



Numerics

802.1Q trunk ports and native VLANs [2-593](#)

802.1Q tunnel ports

 configuring [2-535](#)

 displaying [2-318](#)

 limitations [2-536](#)

802.1x

 and switchport modes [2-536](#)

 violation error recovery [2-93](#)

 See also port-based authentication

A

aaa accounting dot1x command [2-1](#)

aaa authentication dot1x command [2-3](#)

AAA methods [2-3](#)

abort command [2-591](#)

access control entries

 See ACEs

access control lists

 See ACLs

access groups

 IP [2-104](#)

 MAC, displaying [2-378](#)

access map configuration mode [2-179](#)

access mode [2-535](#)

access ports [2-535](#)

ACEs [2-71, 2-240](#)

ACLs

 deny [2-69](#)

 displaying [2-281](#)

ACLs (continued)

 for non-IP protocols [2-161](#)

 IP [2-104](#)

 matching [2-179](#)

 on Layer 2 interfaces [2-104](#)

 permit [2-238](#)

action command [2-5](#)

address aliasing [2-227](#)

aggregate-port learner [2-232](#)

allowed VLANs [2-554](#)

apply command [2-591](#)

archive download-sw command [2-7](#)

archive tar command [2-10](#)

archive upload-sw command [2-13](#)

arp access-list command [2-15](#)

audience [xvii](#)

authorization state of controlled port [2-82](#)

autonegotiation of duplex mode [2-90](#)

auto qos voip command [2-17](#)

B

BackboneFast, for STP [2-474](#)

backup interfaces

 configuring [2-531](#)

 displaying [2-337](#)

boot (boot loader) command [A-2](#)

boot bootlpr command [2-22](#)

boot config-file command [2-23](#)

boot enable-break command [2-24](#)

boot helper command [2-25](#)

boot helper-config file command [2-26](#)

booting

- Cisco IOS image [2-29](#)
- displaying environment variables [2-291](#)
- interrupting [2-24](#)
- manually [2-27](#)

boot loader

- accessing [A-1](#)
- booting
 - Cisco IOS image [A-2](#)
 - helper image [2-25](#)
- directories
 - creating [A-15](#)
 - displaying a list of [A-7](#)
 - removing [A-19](#)
- displaying
 - available commands [A-12](#)
 - memory heap utilization [A-14](#)
 - version [A-26](#)
- environment variables
 - described [A-20](#)
 - displaying settings [A-20](#)
 - location of [A-21](#)
 - setting [A-20](#)
 - unsetting [A-24](#)
- files
 - copying [A-5](#)
 - deleting [A-6](#)
 - displaying a list of [A-7](#)
 - displaying the contents of [A-4, A-16, A-23](#)
 - renaming [A-17](#)
- file system
 - formatting [A-10](#)
 - initializing flash [A-9](#)
 - running a consistency check [A-11](#)
- loading helper images [A-13](#)
- prompt [A-1](#)
- resetting the system [A-18](#)

boot manual command [2-27](#)

boot private-config-file command [2-28](#)

boot system command [2-29](#)

BPDU filtering, for spanning tree [2-475, 2-507](#)

BPDU guard, for spanning tree [2-477, 2-507](#)

broadcast storm control [2-524](#)

C

candidate switches

- See clusters

cat (boot loader) command [A-4](#)

caution, description [xviii](#)

CDP, enabling protocol tunneling for [2-148](#)

channel-group command [2-30](#)

channel-protocol command [2-33](#)

Cisco Network Assistant

- See Network Assistant [xviii](#)

Cisco SoftPhone

- auto-QoS configuration [2-17](#)
- trusting packets sent from [2-219](#)

class command [2-34](#)

class-map command [2-36](#)

class maps

- creating [2-36](#)
- defining the match criteria [2-181](#)
- displaying [2-296](#)

class of service

- See CoS

clear ip arp inspection log command [2-38](#)

clear ip arp inspection statistics command [2-39](#)

clear ipc command [2-41](#)

clear ip dhcp snooping database command [2-40](#)

clear l2protocol-tunnel counters command [2-42](#)

clear lacp command [2-43](#)

clear mac address-table command [2-44](#)

clear pagp command [2-46](#)

clear spanning-tree counters command [2-47](#)

clear spanning-tree detected-protocols command [2-48](#)

clear vmmps statistics command [2-49](#)

clear vtp counters command [2-50](#)

- cluster commander-address command [2-51](#)
- cluster discovery hop-count command [2-53](#)
- cluster enable command [2-54](#)
- cluster holdtime command [2-56](#)
- cluster member command [2-57](#)
- cluster outside-interface command [2-59](#)
- cluster requirements [xix](#)
- cluster run command [2-60](#)
- clusters
 - adding candidates [2-57](#)
 - binding to HSRP group [2-61](#)
 - building manually [2-57](#)
 - communicating with
 - devices outside the cluster [2-59](#)
 - members by using Telnet [2-261](#)
 - debug messages, display [B-4](#)
 - displaying
 - candidate switches [2-299](#)
 - debug messages [B-4](#)
 - member switches [2-301](#)
 - status [2-297](#)
 - hop-count limit for extended discovery [2-53](#)
 - HSRP standby groups [2-61](#)
 - redundancy [2-61](#)
 - SNMP trap [2-465](#)
- cluster standby-group command [2-61](#)
- cluster timer command [2-63](#)
- command modes defined [1-1](#)
- commands changed in Cisco IOS Release 12.2(20)SE [1-5](#)
- command switch
 - See clusters
- configuration, initial
 - See getting started guide and hardware installation guide
- configuration files
 - password recovery disable considerations [A-1](#)
 - specifying the name [2-23, 2-28](#)
- configuring multiple interfaces [2-99](#)

- config-vlan mode
 - commands [2-577](#)
 - description [1-4](#)
 - entering [2-576](#)
 - summary [1-2](#)
- conventions
 - command [xviii](#)
 - for examples [xviii](#)
 - publication [xviii](#)
 - text [xviii](#)
- copy (boot loader) command [A-5](#)
- CoS
 - assigning default value to incoming packets [2-189](#)
 - assigning to Layer 2 protocol packets [2-151](#)
 - overriding the incoming value [2-189](#)
- CoS-to-DSCP map [2-193](#)
- CPU ASIC statistics, displaying [2-303](#)

