



INDEX

A

AAA down policy, NAC Layer 2 IP validation [1-9](#)

abbreviating commands [2-4](#)

ABRs [39-24](#)

access-class command [36-18](#)

access control entries

See ACEs

access control entry (ACE) [43-3](#)

access-denied response, VMPS [15-24](#)

access groups

applying IPv4 ACLs to interfaces [36-19](#)

Layer 2 [36-19](#)

Layer 3 [36-19](#)

accessing

clusters, switch [6-12](#)

command switches [6-10](#)

member switches [6-12](#)

switch clusters [6-12](#)

access lists

See ACLs

access ports

and Layer 2 protocol tunneling [19-10](#)

defined [13-2](#)

in switch clusters [6-8](#)

accounting

with 802.1x [10-48](#)

with IEEE 802.1x [10-14](#)

with RADIUS [9-35](#)

with TACACS+ [9-11, 9-17](#)

ACEs

and QoS [37-7](#)

defined [36-2](#)

Ethernet [36-2](#)

IP [36-2](#)

ACLs

ACEs [36-2](#)

any keyword [36-11](#)

applying

time ranges to [36-15](#)

to an interface [36-18, 43-7](#)

to IPv6 interfaces [43-7](#)

to QoS [37-7](#)

classifying traffic for QoS [37-42](#)

comments in [36-17](#)

compiling [36-21](#)

defined [36-1, 36-5](#)

examples of [36-21, 37-42](#)

extended IP, configuring for QoS
classification [37-43](#)

extended IPv4

creating [36-8](#)

matching criteria [36-5](#)

hardware and software handling [36-20](#)

host keyword [36-11](#)

IP

creating [36-5](#)

fragments and QoS guidelines [37-32](#)

implicit deny [36-8, 36-13, 36-15](#)

implicit masks [36-8](#)

matching criteria [36-5](#)

undefined [36-20](#)

IPv4

applying to interfaces [36-18](#)

creating [36-5](#)

matching criteria [36-5](#)

- named 36-13
- numbers 36-6
- terminal lines, setting on 36-18
- unsupported features 36-5
- IPv6
 - applying to interfaces 43-7
 - configuring 43-3, 43-4
 - displaying 43-8
 - interactions with other features 43-4
 - limitations 43-2, 43-3
 - matching criteria 43-3
 - named 43-2
 - precedence of 43-2
 - supported 43-2
 - unsupported features 43-3
- logging messages 36-7
- MAC extended 36-26, 37-44
- matching 36-5, 36-19, 43-3
- monitoring 36-29, 43-8
- named, IPv4 36-13
- named, IPv6 43-2
- names 43-4
- number per QoS class map 37-32
- port 43-1
- QoS 37-7, 37-42
- resequencing entries 36-13
- router 43-1
- standard IP, configuring for QoS classification 37-42
- standard IPv4
 - creating 36-7
 - matching criteria 36-5
- support for 1-7
- support in hardware 36-20
- time ranges 36-15
- types supported 36-2
- unsupported features, IPv4 36-5
- unsupported features, IPv6 43-3
- active link 24-4, 24-5, 24-6
- active links 24-2
- active router 44-1
- active traffic monitoring, IP SLAs 45-1
- addresses
 - displaying the MAC address table 8-23
 - dynamic
 - accelerated aging 20-8
 - changing the aging time 8-14
 - default aging 20-8
 - defined 8-12
 - learning 8-13
 - removing 8-15
 - IPv6 40-2
 - MAC, discovering 8-23
 - multicast
 - STP address management 20-8
 - static
 - adding and removing 8-19
 - defined 8-12
- address resolution 8-23, 39-8
- Address Resolution Protocol
 - See ARP
- adjacency tables, with CEF 39-87
- administrative distances
 - defined 39-99
 - OSPF 39-30
 - routing protocol defaults 39-89
- administrative VLAN
 - REP, configuring 23-8
- administrative VLAN, REP 23-8
- advertisements
 - CDP 30-1
 - LLDP 29-1, 29-2
 - RIP 39-18
 - VTP 15-16, 16-3
- age timer, REP 23-8
- aggregatable global unicast addresses 40-3
- aggregate addresses, BGP 39-57
- aggregated ports
 - See EtherChannel

- aggregate policers [37-57](#)
- aggregate policing [1-11](#)
- aging, accelerating [20-8](#)
- aging time
 - accelerated
 - for MSTP [21-23](#)
 - for STP [20-8, 20-21](#)
 - MAC address table [8-14](#)
 - maximum
 - for MSTP [21-23, 21-24](#)
 - for STP [20-21, 20-22](#)
- alarm profiles
 - configuring [3-12](#)
 - creating or modifying [3-11](#)
- alarms
 - displaying [3-13](#)
 - power supply [3-2](#)
 - temperature [3-2](#)
- alarms, RMON [32-3](#)
- allowed-VLAN list [15-18](#)
- application engines, redirecting traffic to [47-1](#)
- area border routers
 - See ABRs
- area routing
 - IS-IS [39-62](#)
 - ISO IGRP [39-62](#)
- ARP
 - configuring [39-9](#)
 - defined [1-4, 8-23, 39-8](#)
 - encapsulation [39-10](#)
 - static cache configuration [39-9](#)
 - table
 - address resolution [8-23](#)
 - managing [8-23](#)
- ASBRs [39-24](#)
- AS-path filters, BGP [39-52](#)
- associating the temperature alarms to a relay [3-9](#)
- asymmetrical links, and IEEE 802.1Q tunneling [19-4](#)
- attaching an alarm profile to a port [3-12](#)
- attributes, RADIUS
 - vendor-proprietary [9-38](#)
 - vendor-specific [9-36](#)
- attribute-value pairs [10-12, 10-15, 10-20](#)
- authentication
 - EIGRP [39-38](#)
 - HSRP [44-10](#)
 - local mode with AAA [9-44](#)
 - open1x [10-29](#)
 - RADIUS
 - key [9-28](#)
 - login [9-30](#)
 - TACACS+
 - defined [9-11](#)
 - key [9-13](#)
 - login [9-14](#)

See also port-based authentication
- authentication compatibility with Catalyst 6000 switches [10-8](#)
- authentication failed VLAN
 - See restricted VLAN
- authentication keys, and routing protocols [39-99](#)
- authentication manager
 - CLI commands [10-9](#)
 - compatibility with older 802.1x CLI commands [10-9 to ??](#)
 - overview [10-7](#)
- authoritative time source, described [8-2](#)
- authorization
 - with RADIUS [9-34](#)
 - with TACACS+ [9-11, 9-16](#)
- authorized ports with IEEE 802.1x [10-10](#)
- autoconfiguration [4-3](#)
- auto enablement [10-30](#)
- automatic discovery
 - considerations
 - beyond a noncandidate device [6-7](#)
 - brand new switches [6-8](#)
 - connectivity [6-4](#)

- different VLANs [6-6](#)
- management VLANs [6-7](#)
- non-CDP-capable devices [6-6](#)
- noncluster-capable devices [6-6](#)
- in switch clusters [6-4](#)
- See also CDP
- automatic QoS
 - See QoS
- auto-MDIX
 - configuring [13-20](#)
 - described [13-19](#)
- autonegotiation
 - duplex mode [1-2](#)
 - interface configuration guidelines [13-17](#)
 - mismatches [36-4](#)
- autonomous system boundary routers
 - See ASBRs
- autonomous systems, in BGP [39-45](#)
- autosensing, port speed [1-2](#)
- Auto Smartports macros
 - displaying [14-5](#)
- auxiliary VLAN
 - See voice VLAN
- availability, features [1-5](#)

B

- BackboneFast
 - described [22-5](#)
 - disabling [22-14](#)
 - enabling [22-13](#)
- backup interfaces
 - See Flex Links
- backup links [24-2](#)
- backup static routing, configuring [46-11](#)
- banners
 - configuring
 - login [8-12](#)
 - message-of-the-day login [8-11](#)
- default configuration [8-10](#)
- when displayed [8-10](#)
- Berkeley r-tools replacement [9-56](#)
- BGP
 - aggregate addresses [39-57](#)
 - aggregate routes, configuring [39-57](#)
 - CIDR [39-57](#)
 - clear commands [39-61](#)
 - community filtering [39-54](#)
 - configuring neighbors [39-55](#)
 - default configuration [39-43](#)
 - described [39-42](#)
 - enabling [39-45](#)
 - monitoring [39-61](#)
 - multipath support [39-49](#)
 - neighbors, types of [39-45](#)
 - path selection [39-49](#)
 - peers, configuring [39-55](#)
 - prefix filtering [39-53](#)
 - resetting sessions [39-48](#)
 - route dampening [39-60](#)
 - route maps [39-51](#)
 - route reflectors [39-59](#)
 - routing domain confederation [39-58](#)
 - routing session with multi-VRF CE [39-81](#)
 - show commands [39-61](#)
 - supernets [39-57](#)
 - support for [1-11](#)
 - Version 4 [39-42](#)
- binding cluster group and HSRP group [44-12](#)
- binding database
 - address, DHCP server
 - See DHCP, Cisco IOS server database
 - DHCP snooping
 - See DHCP snooping binding database
- bindings
 - address, Cisco IOS DHCP server [25-7](#)
 - DHCP snooping database [25-7](#)
 - IP source guard [25-16](#)

binding table, DHCP snooping
 See DHCP snooping binding database

blocking packets [27-6](#)

Boolean expressions in tracked lists [46-4](#)

booting

- boot loader, function of [4-2](#)
- boot process [4-1](#)
- manually [4-18](#)
- specific image [4-19](#)

boot loader

- accessing [4-19](#)
- described [4-2](#)
- environment variables [4-19](#)
- prompt [4-19](#)
- trap-door mechanism [4-2](#)

Border Gateway Protocol

- See BGP

BPDU

- error-disabled state [22-2](#)
- filtering [22-3](#)
- RSTP format [21-12](#)

BPDU filtering

- described [22-3](#)
- disabling [22-12](#)
- enabling [22-12](#)
- support for [1-6](#)

BPDU guard

- described [22-2](#)
- disabling [22-12](#)
- enabling [22-11](#)
- support for [1-6](#)

bridge groups

- See fallback bridging

bridge protocol data unit

- See BPDU

broadcast flooding [39-16](#)

broadcast packets

- directed [39-13](#)
- flooded [39-13](#)

broadcast storm-control command [27-4](#)

broadcast storms [27-1, 39-13](#)

C

cables, monitoring for unidirectional links [31-1](#)

candidate switch

- automatic discovery [6-4](#)
- defined [6-3](#)
- requirements [6-3](#)

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

Catalyst 6000 switches

- authentication compatibility [10-8](#)

CA trustpoint

- configuring [9-53](#)
- defined [9-50](#)

CDP

- and trusted boundary [37-38](#)
- automatic discovery in switch clusters [6-4](#)
- configuring [30-2](#)
- default configuration [30-2](#)
- defined with LLDP [29-1](#)
- described [30-1](#)
- disabling for routing device [30-4](#)
- enabling and disabling
 - on an interface [30-4](#)
 - on a switch [30-4](#)
- Layer 2 protocol tunneling [19-7](#)
- monitoring [30-5](#)
- overview [30-1](#)
- power negotiation extensions [13-4](#)
- support for [1-4](#)
- transmission timer and holdtime, setting [30-3](#)
- updates [30-3](#)

CEF

- defined [39-86](#)
- enabling [39-87](#)
- IPv6 [40-18](#)

- CGMP
 - switch support of [1-3](#)
- CIDR [39-57](#)
- CipherSuites [9-52](#)
- Cisco 7960 IP Phone [17-1](#)
- Cisco Discovery Protocol
 - See CDP
- Cisco Express Forwarding
 - See CEF
- Cisco Group Management Protocol
 - See CGMP
- Cisco intelligent power management [13-4](#)
- Cisco IOS DHCP server
 - See DHCP, Cisco IOS DHCP server
- Cisco IOS File System
 - See IFS
- Cisco IOS IP SLAs [45-1](#)
- Cisco Secure ACS
 - attribute-value pairs for downloadable ACLs [10-20](#)
 - attribute-value pairs for redirect URL [10-20](#)
- Cisco Secure ACS configuration guide [10-59](#)
- Cisco TrustSec
 - configuring [12-9](#)
 - connection caching [12-8](#)
- Cisco TrustSec caching
 - clearing [12-9](#)
 - enabling [12-8](#)
- CiscoWorks 2000 [1-4, 34-4](#)
- CISP [10-30](#)
- CIST regional root
 - See MSTP
- CIST root
 - See MSTP
- civic location [29-3](#)
- classless interdomain routing
 - See CIDR
- classless routing [39-6](#)
- class maps for QoS
 - configuring [37-45](#)
 - described [37-7](#)
 - displaying [37-77](#)
- class of service
 - See CoS
- clearing interfaces [13-28](#)
- CLI
 - abbreviating commands [2-4](#)
 - command modes [2-1](#)
 - configuration logging [2-5](#)
 - described [1-3](#)
 - editing features
 - enabling and disabling [2-7](#)
 - keystroke editing [2-8](#)
 - wrapped lines [2-9](#)
 - error messages [2-5](#)
 - filtering command output [2-10](#)
 - getting help [2-3](#)
 - history
 - changing the buffer size [2-6](#)
 - described [2-6](#)
 - disabling [2-7](#)
 - recalling commands [2-6](#)
 - managing clusters [6-13](#)
 - no and default forms of commands [2-4](#)
- Client Information Signalling Protocol
 - See CISP
- client mode, VTP [16-3](#)
- client processes, tracking [46-1](#)
- CLNS
 - See ISO CLNS
- clock
 - See system clock
- clusters, switch
 - accessing [6-12](#)
 - automatic discovery [6-4](#)
 - benefits [1-2](#)
 - compatibility [6-4](#)
 - described [6-1](#)
 - LRE profile considerations [6-13](#)

- managing
 - through CLI [6-13](#)
 - through SNMP [6-14](#)
- planning [6-4](#)
- planning considerations
 - automatic discovery [6-4](#)
 - CLI [6-13](#)
 - host names [6-12](#)
 - IP addresses [6-12](#)
 - LRE profiles [6-13](#)
 - passwords [6-12](#)
 - RADIUS [6-13](#)
 - SNMP [6-13, 6-14](#)
 - TACACS+ [6-13](#)

