



INDEX

A

- AAA down policy, NAC Layer 2 IP validation [1-9](#)
- abbreviating commands [2-4](#)
- ABRs [35-24](#)
- AC (command switch) [5-10](#)
- access-class command [32-19](#)
- access control entries
 - See ACEs
- access control entry (ACE) [38-3](#)
- access-denied response, VMPS [12-28](#)
- access groups
 - applying IPv4 ACLs to interfaces [32-20](#)
 - Layer 2 [32-20](#)
 - Layer 3 [32-20](#)
- accessing
 - clusters, switch [5-13](#)
 - command switches [5-11](#)
 - member switches [5-13](#)
 - switch clusters [5-13](#)
- access lists
 - See ACLs
- access ports
 - and Layer 2 protocol tunneling [16-11](#)
 - defined [10-3](#)
 - in switch clusters [5-9](#)
- access template [7-1](#)
- accounting
 - with 802.1x [9-32](#)
 - with IEEE 802.1x [9-8](#)
 - with RADIUS [8-28](#)
 - with TACACS+ [8-11, 8-17](#)
- ACEs
 - and QoS [33-7](#)
 - defined [32-2](#)
 - Ethernet [32-2](#)
 - IP [32-2](#)
- ACLs
 - ACEs [32-2](#)
 - any keyword [32-12](#)
 - applying
 - on bridged packets [32-37](#)
 - on multicast packets [32-39](#)
 - on routed packets [32-38](#)
 - on switched packets [32-37](#)
 - time ranges to [32-16](#)
 - to an interface [32-19, 38-7](#)
 - to IPv6 interfaces [38-7](#)
 - to QoS [33-7](#)
 - classifying traffic for QoS [33-43](#)
 - comments in [32-18](#)
 - compiling [32-21](#)
 - defined [32-1, 32-7](#)
 - examples of [32-21, 33-43](#)
 - extended IP, configuring for QoS classification [33-44](#)
 - extended IPv4
 - creating [32-10](#)
 - matching criteria [32-7](#)
 - hardware and software handling [32-21](#)
 - host keyword [32-12](#)
- IP
 - creating [32-7](#)
 - fragments and QoS guidelines [33-33](#)
 - implicit deny [32-9, 32-13, 32-15](#)
 - implicit masks [32-9](#)

ACLs (continued)

IP (continued)

- matching criteria [32-7](#)
- undefined [32-20](#)

IPv4

- applying to interfaces [32-19](#)
- creating [32-7](#)
- matching criteria [32-7](#)
- named [32-14](#)
- numbers [32-8](#)
- terminal lines, setting on [32-18](#)
- unsupported features [32-7](#)

IPv6

- applying to interfaces [38-7](#)
- configuring [38-4](#), [38-5](#)
- displaying [38-8](#)
- interactions with other features [38-4](#)
- limitations [38-3](#)
- matching criteria [38-3](#)
- named [38-3](#)
- precedence of [38-2](#)
- supported [38-3](#)
- unsupported features [38-3](#)

Layer 4 information in [32-36](#)logging messages [32-8](#)MAC extended [32-26](#), [33-45](#)matching [32-7](#), [32-20](#), [38-3](#)monitoring [32-39](#), [38-8](#)named, IPv4 [32-14](#)named, IPv6 [38-3](#)names [38-4](#)number per QoS class map [33-33](#)port [32-2](#), [38-2](#)precedence of [32-2](#)QoS [33-7](#), [33-43](#)resequencing entries [32-14](#)router [32-2](#), [38-2](#)router ACLs and VLAN map configuration guidelines [32-36](#)**ACLs (continued)**standard IP, configuring for QoS classification [33-43](#)

standard IPv4

- creating [32-9](#)
- matching criteria [32-7](#)

support for [1-8](#)support in hardware [32-21](#)time ranges [32-16](#)types supported [32-2](#)unsupported features, IPv4 [32-7](#)unsupported features, IPv6 [38-3](#)using router ACLs with VLAN maps [32-35](#)

VLAN maps

- configuration guidelines [32-29](#)
- configuring [32-28](#)

active links [20-2](#)active router [39-1](#)active traffic monitoring, IP SLAs [40-1](#)address aliasing [23-2](#)

addresses

displaying the MAC address table [6-26](#)

dynamic

- accelerated aging [17-8](#)
- changing the aging time [6-21](#)
- default aging [17-8](#)
- defined [6-19](#)
- learning [6-20](#)
- removing [6-22](#)

MAC, discovering [6-26](#)

multicast

- group address range [43-3](#)
- STP address management [17-8](#)

static

- adding and removing [6-24](#)
- defined [6-19](#)

address resolution [6-26](#), [35-8](#)

Address Resolution Protocol

See ARP

adjacency tables, with CEF [35-77](#)

- administrative distances
 - defined [35-89](#)
 - OSPF [35-30](#)
 - routing protocol defaults [35-79](#)
- advanced IP services image [36-1](#)
- advertisements
 - CDP [25-1](#)
 - LLDP [26-2](#)
 - RIP [35-19](#)
 - VTP [12-19, 13-3](#)
- aggregatable global unicast addresses [36-3](#)
- aggregate addresses, BGP [35-57](#)
- aggregated ports
 - See EtherChannel
- aggregate policers [33-58](#)
- aggregate policing [1-10](#)
- aging, accelerating [17-8](#)
- aging time
 - accelerated
 - for MSTP [18-23](#)
 - for STP [17-8, 17-21](#)
 - MAC address table [6-21](#)
 - maximum
 - for MSTP [18-23, 18-24](#)
 - for STP [17-21, 17-22](#)
- alarms, RMON [29-3](#)
- allowed-VLAN list [12-21](#)
- application engines, redirecting traffic to [42-1](#)
- area border routers
 - See ABRs
- ARP
 - configuring [35-9](#)
 - defined [1-5, 6-26, 35-8](#)
 - encapsulation [35-9](#)
 - static cache configuration [35-9](#)
 - table
 - address resolution [6-26](#)
 - managing [6-26](#)
- ASBRs [35-24](#)
- AS-path filters, BGP [35-51](#)
- asymmetrical links, and IEEE 802.1Q tunneling [16-4](#)
- attributes, RADIUS
 - vendor-proprietary [8-31](#)
 - vendor-specific [8-29](#)
- audience [xliv](#)
- authentication
 - EIGRP [35-38](#)
 - HSRP [39-9](#)
 - local mode with AAA [8-36](#)
 - NTP associations [6-4](#)
 - RADIUS
 - key [8-21](#)
 - login [8-23](#)
 - TACACS+
 - defined [8-11](#)
 - key [8-13](#)
 - login [8-14](#)

See also port-based authentication
- authentication failed VLAN
 - See restricted VLAN
- authentication keys, and routing protocols [35-89](#)
- authoritative time source, described [6-2](#)
- authorization
 - with RADIUS [8-27](#)
 - with TACACS+ [8-11, 8-16](#)
- authorized ports with IEEE 802.1x [9-7](#)
- autoconfiguration [3-3](#)
- automatic discovery
 - considerations
 - beyond a noncandidate device [5-7](#)
 - brand new switches [5-9](#)
 - connectivity [5-4](#)
 - different VLANs [5-6](#)
 - management VLANs [5-7](#)
 - non-CDP-capable devices [5-6](#)
 - noncluster-capable devices [5-6](#)
 - routed ports [5-8](#)

automatic discovery (continued)

- in switch clusters [5-4](#)

- See also CDP

automatic QoS

- See QoS

automatic recovery, clusters [5-10](#)

- See also HSRP

auto-MDIX

- configuring [10-20](#)

- described [10-20](#)

autonegotiation

- duplex mode [1-3](#)

- interface configuration guidelines [10-17](#)

- mismatches [46-11](#)

autonomous system boundary routers

- See ASBRs

autonomous systems, in BGP [35-45](#)Auto-RP, described [43-6](#)autosensing, port speed [1-3](#)

auxiliary VLAN

- See voice VLAN

availability, features [1-6](#)**B**

BackboneFast

- described [19-5](#)

- disabling [19-14](#)

- enabling [19-13](#)

- support for [1-6](#)

backup interfaces

- See Flex Links

backup links [20-2](#)

banners

- configuring

- login [6-19](#)

- message-of-the-day login [6-18](#)

- default configuration [6-17](#)

- when displayed [6-17](#)

BGP

- aggregate addresses [35-57](#)

- aggregate routes, configuring [35-57](#)

- CIDR [35-57](#)

- clear commands [35-60](#)

- community filtering [35-54](#)

- configuring neighbors [35-55](#)

- default configuration [35-42](#)

- described [35-42](#)

- enabling [35-45](#)

- monitoring [35-60](#)

- multipath support [35-49](#)

- neighbors, types of [35-45](#)

- path selection [35-49](#)

- peers, configuring [35-55](#)

- prefix filtering [35-53](#)

- resetting sessions [35-48](#)

- route dampening [35-59](#)

- route maps [35-51](#)

- route reflectors [35-58](#)

- routing domain confederation [35-58](#)

- routing session with multi-VRF CE [35-71](#)

- show commands [35-60](#)

- supernets [35-57](#)

- support for [1-11](#)

- Version 4 [35-42](#)

- binding cluster group and HSRP group [39-11](#)

binding database

- address, DHCP server

- See DHCP, Cisco IOS server database

- DHCP snooping

- See DHCP snooping binding database

bindings

- address, Cisco IOS DHCP server [21-6](#)

- DHCP snooping database [21-7](#)

- IP source guard [21-16](#)

- binding table, DHCP snooping

- See DHCP snooping binding database

- blocking packets [24-7](#)

Boolean expressions in tracked lists [41-4](#)

booting

boot loader, function of [3-2](#)

boot process [3-2](#)

manually [3-13](#)

specific image [3-14](#)

boot loader

accessing [3-14](#)

described [3-2](#)

environment variables [3-14](#)

prompt [3-14](#)

trap-door mechanism [3-2](#)

bootstrap router (BSR), described [43-7](#)

Border Gateway Protocol

See BGP

BPDU

error-disabled state [19-2](#)

filtering [19-3](#)

RSTP format [18-12](#)

BPDU filtering

described [19-3](#)

disabling [19-12](#)

enabling [19-12](#)

support for [1-7](#)

BPDU guard

described [19-2](#)

disabling [19-12](#)

enabling [19-11](#)

support for [1-7](#)

bridged packets, ACLs on [32-37](#)

bridge groups

See fallback bridging

bridge protocol data unit

See BPDU

broadcast flooding [35-16](#)

broadcast packets

directed [35-13](#)

flooded [35-13](#)

broadcast storm-control command [24-4](#)

broadcast storms [24-1, 35-13](#)

C

cables, monitoring for unidirectional links [27-1](#)

candidate switch

automatic discovery [5-4](#)

defined [5-3](#)

requirements [5-3](#)

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

CA trustpoint

configuring [8-45](#)

defined [8-43](#)

caution, described [xliv](#)

CDP

and trusted boundary [33-39](#)

automatic discovery in switch clusters [5-4](#)

configuring [25-2](#)

default configuration [25-2](#)

defined with LLDP [26-1](#)

described [25-1](#)

disabling for routing device [25-3 to 25-4](#)

enabling and disabling

on an interface [25-4](#)

on a switch [25-3](#)

Layer 2 protocol tunneling [16-8](#)

monitoring [25-4](#)

overview [25-1](#)

power negotiation extensions [10-6](#)

support for [1-5](#)

transmission timer and holdtime, setting [25-2](#)

updates [25-2](#)

CEF

defined [35-76](#)

enabling [35-77](#)

IPv6 [36-17](#)

CGMP

- as IGMP snooping learning method [23-9](#)
- clearing cached group entries [43-51](#)
- enabling server support [43-34](#)
- joining multicast group [23-3](#)
- overview [43-9](#)
- server support only [43-9](#)
- switch support of [1-4](#)

CIDR [35-57](#)CipherSuites [8-44](#)Cisco 7960 IP Phone [15-1](#)

Cisco Discovery Protocol

See CDP

Cisco Express Forwarding

See CEF

Cisco Group Management Protocol

See CGMP

Cisco intelligent power management [10-6](#)

Cisco IOS DHCP server

See DHCP, Cisco IOS DHCP server

Cisco IOS File System

See IFS

Cisco IOS IP Service Level Agreements (SLAs) responder [1-4](#)Cisco IOS IP SLAs [40-1](#)

Cisco Network Assistant

See Network Assistant

CiscoWorks 2000 [1-5, 31-4](#)

CIST regional root

See MSTP

CIST root

See MSTP

civic location [26-3](#)

classless interdomain routing

See CIDR

classless routing [35-6](#)

class maps for QoS

- configuring [33-46](#)
- described [33-7](#)
- displaying [33-78](#)

class of service

See CoS

clearing interfaces [10-29](#)

CLI

- abbreviating commands [2-4](#)
- command modes [2-1](#)
- configuration logging [2-5](#)
- described [1-5](#)
- 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 [5-15](#)
- no and default forms of commands [2-4](#)

client mode, VTP [13-3](#)client processes, tracking [41-1](#)

clock

See system clock

cluster requirements [xlv](#)

clusters, switch

- accessing [5-13](#)
- automatic discovery [5-4](#)
- automatic recovery [5-10](#)
- benefits [1-2](#)
- compatibility [5-4](#)
- described [5-1](#)
- LRE profile considerations [5-14](#)

clusters, switch (continued)

managing

through CLI [5-15](#)through SNMP [5-15](#)planning [5-4](#)

planning considerations

automatic discovery [5-4](#)automatic recovery [5-10](#)CLI [5-15](#)host names [5-13](#)IP addresses [5-13](#)LRE profiles [5-14](#)passwords [5-13](#)RADIUS [5-14](#)SNMP [5-14, 5-15](#)TACACS+ [5-14](#)

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

cluster standby group

and HSRP group [39-11](#)automatic recovery [5-12](#)considerations [5-11](#)defined [5-2](#)requirements [5-3](#)virtual IP address [5-11](#)

See also HSRP

CNS [1-5](#)

Configuration Engine

configID, deviceID, hostname [4-3](#)configuration service [4-2](#)described [4-1](#)event service [4-3](#)

embedded agents

described [4-5](#)enabling automated configuration [4-6](#)enabling configuration agent [4-9](#)enabling event agent [4-8](#)management functions [1-5](#)

Coarse Wave Division Multiplexer

See CWDM SFPs

command-line interface

See CLI

command modes [2-1](#)

commands

abbreviating [2-4](#)no and default [2-4](#)commands, setting privilege levels [8-8](#)

command switch

accessing [5-11](#)active (AC) [5-10](#)configuration conflicts [46-11](#)defined [5-2](#)passive (PC) [5-10](#)password privilege levels [5-15](#)priority [5-10](#)

recovery

from command-switch failure [5-10, 46-7](#)from lost member connectivity [46-11](#)redundant [5-10](#)

replacing

with another switch [46-9](#)with cluster member [46-8](#)requirements [5-3](#)standby (SC) [5-10](#)

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

community list, BGP [35-54](#)community ports [14-2](#)

community strings

configuring [5-14, 31-8](#)for cluster switches [31-4](#)in clusters [5-14](#)overview [31-4](#)SNMP [5-14](#)community VLANs [14-2, 14-3](#)compatibility, feature [24-11](#)config.text [3-12](#)

