



INDEX

A

aaa accounting dot1x command [2-1](#)
aaa authentication dot1x command [2-3](#)
AAA methods [2-3](#)
access control entries
 See ACEs
access control lists
 See ACLs
access groups
 IP [2-118](#)
 MAC, displaying [2-459](#)
 matching for QoS classification [2-235](#)
access list, IPv6 [2-182](#)
access mode [2-616](#)
access ports [2-616](#)
ACEs [2-72](#), [2-274](#)
ACLs
 as match criteria for QoS classes [2-235](#)
 deny [2-70](#)
 displaying [2-349](#)
 for non-IP protocols [2-213](#)
 IP [2-118](#)
 on Layer 2 interfaces [2-118](#)
 permit [2-272](#)
action command [2-5](#)
address aliasing [2-255](#)
aggregate policers
 applying [2-283](#)
 creating [2-279](#)
 displaying [2-494](#)
 QoS [2-280](#)
aggregate-port learner [2-261](#)

allowed VLANs [2-632](#)
archive download-sw command [2-7](#)
archive tar command [2-10](#)
archive upload-sw command [2-13](#)
arp access-list command [2-15](#)
attaching policy maps to interfaces [2-331](#)
authorization state of controlled port [2-79](#)
autonegotiation of duplex mode [2-90](#)

B

backup interfaces
 configuring [2-609](#)
 displaying [2-399](#)
bandwidth, configuring for QoS [2-17](#)
bandwidth command [2-17](#)
boot (boot loader) command [A-2](#)
boot config-file command [2-20](#)
boot enable-break command [2-21](#)
boot helper command [2-22](#)
boot helper-config file command [2-23](#)
booting
 Cisco IOS image [2-26](#)
 displaying environment variables [2-354](#)
 interrupting [2-21](#)
 manually [2-24](#)
boot loader
 accessing [A-1](#)
 booting
 Cisco IOS image [A-2](#)
 helper image [2-22](#)

boot loader (continued)

directories

- creating [A-14](#)
- displaying a list of [A-7](#)
- removing [A-18](#)

displaying

- available commands [A-12](#)
- memory heap utilization [A-13](#)
- version [A-25](#)

environment variables

- described [A-19](#)
- displaying settings [A-19](#)
- location of [A-20](#)
- setting [A-19](#)
- unsetting [A-23](#)

files

- copying [A-5](#)
- deleting [A-6](#)
- displaying a list of [A-7](#)
- displaying the contents of [A-4, A-15, A-22](#)
- renaming [A-16](#)

file system

- formatting [A-10](#)
- initializing flash [A-9](#)
- running a consistency check [A-11](#)

prompt [A-1](#)resetting the system [A-17](#)boot manual command [2-24](#)boot private-config-file command [2-25](#)boot system command [2-26](#)BPDU filtering, for spanning tree [2-554, 2-592](#)BPDU guard, for spanning tree [2-556, 2-592](#)broadcast storm control [2-602](#)bundling characteristics, UNI [2-101](#)burst bytes, in QoS policers [2-275, 2-279](#)CBWFQ, configuring [2-17](#)CDP, enabling protocol tunneling for [2-193](#)CFM [2-260](#)CFM as OAM protocol [2-260](#)channel-group command [2-27](#)channel-protocol command [2-31](#)child policy maps [2-333](#)class-based traffic shaping [2-347](#)

class-based weighted fair queuing

See CBWFQ

class command [2-33](#)class-map command [2-35](#)class-map configuration mode [2-35](#)

class maps

- creating [2-35](#)
- defining the match criteria [2-236](#)
- displaying [2-358](#)
- matching in [2-35](#)

class of service

See CoS

clear ip arp inspection log command [2-37](#)clear ip arp inspection statistics command [2-38](#)clear ipc command [2-41](#)clear ipv6 dhcp conflict command [2-42](#)clear l2protocol-tunnel counters command [2-43](#)clear lacp command [2-44](#)clear mac address-table command [2-45, 2-46](#)clear pagp command [2-47, 2-51](#)clear policer cpu uni-eni counters command [2-48](#)clear port-security command [2-49](#)clear spanning-tree counters command [2-52](#)clear spanning-tree detected-protocols command [2-53](#)clear vmmps statistics command [2-55](#)command modes defined [1-1](#)committed information rate in QoS policers [2-275, 2-279](#)

configuration files

- password recovery disable considerations [A-1](#)
- specifying the name [2-20, 2-25](#)

configuring multiple interfaces [2-114](#)**C**cat (boot loader) command [A-4](#)

conform-action command [2-56](#)
 control-plane policer [2-48](#)
 control-plane policer information, displaying [2-495](#)
 control-plane security [2-285](#)
 control plane statistics, clearing [2-48](#)
 copy (boot loader) command [A-5](#)
 CoS
 as match criteria for QoS groups [2-236](#)
 for QoS classification [2-336](#)
 setting value in policy maps [2-336](#)
 CoS value, assigning to Layer 2 protocol packets [2-196](#)
 CPU ASIC statistics, displaying [2-359](#)
 CPU protection policers, displaying [C-26](#)
 cpu traffic qos [2-58](#)