D

- debug auto qos command [B-2](#)
- debug cluster command [B-4](#)
- debug dot1x command [B-6](#)
- debug dtp command [B-7](#)
- debug etherchannel command [B-8](#)
- debug ilpower command [B-9](#)
- debug interface command [B-12](#)
- debug ip dhcp snooping command [B-10](#)
- debug ip igmp filter command [B-13](#)
- debug ip igmp max-groups command [B-14](#)
- debug ip igmp snooping command [B-15](#)
- debug ip verify source packet command [B-11](#)
- debug lacp command [B-16](#)
- debug mac-notification command [B-17](#)
- debug matm command [B-18](#)
- debug monitor command [B-19](#)
- debug mvrdbg command [B-20](#)

- debug nvram command [B-21](#)
- debug pagp command [B-22](#)
- debug platform acl command [B-23](#)
- debug platform configuration command [B-31](#)
- debug platform cpu-queues command [B-24](#)
- debug platform device-manager command [B-26](#)
- debug platform dot1x command [B-27](#)
- debug platform etherchannel command [B-28](#)
- debug platform fallback-bridging command [B-29](#)
- debug platform forw-tcam command [B-30](#)
- debug platform ip arp inspection command [B-32](#)
- debug platform ip dhcp command [B-33](#)
- debug platform ip igmp snooping command [B-34](#)
- debug platform led command [B-36](#)
- debug platform matm command [B-37](#)
- debug platform messaging application command [B-38](#)
- debug platform phy command [B-39](#)
- debug platform pm command [B-40](#)
- debug platform port-asic command [B-42](#)
- debug platform port-security command [B-43](#)
- debug platform qos-acl-tcam command [B-44](#)
- debug platform remote-commands command [B-45](#)
- debug platform resource-manager command [B-46](#)
- debug platform snmp command [B-47](#)
- debug platform span command [B-48](#)
- debug platform supervisor-asic command [B-49](#)
- debug platform sw-bridge command [B-50](#)
- debug platform tcam command [B-51](#)
- debug platform udd command [B-54](#)
- debug platform vlan command [B-55](#)
- debug pm command [B-56](#)
- debug port-security command [B-58](#)
- debug qos-manager command [B-59](#)
- debug spanning-tree backbonefast command [B-62](#)
- debug spanning-tree bpdu command [B-63](#)
- debug spanning-tree bpdu-opt command [B-64](#)
- debug spanning-tree command [B-60](#)
- debug spanning-tree mstp command [B-65](#)
- debug spanning-tree switch command [B-67](#)
- debug spanning-tree uplinkfast command [B-69](#)
- debug sw-vlan command [B-70](#)
- debug sw-vlan ifs command [B-72](#)
- debug sw-vlan notification command [B-73](#)
- debug sw-vlan vtp command [B-75](#)
- debug udd command [B-77](#)
- debug vqpc command [B-79](#)
- define interface-range command [2-64](#)
- delete (boot loader) command [A-6](#)
- delete command [2-66](#)
- deny (ARP access-list configuration) command [2-67](#)
- deny command [2-69](#)
- detect mechanism, causes [2-91](#)
- device manager requirements [xviii](#)
- DHCP snooping
 - enabling
 - on a VLAN [2-132](#)
 - option 82 [2-127](#)
 - trust on an interface [2-130](#)
 - error recovery timer [2-93](#)
 - rate limiting [2-129](#)
- DHCP snooping binding database
 - binding file, configuring [2-125](#)
 - bindings
 - adding [2-123](#)
 - deleting [2-123](#)
 - clearing database agent statistics [2-40](#)
 - database agent, configuring [2-125](#)
 - displaying
 - binding entries [2-353](#)
 - database agent status [2-355](#)
 - renewing [2-265](#)
- dir (boot loader) command [A-7](#)
- directories, deleting [2-66](#)
- documentation, related [xviii](#)
- document conventions [xviii](#)
- domain name, VTP [2-601, 2-605](#)
- dot1x command [2-72](#)
- dot1x default command [2-74](#)

- dot1x guest-vlan command [2-75](#)
- dot1x host-mode command [2-77](#)
- dot1x initialize command [2-78](#)
- dot1x max-req command [2-79, 2-80](#)
- dot1x multiple-hosts command [2-81](#)
- dot1x port-control command [2-82](#)
- dot1x re-authenticate command [2-84](#)
- dot1x re-authentication command [2-85](#)
- dot1x reauthentication command [2-86](#)
- dot1x timeout command [2-87](#)
- dropping packets, with ACL matches [2-5](#)
- drop threshold, Layer 2 protocol tunneling [2-148](#)
- DSCP-to-CoS map [2-193](#)
- DSCP-to-DSCP-mutation map [2-193](#)
- DTP [2-536](#)
- DTP flap
 - error detection for [2-91](#)
 - error recovery timer [2-93](#)
- DTP negotiation [2-540](#)
- duplex command [2-89](#)
- dynamic-access ports
 - configuring [2-529](#)
 - restrictions [2-530](#)
- dynamic ARP inspection
 - ARP ACLs
 - apply to a VLAN [2-109](#)
 - define [2-15](#)
 - deny packets [2-67](#)
 - display [2-286](#)
 - permit packets [2-236](#)
 - clear
 - log buffer [2-38](#)
 - statistics [2-39](#)
 - display
 - ARP ACLs [2-286](#)
 - configuration and operating state [2-349](#)
 - log buffer [2-349](#)
 - statistics [2-349](#)
 - trust state and rate limit [2-349](#)

- dynamic ARP inspection (continued)
 - enable per VLAN [2-119](#)
 - error detection for [2-91](#)
 - error recovery timer [2-93](#)
 - log buffer
 - clear [2-38](#)
 - configure [2-113](#)
 - display [2-349](#)
 - rate-limit incoming ARP packets [2-111](#)
 - statistics
 - clear [2-39](#)
 - display [2-349](#)
 - trusted interface state [2-115](#)
 - type of packet logged [2-120](#)
 - validation checks [2-117](#)
- dynamic auto VLAN membership mode [2-535](#)
- dynamic desirable VLAN membership mode [2-535](#)
- Dynamic Host Configuration Protocol (DHCP)
 - See DHCP snooping
- Dynamic Trunking Protocol
 - See DTP