- configurable leave timer, IGMP [23-6](#)
- configuration, initial
 - defaults [1-13](#)
 - Express Setup [1-2](#)
 - See also getting started guide and hardware installation guide
- configuration changes, logging [30-10](#)
- configuration conflicts, recovering from lost member connectivity [46-11](#)
- configuration examples, network [1-16](#)
- configuration files
 - archiving [B-21](#)
 - clearing the startup configuration [B-19](#)
 - creating using a text editor [B-10](#)
 - default name [3-12](#)
 - deleting a stored configuration [B-19](#)
 - described [B-8](#)
 - downloading
 - automatically [3-12](#)
 - preparing [B-11, B-13, B-16](#)
 - reasons for [B-8](#)
 - using FTP [B-14](#)
 - using RCP [B-17](#)
 - using TFTP [B-11](#)
 - guidelines for creating and using [B-9](#)
 - guidelines for replacing and rolling back [B-22](#)
 - invalid combinations when copying [B-5](#)
 - limiting TFTP server access [31-16](#)
 - obtaining with DHCP [3-7](#)
 - password recovery disable considerations [8-5](#)
 - replacing a running configuration [B-19, B-21](#)
 - rolling back a running configuration [B-19, B-22](#)
 - specifying the filename [3-12](#)
 - system contact and location information [31-15](#)
 - types and location [B-10](#)
- configuration files (continued)**
 - uploading
 - preparing [B-11, B-13, B-16](#)
 - reasons for [B-9](#)
 - using FTP [B-15](#)
 - using RCP [B-18](#)
 - using TFTP [B-12](#)
- configuration guidelines, multi-VRF CE [35-64](#)
- configuration logger [30-10](#)
- configuration logging [2-5](#)
- configuration replacement [B-19](#)
- configuration rollback [B-19, B-21](#)
- configuration settings, saving [3-10](#)
- configure terminal command [10-10](#)
- config-vlan mode [2-2, 12-7](#)
- conflicts, configuration [46-11](#)
- connections, secure remote [8-38](#)
- connectivity problems [46-13, 46-14, 46-16](#)
- consistency checks in VTP Version 2 [13-4](#)
- console port, connecting to [2-10](#)
- content-routing technology
 - See WCCP
- control protocol, IP SLAs [40-3](#)
- conventions
 - command [xliv](#)
 - for examples [xliv](#)
 - publication [xliv](#)
 - text [xliv](#)
- corrupted software, recovery steps with Xmodem [46-2](#)
- CoS
 - in Layer 2 frames [33-2](#)
 - override priority [15-6](#)
 - trust priority [15-6](#)
- CoS input queue threshold map for QoS [33-16](#)
- CoS output queue threshold map for QoS [33-19](#)

CoS-to-DSCP map for QoS [33-60](#)
 counters, clearing interface [10-29](#)
 crashinfo file [46-23](#)
 critical authentication, IEEE 802.1x [9-36](#)
 cryptographic software image
 Kerberos [8-32](#)
 SSH [8-37](#)
 SSL [8-42](#)
 customer edge devices [35-62](#)
 CWDM SFPs [1-22](#)

D

daylight saving time [6-13](#)
 debugging
 enabling all system diagnostics [46-20](#)
 enabling for a specific feature [46-19](#)
 redirecting error message output [46-20](#)
 using commands [46-19](#)
 default commands [2-4](#)
 default configuration
 802.1x [9-21](#)
 auto-QoS [33-21](#)
 banners [6-17](#)
 BGP [35-42](#)
 booting [3-12](#)
 CDP [25-2](#)
 DHCP [21-8](#)
 DHCP option 82 [21-8](#)
 DHCP snooping [21-8](#)
 DHCP snooping binding database [21-9](#)
 DNS [6-16](#)
 dynamic ARP inspection [22-5](#)
 EIGRP [35-35](#)
 EtherChannel [34-9](#)
 Ethernet interfaces [10-14](#)
 fallback bridging [45-4](#)
 Flex Links [20-4, 20-5](#)
 HSRP [39-5](#)
 default configuration (continued)
 IEEE 802.1Q tunneling [16-4](#)
 IGMP [43-28](#)
 IGMP filtering [23-25](#)
 IGMP snooping [23-7, 37-5, 37-6](#)
 IGMP throttling [23-25](#)
 initial switch information [3-3](#)
 IP addressing, IP routing [35-4](#)
 IP multicast routing [43-10](#)
 IP SLAs [40-6](#)
 IP source guard [21-17](#)
 IPv6 [36-13](#)
 Layer 2 interfaces [10-14](#)
 Layer 2 protocol tunneling [16-11](#)
 LLDP [26-3](#)
 MAC address table [6-21](#)
 MAC address-table move update [20-5](#)
 MSDP [44-4](#)
 MSTP [18-14](#)
 multi-VRF CE [35-64](#)
 MVR [23-20](#)
 NTP [6-4](#)
 optional spanning-tree configuration [19-9](#)
 OSPF [35-25](#)
 password and privilege level [8-2](#)
 PIM [43-10](#)
 private VLANs [14-6](#)
 RADIUS [8-20](#)
 RIP [35-19](#)
 RMON [29-3](#)
 RSPAN [28-9](#)
 SDM template [7-3](#)
 SNMP [31-7](#)
 SPAN [28-9](#)
 SSL [8-45](#)
 standard QoS [33-31](#)
 STP [17-11](#)
 system message logging [30-3](#)
 system name and prompt [6-15](#)

default configuration (continued)TACACS+ [8-13](#)UDLD [27-4](#)VLAN, Layer 2 Ethernet interfaces [12-19](#)VLANs [12-8](#)VMPS [12-29](#)voice VLAN [15-3](#)VTP [13-6](#)WCCP [42-5](#)default gateway [3-10, 35-11](#)default networks [35-79](#)default routes [35-79](#)default routing [35-2](#)deleting VLANs [12-10](#)denial-of-service attack [24-1](#)description command [10-24](#)designing your network, examples [1-16](#)

destination addresses

in IPv4 ACLs [32-11](#)in IPv6 ACLs [38-5](#)destination-IP address-based forwarding,
EtherChannel [34-7](#)destination-MAC address forwarding, EtherChannel [34-7](#)detecting indirect link failures, STP [19-5](#)device [B-25](#)device discovery protocol [25-1, 26-1](#)

device manager

benefits [1-2](#)described [1-2, 1-4](#)in-band management [1-6](#)requirements [xliv](#)upgrading a switch [B-25](#)**DHCP**

Cisco IOS server database

configuring [21-14](#)default configuration [21-9](#)described [21-6](#)**DHCP (continued)**

enabling

relay agent [21-10](#)server [21-10](#)

DHCP-based autoconfiguration

client request message exchange [3-4](#)

configuring

client side [3-3](#)DNS [3-6](#)relay device [3-6](#)server side [3-5](#)server-side [21-10](#)TFTP server [3-6](#)example [3-8](#)

lease options

for IP address information [3-5](#)for receiving the configuration file [3-5](#)overview [3-3](#)relationship to BOOTP [3-4](#)relay support [1-5, 1-12](#)support for [1-5](#)

DHCP binding database

See DHCP snooping binding database

DHCP binding table

See DHCP snooping binding database

DHCP option 82

circuit ID suboption [21-5](#)configuration guidelines [21-9](#)default configuration [21-8](#)displaying [21-15](#)forwarding address, specifying [21-11](#)helper address [21-11](#)overview [21-3](#)

packet format, suboption

circuit ID [21-5](#)remote ID [21-5](#)remote ID suboption [21-5](#)

- DHCP snooping
 - accepting untrusted packets form edge switch [21-3](#), [21-12](#)
 - and private VLANs [21-13](#)
 - binding database
 - See DHCP snooping binding database
 - configuration guidelines [21-9](#)
 - default configuration [21-8](#)
 - displaying binding tables [21-15](#)
 - message exchange process [21-4](#)
 - option 82 data insertion [21-3](#)
 - trusted interface [21-2](#)
 - untrusted interface [21-2](#)
 - untrusted messages [21-2](#)
- DHCP snooping binding database
 - adding bindings [21-14](#)
 - binding file
 - format [21-7](#)
 - location [21-7](#)
 - bindings [21-7](#)
 - clearing agent statistics [21-15](#)
 - configuration guidelines [21-10](#)
 - configuring [21-14](#)
 - default configuration [21-8](#), [21-9](#)
 - deleting
 - binding file [21-15](#)
 - bindings [21-15](#)
 - database agent [21-15](#)
 - described [21-7](#)
 - displaying [21-15](#)
 - binding entries [21-15](#)
 - status and statistics [21-15](#)
 - enabling [21-14](#)
 - entry [21-7](#)
 - renewing database [21-15](#)
 - resetting
 - delay value [21-15](#)
 - timeout value [21-15](#)
- DHCP snooping binding table
 - See DHCP snooping binding database
- Differentiated Services architecture, QoS [33-2](#)
- Differentiated Services Code Point [33-2](#)
- Diffusing Update Algorithm (DUAL) [35-33](#)
- directed unicast requests [1-5](#)
- directories
 - changing [B-4](#)
 - creating and removing [B-4](#)
 - displaying the working [B-4](#)
- discovery, clusters
 - See automatic discovery
- Distance Vector Multicast Routing Protocol
 - See DVMRP
- distance-vector protocols [35-3](#)
- distribute-list command [35-88](#)
- DNS
 - and DHCP-based autoconfiguration [3-6](#)
 - default configuration [6-16](#)
 - displaying the configuration [6-17](#)
 - in IPv6 [36-4](#)
 - overview [6-15](#)
 - setting up [6-16](#)
 - support for [1-5](#)
- documentation, related [xliv](#)
- document conventions [xliv](#)
- domain names
 - DNS [6-15](#)
 - VTP [13-8](#)
- Domain Name System
 - See DNS
- dot1q-tunnel switchport mode [12-18](#)
- double-tagged packets
 - IEEE 802.1Q tunneling [16-2](#)
 - Layer 2 protocol tunneling [16-10](#)

downloading

configuration files

- preparing [B-11, B-13, B-16](#)
- reasons for [B-8](#)
- using FTP [B-14](#)
- using RCP [B-17](#)
- using TFTP [B-11](#)

image files

- deleting old image [B-29](#)
- preparing [B-27, B-31, B-36](#)
- reasons for [B-25](#)
- using CMS [1-3](#)
- using FTP [B-32](#)
- using HTTP [1-3, B-25](#)
- using RCP [B-37](#)
- using TFTP [B-28](#)
- using the device manager or Network Assistant [B-25](#)

drop threshold for Layer 2 protocol packets [16-11](#)

DSCP [1-10, 33-2](#)

DSCP input queue threshold map for QoS [33-16](#)

DSCP output queue threshold map for QoS [33-19](#)

DSCP-to-CoS map for QoS [33-63](#)

DSCP-to-DSCP-mutation map for QoS [33-64](#)

DSCP transparency [33-40](#)

DTP [1-7, 12-17](#)

DUAL finite state machine, EIGRP [35-34](#)

Dual IPv4-and-IPv6 SDM Templates [36-11](#)

dual IPv4 and IPv6 templates [7-2, 36-1, 36-11](#)

dual protocol stacks

- configuring [36-15](#)
- IPv4 and IPv6 [36-11](#)
- SDM templates supporting [36-11](#)

dual-purpose uplinks

- defined [10-6](#)
- LEDs [10-6](#)
- link selection [10-6](#)
- setting the type [10-16](#)

DVMRP

autosummarization

- configuring a summary address [43-48](#)
- disabling [43-50](#)

connecting PIM domain to DVMRP router [43-40](#)

enabling unicast routing [43-43](#)

interoperability

- with Cisco devices [43-38](#)
- with Cisco IOS software [43-9](#)

mrinfo requests, responding to [43-43](#)

neighbors

- advertising the default route to [43-42](#)
- discovery with Probe messages [43-38](#)
- displaying information [43-43](#)
- prevent peering with nonpruning [43-46](#)
- rejecting nonpruning [43-44](#)

overview [43-9](#)

routes

- adding a metric offset [43-50](#)
- advertising all [43-50](#)
- advertising the default route to neighbors [43-42](#)
- caching DVMRP routes learned in report messages [43-44](#)
- changing the threshold for syslog messages [43-47](#)
- deleting [43-51](#)
- displaying [43-52](#)
- favoring one over another [43-50](#)
- limiting the number injected into MBONE [43-47](#)
- limiting unicast route advertisements [43-38](#)

routing table [43-9](#)

source distribution tree, building [43-9](#)

support for [1-12](#)

tunnels

- configuring [43-40](#)
- displaying neighbor information [43-43](#)

dynamic access ports

- characteristics [12-3](#)
- configuring [12-30](#)
- defined [10-3](#)

- dynamic addresses
 - See addresses
- dynamic ARP inspection
 - ARP cache poisoning [22-1](#)
 - ARP requests, described [22-1](#)
 - ARP spoofing attack [22-1](#)
 - clearing
 - log buffer [22-15](#)
 - statistics [22-14](#)
 - configuration guidelines [22-6](#)
 - configuring
 - ACLs for non-DHCP environments [22-8](#)
 - in DHCP environments [22-7](#)
 - log buffer [22-12](#)
 - rate limit for incoming ARP packets [22-4, 22-10](#)
 - default configuration [22-5](#)
 - denial-of-service attacks, preventing [22-10](#)
 - described [22-1](#)
 - DHCP snooping binding database [22-2](#)
 - displaying
 - ARP ACLs [22-14](#)
 - configuration and operating state [22-14](#)
 - log buffer [22-15](#)
 - statistics [22-14](#)
 - trust state and rate limit [22-14](#)
 - error-disabled state for exceeding rate limit [22-4](#)
 - function of [22-2](#)
 - interface trust states [22-3](#)
 - log buffer
 - clearing [22-15](#)
 - configuring [22-12](#)
 - displaying [22-15](#)
 - logging of dropped packets, described [22-4](#)
 - man-in-the-middle attack, described [22-2](#)
 - network security issues and interface trust states [22-3](#)
 - priority of ARP ACLs and DHCP snooping entries [22-4](#)
 - dynamic ARP inspection (continued)**
 - rate limiting of ARP packets
 - configuring [22-10](#)
 - described [22-4](#)
 - error-disabled state [22-4](#)
 - statistics
 - clearing [22-14](#)
 - displaying [22-14](#)
 - validation checks, performing [22-11](#)
 - dynamic auto trunking mode [12-18](#)
 - dynamic desirable trunking mode [12-18](#)
 - Dynamic Host Configuration Protocol
 - See DHCP-based autoconfiguration
 - dynamic port VLAN membership
 - described [12-28](#)
 - reconfirming [12-31](#)
 - troubleshooting [12-33](#)
 - types of connections [12-30](#)
 - dynamic routing [35-3](#)
 - Dynamic Trunking Protocol
 - See DTP

 - E**
 - EBGP [35-41](#)
 - editing features
 - enabling and disabling [2-7](#)
 - keystrokes used [2-7](#)
 - wrapped lines [2-9](#)
 - EIGRP
 - authentication [35-38](#)
 - components [35-34](#)
 - configuring [35-36](#)
 - default configuration [35-35](#)
 - definition [35-33](#)
 - interface parameters, configuring [35-37](#)
 - monitoring [35-40](#)
 - stub routing [35-39](#)