See also candidate switch, command switch, cluster standby group, member switch, and standby command switch
- cluster standby group
 - and HSRP group [44-12](#)
 - automatic recovery [6-11](#)
 - considerations [6-10](#)
 - defined [6-2](#)
 - requirements [6-3](#)
 - virtual IP address [6-10](#)
- CNS [1-4](#)
- Configuration Engine
 - configID, deviceID, hostname [5-3](#)
 - configuration service [5-2](#)
 - described [5-1](#)
 - event service [5-3](#)
- embedded agents
 - described [5-5](#)
 - enabling automated configuration [5-6](#)
 - enabling configuration agent [5-9](#)
 - enabling event agent [5-7](#)
- management functions [1-4](#)
- CoA Request Commands [9-24](#)
- command-line interface
 - See CLI
- command modes [2-1](#)
- commands
 - abbreviating [2-4](#)
 - no and default [2-4](#)
- commands, setting privilege levels [9-8](#)
- command switch
 - accessing [6-10](#)
 - configuration conflicts [36-4](#)
 - defined [6-1](#)
 - password privilege levels [6-14](#)
 - recovery
 - from lost member connectivity [36-4](#)
 - requirements [6-3](#)
 - See also candidate switch, cluster standby group, member switch, and standby command switch
- community list, BGP [39-54](#)
- community ports [18-2](#)
- community strings
 - configuring [6-13, 34-9](#)
 - in clusters [6-13](#)
 - overview [34-4](#)
 - SNMP [6-13](#)
- community VLANs [18-2, 18-3](#)
- compatibility, feature [27-11](#)
- config.text [4-17](#)
- configuration, initial
 - defaults [1-13](#)
- configuration changes, logging [33-10](#)
- configuration conflicts, recovering from lost member connectivity [36-4](#)
- configuration examples, network [1-16](#)
- configuration files
 - archiving [A-19](#)
 - clearing the startup configuration [A-19](#)
 - creating using a text editor [A-10](#)
 - default name [4-17](#)
 - deleting a stored configuration [A-19](#)
 - described [A-9](#)
 - downloading

- automatically [4-17](#)
 - preparing [A-10, A-13, A-16](#)
 - reasons for [A-9](#)
 - using FTP [A-13](#)
 - using RCP [A-17](#)
 - using TFTP [A-11](#)
 - guidelines for creating and using [A-9](#)
 - guidelines for replacing and rolling back [A-20](#)
 - invalid combinations when copying [A-6](#)
 - limiting TFTP server access [34-17](#)
 - obtaining with DHCP [4-9](#)
 - password recovery disable considerations [9-5](#)
 - replacing a running configuration [A-19, A-20](#)
 - rolling back a running configuration [A-19, A-20](#)
 - specifying the filename [4-17](#)
 - system contact and location information [34-17](#)
 - types and location [A-10](#)
 - uploading
 - preparing [A-10, A-13, A-16](#)
 - reasons for [A-9](#)
 - using FTP [A-14](#)
 - using RCP [A-18](#)
 - using TFTP [A-12](#)
 - configuration guidelines
 - REP [23-7](#)
 - configuration guidelines, multi-VRF CE [39-74](#)
 - configuration logger [33-10](#)
 - configuration logging [2-5](#)
 - configuration replacement [A-19](#)
 - configuration rollback [A-19](#)
 - configuration settings, saving [4-15](#)
 - configure terminal command [13-10](#)
 - configuring 802.1x user distribution [10-55](#)
 - configuring port-based authentication violation modes [10-38 to 10-39](#)
 - config-vlan mode [2-2](#)
 - conflicts, configuration [36-4](#)
 - connections, secure remote [9-46](#)
 - connectivity problems [36-6, 36-8](#)
 - consistency checks in VTP Version 2 [16-4](#)
 - console port, connecting to [2-10](#)
 - content-routing technology
 - See WCCP
 - control protocol, IP SLAs [45-4](#)
 - convergence
 - REP [23-4](#)
 - corrupted software, recovery steps with Xmodem [36-2](#)
 - CoS
 - override priority [17-6](#)
 - trust priority [17-6](#)
 - CoS input queue threshold map for QoS [37-15](#)
 - CoS output queue threshold map for QoS [37-17](#)
 - CoS-to-DSCP map for QoS [37-60](#)
 - counters, clearing interface [13-28](#)
 - CPU utilization, troubleshooting [36-15](#)
 - crashinfo file [36-14](#)
 - critical authentication, IEEE 802.1x [10-51](#)
 - critical VLAN [10-23](#)
 - cryptographic software image
 - Kerberos [9-40](#)
 - SSH [9-45](#)
 - SSL [9-50](#)
 - CTS
 - configuring [12-9](#)
 - customer edge devices [39-72](#)
 - customizable web pages, web-based authentication [11-5](#)
-
- ## D
- See downloadable ACL
 - daylight saving time [8-6](#)
 - debugging
 - enabling all system diagnostics [36-12](#)
 - enabling for a specific feature [36-11](#)
 - redirecting error message output [36-12](#)
 - using commands [36-11](#)
 - default commands [2-4](#)

- default configuration
 - 802.1x [10-33](#)
 - auto-QoS [37-19](#)
 - banners [8-10](#)
 - BGP [39-43](#)
 - booting [4-17](#)
 - CDP [30-2](#)
 - DHCP [25-9](#)
 - DHCP option 82 [25-9](#)
 - DHCP snooping [25-9](#)
 - DHCP snooping binding database [25-9](#)
 - DNS [8-9](#)
 - dynamic ARP inspection [26-5](#)
 - EIGRP [39-34](#)
 - EtherChannel [38-9](#)
 - Ethernet interfaces [13-14](#)
 - fallback bridging [48-3](#)
 - Flex Links [24-8](#)
 - HSRP [44-5](#)
 - IEEE 802.1Q tunneling [19-4](#)
 - IGMP snooping [42-5, 42-6](#)
 - initial switch information [4-3](#)
 - IP addressing, IP routing [39-4](#)
 - IP SLAs [45-6](#)
 - IP source guard [25-17](#)
 - IPv6 [40-10](#)
 - IS-IS [39-63](#)
 - Layer 2 interfaces [13-14](#)
 - Layer 2 protocol tunneling [19-11](#)
 - LLDP [29-5](#)
 - MAC address table [8-14](#)
 - MAC address-table move update [24-8](#)
 - MSTP [21-14](#)
 - multi-VRF CE [39-74](#)
 - optional spanning-tree configuration [22-9](#)
 - OSPF [39-25](#)
 - password and privilege level [9-2](#)
 - private VLANs [18-6](#)
 - RADIUS [9-27](#)
 - REP [23-7](#)
 - RIP [39-19](#)
 - RMON [32-3](#)
 - RSPAN [28-9](#)
 - SDM template [7-3](#)
 - SNMP [34-7](#)
 - SPAN [28-9](#)
 - SSL [9-52](#)
 - standard QoS [37-29](#)
 - STP [20-11](#)
 - system message logging [33-3](#)
 - system name and prompt [8-8](#)
 - TACACS+ [9-13](#)
 - UDLD [31-4](#)
 - VLAN, Layer 2 Ethernet interfaces [15-16](#)
 - VLANs [15-6](#)
 - VMPS [15-25](#)
 - voice VLAN [17-3](#)
 - VTP [16-7](#)
 - WCCP [47-5](#)
- default gateway [4-15, 39-11](#)
- default networks [39-90](#)
- default router preference
 - See [DRP](#)
- default routes [39-89](#)
- default routing [39-2](#)
- default web-based authentication configuration
 - 802.1X [11-9](#)
- deleting VLANs [15-8](#)
- denial-of-service attack [27-1](#)
- description command [13-23](#)
- designing your network, examples [1-16](#)
- destination addresses
 - in IPv4 ACLs [36-10](#)
 - in IPv6 ACLs [43-5](#)
- destination-IP address-based forwarding, EtherChannel [38-7](#)
- destination-MAC address forwarding, EtherChannel [38-7](#)

- detecting indirect link failures, STP [22-5](#)
- device [A-23](#)
- device discovery protocol [29-1, 30-1](#)
- device manager
 - benefits [1-2](#)
 - described [1-2, 1-3](#)
 - in-band management [1-5](#)
 - upgrading a switch [A-23](#)
- DHCP
 - Cisco IOS server database
 - configuring [25-14](#)
 - default configuration [25-9](#)
 - described [25-7](#)
 - DHCP for IPv6
 - See DHCPv6
 - enabling
 - relay agent [25-11](#)
- DHCP-based autoconfiguration
 - client request message exchange [4-4](#)
 - configuring
 - client side [4-4](#)
 - DNS [4-8](#)
 - relay device [4-8](#)
 - server side [4-6](#)
 - TFTP server [4-7](#)
 - example [4-9](#)
 - lease options
 - for IP address information [4-6](#)
 - for receiving the configuration file [4-7](#)
 - overview [4-3](#)
 - relationship to BOOTP [4-4](#)
 - relay support [1-4, 1-12](#)
 - support for [1-4](#)
- DHCP-based autoconfiguration and image update
 - configuring [4-11 to 4-14](#)
 - understanding [4-5 to 4-6](#)
- DHCP binding database
 - See DHCP snooping binding database
- DHCP binding table
 - See DHCP snooping binding database
- DHCP object tracking, configuring primary interface [46-10](#)
- DHCP option 82
 - circuit ID suboption [25-5](#)
 - configuration guidelines [25-9](#)
 - default configuration [25-9](#)
 - displaying [25-15](#)
 - forwarding address, specifying [25-11](#)
 - helper address [25-11](#)
 - overview [25-4](#)
 - packet format, suboption
 - circuit ID [25-5](#)
 - remote ID [25-5](#)
 - remote ID suboption [25-5](#)
- DHCP server port-based address allocation
 - configuration guidelines [25-27](#)
 - default configuration [25-27](#)
 - described [25-26](#)
 - displaying [25-30](#)
 - enabling [25-27](#)
 - reserved addresses [25-28](#)
- DHCP server port-based address assignment
 - support for [1-4](#)
- DHCP snooping
 - accepting untrusted packets form edge switch [25-3, 25-13](#)
 - binding database
 - See DHCP snooping binding database
 - configuration guidelines [25-9](#)
 - default configuration [25-9](#)
 - displaying binding tables [25-15](#)
 - message exchange process [25-4](#)
 - option 82 data insertion [25-4](#)
 - trusted interface [25-2](#)
 - untrusted interface [25-2](#)
 - untrusted messages [25-2](#)
- DHCP snooping binding database
 - adding bindings [25-14](#)

- binding file
 - format [25-8](#)
 - location [25-7](#)
- bindings [25-7](#)
- clearing agent statistics [25-15](#)
- configuration guidelines [25-10](#)
- configuring [25-14](#)
- default configuration [25-9](#)
- deleting
 - binding file [25-15](#)
 - bindings [25-15](#)
 - database agent [25-15](#)
- described [25-7](#)
- displaying [25-15](#)
 - binding entries [25-15](#)
 - status and statistics [25-15](#)
- enabling [25-14](#)
- entry [25-7](#)
- renewing database [25-15](#)
- resetting
 - delay value [25-15](#)
 - timeout value [25-15](#)
- DHCP snooping binding table
 - See DHCP snooping binding database
- DHCPv6
 - configuration guidelines [40-15](#)
 - default configuration [40-15](#)
 - described [40-6](#)
 - enabling client function [40-17](#)
 - enabling DHCPv6 server function [40-15](#)
 - support for [1-12](#)
- Differentiated Services architecture, QoS [37-1](#)
- Differentiated Services Code Point [37-2](#)
- Diffusing Update Algorithm (DUAL) [39-33](#)
- directed unicast requests [1-4](#)
- directories
 - changing [A-4](#)
 - creating and removing [A-5](#)
 - displaying the working [A-4](#)
- discovery, clusters
 - See automatic discovery
- displaying switch alarms [3-13](#)
- Distance Vector Multicast Routing Protocol
 - See DVMRP
- distance-vector protocols [39-3](#)
- distribute-list command [39-98](#)
- DNS
 - and DHCP-based autoconfiguration [4-8](#)
 - default configuration [8-9](#)
 - displaying the configuration [8-10](#)
 - in IPv6 [40-3](#)
 - overview [8-8](#)
 - setting up [8-9](#)
 - support for [1-4](#)
- domain names
 - DNS [8-8](#)
 - VTP [16-8](#)
- Domain Name System
 - See DNS
- domains, ISO IGRP routing [39-62](#)
- dot1q-tunnel switchport mode [15-15](#)
- double-tagged packets
 - IEEE 802.1Q tunneling [19-2](#)
 - Layer 2 protocol tunneling [19-10](#)
- downloadable ACL [10-18, 10-20, 10-59](#)
- downloading
 - configuration files
 - preparing [A-10, A-13, A-16](#)
 - reasons for [A-9](#)
 - using FTP [A-13](#)
 - using RCP [A-17](#)
 - using TFTP [A-11](#)
 - image files
 - deleting old image [A-26](#)
 - preparing [A-24, A-28, A-32](#)
 - reasons for [A-23](#)
 - using FTP [A-29](#)
 - using HTTP [A-23](#)

- using RCP [A-33](#)
 - using TFTP [A-25](#)
 - using the device manager or Network Assistant [A-23](#)
- drop threshold for Layer 2 protocol packets [19-11](#)
- DRP
 - configuring [40-13](#)
 - described [40-4](#)
 - IPv6 [40-4](#)
 - support for [1-12](#)
- DSCP [1-10, 37-2](#)
- DSCP input queue threshold map for QoS [37-15](#)
- DSCP output queue threshold map for QoS [37-17](#)
- DSCP-to-CoS map for QoS [37-63](#)
- DSCP-to-DSCP-mutation map for QoS [37-64](#)
- DSCP transparency [37-39](#)
- DTP [1-6, 15-14](#)
- dual-action detection [38-5](#)
- DUAL finite state machine, EIGRP [39-34](#)
- dual IPv4 and IPv6 templates [7-2, 40-5](#)
- dual protocol stacks
 - IPv4 and IPv6 [40-5](#)
 - SDM templates supporting [40-6](#)
- dual-purpose uplinks
 - defined [13-4](#)
 - LEDs [13-4](#)
 - link selection [13-4, 13-15](#)
 - setting the type [13-15](#)
- DVMRP
 - support for [1-12](#)
- dynamic access ports
 - characteristics [15-3](#)
 - configuring [15-26](#)
 - defined [13-3](#)
- dynamic addresses
 - See addresses
- dynamic ARP inspection
 - ARP cache poisoning [26-1](#)
 - ARP requests, described [26-1](#)
- ARP spoofing attack [26-1](#)
- clearing
 - log buffer [26-15](#)
 - statistics [26-15](#)
- configuration guidelines [26-5](#)
- configuring
 - ACLs for non-DHCP environments [26-8](#)
 - in DHCP environments [26-7](#)
 - log buffer [26-12](#)
 - rate limit for incoming ARP packets [26-4, 26-10](#)
- default configuration [26-5](#)
- denial-of-service attacks, preventing [26-10](#)
- described [26-1](#)
- DHCP snooping binding database [26-2](#)
- displaying
 - ARP ACLs [26-14](#)
 - configuration and operating state [26-14](#)
 - log buffer [26-15](#)
 - statistics [26-15](#)
 - trust state and rate limit [26-14](#)
- error-disabled state for exceeding rate limit [26-4](#)
- function of [26-2](#)
- interface trust states [26-3](#)
- log buffer
 - clearing [26-15](#)
 - configuring [26-12](#)
 - displaying [26-15](#)
- logging of dropped packets, described [26-4](#)
- man-in-the middle attack, described [26-2](#)
- network security issues and interface trust states [26-3](#)
- priority of ARP ACLs and DHCP snooping entries [26-4](#)
- rate limiting of ARP packets
 - configuring [26-10](#)
 - described [26-4](#)
 - error-disabled state [26-4](#)
- statistics
 - clearing [26-15](#)

- displaying 26-15
- validation checks, performing 26-11
- dynamic auto trunking mode 15-15
- dynamic desirable trunking mode 15-15
- Dynamic Host Configuration Protocol
 - See DHCP-based autoconfiguration
- dynamic port VLAN membership
 - described 15-24
 - reconfirming 15-27
 - troubleshooting 15-29
 - types of connections 15-26
- dynamic routing 39-3
 - ISO CLNS 39-62
- Dynamic Trunking Protocol
 - See DTP