D

debug backup command [B-2](#)
 debug dot1x command [B-3](#)
 debug etherchannel command [B-4](#)
 debug interface command [B-9](#)
 debug ip dhcp snooping command [B-7](#)
 debug ip igmp filter command [B-10](#)
 debug ip igmp max-groups command [B-11](#)
 debug ip igmp snooping command [B-12](#)
 debug ip verify source packet command [B-8](#)
 debug lacp command [B-13](#)
 debug mac-notification command [B-14](#)
 debug matm command [B-15](#)
 debug matm move update command [B-16](#)
 debug monitor command [B-17](#)
 debug mvrdbg command [B-18](#)
 debug nvram command [B-19](#)
 debug pagp command [B-20](#)
 debug platform acl command [B-21](#)
 debug platform backup interface command [B-23](#)
 debug platform cfm command [B-22](#)
 debug platform cpu-queues command [B-24](#)
 debug platform dot1x command [B-26](#)
 debug platform etherchannel command [B-27](#)
 debug platform forw-tcam command [B-28](#)
 debug platform ip arp inspection command [B-29](#)
 debug platform ipc command [B-38](#)
 debug platform ip dhcp command [B-30](#)
 debug platform ip igmp snooping command [B-31](#)
 debug platform ip multicast command [B-33](#)
 debug platform ip source-guard command [B-35](#)
 debug platform led command [B-39](#)
 debug platform matm command [B-40](#)
 debug platform messaging application command [B-41](#)
 debug platform phy command [B-42](#)
 debug platform pm command [B-44](#)
 debug platform policer cpu uni-eni command [B-46](#)
 debug platform port-asic command [B-47](#)
 debug platform port-security command [B-48](#)
 debug platform qos-acl-tcam command [B-49](#)
 debug platform remote-commands command [B-50](#)
 debug platform rep command [B-51](#)
 debug platform resource-manager command [B-52](#)
 debug platform snmp command [B-53](#)
 debug platform span command [B-54](#)
 debug platform supervisor-asic command [B-55](#)
 debug platform sw-bridge command [B-56](#)
 debug platform tcam command [B-57](#)
 debug platform udd command [B-59](#)
 debug platform vlan command [B-60](#)
 debug pm command [B-61](#)
 debug port-security command [B-63](#)
 debug qos-manager command [B-65](#)
 debug rep command [B-64](#)
 debug spanning-tree bpdu command [B-68](#)
 debug spanning-tree bpdu-opt command [B-69](#)
 debug spanning-tree command [B-66](#)
 debug spanning-tree mstp command [B-70](#)
 debug spanning-tree switch command [B-72](#)
 debug sw-vlan command [B-74](#)
 debug sw-vlan ifs command [B-75](#)
 debug sw-vlan notification command [B-76](#)

- debug udd command [B-78](#)
- debug vqpc command [B-80](#)
- default policer configuration
 - NNIs [C-28](#)
 - UNIs [C-27](#)
- define interface-range command [2-60](#)
- delete (boot loader) command [A-6](#)
- delete command [2-62](#)
- deny (ARP access-list configuration) command [2-63](#)
- deny (IPv6) command [2-65](#)
- deny command [2-70](#)
- detect mechanism, causes [2-91](#)
- DHCP snooping
 - accepting untrusted packets from edge switch [2-143](#)
 - enabling
 - on a VLAN [2-149](#)
 - option 82 [2-141, 2-143](#)
 - trust on an interface [2-147](#)
 - error recovery timer [2-95](#)
 - rate limiting [2-146](#)
- DHCP snooping binding database
 - binding file, configuring [2-139](#)
 - bindings
 - adding [2-137](#)
 - deleting [2-137](#)
 - displaying [2-420](#)
 - clearing database agent statistics [2-39](#)
 - database agent, configuring [2-139](#)
 - displaying
 - binding entries [2-420](#)
 - database agent status [2-422, 2-424](#)
 - renewing [2-309](#)
- differentiated service code point
 - See DSCP
- Digital Optical Monitoring
 - see DoM
- dir (boot loader) command [A-7](#)
- directories, deleting [2-62](#)
- DoM
 - displaying supported transceivers [2-411](#)
- domains, CFM [2-260](#)
- dot1x default command [2-73](#)
- dot1x host-mode command [2-74](#)
- dot1x initialize command [2-76](#)
- dot1x max-req command [2-77, 2-78](#)
- dot1x port-control command [2-79](#)
- dot1x re-authenticate command [2-81](#)
- dot1x reauthentication command [2-82](#)
- dot1x system-auth-control command [2-83](#)
- dot1x test eapol-capable command [2-84](#)
- dot1x test timeout command [2-85](#)
- dot1x timeout command [2-86](#)
- dot1x violation-mode command [2-88](#)
- dropping packets, with ACL matches [2-5](#)
- drop threshold, Layer 2 protocol tunneling [2-193](#)
- DSCP
 - as match criteria for QoS groups [2-237, 2-243](#)
 - for QoS traffic marking [2-338](#)
 - setting in policy maps [2-338](#)
- dual IPv4 and IPv6 templates [2-267](#)
- dual-purpose uplink ports, selecting the type [2-248](#)
- duplex command [2-89](#)
- dynamic-access ports
 - configuring [2-607](#)
 - restrictions [2-608](#)
- dynamic ARP inspection
 - ARP ACLs
 - apply to a VLAN [2-123](#)
 - define [2-15](#)
 - deny packets [2-63](#)
 - display [2-353](#)
 - permit packets [2-265](#)
- clear
 - log buffer [2-37](#)
 - statistics [2-38](#)

dynamic ARP inspection (continued)

display

ARP ACLs [2-353](#)configuration and operating state [2-415](#)log buffer [2-415](#)statistics [2-415](#)trust state and rate limit [2-415](#)enable per VLAN [2-133](#)error detection for [2-91](#)error recovery timer [2-95](#)

log buffer

clear [2-37](#)configure [2-127](#)display [2-415](#)rate-limit incoming ARP packets [2-125](#)

statistics

clear [2-38](#)display [2-415](#)trusted interface state [2-129](#)type of packet logged [2-134](#)validation checks [2-131](#)

Dynamic Host Configuration Protocol (DHCP)

See DHCP snooping

E

EAP-request/identity frame

maximum number to send [2-78](#)response time before retransmitting [2-86](#)

E-LMI

enabling [2-99](#)mapping [2-101](#)environment variables, displaying [2-354](#)errdisable detect cause command [2-91](#)errdisable detect cause small-frame command [2-93](#)errdisable recovery cause small-frame [2-97](#)errdisable recovery command [2-95](#)error conditions, displaying [2-382](#)error disable detection [2-91](#)error-disabled interfaces, displaying [2-399](#)

EtherChannel

assigning Ethernet interface to channel group [2-27](#)creating port-channel logical interface [2-112](#)debug EtherChannel/PAgP, display [B-4](#)debug platform-specific events, display [B-27](#)displaying [2-386](#)

enabling Layer 2 protocol tunneling for

LACP [2-194](#)PAgP [2-194](#)UDLD [2-194](#)interface information, displaying [2-399](#)