- ELIN location [26-3](#)
- enable password [8-3](#)
- enable secret password [8-3](#)
- encryption, CipherSuite [8-44](#)
- encryption for passwords [8-3](#)
- Enhanced IGRP
 - See EIGRP
- enhanced object tracking
 - commands [41-1](#)
 - defined [41-1](#)
 - HSRP [41-7](#)
 - IP routing state [41-2](#)
 - IP SLAs [41-9](#)
 - line-protocol state [41-2](#)
 - tracked lists [41-3](#)
- environment variables, function of [3-15](#)
- equal-cost routing [1-11, 35-78](#)
- error-disabled state, BPDU [19-2](#)
- error messages during command entry [2-5](#)
- EtherChannel
 - automatic creation of [34-4, 34-5](#)
 - channel groups
 - binding physical and logical interfaces [34-3](#)
 - numbering of [34-3](#)
 - configuration guidelines [34-9](#)
 - configuring
 - Layer 2 interfaces [34-10](#)
 - Layer 3 physical interfaces [34-14](#)
 - Layer 3 port-channel logical interfaces [34-13](#)
 - default configuration [34-9](#)
 - described [34-2](#)
 - displaying status [34-20](#)
 - forwarding methods [34-6, 34-16](#)
 - IEEE 802.3ad, described [34-5](#)
 - interaction
 - with STP [34-9](#)
 - with VLANs [34-10](#)
- EtherChannel (continued)**
 - LACP
 - described [34-5](#)
 - displaying status [34-20](#)
 - hot-standby ports [34-18](#)
 - interaction with other features [34-6](#)
 - modes [34-5](#)
 - port priority [34-19](#)
 - system priority [34-19](#)
 - Layer 3 interface [35-3](#)
 - load balancing [34-6, 34-16](#)
 - logical interfaces, described [34-3](#)
 - PAgP
 - aggregate-port learners [34-17](#)
 - compatibility with Catalyst 1900 [34-17](#)
 - described [34-4](#)
 - displaying status [34-20](#)
 - interaction with other features [34-5](#)
 - learn method and priority configuration [34-17](#)
 - modes [34-4](#)
 - support for [1-3](#)
 - port-channel interfaces
 - described [34-3](#)
 - numbering of [34-3](#)
 - port groups [10-5](#)
 - support for [1-3](#)
- EtherChannel guard
 - described [19-7](#)
 - disabling [19-14](#)
 - enabling [19-14](#)
- Ethernet VLANs
 - adding [12-9](#)
 - defaults and ranges [12-8](#)
 - modifying [12-9](#)
- EUI [36-3](#)
- events, RMON [29-3](#)
- examples
 - conventions for [xliv](#)
 - network configuration [1-16](#)

expedite queue for QoS [33-77](#)

Express Setup [1-2](#)

- See also getting started guide

extended crashinfo file [46-23](#)

extended-range VLANs

- configuration guidelines [12-13](#)
- configuring [12-12](#)
- creating [12-13](#)
- creating with an internal VLAN ID [12-15](#)
- defined [12-1](#)

extended system ID

- MSTP [18-17](#)
- STP [17-4, 17-14](#)

extended universal identifier

- See EUI

Extensible Authentication Protocol over LAN [9-1](#)

external BGP

- See EBGp

external neighbors, BGP [35-45](#)

F

fa0 interface [1-6](#)

fallback bridging

- and protected ports [45-4](#)
- bridge groups
 - creating [45-4](#)
 - described [45-2](#)
 - displaying [45-11](#)
 - function of [45-2](#)
 - number supported [45-5](#)
 - removing [45-5](#)
- bridge table
 - clearing [45-11](#)
 - displaying [45-11](#)
- configuration guidelines [45-4](#)
- connecting interfaces with [10-9](#)
- default configuration [45-4](#)
- described [45-1](#)

fallback bridging (continued)

- frame forwarding
 - flooding packets [45-2](#)
 - forwarding packets [45-2](#)
- overview [45-1](#)
- protocol, unsupported [45-4](#)
- STP
 - disabling on an interface [45-10](#)
 - forward-delay interval [45-9](#)
 - hello BPDU interval [45-9](#)
 - interface priority [45-7](#)
 - keepalive messages [17-2](#)
 - maximum-idle interval [45-10](#)
 - path cost [45-8](#)
 - VLAN-bridge spanning-tree priority [45-6](#)
 - VLAN-bridge STP [45-2](#)
- support for [1-11](#)
- SVIs and routed ports [45-2](#)
- unsupported protocols [45-4](#)
- VLAN-bridge STP [17-10](#)

features, incompatible [24-11](#)

FIB [35-76](#)

fiber-optic, detecting unidirectional links [27-1](#)

files

- basic crashinfo
 - description [46-23](#)
 - location [46-23](#)
- copying [B-5](#)
- crashinfo, description [46-23](#)
- deleting [B-5](#)
- displaying the contents of [B-8](#)
- extended crashinfo
 - description [46-23](#)
 - location [46-23](#)
- tar
 - creating [B-6](#)
 - displaying the contents of [B-7](#)
 - extracting [B-7](#)
 - image file format [B-26](#)

file system

- displaying available file systems [B-2](#)
- displaying file information [B-3](#)
- local file system names [B-1](#)
- network file system names [B-5](#)
- setting the default [B-3](#)

filtering

- in a VLAN [32-28](#)
- IPv6 traffic [38-4, 38-7](#)
- non-IP traffic [32-26](#)
- show and more command output [2-10](#)

filtering show and more command output [2-10](#)

filters, IP

- See ACLs, IP

flash device, number of [B-1](#)

Flex Links

- configuration guidelines [20-5](#)
- configuring [20-5, 20-6](#)
- configuring preferred VLAN [20-8](#)
- configuring VLAN load balancing [20-7](#)
- default configuration [20-4](#)
- description [20-1](#)
- link load balancing [20-2](#)
- monitoring [20-11](#)
- VLANs [20-2](#)

flooded traffic, blocking [24-7](#)flow-based packet classification [1-10](#)

flowcharts

- QoS classification [33-6](#)
- QoS egress queueing and scheduling [33-17](#)
- QoS ingress queueing and scheduling [33-15](#)
- QoS policing and marking [33-10](#)

flowcontrol

- configuring [10-19](#)
- described [10-19](#)

forward-delay time

- MSTP [18-23](#)
- STP [17-21](#)

Forwarding Information Base

- See FIB

forwarding nonroutable protocols [45-1](#)

FTP

- accessing MIB files [A-3](#)
- configuration files
 - downloading [B-14](#)
 - overview [B-13](#)
 - preparing the server [B-13](#)
 - uploading [B-15](#)
- image files
 - deleting old image [B-34](#)
 - downloading [B-32](#)
 - preparing the server [B-31](#)
 - uploading [B-34](#)

G

- get-bulk-request operation [31-3](#)
- get-next-request operation [31-3, 31-5](#)
- get-request operation [31-3, 31-5](#)
- get-response operation [31-3](#)
- global configuration mode [2-2](#)
- global leave, IGMP [23-13](#)
- guest VLAN and 802.1x [9-12](#)

guide

- audience [xliv](#)
- purpose of [xliv](#)

guide mode [1-3](#)

GUIs

- See device manager and Network Assistant

Hhardware limitations and Layer 3 interfaces [10-25](#)

hello time

- MSTP [18-22](#)
- STP [17-20](#)

- help, for the command line [2-3](#)
 - hierarchical policy maps [33-8](#)
 - configuration guidelines [33-33](#)
 - configuring [33-52](#)
 - described [33-11](#)
 - 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 [30-10](#)
 - host names, in clusters [5-13](#)
 - host ports
 - configuring [14-11](#)
 - kinds of [14-2](#)
 - hosts, limit on dynamic ports [12-33](#)
 - Hot Standby Router Protocol
 - See HSRP
 - HP OpenView [1-5](#)
 - HSRP
 - authentication string [39-9](#)
 - automatic cluster recovery [5-12](#)
 - binding to cluster group [39-11](#)
 - cluster standby group considerations [5-11](#)
 - command-switch redundancy [1-1, 1-6](#)
 - configuring [39-4](#)
 - default configuration [39-5](#)
 - definition [39-1](#)
 - guidelines [39-5](#)
 - monitoring [39-11](#)
 - object tracking [41-7](#)
 - overview [39-1](#)
 - priority [39-7](#)
 - routing redundancy [1-11](#)
 - support for ICMP redirect messages [39-11](#)
 - timers [39-9](#)
 - tracking [39-7](#)
 - See also clusters, cluster standby group, and standby command switch
 - HTTP over SSL
 - see HTTPS
 - HTTPS [8-43](#)
 - configuring [8-46](#)
 - self-signed certificate [8-43](#)
 - HTTP secure server [8-43](#)
-
- IBPG [35-41](#)
 - ICMP
 - IPv6 [36-4](#)
 - redirect messages [35-11](#)
 - support for [1-11](#)
 - time-exceeded messages [46-16](#)
 - traceroute and [46-16](#)
 - unreachable messages [32-19](#)
 - unreachable messages and IPv6 [38-4](#)
 - unreachables and ACLs [32-21](#)
 - ICMP Echo operation
 - configuring [40-11](#)
 - IP SLAs [40-10](#)
 - ICMP ping
 - executing [46-13](#)
 - overview [46-13](#)
 - ICMP Router Discovery Protocol
 - See IRDP
 - ICMPv6 [36-4](#)
 - IDS appliances
 - and ingress RSPAN [28-21](#)
 - and ingress SPAN [28-14](#)
 - IEEE 802.1D
 - See STP
 - IEEE 802.1p [15-1](#)
 - IEEE 802.1Q
 - and trunk ports [10-3](#)
 - configuration limitations [12-19](#)
 - encapsulation [12-16](#)
 - native VLAN for untagged traffic [12-23](#)

IEEE 802.1Q (continued)

- tunneling
 - compatibility with other features [16-6](#)
 - defaults [16-4](#)
 - described [16-1](#)
- tunnel ports with other features [16-6](#)

IEEE 802.1s

See MSTP

IEEE 802.1w

See RSTP

IEEE 802.1x

See port-based authentication

IEEE 802.3ad

See EtherChannel

IEEE 802.3af

See PoE

IEEE 802.3x flow control [10-19](#)**ifIndex values, SNMP [31-6](#)****IFS [1-5](#)****IGMP**

- configurable leave timer
 - described [23-6](#)
 - enabling [23-11](#)
- configuring the switch
 - as a member of a group [43-28](#)
 - statically connected member [43-33](#)
- controlling access to groups [43-29](#)
- default configuration [43-28](#)
- deleting cache entries [43-52](#)
- displaying groups [43-52](#)
- fast switching [43-33](#)
- flooded multicast traffic
 - controlling the length of time [23-12](#)
 - disabling on an interface [23-13](#)
 - global leave [23-13](#)
 - query solicitation [23-13](#)
 - recovering from flood mode [23-13](#)
- host-query interval, modifying [43-31](#)
- joining multicast group [23-3](#)

IGMP (continued)

- join messages [23-3](#)
- leave processing, enabling [23-11, 37-9](#)
- leaving multicast group [23-5](#)
- multicast reachability [43-28](#)
- overview [43-3](#)
- queries [23-4](#)
- report suppression
 - described [23-6](#)
 - disabling [23-16, 37-11](#)
- supported versions [23-3](#)
- support for [1-4](#)
- Version 1
 - changing to Version 2 [43-30](#)
 - described [43-3](#)
- Version 2
 - changing to Version 1 [43-30](#)
 - described [43-3](#)
 - maximum query response time value [43-32](#)
 - pruning groups [43-32](#)
 - query timeout value [43-32](#)

IGMP filtering

- configuring [23-25](#)
- default configuration [23-25](#)
- described [23-24](#)
- monitoring [23-29](#)
- support for [1-4](#)

IGMP groups

- configuring filtering [23-28](#)
- setting the maximum number [23-27](#)

IGMP helper [1-4, 43-6](#)**IGMP Immediate Leave**

- configuration guidelines [23-11](#)
- described [23-6](#)
- enabling [23-11](#)

IGMP profile

- applying [23-26](#)
- configuration mode [23-25](#)
- configuring [23-26](#)

- IGMP snooping
 - and address aliasing [23-2](#)
 - configuring [23-7](#)
 - default configuration [23-7, 37-5, 37-6](#)
 - definition [23-2](#)
 - enabling and disabling [23-7, 37-6](#)
 - global configuration [23-7](#)
 - Immediate Leave [23-6](#)
 - method [23-8](#)
 - monitoring [23-16, 37-11](#)
 - querier
 - configuration guidelines [23-14](#)
 - configuring [23-14](#)
 - supported versions [23-3](#)
 - support for [1-4](#)
 - VLAN configuration [23-8](#)
- IGMP throttling
 - configuring [23-28](#)
 - default configuration [23-25](#)
 - described [23-25](#)
 - displaying action [23-29](#)
- IGP [35-24](#)
- Immediate Leave, IGMP [23-6](#)
 - enabling [37-9](#)
- inaccessible authentication bypass [9-14](#)
- initial configuration
 - defaults [1-13](#)
 - Express Setup [1-2](#)
 - See also getting started guide and hardware installation guide
- interface
 - number [10-10](#)
 - range macros [10-12](#)
- interface command [10-10](#)
- interface configuration mode [2-3](#)
- interfaces
 - auto-MDIX, configuring [10-20](#)
 - configuration guidelines
 - duplex and speed [10-17](#)
- interfaces (continued)**
 - configuring
 - for IPv4 and IPv6 [36-15](#)
 - procedure [10-10](#)
 - counters, clearing [10-29](#)
 - default configuration [10-14](#)
 - described [10-24](#)
 - descriptive name, adding [10-24](#)
 - displaying information about [10-28](#)
 - flow control [10-19](#)
 - management [1-4](#)
 - monitoring [10-28](#)
 - naming [10-24](#)
 - physical, identifying [10-10](#)
 - range of [10-11](#)
 - restarting [10-29](#)
 - shutting down [10-29](#)
 - speed and duplex, configuring [10-18](#)
 - status [10-28](#)
 - supported [10-10](#)
 - types of [10-1](#)
- interfaces range macro command [10-12](#)
- interface types [10-10](#)
- Interior Gateway Protocol
 - See IGP
- internal BGP
 - See IBGP
- internal neighbors, BGP [35-45](#)
- Internet Control Message Protocol
 - See ICMP
- Internet Group Management Protocol
 - See IGMP
- Internet Protocol version 6
 - See IPv6
- Inter-Switch Link
 - See ISL
- inter-VLAN routing [1-11, 35-2](#)
- Intrusion Detection System
 - See IDS appliances

inventory management TLV [26-3, 26-6](#)

IP ACLs

for QoS classification [33-7](#)

implicit deny [32-9, 32-13](#)

implicit masks [32-9](#)

named [32-14](#)

undefined [32-20](#)

IP addresses

128-bit [36-2](#)

candidate or member [5-3, 5-13](#)

classes of [35-5](#)

cluster access [5-2](#)

command switch [5-3, 5-11, 5-13](#)

default configuration [35-4](#)

discovering [6-26](#)

for IP routing [35-4](#)

IPv6 [36-2](#)

MAC address association [35-8](#)

monitoring [35-17](#)

redundant clusters [5-11](#)

standby command switch [5-11, 5-13](#)

See also IP information

IP base image [1-1](#)

IP broadcast address [35-15](#)

ip cef distributed command [35-77](#)

IP directed broadcasts [35-13](#)

ip igmp profile command [23-25](#)

IP information

assigned

manually [3-10](#)

through DHCP-based autoconfiguration [3-3](#)

default configuration [3-3](#)

IP multicast routing

addresses

all-hosts [43-3](#)

all-multicast-routers [43-3](#)

host group address range [43-3](#)

administratively-scoped boundaries, described [43-36](#)

and IGMP snooping [23-2](#)

IP multicast routing (continued)

Auto-RP

adding to an existing sparse-mode cloud [43-16](#)

benefits of [43-15](#)

clearing the cache [43-52](#)

configuration guidelines [43-11](#)

filtering incoming RP announcement messages [43-18](#)

overview [43-6](#)

preventing candidate RP spoofing [43-18](#)

preventing join messages to false RPs [43-17](#)

setting up in a new internetwork [43-16](#)

using with BSR [43-23](#)

bootstrap router

configuration guidelines [43-11](#)

configuring candidate BSRs [43-21](#)

configuring candidate RPs [43-22](#)

defining the IP multicast boundary [43-21](#)

defining the PIM domain border [43-20](#)

overview [43-7](#)

using with Auto-RP [43-23](#)

Cisco implementation [43-2](#)

configuring

basic multicast routing [43-11](#)

IP multicast boundary [43-36](#)

default configuration [43-10](#)

enabling

multicast forwarding [43-12](#)

PIM mode [43-13](#)

group-to-RP mappings

Auto-RP [43-6](#)

BSR [43-7](#)

MBONE

deleting sdr cache entries [43-52](#)

described [43-35](#)

displaying sdr cache [43-53](#)

enabling sdr listener support [43-35](#)

limiting DVMRP routes advertised [43-47](#)

limiting sdr cache entry lifetime [43-36](#)