E

- EBGP 39-41
- editing features
 - enabling and disabling 2-7
 - keystrokes used 2-8
 - wrapped lines 2-9
- EIGRP
 - authentication 39-38
 - components 39-34
 - configuring 39-36
 - default configuration 39-34
 - definition 39-33
 - interface parameters, configuring 39-37
 - monitoring 39-40
 - stub routing 39-39
- ELIN location 29-3
- embedded event manager
 - actions 35-4
 - configuring 35-1, 35-5
 - displaying information 35-7
 - environmental variables 35-4
 - event detectors 35-2
 - policies 35-4
 - registering and defining an applet 35-5
 - registering and defining a TCL script 35-6
 - understanding 35-1
- enable password 9-3
- enable secret password 9-3
- enabling SNMP traps 3-13
- encryption, CipherSuite 9-52
- encryption for passwords 9-3
- Enhanced IGRP
 - See EIGRP
- enhanced object tracking
 - backup static routing 46-11
 - commands 46-1
 - defined 46-1
 - DHCP primary interface 46-10
 - HSRP 46-7
 - IP routing state 46-2
 - IP SLAs 46-9
 - line-protocol state 46-2
 - network monitoring with IP SLAs 46-11
 - routing policy, configuring 46-11
 - static route primary interface 46-10
 - tracked lists 46-3
- enhanced object tracking static routing 46-10
- environmental variables, embedded event manager 35-4
- environment variables, function of 4-20
- equal-cost routing 1-12, 39-88
- error-disabled state, BPDU 22-2
- error messages during command entry 2-5
- EtherChannel
 - automatic creation of 38-4, 38-5
 - channel groups
 - binding physical and logical interfaces 38-3
 - numbering of 38-3
 - configuration guidelines 38-9
 - configuring
 - Layer 2 interfaces 38-10
 - default configuration 38-9

- described 38-2
 - displaying status 38-17
 - forwarding methods 38-7, 38-13
 - IEEE 802.3ad, described 38-5
 - interaction
 - with STP 38-10
 - with VLANs 38-10
 - LACP
 - described 38-5
 - displaying status 38-17
 - hot-standby ports 38-15
 - interaction with other features 38-6
 - modes 38-6
 - port priority 38-16
 - system priority 38-16
 - Layer 3 interface 39-3
 - load balancing 38-7, 38-13
 - logical interfaces, described 38-3
 - PAgP
 - aggregate-port learners 38-14
 - compatibility with Catalyst 1900 38-14
 - described 38-4
 - displaying status 38-17
 - interaction with other features 38-5
 - interaction with virtual switches 38-5
 - learn method and priority configuration 38-14
 - modes 38-4
 - support for 1-3
 - with dual-action detection 38-5
 - port-channel interfaces
 - described 38-3
 - numbering of 38-3
 - port groups 13-3
 - support for 1-2
- EtherChannel guard
- described 22-7
 - disabling 22-14
 - enabling 22-14
- Ethernet VLANs
- adding 15-7
 - defaults and ranges 15-7
 - modifying 15-7
- EUI 40-3
- event detectors, embedded event manager 35-2
- events, RMON 32-3
- examples
 - network configuration 1-16
- expedite queue for QoS 37-75
- See also getting started guide
- extended crashinfo file 36-14
- extended-range VLANs
 - configuration guidelines 15-10
 - configuring 15-10
 - creating 15-11
 - creating with an internal VLAN ID 15-12
 - defined 15-1
- extended system ID
 - MSTP 21-17
 - STP 20-4, 20-14
- extended universal identifier
 - See EUI
- Extensible Authentication Protocol over LAN 10-1
- external BGP
 - See EBGp
- external neighbors, BGP 39-45
-
- F**
- fa0 interface 1-5
- fallback bridging
 - and protected ports 48-3
 - bridge groups
 - creating 48-3
 - described 48-1
 - displaying 48-10
 - function of 48-2
 - number supported 48-4
 - removing 48-4

- bridge table
 - clearing [48-10](#)
 - displaying [48-10](#)
 - configuration guidelines [48-3](#)
 - default configuration [48-3](#)
 - described [48-1](#)
 - frame forwarding
 - flooding packets [48-2](#)
 - forwarding packets [48-2](#)
 - overview [48-1](#)
 - protocol, unsupported [48-3](#)
 - STP
 - disabling on an interface [48-9](#)
 - forward-delay interval [48-8](#)
 - hello BPDU interval [48-7](#)
 - interface priority [48-6](#)
 - maximum-idle interval [48-8](#)
 - path cost [48-6](#)
 - VLAN-bridge spanning-tree priority [48-5](#)
 - VLAN-bridge STP [48-2](#)
 - support for [1-12](#)
 - SVIs and routed ports [48-1](#)
 - unsupported protocols [48-3](#)
 - VLAN-bridge STP [20-10](#)
- Fast Convergence [24-3](#)
- FCS bit error rate alarm
 - configuring [3-10](#)
 - defined [3-3](#)
- FCS error hysteresis threshold [3-2](#)
- features, incompatible [27-11](#)
- FIB [39-86](#)
- fiber-optic, detecting unidirectional links [31-1](#)
- files
 - basic crashinfo
 - description [36-14](#)
 - location [36-14](#)
 - copying [A-5](#)
 - crashinfo, description [36-14](#)
 - deleting [A-6](#)
 - displaying the contents of [A-8](#)
 - extended crashinfo
 - description [36-14](#)
 - location [36-15](#)
 - tar
 - creating [A-7](#)
 - displaying the contents of [A-7](#)
 - extracting [A-8](#)
 - image file format [A-23](#)
- file system
 - displaying available file systems [A-1](#)
 - displaying file information [A-4](#)
 - local file system names [A-1](#)
 - network file system names [A-5](#)
 - setting the default [A-3](#)
- filtering
 - IPv6 traffic [43-3, 43-7](#)
 - non-IP traffic [36-26](#)
 - show and more command output [2-10](#)
- filtering show and more command output [2-10](#)
- filters, IP
 - See ACLs, IP
- flash device, number of [A-1](#)
- flexible authentication ordering
 - configuring [10-62](#)
 - overview [10-28](#)
- Flex Link Multicast Fast Convergence [24-3](#)
- Flex Links
 - configuration guidelines [24-8](#)
 - configuring [24-9](#)
 - configuring preferred VLAN [24-12](#)
 - configuring VLAN load balancing [24-11](#)
 - default configuration [24-8](#)
 - description [24-1](#)
 - link load balancing [24-2](#)
 - monitoring [24-15](#)
 - VLANs [24-2](#)
- flooded traffic, blocking [27-7](#)
- flow-based packet classification [1-10](#)

flowcharts

- QoS classification [37-6](#)
- QoS egress queueing and scheduling [37-16](#)
- QoS ingress queueing and scheduling [37-14](#)
- QoS policing and marking [37-10](#)

flowcontrol

- configuring [13-19](#)
- described [13-18](#)

forward-delay time

- MSTP [21-23](#)
- STP [20-21](#)

Forwarding Information Base

See FIB

forwarding nonroutable protocols [48-1](#)

FTP

- configuration files
 - downloading [A-13](#)
 - overview [A-12](#)
 - preparing the server [A-13](#)
 - uploading [A-14](#)
- image files
 - deleting old image [A-30](#)
 - downloading [A-29](#)
 - preparing the server [A-28](#)
 - uploading [A-30](#)

G

- general query [24-5](#)
- Generating IGMP Reports [24-3](#)
- get-bulk-request operation [34-3](#)
- get-next-request operation [34-3, 34-4](#)
- get-request operation [34-3, 34-4](#)
- get-response operation [34-3](#)
- global configuration mode [2-2](#)
- global status monitoring alarms [3-2](#)
- guest VLAN and 802.1x [10-21](#)

GUIs

See device manager and Network Assistant

H

hello time

- MSTP [21-22](#)
- STP [20-20](#)

help, for the command line [2-3](#)hierarchical policy maps [37-8](#)

- configuration guidelines [37-32](#)
- configuring [37-51](#)
- described [37-11](#)

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 [33-10](#)host names, in clusters [6-12](#)

host ports

- configuring [18-11](#)
- kinds of [18-2](#)

hosts, limit on dynamic ports [15-29](#)

Hot Standby Router Protocol

See HSRP

HP OpenView [1-4](#)

HSRP

- authentication string [44-10](#)
- automatic cluster recovery [6-11](#)
- binding to cluster group [44-12](#)
- cluster standby group considerations [6-10](#)
- command-switch redundancy [1-5](#)
- configuring [44-4](#)
- default configuration [44-5](#)
- definition [44-1](#)
- guidelines [44-6](#)
- monitoring [44-13](#)
- object tracking [46-7](#)
- overview [44-1](#)
- priority [44-8](#)
- routing redundancy [1-11](#)

- support for ICMP redirect messages [44-12](#)
- timers [44-11](#)
- tracking [44-8](#)

HSRP for IPv6

- configuring [40-24](#)
- guidelines [40-23](#)

HTTP over SSL

- see HTTPS

HTTPS [9-50](#)

- configuring [9-54](#)
- self-signed certificate [9-51](#)

HTTP secure server [9-50](#)

I

IBPG [39-41](#)

ICMP

- IPv6 [40-4](#)
- redirect messages [39-11](#)
- support for [1-12](#)
- time-exceeded messages [36-8](#)
- traceroute and [36-8](#)
- unreachable messages [36-19](#)
- unreachable messages and IPv6 [43-4](#)
- unreachables and ACLs [36-20](#)

ICMP Echo operation

- configuring [45-12](#)
- IP SLAs [45-11](#)

ICMP ping

- overview [36-6](#)

ICMP Router Discovery Protocol

- See IRDP

ICMPv6 [40-4](#)

IDS appliances

- and ingress RSPAN [28-20](#)
- and ingress SPAN [28-13](#)

IEEE 802.1D

- See STP

IEEE 802.1p [17-1](#)

IEEE 802.1Q

- and trunk ports [13-3](#)
- configuration limitations [15-15](#)
- native VLAN for untagged traffic [15-19](#)
- tunneling
 - compatibility with other features [19-5](#)
 - defaults [19-4](#)
 - described [19-1](#)
- tunnel ports with other features [19-6](#)

IEEE 802.1s

- See MSTP

IEEE 802.1w

- See RSTP

IEEE 802.1x

- See port-based authentication

IEEE 802.3ad

- See EtherChannel

IEEE 802.3x flow control [13-18](#)

ifIndex values, SNMP [34-5](#)

IFS [1-4](#)

IGMP

- leave processing, enabling [42-8](#)
- report suppression
 - disabling [42-10](#)
- support for [1-3](#)

IGMP filtering

- support for [1-3](#)

IGMP helper [1-3](#)

IGMP snooping

- default configuration [42-5](#), [42-6](#)
- enabling and disabling [42-6](#)
- monitoring [42-11](#)
- support for [1-3](#)

IGP [39-24](#)

Immediate Leave, IGMP

- enabling [42-8](#)

inaccessible authentication bypass [10-23](#)

- support for multiauth ports [10-23](#)

initial configuration

- defaults [1-13](#)
- interface
 - number [13-9](#)
 - range macros [13-12](#)
- interface command [13-9 to 13-10](#)
- interface configuration
 - REP [23-9](#)
- interface configuration mode [2-3](#)
- interfaces
 - auto-MDIX, configuring [13-19](#)
 - configuration guidelines
 - duplex and speed [13-17](#)
 - configuring
 - procedure [13-10](#)
 - counters, clearing [13-28](#)
 - default configuration [13-14](#)
 - described [13-23](#)
 - descriptive name, adding [13-23](#)
 - displaying information about [13-26](#)
 - flow control [13-18](#)
 - management [1-3](#)
 - monitoring [13-26](#)
 - naming [13-23](#)
 - physical, identifying [13-9](#)
 - range of [13-10](#)
 - restarting [13-28](#)
 - shutting down [13-28](#)
 - speed and duplex, configuring [13-17](#)
 - status [13-26](#)
 - supported [13-9](#)
 - types of [13-1](#)
- interfaces range macro command [13-12](#)
- interface types [13-9](#)
- Interior Gateway Protocol
 - See IGP
- internal BGP
 - See IBGP
- internal neighbors, BGP [39-45](#)
- Internet Control Message Protocol
 - See ICMP
- Internet Protocol version 6
 - See IPv6
- inter-VLAN routing [1-11, 39-2](#)
- Intrusion Detection System
 - See IDS appliances
- inventory management TLV [29-3, 29-8](#)
- IP ACLs
 - for QoS classification [37-7](#)
 - implicit deny [36-8, 36-13](#)
 - implicit masks [36-8](#)
 - named [36-13](#)
 - undefined [36-20](#)
- IP addresses
 - 128-bit [40-2](#)
 - candidate or member [6-3, 6-12](#)
 - classes of [39-5](#)
 - cluster access [6-2](#)
 - command switch [6-3, 6-10, 6-12](#)
 - default configuration [39-4](#)
 - discovering [8-23](#)
 - for IP routing [39-4](#)
 - IPv6 [40-2](#)
 - MAC address association [39-8](#)
 - monitoring [39-17](#)
 - redundant clusters [6-10](#)
 - standby command switch [6-10, 6-12](#)
 - See also IP information
- IP broadcast address [39-15](#)
- ip cef distributed command [39-87](#)
- IP directed broadcasts [39-13](#)
- IP information
 - assigned
 - manually [4-14](#)
 - through DHCP-based autoconfiguration [4-3](#)
 - default configuration [4-3](#)
- IP phones
 - and QoS [17-1](#)
 - automatic classification and queuing [37-18](#)

- configuring [17-4](#)
 - ensuring port security with QoS [37-37](#)
 - trusted boundary for QoS [37-37](#)
- IP Port Security for Static Hosts
 - on a Layer 2 access port [25-19](#)
 - on a PVLAN host port [25-24](#)
- IP precedence [37-2](#)
- IP-precedence-to-DSCP map for QoS [37-61](#)
- IP protocols
 - in ACLs [36-10](#)
 - routing [1-11](#)
- IP routes, monitoring [39-100](#)
- IP routing
 - disabling [39-18](#)
 - enabling [39-18](#)
- IP Service Level Agreements
 - See IP SLAs
- IP service levels, analyzing [45-1](#)
- IP SLAs
 - benefits [45-2](#)
 - configuration guidelines [45-6](#)
 - configuring object tracking [46-9](#)
 - Control Protocol [45-4](#)
 - default configuration [45-6](#)
 - definition [45-1](#)
 - ICMP echo operation [45-11](#)
 - measuring network performance [45-3](#)
 - monitoring [45-13](#)
 - multioperations scheduling [45-5](#)
 - object tracking [46-9](#)
 - operation [45-3](#)
 - reachability tracking [46-9](#)
 - responder
 - described [45-4](#)
 - response time [45-4](#)
 - scheduling [45-5](#)
 - SNMP support [45-2](#)
 - supported metrics [45-2](#)
 - threshold monitoring [45-6](#)
 - track object monitoring agent, configuring [46-11](#)
 - track state [46-9](#)
 - UDP jitter operation [45-9](#)
- IP source guard
 - and 802.1x [25-18](#)
 - and DHCP snooping [25-15](#)
 - and EtherChannels [25-18](#)
 - and port security [25-18](#)
 - and private VLANs [25-18](#)
 - and routed ports [25-17](#)
 - and TCAM entries [25-18](#)
 - and trunk interfaces [25-18](#)
 - and VRF [25-18](#)
 - binding configuration
 - automatic [25-16](#)
 - manual [25-16](#)
 - binding table [25-16](#)
 - configuration guidelines [25-17](#)
 - default configuration [25-17](#)
 - described [25-15](#)
 - disabling [25-19](#)
 - displaying
 - active IP or MAC bindings [25-26](#)
 - bindings [25-26](#)
 - configuration [25-26](#)
 - enabling [25-18, 25-19](#)
 - filtering
 - source IP address [25-16](#)
 - source IP and MAC address [25-16](#)
 - source IP address filtering [25-16](#)
 - source IP and MAC address filtering [25-16](#)
 - static bindings
 - adding [25-18, 25-19](#)
 - deleting [25-19](#)
 - static hosts [25-19](#)
- IP traceroute
 - executing [36-9](#)
 - overview [36-8](#)
- IP unicast routing