LACP

clearing channel-group information [2-44](#)debug messages, display [B-13](#)displaying [2-450](#)modes [2-27](#)port priority for hot-standby ports [2-197](#)restricting a protocol [2-31](#)system priority [2-199](#)load-distribution methods [2-290](#)

PAgP

aggregate-port learner [2-261](#)clearing channel-group information [2-47](#)debug messages, display [B-20](#)displaying [2-490](#)error detection for [2-91](#)error recovery timer [2-95](#)learn method [2-261](#)modes [2-27](#)physical-port learner [2-261](#)priority of interface for transmitted traffic [2-263](#)ethermnet lmi ce command [2-99](#)Ethernet controller, internal register display [2-361](#)ethernet evc command [2-98](#)ethernet lim global command [2-99](#)ethernet lmi ce-vlan map command [2-101, 2-103](#)ethernet lmi command [2-99](#)

Ethernet Local Management Interface

See E-LMI

Ethernet service

debugging [B-5](#)displaying [2-389](#)Ethernet service instance [2-327](#)Ethernet service interfaces [2-393](#)Ethernet statistics, collecting [2-323](#)Ethernet UNI configuration [2-105](#)ethernet uni id command [2-107](#)

Ethernet virtual connections

See EVCs

EVC configuration mode [2-98](#)EVCs [2-98](#)and VLANs [2-105](#)service instances [2-327](#)UNI counts [2-653](#)

EVC service

point-to-multipoint [2-653](#)point-to-point [2-653](#)exceed-action command [2-108](#)

extended-range VLANs

and allowed VLAN list [2-632](#)configuring [2-657](#)extended system ID for STP [2-562](#)

Ffan information, displaying [2-377](#)files, deleting [2-62](#)flash_init (boot loader) command [A-9](#)

Flex Links

configuring [2-609](#)configuring preferred VLAN [2-611](#)displaying [2-399](#)flowcontrol command [2-110](#)format (boot loader) command [A-10](#)forwarding packets, with ACL matches [2-5](#)forwarding results, display [C-8](#)frame forwarding information, displaying [C-8](#)front-end controller counter and status information [C-10](#)fsck (boot loader) command [A-11](#)

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

Hhardware ACL statistics [2-349](#)help (boot loader) command [A-12](#)host connection, port configuration [2-615](#)host ports, private VLANs [2-619](#)

I

IEEE 802.1ag Connectivity Fault Management

See CFM

IEEE 802.1Q trunk ports and native VLANs [2-662](#)

IEEE 802.1Q tunnel ports

configuring [2-616](#)displaying [2-373](#)limitations [2-617](#)

IEEE 802.1x

and switchport modes [2-617](#)violation error recovery [2-95](#)

See also port-based authentication

IGMP filters

applying [2-152](#)debug messages, display [B-10](#)IGMP groups, setting maximum [2-154](#)IGMP maximum groups, debugging [B-11](#)

IGMP profiles

creating [2-156](#)displaying [2-427](#)

IGMP snooping

- adding ports as a static member of a group [2-171](#)
- displaying [2-428, 2-432, 2-434](#)
- enabling [2-158](#)
- enabling the configurable-leave timer [2-160](#)
- enabling the Immediate-Leave feature [2-168](#)
- flooding query count [2-166](#)
- interface topology change notification behavior [2-167](#)
- multicast table [2-430](#)
- querier [2-162](#)
- query solicitation [2-166](#)
- report suppression [2-164](#)
- switch topology change notification behavior [2-166](#)

images

See software images

Immediate-Leave feature, MVR [2-257](#)

immediate-leave processing [2-168](#)

input policy maps

- and ACL classification [2-235](#)
- and aggregate policers [2-281](#)
- commands not supported in [2-288](#)
- configuration guidelines [2-288](#)

interface command [2-116](#)

interface configuration mode [1-2, 1-4](#)

interface port-channel command [2-112](#)

interface range command [2-114](#)

interface-range macros [2-58, 2-60](#)

interfaces

- assigning Ethernet interface to channel group [2-27](#)
- configuring [2-89](#)
- configuring multiple [2-114](#)
- creating port-channel logical [2-112](#)
- debug messages, display [B-9](#)
- disabling [2-537](#)
- displaying the MAC address table [2-471](#)
- restarting [2-537](#)

interface speed, configuring [2-600](#)

internal registers, displaying [2-361, 2-368, 2-372](#)

Internet Group Management Protocol

See IGMP

invalid GBIC

- error detection for [2-91](#)
- error recovery timer [2-95](#)

ip address command [2-121](#)

IP addresses, setting [2-121](#)

IP address matching [2-233](#)

ip arp inspection filter vlan command [2-123](#)

ip arp inspection limit command [2-125](#)

ip arp inspection log-buffer command [2-127](#)

ip arp inspection trust command [2-129](#)

ip arp inspection validate command [2-131](#)

ip arp inspection vlan command [2-133](#)

ip arp inspection vlan logging command [2-134](#)

IP DHCP snooping

See DHCP snooping

ip dhcp snooping binding command [2-137](#)

ip dhcp snooping command [2-136](#)

ip dhcp snooping database command [2-139](#)

ip dhcp snooping information option allow-untrusted command [2-143](#)

ip dhcp snooping information option command [2-141](#)

ip dhcp snooping information option format remote-id command [2-145](#)

ip dhcp snooping limit rate command [2-146](#)

ip dhcp snooping trust command [2-147](#)

ip dhcp snooping verify command [2-148](#)

ip dhcp snooping vlan command [2-149](#)

ip dhcp snooping vlan information option format-type circuit-id string command [2-150](#)

ip igmp filter command [2-152](#)

ip igmp max-groups command [2-154, 2-177, 2-179](#)

ip igmp profile command [2-156](#)

ip igmp snooping command [2-158](#)

ip igmp snooping last-member-query-interval command [2-160](#)

ip igmp snooping querier command [2-162](#)

ip igmp snooping report-suppression command [2-164](#)