IP multicast routing (continued)

MBONE (continued)

SAP packets for conference session
announcement [43-35](#)

Session Directory (sdr) tool, described [43-35](#)

monitoring

packet rate loss [43-53](#)

peering devices [43-53](#)

tracing a path [43-53](#)

multicast forwarding, described [43-7](#)

PIMv1 and PIMv2 interoperability [43-10](#)

protocol interaction [43-2](#)

reverse path check (RPF) [43-7](#)

routing table

deleting [43-52](#)

displaying [43-52](#)

RP

assigning manually [43-14](#)

configuring Auto-RP [43-15](#)

configuring PIMv2 BSR [43-19](#)

monitoring mapping information [43-24](#)

using Auto-RP and BSR [43-23](#)

statistics, displaying system and network [43-52](#)

See also CGMP

See also DVMRP

See also IGMP

See also PIM

IP phones

and QoS [15-1](#)

automatic classification and queuing [33-20](#)

configuring [15-4](#)

ensuring port security with QoS [33-38](#)

trusted boundary for QoS [33-38](#)

IP precedence [33-2](#)

IP-precedence-to-DSCP map for QoS [33-61](#)

IP protocols

in ACLs [32-11](#)

routing [1-11](#)

IP routes, monitoring [35-90](#)

IP routing

connecting interfaces with [10-9](#)

disabling [35-18](#)

enabling [35-18](#)

IP Service Level Agreements

See IP SLAs

IP service levels, analyzing [40-1](#)

IP services image [1-1](#)

IP SLAs

benefits [40-2](#)

configuration guidelines [40-6](#)

configuring object tracking [41-9](#)

Control Protocol [40-3](#)

default configuration [40-6](#)

definition [40-1](#)

ICMP echo operation [40-10](#)

measuring network performance [40-2](#)

monitoring [40-13](#)

multioperations scheduling [40-5](#)

object tracking [41-9](#)

operation [40-3](#)

reachability tracking [41-9](#)

responder

described [40-3](#)

enabling [40-7](#)

response time [40-4](#)

scheduling [40-5](#)

SNMP support [40-2](#)

supported metrics [40-2](#)

threshold monitoring [40-5](#)

track state [41-9](#)

UDP jitter operation [40-8](#)

IP source guard

and 802.1x [21-17](#)

and DHCP snooping [21-16](#)

and EtherChannels [21-17](#)

and port security [21-17](#)

and private VLANs [21-17](#)

and routed ports [21-17](#)

IP source guard (continued)

- and TCAM entries [21-17](#)
- and trunk interfaces [21-17](#)
- and VRF [21-17](#)
- binding configuration
 - automatic [21-16](#)
 - manual [21-16](#)
- binding table [21-16](#)
- configuration guidelines [21-17](#)
- default configuration [21-17](#)
- described [21-16](#)
- disabling [21-18](#)
- displaying
 - bindings [21-19](#)
 - configuration [21-19](#)
- enabling [21-18](#)
- filtering
 - source IP address [21-16](#)
 - source IP and MAC address [21-16](#)
- source IP address filtering [21-16](#)
- source IP and MAC address filtering [21-16](#)
- static bindings
 - adding [21-18](#)
 - deleting [21-18](#)

IP traceroute

- executing [46-17](#)
- overview [46-16](#)

IP unicast routing

- address resolution [35-8](#)
- administrative distances [35-79](#), [35-89](#)
- ARP [35-8](#)
- assigning IP addresses to Layer 3 interfaces [35-5](#)
- authentication keys [35-89](#)
- broadcast
 - address [35-15](#)
 - flooding [35-16](#)
 - packets [35-13](#)
 - storms [35-13](#)
- classless routing [35-6](#)

IP unicast routing (continued)

- configuring static routes [35-78](#)
- default
 - addressing configuration [35-4](#)
 - gateways [35-11](#)
 - networks [35-79](#)
 - routes [35-79](#)
 - routing [35-2](#)
- directed broadcasts [35-13](#)
- disabling [35-18](#)
- dynamic routing [35-3](#)
- enabling [35-18](#)
- EtherChannel Layer 3 interface [35-3](#)
- IGP [35-24](#)
- inter-VLAN [35-2](#)
- IP addressing
 - classes [35-5](#)
 - configuring [35-4](#)
- IPv6 [36-3](#)
- IRDP [35-11](#)
- Layer 3 interfaces [35-3](#)
- MAC address and IP address [35-8](#)
- passive interfaces [35-87](#)
- protocols
 - distance-vector [35-3](#)
 - dynamic [35-3](#)
 - link-state [35-3](#)
- proxy ARP [35-8](#)
- redistribution [35-80](#)
- reverse address resolution [35-8](#)
- routed ports [35-3](#)
- static routing [35-3](#)
- steps to configure [35-4](#)
- subnet mask [35-5](#)
- subnet zero [35-6](#)
- supernet [35-6](#)
- UDP [35-14](#)
- with SVIs [35-3](#)
- See also BGP

IP unicast routing (continued)

See also EIGRP

See also OSPF

See also RIP

IPv4 ACLs

applying to interfaces [32-19](#)

extended, creating [32-10](#)

named [32-14](#)

standard, creating [32-9](#)

IPv4 and IPv6

configuring on an interface [36-15](#)

differences [36-2](#)

dual protocol stacks [36-6](#)

IPv6**ACLs**

displaying [38-8](#)

limitations [38-3](#)

matching criteria [38-3](#)

port [38-2](#)

precedence [38-2](#)

router [38-2](#)

supported [38-3](#)

addresses [36-2](#)

address formats [36-2](#)

advantages [36-2](#)

applications [36-5](#)

assigning address [36-13](#)

autoconfiguration [36-5](#)

CEFv6 [36-17](#)

configuring static routes [36-18](#)

default configuration [36-13](#)

defined [36-1](#)

enabling [36-13](#)

Enhanced Interior Gateway Routing Protocol (EIGRP)

IPv6 [36-6](#)

EIGRP IPv6 Commands [36-7](#)

Passive Interfaces [36-7](#)

Prefix Lists [36-7](#)

Router ID [36-7](#)

IPv6 (continued)

feature limitations [36-10](#)

features not supported [36-9](#)

ICMP [36-4](#)

ICMP rate limiting [36-17](#)

monitoring [36-24](#)

neighbor discovery [36-4](#)

OSPF [36-22](#)

path MTU discovery [36-4](#)

reasons for [36-1](#)

RIP [36-20](#)

SDM templates [7-2, 36-10, 37-1, 38-1](#)

supported features [36-3](#)

switch limitations [36-10](#)

IPv6 traffic, filtering [38-4](#)

IRDP

configuring [35-12](#)

definition [35-11](#)

support for [1-11](#)

ISL

and IPv6 [36-3](#)

and trunk ports [10-3](#)

encapsulation [1-7, 12-16](#)

trunking with IEEE 802.1 tunneling [16-5](#)

isolated port [14-2](#)

isolated VLANs [14-2, 14-3](#)

J

join messages, IGMP [23-3](#)

K**KDC**

described [8-32](#)

See also Kerberos

keepalive messages [17-2](#)

Kerberos

- authenticating to
 - boundary switch [8-34](#)
 - KDC [8-34](#)
 - network services [8-35](#)
 - configuration examples [8-32](#)
 - configuring [8-35](#)
 - credentials [8-32](#)
 - cryptographic software image [8-32](#)
 - described [8-32](#)
 - KDC [8-32](#)
 - operation [8-34](#)
 - realm [8-33](#)
 - server [8-34](#)
 - support for [1-9](#)
 - switch as trusted third party [8-32](#)
 - terms [8-33](#)
 - TGT [8-34](#)
 - tickets [8-32](#)
- key distribution center
- See KDC

L

l2protocol-tunnel command [16-13](#)

LACP

- Layer 2 protocol tunneling [16-9](#)
- See EtherChannel

LAN base image [38-1](#)

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

Layer 2 interfaces, default configuration [10-14](#)

Layer 2 protocol tunneling

- configuring [16-10](#)
- configuring for EtherChannels [16-14](#)
- default configuration [16-11](#)
- defined [16-8](#)
- guidelines [16-12](#)

Layer 2 traceroute

- and ARP [46-15](#)
- and CDP [46-15](#)
- broadcast traffic [46-15](#)
- described [46-15](#)
- IP addresses and subnets [46-15](#)
- MAC addresses and VLANs [46-15](#)
- multicast traffic [46-15](#)
- multiple devices on a port [46-16](#)
- unicast traffic [46-15](#)
- usage guidelines [46-15](#)

Layer 3 features [1-11](#)

Layer 3 interfaces

- assigning IP addresses to [35-5](#)
- assigning IPv4 and IPv6 addresses to [36-15](#)
- assigning IPv6 addresses to [36-14](#)
- changing from Layer 2 mode [35-5, 35-68, 35-69](#)
- types of [35-3](#)

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

LDAP [4-2](#)

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 [18-8](#)

Link Layer Discovery Protocol

- See CDP

link local unicast addresses [36-3](#)

link redundancy

- See Flex Links

links, unidirectional [27-1](#)

link state advertisements (LSAs) [35-28](#)

link-state protocols [35-3](#)

link-state tracking

- configuring [34-23](#)
- described [34-21](#)

LLDP

- configuring [26-3](#)
 - characteristics [26-4](#)
 - default configuration [26-3](#)
- disabling and enabling
 - globally [26-5](#)
 - on an interface [26-5](#)
- monitoring and maintaining [26-7](#)
- overview [26-1](#)
- supported TLVs [26-2](#)
- switch stack considerations [26-2](#)
- transmission timer and holdtime, setting [26-4](#)

LLDP-MED

- configuring
 - procedures [26-3](#)
 - TLVs [26-6](#)
- monitoring and maintaining [26-7](#)
- overview [26-1, 26-2](#)
- supported TLVs [26-2](#)

LLDP Media Endpoint Discovery

See LLDP-MED

load balancing [39-3](#)local SPAN [28-2](#)location TLV [26-3, 26-6](#)logging messages, ACL [32-8](#)

login authentication

- with RADIUS [8-23](#)
- with TACACS+ [8-14](#)

login banners [6-17](#)

log messages

See system message logging

Long-Reach Ethernet (LRE) technology [1-17](#)

loop guard

- described [19-9](#)
- enabling [19-15](#)
- support for [1-7](#)

LRE profiles, considerations in switch clusters [5-14](#)

M

MAB aging timer [1-8](#)

MAB inactivity timer

- default setting [9-22](#)
- range [9-24](#)

MAC/PHY configuration status TLV [26-2](#)

MAC addresses

- aging time [6-21](#)
- and VLAN association [6-20](#)
- building the address table [6-20](#)
- default configuration [6-21](#)
- discovering [6-26](#)
- displaying [6-26](#)
- displaying in the IP source binding table [21-19](#)
- dynamic
 - learning [6-20](#)
 - removing [6-22](#)
- in ACLs [32-26](#)
- IP address association [35-8](#)
- static
 - adding [6-24](#)
 - allowing [6-26](#)
 - characteristics of [6-24](#)
 - dropping [6-25](#)
 - removing [6-24](#)

MAC address notification, support for [1-12](#)

MAC address-table move update

- configuration guidelines [20-5](#)
- configuring [20-9](#)
- default configuration [20-5](#)
- description [20-3](#)
- monitoring [20-11](#)

MAC address-to-VLAN mapping [12-28](#)

MAC authentication bypass

See MAB

- MAC extended access lists
 - applying to Layer 2 interfaces [32-27](#)
 - configuring for QoS [33-45](#)
 - creating [32-26](#)
 - defined [32-26](#)
 - for QoS classification [33-5](#)
- macros
 - See Smartports macros
- magic packet [9-16](#)
- manageability features [1-5](#)
- management access
 - in-band
 - browser session [1-6](#)
 - CLI session [1-6](#)
 - device manager [1-6](#)
 - SNMP [1-6](#)
 - out-of-band console port connection [1-6](#)
- management address TLV [26-2](#)
- management options
 - CLI [2-1](#)
 - clustering [1-3](#)
 - CNS [4-1](#)
 - Network Assistant [1-2](#)
 - overview [1-4](#)
- management VLAN
 - considerations in switch clusters [5-7](#)
 - discovery through different management VLANs [5-7](#)
- mapping tables for QoS
 - configuring
 - CoS-to-DSCP [33-60](#)
 - DSCP [33-60](#)
 - DSCP-to-CoS [33-63](#)
 - DSCP-to-DSCP-mutation [33-64](#)
 - IP-precedence-to-DSCP [33-61](#)
 - policed-DSCP [33-62](#)
 - described [33-12](#)
- marking
 - action with aggregate policers [33-58](#)
 - described [33-4, 33-8](#)
- matching
 - IPv6 ACLs [38-3](#)
- matching, IPv4 ACLs [32-7](#)
- maximum aging time
 - MSTP [18-23](#)
 - STP [17-21](#)
- maximum hop count, MSTP [18-24](#)
- maximum-paths command [35-49, 35-78](#)
- MDA
 - configuration guidelines [9-19](#)
 - described [1-9, 9-18](#)
 - exceptions with authentication process [9-4](#)
- membership mode, VLAN port [12-3](#)
- member switch
 - automatic discovery [5-4](#)
 - defined [5-2](#)
 - managing [5-15](#)
 - passwords [5-13](#)
 - recovering from lost connectivity [46-11](#)
 - requirements [5-3](#)
 - See also candidate switch, cluster standby group, and standby command switch
- messages, to users through banners [6-17](#)
- metrics, in BGP [35-49](#)
- metric translations, between routing protocols [35-83](#)
- metro tags [16-2](#)
- MHSRP [39-3](#)
- MIBs
 - accessing files with FTP [A-3](#)
 - location of files [A-3](#)
 - overview [31-1](#)
 - SNMP interaction with [31-4](#)
 - supported [A-1](#)
- mirroring traffic for analysis [28-1](#)
- mismatches, autonegotiation [46-11](#)
- module number [10-10](#)

monitoring

- access groups [32-39](#)
- BGP [35-60](#)
- cables for unidirectional links [27-1](#)
- CDP [25-4](#)
- CEF [35-77](#)
- EIGRP [35-40](#)
- fallback bridging [45-11](#)
- features [1-12](#)
- Flex Links [20-11](#)
- HSRP [39-11](#)
- IEEE 802.1Q tunneling [16-18](#)
- IGMP
 - filters [23-29](#)
 - snooping [23-16, 37-11](#)
- interfaces [10-28](#)
- IP
 - address tables [35-17](#)
 - multicast routing [43-51](#)
 - routes [35-90](#)
- IP SLAs operations [40-13](#)
- IPv4 ACL configuration [32-39](#)
- IPv6 [36-24](#)
- IPv6 ACL configuration [38-8](#)
- Layer 2 protocol tunneling [16-18](#)
- MAC address-table move update [20-11](#)
- MSDP peers [44-18](#)
- multicast router interfaces [23-17, 37-12](#)
- multi-VRF CE [35-75](#)
- MVR [23-24](#)
- network traffic for analysis with probe [28-2](#)
- object tracking [41-10](#)
- OSPF [35-32](#)
- port
 - blocking [24-19](#)
 - protection [24-19](#)

monitoring (continued)