E

- EAP-request/identity frame
 - maximum number to send [2-80](#)
 - response time before retransmitting [2-87](#)
- encapsulation methods [2-554](#)
- environment variables, displaying [2-291](#)
- errdisable detect cause command [2-91](#)
- errdisable recovery command [2-93](#)
- error conditions, displaying [2-328](#)
- error disable detection [2-91](#)
- error-disabled interfaces, displaying [2-337](#)
- EtherChannel
 - assigning Ethernet interface to channel group [2-30](#)
 - creating port-channel logical interface [2-97](#)
 - debug EtherChannel/PAGP, display [B-8](#)
 - debug platform-specific events, display [B-28](#)

EtherChannel (continued)

- displaying [2-332](#)
- enabling Layer 2 protocol tunneling for
 - LACP [2-149](#)
 - PAgP [2-149](#)
 - UDLD [2-149](#)
- interface information, displaying [2-337](#)
- LACP
 - clearing channel-group information [2-43](#)
 - debug messages, display [B-16](#)
 - displaying [2-374](#)
 - modes [2-30](#)
 - port priority for hot-standby ports [2-152](#)
 - restricting a protocol [2-33](#)
 - system priority [2-154](#)
- load-distribution methods [2-248](#)
- PAgP
 - aggregate-port learner [2-232](#)
 - clearing channel-group information [2-46](#)
 - debug messages, display [B-22](#)
 - displaying [2-421](#)
 - error detection for [2-91](#)
 - error recovery timer [2-93](#)
 - learn method [2-232](#)
 - modes [2-30](#)
 - physical-port learner [2-232](#)
 - priority of interface for transmitted traffic [2-234](#)
- Ethernet controller, internal register display [2-305](#)
- Ethernet statistics, collecting [2-267](#)
- examples, conventions for [xviii](#)
- exit command [2-591](#)
- extended discovery of candidate switches [2-53](#)
- extended-range VLANs
 - and allowed VLAN list [2-554](#)
 - and pruning-eligible list [2-554](#)
 - configuring [2-576](#)
- extended system ID for STP [2-483](#)

F

- fan information, displaying [2-324](#)
- file name, VTP [2-601](#)
- files, deleting [2-66](#)
- flash_init (boot loader) command [A-9](#)
- Flex Links
 - configuring [2-531](#)
 - displaying [2-337](#)
- flowcontrol command [2-95](#)
- format (boot loader) command [A-10](#)
- forwarding packets, with ACL matches [2-5](#)
- forwarding results, display [C-5](#)
- frame forwarding information, displaying [C-5](#)
- front-end controller
 - counter and status information [C-7](#)
- fsck (boot loader) command [A-11](#)

G

- global configuration mode [1-2, 1-3](#)

H

- hardware ACL statistics [2-281](#)
- help (boot loader) command [A-12](#)
- hierarchical policy maps [2-246](#)
- hop-count limit for clusters [2-53](#)
- host connection, port configuration [2-534](#)
- host ports, private VLANs [2-538](#)
- Hot Standby Router Protocol
 - See HSRP
- HSRP
 - binding HSRP group to cluster [2-61](#)
 - standby group [2-61](#)

-
- I
- IGMP filters
 - applying [2-133](#)
 - debug messages, display [B-13](#)
 - IGMP groups, setting maximum [2-134](#)
 - IGMP maximum groups, debugging [B-14](#)
 - IGMP profiles
 - creating [2-136](#)
 - displaying [2-357](#)
 - IGMP snooping
 - displaying [2-358](#), [2-361](#)
 - enabling [2-138](#)
 - multicast table [1-5](#), [2-362](#)
 - report suppression [2-141](#)
 - images
 - See software images
 - Immediate-Leave feature, MVR [2-229](#)
 - Immediate-Leave processing [2-138](#)
 - initial configuration
 - See getting started guide and hardware installation guide
 - interface command [2-102](#)
 - interface configuration mode [1-2](#), [1-4](#)
 - interface port-channel command [2-97](#)
 - interface range command [2-99](#)
 - interface-range macros [2-64](#)
 - interfaces
 - assigning Ethernet interface to channel group [2-30](#)
 - configuring [2-89](#)
 - configuring multiple [2-99](#)
 - creating port-channel logical [2-97](#)
 - debug messages, display [B-12](#)
 - disabling [2-463](#)
 - displaying the MAC address table [2-390](#)
 - restarting [2-463](#)
 - interface speed, configuring [2-516](#)
 - internal registers, displaying [2-305](#), [2-314](#)
 - Internet Group Management Protocol
 - See IGMP
 - invalid GBIC
 - error detection for [2-91](#)
 - error recovery timer [2-93](#)
 - ip address command [2-107](#)
 - IP addresses, setting [2-107](#)
 - IP address matching [2-179](#)
 - ip arp inspection filter vlan command [2-109](#)
 - ip arp inspection limit command [2-111](#)
 - ip arp inspection log-buffer command [2-113](#)
 - ip arp inspection trust command [2-115](#)
 - ip arp inspection validate command [2-117](#)
 - ip arp inspection vlan command [2-119](#)
 - ip arp inspection vlan logging command [2-120](#)
 - IP DHCP snooping
 - See DHCP snooping
 - ip dhcp snooping binding command [2-123](#)
 - ip dhcp snooping command [2-122](#)
 - ip dhcp snooping database command [2-125](#)
 - ip dhcp snooping information option command [2-127](#)
 - ip dhcp snooping limit rate command [2-129](#)
 - ip dhcp snooping trust command [2-130](#)
 - ip dhcp snooping verify command [2-131](#)
 - ip dhcp snooping vlan command [2-132](#)
 - ip igmp filter command [2-133](#)
 - ip igmp max-groups command [2-134](#)
 - ip igmp profile command [2-136](#)
 - ip igmp snooping command [2-138](#)
 - ip igmp snooping report-suppression command [2-141](#)
 - IP multicast addresses [2-226](#)
 - IP phones
 - auto-QoS configuration [2-17](#)
 - trusting packets sent from [2-219](#)
 - IP-precedence-to-DSCP map [2-193](#)
 - ip source binding command [2-143](#)