ip igmp snooping tcn command [2-166](#)

ip igmp snooping tcn flood command [2-167](#)
 ip igmp snooping vlan immediate-leave command [2-168](#)
 ip igmp snooping vlan mrouter command [2-169](#)
 ip igmp snooping vlan static command [2-171](#)
 IP multicast addresses [2-254](#)
 IP precedence, as match criteria for QoS groups [2-239](#)
 ip source binding command [2-173](#)
 IP source guard
 disabling [2-181](#)
 displaying
 binding entries [2-436](#)
 configuration [2-437](#)
 enabling [2-181](#)
 static IP source bindings [2-173](#)
 IP source guard, displaying dynamic binding entries [2-420](#)
 ip ssh command [2-175](#)
 IPv6 access list, deny conditions [2-65](#)
 ipv6 access-list command [2-182](#)
 ipv6 address dhcp command [2-184](#)
 ipv6 dhcp client request vendor command [2-185](#)
 ipv6 dhcp ping packets command [2-186](#)
 ipv6 dhcp pool command [2-187](#)
 ipv6 dhcp server command [2-189](#)
 IPv6 SDM template [2-324](#)
 ipv6 traffic-filter command [2-191](#)
 ip verify source command [2-181](#)

J

jumbo frames
 See MTU

L

l2protocol-tunnel command [2-193](#)
 l2protocol-tunnel cos command [2-196](#)
 LACP
 See EtherChannel

lacp port-priority command [2-197](#)
 lacp system-priority command [2-199](#)
 Layer 2 mode, enabling [2-605](#)
 Layer 2 protocol ports, displaying [2-448](#)
 Layer 2 protocol-tunnel
 error detection for [2-91](#)
 error recovery timer [2-95](#)
 Layer 2 protocol tunnel counters [2-43](#)
 Layer 2 protocol tunneling error recovery [2-194](#)
 Layer 2 traceroute
 IP addresses [2-646](#)
 MAC addresses [2-643](#)
 Layer 3 mode, enabling [2-605](#)
 line configuration mode [1-2, 1-4](#)
 Link Aggregation Control Protocol
 See EtherChannel
 link flap
 error detection for [2-91](#)
 error recovery timer [2-95](#)
 link state group command [2-201](#)
 link state track command [2-203](#)
 load-distribution methods for EtherChannel [2-290](#)
 location (global configuration) command [2-204](#)
 location (interface configuration) command [2-206](#)
 logging event command [2-208](#)
 logging file command [2-209](#)
 logical interface [2-112](#)
 loopback error
 detection for [2-91](#)
 recovery timer [2-95](#)
 loop guard, for spanning tree [2-564, 2-568](#)

M

mac access-group command [2-211](#)
 MAC access-groups, displaying [2-459](#)
 MAC access list configuration mode [2-213](#)
 mac access-list extended command [2-213](#)
 MAC access lists [2-70](#)

MAC addresses

disabling MAC address learning per VLAN [2-216](#)

displaying

aging time [2-465](#)

all [2-463](#)

dynamic [2-469](#)

MAC address-table move updates [2-474](#)

notification settings [2-473, 2-476](#)

number of addresses in a VLAN [2-467](#)

per interface [2-471](#)

per VLAN [2-480](#)

static [2-478](#)

static and dynamic entries [2-461](#)

dynamic

aging time [2-215](#)

deleting [2-45](#)

displaying [2-469](#)

enabling MAC address notification [2-220](#)

enabling MAC address-table move update [2-218](#)

matching [2-233](#)

static

adding and removing [2-222](#)

displaying [2-478](#)

dropping on an interface [2-223](#)

tables [2-463](#)

MAC address notification, debugging [B-14](#)

mac address-table aging-time [2-211, 2-233](#)

mac address-table aging-time command [2-215](#)

mac address-table learning command [2-216](#)

mac address-table move update command [2-218](#)

mac address-table notification command [2-220](#)

mac address-table static command [2-222](#)

mac address-table static drop command [2-223](#)

macro description command [2-227](#)

macro global command [2-228](#)

macro global description command [2-230](#)

macro name command [2-231](#)

macros

adding a description [2-227](#)

adding a global description [2-230](#)

applying [2-228](#)

creating [2-231](#)

displaying [2-492](#)

interface range [2-60, 2-114](#)

specifying parameter values [2-228](#)

tracing [2-228](#)

maintenance end points [2-653](#)

mapping tables, QoS [2-639](#)

maps

class

creating [2-35](#)

VLAN

creating [2-660](#)

defining [2-233](#)

displaying [2-533](#)

match access-group command [2-235](#)

match cos command [2-236](#)

match ip dscp command [2-237](#)

match ip precedence command [2-239](#)

match qos-group command [2-241](#)

match vlan command [2-243](#)

maximum transmission unit

See MTU

mdix auto command [2-246](#)

media-type command [2-248](#)

memory (boot loader) command [A-13](#)

mkdir (boot loader) command [A-14](#)

mode, MVR [2-254](#)

modes, commands [1-1](#)

monitor session command [2-250](#)

more (boot loader) command [A-15](#)

MSTP

- displaying [2-513](#)
- interoperability [2-53](#)
- link type [2-566](#)
- MST region
 - aborting changes [2-572](#)
 - applying changes [2-572](#)
 - configuration name [2-572](#)
 - configuration revision number [2-573](#)
 - current or pending display [2-573](#)
 - displaying [2-513](#)
 - MST configuration mode [2-572](#)
 - VLANs-to-instance mapping [2-572](#)
- path cost [2-574](#)
- protocol mode [2-570](#)
- restart protocol migration process [2-53](#)
- root port
 - loop guard [2-564](#)
 - preventing from becoming designated [2-564](#)
 - restricting which can be root [2-564](#)
 - root guard [2-564](#)
- root switch
 - affects of extended system ID [2-562](#)
 - hello-time [2-577, 2-588](#)
 - interval between BPDU messages [2-579](#)
 - interval between hello BPDU messages [2-577, 2-588](#)
 - max-age [2-579](#)
 - maximum hop count before discarding BPDU [2-581](#)
 - port priority for selection of [2-583](#)
 - primary or secondary [2-588](#)
 - switch priority [2-586](#)