- address resolution [39-8](#)
- administrative distances [39-89, 39-99](#)
- ARP [39-8](#)
- assigning IP addresses to Layer 3 interfaces [39-5](#)
- authentication keys [39-99](#)
- broadcast
 - address [39-15](#)
 - flooding [39-16](#)
 - packets [39-13](#)
 - storms [39-13](#)
- classless routing [39-6](#)
- configuring static routes [39-88](#)
- default
 - addressing configuration [39-4](#)
 - gateways [39-11](#)
 - networks [39-90](#)
 - routes [39-89](#)
 - routing [39-2](#)
- directed broadcasts [39-13](#)
- disabling [39-18](#)
- dynamic routing [39-3](#)
- enabling [39-18](#)
- EtherChannel Layer 3 interface [39-3](#)
- IGP [39-24](#)
- inter-VLAN [39-2](#)
- IP addressing
 - classes [39-5](#)
 - configuring [39-4](#)
- IRDP [39-11](#)
- Layer 3 interfaces [39-3](#)
- MAC address and IP address [39-8](#)
- passive interfaces [39-97](#)
- protocols
 - distance-vector [39-3](#)
 - dynamic [39-3](#)
 - link-state [39-3](#)
- proxy ARP [39-8](#)
- redistribution [39-90](#)
- reverse address resolution [39-8](#)
- routed ports [39-3](#)
- static routing [39-3](#)
- steps to configure [39-4](#)
- subnet mask [39-5](#)
- subnet zero [39-6](#)
- supernet [39-6](#)
- UDP [39-14](#)
- with SVIs [39-3](#)
- See also BGP
- See also EIGRP
- See also OSPF
- See also RIP
- IPv4 ACLs
 - applying to interfaces [36-18](#)
 - extended, creating [36-8](#)
 - named [36-13](#)
 - standard, creating [36-7](#)
- IPv4 and IPv6
 - dual protocol stacks [40-5](#)
- IPv6
 - ACLs
 - displaying [43-8](#)
 - limitations [43-2](#)
 - matching criteria [43-3](#)
 - port [43-1](#)
 - precedence [43-2](#)
 - router [43-1](#)
 - supported [43-2](#)
 - addresses [40-2](#)
 - address formats [40-2](#)
 - applications [40-5](#)
 - assigning address [40-10](#)
 - autoconfiguration [40-4](#)
 - CEFv6 [40-18](#)
 - configuring static routes [40-19](#)
 - default configuration [40-10](#)
 - default router preference (DRP) [40-4](#)
 - defined [40-1](#)

Enhanced Interior Gateway Routing Protocol (EIGRP)
IPv6 [40-7](#)

- EIGRP IPv6 Commands [40-7](#)
- Router ID [40-7](#)

feature limitations [40-9](#)

features not supported [40-8](#)

forwarding [40-10](#)

ICMP [40-4](#)

monitoring [40-26](#)

neighbor discovery [40-4](#)

OSPF [40-7](#)

path MTU discovery [40-4](#)

SDM templates [7-2, 42-1, 43-1](#)

Stateless Autoconfiguration [40-4](#)

supported features [40-2](#)

switch limitations [40-9](#)

understanding static routes [40-6](#)

IPv6 traffic, filtering [43-3](#)

IRDP

- configuring [39-12](#)
- definition [39-11](#)
- support for [1-12](#)

IS-IS

- addresses [39-62](#)
- area routing [39-62](#)
- default configuration [39-63](#)
- monitoring [39-71](#)
- show commands [39-71](#)
- system routing [39-62](#)

ISO CLNS

- clear commands [39-71](#)
- dynamic routing protocols [39-62](#)
- monitoring [39-71](#)
- NETs [39-62](#)
- NSAPs [39-62](#)
- OSI standard [39-62](#)

ISO IGRP

- area routing [39-62](#)
- system routing [39-62](#)

isolated port [18-2](#)

isolated VLANs [18-2, 18-3](#)

K

KDC

described [9-41](#)

See also Kerberos

Kerberos

authenticating to

- boundary switch [9-43](#)

- KDC [9-43](#)

- network services [9-44](#)

configuration examples [9-40](#)

configuring [9-44](#)

credentials [9-41](#)

cryptographic software image [9-40](#)

described [9-41](#)

KDC [9-41](#)

operation [9-43](#)

realm [9-42](#)

server [9-42](#)

support for [1-9](#)

switch as trusted third party [9-40](#)

terms [9-41](#)

TGT [9-42](#)

tickets [9-41](#)

key distribution center

See KDC

L

l2protocol-tunnel command [19-12](#)

LACP

Layer 2 protocol tunneling [19-9](#)

See EtherChannel

Layer 2 frames, classification with CoS [37-2](#)

Layer 2 interfaces, default configuration [13-14](#)

- Layer 2 protocol tunneling
 - configuring [19-10](#)
 - configuring for EtherChannels [19-14](#)
 - default configuration [19-11](#)
 - defined [19-8](#)
 - guidelines [19-11](#)
- Layer 2 traceroute
 - and ARP [36-7](#)
 - and CDP [36-7](#)
 - broadcast traffic [36-7](#)
 - described [36-7](#)
 - IP addresses and subnets [36-7](#)
 - MAC addresses and VLANs [36-7](#)
 - multicast traffic [36-7](#)
 - multiple devices on a port [36-8](#)
 - unicast traffic [36-7](#)
 - usage guidelines [36-7](#)
- Layer 3 features [1-11](#)
- Layer 3 interfaces
 - assigning IP addresses to [39-5](#)
 - assigning IPv4 and IPv6 addresses to [40-14](#)
 - assigning IPv6 addresses to [40-11](#)
 - changing from Layer 2 mode [39-5, 39-79](#)
 - types of [39-3](#)
- Layer 3 packets, classification methods [37-2](#)
- LDAP [5-2](#)
- Leaking IGMP Reports [24-4](#)
- LEDs, switch
 - See hardware installation guide
- lightweight directory access protocol
 - See LDAP
- line configuration mode [2-3](#)
- Link Aggregation Control Protocol
 - See EtherChannel
- link failure, detecting unidirectional [21-7](#)
- link fault alarm [3-3](#)
- link integrity, verifying with REP [23-3](#)
- Link Layer Discovery Protocol
 - See CDP
- link local unicast addresses [40-3](#)
- link redundancy
 - See Flex Links
- links, unidirectional [31-1](#)
- link state advertisements (LSAs) [39-29](#)
- link-state protocols [39-3](#)
- link-state tracking
 - configuring [38-20](#)
 - described [38-18](#)
- LLDP
 - configuring [29-5](#)
 - characteristics [29-7](#)
 - default configuration [29-5](#)
 - enabling [29-6](#)
 - monitoring and maintaining [29-12](#)
 - overview [29-1](#)
 - supported TLVs [29-2](#)
 - switch stack considerations [29-2](#)
 - transmission timer and holdtime, setting [29-7](#)
- LLDP-MED
 - configuring
 - procedures [29-5](#)
 - TLVs [29-8](#)
 - monitoring and maintaining [29-12](#)
 - overview [29-1, 29-2](#)
 - supported TLVs [29-2](#)
- LLDP Media Endpoint Discovery
 - See LLDP-MED
- load balancing [44-4](#)
- local SPAN [28-2](#)
- location TLV [29-3, 29-8](#)
- logging messages, ACL [36-7](#)
- login authentication
 - with RADIUS [9-30](#)
 - with TACACS+ [9-14](#)
- login banners [8-10](#)
- log messages
 - See system message logging
- loop guard

- described [22-9](#)
- enabling [22-15](#)
- support for [1-6](#)

LRE profiles, considerations in switch clusters [6-13](#)

M

MAB

See MAC authentication bypass

MAB aging timer [1-7](#)

MAB inactivity timer

- default setting [10-33](#)

- range [10-36](#)

MAC/PHY configuration status TLV [29-2](#)

MAC addresses

- aging time [8-14](#)

- and VLAN association [8-13](#)

- building the address table [8-13](#)

- default configuration [8-14](#)

- disabling learning on a VLAN [8-22](#)

- discovering [8-23](#)

- displaying [8-23](#)

- displaying in the IP source binding table [25-26](#)

- dynamic

- learning [8-13](#)

- removing [8-15](#)

- in ACLs [36-26](#)

- IP address association [39-8](#)

- static

- adding [8-20](#)

- allowing [8-21, 8-22](#)

- characteristics of [8-19](#)

- dropping [8-21](#)

- removing [8-20](#)

MAC address learning [1-4](#)

MAC address learning, disabling on a VLAN [8-22](#)

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

MAC address-table move update

- configuration guidelines [24-8](#)

- configuring [24-12](#)

- default configuration [24-8](#)

- description [24-6](#)

- monitoring [24-15](#)

MAC address-to-VLAN mapping [15-24](#)

MAC authentication bypass [10-35](#)

- configuring [10-55](#)

- overview [10-16](#)

- See MAB

MAC extended access lists

- applying to Layer 2 interfaces [36-28](#)

- configuring for QoS [37-44](#)

- creating [36-26](#)

- defined [36-26](#)

- for QoS classification [37-5](#)

magic packet [10-25](#)

manageability features [1-4](#)

management access

- in-band

- browser session [1-5](#)

- CLI session [1-5](#)

- device manager [1-5](#)

- SNMP [1-5](#)

- out-of-band console port connection [1-5](#)

management address TLV [29-2](#)

management options

- CLI [2-1](#)

- clustering [1-2](#)

- CNS [5-1](#)

- overview [1-3](#)

management VLAN

- considerations in switch clusters [6-7](#)

- discovery through different management VLANs [6-7](#)

manual preemption, REP, configuring [23-13](#)

mapping tables for QoS

- configuring

- CoS-to-DSCP [37-60](#)

- DSCP [37-59](#)

- DSCP-to-CoS [37-63](#)
- DSCP-to-DSCP-mutation [37-64](#)
- IP-precedence-to-DSCP [37-61](#)
- policed-DSCP [37-62](#)
- described [37-12](#)
- marking
 - action with aggregate policers [37-57](#)
 - described [37-3, 37-8](#)
- matching
 - IPv6 ACLs [43-3](#)
- matching, IPv4 ACLs [36-5](#)
- maximum aging time
 - MSTP [21-23](#)
 - STP [20-21](#)
- maximum hop count, MSTP [21-24](#)
- maximum number of allowed devices, port-based authentication [10-36](#)
- maximum-paths command [39-49, 39-88](#)
- MDA
 - configuration guidelines [10-12 to 10-13](#)
 - described [1-8, 10-12](#)
 - exceptions with authentication process [10-5](#)
- membership mode, VLAN port [15-3](#)
- member switch
 - automatic discovery [6-4](#)
 - defined [6-1](#)
 - managing [6-13](#)
 - passwords [6-12](#)
 - recovering from lost connectivity [36-4](#)
 - requirements [6-3](#)
 - See also candidate switch, cluster standby group, and standby command switch
- messages, to users through banners [8-10](#)
- metrics, in BGP [39-49](#)
- metric translations, between routing protocols [39-93](#)
- metro tags [19-2](#)
- MHSRP [44-4](#)
- MIBs
 - overview [34-1](#)
- SNMP interaction with [34-4](#)
- mirroring traffic for analysis [28-1](#)
- mismatches, autonegotiation [36-4](#)
- module number [13-9](#)
- monitoring
 - access groups [36-29](#)
 - alarms [3-13](#)
 - BGP [39-61](#)
 - cables for unidirectional links [31-1](#)
 - CDP [30-5](#)
 - CEF [39-87](#)
 - EIGRP [39-40](#)
 - fallback bridging [48-10](#)
 - features [1-12](#)
 - Flex Links [24-15](#)
 - HSRP [44-13](#)
 - IEEE 802.1Q tunneling [19-17](#)
 - IGMP
 - snooping [42-11](#)
 - interfaces [13-26](#)
 - IP
 - address tables [39-17](#)
 - routes [39-100](#)
 - IP SLAs operations [45-13](#)
 - IPv4 ACL configuration [36-29](#)
 - IPv6 [40-26](#)
 - IPv6 ACL configuration [43-8](#)
 - IS-IS [39-71](#)
 - ISO CLNS [39-71](#)
 - Layer 2 protocol tunneling [19-17](#)
 - MAC address-table move update [24-15](#)
 - multicast router interfaces [42-11](#)
 - multi-VRF CE [39-86](#)
 - network traffic for analysis with probe [28-2](#)
 - object tracking [46-12](#)
 - OSPF [39-32](#)
 - port
 - blocking [27-20](#)
 - protection [27-20](#)

- private VLANs [18-14](#)
- REP [23-13](#)
- SFP status [13-26, 36-6](#)
- speed and duplex mode [13-18](#)
- traffic flowing among switches [32-1](#)
- traffic suppression [27-20](#)
- tunneling [19-17](#)
- VLAN
 - filters [36-29](#)
 - maps [36-29](#)
 - VLANs [15-13](#)
 - VMPS [15-28](#)
 - VTP [16-16](#)
- mrouter Port [24-3](#)
- mrouter port [24-5](#)
- MSDP
 - support for [1-12](#)
- MSTP
 - boundary ports
 - configuration guidelines [21-15](#)
 - described [21-6](#)
 - BPDU filtering
 - described [22-3](#)
 - enabling [22-12](#)
 - BPDU guard
 - described [22-2](#)
 - enabling [22-11](#)
 - CIST, described [21-3](#)
 - CIST regional root [21-3](#)
 - CIST root [21-5](#)
 - configuration guidelines [21-14, 22-10](#)
 - configuring
 - forward-delay time [21-23](#)
 - hello time [21-22](#)
 - link type for rapid convergence [21-24](#)
 - maximum aging time [21-23](#)
 - maximum hop count [21-24](#)
 - MST region [21-15](#)
 - neighbor type [21-25](#)
 - path cost [21-20](#)
 - port priority [21-19](#)
 - root switch [21-17](#)
 - secondary root switch [21-18](#)
 - switch priority [21-21](#)
- CST
 - defined [21-3](#)
 - operations between regions [21-3](#)
- default configuration [21-14](#)
- default optional feature configuration [22-9](#)
- displaying status [21-26](#)
- enabling the mode [21-15](#)
- EtherChannel guard
 - described [22-7](#)
 - enabling [22-14](#)
- extended system ID
 - effects on root switch [21-17](#)
 - effects on secondary root switch [21-18](#)
 - unexpected behavior [21-17](#)
- IEEE 802.1s
 - implementation [21-6](#)
 - port role naming change [21-6](#)
 - terminology [21-5](#)
- instances supported [20-9](#)
- interface state, blocking to forwarding [22-2](#)
- interoperability and compatibility among modes [20-10](#)
- interoperability with IEEE 802.1D
 - described [21-8](#)
 - restarting migration process [21-25](#)
- IST
 - defined [21-2](#)
 - master [21-3](#)
 - operations within a region [21-3](#)
- loop guard
 - described [22-9](#)
 - enabling [22-15](#)
- mapping VLANs to MST instance [21-16](#)
- MST region