IP source guard

- disabling [2-147](#)

- displaying

- binding entries [2-364](#)

- configuration [2-365](#)

- dynamic binding entries only [2-353](#)

- enabling [2-147](#)

- static IP source bindings [2-143](#)

ip ssh command [2-145](#)ip verify source command [2-147](#)

J

jumbo frames

- See MTU

L
l2protocol-tunnel command [2-148](#)l2protocol-tunnel cos command [2-151](#)

LACP

- See EtherChannel

lacp port-priority command [2-152](#)lacp system-priority command [2-154](#)Layer 2 mode, enabling [2-527](#)Layer 2 protocol ports, displaying [2-371](#)

Layer 2 protocol-tunnel

- error detection for [2-91](#)

- error recovery timer [2-93](#)

Layer 2 protocol tunnel counters [2-42](#)Layer 2 protocol tunneling error recovery [2-149](#)

Layer 2 traceroute

- IP addresses [2-567](#)

- MAC addresses [2-564](#)

Layer 3 mode, enabling [2-527](#)line configuration mode [1-2, 1-5](#)

Link Aggregation Control Protocol

- See EtherChannel

link flap

- error detection for [2-91](#)

- error recovery timer [2-93](#)

load_helper (boot loader) command [A-13](#)load-distribution methods for EtherChannel [2-248](#)logging event power-inline-status command [2-156](#)logging file command [2-157](#)logical interface [2-97](#)

loopback error

- detection for [2-91](#)

- recovery timer [2-93](#)

loop guard, for spanning tree [2-484, 2-488](#)

M
mac access-group command [2-159](#)MAC access-groups, displaying [2-378](#)MAC access list configuration mode [2-161](#)mac access-list extended command [2-161](#)MAC access lists [2-69](#)

MAC addresses

- displaying

- aging time [2-384](#)

- all [2-382](#)

- dynamic [2-388](#)

- notification settings [2-392](#)

- number of addresses in a VLAN [2-386](#)

- per interface [2-390](#)

- per VLAN [2-396](#)

- static [2-394](#)

- static and dynamic entries [2-380](#)

- dynamic

- aging time [2-163](#)

- deleting [2-44](#)

- displaying [2-388](#)

enabling MAC address notification [2-164](#)matching [2-179](#)

- MAC addresses (continued)
 - static
 - adding and removing [2-166](#)
 - displaying [2-394](#)
 - dropping on an interface [2-167](#)
 - tables [2-382](#)
- MAC address notification, debugging [B-17](#)
- mac address-table aging-time [2-159, 2-179](#)
- mac address-table aging-time command [2-163](#)
- mac address-table notification command [2-164](#)
- mac address-table static command [2-166](#)
- mac address-table static drop command [2-167](#)
- macro description command [2-172](#)
- macro global command [2-173](#)
- macro global description command [2-176](#)
- macro name command [2-177](#)
- macros
 - adding a description [2-172](#)
 - adding a global description [2-176](#)
 - applying [2-173](#)
 - creating [2-177](#)
 - displaying [2-423](#)
 - interface range [2-64, 2-99](#)
 - specifying parameter values [2-173](#)
 - tracing [2-173](#)
- manual
 - audience [xvii](#)
 - purpose of [xvii](#)
- maps
 - QoS
 - defining [2-193](#)
 - displaying [2-406](#)
 - VLAN
 - creating [2-588](#)
 - defining [2-179](#)
 - displaying [2-455](#)
- match (access-map configuration) command [2-179](#)
- match (class-map configuration) command [2-181](#)
- maximum transmission unit
 - See [MTU](#)
- mdix auto command [2-183](#)
- member switches
 - See [clusters](#)
- memory (boot loader) command [A-14](#)
- mkdir (boot loader) command [A-15](#)
- mls qos aggregate-policer command [2-187](#)
- mls qos command [2-185](#)
- mls qos cos command [2-189](#)
- mls qos dscp-mutation command [2-191](#)
- mls qos map command [2-193](#)
- mls qos queue-set output buffers command [2-197](#)
- mls qos queue-set output threshold command [2-199](#)
- mls qos srr-queue input bandwidth command [2-203](#)
- mls qos srr-queue input buffers command [2-205](#)
- mls qos-srr-queue input cos-map command [2-207](#)
- mls qos srr-queue input dscp-map command [2-209](#)
- mls qos srr-queue input priority-queue command [2-211](#)
- mls qos srr-queue input threshold command [2-213](#)
- mls qos-srr-queue output cos-map command [2-215](#)
- mls qos srr-queue output dscp-map command [2-217](#)
- mls qos trust command [2-219](#)
- mls qos vlan-based command [2-221](#)
- mode, MVR [2-226](#)
- Mode button, and password recovery [2-270](#)
- modes, commands [1-1](#)
- monitor session command [2-222](#)
- more (boot loader) command [A-16](#)
- MSTP
 - displaying [2-437](#)
 - interoperability [2-48](#)
 - link type [2-486](#)
 - MST region
 - aborting changes [2-492](#)
 - applying changes [2-492](#)
 - configuration name [2-492](#)
 - configuration revision number [2-492](#)
 - current or pending display [2-492](#)

MSTP (continued)

MST region (continued)

displaying [2-437](#)MST configuration mode [2-492](#)VLANs-to-instance mapping [2-492](#)path cost [2-494](#)protocol mode [2-490](#)restart protocol migration process [2-48](#)

root port

loop guard [2-484](#)preventing from becoming designated [2-484](#)restricting which can be root [2-484](#)root guard [2-484](#)

root switch

affects of extended system ID [2-483](#)hello-time [2-497, 2-503](#)interval between BPDU messages [2-498](#)interval between hello BPDU messages [2-497, 2-503](#)max-age [2-498](#)maximum hop count before discarding BPDU [2-499](#)port priority for selection of [2-500](#)primary or secondary [2-503](#)switch priority [2-502](#)

state changes

blocking to forwarding state [2-509](#)enabling BPDU filtering [2-475, 2-507](#)enabling BPDU guard [2-477, 2-507](#)enabling Port Fast [2-507, 2-509](#)forward-delay time [2-496](#)length of listening and learning states [2-496](#)rapid transition to forwarding [2-486](#)shutting down Port Fast-enabled ports [2-507](#)state information display [2-436](#)