MSTP (continued)

- state changes
 - blocking to forwarding state [2-595](#)
 - enabling BPDU filtering [2-554, 2-592](#)
 - enabling BPDU guard [2-556, 2-592](#)
 - enabling Port Fast [2-592, 2-595](#)
 - forward-delay time [2-576](#)
 - length of listening and learning states [2-576](#)
 - rapid transition to forwarding [2-566](#)
 - shutting down Port Fast-enabled ports [2-592](#)
- state information display [2-512](#)

MTU

- configuring size [2-636](#)
- displaying global setting [2-520](#)
- multicast group address, MVR [2-257](#)
- multicast groups, MVR [2-255](#)
- multicast router learning method [2-169](#)
- multicast router ports, configuring [2-169](#)
- multicast storm control [2-602](#)
- multicast VLAN, MVR [2-254](#)
- multicast VLAN registration

See MVR

- multiple hosts on authorized port [2-74](#)

Multiple Spanning Tree Protocol

See MSTP

- multiplexing, UNI [2-105](#)

MVR

- and address aliasing [2-255](#)
- configuring [2-254](#)
- configuring interfaces [2-257](#)
- debug messages, display [B-18](#)
- displaying [2-484](#)
- displaying interface information [2-486](#)
- members, displaying [2-488](#)
- mvr (global configuration) command [2-254](#)
- mvr (interface configuration) command [2-257](#)
- mvr vlan group command [2-258](#)

N

native VLANs [2-632](#)
 native VLAN tagging [2-662](#)
 network node interface [2-292](#)
 nonegotiate, speed [2-600, 2-601](#)
 non-IP protocols
 denying [2-70](#)
 forwarding [2-272](#)
 non-IP traffic access lists [2-213](#)
 non-IP traffic forwarding
 denying [2-70](#)
 permitting [2-272](#)
 normal-range VLANs [2-657](#)
 no vlan command [2-657](#)

O

OAM PDUs [2-103](#)
 OAM protocol [2-260](#)
 oam protocol cfm svlan command [2-260](#)
 operation, administration, and maintenance protocol
 See OAM
 output policy maps
 and QoS group classification [2-241](#)
 and traffic shaping [2-347](#)
 commands not supported in [2-288](#)
 configuration guidelines [2-288](#)
 priority in [2-297](#)
 queue limit in [2-304](#)

P

PAgP
 See EtherChannel
 pagp learn-method command [2-261](#)
 pagp port-priority command [2-263](#)
 parent policy maps [2-334](#)
 password-recovery mechanism, enabling and disabling [2-329](#)
 permit (ARP access-list configuration) command [2-265](#)
 permit (IPv6) command [2-267](#)
 permit command [2-272](#)
 per-VLAN spanning-tree plus
 See STP
 physical-port learner [2-261](#)
 PID, displaying [2-414](#)
 PIM-DVMRP, as multicast router learning method [2-169](#)
 police
 multiple conform actions for a class [2-56](#)
 multiple exceed actions for a class [2-108](#)
 with priority [2-275](#)
 police aggregate command [2-283](#)
 police command [2-275](#)
 policer aggregate command [2-279](#)
 policer configuration
 default for NNIs [C-28](#)
 default for UNIs [C-27](#)
 policer cpu uni command [2-285](#)
 policers
 aggregate [2-279, 2-283](#)
 for CPU protection [2-285](#)
 individual [2-275](#)
 policy-map class, configuring multiple actions [2-56, 2-108](#)
 policy-map class configuration mode [2-33](#)
 policy-map class police configuration mode [2-56, 2-277](#)
 policy-map command [2-287](#)
 policy-map configuration mode [2-287](#)
 policy maps
 and CoS classification [2-236](#)
 and DSCP classification [2-237](#)
 and IP precedence classification [2-239](#)
 and policing [2-277](#)
 applying [2-331](#)
 applying to an interface [2-288, 2-331, 2-344](#)
 child [2-333](#)
 creating [2-287](#)

policy maps (continued)

- displaying [2-498](#)
- hierarchical [2-333](#)
- parent [2-334](#)
- policers
 - for a single class [2-275](#)
 - for multiple classes [2-279, 2-283, 2-285, 2-333](#)
- setting priority [2-296](#)
- setting QoS group identifier [2-342](#)
- traffic classification, defining [2-33](#)
- traffic marking
 - setting CoS values [2-336](#)
 - setting DSCP values [2-338](#)
 - setting IP precedence values [2-340](#)

Port Aggregation Protocol

See EtherChannel

port-based authentication

- AAA method list [2-3](#)
- configuring violation modes [2-88](#)
- debug messages, display [B-3](#)
- enabling 802.1x
 - globally [2-83](#)
 - per interface [2-79](#)
- host modes [2-74](#)
- IEEE 802.1x AAA accounting methods [2-1](#)
- initialize an interface [2-76, 2-85](#)
- manual control of authorization state [2-79](#)
- multiple hosts on authorized port [2-74](#)
- periodic re-authentication
 - enabling [2-82](#)
 - time between attempts [2-86](#)
- quiet period between failed authentication exchanges [2-86](#)
- re-authenticating 802.1x-enabled ports [2-81](#)
- resetting configurable 802.1x parameters [2-73](#)
- switch-to-authentication server retransmission time [2-86](#)
- switch-to-client frame-retransmission number [2-77 to 2-78](#)

port-based authentication (continued)