- CIST [21-3](#)
 - configuring [21-15](#)
 - described [21-2](#)
 - hop-count mechanism [21-5](#)
 - IST [21-2](#)
 - supported spanning-tree instances [21-2](#)
- optional features supported [1-6](#)
- overview [21-2](#)
- Port Fast
 - described [22-2](#)
 - enabling [22-10](#)
- preventing root switch selection [22-8](#)
- root guard
 - described [22-8](#)
 - enabling [22-15](#)
- root switch
 - configuring [21-17](#)
 - effects of extended system ID [21-17](#)
 - unexpected behavior [21-17](#)
- shutdown Port Fast-enabled port [22-2](#)
- status, displaying [21-26](#)
- multiauth
 - support for inaccessible authentication bypass [10-23](#)
- multiauth mode
 - See multiple-authentication mode
- multicast groups
 - static joins [42-7](#)
- multicast packets
 - blocking [27-7](#)
- multicast router interfaces, monitoring [42-11](#)
- multicast router ports, adding [42-8](#)
- Multicast Source Discovery Protocol
 - See MSDP
- multicast storm [27-1](#)
- multicast storm-control command [27-4](#)
- multidomain authentication
 - See MDA
- multioperations scheduling, IP SLAs [45-5](#)
- multiple authentication [10-13](#)

- multiple authentication mode
 - configuring [10-42](#)
- Multiple HSRP
 - See MHSRP
- multiple VPN routing/forwarding in customer edge devices
 - See multi-VRF CE
- multi-VRF CE
 - configuration example [39-82](#)
 - configuration guidelines [39-74](#)
 - configuring [39-74](#)
 - default configuration [39-74](#)
 - defined [39-72](#)
 - displaying [39-86](#)
 - monitoring [39-86](#)
 - network components [39-74](#)
 - packet-forwarding process [39-73](#)
 - support for [1-11](#)

N

- NAC
 - AAA down policy [1-9](#)
 - critical authentication [10-23, 10-51](#)
 - IEEE 802.1x authentication using a RADIUS server [10-56](#)
 - IEEE 802.1x validation using RADIUS server [10-56](#)
 - inaccessible authentication bypass [1-9, 10-51](#)
 - Layer 2 IEEE 802.1x validation [1-9, 10-28, 10-56](#)
 - Layer 2 IP validation [1-9](#)
- named IPv4 ACLs [36-13](#)
- NameSpace Mapper
 - See NSM
- native VLAN
 - and IEEE 802.1Q tunneling [19-4](#)
 - configuring [15-19](#)
 - default [15-19](#)
- NEAT
 - configuring [10-57](#)

- overview [10-29](#)
- neighbor discovery, IPv6 [40-4](#)
- neighbor discovery/recovery, EIGRP [39-34](#)
- neighbor offset numbers, REP [23-4](#)
- neighbors, BGP [39-55](#)
- Network Admission Control
 - NAC
- Network Assistant
 - benefits [1-2](#)
 - described [1-3](#)
- network configuration examples
 - increasing network performance [1-16](#)
 - providing network services [1-16](#)
- network design
 - performance [1-16](#)
 - services [1-16](#)
- Network Edge Access Topology
 - See NEAT
- network management
 - CDP [30-1](#)
 - RMON [32-1](#)
 - SNMP [34-1](#)
- network performance, measuring with IP SLAs [45-3](#)
- network policy TLV [29-2, 29-8](#)
- Network Time Protocol
 - See NTP
- no commands [2-4](#)
- nonhierarchical policy maps
 - configuration guidelines [37-32](#)
 - described [37-9](#)
- non-IP traffic filtering [36-26](#)
- nontrunking mode [15-15](#)
- normal-range VLANs [15-4](#)
 - configuration guidelines [15-5](#)
 - configuring [15-4](#)
 - defined [15-1](#)
- not-so-stubby areas
 - See NSSA
- NSAPs, as ISO IGRP addresses [39-62](#)

- NSF Awareness
 - IS-IS [39-64](#)
- NSM [5-3](#)
- NSSA, OSPF [39-29](#)
- NTP
 - associations
 - defined [8-2](#)
 - overview [8-2](#)
 - stratum [8-2](#)
 - support for [1-4](#)
 - time
 - services [8-2](#)
 - synchronizing [8-2](#)

O

- object tracking
 - HSRP [46-7](#)
 - IP SLAs [46-9](#)
 - IP SLAs, configuring [46-9](#)
 - monitoring [46-12](#)
- off mode, VTP [16-3](#)
- open1x
 - configuring [10-62](#)
- open1x authentication
 - overview [10-29](#)
- Open Shortest Path First
 - See OSPF
- optimizing system resources [7-1](#)
- options, management [1-3](#)
- OSPF
 - area parameters, configuring [39-28](#)
 - configuring [39-26](#)
 - default configuration
 - metrics [39-30](#)
 - route [39-30](#)
 - settings [39-25](#)
 - described [39-23](#)
 - for IPv6 [40-7](#)

- interface parameters, configuring [39-27](#)
- LSA group pacing [39-31](#)
- monitoring [39-32](#)
- router IDs [39-32](#)
- route summarization [39-30](#)
- support for [1-11](#)
- virtual links [39-30](#)

out-of-profile markdown [1-11](#)

P

- packet modification, with QoS [37-18](#)
- PAgP
 - Layer 2 protocol tunneling [19-9](#)
 - See EtherChannel
- parallel paths, in routing tables [39-88](#)
- passive interfaces
 - configuring [39-97](#)
 - OSPF [39-30](#)
- passwords
 - default configuration [9-2](#)
 - disabling recovery of [9-5](#)
 - encrypting [9-3](#)
 - for security [1-7](#)
 - in clusters [6-12](#)
 - overview [9-1](#)
 - recovery of [36-3](#)
 - setting
 - enable [9-3](#)
 - enable secret [9-3](#)
 - Telnet [9-6](#)
 - with usernames [9-6](#)
 - VTP domain [16-8](#)
- path cost
 - MSTP [21-20](#)
 - STP [20-18](#)
- path MTU discovery [40-4](#)
- PBR
 - defined [39-94](#)
 - enabling [39-95](#)
 - fast-switched policy-based routing [39-97](#)
 - local policy-based routing [39-97](#)
- peers, BGP [39-55](#)
- percentage thresholds in tracked lists [46-6](#)
- performance, network design [1-16](#)
- performance features [1-2](#)
- persistent self-signed certificate [9-51](#)
- per-user ACLs and Filter-Ids [10-8](#)
- per-VLAN spanning-tree plus
 - See PVST+
- PE to CE routing, configuring [39-81](#)
- physical ports [13-2](#)
- PIM
 - support for [1-12](#)
- ping
 - overview [36-6](#)
- PoE
 - auto mode [13-6](#)
 - CDP with power consumption, described [13-4](#)
 - CDP with power negotiation, described [13-4](#)
 - Cisco intelligent power management [13-4](#)
 - configuring [13-20](#)
 - devices supported [13-4](#)
 - high-power devices operating in low-power mode [13-5](#)
 - IEEE power classification levels [13-5](#)
 - monitoring [13-7](#)
 - policing power usage [13-7](#)
 - power budgeting [13-22](#)
 - power consumption [13-22](#)
 - powered-device detection and initial power allocation [13-5](#)
 - power management modes [13-6](#)
 - power negotiation extensions to CDP [13-4](#)
 - standards supported [13-4](#)
 - static mode [13-6](#)
 - troubleshooting [36-5](#)
- policed-DSCP map for QoS [37-62](#)

- configuring
 - for each matched traffic class [37-47](#)
 - for more than one traffic class [37-57](#)
 - described [37-3](#)
 - displaying [37-77](#)
 - number of [37-33](#)
 - types of [37-9](#)
 - described [37-3](#)
 - hierarchical
 - See hierarchical policy maps
 - token-bucket algorithm [37-9](#)
- policy-based routing
 - See PBR
- policy maps for QoS
 - characteristics of [37-47](#)
 - described [37-7](#)
 - displaying [37-77](#)
 - hierarchical [37-8](#)
 - hierarchical on SVIs
 - configuration guidelines [37-32](#)
 - configuring [37-51](#)
 - described [37-11](#)
 - nonhierarchical on physical ports
 - configuration guidelines [37-32](#)
 - described [37-9](#)
- Port Aggregation Protocol
 - See EtherChannel
- port-based authentication
 - accounting [10-14](#)
 - authentication server
 - defined [10-3, 11-2](#)
 - RADIUS server [10-3](#)
 - client, defined [10-3, 11-2](#)
 - configuration guidelines [10-34, 11-9](#)
 - configuring
 - 802.1x authentication [10-39](#)
 - guest VLAN [10-49](#)
 - host mode [10-42](#)
 - inaccessible authentication bypass [10-51](#)
 - manual re-authentication of a client [10-44](#)
 - periodic re-authentication [10-43](#)
 - quiet period [10-44](#)
 - RADIUS server [10-42, 11-13](#)
 - RADIUS server parameters on the switch [10-41, 11-11](#)
 - restricted VLAN [10-50](#)
 - switch-to-client frame-retransmission number [10-45, 10-46](#)
 - switch-to-client retransmission time [10-45](#)
 - violation modes [10-38 to 10-39](#)
 - default configuration [10-33, 11-9](#)
 - described [10-1](#)
 - device roles [10-2, 11-2](#)
 - displaying statistics [10-64, 11-17](#)
 - downloadable ACLs and redirect URLs
 - configuring [10-59 to 10-61, ?? to 10-61](#)
 - overview [10-18 to 10-20](#)
 - EAPOL-start frame [10-5](#)
 - EAP-request/identity frame [10-5](#)
 - EAP-response/identity frame [10-5](#)
 - enabling
 - 802.1X authentication [11-11](#)
 - encapsulation [10-3](#)
 - flexible authentication ordering
 - configuring [10-62](#)
 - overview [10-28](#)
 - guest VLAN
 - configuration guidelines [10-22, 10-23](#)
 - described [10-21](#)
 - host mode [10-11](#)
 - inaccessible authentication bypass
 - configuring [10-51](#)
 - described [10-23](#)
 - guidelines [10-35](#)
 - initiation and message exchange [10-5](#)
 - magic packet [10-25](#)

- maximum number of allowed devices per port [10-36](#)
- method lists [10-39](#)
- multiple authentication [10-13](#)
- per-user ACLs
 - AAA authorization [10-39](#)
 - configuration tasks [10-18](#)
 - described [10-17](#)
 - RADIUS server attributes [10-18](#)
- ports
 - authorization state and dot1x port-control command [10-10](#)
 - authorized and unauthorized [10-10](#)
 - voice VLAN [10-24](#)
- port security
 - described [10-25](#)
- readiness check
 - configuring [10-36](#)
 - described [10-16, 10-36](#)
- resetting to default values [10-64](#)
- statistics, displaying [10-64](#)
- switch
 - as proxy [10-3, 11-2](#)
 - RADIUS client [10-3](#)
- switch supplicant
 - configuring [10-57](#)
 - overview [10-29](#)
- user distribution
 - guidelines [10-27](#)
 - overview [10-27](#)
- VLAN assignment
 - AAA authorization [10-39](#)
 - characteristics [10-16](#)
 - configuration tasks [10-17](#)
 - described [10-16](#)
- voice aware 802.1x security
 - configuring [10-37](#)
 - described [10-29, 10-37](#)
- voice VLAN
 - described [10-24](#)
 - PVID [10-24](#)
 - VVID [10-24](#)
 - wake-on-LAN, described [10-25](#)
 - with ACLs and RADIUS Filter-Id attribute [10-31](#)
- port-based authentication methods, supported [10-7](#)
- port blocking [1-3, 27-6](#)
- port-channel
 - See EtherChannel
- port description TLV [29-2](#)
- Port Fast
 - described [22-2](#)
 - enabling [22-10](#)
 - mode, spanning tree [15-25](#)
 - support for [1-6](#)
- port membership modes, VLAN [15-3](#)
- port not forwarding alarm [3-3](#)
- port not operating alarm [3-3](#)
- port priority
 - MSTP [21-19](#)
 - STP [20-16](#)
- ports
 - access [13-2](#)
 - blocking [27-6](#)
 - dual-purpose uplink [13-4](#)
 - dynamic access [15-3](#)
 - protected [27-5](#)
 - REP [23-6](#)
 - secure [27-8](#)
 - static-access [15-3, 15-9](#)
 - switch [13-2](#)
 - trunks [15-3, 15-14](#)
 - VLAN assignments [15-9](#)
- port security
 - aging [27-17](#)
 - and private VLANs [27-19](#)
 - and QoS trusted boundary [37-37](#)
 - configuring [27-12](#)
 - default configuration [27-10](#)
 - described [27-7](#)

- displaying [27-20](#)
- enabling [27-19](#)
- on trunk ports [27-14](#)
- sticky learning [27-8](#)
- violations [27-9](#)
- with other features [27-11](#)
- port-shutdown response, VMPS [15-24](#)
- port status monitoring alarms
 - FCS bit error rate alarm [3-3](#)
 - link fault alarm [3-3](#)
 - port not forwarding alarm [3-3](#)
 - port not operating alarm [3-3](#)
- port VLAN ID TLV [29-2](#)
- power management TLV [29-2, 29-8](#)
- power over Ethernet
 - See PoE
- preempt delay time, REP [23-5](#)
- preemption, default configuration [24-8](#)
- preemption delay, default configuration [24-8](#)
- preferential treatment of traffic
 - See QoS
- prefix lists, BGP [39-53](#)
- preventing unauthorized access [9-1](#)
- primary edge port, REP [23-4](#)
- primary interface for object tracking, DHCP, configuring [46-10](#)
- primary interface for static routing, configuring [46-10](#)
- primary links [24-2](#)
- primary VLANs [18-1, 18-3](#)
- priority
 - HSRP [44-8](#)
 - overriding CoS [17-6](#)
 - trusting CoS [17-6](#)
- private VLAN edge ports
 - See protected ports
- private VLANs
 - across multiple switches [18-4](#)
 - and SDM template [18-4](#)
 - and SVIs [18-5](#)
- benefits of [18-1](#)
- community ports [18-2](#)
- community VLANs [18-2, 18-3](#)
- configuration guidelines [18-6, 18-7, 18-8](#)
- configuration tasks [18-6](#)
- configuring [18-9](#)
- default configuration [18-6](#)
- end station access to [18-3](#)
- IP addressing [18-3](#)
- isolated port [18-2](#)
- isolated VLANs [18-2, 18-3](#)
- mapping [18-13](#)
- monitoring [18-14](#)
- ports
 - community [18-2](#)
 - configuration guidelines [18-8](#)
 - configuring host ports [18-11](#)
 - configuring promiscuous ports [18-12](#)
 - isolated [18-2](#)
 - promiscuous [18-2](#)
- primary VLANs [18-1, 18-3](#)
- promiscuous ports [18-2](#)
- secondary VLANs [18-2](#)
- subdomains [18-1](#)
- traffic in [18-5](#)
- privileged EXEC mode [2-2](#)
- privilege levels
 - changing the default for lines [9-9](#)
 - command switch [6-14](#)
 - exiting [9-10](#)
 - logging into [9-10](#)
 - mapping on member switches [6-14](#)
 - overview [9-2, 9-8](#)
 - setting a command with [9-8](#)
- promiscuous ports
 - configuring [18-12](#)
 - defined [18-2](#)
- protected ports [1-7, 27-5](#)
- protocol-dependent modules, EIGRP [39-34](#)