- private VLANs [14-14](#)
- RP mapping information [43-24](#)
- SFP status [10-28, 46-13](#)
- source-active messages [44-18](#)
- speed and duplex mode [10-18](#)
- traffic flowing among switches [29-1](#)
- traffic suppression [24-18](#)
- tunneling [16-18](#)
- VLAN
 - filters [32-40](#)
 - maps [32-40](#)
 - VLANs [12-16](#)
 - VMPS [12-32](#)
 - VTP [13-16](#)
- MSDP
 - benefits of [44-3](#)
 - clearing MSDP connections and statistics [44-18](#)
 - controlling source information
 - forwarded by switch [44-11](#)
 - originated by switch [44-9](#)
 - received by switch [44-13](#)
 - default configuration [44-4](#)
 - dense-mode regions
 - sending SA messages to [44-16](#)
 - specifying the originating address [44-17](#)
 - filtering
 - incoming SA messages [44-14](#)
 - SA messages to a peer [44-12](#)
 - SA requests from a peer [44-10](#)
 - join latency, defined [44-6](#)
 - meshed groups
 - configuring [44-15](#)
 - defined [44-15](#)
 - originating address, changing [44-17](#)
 - overview [44-1](#)
 - peer-RPF flooding [44-2](#)

MSDP (continued)

- peers
 - configuring a default [44-4](#)
 - monitoring [44-18](#)
 - peering relationship, overview [44-1](#)
 - requesting source information from [44-8](#)
 - shutting down [44-15](#)
- source-active messages
 - caching [44-6](#)
 - clearing cache entries [44-18](#)
 - defined [44-2](#)
 - filtering from a peer [44-10](#)
 - filtering incoming [44-14](#)
 - filtering to a peer [44-12](#)
 - limiting data with TTL [44-13](#)
 - monitoring [44-18](#)
 - restricting advertised sources [44-9](#)
- support for [1-11](#)

MSTP

- boundary ports
 - configuration guidelines [18-15](#)
 - described [18-6](#)
- BPDU filtering
 - described [19-3](#)
 - enabling [19-12](#)
- BPDU guard
 - described [19-2](#)
 - enabling [19-11](#)
- CIST, described [18-3](#)
- CIST regional root [18-3](#)
- CIST root [18-5](#)
- configuration guidelines [18-15, 19-10](#)
- configuring
 - forward-delay time [18-23](#)
 - hello time [18-22](#)
 - link type for rapid convergence [18-24](#)
 - maximum aging time [18-23](#)
 - maximum hop count [18-24](#)
 - MST region [18-16](#)

MSTP (continued)

- configuring (continued)
 - neighbor type [18-25](#)
 - path cost [18-20](#)
 - port priority [18-19](#)
 - root switch [18-17](#)
 - secondary root switch [18-18](#)
 - switch priority [18-21](#)
- CST
 - defined [18-3](#)
 - operations between regions [18-4](#)
- default configuration [18-14](#)
- default optional feature configuration [19-9](#)
- displaying status [18-26](#)
- enabling the mode [18-16](#)
- EtherChannel guard
 - described [19-7](#)
 - enabling [19-14](#)
- extended system ID
 - effects on root switch [18-17](#)
 - effects on secondary root switch [18-18](#)
 - unexpected behavior [18-17](#)
- IEEE 802.1s
 - implementation [18-6](#)
 - port role naming change [18-7](#)
 - terminology [18-5](#)
- instances supported [17-9](#)
- interface state, blocking to forwarding [19-2](#)
- interoperability and compatibility among modes [17-10](#)
- interoperability with IEEE 802.1D
 - described [18-8](#)
 - restarting migration process [18-25](#)
- IST
 - defined [18-3](#)
 - master [18-3](#)
 - operations within a region [18-3](#)

MSTP (continued)

- loop guard
 - described [19-9](#)
 - enabling [19-15](#)
- mapping VLANs to MST instance [18-16](#)
- MST region
 - CIST [18-3](#)
 - configuring [18-16](#)
 - described [18-2](#)
 - hop-count mechanism [18-5](#)
 - IST [18-3](#)
 - supported spanning-tree instances [18-2](#)
- optional features supported [1-7](#)
- overview [18-2](#)
- Port Fast
 - described [19-2](#)
 - enabling [19-10](#)
- preventing root switch selection [19-8](#)
- root guard
 - described [19-8](#)
 - enabling [19-15](#)
- root switch
 - configuring [18-17](#)
 - effects of extended system ID [18-17](#)
 - unexpected behavior [18-17](#)
- shutdown Port Fast-enabled port [19-2](#)
- status, displaying [18-26](#)
- multicast groups
 - Immediate Leave [23-6](#)
 - joining [23-3](#)
 - leaving [23-5](#)
 - static joins [23-10, 37-8](#)
- multicast packets
 - ACLs on [32-39](#)
 - blocking [24-7](#)
- multicast router interfaces, monitoring [23-17, 37-12](#)
- multicast router ports, adding [23-9, 37-8](#)
- Multicast Source Discovery Protocol
 - See MSDP

- multicast storm [24-1](#)
- multicast storm-control command [24-4](#)
- multicast television application [23-19](#)
- multicast VLAN [23-17](#)
- Multicast VLAN Registration
 - See MVR
- multidomain authentication
 - See MDA
- multioperations scheduling, IP SLAs [40-5](#)
- Multiple HSRP
 - See MHSRP
- multiple VPN routing/forwarding in customer edge devices
 - See multi-VRF CE
- multi-VRF CE
 - configuration example [35-72](#)
 - configuration guidelines [35-64](#)
 - configuring [35-63](#)
 - default configuration [35-64](#)
 - defined [35-61](#)
 - displaying [35-75](#)
 - monitoring [35-75](#)
 - network components [35-63](#)
 - packet-forwarding process [35-63](#)
 - support for [1-11](#)
- MVR
 - and address aliasing [23-21](#)
 - and IGMPv3 [23-21](#)
 - configuration guidelines [23-21](#)
 - configuring interfaces [23-22](#)
 - default configuration [23-20](#)
 - described [23-17](#)
 - example application [23-19](#)
 - modes [23-22](#)
 - monitoring [23-24](#)
 - multicast television application [23-19](#)
 - setting global parameters [23-21](#)
 - support for [1-4](#)

N**NAC**

- AAA down policy [1-9](#)
- critical authentication [9-14, 9-36](#)
- IEEE 802.1x authentication using a RADIUS server [9-40](#)
- IEEE 802.1x validation using RADIUS server [9-40](#)
- inaccessible authentication bypass [1-9, 9-36](#)
- Layer 2 IEEE 802.1x validation [1-9, 9-40](#)
- Layer 2 IEEE802.1x validation [9-18](#)
- Layer 2 IP validation [1-9](#)

named IPv4 ACLs [32-14](#)

NameSpace Mapper

See NSM

native VLAN

- and IEEE 802.1Q tunneling [16-4](#)
- configuring [12-23](#)
- default [12-23](#)

neighbor discovery, IPv6 [36-4](#)

neighbor discovery/recovery, EIGRP [35-34](#)

neighbors, BGP [35-55](#)

Network Admission Control

NAC

Network Admission Control Software Configuration Guide [9-42, 9-43](#)

Network Assistant

- benefits [1-2](#)
- described [1-4](#)
- downloading image files [1-3](#)
- guide mode [1-3](#)
- management options [1-2](#)
- requirements [xliv](#)
- upgrading a switch [B-25](#)
- wizards [1-3](#)

network configuration examples

- increasing network performance [1-16](#)
- large network [1-21](#)
- long-distance, high-bandwidth transport [1-22](#)
- providing network services [1-17](#)
- server aggregation and Linux server cluster [1-18](#)
- small to medium-sized network [1-19](#)

network design

- performance [1-16](#)
- services [1-17](#)

network management

- CDP [25-1](#)
- RMON [29-1](#)
- SNMP [31-1](#)

network performance, measuring with IP SLAs [40-2](#)

network policy TLV [26-2, 26-6](#)

Network Time Protocol

See NTP

no commands [2-4](#)

nonhierarchical policy maps

- configuration guidelines [33-33](#)
- described [33-9](#)

non-IP traffic filtering [32-26](#)

nontrunking mode [12-18](#)

normal-range VLANs [12-4](#)

configuration guidelines [12-6](#)

configuration modes [12-7](#)

configuring [12-4](#)

defined [12-1](#)

no switchport command [10-4](#)

note, described [xliv](#)

not-so-stubby areas

See NSSA

NSM [4-3](#)

NSSA, OSPF [35-28](#)

NTP

associations

authenticating [6-4](#)

defined [6-2](#)

enabling broadcast messages [6-6](#)

peer [6-5](#)

server [6-5](#)

default configuration [6-4](#)

displaying the configuration [6-11](#)

overview [6-2](#)

restricting access

creating an access group [6-8](#)

disabling NTP services per interface [6-10](#)

source IP address, configuring [6-10](#)

stratum [6-2](#)

support for [1-5](#)

synchronizing devices [6-5](#)

time

services [6-2](#)

synchronizing [6-2](#)

O

object tracking

HSRP [41-7](#)

IP SLAs [41-9](#)

IP SLAs, configuring [41-9](#)

monitoring [41-10](#)

online diagnostics

overview [47-1](#)

running tests [47-3](#)

understanding [47-1](#)

Open Shortest Path First

See OSPF

optimizing system resources [7-1](#)

options, management [1-4](#)

OSPF

area parameters, configuring [35-28](#)

configuring [35-26](#)

default configuration

metrics [35-30](#)

route [35-30](#)

settings [35-25](#)

described [35-24](#)

for IPv6 [36-22](#)

interface parameters, configuring [35-27](#)

LSA group pacing [35-31](#)

monitoring [35-32](#)

router IDs [35-32](#)

route summarization [35-30](#)

support for [1-11](#)

virtual links [35-30](#)

out-of-profile markdown [1-10](#)

P

packet modification, with QoS [33-19](#)

PAgP

Layer 2 protocol tunneling [16-9](#)

See EtherChannel

parallel paths, in routing tables [35-78](#)

passive interfaces

configuring [35-87](#)

OSPF [35-30](#)

passwords

default configuration [8-2](#)

disabling recovery of [8-5](#)

encrypting [8-3](#)

for security [1-8](#)

in clusters [5-13](#)

overview [8-1](#)

recovery of [46-3](#)

passwords (continued)

setting

- enable [8-3](#)
- enable secret [8-3](#)
- Telnet [8-6](#)
- with usernames [8-6](#)
- VTP domain [13-8](#)

path cost

- MSTP [18-20](#)
- STP [17-18](#)

path MTU discovery [36-4](#)

PBR

- defined [35-84](#)
- enabling [35-85](#)
- fast-switched policy-based routing [35-87](#)
- local policy-based routing [35-87](#)

PC (passive command switch) [5-10](#)peers, BGP [35-55](#)percentage thresholds in tracked lists [41-6](#)performance, network design [1-16](#)performance features [1-3](#)persistent self-signed certificate [8-43](#)

per-VLAN spanning-tree plus

See PVST+

PE to CE routing, configuring [35-71](#)physical ports [10-2](#)

PIM

- default configuration [43-10](#)
- dense mode
 - overview [43-4](#)
 - rendezvous point (RP), described [43-5](#)
 - RPF lookups [43-8](#)
- displaying neighbors [43-52](#)
- enabling a mode [43-13](#)
- overview [43-4](#)
- router-query message interval, modifying [43-27](#)
- shared tree and source tree, overview [43-25](#)

PIM (continued)

shortest path tree, delaying the use of [43-26](#)

sparse mode

- join messages and shared tree [43-5](#)
- overview [43-5](#)
- prune messages [43-5](#)
- RPF lookups [43-8](#)

stub routing

- displaying [43-52](#)
- enabling [43-13](#)
- overview [43-5](#)

support for [1-11](#)

versions

- interoperability [43-10](#)
- troubleshooting interoperability problems [43-24](#)
- v2 improvements [43-4](#)

PIM-DVMRP, as snooping method [23-8](#)

ping

- character output description [46-14](#)
- executing [46-13](#)
- overview [46-13](#)

PoE

- auto mode [10-8](#)
- CDP with power consumption, described [10-6](#)
- CDP with power negotiation, described [10-6](#)
- Cisco intelligent power management [10-6](#)
- configuring [10-21](#)
- devices supported [10-6](#)
- high-power devices operating in low-power mode [10-6](#)
- IEEE power classification levels [10-7](#)
- power budgeting [10-22](#)
- power consumption [10-22](#)
- powered-device detection and initial power allocation [10-7](#)
- power management modes [10-8](#)

PoE (continued)

- power negotiation extensions to CDP [10-6](#)
- standards supported [10-6](#)
- static mode [10-8](#)
- supported watts per port [10-6](#)
- troubleshooting [46-11](#)
- policed-DSCP map for QoS [33-62](#)
- policers
 - configuring
 - for each matched traffic class [33-48](#)
 - for more than one traffic class [33-58](#)
 - described [33-4](#)
 - displaying [33-78](#)
 - number of [33-34](#)
 - types of [33-9](#)
- policing
 - described [33-4](#)
 - hierarchical
 - See hierarchical policy maps
 - token-bucket algorithm [33-9](#)
- policy-based routing
 - See PBR
- policy maps for QoS
 - characteristics of [33-48](#)
 - described [33-7](#)
 - displaying [33-79](#)
 - hierarchical [33-8](#)
 - hierarchical on SVIs
 - configuration guidelines [33-33](#)
 - configuring [33-52](#)
 - described [33-11](#)
 - nonhierarchical on physical ports
 - configuration guidelines [33-33](#)
 - described [33-9](#)
- port ACLs
 - defined [32-2](#)
 - types of [32-3](#)
- Port Aggregation Protocol
 - See EtherChannel

- port-based authentication
 - accounting [9-8](#)
 - authentication server
 - defined [9-2](#)
 - RADIUS server [9-3](#)
 - client, defined [9-2](#)
 - configuration guidelines [9-22](#)
 - configuring
 - 802.1x authentication [9-25](#)
 - guest VLAN [9-33](#)
 - host mode [9-27](#)
 - inaccessible authentication bypass [9-36](#)
 - manual re-authentication of a client [9-29](#)
 - periodic re-authentication [9-28](#)
 - quiet period [9-29](#)
 - RADIUS server [9-27](#)
 - RADIUS server parameters on the switch [9-26](#)
 - restricted VLAN [9-34](#)
 - switch-to-client frame-retransmission number [9-31](#)
 - switch-to-client retransmission time [9-30](#)
 - default configuration [9-21](#)
 - described [9-1](#)
 - device roles [9-2](#)
 - displaying statistics [9-44](#)
 - EAPOL-start frame [9-5](#)
 - EAP-request/identity frame [9-5](#)
 - EAP-response/identity frame [9-5](#)
 - encapsulation [9-3](#)
 - guest VLAN
 - configuration guidelines [9-12, 9-13](#)
 - described [9-12](#)
 - host mode [9-7](#)
 - inaccessible authentication bypass
 - configuring [9-36](#)
 - described [9-14](#)
 - guidelines [9-24](#)
 - initiation and message exchange [9-5](#)
 - magic packet [9-16](#)

port-based authentication (continued)

- method lists [9-25](#)
- multiple-hosts mode, described [9-8](#)
- per-user ACLs
 - AAA authorization [9-25](#)
 - configuration tasks [9-12](#)
 - described [9-11](#)
 - RADIUS server attributes [9-11](#)
- ports
 - authorization state and dot1x port-control command [9-7](#)
 - authorized and unauthorized [9-7](#)
 - critical [9-14](#)
 - voice VLAN [9-15](#)
- port security
 - and voice VLAN [9-16](#)
 - described [9-15](#)
 - interactions [9-16](#)
 - multiple-hosts mode [9-8](#)
- resetting to default values [9-44](#)
- statistics, displaying [9-44](#)
- switch
 - as proxy [9-3](#)
 - RADIUS client [9-3](#)
- upgrading from a previous release [9-24, 33-26](#)
- VLAN assignment
 - AAA authorization [9-25](#)
 - characteristics [9-10](#)
 - configuration tasks [9-10](#)
 - described [9-9](#)
- voice VLAN
 - described [9-15](#)
 - PVID [9-15](#)
 - VVID [9-15](#)
- wake-on-LAN, described [9-16](#)
- port blocking [1-4, 24-7](#)
- port-channel
 - See EtherChannel
- port description TLV [26-2](#)

