encapsulation [1-6](#)

- trunk ports
 - defined [15-4, 17-3](#)
 - trunks
 - allowed-VLAN list [17-12, 17-19](#)
 - load sharing
 - setting STP path costs [17-13](#)
 - using STP port priorities [17-13](#)
 - native VLAN for untagged traffic [17-12, 17-20](#)
 - parallel [17-13](#)
 - pruning-eligible list [17-19](#)
 - to non-DTP device [17-9](#)
 - trusted boundary for QoS [38-26, 38-34](#)
 - trusted port states
 - between QoS domains [38-27, 38-35](#)
 - classification options [38-10](#)
 - ensuring port security for IP phones [38-26, 38-34](#)
 - support for [1-10](#)
 - within a QoS domain [38-26, 38-33](#)
 - trustpoints, CA [12-23](#)
 - twisted-pair Ethernet, detecting unidirectional links [33-1](#)
 - type of service
 - See ToS
-
- ## U
- UDLD
 - default configuration [33-4](#)
 - echoing detection mechanism [33-3](#)
 - enabling
 - globally [33-4](#)
 - per interface [33-5](#)
 - link-detection mechanism [33-1](#)
 - neighbor database [33-2](#)
 - overview [33-1](#)
 - resetting an interface [33-5](#)
 - support for [1-5](#)
 - UDP jitter operation, IP SLAs [45-5](#)
 - unauthorized ports with IEEE 802.1x [13-9](#)
 - unicast MAC address filtering [1-4](#)
 - and adding static addresses [7-7](#)
 - and broadcast MAC addresses [7-7](#)
 - and CPU packets [7-7](#)
 - and multicast addresses [7-7](#)
 - and router MAC addresses [7-7](#)
 - configuration guidelines [7-7](#)
 - described [7-7](#)
 - unicast storm [29-1](#)
 - unicast storm control command [29-9](#)
 - UNIX syslog servers
 - daemon configuration [35-4](#)
 - facilities supported [35-4](#)
 - message logging configuration [35-10](#)
 - unrecognized Type-Length-Value (TLV) support [18-5](#)
 - upgrading software images
 - See downloading
 - UplinkFast
 - described [22-3](#)
 - uploading
 - configuration files
 - preparing [A-11, A-13, A-16](#)
 - reasons for [A-9](#)
 - using FTP [A-15](#)
 - using RCP [A-18](#)
 - using TFTP [A-12](#)
 - image files
 - preparing [A-25, A-28, A-32](#)
 - reasons for [A-23](#)
 - using FTP [A-30](#)
 - using RCP [A-34](#)
 - using TFTP [A-27](#)
 - user EXEC mode [2-2](#)
 - username-based authentication [12-4](#)
-
- ## V
- version-dependent transparent mode [18-5](#)
 - virtual switches and PAgP [40-5](#)
 - vlan.dat file [17-4](#)