MTU

configuring size [2-561](#)displaying global setting [2-444](#)multicast group address, MVR [2-229](#)multicast groups, MVR [2-227](#)multicast router learning method [2-138](#)multicast router ports, configuring [2-138](#)multicast storm control [2-524](#)multicast VLAN, MVR [2-226](#)

multicast VLAN registration

See MVR

multiple hosts on authorized port [2-77](#)

Multiple Spanning Tree Protocol

See MSTP

MVR

and address aliasing [2-227](#)configuring [2-226](#)configuring interfaces [2-229](#)debug messages, display [B-20](#)displaying [2-415](#)displaying interface information [2-417](#)members, displaying [2-419](#)mvr (global configuration) command [2-226](#)mvr (interface configuration) command [2-229](#)mvr vlan group command [2-230](#)

N

native VLANs [2-554](#)native VLAN tagging [2-593](#)Network Assistant requirements [xviii](#)

nonegotiate

DTP messaging [2-540](#)speed [2-516](#)

non-IP protocols

denying [2-69](#)forwarding [2-238](#)non-IP traffic access lists [2-161](#)

non-IP traffic forwarding

denying [2-69](#)permitting [2-238](#)normal-range VLANs [2-576, 2-582](#)note, description [xviii](#)no vlan command [2-576, 2-586](#)

P

PAgP

See EtherChannel

pagp learn-method command [2-232](#)

pagp port-priority command [2-234](#)

password, VTP [2-601, 2-605](#)

password-recovery mechanism, enabling and disabling [2-270](#)

permit (ARP access-list configuration) command [2-236](#)

permit command [2-238](#)

per-VLAN spanning-tree plus

See STP

physical-port learner [2-232](#)

PIM-DVMRP, as multicast router learning method [2-138](#)

PoE

configuring the power management mode [2-250](#)

displaying controller register values [2-312](#)

displaying power management information [2-431](#)

logging of status [2-156](#)

police aggregate command [2-243](#)

police command [2-241](#)

policed-DSCP map [2-193](#)

policy-map command [2-245](#)

policy maps

applying to an interface [2-272, 2-276](#)

creating [2-245](#)

displaying [2-426](#)

hierarchical [2-246](#)

policers

displaying [2-399](#)

for a single class [2-241](#)

for multiple classes [2-187, 2-243](#)

policed-DSCP map [2-193](#)

traffic classification

defining the class [2-34](#)

defining trust states [2-569](#)

setting DSCP or IP precedence values [2-274](#)

Port Aggregation Protocol

See EtherChannel

port-based authentication

802.1x AAA accounting methods [2-1](#)

AAA method list [2-3](#)

debug messages, display [B-6](#)

enabling 802.1x

globally [2-72](#)

per interface [2-82](#)

guest VLAN [2-75](#)

host modes [2-77](#)

initialize an interface [2-78](#)

manual control of authorization state [2-82](#)

multiple hosts on authorized port [2-77](#)

periodic re-authentication

enabling [2-86](#)

time between attempts [2-87](#)

quiet period between failed authentication exchanges [2-87](#)

re-authenticating 802.1x-enabled ports [2-84](#)

resetting configurable 802.1x parameters [2-74](#)

switch-to-authentication server retransmission time [2-87](#)

switch-to-client frame-retransmission number [2-79 to 2-80](#)

switch-to-client retransmission time [2-87](#)

port-channel load-balance command [2-248](#)

Port Fast, for spanning tree [2-509](#)

port ranges, defining [2-64](#)

ports, debugging [B-56](#)

ports, protected [2-553](#)

port security

aging [2-547](#)

debug messages, display [B-58](#)

enabling [2-542](#)

violation error recovery [2-93](#)

port trust states for QoS [2-219](#)

port types, MVR [2-229](#)

power information, displaying [2-324](#)

power inline command [2-250](#)
 Power over Ethernet
 See PoE
 priority-queue command [2-253](#)
 private-vlan command [2-255](#)
 private-vlan mapping command [2-258](#)

private VLANs

 association [2-551](#)
 configuring [2-255](#)
 configuring ports [2-538](#)
 displaying [2-450](#)
 host ports [2-538](#)
 mapping
 configuring [2-551](#)
 displaying [2-337](#)
 promiscuous ports [2-538](#)

privileged EXEC mode [1-2, 1-3](#)

promiscuous ports, private VLANs [2-538](#)

protected ports, displaying [2-343](#)

pruning

 VLANs [2-554](#)
 VTP
 displaying interface information [2-337](#)
 enabling [2-601, 2-605](#)

pruning-eligible VLAN list [2-556](#)

PVST+

 See STP

Q

QoS

auto-QoS

 configuring [2-17](#)
 debug messages, display [1-5, B-2](#)
 displaying [2-287](#)

class maps

 creating [2-36](#)
 defining the match criteria [2-181](#)
 displaying [2-296](#)

QoS (continued)

 defining the CoS value for an incoming packet [2-189](#)

 displaying configuration information [2-287, 2-398](#)

DSCP trusted ports

 applying DSCP-to-DSCP-mutation map to [2-191](#)
 defining DSCP-to-DSCP-mutation map [2-193](#)

egress queues

 allocating buffers [2-197](#)
 defining the CoS output queue threshold map [2-215](#)
 defining the DSCP output queue threshold map [2-217](#)
 displaying buffer allocations [2-402](#)
 displaying CoS output queue threshold map [2-406](#)
 displaying DSCP output queue threshold map [2-406](#)
 displaying queueing strategy [2-402](#)
 displaying queue-set settings [2-409, 2-411](#)
 enabling bandwidth shaping and scheduling [2-520](#)
 enabling bandwidth sharing and scheduling [2-522](#)
 limiting the maximum output on a port [2-518](#)
 mapping a port to a queue-set [2-260](#)
 mapping CoS values to a queue and threshold [2-215](#)
 mapping DSCP values to a queue and threshold [2-217](#)
 setting maximum and reserved memory
 allocations [2-199](#)
 setting WTD thresholds [2-199](#)

 enabling [2-185](#)

ingress queues

 allocating buffers [2-205](#)
 assigning SRR scheduling weights [2-203](#)
 defining the CoS input queue threshold map [2-207](#)
 defining the DSCP input queue threshold map [2-209](#)
 displaying buffer allocations [2-402](#)
 displaying CoS input queue threshold map [2-406](#)
 displaying DSCP input queue threshold map [2-406](#)
 displaying queueing strategy [2-402](#)
 displaying settings for [2-400](#)
 enabling the priority queue [2-211](#)
 mapping CoS values to a queue and threshold [2-207](#)
 mapping DSCP values to a queue and threshold [2-209](#)
 setting WTD thresholds [2-213](#)