- provider edge devices [39-72](#)
 - proxy ARP
 - configuring [39-10](#)
 - definition [39-8](#)
 - with IP routing disabled [39-11](#)
 - proxy reports [24-3](#)
 - pruning, VTP
 - disabling
 - in VTP domain [16-14](#)
 - on a port [15-19](#)
 - enabling
 - in VTP domain [16-14](#)
 - on a port [15-19](#)
 - examples [16-6](#)
 - overview [16-5](#)
 - pruning-eligible list
 - changing [15-19](#)
 - for VTP pruning [16-5](#)
 - VLANs [16-14](#)
 - PVST+
 - described [20-9](#)
 - IEEE 802.1Q trunking interoperability [20-10](#)
 - instances supported [20-9](#)
-
- ## Q
- QoS
 - auto-QoS
 - categorizing traffic [37-19](#)
 - configuration and defaults display [37-28](#)
 - configuration guidelines [37-24](#)
 - described [37-18](#)
 - disabling [37-26](#)
 - displaying generated commands [37-26](#)
 - displaying the initial configuration [37-28](#)
 - effects on running configuration [37-24](#)
 - egress queue defaults [37-19](#)
 - enabling for VoIP [37-25](#)
 - example configuration [37-27](#)
 - ingress queue defaults [37-19](#)
 - list of generated commands [37-21](#)
 - basic model [37-3](#)
 - classification
 - class maps, described [37-7](#)
 - defined [37-3](#)
 - DSCP transparency, described [37-39](#)
 - flowchart [37-6](#)
 - forwarding treatment [37-3](#)
 - in frames and packets [37-2](#)
 - IP ACLs, described [37-5, 37-7](#)
 - MAC ACLs, described [37-5, 37-7](#)
 - options for IP traffic [37-5](#)
 - options for non-IP traffic [37-4](#)
 - policy maps, described [37-7](#)
 - trust DSCP, described [37-4](#)
 - trusted CoS, described [37-4](#)
 - trust IP precedence, described [37-4](#)
 - class maps
 - configuring [37-45](#)
 - displaying [37-77](#)
 - configuration guidelines
 - auto-QoS [37-24](#)
 - standard QoS [37-32](#)
 - configuring
 - aggregate policers [37-57](#)
 - auto-QoS [37-18](#)
 - default port CoS value [37-37](#)
 - DSCP maps [37-59](#)
 - DSCP transparency [37-39](#)
 - DSCP trust states bordering another domain [37-39](#)
 - egress queue characteristics [37-69](#)
 - ingress queue characteristics [37-65](#)
 - IP extended ACLs [37-43](#)
 - IP standard ACLs [37-42](#)
 - MAC ACLs [37-44](#)
 - policy maps, hierarchical [37-51](#)
 - port trust states within the domain [37-35](#)

- trusted boundary [37-37](#)
- default auto configuration [37-19](#)
- default standard configuration [37-29](#)
- displaying statistics [37-77](#)
- DSCP transparency [37-39](#)
- egress queues
 - allocating buffer space [37-70](#)
 - buffer allocation scheme, described [37-16](#)
 - configuring shaped weights for SRR [37-73](#)
 - configuring shared weights for SRR [37-74](#)
 - described [37-3](#)
 - displaying the threshold map [37-73](#)
 - flowchart [37-16](#)
 - mapping DSCP or CoS values [37-72](#)
 - scheduling, described [37-4](#)
 - setting WTD thresholds [37-70](#)
 - WTD, described [37-17](#)
- enabling globally [37-34](#)
- flowcharts
 - classification [37-6](#)
 - egress queueing and scheduling [37-16](#)
 - ingress queueing and scheduling [37-14](#)
 - policing and marking [37-10](#)
- implicit deny [37-7](#)
- ingress queues
 - allocating bandwidth [37-67](#)
 - allocating buffer space [37-67](#)
 - buffer and bandwidth allocation, described [37-15](#)
 - configuring shared weights for SRR [37-67](#)
 - configuring the priority queue [37-68](#)
 - described [37-3](#)
 - displaying the threshold map [37-66](#)
 - flowchart [37-14](#)
 - mapping DSCP or CoS values [37-66](#)
 - priority queue, described [37-15](#)
 - scheduling, described [37-3](#)
 - setting WTD thresholds [37-66](#)
 - WTD, described [37-15](#)
- IP phones
 - automatic classification and queueing [37-18](#)
 - detection and trusted settings [37-18, 37-37](#)
- limiting bandwidth on egress interface [37-76](#)
- mapping tables
 - CoS-to-DSCP [37-60](#)
 - displaying [37-77](#)
 - DSCP-to-CoS [37-63](#)
 - DSCP-to-DSCP-mutation [37-64](#)
 - IP-precedence-to-DSCP [37-61](#)
 - policed-DSCP [37-62](#)
 - types of [37-12](#)
- marked-down actions [37-49, 37-54](#)
- marking, described [37-3, 37-8](#)
- overview [37-1](#)
- packet modification [37-18](#)
- policers
 - configuring [37-49, 37-54, 37-58](#)
 - described [37-8](#)
 - displaying [37-77](#)
 - number of [37-33](#)
 - types of [37-9](#)
- policies, attaching to an interface [37-8](#)
- policing
 - described [37-3, 37-8](#)
 - token bucket algorithm [37-9](#)
- policy maps
 - characteristics of [37-47](#)
 - displaying [37-77](#)
 - hierarchical [37-8](#)
 - hierarchical on SVIs [37-51](#)
 - nonhierarchical on physical ports [37-47](#)
- QoS label, defined [37-3](#)
- queues
 - configuring egress characteristics [37-69](#)
 - configuring ingress characteristics [37-65](#)
 - high priority (expedite) [37-17, 37-75](#)
 - location of [37-13](#)
 - SRR, described [37-14](#)

- WTD, described [37-13](#)
- rewrites [37-18](#)
- support for [1-10](#)
- trust states
 - bordering another domain [37-39](#)
 - described [37-4](#)
 - trusted device [37-37](#)
 - within the domain [37-35](#)
- quality of service
 - See QoS

R

RADIUS

- attributes
 - vendor-proprietary [9-38](#)
 - vendor-specific [9-36](#)
- configuring
 - accounting [9-35](#)
 - authentication [9-30](#)
 - authorization [9-34](#)
 - communication, global [9-28, 9-36](#)
 - communication, per-server [9-28](#)
 - multiple UDP ports [9-28](#)
- default configuration [9-27](#)
- defining AAA server groups [9-32](#)
- displaying the configuration [9-40](#)
- identifying the server [9-28](#)
- in clusters [6-13](#)
- limiting the services to the user [9-34](#)
- method list, defined [9-27](#)
- operation of [9-20](#)
- overview [9-18](#)
- server load balancing [9-40](#)
- suggested network environments [9-19](#)
- support for [1-9](#)
- tracking services accessed by user [9-35](#)

RADIUS Change of Authorization [9-20](#)

range

- macro [13-12](#)
- of interfaces [13-11](#)
- rapid convergence [21-9](#)
- rapid per-VLAN spanning-tree plus
 - See rapid PVST+
- rapid PVST+
 - described [20-9](#)
 - IEEE 802.1Q trunking interoperability [20-10](#)
 - instances supported [20-9](#)
- Rapid Spanning Tree Protocol
 - See RSTP
- RARP [39-8](#)
- rcommand command [6-13](#)
- RCP
 - configuration files
 - downloading [A-17](#)
 - overview [A-15](#)
 - preparing the server [A-16](#)
 - uploading [A-18](#)
 - image files
 - deleting old image [A-34](#)
 - downloading [A-33](#)
 - preparing the server [A-32](#)
 - uploading [A-34](#)
- reachability, tracking IP SLAs IP host [46-9](#)
- readiness check
 - port-based authentication
 - configuring [10-36](#)
 - described [10-16, 10-36](#)
- reconfirmation interval, VMPS, changing [15-27](#)
- reconfirming dynamic VLAN membership [15-27](#)
- recovery procedures [36-1](#)
- redirect URL [10-18, 10-20, 10-59](#)
- redundancy
 - EtherChannel [38-3](#)
 - HSRP [44-1](#)
 - STP
 - backbone [20-8](#)
 - path cost [15-22](#)

- port priority [15-20](#)
- redundant links and UplinkFast [22-13](#)
- reliable transport protocol, EIGRP [39-34](#)
- reloading software [4-21](#)
- 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](#)
- REP
 - administrative VLAN [23-8](#)
 - administrative VLAN, configuring [23-8](#)
 - age timer [23-8](#)
 - and STP [23-6](#)
 - configuration guidelines [23-7](#)
 - configuring interfaces [23-9](#)
 - convergence [23-4](#)
 - default configuration [23-7](#)
 - manual preemption, configuring [23-13](#)
 - monitoring [23-13](#)
 - neighbor offset numbers [23-4](#)
 - open segment [23-2](#)
 - ports [23-6](#)
 - preempt delay time [23-5](#)
 - primary edge port [23-4](#)
 - ring segment [23-2](#)
 - secondary edge port [23-4](#)
 - segments [23-1](#)
 - characteristics [23-2](#)
 - SNMP traps, configuring [23-13](#)
 - supported interfaces [23-1](#)
 - triggering VLAN load balancing [23-5](#)
 - verifying link integrity [23-3](#)
 - VLAN blocking [23-12](#)
 - VLAN load balancing [23-4](#)
- report suppression, IGMP
 - disabling [42-10](#)
- resequencing ACL entries [36-13](#)
- reserved addresses in DHCP pools [25-28](#)
- resets, in BGP [39-48](#)
- resetting a UDLD-shutdown interface [31-6](#)
- Resilient Ethernet Protocol
 - See REP
- responder, IP SLAs
 - described [45-4](#)
- response time, measuring with IP SLAs [45-4](#)
- restricted VLAN
 - configuring [10-50](#)
 - described [10-22](#)
 - using with IEEE 802.1x [10-22](#)
- restricting access
 - overview [9-1](#)
 - passwords and privilege levels [9-2](#)
 - RADIUS [9-18](#)
 - TACACS+ [9-10](#)
- retry count, VMPS, changing [15-28](#)
- reverse address resolution [39-8](#)
- Reverse Address Resolution Protocol
 - See RARP
- RFC
 - 1058, RIP [39-18](#)
 - 1157, SNMPv1 [34-2](#)
 - 1163, BGP [39-41](#)
 - 1166, IP addresses [39-5](#)
 - 1253, OSPF [39-24](#)
 - 1267, BGP [39-41](#)
 - 1305, NTP [8-2](#)
 - 1587, NSSAs [39-24](#)
 - 1757, RMON [32-2](#)
 - 1771, BGP [39-41](#)
 - 1901, SNMPv2C [34-2](#)
 - 1902 to 1907, SNMPv2 [34-2](#)
 - 2273-2275, SNMPv3 [34-2](#)
- RFC 5176 Compliance [9-21](#)

- RIP
 - advertisements [39-18](#)
 - authentication [39-21](#)
 - configuring [39-20](#)
 - default configuration [39-19](#)
 - described [39-18](#)
 - for IPv6 [40-6](#)
 - hop counts [39-19](#)
 - split horizon [39-22](#)
 - summary addresses [39-22](#)
 - support for [1-11](#)
- RMON
 - default configuration [32-3](#)
 - displaying status [32-6](#)
 - enabling alarms and events [32-3](#)
 - groups supported [32-2](#)
 - overview [32-1](#)
 - statistics
 - collecting group Ethernet [32-5](#)
 - collecting group history [32-5](#)
 - support for [1-12](#)
- root guard
 - described [22-8](#)
 - enabling [22-15](#)
 - support for [1-6](#)
- root switch
 - MSTP [21-17](#)
 - STP [20-14](#)
- route calculation timers, OSPF [39-30](#)
- route dampening, BGP [39-60](#)
- routed ports
 - configuring [39-3](#)
 - IP addresses on [39-4](#)
- route-map command [39-96](#)
- route maps
 - BGP [39-51](#)
 - policy-based routing [39-94](#)
- route reflectors, BGP [39-59](#)
- router ID, OSPF [39-32](#)
- route selection, BGP [39-49](#)
- route summarization, OSPF [39-30](#)
- route targets, VPN [39-74](#)
- routing
 - default [39-2](#)
 - dynamic [39-3](#)
 - redistribution of information [39-90](#)
 - static [39-3](#)
- routing domain confederation, BGP [39-58](#)
- Routing Information Protocol
 - See RIP
- routing protocol administrative distances [39-89](#)
- RSPAN
 - characteristics [28-8](#)
 - configuration guidelines [28-16](#)
 - default configuration [28-9](#)
 - defined [28-2](#)
 - destination ports [28-7](#)
 - displaying status [28-22](#)
 - 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 [28-16](#)
 - defined [28-3](#)
 - limiting source traffic to specific VLANs [28-21](#)
 - specifying monitored ports [28-16](#)
 - with ingress traffic enabled [28-20](#)
 - source ports [28-5](#)
 - transmitted traffic [28-5](#)
 - VLAN-based [28-6](#)
- RSTP
 - active topology [21-9](#)
 - BPDU
 - format [21-12](#)
 - processing [21-12](#)
 - designated port, defined [21-9](#)

- designated switch, defined [21-9](#)
- interoperability with IEEE 802.1D
 - described [21-8](#)
 - restarting migration process [21-25](#)
 - topology changes [21-13](#)
- overview [21-8](#)
- port roles
 - described [21-9](#)
 - synchronized [21-11](#)
- proposal-agreement handshake process [21-10](#)
- rapid convergence
 - described [21-9](#)
 - edge ports and Port Fast [21-9](#)
 - point-to-point links [21-10, 21-24](#)
 - root ports [21-10](#)
- root port, defined [21-9](#)
- See also MSTP
- running configuration
 - replacing [A-19, A-20](#)
 - rolling back [A-19, A-20](#)
- running configuration, saving [4-15](#)