Port Fast

- described [19-2](#)
- enabling [19-10](#)
- mode, spanning tree [12-29](#)
- support for [1-7](#)
- port membership modes, VLAN [12-3](#)
- port priority
 - MSTP [18-19](#)
 - STP [17-17](#)
- ports
 - access [10-3](#)
 - blocking [24-7](#)
 - dual-purpose uplink [10-6](#)
 - dynamic access [12-3](#)
 - IEEE 802.1Q tunnel [12-4](#)
 - protected [24-5](#)
 - routed [10-4](#)
 - secure [24-8](#)
 - static-access [12-3, 12-11](#)
 - switch [10-2](#)
 - trunks [12-3, 12-16](#)
 - VLAN assignments [12-11](#)
- port security
 - aging [24-16](#)
 - and private VLANs [24-17](#)
 - and QoS trusted boundary [33-38](#)
 - configuring [24-12](#)
 - default configuration [24-10](#)
 - described [24-8](#)
 - displaying [24-19](#)
 - enabling [24-18](#)
 - on trunk ports [24-13](#)
 - sticky learning [24-9](#)
 - violations [24-9](#)
 - with other features [24-11](#)
- port-shutdown response, VMPS [12-28](#)
- port VLAN ID TLV [26-2](#)
- power management TLV [26-2, 26-6](#)

- Power over Ethernet
 - See PoE
- preemption, default configuration [20-4](#)
- preemption delay, default configuration [20-5](#)
- preferential treatment of traffic
 - See QoS
- prefix lists, BGP [35-53](#)
- preventing unauthorized access [8-1](#)
- primary links [20-2](#)
- primary VLANs [14-1, 14-3](#)
- priority
 - HSRP [39-7](#)
 - overriding CoS [15-6](#)
 - trusting CoS [15-6](#)
- private VLAN edge ports
 - See protected ports
- private VLANs
 - across multiple switches [14-4](#)
 - and SDM template [14-4](#)
 - and SVIs [14-5](#)
 - benefits of [14-1](#)
 - community ports [14-2](#)
 - community VLANs [14-2, 14-3](#)
 - configuration guidelines [14-6, 14-8](#)
 - configuration tasks [14-6](#)
 - configuring [14-9](#)
 - default configuration [14-6](#)
 - end station access to [14-3](#)
 - IP addressing [14-3](#)
 - isolated port [14-2](#)
 - isolated VLANs [14-2, 14-3](#)
 - mapping [14-13](#)
 - monitoring [14-14](#)
 - private VLANs (continued)**
 - ports
 - community [14-2](#)
 - configuration guidelines [14-8](#)
 - configuring host ports [14-11](#)
 - configuring promiscuous ports [14-12](#)
 - described [12-4](#)
 - isolated [14-2](#)
 - promiscuous [14-2](#)
 - primary VLANs [14-1, 14-3](#)
 - promiscuous ports [14-2](#)
 - secondary VLANs [14-2](#)
 - subdomains [14-1](#)
 - traffic in [14-5](#)
- privileged EXEC mode [2-2](#)
- privilege levels
 - changing the default for lines [8-9](#)
 - command switch [5-15](#)
 - exiting [8-9](#)
 - logging into [8-9](#)
 - mapping on member switches [5-15](#)
 - overview [8-2, 8-7](#)
 - setting a command with [8-8](#)
- promiscuous ports
 - configuring [14-12](#)
 - defined [14-2](#)
- protected ports [1-8, 24-5](#)
- protocol-dependent modules, EIGRP [35-34](#)
- Protocol-Independent Multicast Protocol
 - See PIM
- provider edge devices [35-62](#)
- proxy ARP
 - configuring [35-10](#)
 - definition [35-8](#)
 - with IP routing disabled [35-11](#)

pruning, VTP

- disabling
 - in VTP domain [13-14](#)
 - on a port [12-23](#)
- enabling
 - in VTP domain [13-14](#)
 - on a port [12-22](#)
- examples [13-5](#)
- overview [13-4](#)

pruning-eligible list

- changing [12-22](#)
- for VTP pruning [13-4](#)
- VLANs [13-14](#)

PVST+

- described [17-9](#)
- IEEE 802.1Q trunking interoperability [17-10](#)
- instances supported [17-9](#)

Q

QoS

- and MQC commands [33-1](#)
- auto-QoS
 - categorizing traffic [33-21](#)
 - configuration and defaults display [33-30](#)
 - configuration guidelines [33-25](#)
 - described [33-20](#)
 - disabling [33-27](#)
 - displaying generated commands [33-27](#)
 - displaying the initial configuration [33-20](#)
 - effects on running configuration [33-25](#)
 - egress queue defaults [33-21](#)
 - enabling for VoIP [33-27](#)
 - example configuration [33-28](#)
 - ingress queue defaults [33-21](#)
 - list of generated commands [33-22](#)
- basic model [33-4](#)

QoS (continued)

- classification
 - class maps, described [33-7](#)
 - defined [33-4](#)
 - DSCP transparency, described [33-40](#)
 - flowchart [33-6](#)
 - forwarding treatment [33-3](#)
 - in frames and packets [33-3](#)
 - IP ACLs, described [33-5, 33-7](#)
 - MAC ACLs, described [33-5, 33-7](#)
 - options for IP traffic [33-5](#)
 - options for non-IP traffic [33-5](#)
 - policy maps, described [33-7](#)
 - trust DSCP, described [33-5](#)
 - trusted CoS, described [33-5](#)
 - trust IP precedence, described [33-5](#)
- class maps
 - configuring [33-46](#)
 - displaying [33-78](#)
- configuration guidelines
 - auto-QoS [33-25](#)
 - standard QoS [33-33](#)
- configuring
 - aggregate policers [33-58](#)
 - auto-QoS [33-20](#)
 - default port CoS value [33-38](#)
 - DSCP maps [33-60](#)
 - DSCP transparency [33-40](#)
 - DSCP trust states bordering another domain [33-40](#)
 - egress queue characteristics [33-70](#)
 - ingress queue characteristics [33-66](#)
 - IP extended ACLs [33-44](#)
 - IP standard ACLs [33-43](#)
 - MAC ACLs [33-45](#)
 - policy maps, hierarchical [33-52](#)
 - port trust states within the domain [33-36](#)
 - trusted boundary [33-38](#)

QoS (continued)

- default auto configuration [33-21](#)
- default standard configuration [33-31](#)
- displaying statistics [33-78](#)
- DSCP transparency [33-40](#)
- egress queues
 - allocating buffer space [33-71](#)
 - buffer allocation scheme, described [33-18](#)
 - configuring shaped weights for SRR [33-75](#)
 - configuring shared weights for SRR [33-76](#)
 - described [33-4](#)
 - displaying the threshold map [33-74](#)
 - flowchart [33-17](#)
 - mapping DSCP or CoS values [33-73](#)
 - scheduling, described [33-4](#)
 - setting WTD thresholds [33-71](#)
 - WTD, described [33-19](#)
- enabling globally [33-35](#)
- flowcharts
 - classification [33-6](#)
 - egress queueing and scheduling [33-17](#)
 - ingress queueing and scheduling [33-15](#)
 - policing and marking [33-10](#)
- implicit deny [33-7](#)
- ingress queues
 - allocating bandwidth [33-68](#)
 - allocating buffer space [33-68](#)
 - buffer and bandwidth allocation, described [33-16](#)
 - configuring shared weights for SRR [33-68](#)
 - configuring the priority queue [33-69](#)
 - described [33-4](#)
 - displaying the threshold map [33-67](#)
 - flowchart [33-15](#)
 - mapping DSCP or CoS values [33-67](#)
 - priority queue, described [33-16](#)
 - scheduling, described [33-4](#)
 - setting WTD thresholds [33-67](#)
 - WTD, described [33-16](#)

QoS (continued)

- IP phones
 - automatic classification and queueing [33-20](#)
 - detection and trusted settings [33-20, 33-38](#)
- limiting bandwidth on egress interface [33-77](#)
- mapping tables
 - CoS-to-DSCP [33-60](#)
 - displaying [33-78](#)
 - DSCP-to-CoS [33-63](#)
 - DSCP-to-DSCP-mutation [33-64](#)
 - IP-precedence-to-DSCP [33-61](#)
 - policed-DSCP [33-62](#)
 - types of [33-12](#)
- marked-down actions [33-50, 33-55](#)
- marking, described [33-4, 33-8](#)
- overview [33-2](#)
- packet modification [33-19](#)
- policers
 - configuring [33-50, 33-55, 33-58](#)
 - described [33-8](#)
 - displaying [33-78](#)
 - number of [33-34](#)
 - types of [33-9](#)
- policies, attaching to an interface [33-8](#)
- policing
 - described [33-4, 33-8](#)
 - token bucket algorithm [33-9](#)
- policy maps
 - characteristics of [33-48](#)
 - displaying [33-79](#)
 - hierarchical [33-8](#)
 - hierarchical on SVIs [33-52](#)
 - nonhierarchical on physical ports [33-48](#)
- QoS label, defined [33-4](#)

QoS (continued)

queues

- configuring egress characteristics [33-70](#)
- configuring ingress characteristics [33-66](#)
- high priority (expedite) [33-19, 33-77](#)
- location of [33-13](#)
- SRR, described [33-14](#)
- WTD, described [33-13](#)

rewrites [33-19](#)support for [1-10](#)

trust states

- bordering another domain [33-40](#)
- described [33-5](#)
- trusted device [33-38](#)
- within the domain [33-36](#)

quality of service

See QoS

queries, IGMP [23-4](#)query solicitation, IGMP [23-13](#)**R****RADIUS**

attributes

- vendor-proprietary [8-31](#)
- vendor-specific [8-29](#)

configuring

- accounting [8-28](#)
- authentication [8-23](#)
- authorization [8-27](#)
- communication, global [8-21, 8-29](#)
- communication, per-server [8-20, 8-21](#)
- multiple UDP ports [8-20](#)

default configuration [8-20](#)defining AAA server groups [8-25](#)displaying the configuration [8-31](#)identifying the server [8-20](#)in clusters [5-14](#)limiting the services to the user [8-27](#)**RADIUS (continued)**method list, defined [8-19](#)operation of [8-19](#)overview [8-18](#)suggested network environments [8-18](#)support for [1-9](#)tracking services accessed by user [8-28](#)

range

macro [10-12](#)of interfaces [10-11](#)rapid convergence [18-10](#)

rapid per-VLAN spanning-tree plus

See rapid PVST+

rapid PVST+

described [17-9](#)IEEE 802.1Q trunking interoperability [17-10](#)instances supported [17-9](#)

Rapid Spanning Tree Protocol

See RSTP

RARP [35-8](#)rcommand command [5-15](#)

RCP

configuration files

- downloading [B-17](#)
- overview [B-16](#)
- preparing the server [B-16](#)
- uploading [B-18](#)

image files

- deleting old image [B-38](#)
- downloading [B-37](#)
- preparing the server [B-36](#)
- uploading [B-39](#)

reachability, tracking IP SLAs IP host [41-9](#)reconfirmation interval, VMPS, changing [12-31](#)reconfirming dynamic VLAN membership [12-31](#)recovery procedures [46-1](#)

- redundancy
 - EtherChannel [34-3](#)
 - HSRP [39-1](#)
 - STP
 - backbone [17-8](#)
 - path cost [12-26](#)
 - port priority [12-24](#)
- redundant links and UplinkFast [19-13](#)
- reliable transport protocol, EIGRP [35-34](#)
- reloading software [3-16](#)
- Remote Authentication Dial-In User Service
 - See RADIUS
- Remote Copy Protocol
 - See RCP
- Remote Network Monitoring
 - See RMON
- Remote SPAN
 - See RSPAN
- remote SPAN [28-2](#)
- report suppression, IGMP
 - described [23-6](#)
 - disabling [23-16, 37-11](#)
- requirements
 - cluster [xlv](#)
 - device manager [xlv](#)
 - Network Assistant [xlv](#)
- resequencing ACL entries [32-14](#)
- resets, in BGP [35-48](#)
- resetting a UDLD-shutdown interface [27-6](#)
- responder, IP SLAs
 - described [40-3](#)
 - enabling [40-7](#)
- response time, measuring with IP SLAs [40-4](#)
- restricted VLAN
 - configuring [9-34](#)
 - described [9-13](#)
 - using with IEEE 802.1x [9-13](#)
- restricting access
 - NTP services [6-8](#)
 - overview [8-1](#)
 - passwords and privilege levels [8-2](#)
 - RADIUS [8-17](#)
 - TACACS+ [8-10](#)
- retry count, VMPS, changing [12-32](#)
- reverse address resolution [35-8](#)
- Reverse Address Resolution Protocol
 - See RARP
- RFC
 - 1058, RIP [35-18](#)
 - 1112, IP multicast and IGMP [23-2](#)
 - 1157, SNMPv1 [31-2](#)
 - 1163, BGP [35-40](#)
 - 1166, IP addresses [35-5](#)
 - 1253, OSPF [35-24](#)
 - 1267, BGP [35-40](#)
 - 1305, NTP [6-2](#)
 - 1587, NSSAs [35-24](#)
 - 1757, RMON [29-2](#)
 - 1771, BGP [35-40](#)
 - 1901, SNMPv2C [31-2](#)
 - 1902 to 1907, SNMPv2 [31-2](#)
 - 2236, IP multicast and IGMP [23-2](#)
 - 2273-2275, SNMPv3 [31-2](#)
- RIP
 - advertisements [35-19](#)
 - authentication [35-21](#)
 - configuring [35-20](#)
 - default configuration [35-19](#)
 - described [35-19](#)
 - for IPv6 [36-20](#)
 - hop counts [35-19](#)
 - split horizon [35-22](#)
 - summary addresses [35-22](#)
 - support for [1-11](#)

RMON

- default configuration [29-3](#)
- displaying status [29-6](#)
- enabling alarms and events [29-3](#)
- groups supported [29-2](#)
- overview [29-1](#)
- statistics
 - collecting group Ethernet [29-5](#)
 - collecting group history [29-5](#)
- support for [1-12](#)

root guard

- described [19-8](#)
- enabling [19-15](#)
- support for [1-7](#)

root switch

- MSTP [18-17](#)
- STP [17-14](#)

route calculation timers, OSPF [35-30](#)route dampening, BGP [35-59](#)routed packets, ACLs on [32-38](#)

routed ports

- configuring [35-3](#)
- defined [10-4](#)
- in switch clusters [5-8](#)
- IP addresses on [10-25, 35-4](#)

route-map command [35-86](#)

route maps

- BGP [35-51](#)
- policy-based routing [35-84](#)

router ACLs

- defined [32-2](#)
- types of [32-4](#)

route reflectors, BGP [35-58](#)router ID, OSPF [35-32](#)route selection, BGP [35-49](#)route summarization, OSPF [35-30](#)route targets, VPN [35-63](#)

routing

- default [35-2](#)
- dynamic [35-3](#)
- redistribution of information [35-80](#)
- static [35-3](#)

routing domain confederation, BGP [35-58](#)

Routing Information Protocol

See RIP

routing protocol administrative distances [35-79](#)

RSPAN

- characteristics [28-8](#)
- configuration guidelines [28-17](#)
- default configuration [28-9](#)
- defined [28-2](#)
- destination ports [28-7](#)
- displaying status [28-24](#)
- interaction with other features [28-8](#)
- monitored ports [28-5](#)
- monitoring ports [28-7](#)
- overview [1-12, 28-1](#)
- received traffic [28-4](#)
- sessions
 - creating [28-18](#)
 - defined [28-3](#)
 - limiting source traffic to specific VLANs [28-23](#)
 - specifying monitored ports [28-18](#)
 - with ingress traffic enabled [28-21](#)
- source ports [28-5](#)
- transmitted traffic [28-5](#)
- VLAN-based [28-6](#)

RSTP

- active topology [18-9](#)
- BPDU
 - format [18-12](#)
 - processing [18-13](#)
- designated port, defined [18-9](#)
- designated switch, defined [18-9](#)