- switch-to-client retransmission time [2-86](#)
- test for IEEE 802.1x readiness [2-84](#)
- port-channel load-balance command [2-290](#)
- Port Fast, for spanning tree [2-595](#)
- port ranges, defining [2-58, 2-60](#)
- ports, debugging [B-61](#)
- ports, protected [2-630](#)
- port security
 - aging [2-626](#)
 - debug messages, display [B-63](#)
 - enabling [2-622](#)
 - violation error recovery [2-95](#)
- port shaping [2-348](#)
- port-type command [2-292](#)
- port types, MVR [2-257](#)
- power information, displaying [2-377](#)
- power-supply dual command [2-294](#)
- power-supply status, displaying [2-377](#)
- precedence
 - for QoS traffic marking [2-340](#)
 - setting in policy maps [2-340](#)
- priority command [2-296](#)
- priority queuing, QoS [2-296](#)
- priority with police, QoS [2-296](#)
- private-vlan command [2-299](#)
- private-vlan mapping command [2-302](#)
- private VLANs
 - association [2-628](#)
 - configuring [2-299](#)
 - configuring ports [2-619](#)
 - displaying [2-528](#)
 - host ports [2-619](#)
 - mapping
 - configuring [2-628](#)
 - displaying [2-399](#)
 - promiscuous ports [2-619](#)
- privileged EXEC mode [1-2, 1-3](#)
- product identification information, displaying [2-414](#)

promiscuous ports, private VLANs [2-619](#)

PVST+

See STP

Q

QoS

aggregate policers

applying [2-283](#)

creating [2-279](#)

displaying [2-494](#)

class maps

creating [2-35](#)

defining the match criteria [2-236](#)

displaying [2-358](#)

displaying statistics for [2-498](#), [C-36](#)

policy maps

applying an aggregate policer [2-279](#), [2-283](#), [2-285](#), [2-333](#)

applying to an interface [2-331](#), [2-344](#)

creating [2-287](#)

defining policers [2-275](#)

displaying policy maps [2-498](#)

setting CoS values [2-336](#)

setting DSCP values [2-338](#)

setting IP precedence values [2-340](#)

setting QoS group identifier [2-342](#)

traffic classifications [2-33](#)

table maps

configuring [2-639](#)

displaying [2-521](#)

QoS groups

as match criteria [2-241](#)

for QoS traffic classification [2-342](#)

setting in policy maps [2-342](#)

QoS match criteria

ACLs [2-235](#)

CoS value [2-236](#)

DSCP value [2-237](#), [2-243](#)

precedence value [2-239](#)

QoS group number [2-241](#)

quality of service

See QoS

querytime, MVR [2-254](#)

queue-limit command [2-304](#)

R

rapid per-VLAN spanning-tree plus

See STP

rapid PVST+

See STP

re-authenticating 802.1x-enabled ports [2-81](#)

re-authentication

periodic [2-82](#)

time between attempts [2-86](#)

receiver ports, MVR [2-257](#)

receiving flow-control packets [2-110](#)

recovery mechanism

causes [2-95](#)

display [2-356](#), [2-380](#), [2-384](#)

timer interval [2-96](#)

remote-span command [2-307](#)

Remote Switched Port Analyzer

See RSPAN

rename (boot loader) command [A-16](#)

renew ip dhcp snooping database command [2-309](#)

rep admin vlan command [2-310](#)

rep block port command [2-311](#)

rep lsl-age-timer command [2-314](#)

rep preempt delay command [2-315](#)

rep preempt segment command [2-317](#)

rep segment command [2-318](#)

rep stcn command [2-321](#)

reset (boot loader) command [A-17](#)
 resource templates, displaying [2-510](#)
 rmdir (boot loader) command [A-18](#)
 rmon collection stats command [2-323](#)
 root guard, for spanning tree [2-564](#)
 routed ports
 IP addresses on [2-122](#)
 number supported [2-122](#)

RSPAN

 configuring [2-250](#)
 displaying [2-482](#)
 filter RSPAN traffic [2-250](#)
 remote-span command [2-307](#)
 sessions
 add interfaces to [2-250](#)
 displaying [2-482](#)
 start new [2-250](#)

S

sdm prefer command [2-324](#)
 SDM templates
 allowed resources [2-325](#)
 displaying [2-510](#)
 dual IPv4 and IPv6 [2-324](#)
 secure ports, limitations [2-624](#)
 sending flow-control packets [2-110](#)
 service instance command [2-327](#)
 service instances, displaying [2-391](#)
 service password-recovery command [2-329](#)
 service policy (policy-map class configuration) command [2-333](#)
 service-policy interface configuration command [2-331](#)
 service-policy policy-map class configuration command [2-333](#)
 set (boot loader) command [A-19](#)
 set cos command [2-336](#)
 set dscp command [2-338](#)
 set precedence command [2-340](#)
 set qos-group command [2-342](#)
 setup command [2-344](#)
 SFPs, displaying information about [2-414](#)
 shape average command [2-347](#)
 show access-lists command [2-349](#)
 show aggregate-policer command [2-521](#)
 show archive status command [2-352](#)
 show arp access-list command [2-353](#)
 show boot command [2-354](#)
 show class-map command [2-358](#)
 show controllers cpu-interface command [2-359](#)
 show controllers ethernet-controller command [2-361](#)
 show controllers team command [2-368](#)
 show controllers utilization command [2-370](#)
 show controller utilization command [2-370](#)
 show cpu traffic qos [2-372](#)
 show dot1q-tunnel command [2-373](#)
 show dot1x command [2-374](#)
 show env command [2-377](#)
 show errdisable detect command [2-380](#)
 show errdisable flap-values command [2-382](#)
 show errdisable recovery command [2-384](#)
 show etherchannel command [2-386](#)
 show ethernet service evc command [2-389](#)
 show ethernet service instance command [2-391](#)
 show ethernet service interface command [2-393](#)
 show flowcontrol command [2-395](#)
 show idprom command [2-397](#)
 show interface rep command [2-409](#)
 show interfaces command [2-399](#)
 show interfaces counters command [2-407](#)
 show interfaces rep command [2-409](#)
 show interface transceivers command [2-411](#)
 show inventory command [2-414](#)
 show ip arp inspection command [2-415](#)
 show ipc command [2-439](#)
 show ip dhcp snooping binding command [2-420](#)
 show ip dhcp snooping command [2-419](#)
 show ip dhcp snooping database command [2-422, 2-424](#)