QoS (continued)

- maps
 - defining [2-193, 2-207, 2-209, 2-215, 2-217](#)
 - displaying [2-406](#)
 - policy maps
 - applying an aggregate policer [2-243](#)
 - applying to an interface [2-272, 2-276](#)
 - creating [2-245](#)
 - defining policers [2-187, 2-241](#)
 - displaying policers [2-399](#)
 - displaying policy maps [2-426](#)
 - hierarchical [2-246](#)
 - policed-DSCP map [2-193](#)
 - setting DSCP or IP precedence values [2-274](#)
 - traffic classifications [2-34](#)
 - trust states [2-569](#)
 - port trust states [2-219](#)
 - queues, enabling the expedite [2-253](#)
 - statistics
 - in-profile and out-of-profile packets [2-402](#)
 - packets enqueued or dropped [2-402](#)
 - sent and received CoS values [2-402](#)
 - sent and received DSCP values [2-402](#)
 - trusted boundary for IP phones [2-219](#)
 - VLAN-based [2-221](#)
- quality of service
- See QoS
- querytime, MVR [2-226](#)
- queue-set command [2-260](#)

R

- rapid per-VLAN spanning-tree plus
 - See STP
- rapid PVST+
 - See STP
- rcommand command [2-261](#)
- re-authenticating 802.1x-enabled ports [2-84](#)

- re-authentication
 - periodic [2-86](#)
 - time between attempts [2-87](#)
- receiver ports, MVR [2-229](#)
- receiving flow-control packets [2-95](#)
- recovery mechanism
 - causes [2-93](#)
 - display [2-293, 2-326, 2-330](#)
 - timer interval [2-93](#)
- redundancy for cluster switches [2-61](#)
- remote-span command [2-263](#)
- Remote Switched Port Analyzer
 - See RSPAN
- rename (boot loader) command [A-17](#)
- renew ip dhcp snooping database command [2-265](#)
- requirements
 - cluster [xix](#)
 - device manager [xviii](#)
 - Network Assistant [xviii](#)
- reset (boot loader) command [A-18](#)
- reset command [2-591](#)
- resource templates, displaying [2-433](#)
- rmdir (boot loader) command [A-19](#)
- rmon collection stats command [2-267](#)
- root guard, for spanning tree [2-484](#)
- routed ports
 - IP addresses on [2-108](#)
 - number supported [2-108](#)
- RSPAN
 - configuring [2-222](#)
 - displaying [2-412](#)
 - filter RSPAN traffic [2-222](#)
 - remote-span command [2-263](#)
 - sessions
 - add interfaces to [2-222](#)
 - displaying [2-412](#)
 - start new [2-222](#)

S

- sdm prefer command [2-268](#)
- secure ports, limitations [2-543](#)
- sending flow-control packets [2-95](#)
- service password-recovery command [2-270](#)
- service-policy command [2-272](#)
- set (boot loader) command [A-20](#)
- set command [2-274](#)
- setup command [2-276](#)
- setup express command [2-279](#)
- show access-lists command [2-281](#)
- show archive status command [2-284](#)
- show arp access-list command [2-286](#)
- show auto qos command [2-287](#)
- show boot command [2-291](#)
- show changes command [2-591](#)
- show class-map command [2-296](#)
- show cluster candidates command [2-299](#)
- show cluster command [2-297](#)
- show cluster members command [2-301](#)
- show controllers cpu-interface command [2-303](#)
- show controllers ethernet-controller command [2-305](#)
- show controllers power inline command [2-312](#)
- show controllers team command [2-314](#)
- show controllers utilization command [2-316](#)
- show controller utilization command [2-316](#)
- show current command [2-591](#)
- show dot1q-tunnel command [2-318](#)
- show dot1x command [2-319](#)
- show dtp [2-322](#)
- show env command [2-324](#)
- show errdisable detect command [2-326](#)
- show errdisable flap-values command [2-328](#)
- show errdisable recovery command [2-330](#)
- show etherchannel command [2-332](#)
- show flowcontrol command [2-335](#)
- show interfaces command [2-337](#)
- show interfaces counters command [2-347](#)
- show ip arp inspection command [2-349](#)
- show ipc command [2-367](#)
- show ip dhcp snooping binding command [2-353](#)
- show ip dhcp snooping command [2-352](#)
- show ip dhcp snooping database command [2-355](#)
- show ip igmp profile command [2-357](#)
- show ip igmp snooping command [2-358](#)
- show ip igmp snooping groups command [2-362](#)
- show ip igmp snooping mrouter command [2-361](#)
- show ip source binding command [2-364](#)
- show ip verify source command [2-365](#)
- show l2protocol-tunnel command [2-371](#)
- show lacp command [2-374](#)
- show mac access-group command [2-378](#)
- show mac address-table address command [2-382](#)
- show mac address-table aging time command [2-384](#)
- show mac address-table command [2-380](#)
- show mac address-table count command [2-386](#)
- show mac address-table dynamic command [2-388](#)
- show mac address-table interface command [2-390](#)
- show mac address-table notification command [2-392](#)
- show mac address-table static command [2-394](#)
- show mac address-table vlan command [2-396](#)
- show mls qos aggregate-policer command [2-399](#)
- show mls qos command [2-398](#)
- show mls qos input-queue command [2-400](#)
- show mls qos interface command [2-402](#)
- show mls qos maps command [2-406](#)
- show mls qos queue-set command [2-409](#)
- show mls qos vlan command [2-411](#)
- show monitor command [2-412](#)
- show mvr command [2-415](#)
- show mvr interface command [2-417](#)
- show mvr members command [2-419](#)
- show pagp command [2-421](#)
- show parser macro command [2-423](#)
- show platform acl command [C-2](#)
- show platform configuration command [C-3](#)
- show platform etherchannel command [C-4](#)