RSTP (continued)

- interoperability with IEEE 802.1D
 - described [18-8](#)
 - restarting migration process [18-25](#)
 - topology changes [18-13](#)
- overview [18-8](#)
- port roles
 - described [18-9](#)
 - synchronized [18-11](#)
- proposal-agreement handshake process [18-10](#)
- rapid convergence
 - described [18-10](#)
 - edge ports and Port Fast [18-10](#)
 - point-to-point links [18-10, 18-24](#)
 - root ports [18-10](#)
- root port, defined [18-9](#)
- See also MSTP
- running configuration
 - replacing [B-19, B-21](#)
 - rolling back [B-19, B-22](#)
- running configuration, saving [3-10](#)

S

- SC (standby command switch) [5-10](#)
- scheduled reloads [3-16](#)
- scheduling, IP SLAs operations [40-5](#)
- SDM
 - described [7-1](#)
 - templates
 - configuring [7-4](#)
 - number of [7-1](#)
- SDM template [38-4](#)
 - configuration guidelines [7-4](#)
 - configuring [7-3](#)
 - dual IPv4 and IPv6 [7-2](#)
 - types of [7-1](#)
- secondary VLANs [14-2](#)
- secure HTTP client
 - configuring [8-48](#)
 - displaying [8-48](#)
- secure HTTP server
 - configuring [8-46](#)
 - displaying [8-48](#)
- secure MAC addresses
 - deleting [24-15](#)
 - maximum number of [24-9](#)
 - types of [24-8](#)
- secure ports, configuring [24-8](#)
- secure remote connections [8-38](#)
- Secure Shell
 - See SSH
- Secure Socket Layer
 - See SSL
- security, port [24-8](#)
- security features [1-8](#)
- sequence numbers in log messages [30-8](#)
- server mode, VTP [13-3](#)
- service-provider network, MSTP and RSTP [18-1](#)
- service-provider networks
 - and customer VLANs [16-2](#)
 - and IEEE 802.1Q tunneling [16-1](#)
 - Layer 2 protocols across [16-8](#)
 - Layer 2 protocol tunneling for EtherChannels [16-9](#)
- set-request operation [31-5](#)
- setup program
 - failed command switch replacement [46-9](#)
 - replacing failed command switch [46-8](#)
- severity levels, defining in system messages [30-8](#)
- SFPs
 - monitoring status of [10-28, 46-13](#)
 - security and identification [46-12](#)
 - status, displaying [46-13](#)
- shaped round robin
 - See SRR
- show access-lists hw-summary command [32-21](#)
- show and more command output, filtering [2-10](#)

- show cdp traffic command [25-5](#)
- show cluster members command [5-15](#)
- show configuration command [10-24](#)
- show forward command [46-20](#)
- show interfaces command [10-18, 10-24](#)
- show l2protocol command [16-13, 16-15, 16-16](#)
- show lldp traffic command [26-8](#)
- show platform forward command [46-20](#)
- show running-config command
 - displaying ACLs [32-19, 32-20, 32-30, 32-33](#)
 - interface description in [10-24](#)
- shutdown command on interfaces [10-29](#)
- shutdown threshold for Layer 2 protocol packets [16-11](#)
- Simple Network Management Protocol
 - See SNMP
- Smartports macros
 - applying Cisco-default macros [11-6](#)
 - applying global parameter values [11-5, 11-6](#)
 - applying macros [11-5](#)
 - applying parameter values [11-5, 11-7](#)
 - configuration guidelines [11-2](#)
 - creating [11-4](#)
 - default configuration [11-2](#)
 - defined [11-1](#)
 - displaying [11-8](#)
 - tracing [11-3](#)
 - website [11-2](#)
- SNAP [25-1](#)
- SNMP
 - accessing MIB variables with [31-4](#)
 - agent
 - described [31-4](#)
 - disabling [31-8](#)
 - and IP SLAs [40-2](#)
 - authentication level [31-11](#)
 - community strings
 - configuring [31-8](#)
 - for cluster switches [31-4](#)
 - overview [31-4](#)
 - configuration examples [31-17](#)
 - default configuration [31-7](#)
 - engine ID [31-7](#)
 - groups [31-7, 31-10](#)
 - host [31-7](#)
 - ifIndex values [31-6](#)
 - in-band management [1-6](#)
 - in clusters [5-14](#)
 - informs
 - and trap keyword [31-12](#)
 - described [31-5](#)
 - differences from traps [31-5](#)
 - disabling [31-15](#)
 - enabling [31-15](#)
 - limiting access by TFTP servers [31-16](#)
 - limiting system log messages to NMS [30-10](#)
 - manager functions [1-5, 31-3](#)
 - managing clusters with [5-15](#)
 - MIBs
 - location of [A-3](#)
 - supported [A-1](#)
 - notifications [31-5](#)
 - overview [31-1, 31-4](#)
 - security levels [31-3](#)
 - status, displaying [31-18](#)
 - system contact and location [31-15](#)
 - trap manager, configuring [31-14](#)
 - traps
 - described [31-3, 31-5](#)
 - differences from informs [31-5](#)
 - disabling [31-15](#)
 - enabling [31-12](#)
 - enabling MAC address notification [6-22](#)
 - overview [31-1, 31-5](#)
 - types of [31-12](#)
 - users [31-7, 31-10](#)
 - versions supported [31-2](#)
- SNMPv1 [31-2](#)

- SNMPv2C [31-2](#)
- SNMPv3 [31-2](#)
- snooping, IGMP [23-2](#)
- software images
 - location in flash [B-25](#)
 - recovery procedures [46-2](#)
 - scheduling reloads [3-16](#)
 - tar file format, described [B-26](#)
 - See also downloading and uploading
- source addresses
 - in IPv4 ACLs [32-11](#)
 - in IPv6 ACLs [38-5](#)
- source-and-destination-IP address based forwarding, EtherChannel [34-7](#)
- source-and-destination MAC address forwarding, EtherChannel [34-7](#)
- source-IP address based forwarding, EtherChannel [34-7](#)
- source-MAC address forwarding, EtherChannel [34-6](#)
- SPAN
 - configuration guidelines [28-10](#)
 - default configuration [28-9](#)
 - destination ports [28-7](#)
 - displaying status [28-24](#)
 - interaction with other features [28-8](#)
 - monitored ports [28-5](#)
 - monitoring ports [28-7](#)
 - overview [1-12, 28-1](#)
 - ports, restrictions [24-11](#)
 - received traffic [28-4](#)
 - sessions
 - configuring ingress forwarding [28-15, 28-22](#)
 - creating [28-11](#)
 - defined [28-3](#)
 - limiting source traffic to specific VLANs [28-15](#)
 - removing destination (monitoring) ports [28-13](#)
 - specifying monitored ports [28-11](#)
 - with ingress traffic enabled [28-14](#)
- SPAN (continued)
 - source ports [28-5](#)
 - transmitted traffic [28-5](#)
 - VLAN-based [28-6](#)
- spanning tree and native VLANs [12-19](#)
- Spanning Tree Protocol
 - See STP
- SPAN traffic [28-4](#)
- split horizon, RIP [35-22](#)
- SRR
 - configuring
 - shaped weights on egress queues [33-75](#)
 - shared weights on egress queues [33-76](#)
 - shared weights on ingress queues [33-68](#)
 - described [33-14](#)
 - shaped mode [33-14](#)
 - shared mode [33-14](#)
 - support for [1-10, 1-11](#)
- SSH
 - configuring [8-39](#)
 - cryptographic software image [8-37](#)
 - described [1-6, 8-38](#)
 - encryption methods [8-38](#)
 - user authentication methods, supported [8-38](#)
- SSL
 - configuration guidelines [8-45](#)
 - configuring a secure HTTP client [8-48](#)
 - configuring a secure HTTP server [8-46](#)
 - cryptographic software image [8-42](#)
 - described [8-42](#)
 - monitoring [8-48](#)
- stacks, switch
 - copying an image file from one member to another [B-40](#)
 - incompatible software and image upgrades [B-40](#)
 - upgrading [B-40](#)

- standby command switch
 - configuring
 - considerations [5-11](#)
 - defined [5-2](#)
 - priority [5-10](#)
 - requirements [5-3](#)
 - virtual IP address [5-11](#)
 - See also cluster standby group and HSRP
- standby group, cluster
 - See cluster standby group and HSRP
- standby ip command [39-5](#)
- standby links [20-2](#)
- standby router [39-1](#)
- standby timers, HSRP [39-9](#)
- startup configuration
 - booting
 - manually [3-13](#)
 - specific image [3-14](#)
 - clearing [B-19](#)
 - configuration file
 - automatically downloading [3-12](#)
 - specifying the filename [3-12](#)
 - default boot configuration [3-12](#)
- stateless autoconfiguration [36-5](#)
- static access ports
 - assigning to VLAN [12-11](#)
 - defined [10-3, 12-3](#)
- static addresses
 - See addresses
- static IP routing [1-11](#)
- static MAC addressing [1-8](#)
- static routes
 - configuring [35-78](#)
 - configuring for IPv6 [36-18](#)
- static routing [35-3](#)
- static VLAN membership [12-2](#)
- statistics
 - 802.1x [9-44](#)
 - CDP [25-4](#)
 - interface [10-28](#)
 - IP multicast routing [43-52](#)
 - LLDP [26-7](#)
 - LLDP-MED [26-7](#)
 - OSPF [35-32](#)
 - QoS ingress and egress [33-78](#)
 - RMON group Ethernet [29-5](#)
 - RMON group history [29-5](#)
 - SNMP input and output [31-18](#)
 - VTP [13-16](#)
- sticky learning [24-9](#)
- storm control
 - configuring [24-3](#)
 - described [24-1](#)
 - disabling [24-5](#)
 - displaying [24-19](#)
 - support for [1-4](#)
 - thresholds [24-1](#)
- STP
 - accelerating root port selection [19-4](#)
 - BackboneFast
 - described [19-5](#)
 - disabling [19-14](#)
 - enabling [19-13](#)
 - BPDU filtering
 - described [19-3](#)
 - disabling [19-12](#)
 - enabling [19-12](#)
 - BPDU guard
 - described [19-2](#)
 - disabling [19-12](#)
 - enabling [19-11](#)
 - BPDU message exchange [17-3](#)

STP (continued)

- configuration guidelines [17-12, 19-10](#)
- configuring
 - forward-delay time [17-21](#)
 - hello time [17-20](#)
 - maximum aging time [17-21](#)
 - path cost [17-18](#)
 - port priority [17-17](#)
 - root switch [17-14](#)
 - secondary root switch [17-16](#)
 - spanning-tree mode [17-13](#)
 - switch priority [17-19](#)
 - transmit hold-count [17-22](#)
- counters, clearing [17-22](#)
- default configuration [17-11](#)
- default optional feature configuration [19-9](#)
- designated port, defined [17-3](#)
- designated switch, defined [17-3](#)
- detecting indirect link failures [19-5](#)
- disabling [17-14](#)
- displaying status [17-22](#)
- EtherChannel guard
 - described [19-7](#)
 - disabling [19-14](#)
 - enabling [19-14](#)
- extended system ID
 - effects on root switch [17-14](#)
 - effects on the secondary root switch [17-16](#)
 - overview [17-4](#)
 - unexpected behavior [17-15](#)
- features supported [1-6](#)
- IEEE 802.1D and bridge ID [17-4](#)
- IEEE 802.1D and multicast addresses [17-8](#)
- IEEE 802.1t and VLAN identifier [17-4](#)
- inferior BPDU [17-3](#)
- instances supported [17-9](#)
- interface state, blocking to forwarding [19-2](#)

STP (continued)

- interface states
 - blocking [17-6](#)
 - disabled [17-7](#)
 - forwarding [17-5, 17-6](#)
 - learning [17-6](#)
 - listening [17-6](#)
 - overview [17-4](#)
- interoperability and compatibility among modes [17-10](#)
- keepalive messages [17-2](#)
- Layer 2 protocol tunneling [16-8](#)
- limitations with IEEE 802.1Q trunks [17-10](#)
- load sharing
 - overview [12-24](#)
 - using path costs [12-26](#)
 - using port priorities [12-24](#)
- loop guard
 - described [19-9](#)
 - enabling [19-15](#)
- modes supported [17-9](#)
- multicast addresses, effect of [17-8](#)
- optional features supported [1-7](#)
- overview [17-2](#)
- path costs [12-26](#)
- Port Fast
 - described [19-2](#)
 - enabling [19-10](#)
- port priorities [12-25](#)
- preventing root switch selection [19-8](#)
- protocols supported [17-9](#)
- redundant connectivity [17-8](#)
- root guard
 - described [19-8](#)
 - enabling [19-15](#)
- root port, defined [17-3](#)

STP (continued)

- root switch
 - configuring [17-15](#)
 - effects of extended system ID [17-4, 17-14](#)
 - election [17-3](#)
 - unexpected behavior [17-15](#)
- shutdown Port Fast-enabled port [19-2](#)
- status, displaying [17-22](#)
- superior BPDU [17-3](#)
- timers, described [17-20](#)
- UplinkFast
 - described [19-3](#)
 - enabling [19-13](#)
- VLAN-bridge [17-10](#)
- stratum, NTP [6-2](#)
- stub areas, OSPF [35-28](#)
- stub routing, EIGRP [35-39](#)
- subdomains, private VLAN [14-1](#)
- subnet mask [35-5](#)
- subnet zero [35-6](#)
- success response, VMPS [12-28](#)
- summer time [6-13](#)
- SunNet Manager [1-5](#)
- supernet [35-6](#)
- SVIs
 - and IP unicast routing [35-3](#)
 - and router ACLs [32-4](#)
 - connecting VLANs [10-9](#)
 - defined [10-4](#)
 - routing between VLANs [12-2](#)
- switch clustering technology [5-1](#)
 - See also clusters, switch
- switch console port [1-6](#)
- Switch Database Management
 - See SDM
- switched packets, ACLs on [32-37](#)
- Switched Port Analyzer
 - See SPAN
- switched ports [10-2](#)
- switchport block multicast command [24-7](#)
- switchport block unicast command [24-7](#)
- switchport command [10-14](#)
- switchport mode dot1q-tunnel command [16-6](#)
- switchport protected command [24-6](#)
- switch priority
 - MSTP [18-21](#)
 - STP [17-19](#)
- switch software features [1-1](#)
- switch virtual interface
 - See SVI
- synchronization, BGP [35-45](#)
- syslog
 - See system message logging
- system capabilities TLV [26-2](#)
- system clock
 - configuring
 - daylight saving time [6-13](#)
 - manually [6-11](#)
 - summer time [6-13](#)
 - time zones [6-12](#)
 - displaying the time and date [6-12](#)
 - overview [6-1](#)
 - See also NTP
- system description TLV [26-2](#)
- system message logging
 - default configuration [30-3](#)
 - defining error message severity levels [30-8](#)
 - disabling [30-4](#)
 - displaying the configuration [30-13](#)
 - enabling [30-4](#)
 - facility keywords, described [30-13](#)
 - level keywords, described [30-9](#)
 - limiting messages [30-10](#)
 - message format [30-2](#)
 - overview [30-1](#)
 - sequence numbers, enabling and disabling [30-8](#)
 - setting the display destination device [30-5](#)
 - synchronizing log messages [30-6](#)

system message logging (continued)

- syslog facility [1-12](#)
- time stamps, enabling and disabling [30-7](#)
- UNIX syslog servers
 - configuring the daemon [30-12](#)
 - configuring the logging facility [30-12](#)
 - facilities supported [30-13](#)
- system MTU and IEEE 802.1Q tunneling [16-5](#)
- system name
 - default configuration [6-15](#)
 - default setting [6-15](#)
 - manual configuration [6-15](#)
 - See also DNS
- system name TLV [26-2](#)
- system prompt, default setting [6-14, 6-15](#)
- system resources, optimizing [7-1](#)