- VLAN 1, disabling on a trunk port [17-12](#)
- VLAN 1 minimization [17-12](#)
- vlan-assignment response, VMPS [17-14](#)
- VLAN blocking, REP [23-14](#)
- VLAN configuration
 - at bootup [17-5](#)
 - saving [17-5](#)
- VLAN configuration mode [2-2](#)
- VLAN database
 - and startup configuration file [17-5](#)
 - VLAN configuration saved in [17-5](#)
 - VLANs saved in [17-4](#)
- VLAN filtering and SPAN [30-6](#)
- vlan global configuration command [17-5](#)
- VLAN ID, discovering [7-8](#)
- VLAN load balancing
 - REP [23-4](#)
- VLAN load balancing, triggering [23-6](#)
- VLAN load balancing on flex links [24-2](#)
 - configuration guidelines [24-6](#)
- VLAN management domain [18-2](#)
- VLAN membership
 - modes [17-3](#)
- VLAN Query Protocol
 - See VQP
- VLANs
 - adding [17-17](#)
 - adding to VLAN database [17-7](#)
 - aging dynamic addresses [20-8](#)
 - allowed on trunk [17-12, 17-19](#)
 - and spanning-tree instances [17-3, 17-6, 17-8](#)
 - configuration guidelines, extended-range VLANs [17-8](#)
 - configuration guidelines, normal-range VLANs [17-6](#)
 - configuring [17-1](#)
 - configuring IDs [17-8](#)
 - connecting through SVIs [15-5](#)
 - default configuration [17-6](#)
 - deleting [17-7, 17-17](#)
 - described [15-2, 17-1](#)
 - extended-range [17-8](#)
 - features [1-6](#)
 - illustrated [17-2](#)
 - internal [17-9](#)
 - modifying [17-17](#)
 - multicast [28-8](#)
 - native, configuring [17-12, 17-20](#)
 - normal-range [17-4](#)
 - number supported [1-6](#)
 - parameters [17-5](#)
 - port membership modes [17-3](#)
 - static-access ports [17-7, 17-17](#)
 - STP and IEEE 802.1Q trunks [20-10](#)
 - supported [17-2](#)
 - Token Ring [17-5](#)
 - traffic between [17-2](#)
 - VLAN-bridge STP [20-10](#)
- VLAN Trunking Protocol
 - See VTP
- VLAN trunks [17-9](#)
- VMPS
 - configuration example [17-24](#)
 - configuration guidelines [17-15](#)
 - default configuration [17-15](#)
 - description [17-14](#)
 - dynamic port membership
 - described [17-15](#)
 - reconfirming [17-16](#)
 - troubleshooting [17-16](#)
 - entering server address [17-22](#)
 - mapping MAC addresses to VLANs [17-14](#)
 - reconfirmation interval, changing [17-16](#)
- voice aware 802.1x security
 - port-based authentication
 - configuring [13-16](#)
 - described [13-16](#)
- voice-over-IP [19-1](#)
- voice VLAN

- Cisco 7960 phone, port connections [19-1](#)
 - configuration guidelines [19-3](#)
 - configuring IP phones for data traffic
 - override CoS of incoming frame [19-4](#)
 - trust CoS priority of incoming frame [19-4](#)
 - configuring ports for voice traffic in
 - 802.1p priority tagged frames [19-5](#)
 - 802.1Q frames [19-5](#)
 - connecting to an IP phone [19-4](#)
 - default configuration [19-3](#)
 - described [19-1](#)
 - displaying [19-6](#)
 - IP phone data traffic, described [19-3](#)
 - IP phone voice traffic, described [19-2](#)
 - VQP [1-6, 17-14](#)
 - VTP
 - adding a client to a domain [18-10, 18-13](#)
 - advertisements [17-11, 18-4](#)
 - and extended-range VLANs [17-2, 18-2](#)
 - and normal-range VLANs [17-2, 18-2](#)
 - configuration
 - guidelines [18-9](#)
 - saving [18-9](#)
 - configuration requirements [18-1, 20-1](#)
 - configuration revision number
 - guideline [18-10, 18-13](#)
 - resetting [18-14](#)
 - consistency checks [18-5](#)
 - default configuration [18-9](#)
 - described [18-2](#)
 - domain names [18-10](#)
 - domains [18-2](#)
 - modes
 - client [18-3](#)
 - off [18-3](#)
 - server [18-3](#)
 - transparent [18-3](#)
 - monitoring [18-14](#)
 - passwords [18-10](#)
 - pruning
 - enabling [18-13](#)
 - examples [18-8](#)
 - overview [18-7](#)
 - support for [1-6](#)
 - pruning-eligible list, changing [17-19](#)
 - statistics [18-14](#)
 - support for [1-6](#)
 - Token Ring support [18-5](#)
 - transparent mode, configuring [18-4](#)
 - using [18-2](#)
 - Version
 - enabling [18-12](#)
 - version, guidelines [18-6](#)
 - Version 1 [18-5](#)
 - Version 2
 - configuration guidelines [18-6](#)
 - overview [18-5](#)
 - Version 3
 - overview [18-5](#)
-
- ## W
- web authentication [13-14](#)
 - described [1-7](#)
 - web-based authentication
 - customizeable web pages [14-6](#)
 - description [14-2](#)
 - web-based authentication, interactions with other features [14-8](#)
 - weighted tail drop
 - See WTD
 - wired location service
 - configuring [31-7](#)
 - displaying [31-8, 31-9](#)
 - location TLV [31-3](#)
 - understanding [31-3](#)
 - WTD
 - described [38-19](#)

setting thresholds

 egress queue-sets [38-31](#), [38-52](#)

 ingress queues [38-49](#)

support for [1-10](#), [1-11](#)

X

Xmodem protocol [46-7](#)