- show platform forward command [C-5](#)
- show platform frontend-controller command [C-7](#)
- show platform igmp snooping command [C-8](#)
- show platform ip multicast command [C-10](#)
- show platform ip unicast command [C-11](#)
- show platform layer4op command [C-13](#)
- show platform mac-address-table command [C-14](#)
- show platform messaging command [C-15](#)
- show platform monitor command [C-16](#)
- show platform mvr table command [C-17](#)
- show platform pm command [C-18](#)
- show platform port-asic command [C-19](#)
- show platform port-security command [C-23](#)
- show platform qos command [C-24](#)
- show platform resource-manager command [C-25](#)
- show platform snmp counters command [C-27](#)
- show platform spanning-tree command [C-28](#)
- show platform stp-instance command [C-29](#)
- show platform team command [C-30](#)
- show platform vlan command [C-33](#)
- show policy-map command [2-426](#)
- show port security command [2-428](#)
- show power inline command [2-431](#)
- show proposed command [2-591](#)
- show sdm prefer command [2-433](#)
- show setup express command [2-435](#)
- show spanning-tree command [2-436](#)
- show storm-control command [2-442](#)
- show system mtu command [2-444](#)
- show trust command [2-569](#)
- show udd command [2-445](#)
- show version command [2-448](#)
- show vlan access-map command [2-455](#)
- show vlan command [2-450](#)
- show vlan command, fields [2-452](#)
- show vlan filter command [2-456](#)
- show vmps command [2-457](#)
- show vtp command [2-459](#)
- shutdown command [2-463](#)
- shutdown threshold, Layer 2 protocol tunneling [2-148](#)
- shutdown vlan command [2-464](#)
- Smartports macros
 - See macros
- SNMP host, specifying [2-468](#)
- SNMP informs, enabling the sending of [2-465](#)
- snmp-server enable traps command [2-465](#)
- snmp-server host command [2-468](#)
- snmp trap mac-notification command [2-472](#)
- SNMP traps
 - enabling MAC address notification trap [2-472](#)
 - enabling the MAC address notification feature [2-164](#)
 - enabling the sending of [2-465](#)
- SoftPhone
 - See Cisco SoftPhone
- software images
 - deleting [2-66](#)
 - downloading [2-7](#)
 - upgrading [2-7](#)
 - uploading [2-13](#)
- software version, displaying [2-448](#)
- source ports, MVR [2-229](#)
- SPAN
 - configuring [2-222](#)
 - debug messages, display [B-19](#)
 - displaying [2-412](#)
 - filter SPAN traffic [2-222](#)
 - sessions
 - add interfaces to [2-222](#)
 - displaying [2-412](#)
 - start new [2-222](#)
- spanning-tree backbonefast command [2-474](#)
- spanning-tree bpdudfilter command [2-475](#)
- spanning-tree bpduguard command [2-477](#)
- spanning-tree cost command [2-479](#)
- spanning-tree etherchannel command [2-481](#)
- spanning-tree extend system-id command [2-483](#)
- spanning-tree guard command [2-484](#)
- spanning-tree link-type command [2-486](#)

- spanning-tree loopguard default command [2-488](#)
- spanning-tree mode command [2-490](#)
- spanning-tree mst configuration command [2-492](#)
- spanning-tree mst cost command [2-494](#)
- spanning-tree mst forward-time command [2-496](#)
- spanning-tree mst hello-time command [2-497](#)
- spanning-tree mst max-age command [2-498](#)
- spanning-tree mst max-hops command [2-499](#)
- spanning-tree mst port-priority command [2-500](#)
- spanning-tree mst priority command [2-502](#)
- spanning-tree mst root command [2-503](#)
- spanning-tree portfast (global configuration) command [2-507](#)
- spanning-tree portfast (interface configuration) command [2-509](#)
- spanning-tree port-priority command [2-505](#)
- Spanning Tree Protocol
 - See STP
- spanning-tree uplinkfast command [2-511](#)
- spanning-tree vlan command [2-513](#)
- speed command [2-516](#)
- srr-queue bandwidth limit command [2-518](#)
- srr-queue bandwidth shape command [2-520](#)
- srr-queue bandwidth share command [2-522](#)
- SSH, configuring version [2-145](#)
- static-access ports, configuring [2-529](#)
- statistics, Ethernet group [2-267](#)
- sticky learning, enabling [2-542](#)
- storm-control command [2-524](#)
- STP
 - BackboneFast [2-474](#)
 - counters, clearing [2-47](#)
 - debug messages, display
 - BackboneFast events [B-62](#)
 - MSTP [B-65](#)
 - optimized BPDUs handling [B-64](#)
 - spanning-tree activity [B-60](#)
 - switch shim [B-67](#)
 - STP (continued)
 - debug messages, display (continued)
 - transmitted and received BPDUs [B-63](#)
 - UplinkFast [B-69](#)
 - detection of indirect link failures [2-474](#)
 - enabling protocol tunneling for [2-148](#)
 - EtherChannel misconfiguration [2-481](#)
 - extended system ID [2-483](#)
 - path cost [2-479](#)
 - protocol modes [2-490](#)
 - root port
 - accelerating choice of new [2-511](#)
 - loop guard [2-484](#)
 - preventing from becoming designated [2-484](#)
 - restricting which can be root [2-484](#)
 - root guard [2-484](#)
 - UplinkFast [2-511](#)
 - root switch
 - affects of extended system ID [2-483, 2-514](#)
 - hello-time [2-513](#)
 - interval between BPDU messages [2-513](#)
 - interval between hello BPDU messages [2-513](#)
 - max-age [2-513](#)
 - port priority for selection of [2-505](#)
 - primary or secondary [2-513](#)
 - switch priority [2-513](#)
 - state changes
 - blocking to forwarding state [2-509](#)
 - enabling BPDU filtering [2-475, 2-507](#)
 - enabling BPDU guard [2-477, 2-507](#)
 - enabling Port Fast [2-507, 2-509](#)
 - enabling timer to recover from error state [2-93](#)
 - forward-delay time [2-513](#)
 - length of listening and learning states [2-513](#)
 - shutting down Port Fast-enabled ports [2-507](#)
 - state information display [2-436](#)
 - VLAN options [2-502, 2-513](#)
- SVIs, creating [2-102](#)