T**TACACS+**

- accounting, defined [8-11](#)
- authentication, defined [8-11](#)
- authorization, defined [8-11](#)
- configuring
 - accounting [8-17](#)
 - authentication key [8-13](#)
 - authorization [8-16](#)
 - login authentication [8-14](#)
- default configuration [8-13](#)
- displaying the configuration [8-17](#)
- identifying the server [8-13](#)
- in clusters [5-14](#)
- limiting the services to the user [8-16](#)
- operation of [8-12](#)
- overview [8-10](#)
- support for [1-9](#)
- tracking services accessed by user [8-17](#)

tagged packets

- IEEE 802.1Q [16-3](#)
- Layer 2 protocol [16-8](#)

tar files

- creating [B-6](#)
- displaying the contents of [B-7](#)
- extracting [B-7](#)
- image file format [B-26](#)

TDR [1-12](#)

Telnet

- accessing management interfaces [2-10](#)
- number of connections [1-6](#)
- setting a password [8-6](#)

templates, SDM [7-1](#)temporary self-signed certificate [8-43](#)Terminal Access Controller Access Control System Plus
See TACACS+terminal lines, setting a password [8-6](#)

TFTP

- configuration files
 - downloading [B-11](#)
 - preparing the server [B-11](#)
 - uploading [B-12](#)
- configuration files in base directory [3-6](#)
- configuring for autoconfiguration [3-6](#)
- image files
 - deleting [B-29](#)
 - downloading [B-28](#)
 - preparing the server [B-27](#)
 - uploading [B-30](#)
- limiting access by servers [31-16](#)

TFTP server [1-5](#)threshold, traffic level [24-2](#)threshold monitoring, IP SLAs [40-5](#)

time

- See NTP and system clock

Time Domain Reflector

See TDR

time-range command [32-16](#)

time ranges in ACLs [32-16](#)

time stamps in log messages [30-7](#)

time zones [6-12](#)

TLVs

defined [26-2](#)

LLDP [26-2](#)

LLDP-MED [26-2](#)

Token Ring VLANs

support for [12-6](#)

VTP support [13-4](#)

ToS [1-10](#)

traceroute, Layer 2

and ARP [46-15](#)

and CDP [46-15](#)

broadcast traffic [46-15](#)

described [46-15](#)

IP addresses and subnets [46-15](#)

MAC addresses and VLANs [46-15](#)

multicast traffic [46-15](#)

multiple devices on a port [46-16](#)

unicast traffic [46-15](#)

usage guidelines [46-15](#)

traceroute command [46-17](#)

See also IP traceroute

tracked lists

configuring [41-3](#)

types [41-3](#)

tracked objects

by Boolean expression [41-4](#)

by threshold percentage [41-6](#)

by threshold weight [41-5](#)

tracking interface line-protocol state [41-2](#)

tracking IP routing state [41-2](#)

tracking objects [41-1](#)

tracking process [41-1](#)

track state, tracking IP SLAs [41-9](#)

traffic

blocking flooded [24-7](#)

fragmented [32-5](#)

fragmented IPv6 [38-3](#)

unfragmented [32-5](#)

traffic policing [1-10](#)

traffic suppression [24-1](#)

transmit hold-count

see STP

transparent mode, VTP [13-3, 13-12](#)

trap-door mechanism [3-2](#)

traps

configuring MAC address notification [6-22](#)

configuring managers [31-12](#)

defined [31-3](#)

enabling [6-22, 31-12](#)

notification types [31-12](#)

overview [31-1, 31-5](#)

troubleshooting

connectivity problems [46-13, 46-14, 46-16](#)

detecting unidirectional links [27-1](#)

displaying crash information [46-23](#)

PIMv1 and PIMv2 interoperability problems [43-24](#)

setting packet forwarding [46-20](#)

SFP security and identification [46-12](#)

show forward command [46-20](#)

with CiscoWorks [31-4](#)

with debug commands [46-19](#)

with ping [46-13](#)

with system message logging [30-1](#)

with traceroute [46-16](#)

trunk failover

See link-state tracking

trunking encapsulation [1-7](#)

trunk ports

configuring [12-20](#)

defined [10-3, 12-3](#)

encapsulation [12-20, 12-25, 12-26](#)

trunks

- allowed-VLAN list [12-21](#)
- configuring [12-20, 12-25, 12-26](#)
- ISL [12-16](#)
- load sharing
 - setting STP path costs [12-26](#)
 - using STP port priorities [12-24, 12-25](#)
- native VLAN for untagged traffic [12-23](#)
- parallel [12-26](#)
- pruning-eligible list [12-22](#)
- to non-DTP device [12-17](#)

trusted boundary for QoS [33-38](#)

trusted port states

- between QoS domains [33-40](#)
- classification options [33-5](#)
- ensuring port security for IP phones [33-38](#)
- support for [1-10](#)
- within a QoS domain [33-36](#)

trustpoints, CA [8-43](#)

tunneling

- defined [16-1](#)
- IEEE 802.1Q [16-1](#)
- Layer 2 protocol [16-8](#)

tunnel ports

- defined [12-4](#)
- described [10-3, 16-1](#)
- IEEE 802.1Q, configuring [16-6](#)
- incompatibilities with other features [16-6](#)

twisted-pair Ethernet, detecting unidirectional links [27-1](#)

type of service

See ToS

U

UDLD

- configuration guidelines [27-4](#)
- default configuration [27-4](#)
- disabling
 - globally [27-5](#)
 - on fiber-optic interfaces [27-5](#)
 - per interface [27-5](#)
- echoing detection mechanism [27-2](#)
- enabling
 - globally [27-5](#)
 - per interface [27-5](#)
- Layer 2 protocol tunneling [16-10](#)
- link-detection mechanism [27-1](#)
- neighbor database [27-2](#)
- overview [27-1](#)
- resetting an interface [27-6](#)
- status, displaying [27-6](#)
- support for [1-6](#)

UDP, configuring [35-14](#)

UDP jitter, configuring [40-8](#)

UDP jitter operation, IP SLAs [40-8](#)

unauthorized ports with IEEE 802.1x [9-7](#)

unicast MAC address filtering [1-5](#)

and adding static addresses [6-25](#)

and broadcast MAC addresses [6-25](#)

and CPU packets [6-25](#)

and multicast addresses [6-25](#)

and router MAC addresses [6-25](#)

configuration guidelines [6-25](#)

described [6-25](#)

unicast storm [24-1](#)

unicast storm control command [24-4](#)

unicast traffic, blocking [24-7](#)

UniDirectional Link Detection protocol

See UDLD

UNIX syslog servers

- daemon configuration [30-12](#)
- facilities supported [30-13](#)
- message logging configuration [30-12](#)

unrecognized Type-Length-Value (TLV) support [13-4](#)

upgrading information

- See release notes

upgrading software images

- See downloading

UplinkFast

- described [19-3](#)
- disabling [19-13](#)
- enabling [19-13](#)
- support for [1-6](#)

uploading

configuration files

- preparing [B-11](#), [B-13](#), [B-16](#)
- reasons for [B-9](#)
- using FTP [B-15](#)
- using RCP [B-18](#)
- using TFTP [B-12](#)

image files

- preparing [B-27](#), [B-31](#), [B-36](#)
- reasons for [B-25](#)
- using FTP [B-34](#)
- using RCP [B-39](#)
- using TFTP [B-30](#)

User Datagram Protocol

- See UDP

user EXEC mode [2-2](#)username-based authentication [8-6](#)**V**version-dependent transparent mode [13-4](#)

virtual IP address

- cluster standby group [5-11](#)
- command switch [5-11](#)

Virtual Private Network

- See VPN

virtual router [39-1](#), [39-2](#)vlan.dat file [12-5](#)VLAN 1, disabling on a trunk port [12-22](#)VLAN 1 minimization [12-21](#)

VLAN ACLs

- See VLAN maps

vlan-assignment response, VMPS [12-28](#)

VLAN configuration

- at bootup [12-8](#)
- saving [12-8](#)

VLAN configuration mode [2-2](#), [12-7](#)

VLAN database

- and startup configuration file [12-8](#)
- and VTP [13-1](#)
- VLAN configuration saved in [12-7](#)
- VLANs saved in [12-4](#)

vlan database command [12-7](#)vlan dot1q tag native command [16-5](#)VLAN filtering and SPAN [28-6](#)vlan global configuration command [12-7](#)VLAN ID, discovering [6-26](#)VLAN load balancing on flex links [20-2](#)

- configuration guidelines [20-5](#)

VLAN management domain [13-2](#)

VLAN Management Policy Server

- See VMPS

VLAN map entries, order of [32-29](#)

VLAN maps

- applying [32-33](#)
- common uses for [32-33](#)
- configuration guidelines [32-29](#)
- configuring [32-28](#)
- creating [32-30](#)
- defined [32-2](#)
- denying access to a server example [32-34](#)
- denying and permitting packets [32-30](#)

VLAN maps (continued)

- displaying [32-40](#)
- examples of ACLs and VLAN maps [32-31](#)
- removing [32-33](#)
- support for [1-8](#)
- wiring closet configuration example [32-34](#)

VLAN membership

- confirming [12-31](#)
- modes [12-3](#)

VLAN Query Protocol

See VQP

VLANs

- adding [12-9](#)
- adding to VLAN database [12-9](#)
- aging dynamic addresses [17-9](#)
- allowed on trunk [12-21](#)
- and spanning-tree instances [12-3, 12-6, 12-13](#)
- configuration guidelines, extended-range VLANs [12-13](#)
- configuration guidelines, normal-range VLANs [12-6](#)
- configuration options [12-7](#)
- configuring [12-1](#)
- configuring IDs 1006 to 4094 [12-13](#)
- connecting through SVIs [10-9](#)
- creating in config-vlan mode [12-9](#)
- creating in VLAN configuration mode [12-10](#)
- customer numbering in service-provider networks [16-3](#)
- default configuration [12-8](#)
- deleting [12-10](#)
- described [10-2, 12-1](#)
- displaying [12-16](#)
- extended-range [12-1, 12-12](#)
- features [1-7](#)
- illustrated [12-2](#)
- internal [12-13](#)

VLANs (continued)

- limiting source traffic with RSPAN [28-23](#)
- limiting source traffic with SPAN [28-15](#)
- modifying [12-9](#)
- multicast [23-17](#)
- native, configuring [12-23](#)
- normal-range [12-1, 12-4](#)
- number supported [1-7](#)
- parameters [12-5](#)
- port membership modes [12-3](#)
- static-access ports [12-11](#)
- STP and IEEE 802.1Q trunks [17-10](#)
- supported [12-2](#)
- Token Ring [12-6](#)
- traffic between [12-2](#)
- VLAN-bridge STP [17-10, 45-2](#)
- VTP modes [13-3](#)

VLAN Trunking Protocol

See VTP

VLAN trunks [12-16](#)**VMPS**

- administering [12-32](#)
- configuration example [12-33](#)
- configuration guidelines [12-29](#)
- default configuration [12-29](#)
- description [12-27](#)
- dynamic port membership
 - described [12-28](#)
 - reconfirming [12-31](#)
 - troubleshooting [12-33](#)
- entering server address [12-30](#)
- mapping MAC addresses to VLANs [12-28](#)
- monitoring [12-32](#)
- reconfirmation interval, changing [12-31](#)
- reconfirming membership [12-31](#)
- retry count, changing [12-32](#)

- voice-over-IP [15-1](#)
- voice VLAN
 - Cisco 7960 phone, port connections [15-1](#)
 - configuration guidelines [15-3](#)
 - configuring IP phones for data traffic
 - override CoS of incoming frame [15-6](#)
 - trust CoS priority of incoming frame [15-6](#)
 - configuring ports for voice traffic in
 - 802.1p priority tagged frames [15-5](#)
 - 802.1Q frames [15-5](#)
 - connecting to an IP phone [15-4](#)
 - default configuration [15-3](#)
 - described [15-1](#)
 - displaying [15-7](#)
 - IP phone data traffic, described [15-2](#)
 - IP phone voice traffic, described [15-2](#)
- VPN
 - configuring routing in [35-70](#)
 - forwarding [35-63](#)
 - in service provider networks [35-61](#)
 - routes [35-62](#)
- VPN routing and forwarding table
 - See VRF
- VQP [1-7, 12-27](#)
- VRF
 - defining [35-63](#)
 - tables [35-61](#)
- VRF-aware services
 - ARP [35-67](#)
 - configuring [35-67](#)
 - ftp [35-70](#)
 - HSRP [35-68](#)
 - ping [35-67](#)
 - SNMP [35-68](#)
 - syslog [35-69](#)
 - tftp [35-70](#)
 - traceroute [35-70](#)
 - uRPF [35-69](#)
- VTP
 - adding a client to a domain [13-14](#)
 - advertisements [12-19, 13-3](#)
 - and extended-range VLANs [13-1](#)
 - and normal-range VLANs [13-1](#)
 - client mode, configuring [13-11](#)
 - configuration
 - global configuration mode [13-7](#)
 - guidelines [13-8](#)
 - privileged EXEC mode [13-7](#)
 - requirements [13-9](#)
 - saving [13-7](#)
 - VLAN configuration mode [13-7](#)
 - configuration mode options [13-7](#)
 - configuration requirements [13-9](#)
 - configuration revision number
 - guideline [13-14](#)
 - resetting [13-15](#)
 - configuring
 - client mode [13-11](#)
 - server mode [13-9](#)
 - transparent mode [13-12](#)
 - consistency checks [13-4](#)
 - default configuration [13-6](#)
 - described [13-1](#)
 - disabling [13-12](#)
 - domain names [13-8](#)
 - domains [13-2](#)
 - Layer 2 protocol tunneling [16-8](#)
 - modes
 - client [13-3, 13-11](#)
 - server [13-3, 13-9](#)
 - transitions [13-3](#)
 - transparent [13-3, 13-12](#)
 - monitoring [13-16](#)
 - passwords [13-8](#)

VTP (continued)

- pruning
 - disabling [13-14](#)
 - enabling [13-14](#)
 - examples [13-5](#)
 - overview [13-4](#)
 - support for [1-7](#)
- pruning-eligible list, changing [12-22](#)
- server mode, configuring [13-9](#)
- statistics [13-16](#)
- support for [1-7](#)
- Token Ring support [13-4](#)
- transparent mode, configuring [13-12](#)
- using [13-1](#)
- version, guidelines [13-8](#)
- Version 1 [13-4](#)
- Version 2
 - configuration guidelines [13-8](#)
 - disabling [13-13](#)
 - enabling [13-13](#)
 - overview [13-4](#)

W**WCCP**

- authentication [42-3](#)
- configuration guidelines [42-5](#)
- default configuration [42-5](#)
- described [42-1](#)
- displaying [42-9](#)
- dynamic service groups [42-3](#)
- enabling [42-6](#)
- features unsupported [42-4](#)
- forwarding method [42-3](#)
- Layer-2 header rewrite [42-3](#)
- MD5 security [42-3](#)
- message exchange [42-2](#)
- monitoring and maintaining [42-9](#)
- negotiation [42-3](#)

WCCP (continued)

- packet redirection [42-3](#)
- packet-return method [42-3](#)
- redirecting traffic received from a client [42-6](#)
- setting the password [42-6](#)
- unsupported WCCPv2 features [42-4](#)
- web authentication
 - configuring [9-41 to 9-43](#)
 - described [1-8, 9-20](#)
 - fallback for IEEE 802.1x [9-42](#)
- Web Cache Communication Protocol
 - See WCCP
- weighted tail drop
 - See WTD
- weight thresholds in tracked lists [41-5](#)
- wizards [1-3](#)
- WTD
 - described [33-13](#)
 - setting thresholds
 - egress queue-sets [33-71](#)
 - ingress queues [33-67](#)
 - support for [1-10, 1-11](#)

X

- Xmodem protocol [46-2](#)