- show ip igmp profile command [2-427](#)
- show ip igmp snooping command [2-428](#)
- show ip igmp snooping command querier detail [2-434](#)
- show ip igmp snooping groups command [2-430](#)
- show ip igmp snooping mrouter command [2-432](#)
- show ip igmp snooping querier command [2-434](#)
- show ip igmp snooping querier detail command [2-434](#)
- show ip source binding command [2-436](#)
- show ipv6 access-list command [2-443](#)
- show ipv6 dhcp conflict command [2-445](#)
- show ipv6 route updated [2-446](#)
- show ipv6 route updated command [2-446](#)
- show ip verify source command [2-437](#)
- show l2protocol-tunnel command [2-448](#)
- show lacp command [2-450](#)
- show link state group command [2-454](#)
- show location [2-456](#)
- show location command [2-456](#)
- show mac access-group command [2-459](#)
- show mac address-table address command [2-463](#)
- show mac address-table aging time command [2-465](#)
- show mac address-table command [2-461](#)
- show mac address-table count command [2-467](#)
- show mac address-table dynamic command [2-469](#)
- show mac address-table interface command [2-471](#)
- show mac address-table learning command [2-473](#)
- show mac address-table move update command [2-474](#)
- show mac address-table notification command [2-46, 2-476, B-16](#)
- show mac address-table static command [2-478](#)
- show mac address-table vlan command [2-480](#)
- show monitor command [2-482](#)
- show mvr command [2-484](#)
- show mvr interface command [2-486](#)
- show mvr members command [2-488](#)
- show pagp command [2-490](#)
- show parser macro command [2-492](#)
- show platform acl command [C-2](#)
- show platform backup interface command [C-3](#)
- show platform cfm command [C-4](#)
- show platform configuration command [C-5](#)
- show platform dl command [C-6](#)
- show platform etherchannel command [C-7](#)
- show platform forward command [C-8](#)
- show platform frontend-controller command [C-10](#)
- show platform igmp snooping command [C-11](#)
- show platform ipc trace command [C-16](#)
- show platform ip multicast command [C-13](#)
- show platform ip unicast command [C-14](#)
- show platform ipv6 unicast command [C-17](#)
- show platform l2pt dm command [C-19](#)
- show platform layer4op command [C-20, C-43](#)
- show platform mac-address-table command [C-21](#)
- show platform messaging command [C-22](#)
- show platform monitor command [C-23](#)
- show platform mvr table command [C-24](#)
- show platform pm command [C-25](#)
- show platform policer cpu command [C-26](#)
- show platform port-asic command [C-30](#)
- show platform port-security command [C-35](#)
- show platform qos command [C-36](#)
- show platform resource-manager command [C-39](#)
- show platform snmp counters command [C-41](#)
- show platform spanning-tree synchronization command [C-42](#)
- show platform stp-instance command [C-44](#)
- show platform team command [C-45](#)
- show platform vlan command [C-48](#)
- show policer aggregate command [2-494](#)
- show policer cpu uni-eni command [2-495](#)
- show policy-map command [2-498](#)
- show policy-map interface output fields [2-501](#)
- show port security command [2-502](#)
- show port-type command [2-505](#)
- show rep topology command [2-507](#)
- show sdm prefer command [2-510](#)
- show spanning-tree command [2-512](#)
- show storm-control command [2-518](#)

- show system mtu command [2-520](#)
- show uddl command [2-523](#)
- show version command [2-526](#)
- show vlan access-map command [2-533](#)
- show vlan command [2-528](#)
- show vlan command, fields [2-530](#)
- show vlan filter command [2-534](#)
- show vmps command [2-535](#)
- shutdown command [2-537](#)
- shutdown threshold, Layer 2 protocol tunneling [2-193](#)
- shutdown vlan command [2-538](#)
- small violation-rate command [2-539](#)
- SNMP host, specifying [2-546](#)
- SNMP informs, enabling the sending of [2-542](#)
- snmp mib rep trap-rate command [2-541](#)
- snmp-server enable traps command [2-542](#)
- snmp-server host command [2-546](#)
- snmp trap mac-notification command [2-550](#)
- SNMP traps
 - enabling MAC address notification trap [2-550](#)
 - enabling the MAC address notification feature [2-220](#)
 - enabling the sending of [2-542](#)
- software images
 - deleting [2-62](#)
 - downloading [2-7](#)
 - upgrading [2-7](#)
 - uploading [2-13](#)
- software version, displaying [2-526](#)
- source ports, MVR [2-257](#)
- SPAN
 - configuring [2-250](#)
 - debug messages, display [B-17](#)
 - displaying [2-482](#)
 - filter SPAN traffic [2-250](#)
 - sessions
 - add interfaces to [2-250](#)
 - displaying [2-482](#)
 - start new [2-250](#)
- spanning-tree bpduguard command [2-556](#)
- spanning-tree cost command [2-558](#)
- spanning-tree etherchannel command [2-560](#)
- spanning-tree extend system-id command [2-562](#)
- spanning-tree guard command [2-564](#)
- spanning-tree link-type command [2-566](#)
- spanning-tree loopguard default command [2-568](#)
- spanning-tree mode command [2-570](#)
- spanning-tree mst configuration command [2-572](#)
- spanning-tree mst cost command [2-574](#)
- spanning-tree mst forward-time command [2-576](#)
- spanning-tree mst hello-time command [2-577](#)
- spanning-tree mst max-age command [2-579](#)
- spanning-tree mst max-hops command [2-581](#)
- spanning-tree mst port-priority command [2-583](#)
- spanning-tree mst pre-standard command [2-585](#)
- spanning-tree mst priority command [2-586](#)
- spanning-tree mst root command [2-588](#)
- spanning-tree portfast (global configuration) command [2-592](#)
- spanning-tree portfast (interface configuration) command [2-595](#)
- spanning-tree port-priority command [2-590](#)
- Spanning Tree Protocol
 - See STP
- spanning-tree vlan command [2-597](#)
- speed command [2-600](#)
- SSH, configuring version [2-175](#)
- static-access ports, configuring [2-607](#)
- statistics, Ethernet group [2-323](#)
- sticky learning, enabling [2-622](#)
- storm-control command [2-602](#)