Switched Port Analyzer
 See SPAN

switching characteristics
 modifying [2-527](#)
 returning to interfaces [2-527](#)

switchport access command [2-529](#)

switchport backup interface command [2-531](#)

switchport block command [2-533](#)

switchport command [2-527](#)

switchport host command [2-534](#)

switchport mode command [2-535](#)

switchport mode private-vlan command [2-538](#)

switchport nonegotiate command [2-540](#)

switchport port-security aging command [2-547](#)

switchport port-security command [2-542](#)

switchport priority extend command [2-549](#)

switchport private-vlan command [2-551](#)

switchport protected command [2-553](#)

switchports, displaying [2-337](#)

switchport trunk command [2-554](#)

switchport voice vlan command [2-557](#)

system env temperature threshold yellow command [2-559](#)

system message logging [2-156](#)

system message logging, save message to flash [2-157](#)

system mtu command [2-561](#)

system resource templates [2-268](#)

T

tar files, creating, listing, and extracting [2-10](#)

TDR, running [2-563](#)

Telnet, using to communicate to cluster switches [2-261](#)

temperature information, displaying [2-324](#)

templates, system resources [2-268](#)

test cable-diagnostics tdr command [2-563](#)

traceroute mac command [2-564](#)

traceroute mac ip command [2-567](#)

trunking, VLAN mode [2-535](#)

trunk mode [2-535](#)

trunk ports [2-535](#)

trunks, to non-DTP device [2-536](#)

trusted boundary for QoS [2-219](#)

trusted port states for QoS [2-219](#)

tunnel ports, Layer 2 protocol, displaying [2-371](#)

type (boot loader) command [A-23](#)

U

UDLD
 aggressive mode [2-571, 2-573](#)
 debug messages, display [B-77](#)
 enable globally [2-571](#)
 enable per interface [2-573](#)
 error recovery timer [2-93](#)
 message timer [2-571](#)
 normal mode [2-571, 2-573](#)
 reset a shutdown interface [2-575](#)
 status [2-445](#)

udld command [2-571](#)

udld port command [2-573](#)

udld reset command [2-575](#)

unicast storm control [2-524](#)

UniDirectional Link Detection
 See UDLD

unknown multicast traffic, preventing [2-533](#)

unknown unicast traffic, preventing [2-533](#)

unset (boot loader) command [A-24](#)

upgrading
 software images [2-7](#)
 monitoring status of [2-284](#)

upgrading information
 See release notes

UplinkFast, for STP [2-511](#)

user EXEC mode [1-2](#)

V

version (boot loader) command [A-26](#)

vlan (global configuration) command [2-576](#)

vlan (VLAN configuration) command [2-582](#)

vlan access-map command [2-588](#)

VLAN access map configuration mode [2-588](#)

VLAN access maps

actions [2-5](#)

displaying [2-455](#)

VLAN-based QoS [2-221](#)

VLAN configuration

rules [2-579, 2-584](#)

saving [2-576, 2-586](#)

VLAN configuration mode

commands

VLAN [2-582](#)

VTP [2-605](#)

description [1-4](#)

entering [2-590](#)

summary [1-2](#)

vlan database command [2-590](#)

vlan dot1q tag native command [2-593](#)

vlan filter command [2-594](#)

VLAN filters, displaying [2-456](#)

VLAN ID range [2-576, 2-582](#)

VLAN maps

applying [2-594](#)

creating [2-588](#)

defining [2-179](#)

displaying [2-455](#)

VLAN Query Protocol

See VQP

VLANs

adding [2-576](#)

configuring [2-576, 2-582](#)

debug messages, display

ISL [B-73](#)

VLAN IOS file system error tests [B-72](#)

VLANs (continued)

debug messages, display (continued)

VLAN manager activity [B-70](#)

VTP [B-75](#)

displaying configurations [2-450](#)

extended-range [2-576](#)

MAC addresses

displaying [2-396](#)

number of [2-386](#)

media types [2-579, 2-584](#)

normal-range [2-576, 2-582](#)

private [2-538](#)

configuring [2-255](#)

displaying [2-450](#)

See also private VLANs

restarting [2-464](#)

saving the configuration [2-576](#)

shutting down [2-464](#)

SNMP traps for VTP [2-466, 2-469](#)

suspending [2-464](#)

variables [2-582](#)

VLAN Trunking Protocol

See VTP

VMPS

configuring servers [2-599](#)

displaying [2-457](#)

error recovery timer [2-93](#)

reconfirming dynamic VLAN assignments [2-596](#)

vmpls reconfirm (global configuration) command [2-597](#)

vmpls reconfirm (privileged EXEC) command [2-596](#)

vmpls retry command [2-598](#)

vmpls server command [2-599](#)

voice VLAN

configuring [2-557](#)

setting port priority [2-549](#)

VQP

and dynamic-access ports [2-530](#)

clearing client statistics [2-49](#)

displaying information [2-457](#)

VQP (continued)

- per-server retry count [2-598](#)
- reconfirmation interval [2-597](#)
- reconfirming dynamic VLAN assignments [2-596](#)

VTP

- changing characteristics [2-601](#)
- clearing pruning counters [2-50](#)
- configuring
 - domain name [2-601, 2-605](#)
 - file name [2-601](#)
 - mode [2-601, 2-605](#)
 - password [2-601, 2-605](#)
- counters display fields [2-460](#)

VTP (continued)

- displaying information [2-459](#)
- enabling
 - pruning [2-601, 2-605](#)
 - tunneling for [2-148](#)
 - Version 2 [2-601, 2-605](#)
- mode [2-601, 2-605](#)
- pruning [2-601, 2-605](#)
- saving the configuration [2-576, 2-586](#)
- statistics [2-459](#)
- status [2-459](#)
- status display fields [2-461](#)
- vtp (global configuration) command [2-601](#)
- vtp (VLAN configuration) command [2-605](#)