S

- scheduled reloads [4-21](#)
- scheduling, IP SLAs operations [45-5](#)
- SCP
 - and SSH [9-56](#)
 - configuring [9-57](#)
- SD flash memory card [A-2](#)
- SDM
 - templates
 - configuring [7-4](#)
 - number of [7-1](#)
- SDM template [43-3](#)
 - configuration guidelines [7-3](#)
 - configuring [7-3](#)
 - dual IPv4 and IPv6 [7-2](#)
 - types of [7-1](#)
- secondary edge port, REP [23-4](#)
- secondary VLANs [18-2](#)
- Secure Copy Protocol
- Secure Digital flash memory card
 - See SD flash memory card
- secure HTTP client
 - configuring [9-55](#)
 - displaying [9-56](#)
- secure HTTP server
 - configuring [9-54](#)
 - displaying [9-56](#)
- secure MAC addresses
 - deleting [27-16](#)
 - maximum number of [27-9](#)
 - types of [27-8](#)
- secure ports, configuring [27-8](#)
- secure remote connections [9-46](#)
- Secure Shell
 - See SSH
- Secure Socket Layer
 - See SSL
- security, port [27-7](#)
- security features [1-7](#)
- See SCP
- sequence numbers in log messages [33-8](#)
- server mode, VTP [16-3](#)
- service-provider network, MSTP and RSTP [21-1](#)
- service-provider networks
 - and customer VLANs [19-2](#)
 - and IEEE 802.1Q tunneling [19-1](#)
 - Layer 2 protocols across [19-8](#)
 - Layer 2 protocol tunneling for EtherChannels [19-9](#)
- set-request operation [34-4](#)
- setting a secondary temperature threshold [3-7, 3-8](#)
- setting power supply alarm options [3-6](#)
- setting the FCS error hysteresis threshold [3-10](#)
- severity levels, defining in system messages [33-8](#)
- SFPs
 - monitoring status of [13-26, 36-6](#)

- security and identification [36-5](#)
- status, displaying [36-6](#)
- shaped round robin
 - See SRR
- show access-lists hw-summary command [36-20](#)
- show alarm commands [3-13](#)
- show and more command output, filtering [2-10](#)
- show cdp traffic command [30-6](#)
- show cluster members command [6-13](#)
- show configuration command [13-23](#)
- show forward command [36-12](#)
- show interfaces command [13-18, 13-23](#)
- show interfaces switchport [24-4](#)
- show l2protocol command [19-13, 19-15](#)
- show lldp traffic command [29-12](#)
- show platform forward command [36-12](#)
- show running-config command
 - displaying ACLs [36-18, 36-19](#)
 - interface description in [13-23](#)
- shutdown command on interfaces [13-28](#)
- shutdown threshold for Layer 2 protocol packets [19-11](#)
- Simple Network Management Protocol
 - See SNMP
- Smartports macros
 - applying Cisco-default macros [14-3](#)
 - applying global parameter values [14-3](#)
 - configuration guidelines [14-2](#)
 - default configuration [14-1](#)
 - displaying [14-5](#)
 - tracing [14-2](#)
- SNAP [30-1](#)
- SNMP
 - accessing MIB variables with [34-4](#)
 - agent
 - described [34-4](#)
 - disabling [34-8](#)
 - and IP SLAs [45-2](#)
 - authentication level [34-11](#)
 - community strings
 - configuring [34-9](#)
 - overview [34-4](#)
 - configuration examples [34-18](#)
 - default configuration [34-7](#)
 - engine ID [34-8](#)
 - groups [34-8, 34-10](#)
 - host [34-8](#)
 - ifIndex values [34-5](#)
 - in-band management [1-5](#)
 - in clusters [6-13](#)
 - informs
 - and trap keyword [34-12](#)
 - described [34-5](#)
 - differences from traps [34-5](#)
 - disabling [34-16](#)
 - enabling [34-16](#)
 - limiting access by TFTP servers [34-17](#)
 - limiting system log messages to NMS [33-10](#)
 - manager functions [1-4, 34-3](#)
 - managing clusters with [6-14](#)
 - notifications [34-5](#)
 - overview [34-1, 34-4](#)
 - security levels [34-2](#)
 - setting CPU threshold notification [34-16](#)
 - status, displaying [34-19](#)
 - system contact and location [34-17](#)
 - trap manager, configuring [34-14](#)
 - traps
 - described [34-3, 34-5](#)
 - differences from informs [34-5](#)
 - disabling [34-16](#)
 - enabling [34-12](#)
 - enabling MAC address notification [8-15, 8-17, 8-18](#)
 - overview [34-1, 34-4](#)
 - types of [34-13](#)
 - users [34-8, 34-10](#)
 - versions supported [34-2](#)
- SNMP and Syslog Over IPv6 [40-8](#)

- SNMP traps
 - REP [23-13](#)
- SNMPv1 [34-2](#)
- SNMPv2C [34-2](#)
- SNMPv3 [34-2](#)
- software images
 - location in flash [A-23](#)
 - recovery procedures [36-2](#)
 - scheduling reloads [4-21](#)
 - tar file format, described [A-23](#)
 - See also downloading and uploading
- source addresses
 - in IPv4 ACLs [36-10](#)
 - in IPv6 ACLs [43-5](#)
- source-and-destination-IP address based forwarding, EtherChannel [38-7](#)
- source-and-destination MAC address forwarding, EtherChannel [38-7](#)
- source-IP address based forwarding, EtherChannel [38-7](#)
- source-MAC address forwarding, EtherChannel [38-7](#)
- SPAN
 - configuration guidelines [28-10](#)
 - default configuration [28-9](#)
 - destination ports [28-7](#)
 - displaying status [28-22](#)
 - interaction with other features [28-8](#)
 - monitored ports [28-5](#)
 - monitoring ports [28-7](#)
 - overview [1-12, 28-1](#)
 - ports, restrictions [27-11](#)
 - received traffic [28-4](#)
 - sessions
 - configuring ingress forwarding [28-14, 28-21](#)
 - creating [28-11](#)
 - defined [28-3](#)
 - limiting source traffic to specific VLANs [28-14](#)
 - removing destination (monitoring) ports [28-12](#)
 - specifying monitored ports [28-11](#)
 - with ingress traffic enabled [28-13](#)
 - source ports [28-5](#)
 - transmitted traffic [28-5](#)
 - VLAN-based [28-6](#)
- spanning tree and native VLANs [15-15](#)
- Spanning Tree Protocol
 - See STP
- SPAN traffic [28-4](#)
- split horizon, RIP [39-22](#)
- SRR
 - configuring
 - shaped weights on egress queues [37-73](#)
 - shared weights on egress queues [37-74](#)
 - shared weights on ingress queues [37-67](#)
 - described [37-14](#)
 - shaped mode [37-14](#)
 - shared mode [37-14](#)
 - support for [1-11](#)
- SSH
 - configuring [9-47](#)
 - cryptographic software image [9-45](#)
 - described [1-5, 9-46](#)
 - encryption methods [9-46](#)
 - user authentication methods, supported [9-46](#)
- SSL
 - configuration guidelines [9-53](#)
 - configuring a secure HTTP client [9-55](#)
 - configuring a secure HTTP server [9-54](#)
 - cryptographic software image [9-50](#)
 - described [9-50](#)
 - monitoring [9-56](#)
- standby command switch
 - configuring
 - considerations [6-10](#)
 - defined [6-2](#)
 - requirements [6-3](#)
 - virtual IP address [6-10](#)
 - See also cluster standby group and HSRP
- standby group, cluster
 - See cluster standby group and HSRP

- standby ip command [44-6](#)
- standby links [24-2](#)
- standby router [44-1](#)
- standby timers, HSRP [44-11](#)
- startup configuration
 - booting
 - manually [4-18](#)
 - specific image [4-19](#)
 - clearing [A-19](#)
 - configuration file
 - automatically downloading [4-17](#)
 - specifying the filename [4-17](#)
 - default boot configuration [4-17](#)
- static access ports
 - assigning to VLAN [15-9](#)
 - defined [13-3, 15-3](#)
- static addresses
 - See addresses
- static IP routing [1-12](#)
- static MAC addressing [1-7](#)
- static route primary interface,configuring [46-10](#)
- static routes
 - configuring [39-88](#)
 - configuring for IPv6 [40-19](#)
 - understanding [40-6](#)
- static routing [39-3](#)
- static routing support, enhanced object tracking [46-10](#)
- static VLAN membership [15-2](#)
- statistics
 - 802.1X [11-17](#)
 - 802.1x [10-64](#)
 - CDP [30-5](#)
 - interface [13-26](#)
 - LLDP [29-12](#)
 - LLDP-MED [29-12](#)
 - NMSP [29-12](#)
 - OSPF [39-32](#)
 - QoS ingress and egress [37-77](#)
 - RMON group Ethernet [32-5](#)
 - RMON group history [32-5](#)
 - SNMP input and output [34-19](#)
 - VTP [16-16](#)
- sticky learning [27-8](#)
- storm control
 - configuring [27-3](#)
 - described [27-1](#)
 - disabling [27-5](#)
 - displaying [27-20](#)
 - support for [1-3](#)
 - thresholds [27-1](#)
- STP
 - accelerating root port selection [22-4](#)
 - and REP [23-6](#)
 - BackboneFast
 - described [22-5](#)
 - disabling [22-14](#)
 - enabling [22-13](#)
 - BPDU filtering
 - described [22-3](#)
 - disabling [22-12](#)
 - enabling [22-12](#)
 - BPDU guard
 - described [22-2](#)
 - disabling [22-12](#)
 - enabling [22-11](#)
 - BPDU message exchange [20-3](#)
 - configuration guidelines [20-12, 22-10](#)
 - configuring
 - forward-delay time [20-21](#)
 - hello time [20-20](#)
 - maximum aging time [20-21](#)
 - path cost [20-18](#)
 - port priority [20-16](#)
 - root switch [20-14](#)
 - secondary root switch [20-16](#)
 - spanning-tree mode [20-13](#)
 - switch priority [20-19](#)
 - transmit hold-count [20-22](#)

- counters, clearing [20-22](#)
- default configuration [20-11](#)
- default optional feature configuration [22-9](#)
- designated port, defined [20-3](#)
- designated switch, defined [20-3](#)
- detecting indirect link failures [22-5](#)
- disabling [20-14](#)
- displaying status [20-22](#)
- EtherChannel guard
 - described [22-7](#)
 - disabling [22-14](#)
 - enabling [22-14](#)
- extended system ID
 - effects on root switch [20-14](#)
 - effects on the secondary root switch [20-16](#)
 - overview [20-4](#)
 - unexpected behavior [20-14](#)
- features supported [1-6](#)
- IEEE 802.1D and bridge ID [20-4](#)
- IEEE 802.1D and multicast addresses [20-8](#)
- IEEE 802.1t and VLAN identifier [20-4](#)
- inferior BPDU [20-3](#)
- instances supported [20-9](#)
- interface state, blocking to forwarding [22-2](#)
- interface states
 - blocking [20-5](#)
 - disabled [20-7](#)
 - forwarding [20-5, 20-6](#)
 - learning [20-6](#)
 - listening [20-6](#)
 - overview [20-4](#)
- interoperability and compatibility among modes [20-10](#)
- Layer 2 protocol tunneling [19-7](#)
- limitations with IEEE 802.1Q trunks [20-10](#)
- load sharing
 - overview [15-20](#)
 - using path costs [15-22](#)
 - using port priorities [15-21](#)
- loop guard
 - described [22-9](#)
 - enabling [22-15](#)
- modes supported [20-9](#)
- multicast addresses, effect of [20-8](#)
- optional features supported [1-6](#)
- overview [20-2](#)
- path costs [15-22, 15-23](#)
- Port Fast
 - described [22-2](#)
 - enabling [22-10](#)
- port priorities [15-21](#)
- preventing root switch selection [22-8](#)
- protocols supported [20-9](#)
- redundant connectivity [20-8](#)
- root guard
 - described [22-8](#)
 - enabling [22-15](#)
- root port, defined [20-3](#)
- root switch
 - configuring [20-14](#)
 - effects of extended system ID [20-4, 20-14](#)
 - election [20-3](#)
 - unexpected behavior [20-14](#)
- shutdown Port Fast-enabled port [22-2](#)
- status, displaying [20-22](#)
- superior BPDU [20-3](#)
- timers, described [20-20](#)
- UplinkFast
 - described [22-3](#)
 - enabling [22-13](#)
- VLAN-bridge [20-10](#)
- stratum, NTP [8-2](#)
- stub areas, OSPF [39-28](#)
- stub routing, EIGRP [39-39](#)
- subdomains, private VLAN [18-1](#)
- subnet mask [39-5](#)
- subnet zero [39-6](#)
- success response, VMPS [15-24](#)

- summer time [8-6](#)
- SunNet Manager [1-4](#)
- supernet [39-6](#)
- supported port-based authentication methods [10-7](#)
- SVIs
 - and IP unicast routing [39-3](#)
 - connecting VLANs [13-9](#)
- switch [40-2](#)
- switch clustering technology [6-1](#)
 - See also clusters, switch
- switch console port [1-5](#)
- Switch Database Management
 - See SDM
- Switched Port Analyzer
 - See SPAN
- switched ports [13-2](#)
- switchport backup interface [24-4, 24-5](#)
- switchport block multicast command [27-7](#)
- switchport block unicast command [27-7](#)
- switchport command [13-14](#)
- switchport mode dot1q-tunnel command [19-6](#)
- switchport protected command [27-6](#)
- switch priority
 - MSTP [21-21](#)
 - STP [20-19](#)
- switch software features [1-1](#)
- SXP
 - configuration process [12-2](#)
 - configuring peer connections [12-2](#)
 - default passwords [12-4](#)
 - enabling [12-2](#)
 - reconcile period [12-5](#)
 - retry period [12-5](#)
 - source IP address [12-4](#)
- synchronization, BGP [39-45](#)
- syslog
 - See system message logging
- system capabilities TLV [29-2](#)
- system clock
 - configuring
 - daylight saving time [8-6](#)
 - manually [8-4](#)
 - summer time [8-6](#)
 - time zones [8-5](#)
 - displaying the time and date [8-5](#)
 - overview [8-1](#)
 - See also NTP
- system description TLV [29-2](#)
- system message logging
 - default configuration [33-3](#)
 - defining error message severity levels [33-8](#)
 - disabling [33-4](#)
 - displaying the configuration [33-13](#)
 - enabling [33-4](#)
 - facility keywords, described [33-13](#)
 - level keywords, described [33-9](#)
 - limiting messages [33-10](#)
 - message format [33-2](#)
 - overview [33-1](#)
 - sequence numbers, enabling and disabling [33-8](#)
 - setting the display destination device [33-5](#)
 - synchronizing log messages [33-6](#)
 - syslog facility [1-12](#)
 - time stamps, enabling and disabling [33-7](#)
 - UNIX syslog servers
 - configuring the daemon [33-12](#)
 - configuring the logging facility [33-12](#)
 - facilities supported [33-13](#)
- system MTU
 - and IS-IS LSPs [39-66](#)
- system MTU and IEEE 802.1Q tunneling [19-5](#)
- system name
 - default configuration [8-8](#)
 - default setting [8-8](#)
 - manual configuration [8-8](#)
 - See also DNS
- system name TLV [29-2](#)
- system prompt, default setting [8-7, 8-8](#)

system resources, optimizing [7-1](#)

system routing

IS-IS [39-62](#)

ISO IGRP [39-62](#)