STP

- counters, clearing [2-52](#)
- debug messages, display
 - MSTP [B-70](#)
 - optimized BPDUs handling [B-69](#)
 - spanning-tree activity [B-66](#)
 - switch shim [B-72](#)
 - transmitted and received BPDUs [B-68](#)
- enabling on ENIs [2-552](#)
- enabling protocol tunneling for [2-193](#)
- EtherChannel misconfiguration [2-560](#)
- extended system ID [2-562](#)
- path cost [2-558](#)
- protocol modes [2-570](#)
- root port
 - loop guard [2-564](#)
 - preventing from becoming designated [2-564](#)
 - restricting which can be root [2-564](#)
 - root guard [2-564](#)
- root switch
 - affects of extended system ID [2-562, 2-598](#)
 - hello-time [2-597](#)
 - interval between BDPU messages [2-597](#)
 - interval between hello BPDU messages [2-597](#)
 - max-age [2-597](#)
 - port priority for selection of [2-590](#)
 - primary or secondary [2-597](#)
 - switch priority [2-597](#)
- state changes
 - blocking to forwarding state [2-595](#)
 - enabling BPDU filtering [2-554, 2-592](#)
 - enabling BPDU guard [2-556, 2-592](#)
 - enabling Port Fast [2-592, 2-595](#)
 - enabling timer to recover from error state [2-95](#)
 - forward-delay time [2-597](#)
 - length of listening and learning states [2-597](#)
 - shutting down Port Fast-enabled ports [2-592](#)
- state information display [2-512](#)
- VLAN options [2-586, 2-597](#)

SVIs, creating [2-116](#)

Switched Port Analyzer

See SPAN

switching characteristics

modifying [2-605](#)

returning to interfaces [2-605](#)

switchport access command [2-607](#)

switchport backup interface command [2-609](#)

switchport block command [2-613](#)

switchport command [2-605](#)

switchport host command [2-615](#)

switchport mode command [2-616](#)

switchport mode private-vlan command [2-619](#)

switchport port-security aging command [2-626](#)

switchport port-security command [2-622](#)

switchport private-vlan command [2-628](#)

switchport protected command [2-630](#)

switchports, displaying [2-399](#)

switchport trunk command [2-632](#)

system env temperature threshold yellow command [2-634](#)

system message logging, save message to flash [2-209](#)

system mtu command [2-636](#)

system resource templates [2-324](#)

T

table-map command [2-639](#)

table-map configuration mode [2-639](#)

table maps

configuring [2-639](#)

displaying [2-521](#)

QoS [2-639](#)

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

TDR, running [2-641](#)

temperature information, displaying [2-377](#)

temperature status, displaying [2-377](#)

templates, system resources [2-324](#)

test cable-diagnostics tdr command [2-641](#)

traceroute mac command [2-643](#)

tracertool mac ip command [2-646](#)
 traffic shaping, QoS [2-347](#)
 trunking, VLAN mode [2-616](#)
 trunk mode [2-616](#)
 trunk ports [2-616](#)
 tunnel ports, Layer 2 protocol, displaying [2-448](#)
 type (boot loader) command [A-22](#)

U

UDLD

aggressive mode [2-648, 2-650](#)
 debug messages, display [B-78](#)
 enable globally [2-648](#)
 enable per interface [2-650](#)
 error recovery timer [2-95](#)
 message timer [2-648](#)
 normal mode [2-648, 2-650](#)
 reset a shutdown interface [2-652](#)
 status [2-523](#)

udld command [2-648](#)

udld port command [2-650](#)

udld reset command [2-652](#)

UNI

bundling and multiplexing [2-105](#)
 Ethernet [2-105](#)

unicast storm control [2-602](#)

uni count command [2-653](#)

UniDirectional Link Detection

See UDLD

UNI ID, Ethernet [2-107](#)

uni-vlan command [2-655](#)

unknown multicast traffic, preventing [2-613](#)

unknown unicast traffic, preventing [2-613](#)

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

upgrading

software images [2-7](#)
 monitoring status of [2-352](#)

user EXEC mode [1-2](#)

user network interface [2-292](#)

V

version (boot loader) command [A-25](#)

vlan access-map command [2-660](#)

VLAN access map configuration mode [2-660](#)

VLAN access maps

actions [2-5](#)

displaying [2-533](#)

vlan command [2-657](#)

VLAN configuration mode

commands [2-657](#)

description [1-4](#)

entering [2-657](#)

summary [1-2](#)

vlan dot1q tag native command [2-662](#)

vlan filter command [2-664](#)

VLAN filters, displaying [2-534](#)

VLAN ID range [2-657](#)

VLAN maps

applying [2-664](#)

creating [2-660](#)

defining [2-233](#)

displaying [2-533](#)

VLAN Query Protocol

See VQP

VLANs

adding [2-657](#)

configuring [2-657](#)

debug messages, display

activation of [B-76](#)

VLAN IOS file system error tests [B-75](#)

VLAN manager activity [B-74](#)

displaying configurations [2-528](#)

extended-range [2-657](#)

VLANs (continued)

MAC addresses

displaying [2-480](#)

number of [2-467](#)

normal-range [2-657](#)

private [2-619](#)

configuring [2-299](#)

displaying [2-528](#)

See also private VLANs

restarting [2-538](#)

saving the configuration [2-657](#)

shutting down [2-538](#)

suspending [2-538](#)

VMPS

configuring servers [2-669](#)

displaying [2-535](#)

error recovery timer [2-95](#)

reconfirming dynamic VLAN assignments [2-666](#)

vmips reconfirm (global configuration) command [2-667](#)

vmips reconfirm (privileged EXEC) command [2-666](#)

vmips retry command [2-668](#)

vmips server command [2-669](#)

VQP

and dynamic-access ports [2-608](#)

clearing client statistics [2-55](#)

displaying information [2-535](#)

per-server retry count [2-668](#)

reconfirmation interval [2-667](#)

reconfirming dynamic VLAN assignments [2-666](#)

VTP, enabling tunneling for [2-193](#)

W

Weighted Tail Drop

See WTD

WTD, queue-limit command [2-304](#)