T

TACACS+

accounting, defined [9-11](#)

authentication, defined [9-11](#)

authorization, defined [9-11](#)

configuring

accounting [9-17](#)

authentication key [9-13](#)

authorization [9-16](#)

login authentication [9-14](#)

default configuration [9-13](#)

displaying the configuration [9-18](#)

identifying the server [9-13](#)

in clusters [6-13](#)

limiting the services to the user [9-16](#)

operation of [9-12](#)

overview [9-10](#)

support for [1-9](#)

tracking services accessed by user [9-17](#)

tagged packets

IEEE 802.1Q [19-3](#)

Layer 2 protocol [19-7](#)

tar files

creating [A-7](#)

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

extracting [A-8](#)

image file format [A-23](#)

TCL script, registering and defining with embedded event manager [35-6](#)

TDR [1-13](#)

Telnet

accessing management interfaces [2-10](#)

number of connections [1-5](#)

setting a password [9-6](#)

temperature alarms, configuring [3-7, 3-8](#)

temporary self-signed certificate [9-51](#)

Terminal Access Controller Access Control System Plus

See TACACS+

terminal lines, setting a password [9-6](#)

TFTP

configuration files

downloading [A-11](#)

preparing the server [A-10](#)

uploading [A-12](#)

configuration files in base directory [4-7](#)

configuring for autoconfiguration [4-7](#)

image files

deleting [A-26](#)

downloading [A-25](#)

preparing the server [A-24](#)

uploading [A-27](#)

limiting access by servers [34-17](#)

TFTP server [1-4](#)

threshold, traffic level [27-2](#)

threshold monitoring, IP SLAs [45-6](#)

time

See NTP and system clock

Time Domain Reflector

See TDR

time-range command [36-15](#)

time ranges in ACLs [36-15](#)

time stamps in log messages [33-7](#)

time zones [8-5](#)

TLVs

defined [29-1](#)

LLDP [29-2](#)

LLDP-MED [29-2](#)

Token Ring VLANs

support for [15-5](#)

VTP support [16-4](#)

ToS [1-10](#)

traceroute, Layer 2

- and ARP [36-7](#)
- and CDP [36-7](#)
- broadcast traffic [36-7](#)
- described [36-7](#)
- IP addresses and subnets [36-7](#)
- MAC addresses and VLANs [36-7](#)
- multicast traffic [36-7](#)
- multiple devices on a port [36-8](#)
- unicast traffic [36-7](#)
- usage guidelines [36-7](#)
- traceroute command [36-9](#)
 - See also IP traceroute
- tracked lists
 - configuring [46-3](#)
 - types [46-3](#)
- tracked objects
 - by Boolean expression [46-4](#)
 - by threshold percentage [46-6](#)
 - by threshold weight [46-5](#)
- tracking interface line-protocol state [46-2](#)
- tracking IP routing state [46-2](#)
- tracking objects [46-1](#)
- tracking process [46-1](#)
- track state, tracking IP SLAs [46-9](#)
- traffic
 - blocking flooded [27-7](#)
 - fragmented [36-3](#)
 - fragmented IPv6 [43-2](#)
 - unfragmented [36-3](#)
- traffic policing [1-10](#)
- traffic suppression [27-1](#)
- transmit hold-count
 - see STP
- transparent mode, VTP [16-3](#)
- trap-door mechanism [4-2](#)
- traps
 - configuring MAC address notification [8-15, 8-17, 8-18](#)
 - configuring managers [34-12](#)
 - defined [34-3](#)
 - enabling [8-15, 8-17, 8-18, 34-12](#)
 - notification types [34-13](#)
 - overview [34-1, 34-4](#)
- triggering alarm options
 - configurable relay [3-3](#)
 - methods [3-3](#)
 - SNMP traps [3-4](#)
 - syslog messages [3-4](#)
- troubleshooting
 - connectivity problems [36-6, 36-8](#)
 - CPU utilization [36-15](#)
 - detecting unidirectional links [31-1](#)
 - displaying crash information [36-14](#)
 - setting packet forwarding [36-12](#)
 - SFP security and identification [36-5](#)
 - show forward command [36-12](#)
 - with CiscoWorks [34-4](#)
 - with debug commands [36-11](#)
 - with ping [36-6](#)
 - with system message logging [33-1](#)
 - with traceroute [36-8](#)
- trunk failover
 - See link-state tracking
- trunking encapsulation [1-6](#)
- trunk ports
 - configuring [15-17](#)
 - defined [13-3, 15-3](#)
- trunks
 - allowed-VLAN list [15-18](#)
 - load sharing
 - setting STP path costs [15-22](#)
 - using STP port priorities [15-20, 15-21](#)
 - native VLAN for untagged traffic [15-19](#)
 - parallel [15-22](#)
 - pruning-eligible list [15-19](#)
 - to non-DTP device [15-14](#)
- trusted boundary for QoS [37-37](#)
- trusted port states

- between QoS domains [37-39](#)
- classification options [37-4](#)
- ensuring port security for IP phones [37-37](#)
- support for [1-10](#)
- within a QoS domain [37-35](#)

trustpoints, CA [9-50](#)

tunneling

- defined [19-1](#)
- IEEE 802.1Q [19-1](#)
- Layer 2 protocol [19-8](#)

tunnel ports

- described [19-1](#)
- IEEE 802.1Q, configuring [19-6](#)
- incompatibilities with other features [19-5](#)

twisted-pair Ethernet, detecting unidirectional links [31-1](#)

type of service

- See ToS

U

UDLD

- configuration guidelines [31-4](#)
- default configuration [31-4](#)
- disabling
 - globally [31-5](#)
 - on fiber-optic interfaces [31-5](#)
 - per interface [31-5](#)
- echoing detection mechanism [31-2](#)
- enabling
 - globally [31-5](#)
 - per interface [31-5](#)
- Layer 2 protocol tunneling [19-10](#)
- link-detection mechanism [31-1](#)
- neighbor database [31-2](#)
- overview [31-1](#)
- resetting an interface [31-6](#)
- status, displaying [31-6](#)
- support for [1-5](#)

UDP, configuring [39-14](#)

UDP jitter, configuring [45-9](#)

UDP jitter operation, IP SLAs [45-9](#)

unauthorized ports with IEEE 802.1x [10-10](#)

unicast MAC address filtering [1-4](#)

- and adding static addresses [8-21](#)
- and broadcast MAC addresses [8-20](#)
- and CPU packets [8-20](#)
- and multicast addresses [8-20](#)
- and router MAC addresses [8-20](#)
- configuration guidelines [8-20](#)
- described [8-20](#)

unicast storm [27-1](#)

unicast storm control command [27-4](#)

unicast traffic, blocking [27-7](#)

UniDirectional Link Detection protocol

- See UDLD

UNIX syslog servers

- daemon configuration [33-12](#)
- facilities supported [33-13](#)
- message logging configuration [33-12](#)

unrecognized Type-Length-Value (TLV) support [16-4](#)

upgrading software images

- See downloading

UplinkFast

- described [22-3](#)
- disabling [22-13](#)
- enabling [22-13](#)

uploading

- configuration files
 - preparing [A-10, A-13, A-16](#)
 - reasons for [A-9](#)
 - using FTP [A-14](#)
 - using RCP [A-18](#)
 - using TFTP [A-12](#)
- image files
 - preparing [A-24, A-28, A-32](#)
 - reasons for [A-23](#)
 - using FTP [A-30](#)
 - using RCP [A-34](#)

using TFTP [A-27](#)
 User Datagram Protocol
 See UDP
 user EXEC mode [2-2](#)
 username-based authentication [9-6](#)

V

version-dependent transparent mode [16-4](#)
 virtual IP address
 cluster standby group [6-10](#)
 command switch [6-10](#)
 Virtual Private Network
 See VPN
 virtual router [44-1, 44-2](#)
 virtual switches and PAgP [38-5](#)
 vlan.dat file [15-4](#)
 VLAN 1, disabling on a trunk port [15-18](#)
 VLAN 1 minimization [15-18](#)
 vlan-assignment response, VMPS [15-24](#)
 VLAN blocking, REP [23-12](#)
 VLAN configuration
 at bootup [15-6](#)
 saving [15-6](#)
 VLAN configuration mode [2-2](#)
 VLAN database
 and startup configuration file [15-6](#)
 and VTP [16-1](#)
 VLAN configuration saved in [15-6](#)
 VLANs saved in [15-4](#)
 vlan dot1q tag native command [19-4](#)
 VLAN filtering and SPAN [28-6](#)
 vlan global configuration command [15-6](#)
 VLAN ID, discovering [8-23](#)
 VLAN load balancing
 REP [23-4](#)
 VLAN load balancing, triggering [23-5](#)
 VLAN load balancing on flex links [24-2](#)
 configuration guidelines [24-8](#)

VLAN management domain [16-2](#)
 VLAN Management Policy Server
 See VMPS
 VLAN maps
 displaying [36-29](#)
 support for [1-8](#)
 VLAN membership
 confirming [15-27](#)
 modes [15-3](#)
 VLAN Query Protocol
 See VQP
 VLANs
 adding [15-7](#)
 adding to VLAN database [15-7](#)
 aging dynamic addresses [20-9](#)
 allowed on trunk [15-18](#)
 and spanning-tree instances [15-2, 15-6, 15-10](#)
 configuration guidelines, extended-range VLANs [15-10](#)
 configuration guidelines, normal-range VLANs [15-5](#)
 configuring [15-1](#)
 configuring IDs 1006 to 4094 [15-10](#)
 connecting through SVIs [13-9](#)
 creating [15-7](#)
 customer numbering in service-provider networks [19-3](#)
 default configuration [15-6](#)
 deleting [15-8](#)
 described [13-2, 15-1](#)
 displaying [15-13](#)
 extended-range [15-1, 15-10](#)
 features [1-6](#)
 illustrated [15-2](#)
 internal [15-11](#)
 limiting source traffic with RSPAN [28-21](#)
 limiting source traffic with SPAN [28-14](#)
 modifying [15-7](#)
 native, configuring [15-19](#)
 normal-range [15-1, 15-4](#)

- number supported [1-6](#)
- parameters [15-4](#)
- port membership modes [15-3](#)
- static-access ports [15-9](#)
- STP and IEEE 802.1Q trunks [20-10](#)
- supported [15-2](#)
- Token Ring [15-5](#)
- VLAN-bridge STP [20-10, 48-2](#)
- VTP modes [16-3](#)
- VLAN Trunking Protocol
 - See VTP
- VLAN trunks [15-14](#)
- VMPS
 - administering [15-28](#)
 - configuration example [15-29](#)
 - configuration guidelines [15-25](#)
 - default configuration [15-25](#)
 - description [15-23](#)
 - dynamic port membership
 - described [15-24](#)
 - reconfirming [15-27](#)
 - troubleshooting [15-29](#)
 - entering server address [15-26](#)
 - mapping MAC addresses to VLANs [15-24](#)
 - monitoring [15-28](#)
 - reconfirmation interval, changing [15-27](#)
 - reconfirming membership [15-27](#)
 - retry count, changing [15-28](#)
- voice aware 802.1x security
 - port-based authentication
 - configuring [10-37](#)
 - described [10-29, 10-37](#)
- voice-over-IP [17-1](#)
- voice VLAN
 - Cisco 7960 phone, port connections [17-1](#)
 - configuration guidelines [17-3](#)
 - configuring IP phones for data traffic
 - override CoS of incoming frame [17-6](#)
 - trust CoS priority of incoming frame [17-6](#)
 - configuring ports for voice traffic in
 - 802.1p priority tagged frames [17-5](#)
 - 802.1Q frames [17-5](#)
 - connecting to an IP phone [17-4](#)
 - default configuration [17-3](#)
 - described [17-1](#)
 - displaying [17-7](#)
 - IP phone data traffic, described [17-2](#)
 - IP phone voice traffic, described [17-2](#)
- VPN
 - configuring routing in [39-81](#)
 - forwarding [39-74](#)
 - in service provider networks [39-71](#)
 - routes [39-72](#)
- VPN routing and forwarding table
 - See VRF
- VQP [1-6, 15-23](#)
- VRF
 - defining [39-74](#)
 - Specifying for an SXP connection [12-3](#)
 - tables [39-71](#)
- VRF-aware services
 - ARP [39-78](#)
 - configuring [39-77](#)
 - ftp [39-80](#)
 - HSRP [39-79](#)
 - ping [39-78](#)
 - SNMP [39-78](#)
 - syslog [39-79](#)
 - tftp [39-80](#)
 - traceroute [39-80](#)
- VTP
 - adding a client to a domain [16-15](#)
 - advertisements [15-16, 16-3](#)
 - and extended-range VLANs [15-2, 16-1](#)
 - and normal-range VLANs [15-2, 16-1](#)
 - client mode, configuring [16-11](#)
 - configuration
 - guidelines [16-8](#)

- requirements [16-10](#)
- saving [16-8](#)
- configuration requirements [16-10](#)
- configuration revision number
 - guideline [16-15](#)
 - resetting [16-16](#)
- consistency checks [16-4](#)
- default configuration [16-7](#)
- described [16-1](#)
- domain names [16-8](#)
- domains [16-2](#)
- Layer 2 protocol tunneling [19-7](#)
- modes
 - client [16-3](#)
 - off [16-3](#)
 - server [16-3](#)
 - transitions [16-3](#)
 - transparent [16-3](#)
- monitoring [16-16](#)
- passwords [16-8](#)
- pruning
 - disabling [16-14](#)
 - enabling [16-14](#)
 - examples [16-6](#)
 - overview [16-5](#)
 - support for [1-6](#)
- pruning-eligible list, changing [15-19](#)
- server mode, configuring [16-10, 16-13](#)
- statistics [16-16](#)
- support for [1-6](#)
- Token Ring support [16-4](#)
- transparent mode, configuring [16-10](#)
- using [16-1](#)
- Version
 - enabling [16-13](#)
- version, guidelines [16-9](#)
- Version 1 [16-4](#)
- Version 2
 - configuration guidelines [16-9](#)

- overview [16-4](#)
- Version 3
 - overview [16-4](#)

W

WCCP

- authentication [47-3](#)
- configuration guidelines [47-5](#)
- default configuration [47-5](#)
- described [47-1](#)
- displaying [47-9](#)
- dynamic service groups [47-3](#)
- enabling [47-6](#)
- features unsupported [47-4](#)
- forwarding method [47-3](#)
- Layer-2 header rewrite [47-3](#)
- MD5 security [47-3](#)
- message exchange [47-2](#)
- monitoring and maintaining [47-9](#)
- negotiation [47-3](#)
- packet redirection [47-3](#)
- packet-return method [47-3](#)
- redirecting traffic received from a client [47-6](#)
- setting the password [47-6](#)
- unsupported WCCPv2 features [47-4](#)
- web authentication [10-16](#)
 - configuring [11-16 to ??](#)
 - described [1-7](#)
- web-based authentication
 - customizeable web pages [11-5](#)
 - description [11-1](#)
- web-based authentication, interactions with other features [11-7](#)
- Web Cache Communication Protocol
 - See WCCP
- weighted tail drop
 - See WTD
- weight thresholds in tracked lists [46-5](#)

wired location service

- configuring [29-10](#)
- displaying [29-12](#)
- location TLV [29-3](#)
- understanding [29-3](#)

WTD

- described [37-13](#)
- setting thresholds
 - egress queue-sets [37-70](#)
 - ingress queues [37-66](#)
- support for [1-11](#)

X

- Xmodem protocol [36-2](#)

